6.—THE ICHTHYOLOGICAL COLLECTIONS OF THE STEAMER ALBATROSS DURING THE YEARS 1890 AND 1891.

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REPORT ON THE FISHES COLLECTED IN BERING SEA AND THE NORTH PACIFIC OCEAN DURING THE SUMMER OF 1890.

During the summer of 1890 the writer accompanied the *Albatross* as chief naturalist during its exploration of Alaskan waters. The plans for the cruise, outlined by the Commissioner, contemplated a thorough examination of the cod banks of Bristol Bay and the area surrounding the Aleutian Islands, followed by an exploration of the deeper waters of the western portion of Bering Sea. It is much to be regretted that unforeseen hindrances prevented the accomplishment of the latter part of this plan. But two hauls of the beam trawl were taken beyond the 1,000-fathom line in Bering Sea, and the interesting results only emphasize the importance of making a thorough exploration of this region.

The narrative and some of the general results of the cruise have been already given by Commander Z. L. Tanner (Report of Commissioner of Fish and Fisheries for 1889–91, pp. 226–256), and the economic phases have been treated sufficiently by the fishery expert, A. B. Alexander (*l. c.*, pp. 280–290). The present paper contains a list of the fishes collected during the cruise, with notes and descriptions of new or little-known forms.

One hundred and forty-three dredging stations were occupied, numbered 3210 to 3352 inclusive, the large beam trawl being usually employed. Of these, stations 3210 to 3227 form a line extending from a point south of the Sannak Islands westward through Unimak Pass to Unalaska; stations 3228 to 3306 were in the shallow waters of Bristol Bay (3¼ to 81 fathoms) and were very monotonous; stations 3307 and 3308 were in the depressed basin occupying the western portion of Bering Sea and were of extreme interest; stations 3309 to 3336, also very rich in results, were to the northward of Unalaska Island in depths of 19 to 578 fathoms; stations 3337 to 3342 form a line extending across the North Pacific from Unalaska to Vancouver Island, station 3342, taken off Queen Charlotte Island in 1,588 fathoms, proving much the most interesting haul of the cruise; stations 3343 to 3352 were off the coasts of Washington, Oregon, and northern California.

NOTE.—The writer desires to express here his indebtedness to his colleague, Prof. W. W. Thoburn, who rendered very material assistance in preparing this report.

The rich results which invariably followed the use of the trawl at depths of 1,000 fathoms and over indicate the direction which future explorations of the *Albatross* should take in the Pacific. The shallower waters and moderate depths of the continental platform have been fairly, if not exhaustively, explored; but the slope between the 1,000-fathom line and oceanic depths is practically unknown. As already stated, it is especially to be regretted that so little work could be done in the deeper waters of Bering Sea during the summer of 1890.

The most characteristic feature of the fish fauna of California is the extreme abundance and variety of three groups of fishes—the "rockfishes" (*Sebastodes*), the flounders (including numerous characteristic genera and species), and the viviparous surf-fishes (*Embiotocidæ*). All these are greatly reduced in numbers to the northward, and the fauna of Bering Sea assumes in consequence a very different appearance. The "surf-fishes" wholly disappear before reaching the Aleutian Islands; but two or three species of rockfish are sparingly present, and the flounders are diminished in numbers and represented by forms such as *Hippoglossus*, *Atheresthes*, *Pleuronectes*, and *Limanda*, more nearly allied to those of the North Atlantic than are the predominating species of California.

To replace these lacking forms, we have at the north large additions to the families *Cottidæ*, *Agonidæ*, *Liparididæ*, and *Blenniidæ*, those added being again close affines of North Atlantic species, with which many of them have, indeed, been considered identical. One of the most interesting results of the present investigation has been the discovery that several of these are distinguishable from their North Atlantic representatives by small but constant characters. Should these distinctions be verified, it will indicate that the icy seas of the Arctic have long been a barrier to the passage of these species. Of the marine fishes collected the following only are now considered by us common to the two oceans:

Mallotus villosus.
Pygosteus pungitius.
Icelus bicornis.
Pholis fasciatus.
Stichæus punctatus.
Leptoclinus maculatus.
Leptoblennius nubilus.
Gymnelis viridis.
Hippoglossus hippoglossus.

A reduction in this list may be expected when adequate series from both oceans can be brought together for comparison.

The following species are here described as new:

Raja abyssicola.
Raja aleutica.
Bathylagus borealis.
Sebastolobus altivelis.
Icelus vicinalis.
Icelus canaliculatus.
Icelus spiniger.
Icelinus borealis.
Artediellus pacificus.
Cottus aleuticus.
Acanthocottus sellaris.
Acanthocottus laticeps.
Acanthocottus profundorum.
Triglops beani.
Triglops scepticus.
Triglops xenostethus.
ELANURA, new genus.
Elanura forficata.
Oligocottus aenticeps.
Paricelinus thoburni.
Aspidophoroides bartoni.
Odontopyxis leptorhynchus.
Odontopyxis frenatus.
Xenochirus alascanus.
Paraliparis holomelas.
Paraliparis ulochir.
Careproctus ectenes.
Careproctus colletti.
Careproctus phasma.
Careproctus ostentum.
Careproctus simus.
GYRINICHTHYS, n. gen.
Gyrinichthys minytremus.
RHINOLIPARIS, new genus
Rhinoliparis barbulifer.
Liparis cyclostigma.
Liparis fucensis.
BATHYPHASMA, new genus.
Bathyphasma ovigerum.
LETHOTREMUS, new genus.
Lethotremus muticus.
Leptoblennius mackayi.
LYCONECTES, new genus.
Lyconectes aleutensis.
Lycodes palearis.
Lycodapus extensus.
Lycodapus parviceps.
DEREPODICHTHYS, n. gen.
Derepodichthys alepidotus.
Nematonurus cyclolepis
Chalinura filifera.
Limanda proboscidea.

Family HEPTATREMIDÆ. The Borers.

1. Polistotrema stouti (Lockington).

Numerously represented from stations 3343 (south of Cape Flattery, Washington, 516 fathoms), 3348 and 3350 (near Point Arena, Cal.; 455 and 75 fathoms). The species was not taken in Alaska.

Family PETROMYZONIDÆ. The Lampreys.

2. Entosphenus tridentatus (Gairdner).

A specimen, 11 inches long, presented by the Alaska Commercial Company, had been taken in one of the small streams of Unalaska Island. It appears not to differ from specimens taken in Monterey Bay, California, with which we have compared it.

Family RAJIDÆ. The Skates.

3. Raja parmifera Bean.

The most abundant of the five species which were taken in Alaskan waters. Eleven specimens in all were secured, distributed among 10 dredging stations in Bristol Bay (3252, 3259, 3267, 3270, 3272, 3281, 3282, 3292, 3293, 3310, and 3313), the depth ranging from 16 to 68 fathoms.

The specimen from station 3270, a female, showed the following characters: Uniform dark olive-brown above, without distinct lighter areas; lower side white, the posterior margins of the disk blackish.

Width of mouth 1⅔ times in its distance from tip of snout; the latter distance half greatest rostral width. Teeth, 30–24. A series of 30 large spines (24, 28, 28 in three other specimens) on median line of back, the anterior one over middle of branchial region, two of the series occupying the space between the dorsal fins. A single strong spine on each shoulder (two of these in most specimens). Prickles on disk comparatively very coarse, with conspicuously stellate bases, not crowded, arranged in somewhat definite areas. A scattered group on terminal half of snout (in other individuals not always recognizable); a patch on anterior and one on posterior portion of orbital rim connected by a line of smaller prickles; a band along the anterior and one along the posterior borders of pectoral fins, the two usually not continuous at the angles; ventral fins with smaller prickles. A well-defined band along each side of median line, continued backwards as conspicuous lateral bands on tail, along the middle of which they increase in size, becoming spines. Both dorsals prickly. A small patch of minute prickles on under side of snout (not present in all specimens). The disk is otherwise smooth.

In the male specimen from station 3282, the armature is essentially as described above, the prickles being smaller, and the lateral series on tail scarcely enlarged. A band of prickles covers all of the angle of pectorals inside the band of bucklers. The snout is naked, except a marginal band, and a patch on tip which extends backwards a short distance on median line. A definite patch of stronger prickles on anterior and one on posterior portion of orbital rim, connected as before by a single series. These patches of orbital prickles are very different from the single series of definitely placed orbital spines, characteristic of *R. rhina*, *R. binoculata*, and *R. inornata*. A series of 25 strong spines along median line, a single spine on each shoulder. Bucklers arranged in 22 series, with 5 in the widest series. The dorsal bands of prickles do not reach the shoulder. Color, light brown, a single pale spot as large as eye at base of each pectoral fin, without definite margins, and not ocellated.

A young female, 205 mm. long, from station 3313, is brown, with scattered, ill-defined black spots, of which two are larger and occupy the position at base of pectorals in which the ocellated spots of other species are found. A pair of round white spots, without darker border on base of pectorals more posteriorly; a pair of smaller light spots on tail at end of basal fourth. Prickles coarse, covering all of disk and tail, except a roundish area on each side of median line, above the branchial region.

No true spines on orbital rim; the latter in common with the whole interorbital area covered with coarse prickles. Median row of spines fully developed and strong, as are also the two scapular spines. The prickles are arranged in quite regular series, those laterally following the rays, those mesially parallel with dorsal row of spines.

This species seems to be confined to Alaskan waters. Among Pacific species it is most nearly related to *R. stellulata* and *R. trachura*, agreeing with both in the wide rostral angle, the rather uniform coloration, and the absence of the definitely placed orbital spines characteristic of other species.

4. Raja stellulata Jordan & Gilbert.

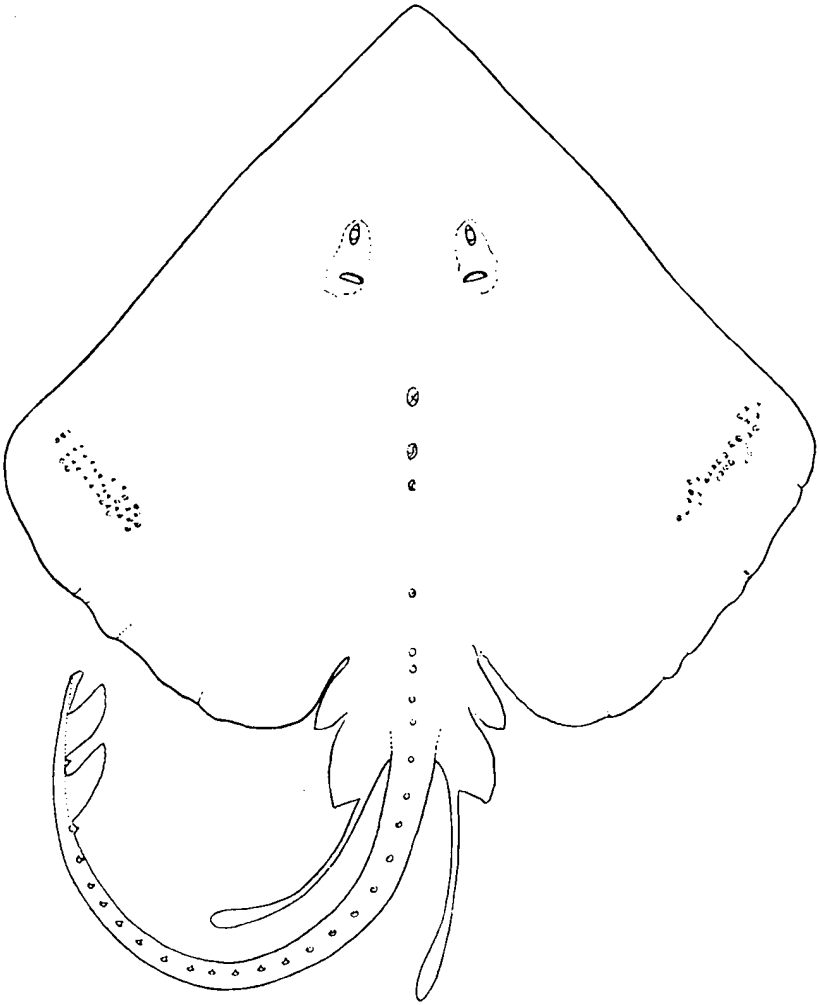
Obtained in Unimak Pass, Bristol Bay, and along the northern shores of Unalaska Island, in depths of 42 to 70 fathoms (stations 3217, 3255, 3258, 3310, and 3312). This species seems to have the most extensive range of any of our Pacific skates from shallow water. We find no difference between these specimens and others from the Santa Barbara Channel, California.

The species does not apparently reach a very large size. A male specimen, 600 mm. in total length, is mature, with claspers 150 mm. long, and the pectoral hooks fully developed. The latter are in 22 series, with 5 hooks in the widest series. The young show a very similar armature to the adults. At no stage is there a trace of orbital spines, the row of orbital prickles being in the young scarcely differentiated from the interorbital band. In a young male, 200 mm. long, the series of median spines on back and tail is strongly developed, and the spines are uniform in size, the two anterior ones separated by an interspace from the third. The two scapular spines are also strong. In older specimens the spines on middle of back diminish in size, the anterior three remaining strong. In some old specimens these reduced spines have entirely disappeared, the median series then appearing to begin over the front of base of ventrals. The color is much as in *R. parmifera*, being brownish, with scattered ill-defined dusky spots. In the young we find at base of pectoral fins a broken dark ring a little larger than pupil. This does not inclose a light spot, is inconspicuous, and soon disappears. The light spots at base of posterior third of pectorals, so conspicuous in the young of *R. parmifera*, and visible even in older specimens, are not present in *R. stellulata*. The prickles in the latter are smaller and more numerous than in *R. parmifera*, but the young resemble each other much more strongly than do the adults of the two species. In neither are prickles developed on the under surface, if we except a small patch near tip of snout, sometimes present in *R. parmifera*.

5. Raja abyssicola sp. nov. (Plate 20.)

A single large male specimen taken near Queen Charlotte Island, station 3342, depth 1,588 fathoms, the greatest depth recorded for any species of skate.

As in other deep-sea species of *Raja*, both the upper and under parts are uniform brown in color, the upper surface obscurely marked anteriorly with very small but definitely margined spots of darker brown. Both upper and lower surfaces are covered with long close-set slender bristle-like spines, which are flexible and give a velvety texture to the skin. The extreme anterior margin and a wide strip along posterior margin of disk, the ocular region, the greater part of the upper surface of ventrals and of the basal two-thirds of the under side of the tail, alone naked. No large spines or prickles on orbital rim. A band of enlarged prickles on each side of tail. An uninterrupted series of 24 large spines with very broad bases extends along median line of tail to opposite front of ventrals. After an interruption, it reappears in a series of 3 spines on middle of back. A single spine between dorsal fins. Pectoral hooks very weakly and irregularly developed. They are usually interradial in position, have at most 3 or 4 in a series, and develop irregularly, the spines being sometimes directed backwards instead of inwards. They are not arranged in definite lengthwise series. Some of them remain permanently in an undeveloped condition as elongate soft papillæ, and the gaps in the series indicate the total disappearance of others.



RAJA ABYSSICOLA sp. nov.

Disk very broad, the outer angles of pectorals behind its middle. Anterior profile convex opposite the orbits, strongly concave both in front of and behind this region. Interorbital space deeply concave, the cranial cartilage apparently thin and weak. Teeth, 31-31. Claspers very long and slender, dilated distally, everywhere so readily flexible as to be easily bent at an acute angle. A wide lateral fold along either side of tail. Dorsals very high and near together; caudal fold but little higher than the lateral ones, with which it becomes confluent at tip of tail.

The following table of measurements in millimeters will give the proportions of the type:

Greatest width of disk	730	Distance from tip of snout to front of eye	185
Width at front of eyes	185	Distance between eyes	60
Tip of snout to axil of pectoral	570	Width of spiracles	33
Axil of pectoral to axil of ventral	125	Diameter of eye	33
Axil of ventral to tip of tail	655	Distance from snout to front of upper jaw	190
Origin of first dorsal to tip of tail	148	Distance from snout to nostril	158
Base of first dorsal	48	Distance between outer edges of nasal flaps	103
Oblique height of first dorsal	45	Width of mouth	105
Distance between dorsals	13	Distance from snout to first branchial slit	310
Base of second dorsal	46	Distance from first to fifth slits	112
Length of claspers	255	Distance between inner edges of first slits	212
Distance from tip of snout to outer pectoral angle	555	Distance between inner edges of fifth slits	133
		Distance from snout to vent	610

6. Raja aleutica sp. nov. (Plate 21.)

A single young male specimen, 835 mm. long, from station 3257, north of Sannak Pass, Aleutian Islands; taken at a depth of 81 fathoms.

Closely related to *R. stellulata* and *R. parmifera*, but reaching a much larger size than either, and having the disk everywhere uniformly covered above with very fine close-set stellate prickles very much finer and more numerous than in either species. The species agrees with *R. parmifera* and differs from *R. stellulata* in having the median spines in an uninterrupted series. They are 34 in number and extend from just behind the occiput to the dorsal fin. Two strong spines on the shoulder; orbital rim without spines or enlarged prickles; a wide band of coarser prickles on each side of tail; the extreme margin of disk and the greater part of ventral fins naked; under parts without spines or prickles.

The disk is not so wide as in *R. stellulata*, and the snout is longer and narrower. The anterior margin is gently concave toward outer angle and gently convex in front, the rostral angle being about 90°, the extreme tip forming a slightly projecting rounded lobe. The cranium is abruptly constricted in front of nostrils, as in *R. abyssicola*, leaving a slender flexible cartilaginous rod extending to tip of snout. In the present species the space between the rostral cartilage and the base of the rostral portion of pectoral fin is membranous and lighter in color than the rest of the disk. Interorbital space deeply concave, its width 3½ in length of snout, the latter 2⅞ in distance from tip of snout to axil of pectorals. Spiracles narrow, ½ diameter of eye. Distance from tip of snout to front of mouth 2⅔ in distance from tip of snout to vent; the latter equals the length of tail. Teeth $\frac{31}{31}$. Claspers not reaching margin of ventrals; pectoral hooks not developed. Color, brown above, with large, obscure, dusky blotches; white below; the edges of disk, the anal area, and the under side of the tail brown.

This species evidently reaches a very large size. The following is a description of a specimen 4 feet across, taken at station 3223, and supposed to belong to the same species. The specimen was too large for preservation.

Snout long but very broad, thus appearing short and blunt, as in *R. stellulata*, the rostral angle being about 100°, the extreme tip of snout projecting. Anterior lateral profile of disk convex, becoming strongly concave posteriorly near angle. Interorbital width (of cartilage) one-third length of snout measured from its tip to a line joining front of orbits. Interorbital area strongly concave. Eye a trifle less than length of spiracle, one-half interorbital width. No elevated supraocular rim. Length of snout (as above defined) a trifle more than half its greatest width.

Prickles small, uniform, entirely covering upper surface, including fins and tail, excepting only the base of ventrals, which are nearly smooth. No spines or enlarged prickles above orbits. An elongate patch of slightly enlarged prickles in front of each eye, the two converging forward, separated from orbit posteriorly by two-thirds diameter of eye. Prickles somewhat enlarged toward tip of snout, not spine-like. The median row of spines on back begins immediately behind occiput, continues without interruption to dorsal, and contains 39 spines in addition to the 2 between dorsal fins. A narrow band of slightly enlarged prickles on each side of tail. Dorsal fins uniformly prickly. Bucklers on pectorals in 26 rows, 6 or 7 in broadest row. Two or three enlarged spines on shoulder.

Entire under surface of snout and a band extending along most of anterior edge of disk prickly. Under surface of pectorals otherwise smooth. Belly smooth. An area immediately in front of vent minutely prickly, as is also the thoracic region. Lower side of tail prickly except at base. Ventrals smooth below.

Width of disk slightly less than distance from tip of tail to shoulder, $1\frac{1}{8}$ times its own length. Length of tail equaling distance from its root to middle of snout. Teeth $\frac{33}{33}$. Dorsals high, about equal in size, their oblique height equaling length of base, which is one-third greater than interspace. Claspers long, smooth.

Dusky olive, with ill-defined light areas; no ocellated spots. Below white; an elongate brown blotch on each side of snout, and a smaller median streak. Lower side of tail brownish dusky. Angle and posterior margin of disk below broadly edged with brown. A large brownish blotch about anus, and some smaller scattered marks.

7. Raja trachura Gilbert.

A second specimen of this interesting deep-sea ray was dredged at station 3338, south of the Shumagin Islands, Alaska, at a depth of 625 fathoms. The specimen is a female, 222 mm. long, and answers well to the description of the type.

Family CHIMÆRIDÆ.

8. Hydrolagus colliei (Bennett). *Ratfish; Elephant-fish.*

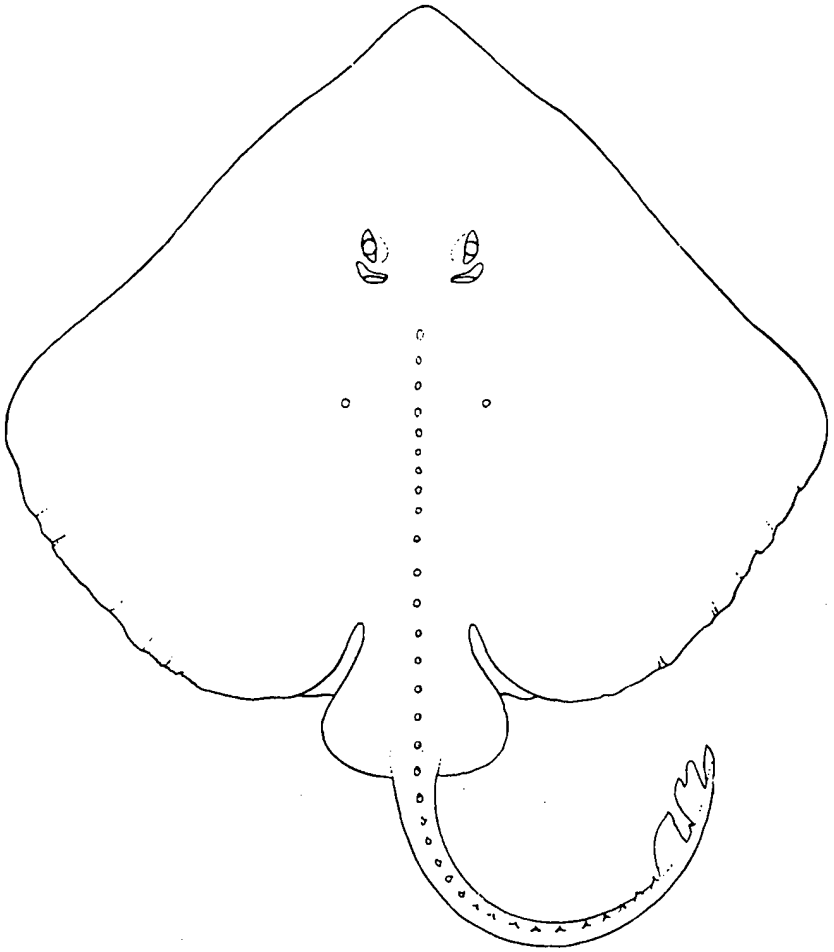
Station 3350, near Point Reyes, Cal.; depth, 75 fathoms.

Family CLUPEIDÆ. The Herrings.

9. Clupea pallasi Cuvier & Valenciennes. *California Herring.*

Clupea mirabilis Girard.

This herring was seen in Departure Bay, Vancouver Island, May 10 to 13; in Unalaska Harbor June 16 and July 31, and in Herendeen Bay, Alaska Peninsula, July 5. In Departure Bay they were swimming in schools about the wharves and ships. It was noticed that when not disturbed all would swim slowly in the same direction with the gill-covers widely open and rigidly set, their oblique silvery surfaces giving bright reflections and rendering the fish very conspicuous when seen from above. If suddenly alarmed, the gill-covers of all were simultaneously closed down, and remained so during whatever rapid maneuvers followed. In this condition it was very difficult to follow their movements. Young salmon were feeding upon them at the time of our visit. In Unalaska Harbor they were present in great numbers the middle of June, but were not seen May 24, at the time of our first visit. They were very large and in excellent condition, and seemed superior to the same species when taken on the California coast.



RAJA ALEUTICA sp. nov.

Family MYCTOPHIDÆ. The Lantern Fishes.

10. Diaphus theta Eigenmann & Eigenmann.

Myctophum protoculus Gilbert. Proc. U. S. Nat. Mus. 1890, 52.

Five specimens from station 3318, taken off the coast of California near Point Arena, Humboldt County, at a depth of 455 fathoms. These are identical with the types of *M. protoculus*, and are in sufficiently good state of preservation to show the division of the luminous spots, a character not visible in the types of *M. protoculus*. It is obvious that the spots are divided into upper and lower halves, which are structurally different, the narrow pigment band indicating this separation on the surface. The species is now known from the above locality, from *Albatross* station 3072 (off the coast of Washington, 584 fathoms), and from the mouths of *Sebastodes* caught near San Diego, Cal.

The specimens before us show great variation in the size of the subocular luminous blotch, and indicate how little dependence can be placed on this as a specific character. In addition to the roundish supra-nasal spot described by Eigenmann, the species possesses a more or less developed subocular bar. In one specimen the latter is a bare line with a minute point separated from it posteriorly. In others it is wider, in extreme specimens reaching one-third the diameter of the pupil. There remains constantly separated from it the small dot already referred to. A peculiar soft flattish body, half as large as pupil, is attached by one edge to the shoulder girdle just above the insertion of the pectoral fin, the other edge remaining free. It is constantly present and uniform in position in all specimens that have come under our observation, including types of *D. theta* and *M. protoculus*. It may be a luminous organ, though it has not strikingly the appearance of one, and its nature must be considered problematical.

11. Nannobrachium leucopsarum Eigenmann.

Numerous specimens from Alaskan waters agree entirely with those from the type locality. Two very closely related species are found among these northern specimens, and both are also present in the dredgings from the Santa Barbara Channel. Both of these are found among the types of *Myctophum nannochir*, and the description of the latter is partly drawn from specimens of each. Such being the case, the name *nannochir* becomes available in connection with the second of these forms, to which I shall here restrict it. The two species are extremely close, and immature or mutilated specimens are often distinguishable with difficulty. The species differ in the following respects:

LEUCOPSARUM.	NANNOCHIR.
Caudal peduncle deep, its least depth about half that of body.	Caudal peduncle long and slender, its least depth two-fifths to one-third that of body.
Head short, 3⅗ to 3¾ in length.	Head longer, 3¼ to 3⅖ in length.
Maxillary shorter, the cheek wider, less tapering posteriorly.	Maxillary long, the preopercle very obliquely placed, the cheek long, tapering to an acute angle posteriorly.
Luminous patches above and below tail occupying the whole length of caudal peduncle, in rare cases somewhat shortened.	Luminous patches on tail short, usually occupying from one-fourth to one-third length of caudal peduncle, rarely longer than this.
Color lighter, the opercle usually with silvery luster, the iris with silvery pigment, and the fins lighter.	Color darker, the opercle black, the iris usually without silvery and the fins uniformly black.
Antro-anal spots usually 6. Ventral spots 4.	Antro-anal spots usually 7. Ventral spots usually 5.

Specimens of *N. leucopsarum* were taken at stations 3227, 3307, 3308, 3325, 3329, 3343, and 3348. The first five mentioned were in Bering Sea, north of Unalaska Island, at depths of 225 to 1,625 fathoms; the last two from off the coasts of Washington and California, depths 516 and 455 fathoms.

12. Nannobrachium nannochir Gilbert.

The present status of this species and its distinctive characters have been discussed under the preceding form. The correlated differences are so constant in our specimens that they can not be ignored, yet are small in amount. They depend neither on age nor sex. From among the original type specimens I select as specific type No. 1459 of the Leland Stanford Junior University Museum, from station 3072.

Specimens in the present collection from stations 3211, 3307, 3308, 3327, 3329, 3338, 3340, 3342, and 3348, including the entire North Pacific and Bering Sea, at depths of 313 to 1,625 fathoms.

Family ARGENTINIDÆ. The Smelts.

13. Mallotus villosus (Müller). *Capelin.*

Dredged in shallow water at three stations in Bristol Bay, Alaska; 3235, 3238, and 3240, depths 11 to 18 fathoms.

14. Thaleichthys pacificus Richardson. *Eulachon; Candle-fish.*

A single fine specimen of the candle-fish was taken near the mouth of the Nushagak River, June 3, 1890.

15. Osmerus dentex Steindachner. *Rainbow Herring.*

Occurs abundantly in the Naknek and Nushagak rivers, and forms an important part of the food supply of the natives. At the time of our visit (June 1–3) it was running rather sparingly. Specimens were secured with the seine in both of the above-mentioned rivers, and in the trawl at station 3231, in Bristol Bay, depth 12 fathoms.

16. Osmerus thaleichthys Ayres.

Several young specimens, probably to be referred to this species, were taken in the Nushagak River near its mouth. They exhibit the characteristic weak dentition of this form, the teeth being barely perceptible on jaws, vomer, and tongue. The scales number 55 and 58 in the course of the lateral line, and the anal rays 14 and 16. The maxillary is short, scarcely reaching to below middle of eye. *O. thaleichthys* has not been previously reported from Alaska.

17. Leuroglossus stilbius Gilbert.

One specimen from station 3330, off the northern shore of Unalaska Island, at the depth of 351 fathoms, and several mutilated examples taken from the stomach of a *Macrurus* at station 3332, in 406 fathoms. The largest of these is 120 mm. long.

Family SALMONIDÆ.

18. Coregonus laurettæ Bean.

A young individual, 125 mm. long, was taken at the mouth of the Nushagak River, June 3. The lower jaw is very slightly longer than the upper; the eye is of moderate size, 4¼ in head; the scales are rather large in size, 84 being present along the lateral line; and the gill-rakers are long and numerous, 25 present on horizontal limb. A similar specimen was taken in the Naknek River (scales 87).

19. Oncorhynchus gorbuscha (Walbaum). *Humpback Salmon.*

The humpback salmon was seen by us at Port Möller, on the northern side of the Alaskan peninsula, during two visits which included the first two weeks and the last week of July. During the first part of this month they were running in small numbers, and as a few scattering ones only had been taken at Unalaska up to June 16, it is safe to indicate the 1st of July as the beginning of their appearance on that part of the coast. In the early part of their run they proved a very acceptable table fish, but later they rapidly deteriorated. On our return to Unalaska, July 31, we learned that they had been running for several weeks, and during several visits in the month of August they were found in incredible numbers crowding into the

mouth of the small stream which flows into Captain's Harbor. Both pools and shallows seemed full of them, and large numbers were dying within a few hundred yards of the beach. The spawning season appeared to begin early in August.

20. Oncorhynchus tschawytscha (Walbaum). *Chinook Salmon; Quinnat Salmon; King Salmon.*

While coaling at Departure Bay, Vancouver Island, May 10–13, young individuals of this species were seen feeding on the herring (*Clupea pallasi*), and a number were taken on the trolling line. They were present in company with *O. nerka*. The latter could always be distinguished on the table by its much redder and drier flesh, and will not, as a food-fish, bear comparison with *O. tschawytscha* of the same size. At Unalaska, May 24–27, the run had hardly begun, though a few individuals were seen. A small pond near the stream which flows into the head of Captain's Harbor was full of young salmon of this species, from 2 to 5 inches long, which took the fly greedily. June 3, at the mouth of the Nushagak River, Bristol Bay, an occasional individual was taken. A small run had come into the river a short time before our visit. On June 16 the "king salmon" were running abundantly at Unalaska, but they were not seen on later visits at this point or at Port Möller. It is worthy of note that their period of greatest abundance coincided in time with that of the herring, and their approach to the coast may be determined by the movements of the latter. Their annual appearance in large numbers in Monterey Bay, California, seems to be dependent on the run of anchovies (*Engraulis mordax*).

21. Oncorhynchus kisutch (Walbaum). *Silver Salmon.*

A few individuals of this species were taken at Unalaska May 24–27. It was, as a food-fish, inferior to *O. nerka* and *O. tschawytscha*. Two young specimens were seined at Unalaska June 16, the smaller of which, 190 mm. long, shows very conspicuous parr-marks. These have disappeared in the larger specimen, 225 mm. long, which has also assumed more the proportions and appearance of the adult. In this specimen the spots are more distinct than in the adults, being large, well defined, and close-set on head, back, and dorsal fin, and the caudal fin is very indistinctly marked, the faint spots being confined to the outer ray of both lobes. It is a male, with the testes so well developed as to make it very probable that it would have sought the spawning-grounds within a few months. Three smaller specimens were taken in Herendeen Bay July 5. The smallest of these is 145 mm., the largest 185 mm. long. The distal half of the dorsal fin is black, with the exception of the last two rays, which are entirely white.

22. Oncorhynchus nerka (Walbaum). *Blueback Salmon; Red Salmon.*

This species appeared constantly associated with the king salmon. It was taken by trolling in Departure Bay, Vancouver Island, May 10 to 13, was seined in small numbers at Unalaska May 24 to 27, and was abundant at Unalaska June 16. It had not begun to run at Nushagak June 3, but the young with parr-marks still evident, ranging in size from 95 to 115 mm., were very abundant. The young were doubtless at that time descending the rivers to the sea, and were probably about 20 months old. On July 5 young specimens averaging slightly larger than the above were taken in salt water at Herendeen Bay, Alaskan Peninsula. These range from 120 to 130 mm. in total length; the color is deeper and less silvery than in the Nushagak specimens, and the parr-marks have almost wholly disappeared. The stomachs are full of copepod crustacea, apparently all of one species. The difference in size between the specimens from Herendeen Bay and those from Nushagak may indicate the average amount of growth of the former since reaching salt water. The specimens from Nushagak contained in their stomachs remains of insects and of marine crustacea. They had probably been playing back and forth on the tides.

The young of *O. nerka* are the most slender of all the salmon. They are wholly without spots or freckles on body or fins. The dorsal and anal fins are without pro-

longed rays or conspicuous color marking. The dorsal fin has a median black blotch and the caudal is slightly dusky on posterior half.

23. Salvelinus malma (Walbaum). *Dolly Varden Trout.*

The Dolly Varden trout was found to be very abundant in the neighborhood of Unalaska, sea-run individuals congregating in great numbers at the mouths and in the lower course of streams when the salmon were running in to spawn. A small stream entering Captain's Harbor, Unalaska Island, has a series of impassable cascades aggregating several hundred feet in height. Above these falls the trout are very abundant, but are dwarfed in size and remarkably brilliant in coloration. They seem to reach no larger size than 8 inches. The largest individual seen during the season was captured in Makushin Bay, Unalaska Island, August 17. It was 24 inches long, with a depth of 6 inches, and weighed 6 pounds. The species was also seined in salt water in Chernoffski Harbor, Unalaska Island.

The black-spotted trout (*Salmo mykiss*), reported by Dr. Bean, from Unalaska, was not seen by us. Its occurrence there must be exceptional.

Family MICROSTOMIDÆ.

24. Bathylagus borealis sp. nov.

A single specimen, 132 mm. long to base of caudal, from station 3327 (north of Unalaska Island, depth 322 fathoms), is taken for the type. A second specimen from the same region, station 3325, depth 284 fathoms.

Head 4½ to base of caudal, depth 5⅔, eye 2½ in head, snout 2¾ in eye. Interorbital width grooved, the groove widening posteriorly, opening onto the flat occipital region, which is not swollen. Width of cartilaginous portion of interorbital space one-third orbit; including the thin membranous plates which overarch the orbits, the interorbital width is three-fourths orbit. The anterior profile of snout declines gently, bringing the mesial portion of premaxillaries on a level with lower margin of pupil. Distance from tip of snout to end of maxillary slightly exceeding length of snout, 2⅓ in orbit. Opercle with two strong ridges diverging downwards and backwards from behind the eye.

Front of dorsal midway between front of snout and adipose fin. Base of dorsal contained 3⅓ times in length of head. Ventrals inserted under posterior portion of dorsal. Free portion of adipose fin very long and narrow, rising above the base of the second and third anal rays before the last, its tip reaching rudimentary caudal rays when depressed. Anal fin rather long, the base 1⅔ in head, the vent immediately before it. Length of tail much exceeding head, 3⅔ in total length without caudal. Dorsal 8; anal 19; ventral 8; pectoral 8. Scales in about 40 rows, judging from the scars. Head scaleless.

Uniform blackish-brown on sides, the head and ventral region blue-black.

Differing from *B. pacificus* in its much greater depth, longer tail, longer anal fin, and flat occiput.

Family CHAULIODONTIDÆ. The Viper Fishes.

25. Chauliodus macouni Bean.

Two specimens were secured, one at station 3340, south of the Alaskan Peninsula, at a depth of 695 fathoms; another at station 3347, off the northern coast of Oregon, at a depth of 345 fathoms. It is not evident in what respects the Pacific form differs from *C. sloani* of the Atlantic, but as no specimens of the latter are at hand for comparison we follow Dr. Bean in holding them distinct.

26. Cyclothone microdon (Günther).

Taken in Bering Sea, southwest of the Pribilof Islands, at stations 3307 and 3308; depths 1,033 and 1,625 fathoms.

Family DALLIIDÆ.

27. Dallia pectoralis Bean. *Alaska Blackfish.*

The blackfish is abundant along the Nushagak River, and there as elsewhere it is an important source of food to the natives. Specimens were presented to us by Mr. Clark, proprietor of the station at Nushagak. The characters assigned by Dr. Gill to his order *Xenomi*, of which *Dallia* is the sole representative, seem to need some modifications. The group is thus defined by him:

"Teleosts with the scapular arch free from the cranium laterally and only abutting on it behind, coracoids represented by a simple cartilaginous plate without developed actinosts, and with the intermaxillary and supramaxillary bones coalescent."

The last of these three characters we have not been able to verify, as the premaxilla, while lying closely appressed to the maxilla, is readily separated from it, the two being in no sense "coalescent." The expression "scapular arch free from the cranium laterally" refers to the simple nature of the post-temporal, which is attached as usual to the epiotic, but seems at first sight to lack entirely the inner fork to join the parotic process of the cranium. Closer examination shows, however, that a strong ligament replaces the lacking arm, and answers to it in all its relations. We find, furthermore, that while in some specimens it retains its ligamentous condition the entire distance between the opisthotic and the simple post-temporal, in others the proximal portion of the ligament is more or less ossified, the bony rod thus formed being an integral part of the post-temporal and representing the proximal portion of the missing fork. As stated, this ossification invades the ligament to a varying extent in different specimens. In at least two which have come under our observation, the fork of the post-temporal thus formed has extended almost the entire distance across to the opisthotic, the shape and relations of the bone being then entirely normal and usual. It is evident that this character is not of high taxonomic value, and would not of itself warrant any very wide separation of *Dallia* from what were at first considered to be its nearest relatives.

The case is different, however, when we come to examine the coracoid portion of the shoulder girdle. As stated by Dr. Gill, we deal here with a cartilaginous plate in which no ossifications occur, and which is followed immediately by the fin rays, without the intervention of actinosts. This coracoid cartilage is an extremely thin and delicate imperforate lamina, usually exhibiting very distinct division into upper and lower halves, which may be taken to represent the hypo- and hyper-coracoid elements. In its distal third the plate begins to break up, by longitudinal subdivision, into a fringe of narrow cartilaginous strips. These approximately equal in number the pectoral rays, and join the latter directly, the basal portion of each pectoral ray forking slightly to receive the tip of the cartilaginous strip.

In the deep-sea spiny eels of the genus *Notacanthus* there is a somewhat similar condition of the coracoid elements, inasmuch as the hypo- and the hyper-coracoid though present, are merely shell-like rudiments surrounded by cartilage, and the actinosts are greatly reduced. It seems probable that we are dealing in the two cases with independent degenerations of the shoulder girdle, and that the two groups are not really related.

Family SYNAPHOBRANCHIDÆ.

28. Histiobranchus bathybius (Günther).

A specimen 575 mm. long, from station 3308 in Bering Sea, depth 1,625 fathoms. The color is light brown, darker on head and belly, and on the fins. The depth at vent is 42 mm., the distance of vent from snout 255 mm., the length of the head 59 mm., and length of pectoral fin 17 mm. The vomerine teeth are in an irregular, rather narrow band, reaching posteriorly to opposite hinder margin of orbit.

Family NOTACANTHIDÆ.

29. Macdonaldia challengeri (Vaillant).

Notacanthus rissoanus Günther, Challenger Report, vol. XXII, p. 250, pl. LXI, fig. B; not of Filippi and Verani.

Vaillant was perfectly justified in separating this Pacific form from the Mediterranean *N. rissoanus*, with which Günther had identified it. The lower, heavier spines in both dorsal and anal fins, the more anterior origin of the dorsal, which is a little in advance of base of pectorals, the very short robust ventral spine, and the lower insertion of the pectoral fin sufficiently distinguish the species, in addition to the peculiarities in the shape of the snout and the greatly increased number of anal spines, to which Vaillant calls attention.

The *Albatross* dredged a single specimen, 500 mm. long, at station 3308, west of Pribilof Islands in Bering Sea, at a depth of 1,625 fathoms. Günther's description, above cited, of a fish taken south of Yeddo at a depth of 1,875 fathoms, agrees so well with our specimen that no doubt can exist of their identity. The maxillary spine, not shown in Günther's figure, is very evident in our specimen. The branchiostegal rays are distinctly 6 instead of 5 in number, and the caudal contains 5 instead of 6 rays. There are 35 dorsal spines. The anal spines pass so gradually into the rays that they are distinguishable with difficulty. Definite articulations appear before the rays have lost their spinous character, while still stiff and pungent. Dividing them on the basis of these articulations, the anal fin contains 27 spines and about 153 soft rays.

Family GASTEROSTEIDÆ. The Sticklebacks.

30. Pygosteus pungitius (Linnæus).

Several specimens were secured from the vicinity of Nushagak, one from the Naknek River, and another from the nest of a sea bird on Round Island, of the Walrus Island group, all in Bristol Bay. None of our specimens shows the short ventral spines ascribed to *P. pungitius brachypoda*, their length being in every case 2¼ to 2⅝ length of head. *Brachypoda* was originally described by Dr. Bean from Greenland, and has been given in his recent lists as the common form of Alaska. Awaiting further information, we refer our specimens rather to typical *pungitius*.

31. Gasterosteus cataphractus (Pallas).

Abundant at Departure Bay, Vancouver Island, May 10–13.

Family AMMODYTIDÆ.

32. Ammodytes personatus Girard. *Sand Lance.*

Unalaska, Chernoffski, Herendeen Bay, Hagemeister Island, and generally in shallow water. It forms an important element in the food of the codfish.

Family BERYCIDÆ.

33. Melamphaes lugubris Gilbert.

One specimen from north of Unalaska, station 3327, depth 322 fathoms.

Family BATHYMASTERIDÆ.

34. Bathymaster signatus Cope.

Taken very abundantly in our series of shallow-water dredgings along the southern shore of the Alaskan Peninsula, northward through Unimak Pass and north of Unalaska. The stations at which it was obtained are numbered 3211, 3212, 3213, 3214, 3215, 3217, 3220, 3222, 3223, and 3319; the depths range from 34 to 56 fathoms. In addition, a very few small specimens were secured at stations 3262, 3309, 3321, and

3333, north of the Aleutian Islands, in depths of 19 to 71 fathoms; but the species is evidently not abundant in Bering Sea. No examples were taken in any of the very numerous dredgings made in Bristol Bay.

In life the sides are olive-brown, and the upper parts show faint traces of 6 or 7 broad dusky crossbars, which correspond to or alternate with an equal number below the lateral line. The anal and ventral fins, the branchiostegal and gular membranes, the lower pectoral rays, and the snout are blue-black. Anterior edge of orbit and front edge of preorbital light yellow. The pores on edge of preopercle, two pores above and behind maxillary, and three at upper edge of opercle, bright scarlet. A large black blotch on anterior dorsal rays. Distal half of anterior portion of dorsal fin and upper pectoral rays yellow.

The outer ventral ray is single and inarticulate, followed by five branched rays. Only the first two dorsal rays are spinous, being soft and flexible, but unjointed. The third and all following rays are jointed and forked. All the anal rays are jointed.

A specimen from station 3211, 35 mm. in length to base of caudal, shows that the ventrals occupy very different positions in adults and in young. In the latter they are truly thoracic in position and are inserted as much behind base of pectorals as they are located in advance of this point in adults. A specimen 65 mm. long is entirely similar to adults in this respect.

35. Bathymaster jordani Gilbert.

A single small specimen, agreeing perfectly with the description of the types, from Bristol Bay, station 3262, depth 43 fathoms. The species has been heretofore reported only from Puget Sound and from Wrangell, Alaska, and the present record forms a notable extension of its range. It can be distinguished at sight from *B. signatus*, the common Alaskan form, by its slender body, scaly cheeks, and the enlarged scales of the lateral line.

Family CHIRIDÆ.

36. Pleurogrammus monopterygius (Pallas).

A single specimen of the Atka mackerel, which had been taken several years before in the harbor at Unalaska, was presented by the Alaska Commercial Company. The species is almost unknown at Unalaska.

37. Hexagrammus ordinatus Cope.

This species is closely related to *H. asper*, the dorsal being continuous but well notched at union of soft and spinous portions, the scales ctenoid throughout except on under parts of body, and the cheeks and opercles partly naked. The two species differ conspicuously in shape, color, and fin formulæ.

H. asper is very slender in shape, tapering rapidly from below front of spinous dorsal backward to the very slender caudal peduncle. In *H. ordinatus* the depth is greater and diminishes very slowly backward, the body tapering gradually into a high compressed caudal peduncle. The vertical height of caudal peduncle equals distance from tip of snout to or beyond middle of eye in *H. ordinatus*, while the same measurement is less than length of snout in *H. asper*. In *H. ordinatus* the snout is shorter and more bluntly rounded, the eye smaller, the mouth smaller, and the cheeks shorter and wider. The squamation is also more complete, the cheeks being entirely invested, except for the area immediately overlying the suborbital stay. The snout and the lower side of the head, including the interopercles, are also devoid of scales. The breast is covered with scales which have no spinous points, and the same is true of the ventral scales in adults, but the body is otherwise invested with strongly ctenoid scales, which extend well upon the bases of the fins, the caudal fin being covered to behind its middle.

The upper line of mucous pores is well developed, reaching to opposite middle of soft dorsal. Anteriorly the two lines converge, typically meeting at a point just

behind occiput. From this point a few pores may continue forward in a straight line. The fourth line forks above and in advance of the ventral fins, the upper branch extending for a variable distance on sides of abdomen, the lower very short, extending directly to base of ventrals. In *H. asper*, as well as in all other species of *Hexagrammus*, the fourth line is not forked, and bends downward to touch in passing the base of ventral fins.

In younger specimens a black humeral spot is conspicuous, but this grows less evident with age.

The spinous portion of the dorsal fin is shorter, and the soft portion, as well the anal fin, longer than in *H. asper*. Following are the fin-formulæ in ten specimens from Unalaska:

Dorsal.	Anal.	Dorsal.	Anal.	Dorsal.	Anal.
XIX, 24	25	XIX, 23	24	XX, 23	25
XIX, 24	25	XIX, 23	23	XX, 23	25
XIX, 24	24	XIX, 23	24	XX, 23	24
XIX, 23	23				

The last ray of soft dorsal and anal is forked and is counted as one in this table.

The species does not seem to reach as large a size as do other species of the genus. Of numerous specimens, the largest is 285 mm. long. A female, 225 mm. long, contains fully developed eggs. The species was obtained by seining in the harbor at Unalaska. It was not seined elsewhere and did not occur in any of the dredge hauls.

38. Hexagrammus asper Steller.

No adults of this species were obtained by dredging, but young specimens were taken in large numbers in the shallow waters of Bristol Bay at the following stations: 3228, 3229, 3231, 3232, 3233, 3234, 3239, 3240, 3241, 3243, and 3245, at depths of from 4½ to 14½ fathoms. Seining parties brought in the species but once, a single young specimen and one adult appearing at Unalaska among the prevalent *H. ordinatus*. The largest individuals dredged measure about 125 mm. in length, the adult specimen from Unalaska 345 mm.

The characters of the species seem very constant. The dorsal varies from XXIII, 19 to XXIV, 21; the anal from 23 to 24. In 15 specimens the dorsal formulæ run as follows: XXIII, 19; XXIII, 19; XXIII, 20; XXIII, 20; XXIII, 20; XXIII, 20; XXIII, 20; XXIII, 20; XXIII, 21; XXIII, 21; XXIII, 21; XXIII, 21; XXIV, 20; XXIV, 20; XXIV, 20.

The anal fin shows the following counts in 12 specimens: 23, 23, 23, 23, 23, 23, 24, 24, 24, 24, 24, 24.

The body is in young specimens much more slender than in *H. ordinatus*. It is also lighter in color, and lacks the round humeral spot present in the latter. The supra-ocular flap is somewhat smaller, the cheeks are more extensively naked, the eye is larger, and the mucous canal system less strongly developed. The snout, cheeks, opercles, and lower side of head are naked, with the exception of a patch of small, loosely imbricated scales on the upper posterior part of cheeks and the upper third of opercles. The dorsal line of pores is very inconspicuous, and terminates in front of the middle of spinous dorsal. In none of our specimens are there traces of a line of pores on middle of sides.

The species can be distinguished at once from all others by the slender caudal peduncle, the shallow notch between dorsals, the fin-formulæ, the short upper line of pores which end under anterior half of spinous dorsal, the largely naked cheeks and opercles, the simple unbranched fourth lateral line, and the extreme roughness of the scales.

39. Hexagrammus superciliosus (Pallas).

Taken in abundance with the seine at Unalaska and at Makushin and Chernoffski bays, Unalaska Island. Adults of the species were also dredged at depths of 4½ and 11½ fathoms in Bristol Bay (stations 3244 and 3245).

We find the patch of palatine teeth to be an unreliable character, as five specimens out of the nine examined do not exhibit it. The species is well distinguished by the depth of the dorsal notch, the comparative smoothness of the scales, and the large size of the supraocular flap. The upper line of pores extends well back under base of soft dorsal, and the fourth line is unbranched. The sides of head are scaled, excepting the region over suborbital stay, the snout, and the interopercle.

The normal fin formula seems to be: Dorsal XXI, 23; anal, 22.

Family SCORPÆNIDÆ.

40. Sebastodes introniger Gilbert.

Several specimens were taken in Bering Sea to the north and west of Unalaska Island, in depths of 85 to 350 fathoms (stations 3311, 3317, 3324, and 3331). The species evidently lives at much greater depths than does *S. alutus*. The cranial ridges are well developed and terminate in strong spines. Coronal spines are usually present, but may be absent on one or both sides. In both types of *S. introniger*, taken at a depth of 266 fathoms in the Santa Barbara Channel, California, the coronal spines are wanting, but as they agree with our specimens in all other important details we make the identification without doubt. We append the following account, drawn from Alaska specimens:

Diagnosis: Scales large, ctenoid. Fins scaled. Cranial ridges and spines rather low but strong; coronal and nuchal spines present. Mandibular symphysis prominent, with small symphyseal knob. Peritoneum, mouth, and gill-cavity black or dusky. Color red.

Specific description: Head 2½; eye in head 4. Dorsal XIII-14. Anal III-7 or 8. Pectoral 18. Lateral line 36. Length 14 inches. Mouth large, the maxillary reaching to middle or posterior third of eye, 2 in head, its greatest width one-third its greatest length. Mandible protruding, entering profile in large specimens, less prominent in the young. Symphyseal knob present, but not conspicuous. Teeth on jaws, vomer, and palatines in narrow bands. Eye large, longer than snout, 3½ in head. Interorbital space slightly concave, with two evident longitudinal ridges. Cranial ridges sharp-edged and moderately elevated, the spines strong. Nasal, preocular, supraocular, postocular, tympanic, coronal, parietal, and nuchal spines present; one or both coronal spines occasionally wanting. Preorbital of moderate width, its anterior lobe sometimes ending in a spine, the posterior with a sharp edge bearing one to four spinous points. Preopercular spines large, regularly radiating, the two upper ones approximated and more slender, the others broadly triangular, directed downward and backward. Two spines sometimes present at angle of subopercle. Opercular spines sometimes double. Lower rim of orbit sometimes serrated. Gill-rakers long and slender, the longest one-third diameter of eye; 22 or 23 on lower limb of outer arch.

Spinous dorsal rather low, the twelfth spine one-half the height of the last, which is one-third head; the longest spine 2½ in head. Second anal spine stronger, but scarcely longer than the third, 2½ in head. Pectoral without thickened lower rays, reaching to vent, 4½ in body. Caudal emarginate. Scales large, ctenoid, about 30 tubes present in the lateral line. Small accessory scales numerous. All parts of the head, including cheeks, maxillary, mandible, branchiostegal rays, snout, and interorbital space covered with scales. Gular region scaled. All the fins invested to their tips with fine scales.

Color, uniform bright red, duller than in *S. miniatus*. Smaller specimens reddish. Traces of fine olive-green bars on back. Numerous dark spots along lateral line. A dark blotch on opercle; three bands on cheek, and a blotch in the axil of pectorals. All the fins edged with black.

41. Sebastodes elongatus (Ayres).

A single specimen dredged off the coast of California, north of Point Reyes (station 3350), at a depth of 75 fathoms.

42. Sebastodes zacentrus (Gilbert).

Several specimens were taken north of Point Reyes, on the coast of California, at depths of 75 and 51 fathoms (stations 3350 and 3351). The second anal spine is always very large, but frequently fails to reach tips of soft anal rays when depressed, thus differing from the type specimens. The depth is also greater, 3 instead of 3⅓ in length.

43. Sebastodes alutus (Gilbert). (Plate 22.)

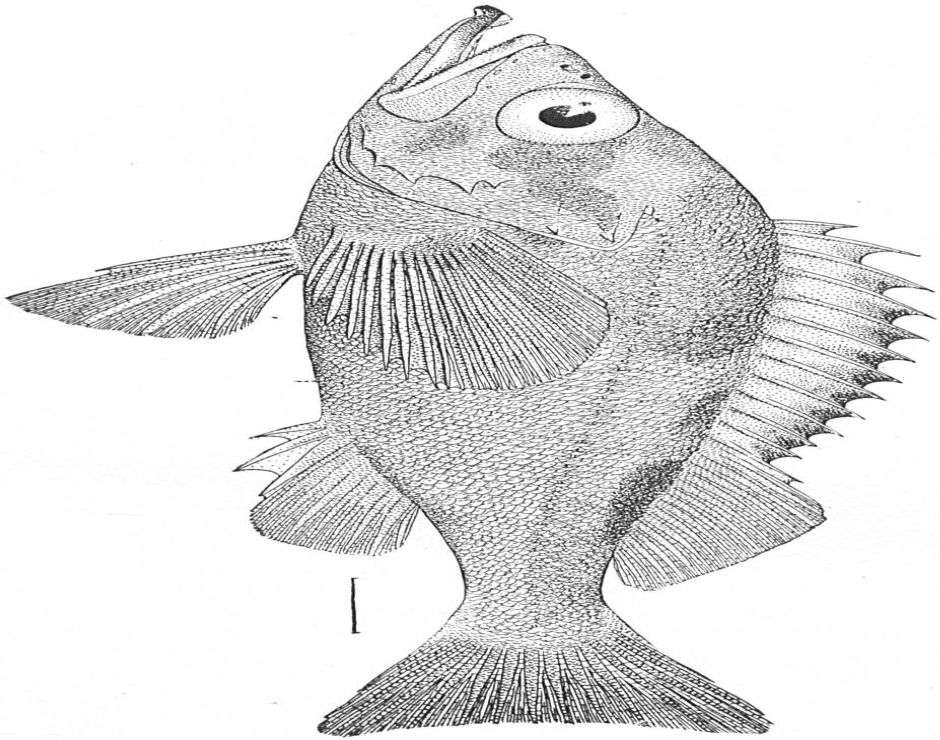
This species was described from a single immature specimen, dredged by the *Albatross* south of Santa Cruz Island, Southern California. No additional material was obtained during the extensive dredging operations of the *Albatross* on the California coast. The species is, however, very abundant in the North Pacific, both north and south of the Aleutian Islands. It was taken at the following dredging stations, located north of Unalaska Island, in the vicinity of Unimak Pass, in Bristol Bay, and south of the Alaskan Peninsula, in depths of 38 to 350 fathoms: 3213, 3214, 3222, 3226, 3262, 3311, 3317, 3319, 3321, 3322, 3324, 3331, 3339, and 3341. A single individual was also taken with hook and line in Unalaska Harbor. At one of the above stations, 48 specimens were taken with the beam trawl. This additional material shows that *S. alutus* is one of the bright-red rockfish, most closely allied perhaps to *S. miniatus*. From the latter it differs conspicuously in the greatly produced mandibular symphysis, with the very pronounced symphyseal knob, as well as in other respects. It is allied also to *S. proriger*, but differs, among other points, in having both postocular and tympanic spines developed. From *S. brevispinis* Bean it differs in its larger eye, larger scales, black peritoneum, and scaly fins.

Following is a detailed description of adult specimens 12 to 18 inches long. In the type, the head is said to be contained 3⅔ times in the length. This is doubtless a misprint for 2⅔.

Diagnosis: Scales large, in about 60 oblique series above the lateral line. Soft fins wholly enveloped in fine scales. Cranial ridges all low, the spines slender; coronal and nuchal spines alone absent. Mandible projecting much beyond the upper profile of head, the symphyseal knob very strongly developed in adult specimens; not noticeably so in young. Gill-rakers long and numerous, half as long as eye. Second and third anal spines about equal. General color red, the peritoneum black or dusky, the mouth and gill-cavities dusky.

Description: Head 2⅔ to 2¾ in length; depth, 3 to 3⅓. Dorsal, XIII–15; anal, III–8; pectoral, 17. Mouth large, maxillary reaching back of pupil, 2¼ to 2⅓ in head. Premaxillaries notched, the symphyseal patch of teeth, however, shutting outside them. Teeth on jaws, vomer, and palatines in very narrow bands except at symphysis and on vomer. A conspicuous depression on each side of symphysis to receive the anterior premaxillary patch. Eye very large, the diameter exceeding snout, 3⅓ in head. Interorbital space very wide, flat or slightly convex, conspicuously grooved, its width 1⅓ eye. Cranial ridges all very low, inconspicuous, with small spines or none. Nasal and preocular spines evident, supraocular, postocular, and tympanic spines present but hidden by scales; more conspicuous in the very young. Parietal ridges evident, ending in low spines. Preorbital narrow, its least width one-seventh eye, its anterior edge with two long mucous slits, and in some cases a single backwardly-directed spine. Opercular and humeral spines well developed. Preopercular spines flat, not very large, the upper two approximated, the lower two broadly triangular, tipped with short spines, which are directed downward and backward.

Dorsal spines curved, the longest 2½ to 2¾ in head; the twelfth about two-thirds the longest. Soft dorsal about as high as the longest spines. Anal spines strong, the second slightly shorter than third, which equals or slightly exceeds diameter of eye. In young specimens, the second anal spine is longer and constantly equals or exceeds



SEBASTODES ALUTUS (Gilbert).

the third. Soft anal rays higher than soft dorsal, 2⅛ in head. Caudal well notched. Ventrals long, reaching vent. Pectorals longer, reaching nearly to front of anal. Gill-rakers long, clavate, half diameter of orbit, 25 on anterior limb of arch.

Scales rough ctenoid, covered with many accessory minute ones, which are especially abundant on head and nape. The head is wholly scaled, including the interopercle, maxillary, and mandible, and the outer branchiostegal rays. The anterior surface of the pectorals and the outer caudal rays are closely invested with minute ctenoid scales, which extend well toward the tips; they also invest the soft dorsal and anal fins. About 58 or 60 series of scales above lateral line, running obliquely downward and backward.

Color: Bright carmine red, lighter on belly. Dorsal dusky, edged with black. An elongate olive-brown blotch along base of soft dorsal; a shorter one under the last spines, and a faint one under the middle of spinous dorsal, the latter extending farther down on sides. A dark blotch on back of caudal peduncle. Belly silvery, washed with red. A dark blotch on opercle and one on axil; a crossbar on occiput, one on snout and two bars on cheeks, dusky. Lower lip and tip of mandible blackish; mouth and gill-cavity dusky. Peritoneum jet-black in the young, varying from black to gray in adults. Fins all red, the spinous dorsal broadly margined with blackish.

44. Sebastodes diploproa Gilbert.

Station 3349, near Point Reyes, California, depth 239 fathoms.

45. Sebastolobus alascanus Bean.

Resembling closely *S. macrochir*, but differing constantly in the increased number of dorsal spines, 16 (17 in one specimen) instead of 15, and in the longer second anal spine.

Head 2⅜ in length; depth 4 (in specimen 360 mm. long). Pores of lateral line 35. Dorsal XVI, 9; anal III, 5; pectoral 21. Mouth large, the maxillary nearly reaching vertical from posterior border of orbit, 2 to 2⅓ in head; its width greater than diameter of pupil. Premaxillary band of teeth wide, shutting largely outside mandible in front and on the sides; a conspicuous tubercle at tip of each premaxillary with a deep emargination between the two, into which fits the tip of the mandible. A small knob at mandibular symphysis. Eye large, 3¼ to 3½ in head, 2⅔ times the interorbital width. Cranial ridges and spines about as in the other species of the genus, but the occipital ridges not strongly diverging, as in *S. macrochir*. Preorbital posteriorly with a spinous point, as in *S. altivelis*.

Dorsal spines low, the contour of the fin evenly rounded, the spines increasing regularly from the first to the fourth, then as regularly diminishing to the fourteenth; the fifteenth and sixteenth again lengthened. The longest spine is contained from 2½ to 2⅝ times in the length of the head. Second anal spine longer and stronger than third, equaling or exceeding length of soft rays, its length 2 to 2¼ in that of head. Ventrals usually scarcely reaching vent, the pectorals not reaching front of anal. Lower pectoral lobe unusually broad, contains 7 to 9 thickened rays. Head less completely scaled than in *S. altivelis*, the branchiostegals, mandible, maxillary, and lower portion of preopercle wholly naked.

Color red. A black blotch occupies the membranes of the first three dorsal spines, a second extends from the sixth to the eleventh spines. Margin of pectoral and ventral fins black. No black blotch behind second anal spine. Peritoneum and lining of gill-cavity white.

This species differs from *S. altivelis* in the lower, longer, evenly rounded spinous dorsal, the white lining of the gill-cavity, and the partly naked head. It was taken abundantly on the Alaskan expedition, being represented from the following stations: 3227, 3324, 3330, 3331, 3332, 3337, 3338, 3339, 3340, 3343, 3346, 3347, and 3348. These are located in Bering Sea, north of Unalaska Island; in the North Pacific southeast of Unimak Island, and off the coasts of Washington, Oregon, and California. They represent depths of from 109 to 786 fathoms.

46. Sebastolobus altivelis sp. nov. (Plate 23.)

Body slender, depth 3¾ in length; head 2½; lateral line 33–35 pores. Dorsal XV, 9; anal III, 5; pectoral 22. Mouth large, 2 in head, maxillary reaching posterior margin of pupil. Mandible laterally and in front shutting within the wide premaxillary band of teeth, its tip fitting into an emargination between premaxillaries, and bearing a short symphyseal knob. Bands of teeth on mandible, vomer, and palatines narrow. Eye very large, 3 in head, 3 times interorbital width. Interorbital narrow, scaled, concave, with 2 low, rounded ridges. Cranial ridges strong, terminating in sharp spines, agreeing with those in *S. alascanus* and *S. macrochir*. Preorbital wide, partially overlapping middle third of maxillary, posteriorly with a forwardly directed triangular spine, in front of which is a long slit-like mucous pore. A blunt tubercle directed forward from front of each premaxillary, less prominent than in *S. alascanus*.

Dorsal spines long and comparatively strong, the third always the highest, the outline of fin behind it straight or concave, never convexly rounded, as in *S. macrochir* and *S. alascanus*. In the type specimen the longest spine is contained 1⅘ times in length of head. The spine before the last is scarcely longer than the one preceding, the last spine again lengthened. Second anal spine usually curved, much longer and stronger than third and longer than soft rays, its length 1⅘ to 2 in head. In the type it is abnormally curved, as shown in the accompanying figure. Ventrals reaching to vent; pectorals to front of anal. Pectoral fin very broad, the lower seven rays thickened and extended beyond membranes, the lobe thus formed subject to much variation, being unusually short in the type. Scales rough ctenoid. Mandible scaled at base only, the head otherwise completely invested, including the branchiostegal rays and membranes. Fin membranes covered with fine ctenoid scales.

Color, red; a dark blotch on membranes between first and third dorsal spines, and a large one beginning back of fourth spine and extending along entire upper edge of fin; edge of pectoral, ventral, anal, and sometimes caudal, black. In some specimens a black blotch on membrane back of second anal spine, as in *S. macrochir*. Opercular lining blackish, this visible externally as a dusky blotch.

The type is a specimen 325 mm. (12¾ inches) long, taken south of the Alaskan Peninsula at a depth of 625 fathoms (station 3338). No other specimens were secured during the Alaskan expedition of 1890, but the species is almost equally abundant with *S. alascanus* in deep water off the coast of California. From *S. alascanus* it is distinguishable at sight by the contour of the spinous dorsal fin, the smaller number of dorsal spines, and the dusky lining of the opercle. From *S. macrochir*, with which it agrees in its fin formula, it is distinguished by the greater height of both dorsal and anal spines, and in the different contour of the spinous dorsal.

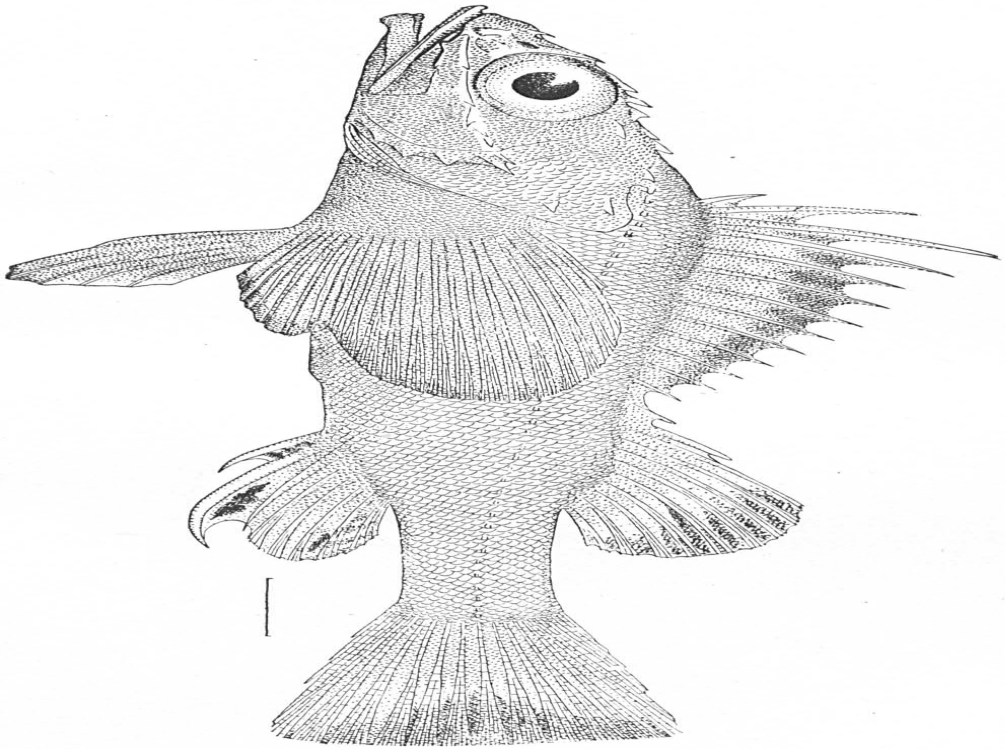
Family COTTIDÆ. The Sculpins.

47. Hemitripterus marmoratus Bean.

Several small specimens were secured at stations 3224, 3257, 3258, and 3311, in Bering Sea, north of Unalaska Island; depths, 70 to 121 fathoms. They agree with the types in having but 14 dorsal spines, the first four of which are not noticeably differentiated. The second dorsal contains 11 or 12 rays, and the anal fin 13. The last two rays of the anal fin are approximated at base, but do not evidently constitute a divided ray.

48. Psychrolutes zebra Bean.

Taken abundantly in shallow water south of the Alaskan Peninsula, thence west to and through Unimak Pass, along the northern shore of Unalaska Island, and in Bristol Bay. The depths range from 31 to 121 fathoms, at stations 3213, 3215, 3216, 3217, 3219, 3222, 3223, 3224, 3225, 3257, 3258, 3259, 3263, 3265, 3272, 3310, 3311, 3313, 3322, and 3334. The spinous dorsal is continuous with soft dorsal, there being no notch between the two.



SEBASTOLOBUS ALTIVELIS sp. nov.

49. Malacocottus zonurus Bean.

Several specimens taken at stations 3227, 3330, 3331, north of Unalaska Island, and at stations 3337 and 3339, south of Unimak Island; depths, 138 to 351 fathoms.

In addition to the characters given by Dr. Bean, we call attention to the following: Nasal spines obsolete. Supraorbital rim low, slightly elevated in front but not behind; the interorbital space wide, shallowly concave. Occiput with two blunt, conical protuberances in lieu of ridges, and without spines. A slight occipital depression. Preopercular angle with three radiating spines of nearly equal length, and a smaller spine directed outward in advance of the middle one of the three; below these a partially concealed spine directed downward and forward. Opercular rib very strong, sharp anteriorly, broadening behind, and provided with three low ridges, not ending in a definite spine. A spinous point on subopercle and one on interopercle; none on shoulder.

Anterior nasal tube short, the posterior margin prolonged into a laciniate flap. Head well provided with slender cutaneous filaments; three on upper portion of eyeball, four in a transverse line behind occiput, a very long one on opercular angle, and numerous shorter ones on opercle, jaws, and along anterior portion of lateral line. Branchiostegals 7. Body without plates or prickles; the head, including upper part of eye, and the upper anterior part of body, with sparsely distributed stellate granulations, visible only in large specimens. In our specimens the brown bar at base of caudal is followed by a wide white bar, sometimes more or less broken; the terminal half of fin blackish, narrowly margined with white.

50. Dasycottus setiger Bean.

Taken at stations 3216, 3257, 3310, 3311, and 3334, located north and south of the Alaskan Peninsula and north of Unalaska Island; depths, 50 to 85 fathoms.

Tubercles on head definitely placed: 1 in front of eye; 4 above orbit, the posterior two the largest; a pair on middle of suborbital stay, with a smaller one above them; 1 on temporal region, and 1 on shoulder; by far the largest pair on occiput, where they are high compressed spines, directed vertically upward, as long as diameter of pupil. Nasal spines obsolete. Cirri are generally distributed over upper part of head and body, the longer ones being specially numerous on maxillary, under surface of mandible, and on the opercle and preopercle. Of the larger ones, two often proceed from one base. A series of short filaments along upper edge of pupil. Mucous pores large, those of the mandibular and buccal series slit-like. In adults, the dorsal bands break up into series of spots and become inconspicuous.

51. Icelus bicornis (Reinhardt).

Not hitherto recorded from Pacific waters. Our specimens are more constant in their characters than the Atlantic individuals reported on by Collett (Den Norske Nordhavs Expedition, 1880, p. 35). A definite narrow band of fine prickles extends along the upper edge of the dorsal series of plates, usually occupying less than half the space between plates and base of dorsals, and extending posteriorly to end of soft dorsal. Similar prickles cover top and sides of head. The plates of the lateral line invariably extend to the root of the caudal fin, and the dorsal series to the back of the caudal peduncle. None of the specimens before us have plates along the base of the anal fin. The species differs conspicuously from *I. spiniger* and *I. canaliculatus* in having a deep pit on occiput, bounded laterally by high occipital ridges, each of which bears two rounded prominences or spines. The preopercular spines are longer and sharper, and the bifurcation of the upper spine deeper than in the species mentioned. In two individuals the upper spine is trifurcate, the branches very long and curving upward. The fin rays in six specimens are as follows: Dorsal VIII–20, IX–19, IX–21, IX–20, IX–20, IX–19; anal 16, 16, 15, 17, 16, 15. These average slightly higher than counts of Atlantic specimens, none of which are at hand for comparison. The Pacific form may prove specifically separable.

The species is represented in our collection principally from Bristol Bay, a few specimens only from farther west in Bering Sea. Stations 3224, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3279, 3280, 3282, 3283, 3285, 3292, 3293, 3302, 3303, and 3306; depths 17½ to 121 fathoms.

52. Icelus spiniger sp. nov. (Plate 24.)

Closely resembling *I. bicornis*, but differing conspicuously in the armature of the dorsal series of plates, in the comparatively plane occiput, and in other characters. Head 2⅔ to 3 in length; depth 5. Caudal peduncle very slender, its depth 2½ in orbit. Mouth large, the maxillary reaching slightly beyond middle of orbit, its length one-half head. Teeth very finely villiform, present in rather wide bands in jaws and on vomer and palatine bones. Nasal spines strong, separated by the high ascending processes of the premaxillaries. Interorbital space very narrow, grooved, its width less than one-half diameter of pupil. The orbital rim becomes elevated anteriorly and posteriorly, and is, at the latter point, strongly denticulated. Behind the orbital region the occiput is shallowly concave, being bounded laterally by two low, evenly rounded ridges, which become narrower posteriorly, and end each in a strong spine projecting backward in line with the series of dorsal prickles. The preopercular spines are similar to those of *I. bicornis*, the uppermost, as in the latter, occasionally simple instead of bifurcate. The second spine is usually directed straight backward, and the two following downward and forward.

The gill-membranes are broadly united, free from the isthmus, and neither pore nor slit exists behind the innermost gill. Branchiostegals, 6. Eye large, longer than snout, 3 to 3⅓ in head in adults. A slender tentacle present over the posterior part of each orbit. A series of plates extends from nape along each side of dorsals to back of caudal peduncle, and a second series along lateral line, as in *I. bicornis*. The dorsal series contains 28 to 35 plates, each of which bears at its center a single strong spine directed ou[illegible] and backward. In *I. bicornis* each plate is traversed by an oblique ridge, the [illegible]ge of which is denticulated, the central tooth being the strongest and corresponding to the single spine present in *I. spiniger*. The latter agrees with *I. canaliculatus* in having an inner series of dorsal plates alternating with the principal series, each of the smaller plates bearing a minute prickle, discernible with difficulty. The plates along the lateral line, 41 to 44 in number, are similar to those in *I. bicornis*, having their upper and posterior free margins serrulate. A few scattered spinous plates present in axillary region. Dorsal fins not connected, the spines very slender and rather high. Pectorals long, reaching front of anal; ventrals not reaching vent.

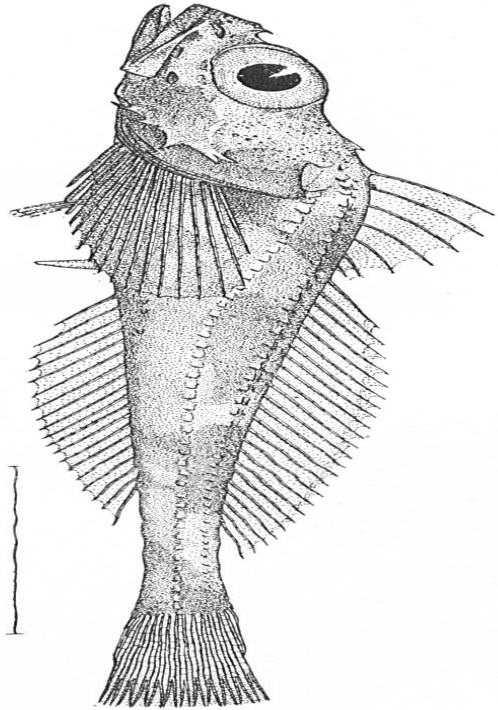
Dorsal IX–20; anal 17; pectoral 18; ventral I, 3. Longest specimen, 118 mm.

Color: Light olivaceous above, white below, the upper parts mottled with dark brown. The back has four faint black crossbars, the first under spinous dorsal, the second and third under soft dorsal, the fourth at base of caudal. A brown blotch on cheek, one on base of pectoral, and an irregular series along full length of body just under lateral line. Two prominent black blotches on first dorsal; the second dorsal, caudal, and pectoral barred; other fins unmarked. Mouth and gill-cavity white.

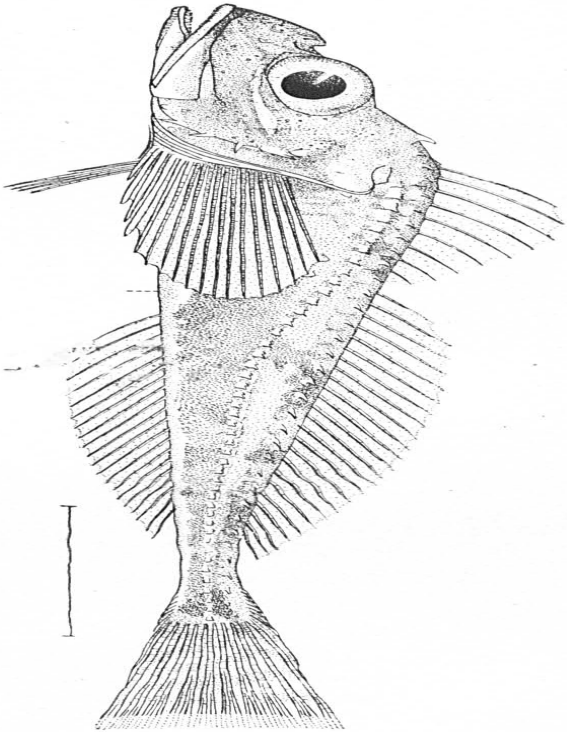
Numerous specimens from stations 3216, 3223, 3224, 3225, 3226, 3257, 3258, 3263, 3267, 3278, 3279, 3280, 3292, 3302, 3311, 3334, and 3336, in 17 to 121 fathoms. These stations are located in the vicinity of Unalaska Island and in Bristol Bay, Alaska.

53. Icelus canaliculatus sp. nov. (Plate 24.)

A deep-water species, with conspicuous mucous canals and pores, thin cranial bones, and rather plain blackish coloration. In other characters it stands somewhat intermediate between *I. bicornis* and *I. spiniger*. The dorsal plates have the serrulated cross ridge of *I. bicornis*, while the occiput is but shallowly concave, with low bounding ridges ending behind in strong spines, and the posterior rim of the orbit is elevated and denticulated, as in *I. spiniger*. In its anterior portion, at least, the



ICELUS CANALICULATUS sp. nov.



ICELUS SPINIGER sp. nov.

series of dorsal plates is accompanied above by a more or less irregular row of smaller plates, which alternate with the larger plates and bear each a small spine.

Head 3 to 3¼ in length; depth 6. Caudal peduncle long and very slender, its depth less than one-third its length. Maxillary reaching to or nearly to vertical from middle of orbit, 2⅞ to 2⅞ in length of head. Jaws weak; teeth villiform, with widened base, in moderate bands on jaws, vomer, and palatines. Nasal spines strong, projecting above a transverse depression which crosses snout immediately in front of orbits. Interorbital space narrow; its least width 3⅞ times in orbit, its width wholly occupied by the two conspicuous supraorbital mucous canals. Occiput a shallowly depressed pit, bounded anteriorly by the raised orbital region and laterally by low, rounded ridges, each of which terminates behind in a very strong spine. Preopercular spines slender and sharp, the uppermost directed very obliquely upward, sharply notched at tip. The second and third are directed downward and backward, the lowermost downward and forward. The bony stay across cheeks is conspicuously developed, and bears a distinct spine just behind eye. A series of mucous slits along under side of suborbital stay. A sharp spine on subopercle. Gill-membranes broadly united, free from the isthmus. Branchiostegals, 6. A distinct slit-like pore behind fourth gill. Eye large, 3 in head, longer than snout. Top and sides of head with many minute scattered whitish pores. A minute filament near tip of maxillary.

Plates of lateral line 43 to 46 in number, their upper and posterior edges free, denticulated. Dorsal series with 45 plates, each of which is crossed obliquely by a raised spiny ridge, the central portion of which is highest. Between the upper angles of these plates is a second series of small plates alternating with the first, each bearing a spine or prickle. These spines are occasionally doubled or trebled, especially in the anterior part of the series, and then recall strikingly the arrangement in *Icelinus*. Axil of pectorals with from 20 to 26 plates similar to those of the lateral line and showing a tendency to regular arrangement. Two or three similar plates along anterior part of base of anal, and a few scattered plates on each side between lateral and dorsal series.

Dorsal VII or VIII, 23 or 24; anal 19; pectoral 16; ventral I, 3. Lateral line 43 to 46. Length 110 mm.

Color: Light olivaceous above, blackish below, except lower jaw; back with four black crossbars, evident but not conspicuous. Opercles black. Fins all dark. Pectorals mottled with slate color. Base of caudal fin light. Mouth and gill-cavity dark.

The types were taken north of Unalaska, at station 3329, at a depth of 399 fathoms.

54. Icelus vicinalis sp. nov.

This species is extremely close both to *I. canaliculatus*, with which it was found associated, and to *I. euryops* Bean. From *I. canaliculatus* it differs in the following respects:

(*a*) The coloration, though similar in pattern, is much lighter. The belly is dusky, but not deep brown; the isthmus usually becomes abruptly white under the branchiostegal membranes, and the latter are white or dusky, not blue-black as in *I. canaliculatus*. The floor and anterior part of the roof of the mouth and the gill-cavities are white, not blackish. The nostril tube is white, not black.

(*b*) The occipital ridge is lower and less conspicuous and the spines shorter, but both are obvious. The small spinous point on suborbital stay is less developed.

(*c*) The dorsal spines are 9 in number in all our specimens.

(*d*) A closely crowded series or narrow band of prickles accompanies the dorsal series, as in *I. canaliculatus*. It is noticeable, however, that those of the series which occupy a position corresponding to the interspace between the dorsal plates are somewhat enlarged, and recall the alternating plates of *Icelinus*. The region between the lateral line and the dorsal series is almost completely invested with spinous scales in most specimens, while in *I. canaliculatus* few or none are present;

(*e*) The head is densely covered with small spinous scales or prickles, especially numerous on top of head and on opercles. In *I. canaliculatus* the head is either naked or sparsely covered, and the opercles are almost or quite naked.

(*f*) Three pairs of slender filaments on top of head, the anterior pair the largest, placed above back of orbit; the second pair is in front of and slightly within the occipital ridges, the third pair on occipital spines. An additional pair on opercles seems to be less constant. The supraocular pair alone is present in *I. canaliculatus*.

(*g*) The mucous canals and pores, though large, are less developed than in *I. canaliculatus*, the fish having in general the bathybial characteristics less pronounced.

The agreement with *I. euryops* is closer than with *I. canaliculatus*. In fact it seems to differ from *I. euryops* only in the much smaller eye and somewhat wider interorbital space, agreeing with *I. euryops* in all those respects in which it differs from *I. canaliculatus*. In *I. vicinalis* the eye is 2⅝ to 3 in head, and but 1½ times length of snout, and the least interorbital width is 11 or 12 times in head. In *I. euryops* (co-type No. 45367, U. S. Nat. Mus.) the eye is 2⅛ times in head and twice the length of the snout, and the least interorbital width 16 times in head. It does not seem probable that the species will vary to that extent.

Dorsal IX–21 to 23; anal 18; pectoral 18; caudal 9. Head 3¼ to 3½ in length; depth 5¾. Maxillary reaching middle of pupil, 2½ in head. Upper preopercular spine slender, forked at tip, directed upward and backward; the second and third spines simple, slender, directed downward and backward, the fourth downward and forward. Interorbital space shallowly grooved, the groove widening backward into an occipital depression bounded in front by the somewhat elevated interocular space, laterally by the occipital ridges. The supraorbital rim is elevated in front and behind. The occipital ridges are low, broad, and rounded anteriorly, becoming narrower and more crest-like posteriorly. In addition to the prickles and plates already mentioned, there is a band of spinous scales behind axil of pectorals.

Spinous dorsal low, the longest spine 2½ in head, the longest ray of soft dorsal 2 in head. Pectorals reaching beginning of horizontal portion of lateral line, the lower rays thickened, their membranes incised. Ventrals short, scarcely reaching vent. Anal papilla large.

Color in spirits: Light-brown above, with four blackish crossbars, one under spinous dorsal joining the dark axillary patch, two under soft dorsal, and one at base of tail merging into the uniform deep brown of the under parts. Head, light brown above and below; subocular ring dark brown, this streak widening forward and crossing upper and lower lips. A small brown patch at base of exposed portion of maxillary. Opercle blackish. Upper half of pectorals light, with or without a brown basal bar, the distal portion indistinctly barred with light brown. Lower half of pectorals and all of ventrals dark brown or black. Dorsals blackish, darkest above crossbars on back. Anal black. Caudal whitish, dusky above toward tip.

Numerous specimens 50 to 110 mm. long, from stations 3324, 3330, 3331, and 3332, Bristol Bay, Alaska, at depths of 109, 351, 350, and 406 fathoms, respectively.

The following notes are drawn from one of the co-types (No. 45367, U. S. N. M.) of *I. euryops*, kindly loaned to us for that purpose by Dr. Bean.

Specimen 77 mm. long, 65 mm. to base of caudal fin. Head 22 mm. to end of opercular spine; depth 11; orbit 10½; snout 5½; maxillary 11; interorbital width 1⅛.

Dorsal IX–23; anal 19; pectoral 18; caudal 9. Preopercular spines as in *I. vicinalis*, the upper spine abnormal on one side, showing three points instead of two. Below the forked spine are three others—one directed backward and a little downward, one nearly vertically downward, and one downward and forward. Nasal spines strong. Occipital ridges obvious, with easily perceptible slender spines about as in *I. vicinalis*, the ridges broadly rounded anteriorly, scarcely ridge-like until immediately in front of spines. Head rather closely invested with scales, scarcely so rough or so numerous as in *I. vicinalis*, but more so than in *I. canaliculatus*. Opercle covered with scales. Filaments as in *I. vicinalis*—one pair above eyes, one ante-

riorly on occiput, and one occupying tips of occipital spines. The pair on opercles can not be made out.

Armature of body as in less strongly scaled specimens of *I. vicinalis*. Lateral line provided with the usual spinous scales, 43 to 44 in number; 40 scales in the dorsal series, which extends to base of caudal. Above it is a rather crowded irregular series of smaller scale-like prickles, some of which are larger than the others and alternate rather regularly with the plates of the principal series; posteriorly the smaller of the upper series are absent, the alternating larger ones alone present. Ten or twelve small spinous plates are irregularly disposed between lateral line and dorsal series. A patch of spinous plates behind pectorals.

Color evidently as in *I. vicinalis*, though very greatly faded from exposure to light. The back shows traces of two dark crossbars under soft dorsal; one occupies end of caudal peduncle, and a very indistinct one extends downward from spinous dorsal, which is black posteriorly. Belly, and under parts generally, dusted with fine black specks, the isthmus becoming abruptly white. Nostril tube white. Subocular region blackish, the color continued forward onto the preorbital, opposite the front end of which it crosses upper and lower lip. A dark blotch on maxillary in advance of tip. Pectorals dusky.

55. Icelus scutiger Bean.

This species is distinguished from all others in the genus by the absence of the series of enlarged spinous plates along the base of the dorsal fin. Our specimens agree with the types in having the sides above lateral lines densely covered with scales. These are not uniform in size, and are arranged in rather irregular oblique series. The sides behind pectorals contain larger spinous plates, and the tail below lateral line is densely scaled, leaving only a narrow naked strip along each side of anal base. As stated, the upper half of head is densely covered with small prickles. As in other species of *Icelus*, the upper preopercular spine may be simple or bifurcate. The latter condition obtains in most of our specimens. All of the preopercular spines are weaker than in other species of the genus.

Compared with the nearest allies, *I. euryops* and *I. canaliculatus*, the species is further distinguished by its more robust body (the depth approximately 5 in length instead of nearly 6), by the smaller eye (in which the snout is contained 1¼ times instead of nearly twice), the narrower interorbital space, the very slight development of the occipital crests, the obsolescence of the occipital spines, and the great height of the spinous dorsal fin in the male specimens. It has also a shorter second dorsal fin, the formula in 11 specimens being IX–19, IX–19, IX–19, IX–19, IX–19, IX–20, X–19, X–19, X–20, X–20, X–20. It has less the appearance of a deep-water species, the mucous canals and pores being less conspicuous and the color lighter, with no brownish-black or blue-black tints. In alcoholic specimens the upper parts are light brown, the lower side of head and belly, including the ventral fins, whitish. A vertical black bar occupies base of upper half of pectorals, a streak extending from its lower end out along middle ray of fin. The black bars characteristic of its congeners are here represented by irregular, rather sharply defined blotches on back and sides. These extend also onto spinous and soft dorsal fins. A distinct dark streak runs forward from eye, crossing premaxillaries, and leaving tip of snout pale. Mouth and gill-cavities white.

Numerous specimens were taken at station 3339, south of the Alaskan Peninsula, at a depth of 138 fathoms.

56. Icelinus borealis sp. nov. (Plate 25.)

Very similar to *I. oculatus*, but differing in the large size of the preopercular spine, the smaller, less elliptical, eye, the wider interocular space less abruptly expanding anteriorly, the lower occipital ridges, and in the much smaller size.

Body slender, tapering rapidly backward to caudal peduncle, whose least depth is 3⅘ to 4¼ in its length; depth 4⅘ to 5¼ in length, in specimens 1⅘ to 3¼ inches long.

Head long, smaller than in *I. oculatus*, 2¾ in length. The occipital ridges blunt, the included space gently concave, not pit-like. Interorbital space wider than in *I. oculatus*, not distinctly concave, the median ridge very faint, the width about one-fourth eye (in *oculatus* about one-tenth eye). Supraocular and occipital ridges rugose or minutely pitted. Two conspicuous mucous pores behind each eye, the anterior margins of the pores often elevated to form a spinous projection. Eye small, 4 in head. Mouth large, extending beyond vertical from pupil, 2¼ in head. Teeth in narrow bands on jaws, vomer and palatines. The two anterior pores on mandible open together at symphysis, as in all the other species of the genus except *I. oculatus*, where they open separately, on either side of the symphysis. Preopercular spine large, about as large as eye, with three antler-like processes directed upward. Below this is a weak spinous projection directed backward (wanting in many specimens) and two stronger ones downward and forward. A spinous point at the lower angle of subopercle; an indistinct spine terminating occipital ridge.

Armature of sides as in *I. oculatus*, the dorsal series of plates extending continuously onto back of caudal peduncle. No scattered plates behind pectorals. A large, rather broad, supraorbital flap, bifid or trifid, or occasionally with more than three terminal filaments; the height of flap equals or slightly exceeds diameter of pupil. A white filament near tip of maxillary; two pairs on occipital ridges; one, not wholly constant, on cheeks overlying suborbital stay; a few scattered ones accompanying plates of lateral line. None of the dorsal spines elevated. Pectoral fins reaching slightly beyond origin of anal. Dorsal IX or X–16 or 17; anal 12 to 14; pectoral 16; lateral line 39. Length 75 mm.

Color: Olivaceous above, sides of head and body vermiculated and blotched with olive brown, especially along middle of sides; white below, nearly to lateral line. The back with four black crossbars, as in *I. oculatus*. A dark blotch on cheek, and a dark streak forward from eye. Membrane between first two spines of first dorsal dark, usually a black terminal bar posteriorly; second dorsal, pectorals, and caudal with faint oblique bars. No dusky patch at base of pectoral. Anal translucent.

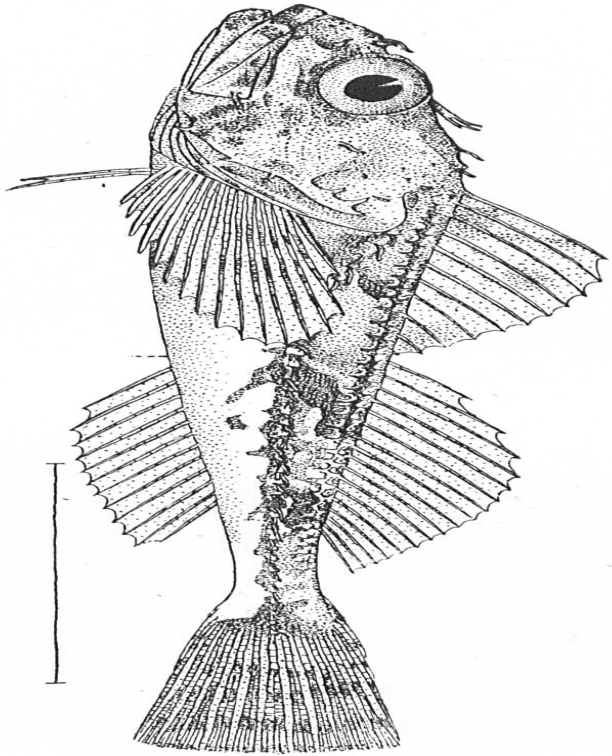
Numerous specimens taken both north and south of the Aleutian Islands and in Bristol Bay, at stations 3213, 3214, 3222, 3223, 3224, 3226, 3235, 3258, 3265, 3286, 3293, 3303, 3319, 3321. The depths range from 11 to 121 fathoms. It is impossible to compare this or any other described species of *Icelinus* with *Icelinus australis* Eigenmann, described from partially digested specimens. From Eigenmann's description of the preopercular spine, it is even doubtful whether his species is a member of the genus *Icelinus*.

57. Artediellus pacificus sp. nov.

Very closely related to *A. uncinatus*, differing in the entire obsolescence of the occipital protuberances or ridges, in the increased number of cirri on the head, the more numerous pores of the lateral line, the greater number of rays in the pectoral fins, and the reduction in the rays of the caudal. This diagnosis is the result of a comparison of our type with Collett's description of *Centridermichthys uncinatus* (Norske Nord-Havs Expedition, 1880, 29), no typical specimens being at hand for comparison. Specimens of *Artediellus* from the coast of Massachusetts also differ from Collett's description and may be specifically or subspecifically separable.

Length of head (measured to end of opercular flap) 2¾ to 2$\frac{9}{10}$; depth 4⅛. Least depth of caudal peduncle 1¾ times in orbit; its length, from base of last anal ray, 2⅝ in head.

Head evenly rounded in all directions, the orbital region not elevated, the snout not angulated. Mouth slightly larger in males than in females, reaching vertical from middle or posterior margin of pupil, 2½ to 2⅝ in head. Lower jaw shorter than the upper, a portion of the premaxillary band of teeth projecting beyond the mandible in closed mouth. Teeth cardiform, in rather broad bands in jaws, and in patches of varying size on vomer and palatines. In some specimens a few teeth



ICELINUS BOREALIS sp. nov.

occur in a single convex series on front of vomer, and but three or four form a line on palatines; in others, we find an irregular double series or a narrow band on each of these bones. The teeth are always strong, and are probably in adult specimens never entirely wanting on either vomer or palatines. Longitudinal diameter of orbit 3½ in head. Interorbital space very narrow, shallowly concave, entirely occupied by the supraocular canals, which unite in a single pore opposite posterior margin of orbit. Least interocular width two-thirds pupil. Premaxillary processes projecting but little beyond the profile. Nasal spines very small. Both pairs of nostrils in short tubes, the posterior situated on anterior orbital rim.

Occiput with two very inconspicuous low rounded ridges, appreciated with difficulty, and sometimes entirely wanting. No trace of the occipital spine which is seen in Massachusetts specimens of *Artediellus*, nor of the conical protuberance described and figured by Collett. Barbels numerous. Maxillary barbel large and conspicuous, sometimes simple, more often compound, furnished with from one to four short lateral branches. A well-developed supraocular cirrus, and a pair of cirri on posterior margin of occiput, the latter occupying the position of occipital spines. A short cirrus near base of opercular flap, and two or three on preopercle, two of which are usually at base of the preopercular spines. Two cirri on anterior part of trunk, one immediately above base of pectorals, the other half way between lateral line and front of spinous dorsal. Sometimes additional cirri above front of lateral line and on lower margin of subocular ring. A series of four or five very short cirri crosses the eye horizontally immediately above the pupil. Gill-membranes broadly united, joined to the isthmus anteriorly, with a wide free margin. Gills 3½, no slit or pore behind last arch. Preopercular spines as in *A. uncinatus*, the upper one without smaller basal spine.

Dorsal fins well separated, low in females, extraordinarily developed in males, the spinous dorsal in the latter well overlapping front of second dorsal and having all of the spines exserted, the median ones for half their length. These exserted spines have their free portions narrowly margined with membrane, which widens at their tips to form a cutaneous flap. Soft dorsal also somewhat elevated in males. Ventral fins reaching half way to vent in females, about three-fourths this distance in males.

Dorsal VII or VIII–12 or 13; anal 11 or 12; pectoral 23 (22 to 24); ventral I, 3; caudal with 9 divided rays (not 11 as in *C. uncinatus*); lateral line 24 (22 to 26).

A series of five wide mucous slits running along lower edge of suborbital ring and across cheeks. Pores of lateral line minute, at the ends of short downwardly-directed branches, the main line opening in a large slit like pore at base of caudal.

Color much as in *A. uncinatus*, the lower parts whitish, unmarked, the dorsal region of the trunk crossed by three wide dark bars, which often in adults break up into spots separated by vermiculations of the lighter ground color. One of these bars is below the spinous dorsal, running downward and forward to base of pectorals; the second is under soft dorsal, the third on caudal peduncle. Top and sides of head generally dark, with fine light dots or vermiculations. A light streak sometimes present, extending from preopercular spine forward and inward, meeting its fellow immediately behind eyes. This V-shaped mark is usually absent or inconspicuous, but is sometimes in young specimens formed of bright silvery-white pigment. Other silvery spots or blotches may occur on the lighter intervals of the back or sides. Pectorals, dorsal, and caudal cross-banded; a black blotch at base of upper and one at base of lower pectoral rays. Tips of elongate dorsal spines of the male black. Ventrals and anal unmarked.

Taken abundantly at stations 3216, 3219, 3222, 3228, 3251, 3252, 3254, 3259, 3265, 3267, 3272, 3273, 3278, 3279, 3280, 3281, 3282, 3285, 3293, 3294, 3302, 3306, and 3323, at depths of from 8 to 61 fathoms. The above stations are in Bristol Bay, excepting 3216 (south of Sannak Island) and 3323 (north of Unalaska Island).

58. Cottus aleuticus sp. nov.

Uranidea microstoma, Lockington, Proc. U. S. Nat. Mus. 1880, 58; not of Hæckel.

In appearance resembling *C. philonips;* the head small, its width but one-fourth greater than its depth, the body low and but little compressed, the depth at shoulders but little greater than the width. Caudal peduncle moderate, not slender, its length from base of last anal ray 1⅞ to 1¾ in head; measured from last dorsal ray but little more than half as long. Depth of caudal peduncle 4½ to 4⅞ in head.

Head small, 3¼ to 3½ in length; depth 5 to 5½. Mouth small, variable, maxillary reaching vertical from front or middle of pupil, 2⅞ to 3 in head. Vomerine patch of teeth small, the palatines toothless. Preorbital as wide as eye, produced anteriorly into a convex lobe which conceals all but the widened tip of the maxillary. Both pairs of nostrils opening in short but evident tubes, a character not known by us to exist in any other species of the genus. Eye 4⅛ to 4⅔ in head. Interorbital space narrow, the least width of the bone slightly less than half the vertical diameter of orbit, in adults 160 mm. long, much narrower in younger specimens. In this respect our specimens differ conspicuously from the types of *C. microstomus*, in which the interorbital width is said to equal vertical diameter of eye. As in *C. philonips*, we have but a single preopercular spine, which is straight and directed obliquely upward. Preopercular margin below the spine evenly rounded. Subopercular spine well developed.

Lateral line complete, following outline of back to opposite last dorsal ray, where it abruptly declines to middle of caudal peduncle. Body naked or with a narrow band of prickles extending from upper axil of pectorals along under side of lateral line.

Dorsals more or less joined at base in all our specimens, but varying in the height of the connecting membrane, which usually joins well up on first ray of soft dorsal, sometimes at its extreme base. The spinous dorsal is long, with 9 spines in 13 specimens examined, 10 spines in 5 specimens. The first two spines are very closely approximated, and spring from a single wide interspinal. The first spine is easily overlooked, as has been done by us (Investigations in the Columbia River Basin, 1894, p. 54), and possibly also by Lockington in his description of *C. microstomus*. Spinous dorsal low, the soft dorsal higher, the longest rays equaling length of snout and half eye, the last rays when depressed not quite reaching base of caudal. Anal fin much shorter than soft dorsal, its last ray under the fourth or fifth before the last ray of dorsal. Caudal truncate, slightly rounded when spread, its length 1½ to 1⅞ in head, its rays twice forked. Pectorals reaching to or nearly to front of anal. Ventrals varying in length, not quite reaching vent in any of our specimens. Pectoral rays all simple. Dorsal and anal rays all simple except the last, which is usually divided to the base in the dorsal, and sometimes divided in the anal.

Dorsal IX or X, 18 or 19; anal 13 or 14; pectoral 13 to 15; ventral I, 4; caudal 8 or 9 (forked rays); 35 to 37 pores in lateral line.

Head and body light brown, mottled or spotted above, the darker markings on back often arranged as six crossbars, of which two are below spinous dorsal, three below soft dorsal, and one on caudal peduncle. These are usually broken up into spots or reticulations, and are often obscure, sometimes wanting. Usually a light bar downward and backward from eye. Rays of dorsals, pectorals, and caudal crossed with series of dark blotches. Ventrals and anal light, very obscurely barred with darker.

This species was very abundant in the small stream passing through the village of Iliuliuk, Unalaska, living both in the upper strictly fresh-water portion of the stream and in the lower more or less brackish part. A specimen transferred to the salt-water aquarium on the *Albatross* seemed to suffer no inconvenience from the change of water and lived for several days. This is probably the *Uranidea microstoma* of Lockington, based on specimens collected near St. Paul, Kadiak, and con-

sidered by the describer to be identical with other specimens examined by him from the Aleutian Islands. Four specimens were collected by us May 26, 1889, in a small stream entering Departure Bay, Vancouver Island. These exhibit perfectly the differences separating *C. aleuticus* from its nearest ally, *C. philonips*.

59. Cottus asper (Richardson).

Five specimens taken in a small stream emptying into Departure Bay, Vancouver Island. The head is naked in all of these and the prickles absent on belly, along bases of spinous dorsal and anal fins, and on caudal peduncle.

	First dorsal.		Second dorsal.		Anal.		
Rays	VIII	IX	21	22	16	17	18
Specimens	1	4	3	2	1	1	3

60. Acanthocottus sellaris sp. nov.

Cottus quadrifilis Bean, in Nelson's Report, Natural History Collections in Alaska, 1887, 309, pl. XVIII; not *Porocottus quadrifilis* Gill.

Head cuboid, the anterior profile of snout subvertical, the greatest width a trifle more than the depth at occiput. Cheeks subvertical. Interorbital region elevated, the supraorbital rim furnished posteriorly with a low tubercle which usually bears an inconspicuous cirrus. The interorbital space is rather wide, transversely concave, its least width $2\frac{1}{3}$ in eye. Occipital depression well marked, the ridges unbroken, straight, converging rapidly backward, the distance between their tips but two-thirds that between their anterior ends. From the latter two low ridges converge for a short distance upon the floor of occipital depression. The ridges do not terminate in spines, but bear small cirri similar to those above eye. Like the latter, these cirri may be indistinct or wanting. Maxillary reaching vertical from posterior margin of pupil, $2\frac{2}{3}$ in head; eye $3\frac{3}{4}$, slightly exceeding snout. Nasal spines very strong. Two short spines diverge from angle of preopercle, the upper one slightly curved, directed upward and backward, half the diameter of orbit, the lower directed straight backward, two-fifths the length of the upper one. Below these are a short spinous projection concealed in the skin, and a longer spine directed downward and forward. Opercle with three lengthwise ridges, the uppermost ending in a definite sharp spine. Subopercular spine well developed; a spine also at posterior end of interopercle and one at shoulder. Gill-membranes broadly joined to isthmus, with a wide free fold posteriorly.

A few small prickly plates behind axil of pectorals; skin otherwise smooth. Occiput and nape thickly covered with minute dermal papillæ, interspersed with very small mucous pores, which are distributed also over the anterior part of the head. Pores on mandible and preopercular margin small, not better developed than in other species of *Acanthocottus*. Lateral line giving off pairs of short diverging branches, at the tips of which are the pores. Dorsals connected at extreme base, soft dorsal terminating slightly behind the anal. Fins all low. Ventrals reaching vent. Pectorals to opposite third ray of anal.

The following is a table of fin rays in ten specimens:

	Spinous dorsal.	Second dorsal.		Anal.			Pectoral.	Caudal.
Number of rays	VIII	13	14	10	11	12	16	9
Number of specimens	10	2	8	2	7	1	10	10

Head $2\frac{4}{5}$ to 3 in length; depth $3\frac{1}{3}$. Pairs of pores in lateral line 32 to 34. Branchiostegals 6.

Color in spirits: Upper parts brownish, with two very conspicuous white saddle-shaped bars extending downward and forward from back. The first of these, about as wide as orbit, extends from below the dorsal notch in a straight line toward lower axil of pectorals, including above the posterior margin of spinous dorsal and the extreme basal portion of first rays of soft dorsal. The second bar includes dorsally the terminal portion of soft dorsal upon which it extends and the anterior portion of caudal peduncle. Like the anterior bar, it is variable in width; it extends forward and downward to below caudal peduncle. The ground color becomes intensified along the margins of these light bars. Caudal with a light basal bar which becomes widened and pure white in its lower half, adding a third to the series of conspicuous light markings. In some specimens these white bars are tinged with brownish; hence less conspicuous. Under parts whitish. Lips and lower jaw with light and dark crossbars, which are often indistinct. Branchiostegal membranes sometimes with indistinct crossbars. The darker interspaces below soft dorsal and on caudal peduncle usually encircle the body below, but are sometimes (in males) broken on middle of sides with spots and blotches of white (see figure in Nelson's report cited above). Axil of pectorals usually with two round white spots, most distinct in males. Basal portion of anterior face of pectorals dusky or black, in males with two round white spots; fin distally barred with light and dark. Caudal crossbarred. Anal and ventrals with faint crossbars or plain. Dorsals blackish.

Taken abundantly in Bristol Bay, Alaska, at stations 3229, 3230, 3231, 3232, 3233, 3234, 3244, 3247, and 3300; depths, 5 to 17 fathoms.

We are unable to follow Dr. Bean in identifying this fish with *Porocottus quadrifilis* Gill (Proc. Acad. Nat. Sci. Phila. 1859, 166). The latter is described as having a single hooked preopercular spine, an opercle without rib or spine, and large pores on head and lower jaw. None of these statements apply to the present species. *P. quadrifilis* is also said to have five branchiostegal rays, but this is possibly an error. It is also described as having a slender superciliary filament, and one on each side of nape. We do not find, to offset these, any details in the original description which agree strikingly with our fish, even the color being inapplicable.

61. Acanthocottus polyacanthocephalus (Pallas)

This species closely resembles *A. humilis*, but differs in the much deeper and less-depressed head and body, the larger preopercular spines, the shorter and usually less-pronounced occipital crests, the absence of spinous plates on sides of body, and the presence of 10 (very rarely 9) spines in the dorsal fin. The coloration is also different, the dark bars on back being much better defined, not breaking up at an early age, as in *A. humilis*, into small black spots and blotches. None of our specimens show a pore behind the last gill, though this is constantly present in *A. humilis*. In both species the top and sides of head, including nape, are covered with small dermal warts. Both agree, also, in possessing supraorbital and occipital tubercles, behind the former of which is a cluster of short diverging ridges. Neither species seems to possess filaments on the head. In a highly colored male of *A. polyacanthocephalus*, exhibiting round white spots on lower part of sides and with horny tubercles on the inner surfaces of the pectoral rays, the sides of the body both above and below the lateral line are beset with sparse strong-embedded spines directed backward. All other specimens are naked, and it is probable that *A. polyacanthocephalus* never develops the circular spinous plates characteristic of *A. humilis* and some other species.

The following table gives the fin rays in 32 specimens:

	Spinous dorsal.		Soft dorsal.				Anal.		
Rays.....	IX	X	13	14	15	16	11	12	13
Specimens...	2	30	2	19	10	1	1	18	13

Taken at Makushin Bay, Unalaska Harbor, and near mouth of Unalaska River; at Shaw Bay, Unimak Island; at Herendeen Bay, and at the following stations in Bristol Bay: 3229, 3231, 3232, 3233, 3291, 3296, 3303; depth, 7¼ to 33 fathoms.

62. Acanthocottus humilis (Bean).

This species has a very slender body and an extremely wide, flat head, the latter strikingly triangular when viewed from above, due to the regular way in which it tapers toward the snout. The species is further distinguished by possessing but 9 dorsal spines and by the presence of an irregular series of circular spinous plates above the lateral line. These plates are not present in very young individuals. They are beginning to make their appearance in a specimen 6 inches long, and are invariably present in all our larger specimens. In adults the region below the lateral line contains strong spinous prickles, mostly concealed in the skin and directed backward. Some of the anterior ones may be broader and may have more than one point, but none are circular with a rosette of short spinous points, as is the case with the dorsal series.

Occipital crests long, gently converging behind, suddenly diverging near their posterior ends. Distance from supraorbital to occipital tubercle 1½ times the distance between the two supraorbital tubercles (the two measurements about equal in *A. polyacanthocephalus*). A sharp ethmoidal ridge extends backward from the level of the nasal spines to above front of pupil. Preopercular spines varying in length as in other species, the upper spine in older specimens usually not equaling diameter of eye. Pore behind last gill-arch always present. Spinous dorsal low, an unusually long interval between the two dorsals. Below are the fin rays in 23 specimens:

	First dorsal.			Second dorsal.			Anal.		
Rays.....	VIII	IX	X	15	16	17	13	14	15
Specimens....	1	21	1	6	16	1	1	14	8

The type of *A. humilis* has dorsal x–16; anal 13. According to Mr. Barton A. Bean, two specimens in the United States National Museum, collected by L. M. Turner, at St. Michaels, have dorsal IX–15, anal 14, and dorsal X–15, anal 14.

In the young, the dark dorsal bands are less sharply defined than in *A. polyacanthocephalus*, and in adult specimens they entirely disappear, breaking up into sharply marked black spots and vermiculating blotches and lines, which closely cover the upper parts.

Specimens were taken in the seine at the mouth of the Nushagak River, and one with a hand line at station 3290, Bristol Bay, 16 fathoms. All others were dredged in Bristol Bay, at depths of 3¼ to 21 fathoms, stations 3228, 3229, 3230, 3233, 3242, 3243, 3244, 3245, 3248, and 3250.

A. humilis closely resembles the description of *A. jaok*, with which it may well be identical. We do not venture to make this identification, as *A. jaok* is said to have but 7 dorsal spines, a number we have not found in *A. humilis*.

63. Acanthocottus verrucosus (Bean).

Heretofore known only from the type (3½ inches long) collected by Dr. Bean at Plover Bay, Siberia. The *Albatross* collected numerous specimens, the largest 16 inches (405 mm.) long. Adults possess the same combination of characters assigned to the immature type, having the top of the head strongly verrucose, the preopercular spine short, supraorbital and occipital filaments present, and the rays of dorsal and anal fins numerous. In addition they exhibit spinous plates along the sides, extremely high vertical fins, and very large supraorbital and occipital tubercles, from the summits of which the filaments arise.

The spinous plates above the lateral line are similar to those found in *A. humilis*, the anterior ones at least being circular, with a depressed center, and having the margin provided with a series of short, strong spines, sometimes interrupted for a short distance anteriorly. Under soft dorsal and on caudal peduncle the plates are smaller and less regular, being often much reduced in size, bearing 2 or 3 prickles directed backward from the margin. Below the lateral line are plates similar to those above, but fewer.

Cephalic tubercles are undeveloped in the young, but become very conspicuous in half-grown and adults. One above posterior margin of orbit and one at hinder edge of occiput are the largest and bear the short filaments. These rise very abruptly without evident connection with ridges. Behind the supraorbital tubercle is a smaller one, sometimes accompanied by one or two still smaller elevations, recalling in their arrangement the digitate postocular ridges of *A. humilis* and *A. polyacanthocephalus*. A smaller tubercle is present also immediately in advance of the principal occipital one. Preopercular spine short, the upper one not exceeding, sometimes much less than, longitudinal diameter of orbit. A well-developed pore behind last gill. Dorsals very high, without appreciable interspace, the longest spine sometimes equaling length of snout and eye, 2¼ in head, equaling the longest rays of soft dorsal.

Fin rays are as follows in 16 specimens:

	First dorsal.		Second dorsal.				Anal.			
Rays	X	XI	15	16	17	19	12	13	14	17
Specimens	15	1	2	9	4	1	1	10	4	1

The largest specimen is nearly uniform in the coloration of the upper parts, showing but faint traces of the dark bars usually found in this group. In all other specimens these are distinctly marked, though more irregular and less sharply defined than in *A. sellaris* and *A. polyacanthocephalus*. As usual, there is a broad bar under spinous dorsal, two narrower ones under soft dorsal, and a fourth on end of caudal peduncle. The ground color is unusually pale. In a highly colored male the lower part of sides is blackish, provided with roundish large white spots, the margins of which are often made conspicuous by a series of minute black specks. The fins are conspicuously barred. In most specimens a broad band of the light ground color crosses occipital region and extends backward and downward, including margin of preopercle above the spines and the greater portion of the opercle.

Taken at Unalaska, and in Bristol Bay at stations 3228, 3231, 3232, 3233, 3234, 3245, 3293, and 3300; depths, 5 to 30 fathoms.

64. Acanthocottus laticeps sp. nov. (Plates 26 and 27.)

Cottus tæniopterus Bean, in Turner's Contributions to the Natural History of Alaska, p. 94, plate 6; not of Kner.

Differing from *A. tæniopterus* Kner in the following respects:

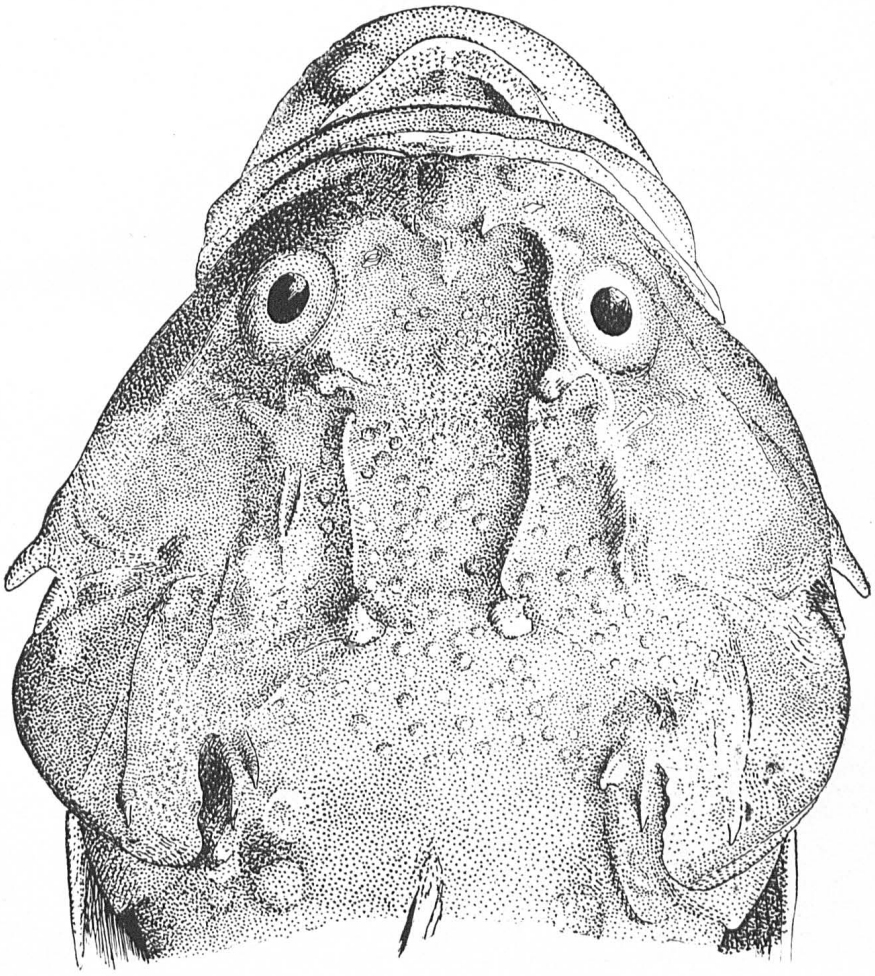
(1) The interorbital width is greater, 1⅔ times the diameter of the eye in *laticeps*, equaling the eye in *tæniopterus*.

(2) Similarly the distance between the anterior ends of occipital ridges is 1⅔ times diameter of eye in *laticeps*, equal to eye in *tæniopterus*.

(3) Conspicuous supraorbital and occipital tubercles in *laticeps*, each surmounted by a fleshy filament; in *tæniopterus* "crown and occiput are without prominences or spines, covered only with naked warty skin."

(4) In *laticeps* the preopercle has two diverging spines, a single downwardly directed spine below them. In *tæniopterus* are two downwardly directed spines below the angle.

(5) The ventrals are much shorter, not reaching vent when depressed, while in *tæniopterus* they reach the anal papillæ. The dorsals are also much lower in *laticeps*.



ACANTHOCOTTUS LATICEPS sp. nov.

The principal features of this species are the very broad, flat head, the short, wide snout, the projecting lower jaw, the two pairs of cephalic tubercles provided with filaments, the verrucose head, the very short preopercular spines, the large pore behind the last gill, the presence of circular spinous plates above the lateral line and prickles below it.

Head and anterior part of body broad, depressed, the depth of head at occiput 1⅞ in its greatest width, its length 2⅞ in body. Body tapering to a slender caudal peduncle, whose least height is equal to diameter of eye. Depth of body 4 to 4⅜ in length. Interorbital space very wide, shallowly concave, its width 1¾ times diameter of orbit, and 4 to 4½ in head. The low supraocular ridge ends in a blunt tubercle above hinder margin of eye, which grows higher with age. Occiput depressed, bounded by two low ridges which converge very strongly toward the nape, where they curve out again in low, rounded tubercles. The inclosed depressed area is twice as wide anteriorly as it is at the narrowest posterior part. A strong temporal ridge, less distinct in young specimens. Nasal spines very small. Mouth wide, transverse, oblique, the maxillary reaching vertical from hinder edge of pupil, 2⅜ in head. Mandible with its triangular tip protruding well beyond upper jaw in adults, the jaws nearly equal in young. Length of snout equal to interorbital width. Bands of short cardiform teeth on the jaws, and a broad patch on vomer; none on palatines. A conspicuous pore behind last gill. Gill-membranes almost wholly joined to the isthmus, the free border scarcely noticeable, its width less than one-third the diameter of the small pupil. Eye small, shorter than snout, 5½ to 6½ in head. Preopercle with two short strong spines diverging backward, and a strong concealed point below directed downward and forward. Upper preopercular spine about equal to eye, but little longer than the lower, reaching one-third the distance from its base to the tip of the opercular flap. Opercle with a well-marked longitudinal rib, ending in a sharp point. Scapular and subopercular spines present. Entire top and sides of head, nape, and anterior dorsal region covered with small dermal warts. Supraorbital and occipital tubercles with short filaments.

Space above the lateral line with an irregular series or double series of large round spinous tubercles. A few scattered plates on sides below the lateral line. Axil smooth. Plates of lateral line concealed in skin.

Spinous dorsal low, its longest spine 1½ in second dorsal, 3 in head. In some specimens a single line of small sharp tubercles, resembling spines, extends along each side of the rays of the second dorsal. The two dorsals are separated by a narrow space. Pectorals large, reaching front of anal, the lower rays much thickened. Caudal rounded. Ventrals reaching two-thirds distance to vent. Dorsal IX–14; anal 13; pectoral 18; ventral I, 3; lateral line 36–40. Length 6–11 inches.

Color: Dark olive-brown above, with faint traces of blackish bars; sides spotted or marbled with whitish. Belly, and lower parts generally, white. A blackish blotch on cheeks, one on opercle, and a third on front of mandible. Pectoral rays dusky, the membrane whitish, the fins crossed by three or four wavy black bars, which sometimes join, inclosing oblong or roundish white areas. Spinous dorsal not banded, the dusky and translucent areas variously arranged. Soft dorsal, with five oblique broad dusky bars. Anal with four bars, sometimes uniting to inclose white spots. Caudal similar to pectoral and anal. Brilliantly colored males are largely black on sides and below, with many large, rounded, partially-confluent, pearly-white spots.

Thirteen specimens from the Nushagak River, near its mouth; one from Herendeen Bay, on the northern side of the Alaskan Peninsula.

65. Acanthocottus profundorum sp. nov. (Plate 27.)

A deep-sea form, allied to *A. bathybius* Günther, from which it differs in the obsolescence of the occipital and nasal spines, the absence of the accessory spine in advance of upper preopercular spine, and in the more numerous rays of dorsal and anal fins. From above, the head appears smooth and evenly rounded, without

projecting spines or ridges. The occipital depression is very shallow, the occipital ridges depressed, scarcely noticeable, ending in depressed spines which are made out with difficulty.

Nasal spines undeveloped, the nasal bone small, posteriorly pointed, but not furnished with a projecting spine. Upper preopercular spine strongly compressed, curved upward, not reaching opercular margin, its length equaling diameter of eye. No spine at its base in front, as in *A. bathybius*. Below it are two short, strong spines directed downward and backward, and one more slender downward and forward. Opercle with a longitudinal rib ending in a short spinous point. A short spine on angle of opercle, and one below it on interopercle. Mucous canals everywhere greatly enlarged, giving a spongy texture to the entire head; series of very conspicuous pores on the preopercle, the mandible, and below suborbital chain.

Head 2⅘ in length; depth 5. Dorsal VII–13; anal 10 or 11; pectoral 17 or 18; ventral I, 3. Lateral line with 17 pores.

Mouth broad, oblique, maxillary reaching middle of pupil, 2⅕ in head. Mandible slightly protruding. Minute teeth in upper jaw anteriorly in two rather distinct rows, laterally in narrow bands. Teeth on vomer, none on the palatines. Eye longer than snout, 3⅘ to 4 in head. Interorbital width one-half diameter of orbit. Gill-membranes widely joined, with a wide, free posterior edge. No slit or pore behind last gill. Body smooth, without plates, granulations, or filaments. No plates developed in connection with the lateral line. Pores of lateral line in a double series; the two closely approximated, those of the lower series much the largest. Longest rays of second dorsal half length of head, twice the longest dorsal spine. Pectoral reaching front of anal or slightly beyond. Ventrals short, not nearly reaching vent. Upper parts very light-brownish, the belly and sides below lateral lines dark brown. Fins blackish. Mouth and gill-cavity dark.

Three specimens, 49 to 55 mm. long, from station 3329, north of Unalaska Island; depth 399 fathoms.

66. Gymnacanthus pistilliger (Pallas).

We agree entirely with Dr. Bean and Mr. Dresel (Proc. U. S. Nat. Mus. 1884, 251) in considering the North Pacific species, *G. pistilliger*, distinct from the North Atlantic form, *G. tricuspis*. We have not had an opportunity to make direct comparison between the two, but find the following differences on comparing our specimens with the current descriptions of *G. tricuspis*. *G. pistilliger* has a different fin formula, the spines and rays of dorsal and anal fins being fewer in number. This is shown by the following table, based on an examination of 40 specimens:

	Spinous dorsal.		Soft dorsal.				Anal.		
Rays	IX	X	13	14	15	16	15	16	17
Specimens ...	10	30	1	17	21	1	2	28	10

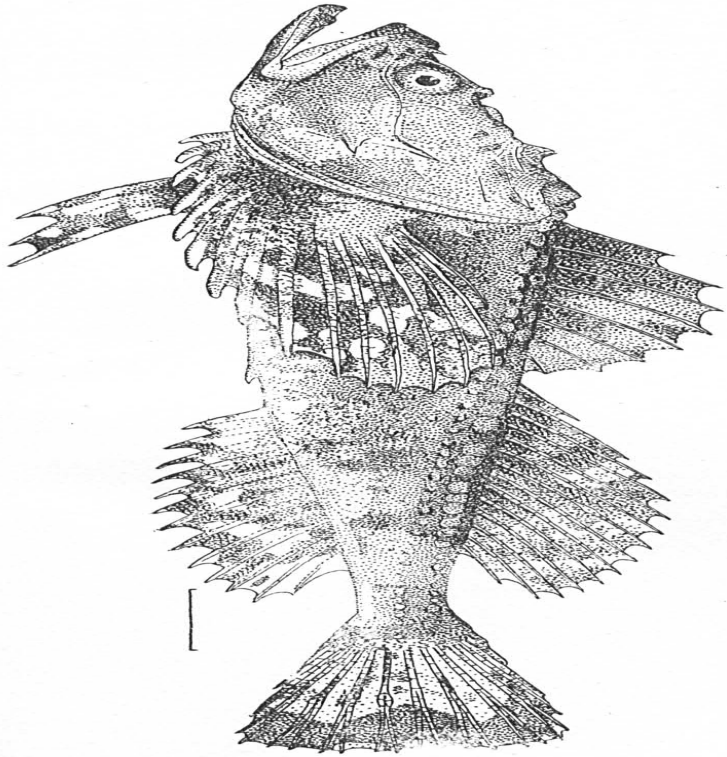
The normal formula may therefore be given: Dorsal IX or X–13 to 15; anal 15 to 17. The type of *G. pistilliger* is said to have dorsal IX–13; anal 16; and its synonyms, *G. ventralis* Cuvier & Valenciennes and *G. intermedius* Temminck & Schlegel, have respectively dorsal IX–13, anal 17, and dorsal IX–13, anal 14.

In *G. tricuspis*, the formula is dorsal XI or XII (rarely X)–15 to 17; anal 16 to 19.

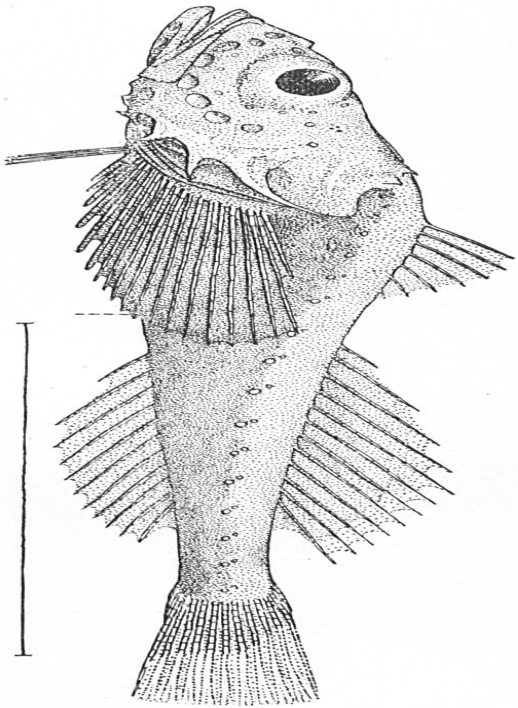
The dorsal fins are more widely separated in *G. pistilliger*, where the interspace is equal to half or more than half the diameter of the pupil.

The vertebræ are fewer in number, 12+24, instead of 12+28.

In *G. pistilliger* an obtuse prominence above the hinder margin of orbit bears in young individuals a slender cirrus, which frequently disappears in adults. Behind the eye a continuous occipital ridge bears three smaller bony prominences, the first



ACANTHOCOTTUS LATICEPS SP. NOV.



ACANTHOCOTTUS PROFUNDORUM SP. NOV.

immediately behind the eye, the second and third approximated at posterior end of ridge. These bear no cirri. *G. tricuspis* has no tubercles on occiput.

In males of *G. pistilliger* the postaxial region is furnished with a number of very slender filaments, each of which is expanded at tip into a compressed frond-like lamina, having the free edge more or less laciniate or fringed. These expanded tips are bright white and very conspicuous. No trace of them is present in females, but they develop in males at a very early age. These agree with the structures described by Pallas, on which he based the name *pistilliger*. They seem to be absent in *G. tricuspis*.

The upper preopercular spine is sharply bifurcate in even our smallest specimens (50 mm.), but in these no trace of a second medial upwardly directed spine is present. The latter is evident in specimens 70 mm. and more in length, and a small concealed prominence representing a third spine is exceptionally present.

The following table gives in millimeters the total length, the depth of body, and length of head in eight specimens:

Total length.	Length of head.	Depth.
Mm.	*Mm.*	*Mm.*
156	44	27
145	39½	25⅛
142	38½	24⅛
135	38	24⅕
135	40	25
134	37	24
125	34½	21
93	25⅝	16

Very young specimens show no groups of granulations on head or nape, these being usually wanting in specimens less than 100 mm. long. In older specimens they are variously developed, the degree of armature dependent neither on age nor sex. They are never armed on interorbital space, being unlike *G. galeatus* in this respect, the granulations being confined to the occipital and nuchal regions, with an additional elongate patch on the upper part of the opercle. In highly developed males the dorsal and ventral rays are accompanied with series of tubercles.

The color is brown above, with very narrow vermiculating lines of lighter; black blotch on cheeks, more conspicuous in males, and four inconspicuous crossbars on back. The darker dorsal area is bounded below lateral line by an irregular series of dark streaks or blotches. In males the lower jaw and preopercle are cross-banded with black and light yellow; the abdomen, the lower half of sides in front of anus, and the prepectoral region, have large roundish white spots, separated by vermiculating areas rendered dusky by aggregations of coarse black dots. Ventrals dusky and silvery, the latter frequently forming crossbands. Spinous dorsal dusky or black, with irregular series of white spots not confined to basal parts of fin. In both sexes the pectorals, second dorsal, and caudal are translucent or yellowish, crossed by narrow black bars.

The females are more numerous than the males in our collection, but the disparity in numbers is not so great as has been found by other writers. In 45 specimens examined as to this, 17 are males, 28 females. Taken abundantly in Bristol Bay at stations 3230, 3231, 3232, 3233, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3289, 3291, 3296, 3300; depths, 3½ to 26 fathoms.

67. Gymnacanthus galeatus Bean.

A single male specimen, 210 mm. long, from Chernoffski Harbor, Unalaska Island. The sexual peculiarities are less strongly marked than in much smaller males of *G. pistilliger*.

The ventrals extend but little beyond the front of the anal fin, and are unmarked. The abdomen is also plain, without the round white spots characteristic of male

specimens of *G. pistilliger* and *G. tricuspis*. These marks were apparently absent also in the type, as no mention is made of them. The spinous dorsal is not greatly elevated, its longest spine being contained 2½ times in the head. It is without distinctive markings, being colored like the soft dorsal, light yellowish, cross-banded with darker. Anal papilla short, 5 mm. in length.

Plates on head as in description, covering the interorbital region, crown, occiput, and nape as far back as front of dorsal; present also on upper part of opercle and in a vertical streak immediately behind eye. A very prominent tubercle over hinder margin of eye, a constriction behind it. Occipital region broadly rounded, without tubercles or conspicuous prominences of any kind, but with three smooth areas corresponding in position with the tubercles of *G. pistilliger*, and perhaps present as such in the young. The anterior one is slightly elevated. No superciliary filaments. Preopercular spines massive, short, with a single fork at tip, no accessory spines developed. Axil with prickly scales but without filaments.

Dorsal XI–16; anal 19; lateral line 43; head 52 mm. long; depth 32 mm. The depth is 6½ in the total length, not 7½ as described for the type.

This species is much more nearly related to *G. tricuspis* than to *G. pistilliger*. We have had no opportunity to compare it with the former, and follow Dr. Bean in considering it distinct.

68. Enophrys diceraus (Cuvier & Valenciennes).

Several adults taken with seine at Herendeen Bay, Alaska Peninsula. There are 6 or 7 strong barbs inclined forward on the upper surface of the preopercular spine, which is very long, slender, and straight, reaching to below middle of spinous dorsal. Filaments arranged as in *E. claviger*, but those on posterior part of body much more numerous. Anal papilla very large, 27 mm. in a specimen 195 mm. long. There seem to be no prickles on region above lateral line or on abdomen.

Fin rays in 7 specimens are as follows:

	Spinous dorsal.	Soft dorsal.		Anal.		
Rays	VIII	13	14	10	11	12
Specimens	7	4	3	1	2	4

Stomachs filled with molluscan shells, mainly limpets.

69. Enophrys claviger (Cuvier & Valenciennes).

A single specimen, 25 mm. long, from station 3233, Bristol Bay, Alaska; depth, 7½ fathoms.

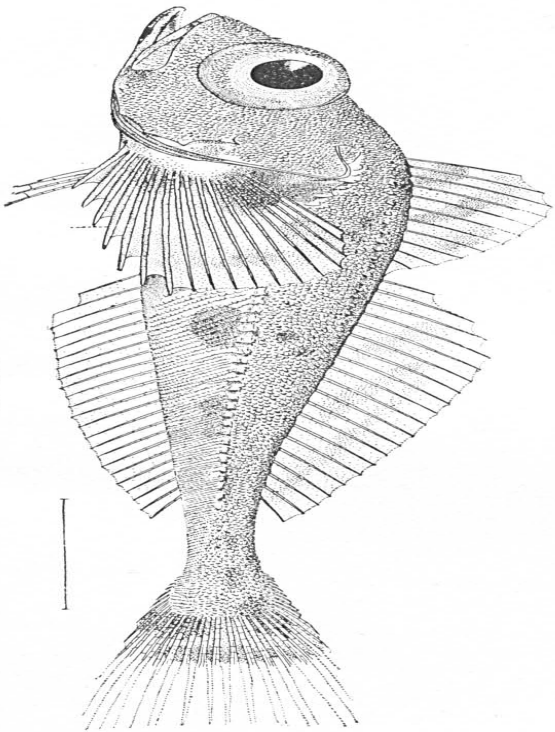
The upper preopercular spine is long and very slender, extending to below middle of spinous dorsal, bearing small serrations on anterior and posterior edges of basal half, but without larger teeth or accessory spinules. Area above lateral plates thickly beset with minute prickles; posterior part of abdominal region and the area above anal fin similarly beset with prickles which scarcely project beyond the small tubercles in which they occur. A few larger postaxial prickles and a small number of white filaments scattered along middle of sides. Filaments also at base of preopercular spines and 2 or 3 at tip of maxillary.

Dorsal VIII–14; anal 11; lateral line 35. It does not seem to us probable that this is the young of *E. diceraus*, as Dr. Bean would have it.

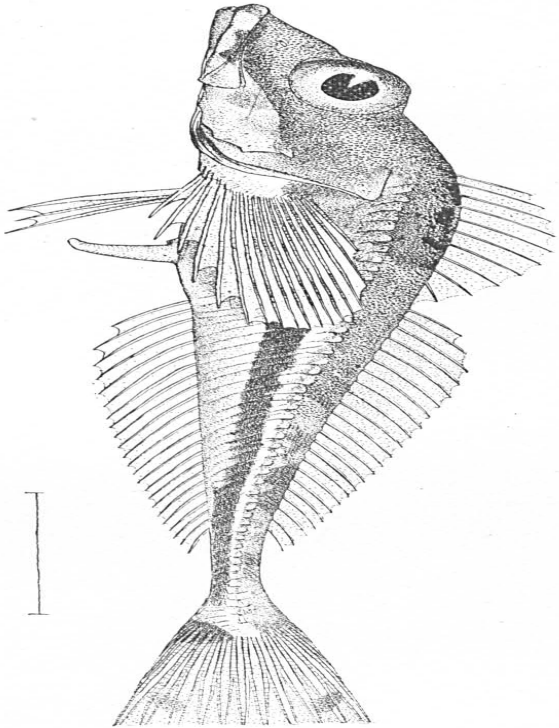
70. Triglops beani sp. nov. (Plate 28.)

Triglops pingeli Bean, Proc. U. S. Nat. Mus. 1883, p. 355, not of Reinhardt.

Diagnosis: This is the Pacific representative of the Atlantic *T. pingeli*, from which it differs in the greater slenderness of the body, particularly of the caudal peduncle, in the somewhat smaller eye, the more pointed snout, the less fine subdivision of the



TRIGLOPS SCEPTICUS sp. nov.



TRIGLOPS BEANI sp. nov.

lateral folds, the less complete investment of the fins with prickly scales, and above all in the peculiar coloration of the male.

Dorsal X or XI, 23 to 26; anal 24 to 26; caudal 12; pectoral 18; ventral I, 3; lateral line 48 to 50; branchiostegals 6.

Description: Body heavy at shoulders, tapering rapidly to the slender caudal peduncle. Depth, 6 in length; depth of caudal peduncle, one-fourth its length from base of last dorsal ray. Head, $3\frac{3}{4}$ to $3\frac{5}{8}$ in length; its greatest width slightly less than its depth; its lower profile straight, the upper descending in a gentle, even curve. Mouth nearly horizontal, the maxillary almost reaching vertical from middle of eye, $2\frac{1}{8}$ to $2\frac{1}{4}$ in head. Villiform teeth on jaws and vomer, none on palatines. Snout longer than eye, $3\frac{1}{8}$ to $3\frac{1}{8}$ in head; eye, $3\frac{1}{4}$ to $3\frac{3}{8}$. Supraorbital rim slightly elevated, a groove-like depression behind it. Interorbital space rather wide, forming a shallow groove; its width $3\frac{1}{8}$ to 5 in diameter of orbit. Occipital ridges obsolete, a faint trace of them sometimes present, never ending in a spine. Opercle with 4 spinous points, the lowermost directed downward and forward, the others radiating downward and backward. Branchiostegal membranes broadly united, free from the isthmus.

Longest dorsal spine, $3\frac{1}{8}$ to 4 in head. Base of spinous dorsal, $1\frac{9}{10}$ to $1\frac{1}{4}$ in head; base of soft dorsal, $2\frac{3}{8}$ to 3 in length of head and body; base of anal, $2\frac{9}{10}$ in head and body. Caudal slightly emarginate, $2\frac{1}{10}$ in head. Head and upper part of body densely covered with very fine prickles, much finer than in *T. scepticus*. The lower side of head, the maxillaries and a narrow strip along the lower side of cheeks naked. The usual series of enlarged prickles along the base of dorsals. Lateral folds few in number, scarcely exceeding the scutes of the lateral line. They leave a wide, naked strip along the base of anal and do not encircle the caudal peduncle below. Breast with 5 or 6 cross folds similar to those on sides. The scales along margins of folds very small, those of successive folds widely separated, not overlapping, as in *T. scepticus*.

Color: Light olive brown above, whitish on lower parts of sides and below; the breast and belly, including area in front of pectorals, silvery. Back crossed with four saddle-shaped black blotches, most distinct in the males. The first of these is under the middle of the spinous dorsal and extends obliquely forward to the upper axil of pectorals. The second and third are under the soft dorsal, narrowing rapidly downward to lateral line. The fourth is on the back of caudal peduncle. In males, the lower ends of these crossbars are connected by a narrow lengthwise jet-black streak extending from shoulder below lateral line nearly to base of caudal. The narrow interval between this streak and lateral line is occupied by a bright silvery streak, interrupted by the dark crossbars. A black blotch at base of upper and one at base of lower caudal rays, and a small black spot near tips of the outer caudal rays; the fin otherwise unmarked. An indistinct, dusky blotch below the eye, and a dusky streak along under side of suborbital stay, extending forward along the margin of the preorbital, to tip of snout. A blotch on middle of maxillary and upper lip. Front of lower lip dusky. A dark blotch on opercle, and a dusky bar on branchiostegal membranes.

In the females the general pattern of coloration is the same, but the darker markings are less distinct, and the black lateral streak of the males is represented by a disconnected series of irregular dark blotches and vermiculations. In both sexes the dorsals and pectorals are crossed by narrow, dusky bars, formed by series of dark streaks on the rays. Mouth whitish. Gill-cavity silvery white, except the lining of opercle and outer half of branchiostegal membrane, which is dusky.

Taken very abundantly at the following stations, located both north and south of the Aleutian Islands and in Bristol Bay: 3214, 3217, 3220, 3231, 3232, 3233, 3235, 3237, 3238, 3241, 3248, 3250, 3264, 3265, 3275, 3281, 3284, 3287, 3289, 3290, 3291, 3294, 3296, 3298, 3300, 3302. The depths range from $7\frac{1}{4}$ to 42 fathoms. Specimens 82 to 140 mm. in length.

71. Triglops scepticus sp. nov. (Plate 28.)

Very closely related to *T. beani* and *T. pingeli*, but different in the following respects: The eye is much larger, the snout shorter, and the maxillary shorter and broader. The maxillary bone and the lower half of cheeks are invested with prickles, not naked. The lower thickened portion of pectoral fin is produced to form a lobe. The scales on the upper half of the body are much coarser. The dorsal series of enlarged prickles is much less conspicuous. The lateral folds are much more numerous, averaging about four to one pore of the lateral line, reaching to or nearly to the anal fin and encircling the caudal peduncle below. The ventral fins are much narrower and nearer together. The lateral line has a much more pronounced upward curve over the base of the pectorals. A short, high occipital ridge is present, but does not terminate in a distinct spine. (Occipital ridge obsolete in *T. beani*, a bare trace of it sometimes visible.)

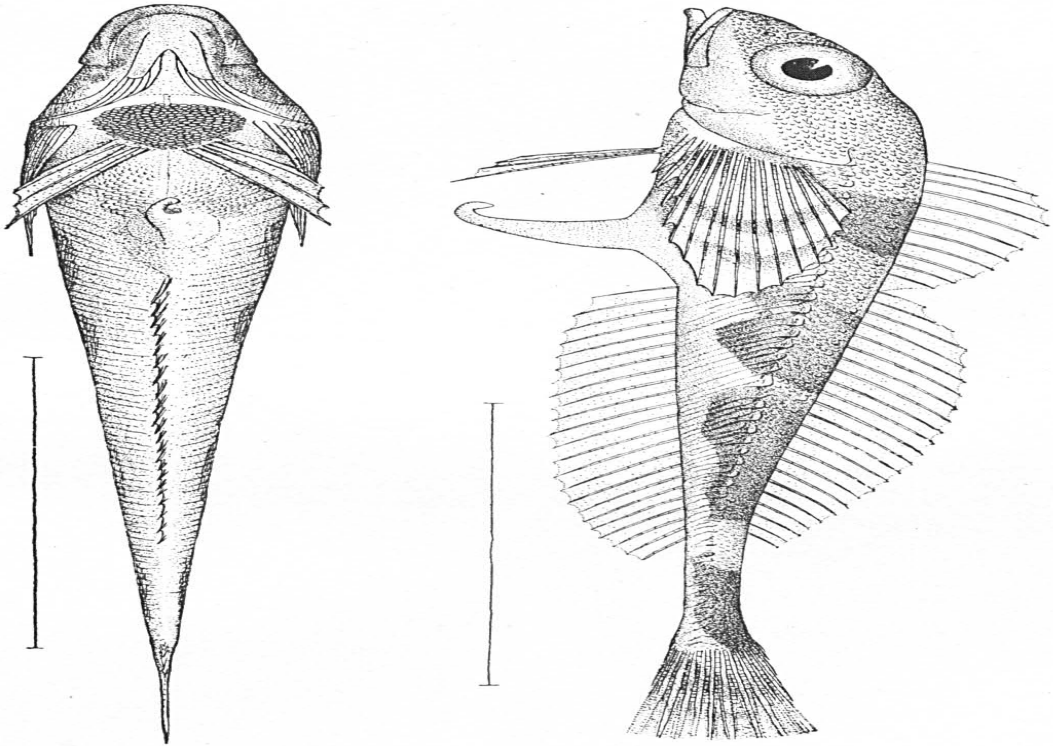
Dorsal, XI, 21 to 23; anal, 22 to 24; pectoral, 19 (18 on left side in two specimens); ventral I, 3; caudal with 12 fully developed rays; lateral line, 46 or 47; branchiostegals, 6.

Body very robust, the upper profile descending rapidly from front of dorsal in a regular curve to tip of the short snout. Depth, $5\frac{2}{7}$ to $5\frac{1}{2}$ in length. Least depth of caudal peduncle, $4\frac{1}{4}$ to $4\frac{3}{4}$ in its length from base of last anal ray.

Head of moderate length, $3\frac{1}{8}$ to $3\frac{1}{2}$ in body; its width is $1\frac{1}{3}$ to 2 in its length. Maxillary reaching to or nearly to vertical from middle of pupil, $2\frac{1}{4}$ to $2\frac{1}{3}$ in head. Mandible slightly projecting. Teeth on jaws and vomer, none on palatines. Two blunt spines on occiput. Eye very large, $1\frac{1}{4}$ times the interorbital width and $2\frac{1}{4}$ in head. Preopercle armed with five small spinous points, the upper one pointing upward and backward, the second and third backward, and the lower two pointing forward. Opercle ending in a triangular spine. Branchiostegal membranes broadly united, free from the isthmus posteriorly.

The upper part of the body and the top and sides of head, including all of cheeks, the lower, anterior, and upper parts of eye, and exposed portion of the maxillary, thickly covered with prickly plates. These are much larger, more spinous and scale-like than in *T. pingeli*, and are on sides loosely arranged in series. Spines and rays of dorsal, caudal, and pectoral fins, covered with series of prickles nearly to their tips, except the lower thickened rays of pectorals, which are naked. A row of enlarged plate-like scales along the lateral line, becoming very indistinct posteriorly. They are more numerous and less distinct than in *T. pingeli*, 38 in number to opposite the last ray of second dorsal. A similar series along the base of dorsal fins ending opposite the posterior part of second dorsal. The lower half of the body is crossed at short intervals by transverse undulating folds of skin, about 180 in number, the edge of each fold with small rough scales, causing it to appear sharply and finely serrate. These scales are much larger and more spinous than in *T. pingeli* and those of successive folds meet and overlap. The folds reach from the lateral line quite to the anal fin, and behind the anal completely encircle the caudal peduncle. In *T. pingeli* the space along the anal and the lower sides of caudal peduncle is naked.

Dorsal fins not connected, the membrane from last dorsal spine connecting with extreme base of first soft ray. Spinous dorsal higher than soft dorsal; the dorsal spines contained $2\frac{1}{3}$ times in length of head. Rays and spines slender. Base of anal equal in length to that of second dorsal, a little more than one-third length of body. Caudal truncate, with a number of short auxiliary rays above and below, and 12 fully developed rays, each of which is twice bifurcate. Pectorals reaching beyond front of anal, the longest ray $1\frac{1}{3}$ to $1\frac{2}{3}$ in length of head. The lower rays are enlarged and exserted, forming a distinct lobe, some of the rays of which are longer than upper part of the fin. Ventrals reaching beyond vent, very narrow at base, inserted close together, the outer ray not provided with the broad membranous flap present in *T. pingeli*.



TRIGLOPS XENOSTETHUS, sp. nov. Lateral and ventral views.

Color: Olivaceous above, light yellow with more or less silvery on sides of head and belly. Traces of four saddle-shaped bands of darker color reaching across back and below lateral line; one under first dorsal, two under second dorsal, and one on back of caudal peduncle. More or less of the outer portion of gill-membranes black, edged posteriorly with white. Gill-cavity black and roof of mouth dusky. Peritoneum silvery grayish. Dorsal and caudal fins indistinctly blotched with black, the blotch on the dorsal corresponding more or less closely to the bars on the back. A large black blotch on upper part of pectoral and on sides of body just above axil.

Several specimens, from 68 to 155 mm. in length, taken from stations 3215, 3222, 3223, 3224, 3225, 3309, and 3339, south of Sanuak and north of Unalaska Island, in 43 to 138 fathoms.

72. Triglops xenostethus sp. nov. (Plate 29.)

Differing widely from other species of *Triglops* in the investment of the breast, which is without trace of folds and is covered by small, closely imbricated spinous scales, not arranged in series. In all other species of the genus the breast is crossed by a few cutaneous folds similar to those on sides of body. In *T. xenostethus* the sides of the abdomen are covered similarly to the breast, but the scales are arranged in more or less evident series, some of which can be traced above into the cutaneous folds. The body is not slender, the lateral folds are not very numerous, the scales on head and on upper part of body are very coarse.

Dorsal XI–23; anal 23; pectoral 16; ventral I, 3; lateral line 43; branchiostegals 6.

Body shaped as in *T. pingeli*, rather heavy at shoulders, tapering gradually backward, its depth 6 in length. Caudal peduncle slender, its least depth 4⅔ in its length, which is two-thirds length of head.

The upper profile of head descends rapidly in a strong convex curve, unbroken to tip of snout. Mouth large, maxillary reaching vertical from middle of pupil, 2⅔ in head. Eye 3⅛ in head, snout 3¾. Interorbital space very narrow, one-fifth orbit, the orbital rim not elevated, the space neither grooved nor ridged. A pair of broadly rounded occipital ridges, not ending in spines. Nasal spines short and inconspicuous, a broad depression behind them. Preopercle with four ill-defined projections between the mucous pores, but without definite spines Gill-membranes as usual. Pectoral rays apparently all simple, the lower ones thickened. Prickles covering dorsal region and back and sides of head unusually coarse and few in number. The usual series of enlarged prickles along either side of base of dorsals. Folds below lateral line numerous, very oblique, two or three to each plate of the lateral line. On sides of abdomen anteriorly to vent the prickly scales bordering the folds form a dense mass in which the linear arrangement is still faintly visible. The breast is covered with a very dense patch of similar scales still more closely crowded. The lower part of cheeks and opercles and the preorbital region naked. Very light grayish above, with the usual four crossbars, those under soft dorsal and on back of tail broader than usual. Under parts whitish, becoming bright silvery on breast and belly. A series of irregular silvery white blotches along lower margins of the dorsal crossbars. Pectorals dusky at base of upper and lower rays, with two convex dusky bars on distal half. Snout and cheeks more or less dusky.

A single specimen 66 mm. long, from station 3220, north of Unalaska Island, at a depth of 34 fathoms.

ELANURA gen. nov.

Most nearly related to *Prionistius*, from which it differs in the presence of a series of enlarged scutes along each side of base of dorsal fins, in the presence of spinous cross folds on the breast, and in the very deeply forked caudal fin. From *Triglops* it differs in the forked caudal, in the great elongation of the body, and in the lengthened dorsal and anal fins. It agrees with *Triglops* and *Prionistius* in all other important structural details, including the exserted, more or less produced lower pectoral rays.

73. Elanura forficata sp. nov. (Plate 30.)

Most closely related to *Prionistius macellus*, with which it agrees in its extreme elongation, in the production of its exserted pectoral rays, and in the investment of the spines and rays of dorsal, caudal, and pectoral fins with series of minute prickles (not "serrations"). The caudal fin is very widely forked, not merely emarginate as in *P. macellus*; the dorsal series of spinous scutes is present, and also the customary plates on the breast. The ventrals occupy the usual position and extend well beyond the vent. The interorbital region is a wide shallow groove, unlike the narrow space in *P. macellus*. There is a narrow naked streak on cheeks following the lower line of the suborbital stay. The coloration is peculiar.

Dorsal XI-29 or 30; anal 30 to 32; pectoral 21; caudal 11; ventral I, 3; lateral line 54 to 56; branchiostegals 6.

Description Extremely elongate, heaviest at the shoulders, tapering slowly and regularly backward, the ventral region often distended. The depth varies from 6⅞ to 7⅓ in length, equaling or nearly equaling length of snout and eye. Length of caudal peduncle, from last anal ray to base of median caudal rays, varying from ⅝ to 1⅛ times length of snout and eye. Body everywhere compressed, slightly deeper than wide, the greatest width and depth of head about equal. Depth of caudal peduncle greater in females than in males, averaging three-sevenths diameter of eye in the former, two-fifths eye in the latter.

Occipital region of head nearly square in cross section, tapering regularly. A pair of inconspicuous low ridges diverging from behind eye; a pair of cross grooves, one immediately behind eyes, the other on middle of occiput, hardly noticeable in the young. Supraocular rim protruding laterally, anteriorly, and posteriorly, deeply incurved above middle of eye. The interorbital space is wide, evenly concave, its greatest width over front of eye equaling length of snout, its least width one-half diameter of orbit. Snout sharp, with greatly convex upper profile, showing a faint transverse groove behind nasal spines. Its length is less than diameter of eye, 3½ to 3⅝ in length of head. Mouth slightly oblique, reaching a vertical half way between front and middle of pupil, 2⅛ (in young) to 2½ in length of head. Eye 3 1/10 (in young) to 3⅛ in head. Gill-membranes widely joined, free from the isthmus. A well-developed slit behind last gill. The nasal spines are minute, as in *T. macellus*, barely visible. Upper preopercular spine short and simple, three lower ones developed as thin rounded lobes, irregularly serrate or spinous.

Squamation as in *Triglops;* the body above the lateral line and the top and sides of head thickly covered with small spinous scales. Lower side of head, including lower parts of cheek and preopercle and a narrow strip along lower half of preorbital, the suborbital ring, and the suborbital stay naked. The series of slightly enlarged dorsal scutes is very irregularly developed, the plates varying from 14 to 34 in 6 specimens counted. Lateral line slightly depressed above axil of pectorals, thence ascending by a gently convex curve, sometimes nearly straight, with 54 to 56 scutes of the usual character, having undulating folds descending obliquely from the posterior margins. Numerous secondary folds are also present, averaging about 2 to each scute of the lateral line, the total number of folds counted along lower half of sides being in adults about 135. The anterior base and the axil of pectorals and a strip encircling breast in front of ventral fins naked, the breast with a few (5 to 10) transverse folds similar to those on sides. The lateral folds leave a wide naked strip along base of anal fin and do not encircle caudal peduncle below.

Dorsal spines long and extremely slender, the longest 2½ to 2⅔ in head. The two fins are separate, the membrane of the last spine extending to base of first soft ray. Soft dorsal very long, its base 2½ to 2⅞ in length. It ends slightly in advance of last anal ray. Base of anal 2⅛ to 2⅜ in length. Anus anterior in position, nearly midway between axil of ventrals and front of anal. Ventrals inserted in the usual position, their distance from snout 3¾ or 4 in length. Along their outer margin they are provided with a wide cutaneous fold, as in *Triglops beani*. They extend well beyond

the vent in both sexes, reaching in males to or nearly to the front of anal. Pectorals usually with 21 rays, the lower 7 simple, thickened, exserted, 2 or 3 of them often as long as or longer than the branched rays above, the fin thus appearing notched or lobed. The longest rays extend well beyond front of anal, and are contained 1¼ to 1½ times in head. Caudal fin very sharply and deeply forked, especially in male specimens, where the median rays are but half the length of the longest ones. The caudal varies in length from five-sixths length of head (in males) to two-thirds length (in females), and contains 11 rays, the lowermost (corresponding to the uppermost developed ray) shortened and unbranched, as in *Triglops*.

Coloration similar in the two sexes. Light-brownish above (in spirits), the back crossed with the usual four saddle-shaped blotches; the first one broad, under the first seven or eight dorsal spines; the second narrow, under the fifth to the tenth rays of second dorsal; the third and fourth very narrow, under last dorsal rays and on back of caudal peduncle. Between the second and third bars are two or three similar fainter ones equally dividing the interspace. The bars are continued to below the lateral line, where they immediately fork, giving rise thus to a series of vertical dark blotches mostly arranged in pairs; the interspaces between some of the anterior pairs are provided each with a bright silvery spot. Under side of head and body whitish, the breast and anterior part of belly more or less silvery. Lining of opercle jet-black, the color descending onto the uppermost branchiostegal rays. An ill-defined dark blotch below eye, from which runs a narrow streak along preorbital to front of snout, where it crosses upper lip. Lower lip black, except laterally. No distinct markings on basal portion of pectorals; a small faint spot at base of its upper rays, and a number of very faint bars sometimes visible in females. Males with two conspicuous jet-black bars crossing terminal half of the lower thickened pectoral rays. Tips of the narrow caudal lobes jet-black; no other markings visible.

Several specimens, from 115 to 245 mm. long, from stations 3213, 3214, and 3222, south of Sannak and north of Unimak Islands, at depths of 38 to 50 fathoms.

74. Prionistius macellus Bean.

The elongation of the lower exserted pectoral rays and the "serrations" (*i. e.*, minute spinous scales) on the fin rays are characters which *Prionistius* shares with other related forms. The slenderness of the body, the emargination of the caudal fin, and the elongate dorsal and anal fins are also present in *Elanura forficata*, where the two former characters are carried to an extreme. The characteristic features of *Prionistius* are the naked breast and the absence of the usual series of enlarged plates along base of dorsal fin.

Four specimens, 77 to 87 mm. long, were secured at stations 3214, 3218, and 3223, south of Sannak and north of Unimak Islands, Alaska, at 38 to 56 fathoms. The ventral fins seem to be not more advanced in position than in the other species. In other respects our specimens agree well with Dr. Bean's admirably full description.

75. Hemilepidotus jordani Bean.

Taken abundantly in most localities visited, with hand lines at Unimak Island, Amak Island, and Unalaska Island, and with beam trawl both north and south of the Alaskan Peninsula and the Aleutian Islands, at stations 3213, 3214, 3215, 3217, 3220, 3222, 3259, 3262, 3266, 3281, 3291, 3292, 3294, 3322, and 3333, at depths of 19 to 50 fathoms. The fin rays range higher than in the types, as shown by the counts in seven specimens.

	Spinous dorsal.		Soft dorsal.		Anal.	
Rays	III, VII	III, VIII	21	22	17	18
Specimens	1	6	2	5	3	4

76. Oligocottus acuticeps sp. nov.

Most nearly related to *O. globiceps*, with which it agrees in the slender curved preopercular spine, not forked at tip, and in the absence of prickles on body. It differs strikingly in the small head, which tapers rapidly forward to the sharp slender snout, and in the narrow mouth with lateral cleft, as seen in all other species of the genus except *globiceps*.

Head 3½ to 3⅝ in length, slenderer and with sharper snout than in *O. maculosus*. Length of snout equaling diameter of eye, 4 in head. Interorbital space slightly concave, its width one-half eye. Maxillary reaching a vertical just in front of pupil, 3 in head. Cardiform teeth on jaws, vomer and palatine bones.

Preopercular spine slender, sharp, curved upward and inward, neither notched nor forked. Preopercular margin unarmed below it. Nasal spines sharp. Occiput without ridges or spines. Opercle thickened above, ending behind in a rounded lobe; without definite ridge or spine. Branchiostegals 6. No evident pore behind last gill. Gill-membranes broadly united, free from the isthmus.

A cirrus at inner base of nasal spines; 3 pairs evenly spaced on top of head, one above orbits, one posteriorly on occiput, and one midway between these two; a cirrus at angle of opercle; one above each pore of anterior portion of lateral line. Sides of body otherwise smooth, without further cirri and without axillary or other prickles.

Dorsal fins usually slightly joined at base. Pectorals reaching to or slightly beyond front of anal fin. Ventrals short, equaling length of snout and eye, extending little more than half way to front of anal. Anus anterior in position, thus differing from *O. maculosus* and *O. analis*, its distance from base of ventrals but half its distance from front of anal fin. Pores of lateral line 33, each of the anterior 15 usually accompanied by a cirrus. Fin rays in seven specimens are as follows:

	Spinous dorsal.		Soft dorsal.		Anal.	
Rays	VII	VIII	15	16	12	13
Specimens	2	5	3	4	3	4

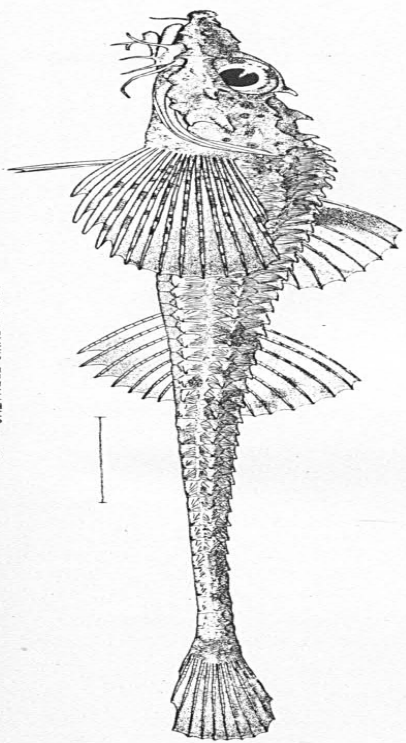
Color varying with the surroundings, often nearly uniform bright green. When dark markings are present, we usually find six short, wedge-shaped dorsal bars, widening rapidly below and joining one another by their extreme tips. Below these a dusky, wavy lengthwise streak and another wider one below lateral line. The latter is marked posteriorly by round white spots, the size of pupil. Occiput dusky. A black bar from eye to snout; one from eye to behind maxillary; one from eye to base of preopercular spine. The interval between these subocular bars may be silvery white. The spinous dorsal often shows two dark bars, as in *O. globiceps*. Ventrals plain. Fins otherwise finely mottled or indistinctly barred. Some or all of these dark markings may be absent.

Four specimens, the largest 47 mm. long, from tide pools at Unalaska, are the types of the species. Three others were taken in Departure Bay, Vancouver Island.

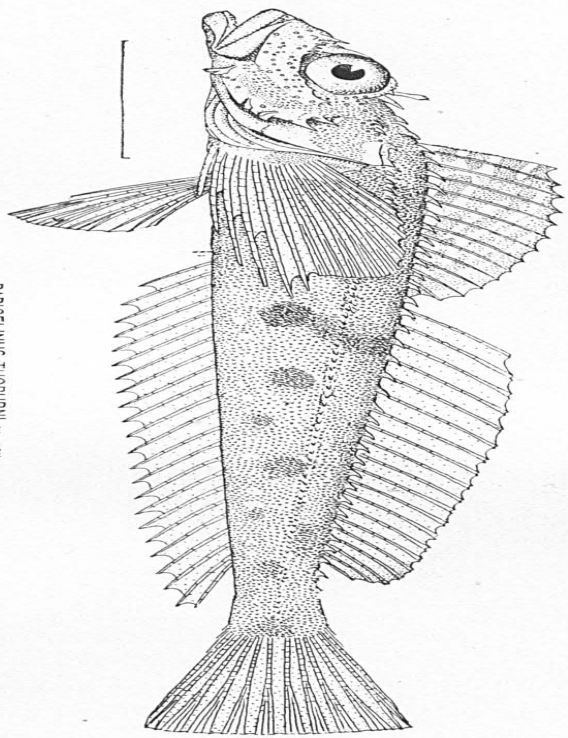
77. Paricelinus thoburni sp. nov. (Plate 30.)

A single specimen, 165 mm. long, was dredged at station 3350, off the coast of Oregon, at a depth of 75 fathoms.

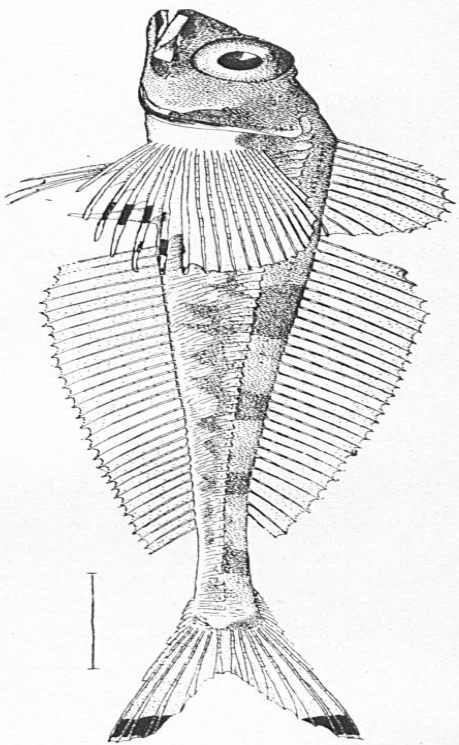
Our specimen agrees in most of its characters with *P. hopliticus* Eigenmann, but differs from the description of the latter (The West American Scientist, October, 1889, p. 131) in the following important respects: *P. thoburni* does not possess a pair of long barbels at the chin, but has others, not mentioned, above eye and along margin of preopercle. The suborbital stay does not possess two strong upwardly directed spines behind eye, but is thickly beset with a number of crowded smaller



ODONTOPYXIS FRENATUS sp. nov.



PARICELINUS THOBURNI sp. nov.



ELANURA FORFICATA sp. nov.

spines. The maxillary is contained 3 times, not 3½, in head. A distinct slit exists behind fourth gill-arch. The origin of the spinous dorsal is above the middle of opercle, not over its posterior portion. The lower portion of pectoral fin has its rays very much exserted and somewhat produced, apparently not the case in *P. hopliticus*. Following is a detailed description of our type:

Diagnosis: Elongate, with slender spinous head. Branchiostegal membranes broadly united, free from the isthmus. Preopercular spine simple; a distinct slit behind last gill-arch. Teeth in jaws and on vomer and palatines. A palmate supraorbital cirrus; others present on preopercle. Nasal spine strong. Body thickly beset with short, stiff villiform prickles. A series of plates along each side of base of dorsals, bearing each a strong spine. Plates of lateral line spinous. Both dorsals and the anal fin very long. Caudal rounded. Pectorals with the lower rays simple, exserted, produced. Ventrals broad, I, 5.

Paricelinus is thus not very closely related to any other genus. It seems to stand nearest *Icelus* (rather than *Icelinus*), but differs widely in the structure of its ventrals and pectorals, in the very spinous head, and in the nature of the body covering.

Dorsal XIII–19; anal 23; pectoral 15; ventral I, 5; lateral line 43 on right side, 44 on the left; branchiostegals 6. Very slender and elongate, the ventral line straight, the dorsal outline descending rapidly forward to the slender sharp snout and declining very gently backward to the comparatively short and compressed caudal peduncle. Body highest at the shoulders, compressed, everywhere deeper than wide. Depth 7 in length. Depth of caudal peduncle half its length from base of last dorsal ray.

Head 3⅔ in length, narrow, its greatest width equaling its depth, its profile convex above the orbits. Mouth nearly horizontal, the maxillary reaching a vertical midway between front of eye and front of pupil, 2⅔ in head. Teeth cardiform, in rather broad bands on jaws, vomer, and palatines. Snout slightly greater than length of eye, 3⅓ in head; eye 3⅔. Supraorbital rim greatly elevated, the interorbital space a deep narrow groove, with a pair of low, rounded, lengthwise ridges along its floor. Interorbital width 3⅓ in diameter of orbit. The anterior half of supraorbital rim is smooth, its posterior portion beset with crowded clusters of short, strong spines, occupying the upper posterior quadrant of the orbital rim. Three of these spines, somewhat larger than the others, lie one on either side, the other in front of the supraorbital cirrus. Upper margin of suborbital stay continuous with that of preorbital, elevated to form a thin knife-like crest which is irregularly serrate, with short spinous teeth, the anterior of which are the largest. Between this ridge and the eye lies a deep narrow groove. A strong postocular spine is directed backward, followed after an interval by two similar spines on occiput, the two series thus formed diverging backward. Nasal spines very strongly developed. The upper edge of the posterotemporal is minutely serrated. In advance of this is a series of three spines parallel with the occipital series, the posterior one remote from the two anterior. Opercle unarmed. Preopercle with three simple strong spines directed backward, the middle one on a line with suborbital stay and slightly the longest, its length three-fourths diameter of pupil. Branchiostegal membranes broadly united, free from the isthmus for its entire width. Gills 3½, a distinct and comparatively long slit behind the fourth arch. Gill-rakers undeveloped, tubercular.

Body covered with slender, short, villiform prickles, which leave only a very narrow naked strip along base of anal, and are continuous over the dorsal series of plates, reaching base of the dorsal fins. A narrow band of prickles occupies axil of pectorals, behind which is a wide naked area extending downward and backward to behind base of ventrals, the two areas separated by a narrow mesial band of prickles on belly. Similar prickles cover continuously the occiput, the opercles, and the portion of cheeks and preopercles which lie above suborbital stay. A narrow lengthwise band of prickles on cheeks below suborbital stay; the lower side of head, together with snout and interorbital region, otherwise naked.

A series of 34 broad plates along each side of dorsal fins, extending from the nape to the middle of caudal peduncle. Each plate is transversely angulated, the outer half directed outward and downward, the inner half nearly horizontally inward, the angle bearing a very strong, compressed, backwardly-hooked spine. The dorsal fins thus occupy the middle of a flat dorsal strip, bounded by the two series of spines. A number of enlarged spine-like prickles accompany the lateral line, each pore of which lies in the axil of one such. Anteriorly these prickles are arranged somewhat definitely in pairs, two to each pore, but this arrangement is lost posteriorly. A series of enlarged prickles is placed convexly at base of caudal fin. The upper unmodified rays of the pectoral fin and all rays of dorsal and caudal fins accompanied by series of prickles; other fins and the thickened pectoral rays smooth. Body without filaments. No barbels at chin, nor on mandible elsewhere. A slender tentacle, palmated at tip, above posterior portion of orbit, its length slightly less than diameter of pupil. A slender branched tentacle near base of middle and lowermost preopercular spines, and a simple one at an equal distance below them. A similar broadly palmated tentacle on cheeks behind end of maxillary, lost on one side in our specimen, but the scar apparent.

Dorsal fins separate, the membrane from last spine joining base of first soft ray. Spines very slender, the sixth the longest, 2¼ in head, very slightly shorter than the soft rays. Base of spinous dorsal 1⅓ in head, of soft dorsal 2⅔ in length of head and body. Front of anal under twelfth dorsal spine, the longest ray one-third head, the length of the base slightly less than half head and body. Caudal rounded, 1⅘ in head. The lower six pectoral rays simple, thickened, exserted, the membrane very deeply incised; the upper three longer than the branched rays above, the longest extending to opposite fifth anal ray. Ventrals broad, the inner rays shorter than the outer, which extend to opposite second anal ray.

Color in life: Light olivaceous, with four brown crossbands, one under spinous dorsal, three under soft dorsal. A series of nine roundish dusky spots along middle of sides below lateral line. Back and sides with small golden spots and streaks; a distinct series of round blue spots above lateral line, and some scattered blue spots and blotches on back and head, Iris green and dusky. Spinous dorsal light green, crossed by narrow yellow lines. Soft dorsal translucent, shaded with reddish and bluish. Ventrals translucent, posteriorly greenish, with white pigment. Pectorals translucent, the rays crossed with reddish and greenish bars, which are little conspicuous. Supraorbital cirrus green; preopercular cirri white.

Named for my esteemed colleague, Prof. W. W. Thoburn, from whom I have received important assistance in the preparation of this report.

78. Blepsias cirrhosus (Pallas).

Not rare at Unalaska, where numerous specimens were taken in the seine. Not seen elsewhere, and not taken with the beam trawl.

79. Nautichthys oculofasciatus (Girard).

Numerous immature specimens were taken in Bristol Bay and south of the Alaskan Peninsula, at depths of 5 to 50 fathoms. Stations 3213, 3217, 3220, 3222, 3231, 3232, 3233, 3234, 3236, 3246, 3274, 3281, 3290, 3291, 3292, 3293, 3294, 3296, 3300, and 3302.

Family AGONIDÆ.

80. Aspidophoroides inermis (Günther).

Not abundant. A few individuals taken north and south of the Aleutian group and in Bristol Bay, at depths of 34 to 59 fathoms. Stations 3213, 3219, 3220, 3265, and 3322.

81. Aspidophoroides bartoni sp. nov.

Very close to *A. monopterygius*, with which Alaskan specimens have been identified by Dr. T. H. Bean. From this species it differs in the much lower ridges, which are slightly rounded rather than sharply carinate, and leave the intervening faces

shallowly concave instead of deeply so. The plates of the lower lateral ridge do not in the young bear backwardly directed spinous points as they do in *A. monopterygius*. The keel in front of the ventral fin, prominent in *A. monopterygius*, is here nearly or quite obsolete. The same is true of the keel below the eye, and the occipital ridge. The plates in front of pectorals also protrude less, and in general the angles and prominences are less marked. The space between the dorsal ridges is less, its greatest width being half length of head behind middle of eye in adults, and behind posterior margin of eye in young. In *A. monopterygius* the same width equals half head behind front of eye in adults, behind middle of eye in young. Some of these differences scarcely admit of quantitative statements, but are sufficiently evident on comparing specimens from the Atlantic and the Pacific.

General proportions, fin rays, and color are the same in the two species.

Taken very abundantly both north and south of the Aleutian Islands and in Bristol Bay, at depths of 11½ to 121 fathoms. Stations 3213, 3223, 3224, 3225, 3238, 3245, 3246, 3248, 3250, 3251, 3252, 3253, 3255, 3256, 3258, 3263, 3267, 3272, 3273, 3278, 3280, 3281, 3282, 3283, 3284, 3285, 3286, 3287, 3291, 3292, 3293, 3294, 3296, 3299, 3300, 3301, 3302, 3303, 3306, 3309, and 3311.

This species is named for Mr. Barton A. Bean, of the U. S. National Museum, from whom I have received many courtesies during the preparation of this paper.

82. Siphagonus barbatus (Steindachner).

Stations 3239, 3240, 3242, 3243, 3244, 3245, and 3258 in Bristol Bay; depth, 4½ to 70 fathoms. The dark band on sides is often very strongly marked; the barbel varies much in length; the fins vary from dorsal VII to VIII–6 to 8; anal 9 to 12.

83. Brachyopsis dodecaedrus (Tilesius).

A few specimens taken in Bristol Bay, at stations 3239, 3240, 3242, and 3248; depth, 4½ to 31 fathoms. In males the colors are much brighter than in females, recalling *B. verrucosus*. The bars on dorsal fins in males intense black and bright white, instead of olive brown and whitish, as in females. Males show also a larger black patch on last anal rays, and have the interradial membrane of ventral jet black. In none of our specimens does the caudal fin show transverse lines of brown points, as described by Cuvier. In both males and females the caudal is dusky or black; the median rays lighter, the outer ones white. Dorsal IX or X—7 or 8; anal 14 to 16. In life the ground color of upper parts is light olivaceous. The median portion of the pectoral fins is largely red, divided by narrow lemon yellow lines into quadrangular areas, each of which has a black spot in its center. Median portion of caudal yellow at base, becoming reddish distally. A faint, long, reddish streak below lateral line.

84. Odontopyxis frenatus sp. nov. (Plate 30.)

Body slightly depressed, tapering regularly backward from occiput, the depth about seven-eighths of the width at base of pectorals. The ridges are prominent, the dorsal and dorso-lateral ridges provided with strong spines, the ventral and ventro-lateral series with weak or scarcely discernible spines, all decreasing in size backward, becoming obsolete on caudal peduncle. Dorsal face deeply concave anteriorly, its ridges coalescing from 3 to 4 plates behind the dorsal fin. Other faces much less concave, the ventral ridges coalescing 3 or 4 plates behind the anal fin. Plates in dorsal series 44 or 45; 5 or 6 pairs between occiput and first dorsal, 9 or 10 under first dorsal, 2 or 3 between dorsals, 7 or 8 under second dorsal, 17 or 18 behind dorsals. About 25 plates on breast, consisting of a strong median series which bears a well-marked rounded ridge, a strong lateral series at edge of breast also projecting, and a number of small plates occupying the concave intermediate areas. In young specimens the breast plates have central elevations and bear each a backwardly-directed spine. These disappear in adults. A number of small irregular plates in front of and on base of pectorals. Membranous intervals behind and around vent smaller than in *A. acipenserinus*, occupied by eight or nine irregularly arranged plates, not in pairs and not corresponding to those of the ventral series,

between which they are intercalated. Medial part of branchiostegal membrane and the gular region covered with roundish plates, the whole forming a halbert-shaped patch. Lateral line running on a series of small plates occupying the middle of the lateral face. Anteriorly these entirely disappear, the lateral line ascending and running on the upper lateral series. About five large plates, sometimes bearing spines, lie behind upper axil of pectorals, between this ascending portion of the lateral line and the inferior lateral series of plates.

Head depressed, tapering rapidly to the snout; depth of head at occiput two-thirds its width at preopercular spine, the latter contained 6¼ times in length of body. Eye large, the orbit about equaling length of snout behind the serrated rostral ridge, 3½ to 3⅔ in head. Snout somewhat variable in length, averaging one-third head. Supraocular ridges strong, rugose, ending in a short, strong spine. An inner pair of ridges occupies the floor of the interorbital groove, very broad and closely joined anteriorly. The triangular space included between these latter ridges is flat and opens posteriorly onto the depressed occipital area. Occipital ridges low, rounded, ending in very strong spines which form the first of the dorsal series; two or three small, rounded projections may occur on anterior ridges of occipital spines. The top and sides of head are more or less closely beset with very fine prickles, which are most thickly clustered on occiput, interorbital area, upper part of opercles, suborbital chain, and sides of snout. A row of prickles on eyeball, just above pupil.

Temporal ridge uneven, sometimes interrupted with a long, strong posterior spine. A strong spine, sometimes with an accessory tubercle, on middle of cheeks. Preorbital with two pairs of spines placed vertically, the upper ones directed outward and upward, the lower spines directed downward and backward. Rostral ridges rough, usually terminating posteriorly in a pair of spinous projections, which are located midway between tip of snout and front of pupil. Anteriorly, at tip of snout, these ridges expand to form such a vertically projecting, rounded, spinous lobe, the posterior spine of which is much the strongest and points backward and outward. In the very young the last-mentioned spines alone are present on snout, and are directed very obliquely backward. Anteriorly ridges converge from them to tip of snout and are very minutely serrulate. These ridges afterward increase in height and in strength of serrations, and become the spinous lobes already described. Two strong diverging spines at angle of preopercle and two rounded lobes below them. Three large plates and a number of smaller ones occupy cheeks below suborbital stay. Posterior portion of mandible expanded into a rough, projecting, bony prominence.

Mouth horizontal, overpassed by the snout in adults for a distance equaling half or less than half diameter of orbit; the snout not noticeably projecting in the very young. Maxillary reaching slightly beyond front of orbit, equaling half length of snout and eye. Teeth in broad bands in jaws; a distinct patch on front of vomer; none on palatines. Branchiostegal membranes broadly joined with a very narrow free fold posteriorly or with none.

Six pairs of barbels on under side of head: One on under side of snout in front of premaxillaries; two at end of maxillary; one near middle of maxillary; one on lower lip just below angle of mouth; one forked for half its length, at middle of side of lower lip. In their distribution, relative lengths, and in the constantly bifid character of the last described, they correspond exactly with the barbels of *L. decagonus*, but the latter has apparently none on under side of snout.

Interspace between dorsals somewhat variable, three-fourths to seven-eighths diameter of orbit. The anal begins two plates in advance of second dorsal. Pectorals 5½ in length of body, the lower rays graduated, four to six of the lower ones thickened, with exserted tips. Ventral fins nearly twice as long in males as in females, in the latter less than diameter of orbit. Caudal slender, 1¾ in head. Head 4⅓ to 4½ in length. Dorsal VI to VIII–7 or 8; anal 6 or 7; pectoral 15; ventral I, 2; caudal with 11 rays and a rudiment of a twelfth below. Lateral line 40.

Color, light grayish or brownish, pale below. A bluish-black stripe from rostral spines to front of orbit. Suborbital, preopercle, and opercle with numerous dark spots. A dark blotch on the side, opposite middle of first dorsal; a faint dark bar under the anterior and a similar one under posterior part of second dorsal. Both dorsals with indefinite oblique dark bands. Pectorals dark except the lower proximal part, with narrow bars of black; ventrals light in females, dark in males; anal dark posteriorly; caudal dark, faintly barred.

Stations 3219, 3225, 3226, 3227, 3255, 3256, 3257, 3258, 3263, 3269, 3279, 3282, 3309, 3311, 3313, and 3330, located on both sides of the Alaskan Peninsula and both north and south of the Aleutian Chain; depth, 16 to 351 fathoms.

85. Odontopyxis leptorhynchus sp. nov.

Very close to *O. frenatus*, with which it agrees in the arrangement of plates, the spines on head, and the barbels. It is distinguishable at once by the elongate slender snout and differs also in the following numerous details: Body somewhat broader and more depressed, its greatest depth a little less than two-thirds its greatest width, which occurs across preopercular spines. The body narrows rapidly backward to below spinous dorsal, as in young *O. frenatus* of the same size. Compared with *O. frenatus* of the same size, the plates on body are much less spinous, the superior and inferior lateral series and the ventral series in some specimens bearing spines on a few of the anterior plates only; the spines of dorsal series are lower. Five plates before dorsal, 10 under spinous dorsal, 2 between dorsals, 7 under second dorsal, and 16 on caudal peduncle. The inferior lateral ridges rise anteriorly, greatly constricting the lateral face under anterior part of spinous dorsal. It then descends slightly and becomes almost or quite obsolete, the series of plates ending behind the upper pectoral rays. In *O. frenatus* the constriction of the lateral face does not occur, the ridge is strongly marked anteriorly, and ends below middle of pectoral base. In *O. leptorhynchus* we have therefore a much narrower interval between the anterior ends of the upper and the lower lateral series. This interval is occupied by but 3 plates, arranged in a series, decreasing in size backward.

The upper preopercular and the humeral spines are much larger than in *O. frenatus*, the former greatly overpassing the second spine. The rostral spines are similar, but the terminal plate is roughened but not serrate, the posterior spine not detached. Snout greatly produced into a narrow triangular piece, which overpasses the snout for a distance equaling two-thirds diameter of orbit in a specimen 100 mm. long. In specimens of *O. frenatus* of this length the ends of the rostrum can barely be seen from below. A few prickles present on upper side of rostrum, and the usual series above pupil. Minutely serrated ridges on sides of snout, and one below eye. No prickles on top or sides of head. Plates on branchiostegal membranes and on gular region smaller and more numerous than in *frenatus*. Twenty plates on breast, without spines, or the young with very small ones.

Head 4 in length. Snout $2\frac{3}{5}$ in head in a specimen 100 mm. long. Eye $3\frac{1}{4}$, equaling length of maxillary. Interorbital width two-thirds eye. Branchiostegal membranes broadly united, extensively free laterally, joined to isthmus mesially to extreme posterior margin, or leaving a very narrow margin free. Teeth present on jaws and on vomer, none on palatines. Dorsals VI to VIII–6 or 7; anal 6 or 7; pectoral 14; ventral I, 2. Pectorals long, reaching to or beyond middle of spinous dorsal, as long as snout and eye. Ventrals equaling length of snout.

Color darker than in *O. frenatus*, the under parts unmarked anteriorly, dotted posteriorly with brown; upper parts dark brown in spirits, with six or seven more or less distinct black bands, which are margined narrowly with lighter. A black streak forward from eye, and several black spots and blotches on sides of head. Caudal blackish. Soft dorsal dusky, obscurely marked with lighter; spinous dorsal black, sharply blotched with pure white. Ventrals and lower pectoral rays white, the upper part of pectorals with obscure bars of black.

A few specimens from stations 3215, 3219, 3222, 3229, 3259, 3265, and 3267, north and south of the Alaskan Peninsula, in 32 to 59 fathoms.

86. Xenochirus triacanthus Gilbert.

A single specimen dredged at station 3350, near Point Reyes, Cal., at a depth of 75 fathoms. In life olive brown, with small pearly spots on back.

87. Xenochirus alascanus sp. nov.

Most nearly related to *X. pentacanthus*, with which it agrees in having a rostral plate bearing three spines and in having the branchiostegal membranes without free fold. It differs conspicuously in the broader head, with its much heavier spines and ridges, in the presence of deep postocular and nuchal pits, in the smooth breast and cheeks, in the different coloration and fin rays, and in many other details. Head 4½ to 4⅝ in length; width of head equaling or slightly exceeding length of snout and eye. Depth of body equals length of snout and half eye. Fin rays in eight specimens as follows:

	Spinous dorsal.			Soft dorsal.		Anal.	
Rays	V	VI	VII	6	7	7	8
Specimens	1	4	3	6	2	7	1

Pectorals 15 or 16; ventrals 1, 2; lateral line 39 or 40.

A decided pit behind the eyes, and a deep transverse nuchal depression, the two separated by the prominent occipital region. Snout of moderate length, much depressed behind the spines, 3⅔ to 3¾ in head. Eye 3 in head in adults. Interorbital space wider, much more deeply concave, the supraocular ridges very heavy, minutely roughened, ending posteriorly in robust spines. Rostral armature as in *X. pentacanthus*, consisting of a small apical plate bearing three small diverging spines, behind which are two longer ones. Preorbital with a small spinous point directed backward. A spine posteriorly on bony bridge across cheeks. Below this bridge the cheeks are entirely mailed by three rounded plates, which bear no spines, except in young specimens, and are so intimately joined that the sutures are difficult to discover. In *X. pentacanthus* the plates are much smaller and do not entirely cover the cheeks, leaving soft areas surrounding them, and the two posterior plates bear spines. Maxillary 3⅔ in head, barely reaching front of orbit. Teeth on jaws, vomer, and palatines. The usual row of 5 or 6 prickles on eyeball. Preopercle with three diverging spines at angle, a rounded lobe beneath them. Spines and ridges otherwise as in *X. pentacanthus*, but stronger and rougher. Three or four strong plates present on gular membrane; a few weak ones, or none, on branchiostegal membrane mesially. Two barbels at tip of each maxillary, and a pair, often double, on under side of mandible arising from the margin of the anterior pair of mandibular pores. The symphyseal pore has its margin sometimes provided with very short barbel-like elevations.

Space between dorsal ridges very deeply concave in front of dorsal fins; the single ridge behind dorsal fins provided with very short, scarcely perceptible, double spines. Lower lateral series of plates continued forward to axil of pectorals (becoming indistinct anteriorly in *X. pentacanthus*). Ventral series anteriorly with few short spines or none; this series strongly spined in *X. pentacanthus*. Plates on breast arranged alike in the two species, but in *X. alascanus* they are more finely striate and bear neither spines nor raised centers, except in very young specimens. In *X. pentacanthus* the elevated centers may or may not bear short spines. Seven plates before dorsal, 8 or 9 under spinous dorsal, 2 or 3 between dorsals, 7 or 8 under soft dorsal, 13 or 14 behind dorsals. Distance from snout to nape equals or slightly exceeds distance from nape to first dorsal. Front of anal under end of spinous dorsal or slightly behind that point, more anteriorly placed than in *X. pentacanthus*. Ventrals 2⅓ to 2⅔ in head. Lower pectoral rays produced, with incised membranes, as long as head behind rostral spines.

Color lighter than in *X. pentacanthus*, more or less finely speckled above, usually with five or six dusky crossbars on back. A series of linear dark blotches below the lateral line. The head is often finely speckled with brown and shows traces of a brown bar forward from eye to snout. Dorsals, caudal, and upper half of pectoral light, finely speckled with brown, the caudal shaded with dusky. Ventrals and anal white.

Taken rather abundantly in the vicinity of Unimak Pass, both north and south of the islands, at depths of 35 to 138 fathoms. Stations 3216, 3219, 3223, 3225, 3226, 3257, 3258, 3263, 3309, 3310, 3311, 3313, 3322, 3334, 3336, and 3339.

88. Bathyagonus nigripinnis Gilbert.

In adult specimens the lower pectoral rays show a tendency to elongate, as in *Xenochirus*, but the fin is never distinctly notched. The lower jaw always strongly protrudes, and the genus differs further in the very thin cranial bones and the inordinate development of the mucous system. In addition to the specific characters mentioned in the original description, we note that the eyeball does not exhibit the usual row of prickles, and that two barbels are usually present at end of maxillary, either black or white in color.

The skull is firmer than indicated in the original description, the mucous channels less conspicuous. Eye 3 in head. Interorbital width 3 in orbit. Anterior part of supraorbital ridge strongly flattened and finely rugose. One occipital spine only.

In life, the body is translucent-grayish, the fins blackish, the lower side of head, the belly, the anal fin, and the lower pectoral rays bright blue with golden reflections.

The majority of the specimens were obtained north of Unalaska Island; it was also taken south of the islands, and off the coast of Washington. Stations 3210, 3316, 3324, 3325, 3329, 3330, 3331, 3332, 3337, and 3343; depths 109 to 483 fathoms.

89. Hypsagonus quadricornis (Cuvier & Valenciennes).

Taken north and south of the Aleutian Islands in shallow water; also at one station in Bristol Bay. Stations 3213, 3214, 3217, 3220, 3223, 3224, 3262, and 3322; depths from 34 to 121 fathoms.

Our specimens agree perfectly with the description of *Hypsagonus* (*Cheiragonus*) *gradiens* Herzenstein (Bull. Acad. Imp. des Sci. de St. Petersburg, XIII, 116, May 29, 1890) described from the Gulf of Awatscha in Kamchatka. Dr. G. A. Boulenger, of the British Museum, has kindly compared one of our specimens with the type of *Aspidophorus quadricornis* Cuvier & Valenciennes, and states that they are undoubtedly identical.

Body short, much compressed, the head also narrow and compressed, especially above and in front. Nasal spines short and strong, a slender barbel of varying length in front of them on middle line of snout. Ocular region abruptly rising above the short slender snout, the eyes vertical, overarched by the supraorbital rim which bears posteriorly a strong vertical spine. Interorbital space with a deep median groove and without ridges, the occipital region depressed below the bottom of the groove. No deep pit on occiput, the space being gently concave transversely, bounded laterally by moderate ridges, which bear posteriorly a spine preceded by a long tubercle. A strong spine at lower inferior border of orbit. A strong spine at upper preopercular angle and three smaller ones below it. A strong spine above the base of pectoral, behind and above which on sides are two strong spines nearly in line with the upper lateral series of plates. Surface of opercles with a few short spinous processes, but without definite spine. Vomer and palatines toothless. Branchiostegal membranes broadly joined, forming a free fold across the isthmus. Mouth narrow, horizontal, terminal, the lower jaw included. Maxillary reaching vertical slightly behind front of orbit, 3¾ in head. Eye large, 3 in head; snout 4; interorbital width over middle of orbit, ¼ head behind snout.

Nape rising very abruptly from occiput to front of dorsal, the outline thence descending to near front of second dorsal, when it again ascends. The points of

origin of the two dorsals are therefore prominent, the profile concave behind them. Body deepest under first dorsal spine, the depth 3¾ in length. Greatest width of body near ventral outline immediately behind ventral fin, 5¼ in length.

A series of small plates along base of spinous and anterior portion of soft dorsal, bearing one spinule to each ray; plates all concealed, the spines alone projecting. Upper lateral series of plates very small, bearing each a minute spinous point. This series is narrowly separated from base of spinous dorsal and runs along base of soft dorsal, the two series uniting immediately behind the latter, bearing each a pair of diverging spines. Lateral series with very strong spines, the largest being the anterior one of the lower lateral series. The upper lateral series is incomplete anteriorly, ending under the eighth dorsal spine. It is apparently completed by two very strong spines, which belong, however, to the series of the lateral line. Ventral series of spines small, running along immediate base of anal fin, the pairs uniting behind the anal, the resulting plates bearing a pair of spines. As in the case of the dorsal series, this union is more or less irregular and incomplete, the corresponding plates sometimes failing to unite, and then either maintaining their opposite position or alternating. Lateral line with few widely spaced pairs of pores, those of each pair approximated, horizontally instead of vertically placed. The interspaces bear in the posterior part of the body a minute prickle each; in the case of the two or three anterior pairs these become very strong spines, nearly on a line with the incomplete upper lateral series of plates. Anus anterior, nearly midway between base of ventrals and front of anal.

First dorsal spine vertically over upper axil of pectoral. The fin is rigidly spread in alcoholic specimens. The third and fourth spines are longest and about equal length of snout and eye; interspace between dorsals equaling half length of orbit; anal much longer than second dorsal, its first ray under last dorsal spine, its last ray slightly in advance of the last ray of soft dorsal; anal membranes deeply incised, especially anteriorly; caudal short, rounded; pectoral of two distinct divisions, the upper portion consisting of four or five rays joined by membrane, the lower part of eight entirely disconnected rays. These upper and lower portions of the fin are used alternately in pushing the fish forward on the bottom, the upper lobe bending downward and forward for the purpose. In the aquarium the fish appears to walk, resting alternately on the upper and lower pectoral rays and on the front rays of the anal. The longest pectoral rays reach to or just beyond front of anal. Ventrals short, not reaching vent in females, reaching to or slightly beyond vent in males. Dorsal IX to XI–6 or 7; anal 9 or 10; pectoral 13 or 14; ventral I, 2; caudal 13; vertebræ 8 + 28; lateral line 7 to 9.

Color: Blackish or grayish violet, paler below. Breast and belly in front of vent marbled with darker. Anterior part of sides to opposite last dorsal spines dark, the darker region limited by a still darker band, which runs up on the fin. Posterior part of body paler, usually with three darker crossbars, the last of which often broadens out to occupy all of the caudal peduncle. Caudal with a dark bar at base and another at posterior margin, the extreme edge white. The dark vertical bars are continued on to the anal fin; anal rays also spotted with black near the tips. Ventral with a black bar or spot at base; sometimes a second on middle of fin. Pectorals indefinitely crossbarred, largely pale on basal portion. The color varies greatly, the lighter areas on body and fins often with dusky marblings.

90. Podothecus acipenserinus (Tilesius).

One of the most abundant species obtained, occurring everywhere in shallow water around the Aleutian Islands and in Bristol Bay. Vertebræ, 13 + 28. Stations 3213, 3215, 3216, 3219, 3238, 3239, 3240, 3246, 3248, 3249, 3250, 3251, 3252, 3259, 3264, 3265, 3266, 3267, 3269, 3271, 3272, 3273, 3278, 3279, 3280, 3281, 3283, 3284, 3285, 3286, 3287, 3290, 3291, 3293, 3294, 3296, 3298, 3299, 3300, 3301, 3302, 3303, 3309, and 3334; depths, 11½ to 71 fathoms.

Family LIPARIDIDÆ.

91. Paraliparis holomelas sp. nov.

Closely allied to *P. cephalus* and *P. mento*, differing in its uniform coloration, its more inferiorly placed horizontal mouth, and the distinctly included lower jaw.

Head about 5 in length; depth about 6. Dorsal 58 to 61; anal 54.

Head very large and heavy, with very broadly rounded snout and much swollen occipital and nuchal regions. The highest point is over upper opercular angle, from which the profile descends rapidly backward, though much less so than in *P. cephalus*. Snout very blunt, evenly rounded, very slightly projecting beyond the mouth, its width equaling the length of snout and eye, half the length of the head. Eye two-thirds interorbital width, 3⅞ in head. Mouth large, horizontal, quite at lower side of snout, entirely below the eye; maxillary reaching a vertical slightly behind posterior margin of orbit, 1⅞ in head. Teeth acute, arranged in oblique series in each jaw, forming a very narrow band in mandible, a broader band in upper jaw. Very large mucous slits on head, 5 forming a series from tip of snout below eye and across cheeks, 6 along mandible and preopercle. Gill-slit wide, extending from above opercular flap nearly to middle of base of pectorals, its length 2¼ in that of head. Opercle forming posteriorly a narrow angular flap, projecting above base of pectorals. No pseudobranchiæ.

Vent below opercular flap, or somewhat in advance of that point, nearer to base of pectorals anteriorly than to first anal ray. Pectorals inserted very low, the base of upper lobe vertical, the base of notch and lower lobe horizontal, the upper end of base below the level of the eye. Pectorals with two wholly distinct lobes, the interspace without free membranous margin, the skin of abdomen directly continuous at this point with that of shoulder girdle. On dissecting off the integument, however, the interspace between the lobes is seen to be provided with two or three short, widely spaced rays, as in all other species examined by us. The upper lobe is long, reaching beyond front of anal, with the rays close set, 18 in number, included in the membranes to their tips. Lower lobe consisting of five or six slender, almost filamentous rays, the longest reaching front of anal, all of them free to the base, without connecting membrane. Anterior (lower) ends of shoulder girdles approximate, the rays separated by a distance equaling half diameter of pupil. Dorsal beginning above base of pectorals.

Color uniformly black, including fins and lining of mouth and gill-cavity.

Two specimens, 95 and 100 mm. long, from north of Unalaska Island; depths 406 and 1,625 fathoms; stations 3308 and 3332.

92. Paraliparis ulochir sp. nov.

Differing from other Pacific species in the high insertion of the pectorals and their short horizontal limb, and from *P. holomelas* in having the fins not divided into two separate lobes. In general appearance greatly resembling *P. holomelas*, being also uniformly black in color, having the same broadly rounded snout, horizontal mouth with included lower jaw, and prominent occipital and nuchal region. The maxillary reaches vertical just behind pupil and is contained 2 1/6 times in head. Teeth acute, in rather broad bands in both jaws. Snout broad and short, very slightly projecting beyond the mouth, the distance from tip of snout to front of eye 4¼ in length of head. Eye large, 3 to 3¼ in head, nearly twice the bony interorbital width. Gill-opening a narrow slit, restricted to area above base of pectorals, not longer than diameter of pupil. Opercle forming a short pointed lobe posteriorly, which touches base of upper pectoral ray. The head is denuded of skin, so the nature of the mucous pores can not be made out.

Dorsal beginning above upper base of pectorals. Pectorals placed higher than in any other species known, its base describing a gentle even curve, convex backward, horizontal for a very short distance anteriorly. Its upper end is above level of pupil, and its lower anterior end is vertically below posterior margin of orbit. The upper

and lower rays of the fin are fine and crowded, the middle third of the base being occupied by 4 or 5 more widely spaced rays. The fin has 25 rays, of which 9 belong to the lower lobe. The upper lobe extends beyond origin of anal fin. None of the rays are free. The lower anterior ends of the pectorals are closely approximated, without perceptible interspace. Vent anterior in position; a distinct though short anal papilla. Distance from vent to anterior end of pectoral base one-third its distance from front of anal. Head about 5 in length, equaling the depth. Dorsal about 65. Anal about 60. Longest specimen 85 mm. Uniformly black, including mouth and branchial cavity.

The types of this species were taken by the *Albatross* in 1890 in the Gulf of California, station 3010; depth, 1,005 fathoms. A single young specimen taken in Alaska north of Unalaska Island, station 3332; depth 406 fathoms.

93. Paraliparis cephalus Gilbert.

Several more or less mutilated specimens were taken north of Unalaska Island and near Port Reyes, Cal.; stations 3225, 3330, and 3348; depths 284 to 455 fathoms.

In this species the pectoral is inserted very low, its upper edge entirely below the eye. The lower jaw shuts within the upper, but the symphysis protrudes. The disproportion in size of head and body is more exaggerated in the young than in adults. In very small examples the head is almost spherical, diminishing abruptly to the very slender tail. No pseudobranchiæ.

94. Careproctus ectenes sp. nov.

An extremely elongate form; depressed, but narrow anteriorly; the head as seen from above appearing shovel-shaped, with truncate snout. The nape is not elevated and the cheeks are not gibbous. The width anteriorly everywhere exceeds the depth. The mouth is inferior and transverse, overlapped by the short, depressed snout for a distance equaling diameter of pupil; the width of mouth nearly twice distance from symphysis of lower jaw to angle of mouth, the latter reaching vertical from about front of pupil. Teeth small, weakly tricuspid, in narrow bands, the lower jaw containing 10 series in each half, the upper 11. Eye large, contained 1¼ times in total interorbital width, equaling length of snout, contained 3¼ times in head. Nostril with a very short tubular rim. Mucous pores large; texture of head and body firmer than in most deep-sea liparids. Gill-opening reduced to a narrow slit entirely above the pectorals, its width equaling one-half diameter of orbit. Opercle produced into a narrow spinous process, forming with its membranous flap a quadrate projection over middle of slit.

Disk small, under the opercles and posterior part of cheeks, round in shape, slightly smaller than eye, its diameter one-fourth length of head. The vent is separated from disk by about two-thirds diameter of disk. Distance from vent to front of anal, one-half its distance from tip of snout. Head 5¼ in total length; depth of head, two-thirds its length; width of head, three-fourths its length. Body extremely slender, its depth at middle of total length equaling diameter of eye; at base of caudal equaling two-thirds diameter of pupil. Dorsal beginning slightly behind axil of pectorals. Distance from origin of anal to tip of snout one-half its distance from base of caudal. Upper lobe of pectorals extending slightly past front of anal, the lower lobe to opposite the vent. Rays of lower lobe partly free. Dorsal with about 51 rays, pectorals with 29. Color nearly uniform dusky-brownish; lighter on snout, belly, and under side of head. Mouth, gill-cavity, and peritoneum white.

Three specimens, the largest 78 mm. long, from north of Unalaska Island, station 3331; depth 350 fathoms.

95. Careproctus colletti sp. nov.

Closely related to *C. reinhardti*, from which it differs principally in the elongation and exsertion of the lower pectoral rays. These extend in all specimens to or nearly to the origin of the anal fin, and are always free for the greater part of their length. The head is blunt and heavy, with subvertical cheeks and bluntly rounded snout,

the latter not projecting beyond the mouth. Nape not elevated. Mouth terminal at lower side of snout, slightly oblique, its lateral cleft about two-thirds its width. Lower jaw shutting within the upper. The angle of mouth reaches a vertical midway between front of eye and front of pupil. Teeth lanceolate, acute, without trace of basal cusps.

Head 5 in length; greatest depth (at occiput) 6. Diameter of eye equals length of snout, 3⅘ in head, 1⅘ in interorbital width. Gill-opening a narrow slit entirely above base of pectorals, its length three-fourths diameter of eye. The opercle is produced posteriorly into a rounded lobe, which overlaps the gill-opening. Disk oblong, of moderate size, placed under the posterior part of head behind the eyes, forming in alcoholic specimens a very deep, cup-shaped depression with incurved edges. Diameter of disk about equaling that of eye; disk separated from vent by half its diameter.

Upper pectoral lobe reaching origin of anal fin; the rays of lower lobe elongate and extensively free, longer than upper lobe and reaching to or nearly to front of anal. The intermediate rays are not as short as in *C. reinhardti*, and hardly form a separate division of the fin, the rays being gradually and uniformly shortened from above downward to origin of lower lobe. Pectoral rays 29. Dorsal beginning immediately behind the head. Distance from tip of snout to origin of anal 3⅘ in length. Series of conspicuous mucous pores on head, as in *C. reinhardti*. Color in spirits, dusky; the tip of snout, under side of head, opercles, abdomen, and posterior portion of vertical fins black; inside of mouth and gill-cavity dusky; peritoneum black.

Five specimens, the longest 85 mm., from station 3338, south of Alaska Peninsula; depth 625 fathoms.

Named in honor of Prof. Robert Collett, the distinguished author of the Fishes of the Norwegian North Atlantic Expedition.

96. Careproctus phasma sp. nov.

Closely related to *Careproctus spectrum* Bean, from the same region; differing in the much larger sucking disk and the narrower gill-slit, the latter confined to area above base of pectorals, its anterior margin formed of the broadly and evenly rounded opercular lobe. Head broad and flat above, subquadrate, with nearly vertical cheeks. Snout very obtuse, broadly rounded, much blunter than in *C. spectrum*, very slightly overlapping the mouth. Width of snout 1⅘ in length of head. Mouth very broad, somewhat oblique, reaching a vertical from slightly behind front of eye, its width more than twice the amount of lateral cleft taken axially. Teeth minute, acute, in a moderate band in each jaw, arranged in oblique series within the band. Nostril opening in a short but conspicuous tube, the tube absent and the pore smaller in *C. spectrum*. Eye 4 in head, 2 in total interorbital width. Mucous pores small. Gill-slit short, slightly less than diameter of orbit, overlapped for almost its entire extent by the broadly rounded opercular flap, its inferior margin attached to base of upper pectoral ray.

Sucking disk comparatively large, much larger than in *C. spectrum*, 1⅓ times the diameter of the eye, 3⅘ in head. It is very nearly round, the transverse diameter equaling or slightly exceeding the longitudinal diameter. Vent immediately behind edge of sucking disk. Anal papilla slender, half as long as diameter of eye. Pectoral fin very broad, barely reaching front of anal, the lower rays equaling the upper, extensively free at tip; 34 rays in the pectoral fin, the lower lobe containing 8 or 9. Dorsal beginning behind the gill-opening at a distance equaling diameter of eye, the fin with 53 rays. Skin exceedingly soft, thick, and lax in the alcoholic specimen, forming folds on head and body and concealing the rays of the fins. Color uniform white in spirits.

Two specimens, 80 to 85 mm. long, from Bristol Bay, stations 3254 and 3256; depths 46 and 49 fathoms.

97. Careproctus ostentum sp. nov.

Differing from *C. spectrum* in the minute size of the sucking disk, which is reduced to a mere rudiment entirely concealed by the anterior (lower) lobes of the pectoral fins, about 1 mm. in diameter in a specimen 78 mm. long. The snout is longer and more pointed than in *C. phasma* or *C. spectrum*, its width little greater than its length, 2¼ in head. Mouth with very distinct lateral cleft, its width less than its length. Maxillary reaching a vertical line crossing orbit behind pupil, 1$\frac{9}{10}$ in head. Teeth minute, in narrow bands, indistinctly tricuspid. Eye equaling length of snout, 1½ in total width of interorbital area. The true bony interorbital width is much narrower than this. The epidermis of the head is largely lost, and the width of the gill-slit can not be determined. A short nostril tube. Fins as in *C. spectrum* and *C. phasma*. Skin loose, thinner than in *C. phasma*. Color white or slightly brownish, minutely punctulate with black.

Three specimens from north of Unalaska Island, stations 3324 and 3331; depths 109 and 350 fathoms.

98. Careproctus simus sp. nov.

A species with very heavy head and body and inferior transverse mouth, overlapped by the thick rounded snout. The appearance is much that of *Rhinoliparis barbulifer*, but the anterior parts are much heavier, the nape more elevated, the snout shorter and blunter, and the latter without barbels. The snout extends beyond front of eyes for a distance (measured axially) equal to two-thirds diameter of orbit, and projects beyond the mouth for one-half that distance. Mouth transverse, its width nearly twice the distance from symphysis of lower jaw to angle of mouth, the latter reaching a vertical midway between front of eye and pupil. Teeth indistinctly tricuspid, in narrow bands, 11 or 12 series in each half of lower jaw, 8 or 9 in the upper. Nostrils without tube. Eye large, one-third length of head, equaling snout, 1½ in total interorbital width. Gill-slit moderate, two-fifths of it opposite upper pectoral rays, its width two-thirds diameter of eye. The opercle is prolonged into an acute lobe overlapping middle of slit.

Disk rather small, round, under posterior part of eye; its diameter seven-ninths that of eye. Vent immediately behind it, equidistant from front of anal and angle of mouth. Pectorals inserted high, the upper edge on a level with the middle of eye. The fin is continuous, the median rays greatly shortened, the lower ones again longer, with exserted free tips. The upper lobe extends beyond front of anal and equals length of head behind snout. The lower rays are two-thirds the length of the upper ones. Pectoral with 33 rays. Origin of dorsal fin just behind axil of pectorals, continuous posteriorly with the caudal fin, which is very narrow and not distinct. Origin of anal at end of first third of length. Whitish or light brown, dusky posteriorly on body and fins. Mouth, gill-cavity, and peritoneum white.

One specimen, 80 mm. long, from north of Unalaska Island, station 3331; depth 350 fathoms.

GYRINICHTHYS gen. nov. (LIPARIDIDÆ.)

Teeth simple, not tricuspid. Body attenuate posteriorly, as in *Paraliparis*, the tail scarcely distinct. Disk small under the posterior part of the head; the vent immediately behind it. Pectorals without anterior lobe, the rays progressively shortened, none of them exserted or with free tips. Gill-openings reduced to a minute round pore, well above base of pectorals. (Type *G. minytremus* sp. nov.)

99. Gyrinichthys minytremus sp. nov.

Body in the type greatly distended with eggs; the original shape difficult to ascertain, tapering posteriorly into an extremely slender compressed tail. Head slender, not greatly depressed, the depth and width about equal. Nuchal region not elevated, the profile rising but little behind the snout, which is blunt, with almost vertical profile. Mouth very small, almost entirely transverse at end of snout, with but little lateral cleft, the angle of mouth scarcely reaching vertical from nostril. Jaws

even; the snout very slightly protruding beyond premaxillaries. Teeth slender, acicular, without cusps, the inner teeth longest. Bands of teeth very narrow, with but five or six oblique series in each half of each jaw. The teeth are directed backward, but are scarcely depressible. Nostrils without tube. Eye large, $1\frac{1}{3}$ in total interorbital width, equaling length of snout. Gill-opening a small pore, scarcely larger than nostril, well separated from upper margin of pectoral. Disk of moderate size, round, its diameter equaling half length of head. Vent close behind disk, separated from it by one-sixth its distance from front of anal fin.

Pectoral small, its upper edge on a level with lower margin of eye, the two fins converging under the throat, the anterior rays progressively shortened, all included within the membrane. Dorsal without any detached anterior portion, beginning well behind the head, at a distance from gill-opening equaling one-half length of head. Like the anal, it is continuous with the very narrow caudal fin, there being no notch or evident separation between them. Distance from tip of snout to front of anal $1\frac{2}{3}$ in distance of latter from base of caudal. Dorsal with about 45 rays. Caudal with a very narrow base, containing apparently 14 rays, its length equaling that of snout and eye. Color light brownish, everywhere dusted with minute black specks, which are largest on back and tail. Lining of mouth and gill-cavity and peritoneum white.

A single specimen, 67 mm. long, from station 3331, north of Unalaska Island; depth 350 fathoms.

Eggs large, visible through the abdominal wall, about $3\frac{1}{4}$ mm. in diameter.

RHINOLIPARIS gen. nov. (LIPARIDIDÆ.)

Allied to *Paraliparis*, from which it differs in the greatly produced snout, which much overlaps the mouth and bears at its tip a pair of barbels. No sucking disk. Vent anterior, between the pectoral fins. Pectorals deeply notched, continuous. Gill-openings narrow, mostly above the pectorals. Teeth acute, in a broad band in each jaw, arranged in oblique series within the band. (Type *R. barbulifer* sp. nov.)

100. Rhinoliparis barbulifer sp. nov.

Slender, compressed, the greatest depth just in front of dorsal, the nuchal region not greatly swollen. Body tapering into an extremely slender, almost filamentous tail. Mouth small, horizontal, inferior, overpassed by the broadly rounded, very soft snout for a distance equaling diameter of pupil. At the tip of the snout, separated by a space half as wide as pupil, are two barbels directed forward, each as long as the interspace. Maxillary reaching vertical from posterior border of orbit, $2\frac{1}{4}$ in head. Eye large, slightly less than one-third head. Bony portion of interorbital width narrow, three-fourths diameter of pupil. Gill-slit narrow, beginning opposite upper pectoral rays, two-thirds diameter of orbit. No pseudobranchiæ. Opercle prolonged posteriorly into a narrow pointed flap. Round mucous pores along under side of snout and suborbital and on under side of mandible.

Pectorals of two lobes, the lower narrow, containing but 4 or 5 rays, the upper with about 15, one or two widely spaced rays connecting the two, none of the rays free. The fin is inserted high, the upper end of base on a level with upper edge of pupil. Below, the fins are not approximated as closely as usual, the lowermost rays of the two fins separated by an interspace as wide as pupil, inserted vertically below middle of cheeks. The dorsal originates slightly in front of gill-slit.

Vent anterior in position, its distance from front of pectorals two-fifths its distance from front of anal fin. Head $5\frac{1}{4}$ in length; depth 7. Length of specimen described 85 mm. In spirits, light gray, dusky along bases of dorsal and anal fins, and on the nape. The black lining of abdominal cavity, gill-cavity, and mouth can be seen through the transparent integuments. Eye also black. Barbels transparent, hence very inconspicuous.

Several specimens taken north of Unalaska Island, stations 3227, 3325, 3326, 3329, 3330, 3331, and 3332; depths 225 to 576 fathoms.

101. Liparis pulchellus (Ayres).

A single specimen dredged in Bristol Bay, Alaska, station 3269; depth 16 fathoms.

102. Liparis cyclopus Günther.

Two specimens from Bristol Bay, Alaska (station 3230; depth, 3¼ fathoms), are referred to this species. Garman places *L. cyclopus* in the synonymy of *L. calliodon*, but our specimens are undoubtedly distinct from the species described by Garman under this name (Discoboli, p. 54, pl. VI, figs. 1–5) from a specimen said to originate from San Francisco. Our Alaska specimens are much more slender, with wide, depressed head, without nuchal elevation, with the dorsal fin beginning posteriorly slightly in front of the vertical from the vent, and the disk separated from the vent by a distance less than its own diameter. The mouth is also much smaller, not at all oblique, its angle in advance of vertical from front of eye. Dorsal 33; anal 30; caudal 12; pectoral 29. Gill-slit extending downward to opposite the upper three or four pectoral rays. Dorsal and anal fins not joined to caudal. Disk 2¼ in head.

103. Liparis agassizii Putnam.

Several young examples were dredged in Bristol Bay, Alaska; stations 3241, 3247 and 3301; depths 14 and 17 fathoms.

104. Liparis cyclostigma sp. nov.

A robust, compressed species, with broad, gently convex head, the nape not elevated, a comparatively wide gill-opening, a single continuous dorsal fin, the dorsal and anal broadly joined to the caudal, and the coloration peculiar. Profile gently and evenly declining from nape to end of premaxillary processes, thence descending more steeply to tip of snout. Interorbital space very wide, equaling length of snout and half of eye, 2⅞ in head. Distance from tip of snout to front of exposed portion of eye 2 1/10 in head.

Head 3⅜ in length. Mouth terminal, broad and transverse with but little lateral cleft, the two jaws equal, the lower not included. The maxillary is entirely bound down by skin of head, reaching vertical from front of pupil, the angle of mouth in advance of eye. Bands of teeth extremely broad, the teeth very small, all tricuspid, the outer ones minute, those toward inner margin of jaw increasing in size. The anterior series in each jaw are nearly transverse, the lateral series becoming successively more and more oblique, the uppermost nearly parallel with the jaw; about 20 series in each side of lower jaw, 30 on each side of upper jaw. The width of band in upper jaw equals two-thirds diameter of exposed portion of eye, which is one-fourth length of snout, two-sevenths interorbital width. Nostrils without tube. Lower lip distinct on lateral three-fifths or two-thirds of mandible. Gill-opening wide, extending downward to opposite base of fifteenth pectoral ray, the length of the slit 2⅞ in head. Disk large, oblong, its longitudinal diameter 2⅛ in head, equaling its distance from anus and twice the distance of the latter from base of first anal ray. Pyloric cœca 28.

Pectoral very broad, inserted low, its upper margin on a level with premaxillaries, much below the eye. The rays decrease but little in length from the first to the twentieth, and form a very broad evenly rounded lobe. Below the twentieth the rays decrease gently and have exserted tips, until the shortest ray equals two-thirds the longest upper ray. There follow three or four somewhat longer rays, the tips still further exserted, then four or five rays which decrease rapidly, the shortest anterior one equaling diameter of eye. Longest pectoral ray 1½ in head. Base of first dorsal ray in a vertical passing through axil of pectoral. Longest dorsal ray 1⅝ in head, the last rays rapidly shortened so as to produce a notch at union with the caudal, the last ray less than two-thirds the longest, the dorsal membrane joining at end of basal third of caudal. The anal fin is equal in height to the dorsal, but the last rays are but little shortened, so that no notch exists posteriorly. It forms a much broader union with the caudal, which it joins at the end of its basal two-thirds. Caudal broad, rounded, the outer rays four-fifths the length of middle rays,

which equal the length of head without the snout. Dorsal 44; anal 34; pectoral 42; caudal 14.

Colors in life: Olivaceous above, overlaid with light grayish. Belly and lower side of head light yellow. Body and fins with large brownish-red spots and blotches, usually roundish, each having a darker margin surrounded with a light ring.

A single specimen, 360 mm. long, from Bristol Bay (station 3252), in 29¼ fathoms.

105. Liparis fucensis sp. nov.

Liparis calliodon Garman, The Discoboli, Mem. Mus. Comp. Zool. XIV, No. 2, p. 54; not *Cyclopterus callyodon* Pallas.

Numerous specimens dredged by the *Albatross* in the Straits of Fuca on a subsequent expedition (August, 1891) serve as the types of this species. It is probably the same as that described by Garman as *Liparis calliodon*, his description being based on specimens "said to have been taken near San Francisco." It is not evident from the text whether the same specimens served as basis for the figures (plate VI, figs. 1–5), concerning which we have no separate data.

Following is a description of the types from *Albatross* Station 3451, Straits of Fuca, depth 106 fathoms: Moderately elongate, compressed; head depressed, with the gibbous snout and occiput separated by the depressed interorbital area which forms a shallow transverse groove. Snout not blunt, the mouth terminal, nearly horizontal, with included mandible, the maxillary reaching to or nearly to the vertical from front of pupil, 3 in head. Teeth all tricuspid. Eye of moderate size, contained 5⅞ in length of head, 1 to 1⅛ times in bony interorbital width, 1⅜ times in snout. The posterior nostril without tube, the anterior with a short tube, less than diameter of pupil. Gill-slit comparatively wide, its width equaling length of snout and half eye, overlapped by a conspicuous triangular prolongation of the opercle. The slit extends down to opposite the upper third of the pectoral fin.

Disk circular, of rather small size, distant from tip of snout 1½ times its own diameter, from vent 1¼ times. Diameter of disk, 2⅜ times in head. Distance from tip of snout to vent, 1⅞ to 1⅞ in distance from tail.

Pectorals extending to a vertical midway between vent and front of anal. Lower rays produced, forming a narrow distinct lobe. The first 5 dorsal rays spinous, unsegmented, shorter than the succeeding segmented rays, from which they are not separated by notch. Dorsal and anal free from caudal, the last rays being rapidly shortened, giving a rounded contour to the posterior portions of the two fins.

Head 3¼ to 3½ in length; depth 4 to 4⅜; dorsal v, 30; anal 28 or 29; caudal 18 or 20; pectoral 38 or 39.

Two styles of coloration are observed: One, plain olive-brown, with minute dark points, whitish below; the other, with numerous narrow lengthwise streaks of light olive and dark olive-brown, which extend forward on top and sides of head; in both cases the belly is whitish and the fins dusky, mottled with darker, the mottlings forming indistinct crossbars on the caudal fin.

106. Neoliparis callyodon (Pallas.)

Liparis mucosus Garman, The Discoboli, Mem. Mus. Comp. Zool. XIV, No. 2, p. 52; p. 52; not of Ayres.

Several young specimens were taken from under stones between tidemarks at Unalaska May 24 and June 16, 1890.

BATHYPHASMA gen. nov.

A deep-sea Liparid, differing from typical members of the genus *Liparis* in having the teeth long and slender, acuminate, sharp, with no trace of lateral lobes. The ventral disk is large, and occupies the position usual in *Liparis*. An approach to the condition here found is evident in *Actinochir major*, in which, according to Lütken, the teeth are at first tricuspid, becoming mostly simple with age. In *Bathyphasma* the ventral disk is simple, without the intramarginal papillæ which are usually present in *Liparis* and correspond to the tips of the spines and rays.

107. Bathyphasma ovigerum sp. nov.

Occipital region greatly elevated, the upper profile of head strongly decurved above the orbits, a line from occiput to end of premaxillary processes forming an angle of 45 degrees with axis of body. In front of tips of premaxillary processes the snout descends almost vertically. Posteriorly the body tapers uniformly and slowly, the width of base of tail equaling one-half diameter of eye. Length of head equaling depth of body, 3¾ in length. Mouth large, horizontal, not overpassed by the snout; the lower jaw slightly shorter than the upper, not distinctly included. The maxillary reaches a vertical from posterior edge of orbit, its length 2⅓ in head, its width 1⅚ in head. Upper lip complete, the fold of lower lip extending half way from angle of mouth to symphysis.

Bands of teeth very wide in the front of each jaw, becoming narrower laterally where the series are few in number and nearly parallel with the jaw. Anteriorly the series grow more and more oblique, until at front of jaw they are nearly transverse. The teeth are all simple and slender, without cusps, directed very obliquely backward, and movably implanted so as to admit of still further depression. The outer teeth in both jaws are very short, the inner ones growing gradually longer and becoming acicular; 16 series of teeth on each side of lower jaw, 22 series on each side of upper jaw.

Posterior nostril in a short, wide tube. Eye large, the diameter of its exposed portion 2½ in total interorbital width, 7 in head. Cheeks and temporal region swollen, the suborbital stay running in a notable depression between the two. Gill-slit wide, extending downward to opposite upper pectoral rays, longer than snout, 2⅔ in head. Mucous pores minute, on sides of snout, mandible, and preopercle, none visible on top of head.

Disk large, nearly round, its center slightly in advance of gill-slit, its length 3⅓ in head, the distance from its posterior margin to vent equaling four-fifths its own diameter. A small anal papilla. Pyloric cœca 19.

Pectoral with 34 rays, not notched, the lower rays regularly diminishing in length to the fifth or sixth before the last, the next two or three abruptly lengthened and exserted. The longest ray of upper lobe equals length of snout and eye; the longest rays of lower lobe equals length of snout and half eye. The dorsal fin begins slightly behind upper axil of pectorals and contains 43 rays, the longest of which equals the distance from tip of snout to front of pupil. The origin of anal fin is half the diameter of the eye in front of the middle of body. It contains 34 rays. Caudal ray long and slender, with 12 rays, its basal two-fifths confluent with dorsal and anal, its length equal to that of pectoral fin.

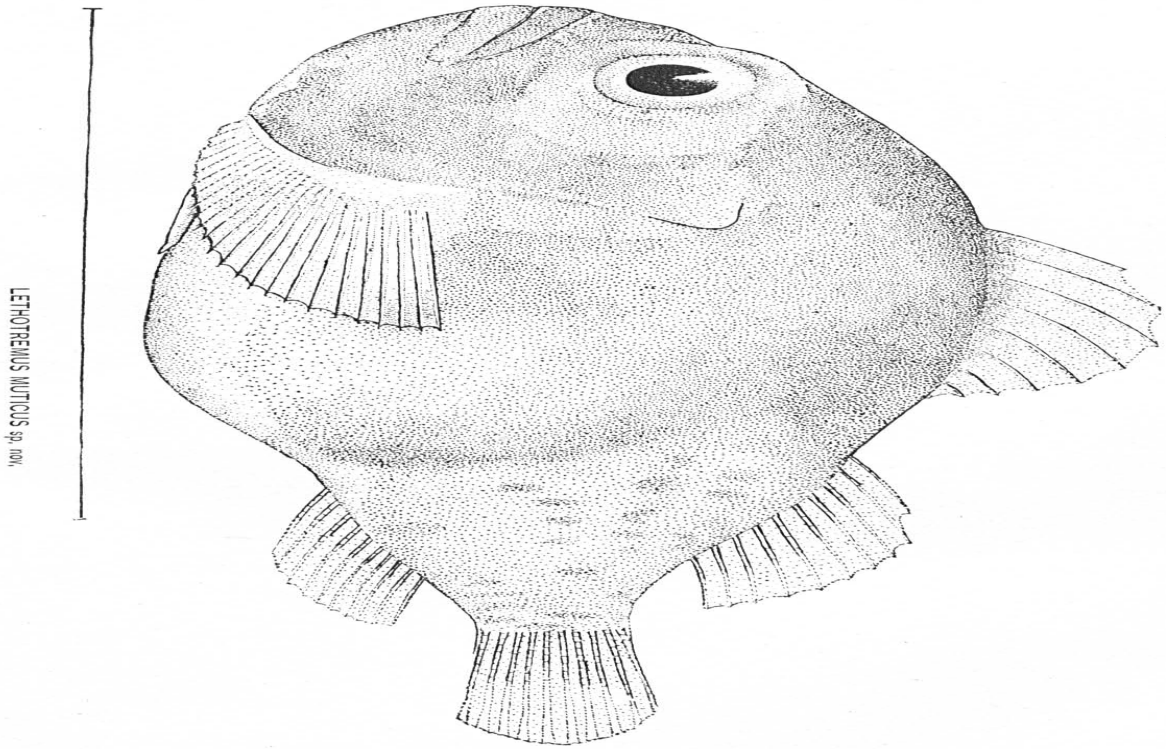
Skin thin, not conspicuously lax. Head, body, and fins white, inconspicuously mottled with light brown. A single specimen, 315 mm. in total length, from station 3342, off Queen Charlotte Islands, depth 1,588 fathoms.

The type is a male with well-developed testes, and contained in its mouth when captured a spherical mass of eggs evidently belonging to this species. The eggs measure 4½ mm. in diameter, and are well along in their development, the embryos distinctly visible through the very tough egg-membranes. The general form of head and body can be made out, and the long, continuous dorsal and anal fins running backward into the tail. It is probable that the male fish protects the eggs in this manner until after hatching.

Family CYCLOPTERIDÆ.

108. Eumicrotremus orbis (Günther).

Three young specimens, the largest 27 mm. long, were dredged south of Sannak Islands and in Bristol Bay (stations 3213, 3258, and 3274; depths 19 to 70 fathoms). Fin-rays in our specimens are as follows: Dorsal VI or VII–9 or 10; anal 8 to 10. We agree with Garman in considering it advisable to distinguish the north Pacific form from *E. spinosus*, until adequate series can be compared.



LETHOTREMUS MUTICUS sp. nov.

LETHOTREMUS gen. nov. (CYCLOPTERIDÆ.)

Differing from *Eumicrotremus* in the total absence of the bony plates and in the absence of pores on sides of head or body.

109. Lethotremus muticus sp. nov. (Plate 31.)

Represented by three young specimens, the largest 30 mm. long. They closely resemble in form, fin-rays, and general appearance *Eumicrotremus orbis*, but differ, in addition to the generic characters already stated, in the much larger eye, the lower spinous dorsal, and the extreme reduction of the posterior nasal tube. In young specimens of *E. orbis*, the posterior nasal tube is much longer than the anterior, and equals half the diameter of the eye. In *L. muticus* both tubes are short and the posterior is little more than an elevated rim to the nasal opening.

Dorsal VII–11; anal 10; pectoral 23. Depth 2 to 2⅓ in length; head 2⅓ to 2¼. Eye very large, 2⅓ to 2½ in head, equaling interorbital width. In *E. orbis* of equal size the length of the slit is slightly less than its distance from upper base of pectorals. Diameter of ventral disk five-sixths length of head, equal to width of mouth. No barbels or filaments. Origin of spinous dorsal slightly in advance of gill-slit. The distance between dorsals equals half the diameter of the eye. Origin of anal under that of second dorsal. No notch between upper and lower portions of pectoral fin, the lower rays thickened but not lengthened, the length of upper ray equaling that of snout and eye. Vent separated from disk by slightly more than half its distance from front of anal.

Color in spirits: Brownish above, white below, the upper parts finely freckled with small black specks.

Three specimens from stations 3223 and 3258, near Unimak Pass, depths 56 and 70 fathoms. The naked specimens from the Atlantic, reported on by Dr. Günther, under the name *Eumicrotremus spinosus*, are probably referable to this genus.

Family BATRACHIDÆ. The Toadfishes.

110. Porichthys notatus Girard.

Near Point Reyes, California; station 3351; depth 51 fathoms.

Family TRICHODONTIDÆ.

111. Trichodon trichodon (Tilesius).

An adult specimen was taken from the stomach of a codfish at station 3260, Bristol Bay, 13 fathoms. Others were seined at Herendeen Bay.

Family BLENNIIDÆ. The Blennies.

112. Chirolophus polyactocephalus (Pallas).

Two specimens, stations 3213 and 3274, north and south of the Alaska Peninsula; depths 41 and 19 fathoms.

113. Pholis fasciatus (Bloch & Schneider).

Several specimens of this species have 86 to 89 dorsal spines and 42 to 44 soft rays in the anal. The coloration agrees more closely with that described by Cuvier & Valenciennes for Atlantic specimens (*Gunnellus grœnlandicus* Cuvier & Valenciennes, Hist. Nat. des Poissons, XI, 442, pl. 340). Ground color yellowish gray; base of dorsal occupied by 10 or 11 oblong blotches of dark brown which extend to the tips of the fins; these blotches each divided upon the fin by a median spot of the ground color. The areas of the ground color alternating with these blotches is finely speckled with brown, a larger spot of brown usually occupying a median position upon the fin. Middle and lower part of sides occupied by vermiculating brown lines on the ground color, these vermiculations arranged in more or less distinct crossbars, about 20 in number. They reach to or nearly to the mid-ventral line; and the posterior ones are often continued faintly onto the anal fin. Pectoral and caudal

fins yellow, unmarked. A brown blotch across snout and tip of mandible followed by a narrow yellowish bar descending to front of eye. Interorbital space crossed by a broad brown bar with blackish margins, which becomes much narrower below and traverses the eye and the cheeks. Behind this is a broader yellow bar margined behind with a narrow brown line.

Specimens were dredged at stations 3230, 3232, 3233, and 3234, in Bristol Bay; depths 3¼ to 10½ fathoms.

114. Pholis ornatus (Girard).

Taken in the seine at Unalaska and Herendeen Bay, entering fresh water.

115. Anoplarchus atropurpureus (Kittlitz).

Found upon the rocks between tide marks at Unalaska.

116. Stichæus punctatus (Fabricius).

Notogrammus rothrocki Bean.

A single specimen, 86 mm. long, was dredged in Bristol Bay, Alaska, station 3239, depth 11½ fathoms. Several larger individuals were seined in Karta Bay, Prince of Wales Island, Alaska, July 12, 1889.

The position of the lateral line in this species is incorrectly given as "median" by Jordan & Gilbert in the Synopsis, pp. 755 and 775. Cuvier and Valenciennes, in their description drawn from the writings of Fabricius, state that the lateral line runs along the upper fifth of the height of the body and terminates at about the middle of the length. This correctly describes its position in all our specimens, where it originates immediately above the opercle, exhibits at first a rather strong upwardly convex curve, then runs nearly parallel to the back, separated from the base of the dorsal fin by one-fifth the height of the body. It is very distinct throughout its course, and terminates at about the middle of the length. The narrow brown streak described as bounding the lateral line above, in *Notogrammus rothrocki*, is conspicuous in our smallest specimen (86 mm.). The branchiostegal membranes are very narrowly joined anteriorly, forming a narrow free fold across the isthmus, from which they are entirely distinct. Narrow bands of teeth in the jaws, and on vomer and palatines. The outer series in upper jaw and the inner series in the lower jaw enlarged.

Dorsal XLVII or XLVIII; anal I, 32 to 35. The membrane from last dorsal spine joins extreme base of upper caudal ray; anal wholly distinct.

We have not the material for a comparison of Pacific with Atlantic representatives of this species, and the published descriptions of the latter lack detail.

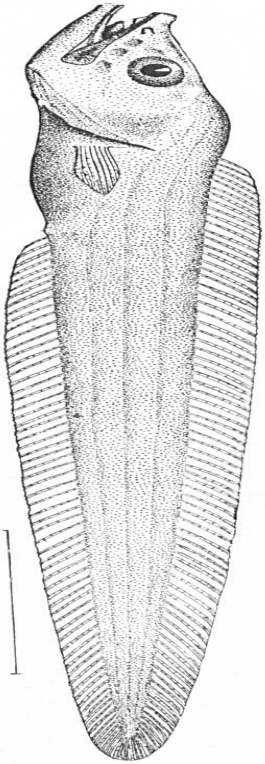
117. Leptoclinus maculatus (Fries).

A few young specimens of this species, hitherto known only from the North Atlantic, were taken at stations 3223, 3252, 3253, 3257, 3258, 3259, 3279, and 3309, the first one in Unimak Pass, the others in Bristol Bay, depths 29½ to 81 fathoms. Having no Atlantic specimens of this species, we are unable to satisfy ourselves of the identity of the two.

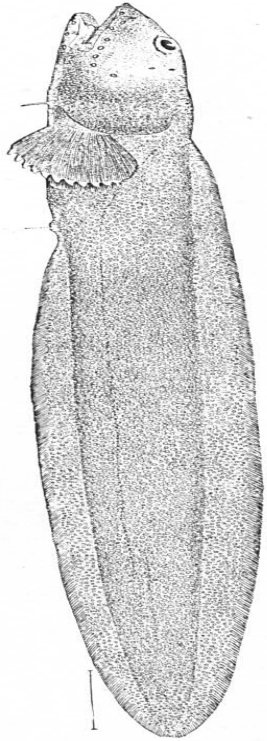
118. Lumpenus anguillaris (Pallas). Seined at Unalaska.

119. Lumpenus mackayi sp. nov. (Plate 32.)

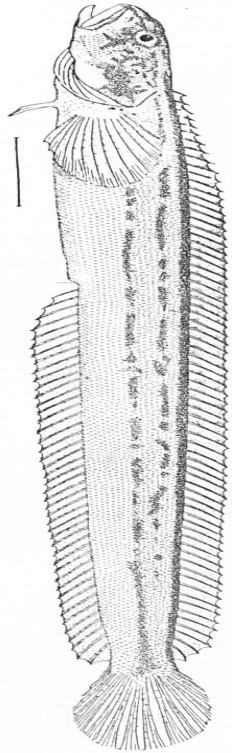
Very elongate, the depth $\frac{1}{13}$ or $\frac{1}{14}$ the length. Head compressed and high, especially anteriorly, the upper profile of snout very convex, the upper jaw decidedly longer than the lower. Mouth nearly horizontal. Maxillary reaching vertical from front or middle of pupil, its length 3⅜ to 3¾ in head. Teeth small, in a narrow band in jaws. A single series of weak teeth on palatines. Vomer toothless. Gill-openings continued forward to below middle of cheeks, the membranes then narrowly joined to isthmus. Gill-rakers short and weak, about 10 on horizontal limb of arch. Eye small, its horizontal diameter one-half longer than its vertical, slightly longer than interorbital width, 2 in snout, 8 in head. Distance from snout to nape equals length of postorbital part of head. Opercles large, continued to beyond base of pectorals.



LYCODAPUS FIERASFER Gilbert.



LYCODOPSIS CROTALINUS Gilbert.



LUMPENUS MACKAYI sp. nov.

Dorsal beginning immediately above upper end of gill-slit, the spines short, strong and pungent, not flexible. Some of the anterior spines are short, but not free, the fin increasing in height to opposite front of anal, the longest spine equaling length of snout. The membrane of the last spine joins base of upper rays of caudal. Anal with two strong spines similar to those of dorsal fin, the second twice the length of the first and three-fourths that of highest dorsal spines. Anal rays all forked; the posterior longest, equaling length of snout and eye, free from the caudal. Caudal fin rounded in the younger specimens, lanceolate in adults, becoming in the latter three-fourths as long as head. Ventrals short, of one short spine and three simple rays, the fin one-fourth length of head. Pectorals large, the middle rays longest, two-thirds length of head. Scales small, smooth, elongate, imperfectly imbricated; partially embedded or altogether wanting on anterior part of back. Cheeks scaled, head otherwise naked. Faint traces of a lateral line sometimes visible on middle of sides anteriorly. Head $6\frac{2}{3}$ in length; depth 13 to 14. Dorsal LXIX; anal II, 41. Length 290 mm.

Color in spirits: Light olivaceous (light yellowish in life), a continuous jet-black streak from occiput along each side of dorsal to base of caudal, with two interrupted black streaks below it, the lowermost running on middle of sides. Top and sides of the head darker, variously marked with anastomosing black lines and spots. Opercles blackish. Dorsal and caudal fins dusky translucent, without distinctive markings. Anal and ventrals white. Pectorals white or dusky. Roof of mouth black. Peritoneum black dorsally, white ventrally.

Several specimens were seined near the mouth of the Nushagak River, Alaska.

120. Leptoblennius nubilus (Richardson).

Our specimens seem to agree in structural details with descriptions of *L. nubilus* from the North Atlantic, except that the ventral fins have but three soft rays. We have no specimens for comparison, and make the identification with some doubt. Pacific specimens seem lighter in color, with the dusky mottlings confined to the dorsal region and with a very distinct series of oblong brown blotches along lateral line, alternating with a lower series of small faint round spots. Under parts immaculate. The mottlings along base of dorsal frequently unite to form a series of oblong blotches alternating with those of lateral line. Other specimens show no traces of dorsal blotches. Dorsal fin translucent, faintly mottled with darker. Caudal with brownish crossbars. Fins otherwise unmarked. Fins and proportions as described for *L. nubilus*. Dentition also as in the latter; mandible with a single series of conical teeth, which widens at symphysis into an irregular double series or narrow patch; a similar series of conical teeth in premaxillaries, within which is a band of fine villiform teeth. Palate smooth.

Numerous specimens from Bristol Bay, Alaska, dredged at stations 3241, 3242, 3243, and 3244; depths, $4\frac{1}{2}$ to 14 fathoms.

121. Poroclinus rothrocki Bean.

A single specimen from north of Unalaska Island, station 3312, depth 45 fathoms. Depth at nape $\frac{1}{7}$ length, the body tapering uniformly backward. Vent placed anteriorly, its distance from snout $1\frac{2}{3}$ to $1\frac{3}{4}$ in its distance from base of caudal. Head $6\frac{1}{4}$ in length. Snout compressed, slightly projecting, the lower jaw included. Maxillary reaching vertical from front of pupil, $3\frac{1}{3}$ to $3\frac{1}{2}$ in head. Teeth acute, in narrow bands in the jaws, a single well-marked series on vomer and a patch on front of palatines, those on vomer and palatines fully as large as those on jaws and equally developed in young and adults. Eyes large, close together, the interorbital space convex, its width about half pupil. Diameter of orbit equals length of maxillary, about $3\frac{1}{3}$ in head. Nostril tubes well developed, half diameter of pupil. Gill-openings narrower than in other described members of this group, extending forward below the vertical from posterior part of cheeks, where they are firmly joined to isthmus, across which they do not form a fold. Gill-rakers obsolete.

Dorsal beginning over end of opercular flap, its distance from nape equaling distance of latter from posterior margin of pupil. Membrane of last spine slightly joined to base of caudal. Anterior dorsal spines short, but well connected by membrane. Anal with three distinct spines, shorter than the rays that follow, the second the longest, all as strong as dorsal spine, and fully connected by membrane. Rays all branched at tip. Membrane of last ray joined only slightly to base of caudal. Caudal sharply pointed in our specimens, the median rays longest, about as long as head. Pectorals evenly rounded, the median rays longest, 14 or 15 in number, all branched. Ventrals well developed, about two-fifths as long as head, consisting of one short, sharp spine and three rays, the spine not closely joined to rays.

Lateral line indistinct, usually appearing obsolete, more evident toward head, consisting of a series of distinct pores along median line. Scales very small, cycloid, imbricated, covering body, including abdomen, breast, and nape. Cheeks scaled, the head otherwise naked, or sometimes with a small patch of scales on upper part of opercles. D. LVII to LX; A. III, 40 to 42.

Color: Sides with a series of 10 to 12 narrow white crossbars, the first in front of dorsal fin, the last under last dorsal spine, the bars about one-fifth interspaces. Above lateral line they are conspicuously margined with darker; below lateral line they broaden out and become forked, forming Λ-shaped markings. Upper caudal rays at base with an oval white ring inclosing a darker area; this mark more conspicuous in the young. Belly and ventrals white, other fins dusky, but without definite markings.

Family CRYPTACANTHODIDÆ.

122. Delolepis virgatus Bean.

A decayed specimen was found on the beach at Unalaska.

LYCONECTES gen. nov. (CRYPTACANTHODIDÆ.)

Differing from *Cryptacanthodes* principally in the absence of palatine teeth, agreeing with it in general appearance and in most details of structure. Mouth subvertical; lower jaw projecting; premaxillary protractile. Teeth strong, conic, wide-set, in more than one series. Mucous pits prominent on head. Gill-opening narrow, ceasing opposite middle of base of pectorals, the membranes widely joined to isthmus. Dorsal and anal wholly joined to caudal, the latter extending well beyond them. Dorsal fin composed of spines only. No ventral fins. Body naked. No lateral line. Type *L. aleutensis*.

123. Lyconectes aleutensis sp. nov. (Plate 34.)

Head 7⅛ in length, without caudal; depth 14⅓. Dorsal LXIX; anal 49; pectoral 13; caudal 18. Head square in cross section, the upper and lower surfaces plain, the cheeks vertical, the depth and width equal. Mouth still more oblique than in *Cryptacanthodes maculatus*, with much heavier mandible and less expanded maxillary, the exposed portion of the latter with vertical axis, not extending beyond vertical from middle of the eye. Teeth all similar, few in number; those in premaxillary arranged in two series, the inner of which are smaller than outer, from which they are separated by a wide interspace. Teeth in mandible in a single series laterally, becoming a sparsely filled patch toward symphysis. Four or five similar conical teeth on head of vomer. Palatines toothless. A long nostril tube overhangs the upper lip. Upper lip separated by a fold from forehead, the upper jaw protractile. Eye extremely small, sunken in the socket, which it does not nearly fill, its diameter slightly less than half interorbital width. The supraorbital rim is not elevated, and contains no conspicuous projections. Suborbital rim swollen, with an enlarged mucous channel; a conspicuous series of mucous pits along each mandible and the margin of the preopercle; two series on top of head, diverging backward from above

the eyes. Otherwise no pits or projection on head. A shallow triangular depression on occiput. Gill-slit much less oblique than margin of preopercle, its length 1¼ times the distance between lower ends of gill-slits, the latter reaching the vertical from middle of opercles.

Dorsal fin of rather flexible spines, not concealed in heavy fin membranes. The origin of dorsal falls immediately behind axil of pectorals. Hinder margin of occiput midway between front of dorsal and middle of eye. Origin of anal well in advance of middle of length, its distance from tip of snout contained 1⅞ times in its distance from base of caudal. Pectoral short, rounded, its base separated by a wide prepectoral area from gill-slit, the width of area three-fourths length of fin, the latter equaling distance from tip of snout to middle of eye. No ventrals. Body covered with lax naked skin, which also covers but does not obscure rays of dorsal and anal fins. No pores to lateral line.

Color in life: Reddish on head, body, and fins, due to the blood vessels in the skin.

A single specimen, 180 mm. long, dredged north of Unalaska Island, at station 3312; depth 45 fathoms.

Family PTILICHTHYIDÆ.

124. Ptilichthys goodei Bean.

A third specimen of this little-known fish was taken by dredging in shallow water at the entrance to Unalaska Harbor, station 3311; depth, 85 fathoms.

The genus *Ptilichthys*, of which this species is the sole representative, has been doubtfully referred by Dr. Bean to the *Mastacembelidæ*, a family of fresh-water fishes inhabiting the East Indies, characterized by having the shoulder girdle posteriorly placed and not articulating with the cranium (order *Opisthomi* Gill). The necessity for preserving intact the unique type of the species prevented Dr. Bean from making any anatomical examination of *Ptilichthys*, and it was reserved for Dr. Theodore Gill, in the Standard Natural History, 1885, p. 259, to express his disbelief in the relationships which had been suggested and to make the fish the type of a peculiar family, the *Ptilichthyidæ*, to be placed provisionally among the blennioid series. His adherence to this view is again expressed in his list of "Families and Subfamilies of Fishes," appearing as the sixth memoir of volume VI, of the National Academy of Sciences. He has doubtless indicated the proper position of this peculiar fish as nearly as we are now able to determine it. An examination of its shoulder girdle shows it to be entirely normal. The post-temporal is not furcate, but is a very slender bony rod attaching to the epiotic region of the skull and giving loose attachment posteriorly to the almost equally slender posterotemporal. The latter overlaps the upper end of the clavicle in the usual manner. A postclavicle was not detected. The coracoid portion consists of a roundish oblong, perforated hypercoracoid meeting the hypocoracoid directly, without intervening cartilage. The curved line separating the two bones corresponds distally with the interspace between the first (upper) and second actinosts. The hypocoracoid is broad and short. Its mesially directed (*i. e.*, inferior) process joins at its tip the clavicle, but is elsewhere separated from the latter by the usual elongate membranous interspace. The actinosts are four in number, of large size, hour-glass shaped.

The jaws are normal, the premaxillary alone occupying the front and sides of upper jaw and bearing the teeth, while the maxillary is a broad bone lying behind it, overlapped proximally by the maxillary process of the palatines. Both vomer and palatines seem to be toothless. The alimentary canal is almost perfectly straight, with the anterior portion entirely enveloped in the long, narrow liver. At the pylorus occurs a short and abrupt V-shaped flexure, scarcely noticeable on account of the closeness with which the sides are joined and the fact that the width of the flexure is no greater than the cross diameter of the tube. Pyloric cæca are not evident. An air bladder is entirely wanting. The ovary is single, apparently without oviduct, and contains in our specimen eggs which are comparatively very large.

Family LYCODIDÆ.

125. Lycodopsis crotalinus Gilbert. (Plate 32.)

One specimen from station 3210, south of Sannak Islands; depth, 483 fathoms.

Colors in life: Head and body light brown, the lower parts darker; snout, suborbital region, and a band across pectorals greenish gilt; no light bar on head.

Depth 12⅘ in length; head 5⅓; maxillary 2½ in head; eye 7, equal to interorbital width; width of bone between orbits 17 in head; snout 3⅓ in head; teeth above in a narrow band, reaching only about half way of gape. In the mandible teeth are absent on posterior two-fifths of gape. The gill-slit extends a little farther forward below than above. Ventrals as long as pupil. Longest pectoral ray 2⅘ in head. Head wholly scaled behind eyes. Lateral line not evident.

The stomach contained remains of crustacea.

126. Lycodes diapterus Gilbert.

Taken abundantly north of Unalaska at stations 3227, 3324, 3326, 3329, 3330, 3331, and 3332; depths 109 to 576 fathoms.

127. Lycodes brevipes Bean.

Numerous specimens from stations 3216, 3225, 3226, 3227, 3263, 3309, 3310, 3311, 3313, and 3330, located north and south of the Aleutian Islands and in Bristol Bay; depths 58 to 351 fathoms.

128. Lycodes palearis sp. nov.

Very close to *L. brevipes* Bean, differing constantly in the longer ventrals, the greater development of mandibular and labial folds, the more numerous white bars, and the smaller eye. Head naked. Nape more or less naked, the scaleless area variable in extent, sometimes confined to its anterior third, sometimes reaching nearly to front of dorsal. Body sparsely covered with imbedded scales; axil naked. Lateral line short, decurved, extending scarcely beyond middle of pectorals. Teeth present in jaws, vomer, and palatines, those on premaxillaries laterally in a single series which widens anteriorly into a rather broad patch, the outer teeth somewhat enlarged, especially in front. All the premaxillary teeth shut outside the mandibular series, which are opposed to those on vomer and palatines. Mandibular teeth arranged similarly to those in upper jaw, the lateral series somewhat enlarged, continuous with the inner edge of the symphyseal patch. Vomerine teeth bluntly conic, 3 or 4 in number; palatines in a single series.

Snout long, prominent, the upper jaw projecting beyond the lower for a distance equaling two-thirds diameter of orbit. Upper lip thin, much expanded laterally, continuous posteriorly with the lower lip, which forms a wide, free membranous lobe opposite middle of each mandible. Anteriorly the lower lip becomes abruptly contracted and adnate to the jaw, leaving the symphyseal portion without free margin. Inner edges of mandibles with wide membranous borders, which increase in width anteriorly, where they terminate in a pair of acutely pointed free flaps. These free flaps and membranous margins are very conspicuous in both young and old specimens. In *L. brevipes* they are very inconspicuous, becoming evident in adults only. Dorsal with about 105 rays, counted to middle of caudal; anal about 90; pectoral 18. Head 5½ in length; depth 9½ to 11 in length, 2⅛ in head. Eye 5 to 6 in head, 1½ to 2 in snout. Ventrals 1½ to 1⅘ in eye, twice as long as in *L. brevipes*. Pectorals 1⅓ in head. Anal origin under eighteenth dorsal ray.

General color brownish olive, growing lighter on the lower parts. Dorsal with 14 to 16 white vertical bars, extending in young specimens across back and sides and onto anal fin; in adults confined to the fins and frequently indistinct or wanting. Anterior dorsal angle frequently black, separated from remainder of fin by a curved white bar. Dorsal and anal not black-margined as in *L. brevipes*. In the latter the white lateral bars are 9 to 12 in number and are usually confined to upper half of body. There is also no black spot on anterior dorsal rays.

Three specimens, 113 to 166 mm. long, from stations 3253 and 3254 in Bristol Bay, in 36 and 46 fathoms.

129. Aprodon corteziana Gilbert.

One specimen from station 3349, off the coast of northern California; depth 239 fathoms.

The depth in this species varies from 7½ to 9, the head from 4⅛ to 4½ in length.

130. Maynea pusilla Bean.

A few small specimens from north of Unalaska, at stations 3224, 3227, 3330, and 3331; depth 121 to 351 fathoms.

131. Gymnelis viridis (Fabricius).

Two specimens from between tide marks at Unalaska, one from station 3256 in Bristol Bay; depth 49 fathoms.

132. Lycodapus fierasfer Gilbert. (Plate 32.)

Several specimens from station 3324, in Bering Sea, north of Unalaska Island; depth, 109 fathoms. The statement in the original description (Proc. U. S. Nat. Mus. 1890, 108), "ventrals narrow," etc., applies instead to the pectorals, the ventrals being absent in this genus.

133. Lycodapus extensus sp. nov.

An extremely slender elongate form, with head smaller than in *L. fierasfer*, but otherwise resembling that species more than *L. parviceps*. The head is 6⅔ in length, the depth of body 15⅓. Gill-openings as in *L. fierasfer*, extending well above base of ventrals. Skin thin, the mucous pores inconspicuous, evident on mandible and along margin of preopercle. Upper profile of head longitudinally concave, shaped as in *fierasfer*, but slenderer, its depth greater than that of body. Mouth oblique, the maxillary reaching vertical from middle of eye, 2⅓ in head. Teeth in narrow bands in both jaws, tapering laterally to single series. Vomerine teeth more numerous than in *L. parviceps* or *L. fierasfer*, small, not canine-like, in a single series. Palatine teeth wanting, as in some individuals of *L. fierasfer*. Eye 4¼ in head. Interorbital space 1⅓ in eye. Snout 3⅓ in head. Occiput midway between front of dorsal and anterior nostril. Pectorals slenderer and longer than in *fierasfer*, 2⅔ in head. Head and trunk contained 2⅔ times in tail. Dorsal 96, the extreme end of the tail wanting.

Color, light brownish, the black peritoneum visible through the skin of the abdomen. Mouth and gill-cavity largely dusky. A narrow dark-brown streak along base of dorsal and anal, occupying, toward tip of tail, the entire height of both fins.

A single specimen, 92 mm. long, from station 3324, north of Unalaska Island; depth 109 fathoms.

134. Lycodapus parviceps sp. nov.

Similar to *L. fierasfer*, differing in the much smaller head, longer, slenderer body, the thicker skin with more evident mucous pores, and in the more restricted gill-openings. Head short, 7⅔ in length (5⅓ to 5⅔ in *fierasfer*); depth 11. Upper profile of head nearly straight, not longitudinally concave, as in *fierasfer*. Head deeper and narrower, the snout less spatulate. Skin thicker. A conspicuous series of pores on mandible and along preopercular margin. Gill-slit very oblique, as in *fierasfer*, extending anteriorly as far as vertical from eye, the membranes then narrowly united, free from the isthmus except at extreme front. The gill-slit is superiorly much more restricted than in *fierasfer*, not extending above base of pectorals, while in the latter it extends above them for two-thirds diameter of eye.

Mouth oblique, the maxillary reaching vertical from middle of eye, 2⅓ in head. The jaws are even at tip, the mandible slightly included laterally. Mandibular teeth in a moderate band anteriorly, the inner series enlarged, narrowing posteriorly to a single row. Premaxillary teeth of uniform size, in a narrow band throughout.

Vomer with four canine-like teeth. Palatine teeth small, in a single close-set series. Eye 4¼ in head; least interorbital width 5; snout 3½. Distance from origin of dorsal to occiput slightly less than that from occiput to posterior nostril. Head and trunk contained 3½ in tail. Pectorals 2⅔ in head. Dorsal about 100; anal about 85; both counted to middle of caudal. Pectorals 9. No ventrals.

Body brownish in spirits, fins whitish-translucent; everywhere dusted with black specks. Tail and fins distinctly blackish posteriorly. Orbit blackish above. Gill-cavity silvery, blackish anteriorly. Mouth blackish, except anteriorly. Peritoneum black, the color not showing through the abdominal wall.

A single specimen, 115 mm. long, from station 3324, north of Unalaska Island; depth 109 fathoms.

DEREPODICHTHYS gen. nov. (LYCODIDÆ.)

A slender deep-sea Lycodid without scales or lateral line and with the ventral fins reduced each to a slender unbranched filament, the two very closely approximated, springing from a common projecting base, which is located far forward below the eye, as in Ophidioids. Gill-opening a narrow vertical slit, little wider than base of pectorals. Teeth cardiform, curved, few in number, in narrow bands or irregular single series on jaws, vomer, and palatines.

Derepodichthys alepidotus, type.

135. Derepodichthys alepidotus sp. nov.

Head and body very long and slender, the former resembling a *Lycodes* in appearance, being moderately compressed, with a flattish occiput and a gently rounded, decurved rostral profile. Mouth slightly oblique, quite at lower side of snout, the lower jaw shorter, fitting within the upper. Maxillary and premaxillary entirely concealed within the thick skin of the upper lip, which is directly continuous with that of the forehead, the upper jaw being therefore nonprotractile. Angle of mouth under front of pupil, its distance from tip of snout 2⅔ in head. Teeth as described under the genus. Eye small, not filling the elongate orbit, the diameter of exposed portion of eyeball slightly less than three-fourths length of snout, the latter 3½ in head. A series of large mucous pores on snout and lower part of cheeks; a second series on mandible; no pores on body. Gill-slit vertical, not continued forward, its lower end slightly above base of lower pectoral rays. Length of slit one-fourth length of head, slightly less than distance between slits. Head 8½ in total length depth of head and body 2⅛ in head; width of head 2⅔ in its length. Distance from tip of snout to base of ventrals 2½ in length of head. Distance from tip of snout to front of dorsal 5½ in total length; from tip of snout to vent 3⅔ in total.

Pectorals long and slender, reaching half way to vent, 1⅓ in head. Dorsal and anal confluent with the caudal, concealed in the thick integument so that the rays can not be counted.

Color in spirits light brownish, the dorsal and pectorals whitish, the anal with a dark margin, which becomes black posteriorly. Lips dusky. Abdominal region blue-black.

A single specimen, 110 mm. long, dredged off Queen Charlotte Island, station 3342; depth 1,588 fathoms.

Family GADIDÆ. The Cods.

136. Lota maculosa (Le Sueur). *Ling.*

A young specimen was taken at Nushagak.

137. Antimora microlepis Bean.

Several specimens taken at stations 3330, 3331, 3342, and 3348, in Bering Sea, at depths of 350 and 351 fathoms, and off the coasts of the Queen Charlotte Islands and of California at depths of 1,588 and 455 fathoms.

138. Gadus macrocephalus Tilesius. *Pacific cod.*

It has been frequently pointed out and is well known to fishermen that the Pacific codfish has a smaller air-bladder, or "sound," than the Atlantic cod. Pending an examination of this question, which we are not now in a position to make, we propose to recognize the Pacific fish as a distinct species. A report on the cod banks of Bering Sea, based on the operations of the *Albatross*, has been given by A. B. Alexander. (Report of Commissioner of Fish and Fisheries, 1889–91, p. 280.) An occasional specimen was taken in the dredge, the species being recorded from stations 3224, 3226, 3285, 3291, and 3301, in Bering Sea; depths 17 to 128 fathoms.

139. Pollachius chalcogrammus (Pallas).

A few adults were taken by trolling in Captains Harbor, Unalaska. Young specimens, 4 to 6 inches long, were dredged in great abundance in the shallow water of Bristol Bay and around the Aleutian Islands, at stations 3217, 3222, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3245, 3246, 3248, 3250, 3252, 3253, 3255, 3256, 3259, 3273, 3278, 3279, 3281, 3282, 3285, 3286, 3294, 3298, 3301, 3309, and 3310; depths 5 to 71 fathoms.

Family MACRURIDÆ.

140. Macrurus acrolepis Bean.

Not taken in Alaskan waters, but found abundant off Vancouver Island, Washington and Oregon, at stations 3340, 3346, 3347, and 3348; depths 345 to 786 fathoms.

141. Macrurus cinereus sp. nov.

Snout high and blunt, but little overlapping the mouth, terminating in a pointed prolongation of the median ridge, which bears at its tip a bony tubercle furnished with radiating ridges. The nasal ridges also terminate in shorter and smaller, but similar tubercles, the outline between rostral and nasal tubercles concave. Length of snout slightly less than diameter of orbit, 3⅔ to 4 in head, its tip overpassing the premaxillaries for two-thirds its length. Mouth of moderate size, the maxillary reaching vertical from hinder margin of orbit, equaling length of snout and half of eye. Teeth finely villiform in both jaws, the outer series not at all enlarged, the mandibular band narrow. Barbel short and slender, its length less than half diameter of pupil. Interorbital width six-sevenths diameter of orbit, equaling length of snout. Preopercle greatly expanded, much overlapping the interorbital below, leaving exposed only the extreme posterior angle. Gill-membranes narrowly joined, with a posterior fold free from the isthmus. Gill-rakers short, compressed, almost tubercular, 2+12.

Origin of dorsal well behind base of pectorals. Second dorsal spine long and filamentous, strongly serrate, except on extreme base and tip. Length of spine five-sixths to six-sevenths head. Base of first dorsal equaling diameter of orbit. Interspace between dorsals two-thirds to two-fifths base of first dorsal. Pectoral long and slender, equaling length of head behind anterior nostril opening, about as long as the filamentous outer ventral ray. Vent immediately in front of anal origin. Scales on sides well imbricated, each with 7 to 9 parallel ridges, which bear short sharp spines directed very obliquely backward.

Dorsal II, 10 or 11; ventral 9. Seven scales between lateral line and base of first dorsal.

Color uniform light-grayish on body and fins, with the exception of the blackish pectorals and ventrals. Sides of head silvery. Mouth, gill-cavity, and peritoneum brownish or purplish black, gill membranes and gular membrane dusky.

Numerous specimens from north of Unalaska Island (stations 3307 and 3329, depths 1,033 and 399 fathoms), and from the North Pacific, south of Ookamok Island (station 3340, depth 695 fathoms).

142. Nematonurus cyclolepis sp. nov.

A species with the general appearance (including the protruding snout, inferior mouth, and comparatively weak dentition) of *N. armatus* and *N. affinis*, but with the dorsals less widely separated, the vent anterior in position, and the scales unarmed, as in *Moseleya longifilis*.

Head smooth, compressed, without conspicuous ridges. Median and lateral rostral ridges terminating in slightly projecting points; the median process, a short portion of the median ridge, and the edge of the membrane connecting median with lateral processes with spinous scales and points. Snout projecting beyond the premaxillaries for two-thirds its length, which is contained 3⅔ times in head. Eye small, less than snout, very slightly exceeding interorbital space, 4½ in head. Mouth small, wholly inferior, maxillary reaching vertical from posterior margin of pupil, 2⅔ in head. Premaxillary teeth in two series—the outer similar to those in mandible, not enlarged or canine-like; the inner series smaller, directed obliquely backward. A single series of teeth in mandible, not widening into a patch at symphysis. Barbel thick at base, two-thirds length of snout. Preopercle incurved above the angle, the lower limb expanded, the marginal region striate.

First dorsal inserted behind axil of pectoral. Second spine broken in both specimens, the basal portion smooth, a single sharp barb showing that the spine is serrate. The base of the fin equals the length of the snout. Interspace between dorsals exceeding length of first dorsal base by one-third to two-fifths length of latter. Vent immediately in advance of origin of anal, under middle of interspace between dorsals. The dorsal is low and inconspicuous and the anal higher, as usual in this group. Pectorals very slender, $1\frac{9}{10}$ in length of head. Outer ventral ray filamentous, reaching third or fourth anal ray. Dorsal II, 8 or 9; ventral 12.

Scales mostly lost. The few remaining on head are either entirely smooth or bear a single median keel, with one or two low spinous points. Those on body are without spines, and are either entirely smooth or show traces of a low median keel. Six scales in an oblique series between lateral line and middle of base of dorsal. Color dark brown, the anterior portion of back and sides with small scattered black spots. Opercles, lower side of head (including gill-membranes and ventral area) black, as are also the mouth and gill-cavity and the peritoneum.

Two specimens, the longest 150 mm., from station 3342, off Queen Charlotte Island, depth 1,588 fathoms.

143. Chalinura filifera sp. nov.

Related to *C. serrula* Bean, from the same region and depth, differing in the larger eye, shorter mental barbel, longer snout, longer pectoral fins, shorter interspace between dorsals, and the longer dorsal fin. Snout short, slightly exceeding diameter of eye, $3\frac{3}{10}$ in head; the median ridge and the nasal ridges terminate each in a much projecting point, furnished each with a short rosette of radiating spines and ridges. The outline between these points is concave. Tip of snout projecting beyond the premaxillaries for a distance equaling that which separates the central rosette from one of the lateral ones. Infraorbital ridges inconspicuous, not reaching angle of preopercle behind or bony portion in front.

Mouth large, slightly oblique, with extensive lateral cleft, the maxillary reaching vertical from posterior margin of pupil, 2⅔ in head, equaling distance from tip of snout to middle of eye. Outer series of teeth in premaxillary strong, succeeded by a narrow band of smaller cardiform teeth. Mandibular teeth similar to inner band of upper jaw, the band becoming slightly wider at the prominent symphysis. Barbel short, one-half to two-fifths length of snout. Eye large, the diameter of orbit slightly less than interorbital width or length of snout, 4 in head. Angle of preopercle produced backward, concealing all but the extreme posterior angle of interopercle, the margin appearing serrulate when divested of skin. Gill-membranes joined to isthmus, with a posterior free margin. Gill-rakers very short and heavy, 1 + 11.

Dorsal beginning vertically above base of pectorals; the second spine extremely long and slender, smooth basally, the terminal half rather strongly toothed. It becomes very slender toward the tip, and terminates in a long membranous filament. In one specimen it exceeds length of head, in the others it equals five-sixths that length. Length of base of first dorsal equaling one-third length of head. Interspace between dorsals short, two-fifths to three-fourths length of snout. Pectorals very long and slender, equaling the head without the snout. Outer ventral rays very long and filamentous, equaling length of head. Vent immediately in advance of anal origin. Scales rather thin, those on back and sides with about five diverging ridges, each of which bears a number of short rigid spinules directed very obliquely backward, the posterior projecting but little beyond the margin of the scale. Eight or nine scales in an oblique series between the middle of first dorsal and the lateral line.

Dorsal II, 12 to 14; pectoral 20 to 22; ventral 9 or 10.

Dark brown, the fins, gill-membranes, lips, nostrils, and under side of snout black. Anterior part of mouth and lining of gill-cavity purple. Peritoneum blackish brown.

Three specimens, 520 to 550 mm. long, were dredged in 1,588 fathoms off Queen Charlotte Island, at station 3342.

Family PLEURONECTIDÆ. The Flounders.

144. Citharichthys sordidus (Girard).

At stations 3351 and 3352 off northern California; depths 26 and 51 fathoms.

145. Citharichthys stigmæus Jordan & Gilbert.

At station 3350, near Point Reyes, Cal.; depth 75 fathoms.

146. Hippoglossus hippoglossus (Linnæus). *Halibut.*

A few small specimens dredged at stations 3218, 3230, 3238, and 3239; depths 3¼ to 41 fathoms. Taken with hand lines on all the cod banks.

147. Atheresthes stomias Jordan & Gilbert. *Arrow-toothed Halibut.*

At stations 3215, 3216, 3218, 3221, 3223, 3224, 3225, 3227, 3259, 3263, 3264, 3267, 3321, 3324, 3331, 3332, and 3339, located north and south of the Aleutian Islands and in Bristol Bay; depths 32 to 406 fathoms.

148. Eopsetta jordani (Lockington). *California Sole.*

Station 3351, near Point Reyes, Cal.; depth 51 fathoms.

149. Hippoglossoides elassodon Jordan & Gilbert.

North and south of the Aleutian Islands, and Bristol Bay; stations 3216, 3217, 3218, 3225, 3257, 3259, 3284, 3310, 3311, 3313, 3314, 3321, 3323, and 3334; depths 25 to 85 fathoms. In four specimens we find the following fin formulæ: D. 86, A. 65; D. 87, A. 69; D. 79, A. 67; D. 84, A. 63.

150. Lyopsetta exilis (Jordan & Gilbert).

At station 3351, off northern California; depth 51 fathoms.

151. Lepidopsetta bilineata (Ayres).

Taken abundantly at Unalaska and Chernoffski harbors, at Herendeen Bay, and Hagemeister Island, and at stations 3213, 3214, 3215, 3217, 3218, 3219, 3222, 3232, 3233, 3235, 3237, 3238, 3239, 3242, 3244, 3245, 3246, 3248, 3249, 3250, 3251, 3252, 3258, 3259, 3264, 3265, 3266, 3267, 3268, 3269, 3270, 3271, 3272, 3273, 3275, 3278, 3279, 3280, 3282, 3283, 3284, 3285, 3286, 3287, 3289, 3290, 3291, 3292, 3293, 3294, 3295, 3298, 3299, 3300, 3301, 3302, 3303, and 3323; depths 4½ to 70 fathoms. This species is variable in the height of the anterior arch to the lateral line, which is sometimes strong, sometimes little marked.

152. Limanda aspera (Pallas).

An excellent food-fish, taken in abundance at Herendeen Bay and at stations 3230, 3233, 3234, 3235, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3248, 3251, 3252, 3266, 3267, 3269, 3282, 3283, 3286, 3298, 3299, 3301, and 3303 in Bristol Bay; depths 3¼ to 53 fathoms.

153. Limanda proboscidea sp. nov. (Plate 33.)

Bearing some resemblance to *L. ferruginea* (Storer) but having fewer rays in dorsal and anal, larger scales and longer snout. Profile sharply angulated above front of upper eye, the snout convexly protruding. Form varying from very slender to broadly elliptical, the two outlines equally curved. Depth 2¼ to 2½ in length. Head large, 3 to 3⅓ in length, in a specimen 7 inches long. Caudal peduncle short, widening backward, its least depth twice its length. Mouth oblique, the maxillary reaching beyond front of lower eye, 4 in head. Teeth narrow, little compressed, in a single series on both sides of the jaw, extending farther back on the blind side. Eyes on right side. Lower eye well in advance of upper, the diameter of upper eye 5½ to 6 in head, 1½ in snout. Vertical from front of upper eye falling midway between front of orbit and front of pupil of lower eye. Interorbital space a very narrow sharp ridge, naked in females, with a single series of ctenoid scales in males. Gill-rakers short, about equal to diameter of pupil, 13 or 14 in number, 9 or 10 on lower limb.

Scales loosely imbricated, ctenoid in males on colored side, smooth in females. Blind side of both sexes smooth. Head scaled on eyed side in males; the opercle, subopercle, interopercle, and preopercle mostly naked in females. Head on blind side naked. Rays of vertical fins with single series of ctenoid scales. Dorsal fin beginning slightly behind front of upper eye, the first three rays usually higher and with membranes more deeply incised than in those which follow. Highest portions of both dorsal and anal fins behind the middle of the body. The fins about equal, their longest rays equal to the snout and eye. Caudal two-thirds head. Pectorals short, one-third head. Ventrals reaching beyond front of anal, 3⅓ in head. The usual small antrose spine in front of anal fin.

D. 63–67; A. 47–49; Lateral line 86–95. Length 7½ inches.

Color: Light grayish or brownish, thickly covered with small whitish spots. Entire left side with margins of dorsal, caudal and anal fins bright lemon-yellow (as in *ferruginea*). Vertical fins grayish with an occasional dark-brown ray.

Several specimens from stations 3239, 3240, and 3248 in Bristol Bay; depths 11½ to 21 fathoms; one young specimen from Herendeen Bay.

154. Platichthys stellatus (Pallas). *Great California Flounder.*

Mouth of the Nushagak River, and stations 3229, 3235, 3239, 3240, and 3269, Bristol Bay; depths 8 to 16 fathoms.

155. Pleuronectes quadrituberculatus Pallas.

Numerously represented at Chernoffski Harbor and Herendeen Bay, and at stations 3240, 3244, 3251, and 3252 in Bristol Bay; depths 4½ to 29½ fathoms.

156. Pleuronectes glacialis Pallas.

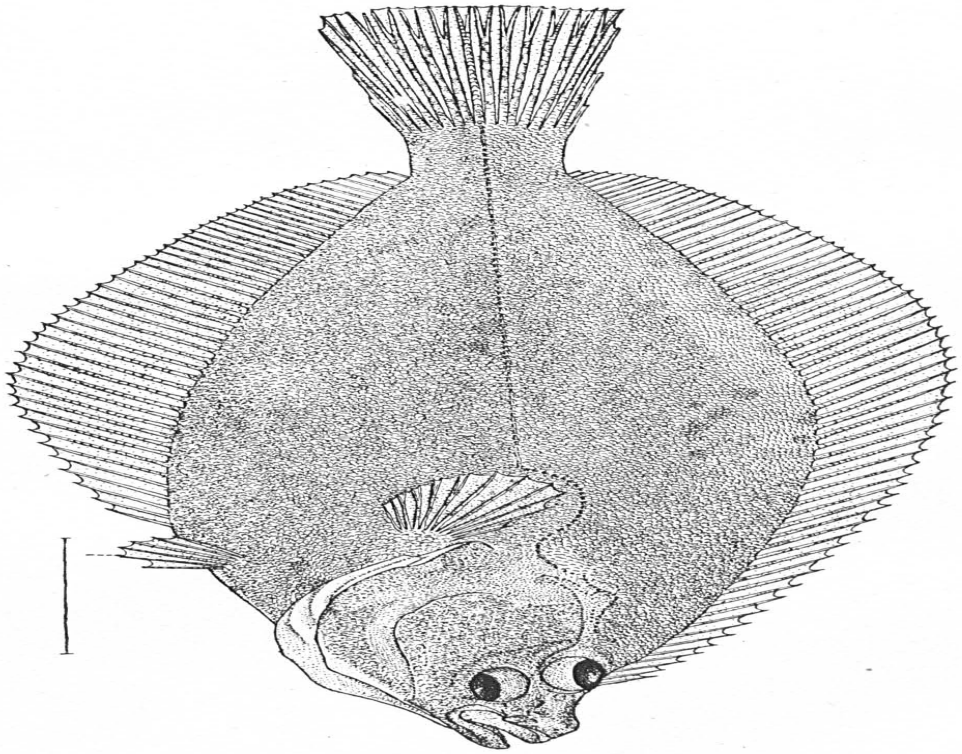
Found abundant in the mouths of the Naknek and Nushagak rivers, and at station 3232 in Bristol Bay; depth 10½ fathoms.

157. Glyptocephalus zachirus Lockington.

Bering Sea and North Pacific generally; stations 3227, 3259, 3322, 3323, 3324, 3331, 3334, 3349, and 3351; depths 35 to 350 fathoms.

158. Microstomus pacificus (Lockington). *Slippery Sole.*

Stations 3216 (south of Alaska Peninsula, 61 fathoms), 3333 (north of Unalaska, 19 fathoms), 3343, 3347, 3348, and 3349 (coasts of Washington, Oregon, and northern California; depths, 239 to 516 fathoms). This species is dredged in abundance in the vicinity of San Francisco, at depths of 15 to 50 fathoms.



LIMANDA PROBOSCIDEA sp. nov.

REPORT UPON THE FISHES COLLECTED BY THE STEAMER ALBATROSS OFF THE COAST OF CALIFORNIA, BETWEEN POINT CONCEPTION AND POINT ARENA, IN MARCH AND APRIL, 1890.

During parts of March and April, 1890, the U. S. Fish Commission steamer *Albatross* made an investigation of the fishing-grounds on the coast of California from Point Conception to Point Arena, in continuation of the inquiries conducted the previous year to the southward of Point Conception. On the earlier expedition the writer acted as chief naturalist of the *Albatross*, and the new fishes obtained at that time have been described by him in a paper published in 1890, in the Proceedings of the United States National Museum.* The collection of fishes made on the latter cruise was also referred to him and is discussed in the present paper. It consists largely of the same species secured south of Point Conception, but was found to contain representatives of one undescribed genus and four new species.

The cruise of March and April, 1890, is fully described by Lieut. Commander Z. L. Tanner, U. S. N., the commanding officer of the steamer *Albatross*, in his report for that year, pp. 219–226; and the fishery results are discussed by Mr. A. B. Alexander, fishery expert of the *Albatross*, in the same connection, pp. 275–279.†

The investigations were carried from the shallow water along shore into a depth of 627 fathoms, the fishery work having been conducted chiefly by means of the beam trawl, which was employed at 113 separate stations. The positions of the different stations, the depth of water, character of bottom found at each, with other data, are given in the report of Lieut. Commander Tanner above referred to.

Family HEPTATREMIDÆ.

1. Polistotrema stouti (Lockington).

Stations 3103 and 3126; depths 67 and 456 fathoms.

Family SCYLLIORHINIDÆ. The Cat Sharks.

2. Catulus xaniurus Gilbert.

Stations 3126, 3196, and 3200, in 200 to 456 fathoms,

In two young specimens, 105 and 110 mm. long, a series of spines is developed on each side of the middle line of back, larger than the prickles and firmly set. These begin above the second or third gill-slit, continue to slightly beyond front of first dorsal fin, and contain 15 to 18 spines. A similar series of lateral spinelets is described by Eigenmann in young of *Scylliorhinus ventriosus* = *Catulus uter* J. & G. (West American Scientist, Nov., 1889, p. 151). It is not improbable that they may

* Scientific results of explorations by the U. S. Fish Commission steamer *Albatross*, No. XII.—A preliminary report on the fishes collected by the steamer *Albatross* on the Pacific Coast of North America during the year 1889, with descriptions of 12 new genera and 92 new species, by Charles H. Gilbert; Proc. U. S. Nat. Mus. 1890, 49–126.

† Report upon the investigations of the U. S. Fish Commission steamer *Albatross* from July 1, 1889, to June 30, 1890, by Lieut. Commander Z. L. Tanner, U. S. N., commanding. Report U. S. Fish Comm. for 1889–1891, 207–342.

be found characteristic of Scyllioid sharks. No trace of them is found in older specimens. They strongly resemble the primary definitely placed spines of *Raja*, and have doubtless, as in the latter, some taxonomic value.

Young specimens have the dorsal and anal fins occupying somewhat different positions from that found in adults, and of different relative sizes. In a specimen 110 mm. long the dorsals are very narrow, and the anterior dorsal is much farther back, being mostly behind the ventrals instead of terminating above their posterior line of insertion. The anal is very long, separated from caudal by a hardly appreciable space, and in front slightly overlapping the first dorsal. In a specimen 240 mm. long the anal is still disproportionately long, separated from caudal by about one-fifth base of fin instead of one-half base of fin, as in adults. The first dorsal has apparently shifted forward, as it now terminates slightly behind ventrals.

A male specimen, 430 mm. long, has the claspers projecting but little beyond the ventrals. It differs as follows from the original description: The distance from tip of snout to front of mouth is more than half the greatest width of snout. The first dorsal is more posteriorly placed, extending behind the vertical from ventrals, the length of its base contained but 1¾ times in the space between dorsals. This posterior position of the first dorsal may be a case of retarded development, as the fin shifts forward during growth. The scales on side of tail are smaller and less crowded than those forming the upper caudal band, but are otherwise wholly similar, each possessing a strong central spine and a pair of shorter lateral cusps, and having the central portion deeply grooved.

Family GALEIDÆ. The Requiem Sharks.

3. Rhinotriacis henlei Gill.

One specimen from station 3100, in 29 fathoms.

Family RAJIDÆ. The Skates.

4. Raja stellulata Jordan & Gilbert.

Stations 3105, 3129, 3189, 3196, 3204, and 3208, in 200 to 218 fathoms.

No series of young is at hand. In a single young male, 130 mm. long, there is no trace of spines or papillæ on the orbital rim, but those along middle of back are very large, as is also a large spine on each shoulder. The prickles are coarse, entirely covering the disk and tail above, none on the lower side. The prickles on sides of disk are in rows following the pectoral rays, those on middle of back are in lengthwise series, and those below eye are in rows parallel with its lower border. This serial arrangement of prickles I have noticed also in the young of *Catulus xaniurus*.

In four larger specimens, 300 to 390 mm. long, there is no trace of ocular spines. Of primary spines there seem to be 3 or 4 behind the occiput, the most anterior occupying the position of the single postoccipital spine in *R. inornata*, and a series of 17 to 20 on middle of tail. The interspace on middle of back is apparently filled in later by 6 or 7 spines, which are just appearing in one of the large specimens and are smaller than the caudal series in all the others. No ocellated spot appears at base of pectorals, an ill-defined darker spot occupying this position in one specimen.

5. Raja inornata Jordan & Gilbert.

Stations 3106, 3115, and 3147, in 43 to 76 fathoms. The collection presents a very interesting series from unhatched young to adults, and throws some light on the development of the spines and on the early stages of fins and tail.

The first spines to appear correspond exactly in position with those described below in *Raja rhina*. There are three definitely placed on the orbital rim, one occupying a median position behind the occiput, and a continuous series along median line of tail. The postoccipital spine can be always identified by its relation to a conspicuous short double series of pores. These series are curved, and each presents its convex side toward the middle line of the back. It is between the posterior diverging ends of these series that the spine in question is found.

In a young specimen, 145 mm. long, taken from the egg, having the yolk nearly absorbed, no spines are externally visible. They are fully developed, however, and lie declined and hidden beneath the epidermis. The three ocular spines, the postoccipital spine, and the caudal series are all present. No rudiments of spines are visible in the mid-dorsal region, between the postoccipital spine and the middle of the ventrals. On freeing them from the epidermis the spines can be readily elevated and depressed. The posterior attachment of the base is, however, firm, and will not permit the elevation of the spine beyond a certain point. Later, a firm anterior attachment is formed, the spine in the meantime breaking through the skin. When it first appears it is still movable, but soon becomes rigid.

In still younger embryos, 120 and 125 mm. in length, the spines are represented by elongate soft, dermal papillæ, of about the same size and shape as the future spines. They occupy the same definite positions found characteristic for the spines of this and related species. The papillæ lie declined beneath the epidermis, through which they are visible as short white lines. No rudiments appear between the postoccipital papilla and the base of the ventrals.

A specimen 190 mm. long has the spines fully developed and the mid-dorsal series nearly complete. Thus the caudal series continues forward beyond base of ventrals for about three spines, and is then followed after a short interval by three stronger spines, the anterior of which is the postoccipital spine, as indicated by its characteristic position. In another specimen, 200 mm. long, a continuous dorsal series is present from the postoccipital spine to tail, without evidence that those on middle of back appeared later than the others. In this specimen are rudiments of the additional ocular spines which appear later, one papilla being present above middle of orbit, a second over spiracle. In later stages the growth of these secondary ocular spines may be traced, their development being often accompanied by the total disappearance of the primary spines. The secondary spines may disappear in turn. The growth of the mid-dorsal series I have been unable to trace. Specimens show much variation with respect to their development. In one, 340 mm. long, no spines are present between the postoccipital spine and the tail. In another, the series is complete except the two immediately following the postoccipital spine, these two being still represented by dermal papillæ.

In an embryo, 145 mm. long, the tail is produced 31 mm. beyond the second dorsal, and forms a depressed tapering appendage which becomes very slender toward the tip. The lateral folds and the median dorsal fold are continued some distance along this appendage, but are very low. Aside from this, there is no indication of the future caudal fin. In a younger embryo, 125 mm. long, the unabsorbed yolk being still large (about 25 mm. in diameter), the tail is proportionately longer than in the last, 86 mm. in length, the terminal portion projecting 32 mm. beyond the dorsal fin. As in the first described, the lateral caudal fold is distinct, highest in the region of the dorsal fins, thence declining in front and behind, disappearing before reaching either base or tip of tail. No trace is present of a median fold connecting the two dorsals. Such a fold appears to extend from second dorsal around tip of tail, becoming continuous with the anal fold, which is arrested definitely at a distance of 4 mm. behind the vertical from second dorsal. The latter folds may, however, be exaggerated, or may be entirely due to the shriveling of the specimens.

The youngest embryo described is light brownish in color, with a series of whitish or light-yellowish crossbars down the middle of back and tail. The same colors appear on pectorals in the form of rounded spots and blotches. A round black spot has appeared at base of each pectoral, surrounded by an area of light yellowish. In a second embryo, of about equal size, the bands on back of tail seem to bear a definite relation to the spines. In an older embryo, with the yoke nearly absorbed, the color has undergone considerable modification. The bands and the lighter areas have disappeared, and the disk is sparsely covered with small, round black spots, the largest nearly equaling diameter of pupil.

6. Raja rhina Jordan & Gilbert.

In two young males, 154 and 225 mm. long, the spines are well developed and exactly correspond. In each there are three spines on the orbital rim, one at the upper and one at the lower anterior angle of the eye and one at its upper posterior angle; a very large one on median line behind occiput, and a strong median series on tail, beginning opposite posterior base of ventral fin. This is the invariable arrangement in the young, but is modified later on by the disappearance of some of the original spines and the development of others. Thus, in a specimen 450 mm. long the lower preorbital spine has nearly disappeared, and the others are evident, but accompanied by additional spines which have been interposed. As in younger specimens, there is a single postoccipital spine and no mid-dorsal series, but some of the original spines on middle of tail have apparently been lost and replaced by others, as the lining and spacing is now irregular. The taxonomic value of these first spines appears from the fact that they exactly correspond in the young of a number of related species, and from the further fact that their rudiments are found occupying definite positions during the later larval stages, some of which are described above in the nearly related *R. inornata*. The same arrangement is found also in the young of *R. binoculata*. The first prickles to appear are those on under side of snout, where they form a sparse band or a single definite series along the edge and an elongate median patch in front.

In two young males, 154 and 225 mm. long, the claspers measured from inner base respectively 7 and 10 mm., in both cases overpassed by the ventrals.

Stations 3147, 3163, 3193, 3197, and 3208, in 56 to 203 fathoms.

7. Raja binoculata Girard.

The young can be at once distinguished by the very conspicuous ocellated spots. In a specimen 190 mm. long the black center, the wide, yellowish ring, and the outer black ring are very strongly marked. These spots are only faintly indicated in the young of related species. The spines are, as usual at this stage, just appearing from beneath the epidermis. Caudal spines 15 or 16 in number.

Family ALEPOCEPHALIDÆ.

8. Alepocephalus tenebrosus Gilbert.

One specimen each from stations 3104 and 3186, in 391 and 328 fathoms. Differing from original description as follows: The distance of ventrals from head equals length of head behind front of pupil. Interorbital space gently convex. Base of anal fin slightly exceeding that of dorsal.

Family CLUPEIDÆ. The Herrings.

9. Clupanodon cæruleus (Girard). *California Sardine.*

Station 3167; depth 33 fathoms.

10. Alosa sapidissima (Wilson). *Common Shad.*

Three specimens of this introduced food-fish were taken in Drake Bay. Each is about 150 mm. long.

Family ENGRAULIDIDÆ. The Anchovies.

11. Engraulis mordax Girard. *California Anchovy.*

Stations 3099, 3154, 3167, and 3182; depths 11 to 33 fathoms.

Family MYCTOPHIDÆ. The Lantern Fishes.

12. Nannobrachium leucopsarum Eigenmann & Eigenmann.

Stations 3112, 3126, 3127, 3128, 3198, 3199, 3200, and 3201; depths 233 to 627 fathoms.

Family ARGENTINIDÆ. The Smelts.

13. Leuroglossus stilbius Gilbert. (Plate 34.)

Stations 3126 and 3188; depths 456 and 316 fathoms. In the specimen from 3126 the mandible has a single series of conical close-set teeth, which work against the palatine and vomerine series above. They seem to grow slightly larger laterally. The tongue seems to have some slight asperities, but no teeth can be detected.

14. Osmerus thaleichthys Ayres.

Stations 3099, 3134, 3135, 3136, and 3182, in 17 to 20 fathoms. Our specimens vary so much in the curvature of the maxillary and in the length of the paired fins that I am unable to recognize *O. attenuatus* as a distinct species. The head is 4 in length, and the anal contains 18 or 19 rays in two specimens which differ widely in the curvature of the maxillary.

Family STERNOPTYCHIDÆ.

15. Sternoptyx diaphana Hermann. Stations 3127 and 3188; depths 418 and 316 fathoms.

Family CHAULIODONTIDÆ. The Viper Fishes.

16. Chauliodus macouni Bean. Stations 3127, 3128, and 3201; depths 280 to 627 fathoms.

17. Cyclothone microdon (Günther). Station 3127; depth 418 fathoms.

Family SYNGNATHIDÆ. The Pipefishes.

18. Siphostoma californiense (Storer). Monterey and at station 3141; depth 24 fathoms.

Family AULORHYNCHIDÆ.

19. Aulorhynchus flavidus Gill. Monterey.

Family ATHERINIDÆ. The Silversides.

20. Atherinopsis californiensis Girard. *California Smelt; Pescado del Rey.* Monterey.

21. Atherinops affinis (Ayres). *Little Smelt; Pescadillo del Rey.* Santa Barbara and Drake Bay. Dorsal fin with 6 or 7 spines, 52 to 56 series of scales, and 4 rows between lateral line and base of first dorsal.

22. Atherinops insularum Gilbert. Two typical specimens from Drake Bay, with 62 to 68 scales in lateral line and 5 dorsal spines. It is possible that intermediate forms will be found and the species proved untenable.

Family BERYCIDÆ.

23. Melamphaes cristiceps Gilbert. Station 3127; depth 418 fathoms.

Family ECHENEIDIDÆ.

24. Remora remora (Linnæus). *Remora; Sucker.* Three specimens from Santa Barbara.

Family SCIÆNIDÆ. The Croakers.

25. Genyonemus lineatus (Ayres). *Little Roncador.* Stations 3099, 3100, 3132, 3134, and 3136; depths 7 to 33 fathoms.

Family EMBIOTOCIDÆ. The Surf Fishes.

26. Brachyistius rosaceus (Jordan & Gilbert). Stations 3101, 3115, 3132, 3147, and 3156; depths 33 to 56 fathoms.

27. Cymatogaster aggregatus Gibbons. *Viviparous Perch.* Drake Bay and stations 3100, 3101, 3115, 3149, 3152, and 3156; depths 29 to 50 fathoms.

28. Hypocritichthys analis (A. Agassiz). Stations 3100, 3135, and 3137; depths 11 to 29 fathoms.

29. Hyperprosopon argenteus Gibbons. Monterey.

30. Holconotus rhodoterus Agassiz. San Simeon Bay.

31. Amphisticus argenteus Agassiz. Monterey, San Simeon Bay, and Santa Barbara.

32. Phanerodon furcatus Girard. Station 3137; depth 11 fathoms.

33. Damalichthys argyrosomus (Girard). Station 3149; depth 45 fathoms.

Family GOBIIDÆ. The Gobies.

34. Lepidogobius lepidus (Girard). Stations 3115, 3153, and 3154; depths 20 to 43 fathoms.

Family CHIRIDÆ.

35. Zaniolepis latipinnis Girard. Stations 3115, 3149, 3156, 3173, and 3175; depths 43 to 62 fathoms.

36. Oxylebius pictus Gill. Station 3102; depth 27 fathoms.

Family SCORPÆNIDÆ.

37. Sebastodes goodei Eigenmann & Eigenmann. *Rockfish.*

Stations 3113, 3125, and 3190; depths 53 to 70 fathoms.

Gill-rakers 10 or 11 + 23 to 25. Peritoneum silvery, with scattered stellate black spots. In three young specimens the occipital spines are evident, the others concealed or not developed. The young show five dusky bars downward from back, under front, middle, and end of spinous dorsal, below soft dorsal, and on caudal peduncle. The head is contained $2\frac{2}{3}$ times in the length; the depth, $3\frac{1}{3}$. The second anal spine is as long as the third, but does not reach its tip when fin is declined.

38. Sebastodes jordani sp. nov.

Most nearly allied to *S. goodei*, from which it differs in the much slenderer body, the longer anal spines, the black peritoneum, and the more numerous gill-rakers. From *entomelas* and *ovalis* this species differs in the obsolescence of the cranial ridges, as well as in other details.

Body very slender, the depth 4 in the length, the least depth of caudal peduncle three-fourths diameter of eye. Head very slender, $2\frac{1}{3}$ in length, tapering regularly to the very sharp snout. Mandible projecting, its tip entering profile, provided with a rather small but distinct symphyseal knob. Maxillary reaching vertical from middle of eye, $2\frac{1}{4}$ in head. Snout $3\frac{5}{6}$ in head. Interorbital width $4\frac{1}{3}$. Eye large, $3\frac{1}{3}$. Interorbital width flat or slightly convex, wholly scaled over, the orbital ridges obsolete, or a faint trace only of the supraorbital, which is always without spine. The occipital ridges are low and sharp, terminating each in a spinous point. In addition to these, the tympanic spines are sometimes weakly developed, and the nasal spines are present. The head is otherwise wholly smooth. Preorbital very narrow below eye, wide anteriorly, without distinct lobes but with one or two weak spinous points. Gill-rakers long and very slender, 29 present on horizontal limb of outer arch, the longest equaling one-half diameter of orbit. Preopercular spines 5, comparatively slender, all directed backward.

Dorsal spines very slender, the fourth the longest, or the fourth and fifth equal, contained 2⅞ to 2¾ in length of head. Dorsal very deeply notched, the twelfth spine but one-fourth as long as the longest, and barely connected at base with the eleventh. Soft dorsal scarcely as high as the spinous. First anal spine very short, the second very slightly stronger than the third, and nearly or quite as long measured from base, its length 3½ in head. The second spine appears much shorter than the third when the fin is declined. Longest soft ray of anal 2⅞ in head. Caudal deeply notched. Anus anterior in position, midway between first anal spine and base of ventrals; the tips of the ventrals extend to or beyond it, and the pectorals extend beyond tips of ventrals.

D. XIII, 14 or 15; A. III, 9 or 10. Pores in lateral line, 54 to 58.

Scales small, everywhere ctenoid, entirely covering head, including maxillaries, mandibles, and snout, except a triangular area on top of snout, beneath which lie the premaxillary spines. Color as in *S. goodei*, dusky olive above, bright silvery on sides of head and body and below; probably with some red in life. Fins unmarked. Mouth and gill-cavities pure white, the peritoneum jet black.

Specimens ranging in size from 165 mm. to 215 mm. from stations 2935, 3103, and 3114; depths 62 to 124 fathoms.

Named for David Starr Jordan, president of the Leland Stanford Junior University, the most successful worker in the genus *Sebastodes*.

39. Sebastodes saxicola (Gilbert).

Stations 3103, 3104, 3113, 3114, 3115, 3125, 3129, 3161, 3183, 3184, 3189, 3192, 3194, 3196, 3197, 3206, 3207, 3208, and 3209; depths 43 to 391 fathoms.

Gill-rakers constantly 10+22 or 23. The second anal spine varies somewhat in length, always extending slightly beyond tip of third anal spine when the fin is declined, usually not reaching tips of soft anal rays, its length 2½ to 2⅓ in that of head. Young specimens have faint dark bars occupying usual position; a jet-black blotch on middle of soft dorsal with a light streak below it separating it from the back.

40. Sebastodes diploproa (Gilbert).

Stations 3105, 3129, 3161, 3170, 3188, 3189, 3191, 3193, 3195, 3196, 3197, 3204, and 3208; depths 160 to 316 fathoms, excepting station 3197 (77 fathoms), from which there are 11 young specimens 2 to 3 inches long, supposed to belong to this species. All these show the characteristic silvery-white coloration on lower half of sides. There are traces of dark bars on the sides; one on nape and under front of spinous dorsal; two on sides diverging downward from behind middle of spinous dorsal; one under middle of soft dorsal. There are corresponding dusky marks on the fins, that on soft dorsal being a distinct blackish blotch. The projecting lobes of the premaxillaries are evident in the youngest specimens. Fins and spines of head about as in adults.

The gill-rakers in this species are 9 or 10 + 23 to 25. The maxillary is 2½ to 2¼ in head. The interorbital space is very slightly more than one-half eye. The ventral fins extend nearly to vent. Pectorals 1⅔ in head. There is considerable variation in the direction of the upper preopercular spines, which are directed sometimes straight forward, sometimes obliquely forward and downward. Lower preorbital spine directed obliquely downward and backward.

41. Sebastodes aurora (Gilbert).

Stations 3195, 3199, and 3205; depths 233 to 252 fathoms. Gill-rakers very large and thick, comparatively few in number, 7 on vertical limb, and 14 or 15 movable ones and about 3 tubercles on horizontal limb of gill-arch. The coronal spines are an inconstant feature of this species, absent nearly as often as present. In one specimen a slight prominence on one side indicates its position.

42. Sebastodes rhodochloris (Jordan & Gilbert). *Flyfish.*

Stations 3183 and 3189; depths 162 and 218 fathoms. Gill-rakers 6 + 18.

43. Sebastodes chlorostictus (Jordan & Gilbert). *Pesca vermiglia.*

Station 3129; depth 204 fathoms. The preorbital spines can not be used to distinguish this species from *S. eos* Eigenmann. If the two are distinct, they are distinguishable by the scaliness of the maxillary and mandible, the length of the second anal spine, and the color of the peritoneum.

44. Sebastodes rupestris (Gilbert).

Station 3189; depth 218 fathoms. A single specimen, 5 inches long. The species is evidently allied to the *rosaceus* group, but is without the pink spots. Below the lateral line is a single black streak, which grows more intense opposite the dark vertical bars. The interorbital space contains two low inconspicuous ridges; its width is contained 2⅓ times in diameter of eye. No spine or a very weak one at lower angle of suboperele

45. Sebastodes elongatus (Ayres). *Reina.*

Stations 3106, 3113, 3125, 3129, 3161, 3163, 3203, 3204, and 3207; depths 65 to 204 fathoms.

Gill-rakers 9 or 10 + 20 to 22, extending full length of arch. In the young the lateral stripes are broken up into smaller blotches, the interruptions to the dorsal stripe leaving a series of saddle-like blotches along the back, which correspond in position with those of *S. saxicola*. There is one under first dorsal spines, one under middle, and one under end of spinous dorsal, one under soft dorsal, and one on back of caudal peduncle. This correspondence is interesting in connection with similar color marks discovered in the young of *S. diploproa* and those known to occur in the young of the *rosaceus* group.

46. Sebastodes auriculatus (Girard).

Stations 3097, 3100, 3132, 3150, 3154, and 3181; depths 16 to 33 fathoms. In one specimen the gill-rakers are 7+15. On the upper limb two only are long and compressed; the others are round and thick, but slightly movable. On lower limb all those enumerated are compressed. In front is a mass that might represent rudiments of one or more.

47. Sebastolobus alascanus Bean.

Stations 3112, 3126, 3161, 3170, 3186, 3187, 3191, 3195, 3196, 3199, 3204, and 3208; depths 191 to 456 fathoms. Dorsal usually with 16 spines, with 17 in two specimens noted. In the young the fins are colored as in adults, not black as in *S. altivelis*. Inside of mouth and gill-cavity white.

48. Sebastolobus altivelis Gilbert.

Stations 3104, 3112, 3127, 3128, 3188, and 3202. In very young specimens all the fins are black, and the intense black lining to gill-cavity is externally visible, making sides of head appear dusky. The mouth is posteriorly black. The branchiostegal membranes are lined with white on basal part and edged with black. The spinous dorsal is without black blotches, nearly uniformly dark in color. The spines vary much in height, but the third is always the highest. The second anal spine is always much longer than the third, reaching if uninjured beyond tips of soft rays.

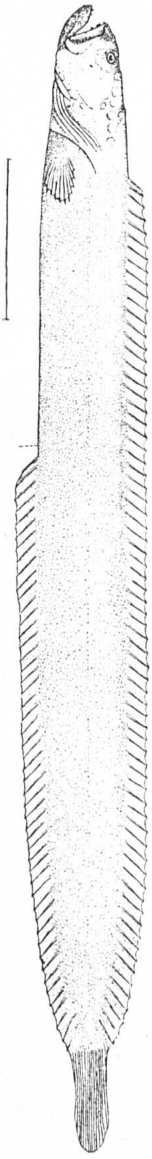
Family COTTIDÆ. The Sculpins.

49. Icelinus quadriseriatus (Lockington).

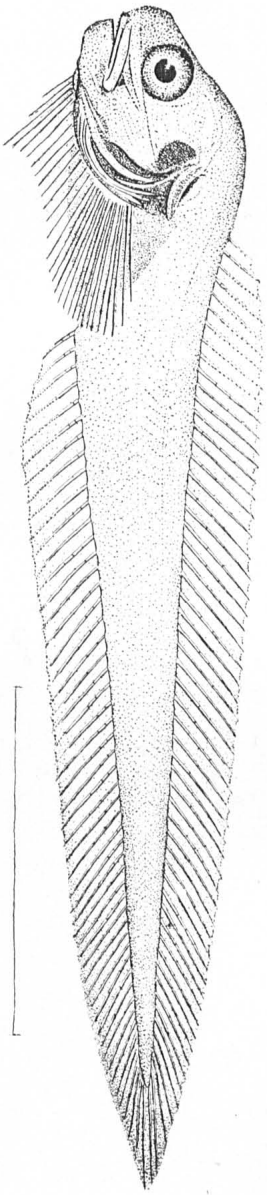
Stations 3115, 3152, 3154, 3155, 3166, 3167, and 3179; depths 20 to 47 fathoms.

50. Icelinus tenuis Gilbert.

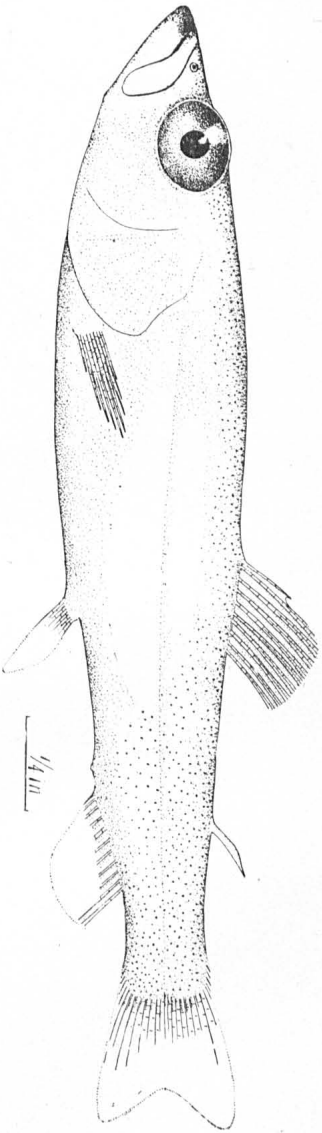
Stations 3106 and 3129; depth 77 to 204 fathoms. These specimens are slenderer than indicated in the original description, the depth being contained 6½ times in the length. In two specimens the second dorsal spine is filamentous as well as the first, reaching in one specimen beyond front of second dorsal.



LYCONECTES ALEUTENSIS Gilbert.



PARALIPARIS DACTYLOSUS sp. nov.



LEUROGLOSSUS STILBIUS Gilbert.

51. Icelinus filamentosus Gilbert.

Stations 3113, 3125, 3129, 3146, 3161, 3183, 3184, and 3209; depths 62 to 204 fathoms. The preopercular spine increases disproportionately with age. In specimens 2 to 3 inches long it is short and slender, with but two upwardly directed cusps. In adults it is the most massive found in the genus, and is furnished with four upwardly directed barbs, the basal one of which may be minute or rudimentary.

52. Chitonotus megacephalus Lockington.

Stations 3115, 3176, and 3179; depths 30 to 43 fathoms. Two specimens have a small preopercular spine, with one terminal and two upwardly-directed points. The mouth does not extend to opposite posterior border of orbit.

53. Leptocottus armatus Girard. Station 3097; depth 12 fathoms.

54. Oligocottus analis Girard. Monterey.

55. Oligocottus maculosus Girard. Monterey.

56. Radulinus asprellus Gilbert. Stations 3103, 3171, 3172, 3173, 3175, and 3194; depths 52 to 92 fathoms.

Family AGONIDÆ.

57. Brachyopsis verrucosus Lockington. Stations 3152, 3155, 3182; depths 36, 35, and 11 fathoms.

58. Brachyopsis xyosternus Jordan & Gilbert. Station 3182; depth 11 fathoms.

59. Odontopyxis trispinosus Lockington. Stations 3129, 3137, 3152, 3153, 3154, 3155, 3157, and 3166; depths 11 to 47 fathoms, excepting station 3129 (204 fathoms).

60. Xenochirus triacanthus Gilbert. Stations 3103, 3113, 3114, 3145, 3156, 3157, and 3171; depths 47 to 76 fathoms.

61. Xenochirus pentacanthus Gilbert. Stations 3161, 3189, 3191, 3193, and 3204; depths 160 to 218 fathoms.

62. Xenochirus latifrons Gilbert.

Stations 3103, 3129, 3147, 3156, 3161, 3174, 3189, 3193, 3194, 3204, 3206, and 3209; depths 50 to 218 fathoms. The gill-membranes have always a distinct free edge except at middle line, where a frenum joining middle of membrane to isthmus may come out to the very margin. Plates on cheeks are always absent, and other diagnostic marks are constant.

Family LIPARIDÆ.

63. Careproctus melanurus Gilbert.

Stations 3112, 3186, 3189, and 3199; depths 218 to 328 fathoms. Three specimens from station 3112 are graduated in size, measuring 65, 78, and 95 mm. The disk becomes relatively smaller with age, measuring 4, 4½, and 4⅝ mm. The position remains the same, as does that of vent.

64. Paraliparis cephalus Gilbert.

Stations 3112 and 3126; depths 296 and 456 fathoms.

65. Paraliparis dactylosus sp. nov. (Plate 34.)

Very close to *P. ulochir*, but with the upper insertion of the pectoral much lower, opposite the lower margin of pupil, and the head and body much more slender and elongate. Shape of head much the same as in *P. ulochir*, the snout broadly rounded, slightly if at all overlapping the horizontal mouth; the cheek vertical. Occiput and nape not conspicuously swollen. Lower jaw included. Maxillary reaching vertical behind middle of pupil, 2⅜ in head. Eye large, 3 in head. Bony interorbital space 5.

Snout 4¼. Gill-opening a narrow slit, extending to opposite third or fourth pectoral ray, its length equaling diameter of pupil. Teeth acute, in narrow bands in the two jaws, each band made up of oblique rows. Opercle produced into a pointed lobe, which is separated from upper pectoral ray by a distance equaling diameter of pupil.

Dorsal beginning slightly behind upper base of pectoral. Pectorals inserted lower than in *P. ulochir*, the upper ray on a level with or below margin of pupil. As in *P. ulochir*, the two lobes are joined by a series of about 8 more widely-spaced rays. None of the rays are free. The anterior ends of the fins meet under the throat, at a point vertically below the pupil. Pectoral rays 30, of which about 10 constitute the lower lobe. The upper rays extend beyond front of anal, but the lower lobe is apparently much shorter. Vent anterior in position, its distance from pectoral symphysis one-half its distance from front of anal. Head 5 in length; depth 6¼. Length of longest specimen 78 mm. Dorsal *ca.* 56. Anal *ca.* 46. Each of the types has lost the epidermis. In this condition the head and body are light or slightly dusky, except the eyes, opercles, gill-membranes, and abdomen, which are black. Gill-cavity and mouth black. Probably black everywhere in life. Three specimens from station 3112, off Santa Cruz, California; depth 296 fathoms.

Family TRIGLIDÆ. The Gurnards.

66. Porichthys notatus Girard.

Stations 3099, 3100, 3103, 3114, 3130, 3145, 3149, 3166, and 3190; depths 9 to 62 fathoms.

Family BLENNIIDÆ. The Blennies.

67. Gibbonsia evides (Jordan & Gilbert).

Monterey. This species is distinguished from *Gibbonsia elegans*, found south of Point Conception, by the longer and lower soft dorsal and by the less variegated coloration.

68. Exerpes fucorum (Jordan & Gilbert.) Monterey Bay.

69. Xiphidion mucosum Girard. San Simeon Bay.

70. Cebedichthys violaceus (Girard). San Simeon Bay.

Family LYCODIDÆ. The Eelpouts.

71. Lyconectes aleutensis Gilbert. (Plate 34.)

A single young specimen from station 3161; depth, 191 fathoms. Agreeing with the typical example, but having head and body marked with numerous small, round, black spots.

72. Lycodopsis pacificus Collett.

Stations 3147, 3156, 3174, 3189, 3194, and 3197. Station 3194 is recorded with a depth of 218 fathoms. With this exception the depths range from 50 to 92 fathoms. One specimen contains eggs two-thirds the size of buckshot.

73. Lycodes diapterus Gilbert.

Stations 3104, 3105, 3112, 3187, 3189, 3191, 3193, 3195, 3196, 3198, 3199, and 3201; depths 160 to 391 fathoms. There is great variation in the development of the white vertical bars in this species. They seem to be usually but not always present in specimens from 7 to 10 inches long. The bars usually fork below, becoming Λ-shaped, and do not extend onto the fins. One specimen, 5 inches long, has the top of the head and half the predorsal area naked. In larger specimens the head is minutely scaled as far forward as the eyes.

74. Aprodon corteziana Gilbert.

Stations 3105, 3129, 3161, 3186, 3199, and 3204; depths 191 to 328 fathoms.

LYCONEMA gen. nov. (LYCODIDÆ.)

Generic characters as in *Lycodes*, but the lower jaw covered with a dense mass of slender filaments or barbels, between which can be seen the mucous pores of the mandible. In *Iluocœtes* the mandible is provided with a series of hollow tubes, which are doubtless the produced margins of the pores.

Type, *Lyconema barbatum* sp. nov.

75. Lyconema barbatum sp. nov. (Plate 35.)

A dense fringe of filaments covers the entire under surface of lower jaw, extending to behind angle of mouth. A series of filaments is found also laterally on the throat, and a few scattering ones are sometimes present on the branchiostegal membranes. Upper jaw without barbels. Body slender, the depth 11½ in the length; head 6⅓ in length. Upper jaw overlapping the lower. Mouth small, the maxillary reaching vertical from front of pupil, 3 in head. Teeth all conical, none of them much enlarged. Those in lower jaw in a patch or irregular double series, narrowing to a single series laterally. In upper jaw there is a single series, the teeth of which increase in size toward the middle line, the middle teeth being almost canine-like. Behind the latter is found a short inner series of small teeth directed backward. Teeth on vomer and palatines in single series.

Gill-slits continued forward to slightly beyond bases of ventrals and to the level of lower edge of base of pectorals. Width between gill-slits one-half diameter of eye. Pseudobranchiæ well developed. Eye 3⅓ in head. Snout 4⅓. Posterior line of occiput midway between origin of dorsal and front of pupil or front of eye. Origin of anal fin at end of first third of length of body.

Ventrals very short, one-half to two-fifths diameter of orbit. Pectorals broad, with the posterior edge emarginate, some of the upper and the lower rays longer than the intermediate ones. Length of fin $1\frac{8}{10}$ in head.

Dorsal 103; anal 91; each counted to middle of caudal; pectoral 15.

Scales showing traces of definite arrangement in series, widely separated anteriorly, becoming crowded toward end of tail. They are continued up on the vertical fins, but are absent on head, on anterior half of nape, and on the pectoral fins. The lateral line is very faintly shown, and only for a short distance behind head, where its course is obliquely downward. The usual series of mucous pores present, but not conspicuous.

In spirits this species has an olive-brown ground color, becoming white on under side of head and on abdomen. A series of eight or nine brown spots half as large as eye along middle of sides, those posteriorly continued downward onto the base of the anal, the last two or three reaching the edge of the fin and there developing into intense black blotches. A similar series of smaller spots corresponding in position to those just described occurs along the base of dorsal. They are also continued as faint bars on the fin, at the margin of which they each develop a black blotch, those posteriorly wider and more intense. An intermediate series of spots alternates with the two just described. An elliptical jet-black spot occupies the greater part of caudal fin and is narrowly margined all around with white. The peritoneum is jet-black, the mouth and gill-cavities white.

Twelve specimens, the longest 150 mm., from station 3129 (lat., N. 36° 39′ 40″; long., W. 122° 01′; depth 204 fathoms).

76. Maynea brunnea Bean.

Station 3188; depth 316 fathoms. The teeth on the palatines are in a single series instead of a wide band, as stated in the original description.

77. Lycodapus fierasfer Gilbert. Station 3202; depth 382 fathoms.

78. Lycodapus dermatinus sp. nov. (Plate 35.)

Very similar to *L. fierasfer*, but the head, body, and fins covered with a thick, loose skin which contains numerous pores or openings for the mucous canals. One series of these runs along the middle of sides and forms the lateral line; it rises anteriorly

above the gill-opening and is continued forward on top of head, the two meeting between eyes. A second series runs between eye and upper lip and curves around on middle of cheek, running upward to behind eye. One series runs along a fold bordering mandible, one along preopercular margin, and one on opercle. In *L. fierasfer* a few pores are visible on mandible, and one or two can frequently be made out on preopercular margins. The skin is very thin and delicate and the fin rays are very evident through the membrane. The general proportions and the dentition of the type are essentially as in *L. fierasfer*, but the vomerine teeth are longer and hooked backward.

Head 4⅘ in length; depth 1⅘ in head; maxillary 2⅕ in head. Mandible heavier than in *L. fierasfer*. Eye 5 in head; snout 4. Origin of dorsal vertically above axil of pectorals. Length of head and trunk one-third total length. Teeth in narrow bands in the jaws, a single series on vomer and palatines. Gill-membranes very narrowly joined below and free from the isthmus, as in *L. fierasfer*. Dorsal 70; anal 60; pectorals much longer than in *L. fierasfer*.

The general color in spirits is light brownish-yellow, made somewhat dusky by the pigment spots in the skin. The body, and especially the fins, grows darker posteriorly.

One specimen, 113 mm. long, from station 3162 (lat., N. 37° 54′ 10″; long., W. 123° 30′; depth 552 fathoms).

79. Melanostigma pammelas sp. nov. (Plate 35.)

Well distinguished from *M. gelatinosum* by the wider, blunter head, the smaller, less oblique mouth, the uniform black coloration, and the arrangement of the teeth in the jaws in two series. As in *M. gelatinosum*, the head and body are enveloped in a loose, thin skin, which is thrown into folds in alcoholic specimens, and entirely conceals the anterior portions of the dorsal and anal fins. On dissection the dorsal is seen to have its origin close behind the head, at a point over middle of pectoral fin. The anal begins immediately behind the vent. The rays of both fins are enveloped in a gelatinous subcutaneous tissue.

The head is broad, with its greatest width equaling its greatest depth. The mouth is broad, somewhat oblique, with equal jaws, the maxillary reaching vertical from front of pupil. Both jaws with the teeth in two distinct series in front, in a single series laterally in lower jaw. The outer teeth in front are enlarged, almost canine-like. Eye large, 3 in head, twice the length of the short, broad snout. Gill-opening a small pore above the base of the pectorals, its diameter about one-half that of the eye.

Head 8 in total length; depth 12½. Pectoral narrow, its length 2⅔ in head.

Color intense black on head and abdomen, brownish-black elsewhere.

The type of the species is a specimen 104 mm. long, from station 3202 (lat., N. 36° 46′ 10″; long., W. 121° 58′ 45″; depth 382 fathoms). Three other specimens are at hand from station 3126 (lat., N. 36° 49′ 20″; long., W. 122° 12′ 30″; depth 456 fathoms). In the smallest, 56 mm. long, the head and abdomen are jet-black, but the rest of body is only slightly dusky.

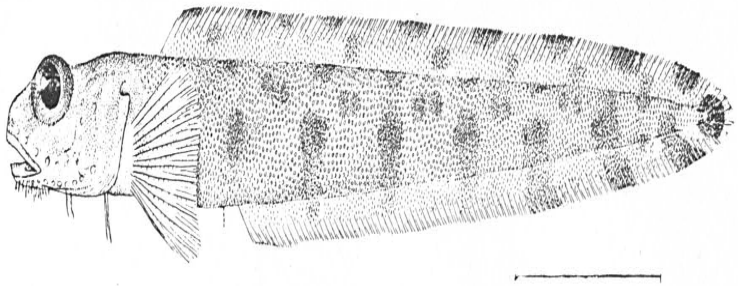
Family OPHIDIIDÆ.

80. Otophidium taylori (Girard).

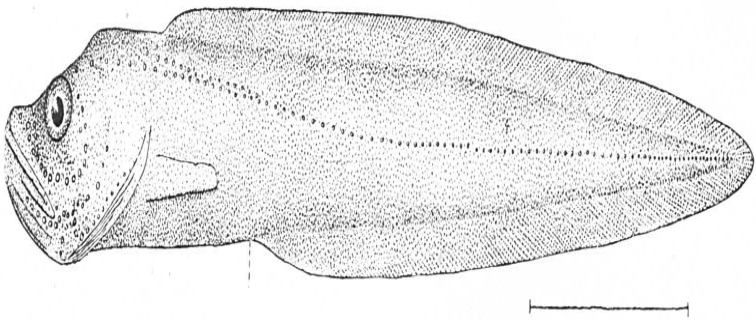
Stations 3103, 3136, and 3163; depths 7 to 69 fathoms. The lateral line varies greatly in length. In none of the specimens does it reach the end of the tail. It frequently differs widely on two sides of the same fish, and varies in length from one-half to seven-eighths of the total length.

81. Catætyx rubrirostris Gilbert.

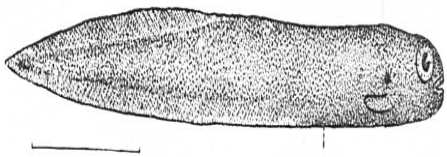
Three specimens, stations 3199 and 3200; depths 233 and 269 fathoms. Head 4$\frac{1}{11}$ to 4$\frac{1}{11}$ in length. Distance from snout to origin of dorsal 3 to 3⅓ in length. Distance of dorsal from occiput greater than from latter to tip of snout. Maxillary 2⅓ in head. Eye longer than snout, 4⅔ in head.



LYCONEMA BARBATUM sp. nov.



LYCODAPUS DERMATINUS sp. nov.



MELANOSTIGMA PAMMELAS sp. n.

Family GADIDÆ. The Codfishes.

82. Antimora microlepis Bean.
Stations 3126 and 3188; depths 456 and 316 fathoms.

83. Microgadus proximus (Girard).
Stations 3097 and 3100; depths 12 and 29 fathoms.

84. Merluccius productus (Ayres).
Stations 3103, 3125, 3173, and 3193; depths 62 to 160 fathoms.

Family MACRURIDÆ. The Grenadiers.

85. Macrurus liolepis Gilbert. Station 3126; depth 456 fathoms.

Family PLEURONECTIDÆ. The Flounders and Soles.

86. Citharichthys sordidus (Girard).
Stations 3099, 3113, 3114, 3115, 3170, 3185, and 3197; depths 20 to 167 fathoms.

87. Citharichthys stigmæus Jordan & Gilbert.

Stations 3130, 3135, 3137, and 3185; depths 9 to 41 fathoms. Taken also in Drake Bay. Gill-rakers, 9 on horizontal limb of anterior arch. Two specimens, 45 and 50 mm. long, show white spots, each with a black half ring on the outer side, symmetrically arranged along bases of dorsal and anal. There are four distinct pairs of these, two unpaired placed more anteriorly along dorsal base, and a few fainter ones midway between these rows and the lateral line, and alternating with them. There are some other scattered light spots. The abdomen is crossed by a broad, black, vertical streak. If this is the usual coloration of the young, it must be a very transitory stage, as other specimens, a little smaller and a little larger, show traces only of the spots.

88. Paralichthys californicus (Ayres). Monterey Bay.

89. Eopsetta jordani (Lockington).
Stations 3106, 3115, 3135, 3149, 3150, 3151, 3153, 3176, and 3190; depths 15 to 77 fathoms.

90. Lyopsetta exilis (Jordan & Gilbert).
Stations 3103, 3113, 3114, 3129, 3156, 3161, 3184, 3189, 3193, 3197, and 3201; depths 50 to 280 fathoms.

91. Psettichthys melanostictus Girard.
Stations 3100 and 3135; depths 29 and 15 fathoms. Taken also in Drake Bay.

92. Pleuronichthys decurrens Jordan & Gilbert.
Stations 3101, 3107, 3115, 3147, 3150, 3161, and 3190; depths 21 to 191 fathoms.

93. Parophrys vetulus Girard.
Stations 3099, 3113, and 3115; depths 20 to 70 fathoms.

94. Isopsetta isolepis (Lockington).
Stations 3099, 3152, and 3153; depths 20, 36, and 32 fathoms.

95. Lepidopsetta bilineata (Ayres).
Stations 3100, 3150, 3151, and 3190; depths 21 to 53 fathoms.

96. Glyptocephalus zachirus Lockington.
Stations 3105, 3114, 3172, and 3197; depths 62 to 217 fathoms.

97. Microstomus pacificus (Lockington).
Stations 3105, 3113, 3114, 3115, 3129, 3161, 3166, 3167, 3171, 3172, 3190, 3195, and 3197; depths 33 to 252 fathoms.

FISHES COLLECTED BY THE STEAMER ALBATROSS ON THE COASTS OF ALASKA AND WASHINGTON DURING THE SUMMER OF 1891.

During the summer of 1891 the *Albatross* was detailed to convey to Bering Sea the United States Bering Sea commissioners, and Fish Commission work was therefore necessarily abandoned. The only collecting done in Alaskan waters was on August 3, when five hauls of the beam trawl (Nos. 3438 to 3442, inclusive) were taken in depths of 20 to 51 fathoms off the south and west sides of St. Paul Island. Nothing of special interest was secured, as will appear from the list which follows. On her return late in August an exploration was made of the Straits of Fuca and Hood Canal. Twenty-four hauls of the beam trawl were taken in depths of 14 to 351 fathoms, and in addition some shore collecting at Port Angeles, Wash. While no forms were obtained which had not been previously reported on, the dredging in the Straits of Fuca was of especial interest, as demonstrating the presence of a number of Alaskan species not previously known to range so far south.

FISHES DREDGED NEAR ST. PAUL ISLAND, ALASKA.

1. Hemitripterus marmoratus Bean.

One specimen, 5 inches long, from station 3440. A detailed description follows; D. XIV, 12; A. 13; lateral line 43. Head 2¾ in length to base of caudal; depth 4. Eye 1¼ in the snout, about 5 in the head. Body densely covered with small, conical protuberances, each with a short filamentous tip; these are about one-sixteenth of an inch long on the back, where they are longest and thickest, and become much shorter below. Head and fins less densely covered; the lips, occipital area, and an area around the eyes nearly smooth. A few cirri scattered over the head; a thick fringe around the margin of the lower jaw. The cirri at the base of the nasal spines are rather large, 1¼ in the eye, and bifid or trifid at tip. Head rather broad and flat, provided with blunt, bony protuberances. Interorbital area broad, deeply concave, separated from the concave occipital area by a transverse ridge. Nasal spines sharp, separated by a width equal to the diameter of the eye. Supraocular ridge prominent, with a notch, bordered posteriorly by two bony knobs; occipital ridge with three, paroccipital with two prominent knobs. Preopercular spines very blunt, the second the longest.

Mouth wide; lower jaw somewhat projecting; teeth sharp, in cardiform bands on the jaws, vomer, and palatines, the vomerine patch divided by a median groove. Gill-membranes united, forming a broad, free fold. No slit behind the fourth gill. Pseudobranchiæ large. Pyloric cæca 8. The base of the first dorsal is equal to the length from its front to the snout; the dorsals are separated by a space equal to two-thirds the diameter of the eye. Second dorsal about 1¼ in the base of the spinous dorsal. Dorsal spines all with long, free tips, the second and third spines longest; the fin without distinct notch. The anal begins under the origin of the soft dorsal, the length of its base nearly equaling that of the spinous dorsal. The pectorals reach the posterior edge of the spinous dorsal. Ventrals about equaling length of snout.

General color gray, with dark marblings. Top of head darker, the under parts light. A black spot on the spinous dorsal covering the first three membranes; also a dark blotch on its posterior part. Two black blotches below the soft dorsal are continued upward on the fin. Outer third of the pectorals blackish; ventrals dark, with light tips. Tail with a light bar across its middle. Posterior half of occipital, supraocular and nasal region, lips, and cheeks all with darker areas.

2. **Icelus bicornis** (Reinhardt). Stations 3439, 3440, and 3441.
3. **Triglops beani** Gilbert. Station 3438.
4. **Hemilepidotus hemilepidotus** (Tilesius). Numerous specimens, less than an inch long, taken at the surface near St. Paul Island.
5. **Aspidophoroides bartoni** Gilbert. Stations 3439, 3440, 3441, and 3442.
6. **Odontopyxis frenatus** Gilbert. Station 3440.
7. **Lycodes brevipes** Bean. Stations 3440, 3441, and 3442.
8. **Lycodes palearis** Gilbert. Stations 3439 and 3442.
9. **Gymnelis viridis** (Fabricius). Stations 3441 and 3442.
10. **Pollachius chalcogrammus** (Pallas). Stations 3440, 3441, and 3442.

In addition to these there are mentioned by Commander Tanner, in his report on the cruise (in Report U. S. Fish Commissioner, 1892), young cod (*Gadus macrocephalus*), tomcod (*Microgadus proximus*), and flounders (*Limanda aspera* and *Lepidopsetta bilineata*). Specimens of none of these were included in the material submitted to me. The "eels" referred to by Captain Tanner were probably Lycodids.

FISHES DREDGED IN THE STRAITS OF FUCA.

1. **Raja inornata** Jordan & Gilbert. A male specimen, 17 inches long, from station 3450. Spines and prickles in greatly reduced numbers. Four strong supra-ocular spines, a strong spine anteriorly on middle of back, and a row of strong spines on the tail. A few small prickles on interorbital space and on each side the middle line of back. Upper surface otherwise smooth. Below smooth, except snout and anterior line of pectorals.
2. **Raja stellulata** Jordan & Gilbert. Stations 3447, 3450, and 3466.
3. **Hydrolagus colliei** (Bennett). Station 3447.
4. **Diaphus theta** Eigenmann. Stations 3450 and 3459.
5. **Bathymaster jordani** Gilbert. Stations 3464 and 3465.
6. **Sebastolobus alascanus** Bean. Stations 3450, 3452, and 3460.
7. **Sebastodes alutus** (Gilbert). Stations 3449, 3453, 3459, and 3462.
8. **Sebastodes caurinus** (Richardson). Station 3449.
9. **Psychrolutes zebra** Bean. Stations 3451, 3460, and 3464.
10. **Icelinus borealis** Gilbert. Stations 3460, 3464, 3465, and 3466.
11. **Triglops beani** Gilbert. Stations 3464 and 3465.
12. **Nautichthys oculofasciatus** Girard. Station 3465.
13. **Aspidophoroides inermis** (Günther). Station 3465.
14. **Hypsagonus quadricornis** (Cuvier & Valenciennes). Stations 3464 and 3465.
15. **Xenochirus alascanus** Gilbert. Stations 3443, 3445, 3446, 3456, 3457, 3459, and 3461.
16. **Liparis dennyi** Jordan & Starks. Stations 3443, 3445, 3453, 3458, 3459, 3460, 3461, 3465, and 3466.
17. **Liparis fucensis** Gilbert. Stations 3445, 3450, 3451, 3458, and 3459.
18. **Liparis cyclopus** Günther. Stations 3443 and 3445.
19. **Chirolophus polyactocephalus** (Pallas). Station 3465.
20. **Gadus macrocephalus** Tilesius. Stations 3447, 3460, and 3462.

21. **Atheresthes stomias** Jordan & Gilbert. Stations 3448, 3450, 3460, and 3466.
22. **Hippoglossoides elassodon** Jordan & Gilbert. Station 3460.
23. **Parophrys vetulus** Girard. Station 3460.
24. **Microstomus pacificus** (Lockington). Stations 3443, 3447, 3451, and 3466.
25. **Glyptocephalus zachirus** Lockington. Stations 3447, 3448, 3456, and 3460.

The following 26 species of shore fishes were taken with the seine at Port Angeles, Wash.:

Ammodytes personatus.
Clupea pallasi.
Oncorhynchus kisutch (young).
Hypomesus pretiosus.
Aulorhynchus flavidus.
Cymatogaster aggregatus.
Embiotoca jacksoni.
Damalichthys argyrosomus.
Hexagrammus decagrammus.
Ophiodon elongatus.
Psychrolutes zebra.
Artedius fenestralis.
Acanthocottus polyacanthocephalus.
Enophrys bison.
Leptocottus armatus.
Oligocottus maculosus.
Blepsias cirrhosus.
Siphagonus barbatus.
Liparis fucensis.
Pholis ornatus.
Lumpenus anguillaris.
Microgadus proximus.
Citharichthys sordidus.
Parophrys vetulus.
Lepidopsetta bilineata.
Platichthys stellatus.

At Neah Bay, Washington, were obtained: *Ammodytes personatus*, *Gasterosteus cataphractus*, and young examples of *Bathymaster jordani*.