approximated, the last spine approximately half the height of the first ray and the absence of ocelli.

The striped kelp-fish was first taken in British Columbia waters in July, 1909, at Ucluelet by Messrs C. H. Young and W. Spreadborough and distinguished in 1920 by B. A. Bean and A. C. Weed as different from their *Gibbonsia evides* but not applying any name. Fourteen specimens were obtained. In 1927, C. L. Hubbs pointed out that this second species was actually *Gibbonsia metzi*, which he described in the same paper. On July 10, 1934, two other specimens were obtained on Nootka island at Maquinna point in a beach seine and recorded in 1936 by L. P. Schultz and A. C. DeLacy. This species inhabits shallow water, usually in tide-pools.

Range southern California to Vancouver island.

Family XIPHISTERIDAE — Belted blennies

In the belted blennies the gill membranes are united and free from the isthmus. The lateral lines are four in number with numerous short vertical extensions. The dorsal fin is composed of spines only; the vertical fins are confluent; the pelvic fins are absent.

The belted blennies are shore fishes of the intertidal zone. The rather uniform body colours blend well with the rocks and seaweeds of their environments.

Belted blenny — *Phytichthys chirus* (Jordan and Gilbert) 1880

Body elongate, slender, compressed. Head small; mouth terminal, small, oblique; teeth on jaws small, conical; gill membranes united, free from isthmus. Fins: dorsal (1), LXIX to LXXVIII, long, low, confluent with caudal; anal, II or

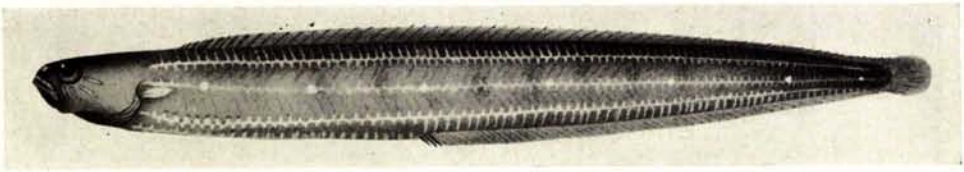

FIGURE 109. Belted blenny. *Phytichthys chirus* (Jordan and Gilbert) 1880

III, 40 to 50, confluent with caudal; pelvic, absent; pectoral, small, length slightly greater than diameter of eye; caudal, rounded. Lateral lines with numerous vertical branches: 4, lowermost joining that of opposite side anteriorly. Scales: cycloid, small, over entire body. Colour: olive green to olive brown on dorsal surface; yellow to green on ventral surface; frequently with various markings of darker on sides; small white spots on midlateral line, 5 to 7; light and dark streaks diverging backward from eye; green to brown, tinged with yellow, on fins.

Length to 8 inches.

Distinguished by the absence of pelvic fins, the 4 lateral lines on each side of the body and the 2 or 3 spines and 40 to 50 rays in the anal fin.

The belted blenny was first taken from British Columbia waters on the Queen Charlotte islands by W. H. Osgood who recorded it in 1901 as *Xiphistes chirus*. In June, 1910, a specimen 5½ inches in length was collected at Skidegate by Mr. W. Spreadborough and recorded in 1920 by B. A. Bean and A. C. Weed as *Xiphistes ulvae* Jordan and Starks. The species is common along the entire coast inhabiting the shallow water of the intertidal zone where stones provide lurking places. The food consists largely of red and green algae.

Range southern California to northwestern Alaska.

Rock blenny *Xiphister mucosus* (Girard) 1858

Body elongate, slender, rather deep, compressed. Head small, rather blunt; mouth terminal, small, oblique; teeth on jaws small, conical; gill membranes united, free from isthmus. Distance from tip of snout to occiput greater than

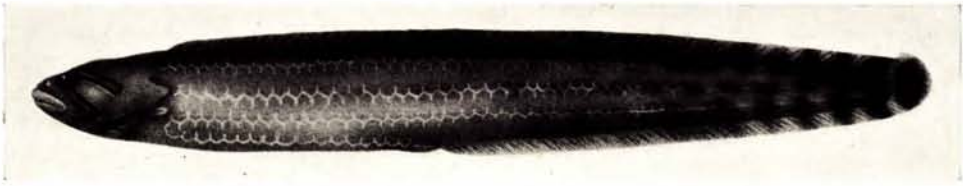

FIGURE 110. Rock blenny. *Xiphister mucosus* (Girard) 1858

that from occiput to origin of dorsal fin. Fins: dorsal (1), LXXI to LXXVII, confluent with caudal; anal, 46 to 50, confluent with caudal; pelvic, absent; pectoral minute, length slightly greater than diameter of eye; caudal, rounded. Lateral lines with numerous vertical branches: 4, lowermost joining that of opposite side anteriorly. Scales: cycloid, small, over entire body. Colour: greenish black with several dusky white bars on posterior portion of body; dark bands diverging backward from eye, 2, prominent, pale in centre, margined with black, outside of which sometimes pale streak.

Length to 20 inches.

Distinguished by the absence of pelvic fins, the 4 lateral lines on each side of the body, the absence of spines from the anal fin, the distance from the tip of the snout to the occiput greater than the distance from the occiput to the origin of the dorsal fin and the dark bands with pale centres diverging from each eye.

The rock blenny was first recorded from British Columbia waters in 1898 by J. Fannin as *Xiphister mucosus* Girard, based on a specimen in the Provincial Museum. In 1893 two individuals were obtained from Vancouver island by Mr. J. Macoun and recorded in 1920 by B. A. Bean and A. C. Weed as *Xiphidion mucosum* Girard. The species was listed in 1901 from the Queen Charlotte islands by W. H. Osgood as *Xiphidion umcosum* (evidently a misprint for *mucosum*).

The rock blenny is common along the coast, the young being taken frequently beneath rocks in the upper intertidal zone and the adults in the lower intertidal zone to a depth of at least 10 fathoms. It is the largest of the shore blennies. The food consists largely of algae.

Range southern California to southeastern Alaska.

Black blenny *Epigeichthys atro-purpureus* (Kittlitz) 1858

Body elongate, slender, compressed. Head small, pointed; mouth terminal, small, oblique; teeth on jaws small, conical, outer row somewhat enlarged; gill membranes united, free from isthmus. Distance from tip of snout to occiput less than from occiput to origin of dorsal fin. Fins: dorsal (1), LXV to LXVIII,

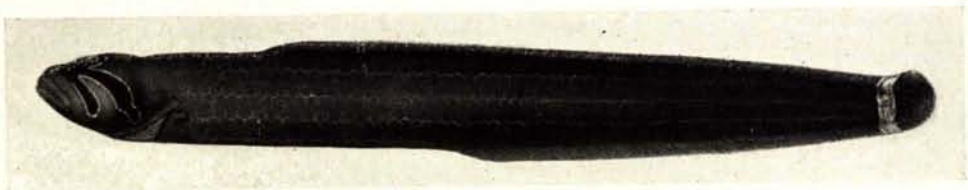

FIGURE 111. Black blenny. *Epigeichthys atro-purpureus* (Kittlitz) 1858

confluent with caudal; anal, 40 to 50, confluent with caudal; pelvic, absent; pectoral, minute, length slightly less than diameter of eye; caudal, rounded. Lateral lines with numerous vertical branches: 4, lowermost joining that of opposite side anteriorly. Scales: cycloid, small, over entire body. Colour: reddish brown to black; dark to black bands diverging backward from eye, 3, prominent, each conspicuously and sharply margined with narrow white to light olive lines; white bar across base of caudal fin extending onto dorsal and anal fins, prominent.

Length to 12 inches.

Distinguished by the absence of pelvic fins, the 4 lateral lines on each side of the body, the absence of spines from the anal fin, the distance from the tip of the snout to the occiput less than the distance from the occiput to the origin of the dorsal fin and the dark bands with narrow white margins diverging from each eye.

The black blenny was first recorded from British Columbia waters in 1881 by T. H. Bean as *Xiphister rupestris* Jordan and Gilbert, based on a specimen from Vancouver island collected by Mr. S. W. Hewson. In the following year T. H. Bean recorded the species under the same name from Alert bay, Alaska (evidently British Columbia), taken in February, 1882, by Dr. Wm. Jones. In 1885 a specimen was collected in Discovery passage by Dr. G. M. Dawson and recorded in 1920 by B. A. Bean and A. C. Weed as *Xiphidon rupestre* (Jordan and Gilbert). The black blenny occurs along the entire coast in shallow water and is often found under rocks well up on the beach when the tide recedes. It is more

frequently observed in the intertidal zone than is the rock blenny which it closely resembles.

Range southern California to northwestern Alaska.

Family PHOLIDAE Gunnels

In the gunnels the gill membranes are united and free from the isthmus. The lateral line is short or absent. The dorsal fin is low and supported by spines only; the vertical fins are confluent; the pelvic fins, when present, are thoracic with 1 spine and 1 or 4 rays.

The gunnels are brightly coloured blennies inhabiting the eel-grass and rockweed areas of the intertidal zone.

Ornamented blenny *Chirolophis nugator* (Jordan and Williams) 1895

Body elongate, moderately slender, compressed. Head short, blunt; mouth terminal, small, oblique; lips thick; teeth on jaws, small; gill membranes united, free from isthmus; gill filaments thin, plate-like, bearing on each side series of numerous leaflets. Fins: dorsal (1), LIII to LV, slightly joined to caudal; anal,

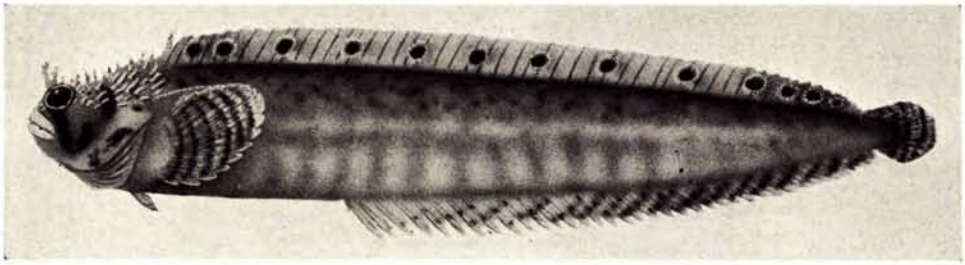

FIGURE 112. Ornamented blenny. *Chirolophis nugator* (Jordan and Williams) 1895

I, 37 to 42, free from caudal; pelvic, I, 4, thoracic; caudal, rounded. Lateral line: shorter than length of pectoral fin; pores about 10. Scales: cycloid, small, embedded. Cirri: numerous, low, slender, fleshy, covering top of head, extending backward to first spine of dorsal fin. Colour of male: brown, sometimes with reddish tinge, variable; pale cross bars in series on lower half of body, lighter markings fainter on upper half; light on lower part of head with numerous brown streaks; black spots margined with yellow rings (ocelli), on dorsal fin, 12 or 13, conspicuous; white on pelvic fins; brownish dots in rows forming bars on other fins. Colour of female: nearly plain brown on body; dark bars on dorsal fin instead of ocelli as in male.

Length to 4¾ inches.

Distinguished by the cirri on the top of the head and extending only onto the first spine of the dorsal fin, the anal fin with 1 spine and 37 to 42 rays, the numerous narrow brown streaks on the lower part of the head and the ocelli on the dorsal fin of the male.

The ornamented blenny was first taken in British Columbia waters April 20, 1912, at Snake island near Departure bay. This was a small male specimen and it is now in the fish collection of the Pacific Biological Station. Four other individuals were obtained in May, 1934, south of Nanaimo on the reef at False narrows. An examination of the gill filaments of this species disclosed the fact that their structure was similar to that of *Chirolophis polyactocephalus*, therefore the genus should be known as *Chirolophis* instead of *Bryostemma*. This is a small species found under rocks in the intertidal zone. It is strikingly marked and one of the handsomest of the blennies.

Range northern California to strait of Georgia.

Decorated blenny *Chirolophis polyactocephalus* (Pallas) 1811

Body elongate, moderately slender, compressed. Head short, blunt; mouth terminal, small, oblique; lips thick; teeth on jaws, small; gill membranes united, free from isthmus; gill filaments thin, plate-like, bearing on each side series of numerous leaflets. Fins: dorsal (1), LXI or LXII, slightly joined to caudal;

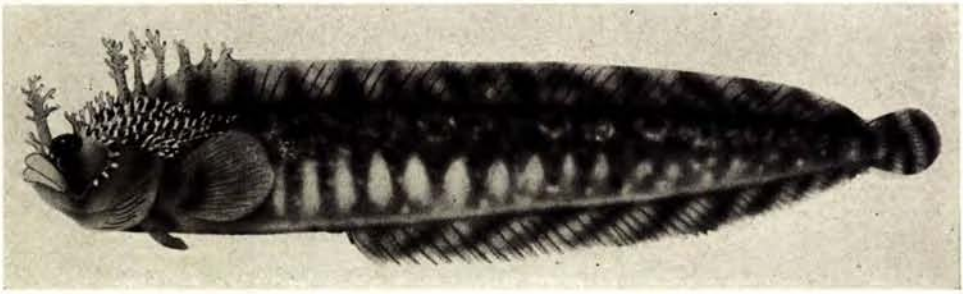

FIGURE 113. Decorated blenny. *Chirolophis polyactocephalus* (Pallas) 1811

anal, I, 44 to 61, free from caudal; pelvic, I, 4, thoracic; caudal, rounded. Lateral line: shorter than length of pectoral fin; pores, 6 to 15. Scales: cycloid, small, embedded. Cirri: numerous, high, plumose, fleshy, covering top of head, extending backward to first 4 to 8 spines of dorsal fin. Colour: pale brown, with white to cream markings; light areas on upper half of body, irregular to almost pentagonal with dark centres; white bars in series on lower half of body; dark band extending downward from eye to lower margin of cheek, thence backward, prominent; black bars on dorsal, anal and caudal fins prominent, on pectoral fins, faint; on pelvic fins, dusky white.

Length to 16½ inches.

Distinguished by the numerous plumose cirri on the top of the head and extending onto the first 4 to 8 spines of the dorsal fin, the anal fin with 1 spine and 44 to 61 rays and the general coloration.

The decorated blenny was first taken in British Columbia waters in November, 1890, at Alert bay, by Mr. Spencer. This was a specimen 14½ inches in

length, deposited in the Provincial Museum at Victoria and recorded in 1891 by Ashdown Green as *Chirolophus polyactocephalus*. In 1903 D. S. Jordan and J. O. Snyder described *Bryostemma decoratum* and expressed the opinion that all specimens previously referred to as *Chirolophus* or *Bryostemma polyactocephalus*, taken on the northeastern shores of the Pacific ocean, should be considered as *Bryostemma decoratum*. In 1942, P. J. Schmidt pointed out that the peculiar structure of the gill filaments of this species were of the nature of those described by Swainson for the genus *Chirolophis*, hence the scientific name should be *Chirolophis polyactocephalus* (Pallas). Individuals have also been secured in the following localities: Juan de Fuca strait, English bay, Burrard inlet, Stuart island, Alert bay and Prince Rupert harbour. The species has been secured at depths ranging from 10 to 50 fathoms.

Range Puget sound to northwestern Alaska.

Saddled blenny *Pholis ornatus* (Girard) 1854

Body elongate, moderately slender, compressed. Head small, compressed; mouth terminal, small, oblique; teeth small, conical; gill membranes broadly united, free from isthmus. Fins: dorsal (1), LXXIV to LXXIX, confluent with caudal; anal, II, 35 to 38, confluent with caudal; pelvic, I, 1, thoracic, minute;

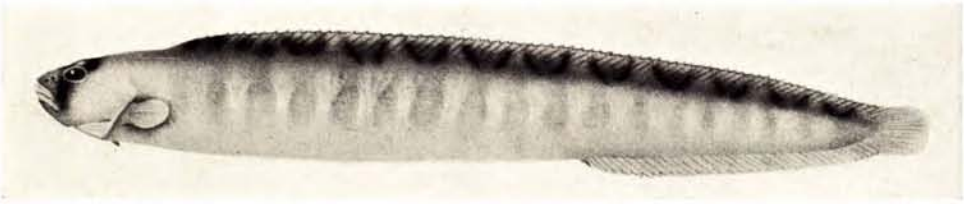

FIGURE 114. Saddled blenny. *Pholis ornatus* (Girard) 1854

pectoral small, length about half that of head; caudal, rounded. Lateral line: absent. Scales: cycloid, very small. Colour: olive green to brown on dorsal surface; yellow, orange or red on ventral surface; dark bar across head behind eyes; dark bar downward from eye; dusky bars in series across sides of body; black markings in series along base of dorsal fin "V" to "U"-shaped, enclosing dark green or brown areas darker than body colour; orange sometimes on pectoral, anal and caudal fins; light green with series of white bars on anal fin in some specimens.

Length to 12 inches.

Distinguished by the series of "V" to "U"-shaped black markings along the base of the dorsal fin and the presence of the minute pelvic fins thoracic in position each with 1 spine and 1 ray.

The saddled blenny was first recorded from British Columbia waters in 1861 from Vancouver island by A. Günther as *Centronotus nebulosus* on the basis of 3 specimens collected by Lieut.-Col. Hawkins of H.M.S. *Plumper*. The

species was listed in 1898 by J. Fannin as *Muraenoides ornatus* on the basis of an individual in the Provincial Museum. (Many of the records of *Pholis ornatus* may be confused with the following species, *Pholis laetus*, because of the fact that over a considerable period of years the two species were considered identical and were recorded as *P. ornatus*.) The first definite locality record from these waters is that of a single individual taken in 1885 in Houston Stewart channel by Dr. G. M. Dawson and recorded in 1920 by B. A. Bean and A. C. Weed. Specimens have been taken at Fort Rupert, Union bay, Departure bay, Burrard inlet and Victoria. The saddled blenny occurs frequently near the mouths of streams on muddy bottoms at depths between 10 and 20 fathoms although it is found occasionally in the intertidal zone. It feeds upon small crustaceans and molluscs.

Range northern California to southeastern Alaska.

Bracketed blenny *Pholis laetus* (Cope) 1873

Body elongate, moderately slender, compressed. Head small, compressed; mouth terminal, small, oblique; teeth small, conical; gill membranes united, free from isthmus. Fins: dorsal (1), LXXIV to LXXX, confluent with caudal; anal, II, 35 to 37, confluent with caudal; pelvic, I, 1, thoracic, minute; pectoral, small,

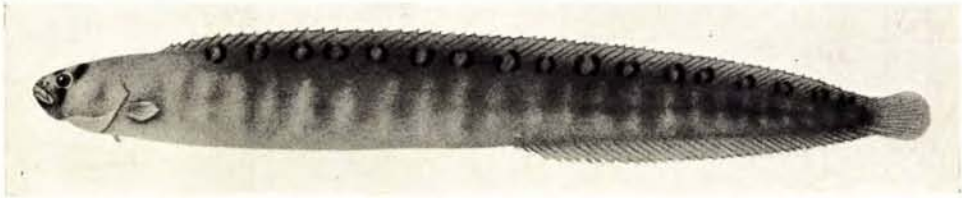

FIGURE 115. Bracketed blenny. *Pholis laetus* (Cope) 1873

length 2.2 to 3 in that of head; caudal, rounded. Lateral line: absent. Scales: cycloid, very small. Colour: yellowish green darker on dorsal surface; slightly mottled on sides; black markings in series along base of dorsal fin, bracket-shaped, enclosing orange or yellow areas; light area on top of head, "V"-shaped, narrowly margined with black; green spot sometimes on opercle; orange on anal fin, sometimes on caudal fin.

Length to 10 inches.

Distinguished by the series of bracket-shaped black markings along the base of the dorsal fin and the presence of the minute pelvic fins thoracic in position each with 1 spine and 1 ray.

The bracketed blenny was first taken in British Columbia waters in 1903 by the *Albatross* as follows: June 23, at Union bay; June 25, at Fort Rupert; July, at Metlakatla near Port Simpson. These specimens were recorded in 1907 by B. W. Evermann and E. L. Goldsborough as *Pholis ornatus*, although figuring *Pholis laetus*. Re-examination of the collections from these localities by Dr. L. P. Schultz revealed the presence of *P. laetus* as indicated above, and *P. ornatus*

at Union bay and Fort Rupert. The bracketed blenny is common along the coast in shallow water, being found frequently in the intertidal zone, around seaweeds and rocks, in tide-pools and occasionally down to 30 or 40 fathoms. It has been taken in Burrard inlet, Departure bay, Nootka island, Massett inlet and Prince Rupert harbour and apparently is more common northward.

Range northern California to northwestern Alaska.

Fucus blenny *Xererpes fucorum* (Jordan and Gilbert) 1880

Body elongate, slender, compressed. Head small; mouth terminal, small, oblique; teeth small, conical; crest on head, low; gill membranes united, free from isthmus. Fins: dorsal (1), LXXXIII or LXXXIV, confluent with caudal; anal, II, 32 to 38, confluent with caudal, spines small, first short, enlarged, rounded,

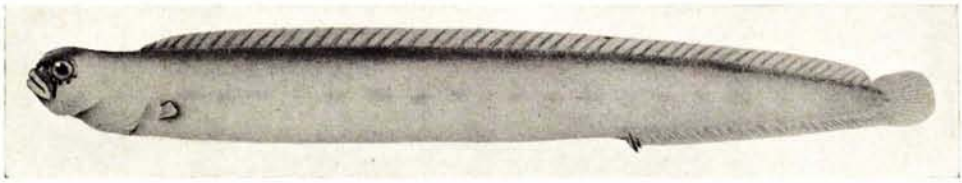

FIGURE 116. Fucus blenny. *Xererpes fucorum* (Jordan and Gilbert) 1880

not channeled on anterior surface, only partially included in very slight pouch; pelvic, absent; pectoral, very small; caudal, rounded. Lateral line: absent. Scales: cycloid, small. Colour: bright green to deep red; dark spots sometimes along midline of body in series; dark bar downward from eye, narrow.

Length to 9 inches.

Distinguished by the uniform bright green to deep red coloration, the short stout round spine in the anal fin partially enclosed in a sheath and the absence of pelvic fins.

The fucus blenny was first taken in British Columbia waters in June, 1909, at Ucluelet and recorded in 1920 by B. A. Bean and A. C. Weed. In June and July, 1934, specimens were collected from Vargas and Nootka islands. A single individual was obtained July 10, 1936, in the stomach of a Farralone cormorant found at Bare island near Victoria, and another on June 20, 1943, at Comox by shore collecting. This exceedingly active blenny appears to occur most frequently in masses of the seaweed, *Fucus*, commonly known as bladderweed or rockweed. Its food includes small crustaceans and molluscs.

Range southern California to Vancouver island.

Pen-point blenny *Apodichthys flavidus* Girard 1854

Body elongate, moderately slender, compressed. Head small, compressed; mouth terminal, small, oblique; teeth small, conical; crest on head, low; gill membranes united, free from isthmus. Fins: dorsal (1), XC to XCIV, confluent with

caudal; anal, I, 38 to 42, confluent with caudal, spine very large, pen-point shaped, deeply excavated on anterior surface, very convex behind, thin, flexible, with sharp edges, entirely included in pouch of skin; pelvic, absent; pectoral, length about 2.5 in that of head; caudal, rounded. Lateral line: absent. Scales: cycloid, small. Colour: vivid green, yellow, orange, brown or red; light spots frequently along midline of body, in series; silvery line from middle of maxillary through lower part of eye to nape or to opercle, narrow, margined with orange and black; dark bar downward from eye, narrow.

Length to 18 inches.

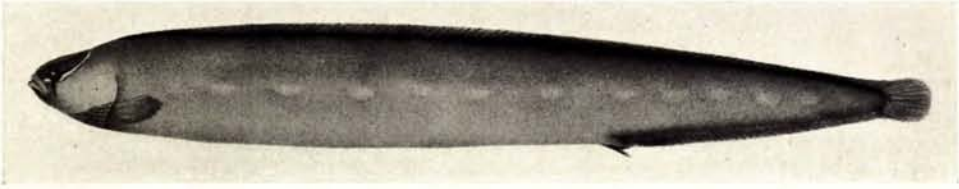

FIGURE 117. Pen-point blenny. *Apodichthys flavidus* Girard 1854

Distinguished by the vivid green to red coloration with the silvery line across each side of the head, the pen-point shaped spine in the anal fin and the absence of pelvic fins.

The pen-point blenny was first taken in British Columbia waters by H.M.S. *Plumper* in the strait of Georgia and was recorded in 1861 by A. Günther who stated that the specimen, a female, was presented to the British Museum by the Lords of the Admiralty. The first definite locality record is that of a specimen taken in 1895 in Active pass by Prof. E. E. Prince and recorded in 1920 by B. A. Bean and A. C. Weed. Distribution probably is general along the coast as it is common in the strait of Georgia and has been recorded from Victoria, Ucluelet, Vargas island, Clayoquot sound and the Queen Charlotte islands. Its brilliant uniform colour of green or yellow green admirably blends with its eel-grass habitat. The food consists of small crustaceans and molluscs.

Range southern California to southeastern Alaska.

Family STICHAEIDAE — Northern blennies

In the northern blennies the gill membranes are united and either free from, or joined to, the isthmus (joined in British Columbia species). The lateral line is single, faint and marked by a series of minute pores. The dorsal fin usually is supported by spines only but sometimes with a few rays posteriorly; the vertical fins are confluent, or nearly so; the pelvic fins, when present, are thoracic with 1 spine and 3 or 4 rays.

The northern blennies inhabit the cold waters of the northern oceans. They occur from the intertidal area to depths of at least 200 fathoms and are bottom dwellers.

Crested blenny *Anoplarchus purpurescens* Gill 1861

Body elongate, slender, compressed. Head small; mouth terminal, moderate, oblique; lower jaw included; lips fleshy; teeth: on jaws, small, conical; on vomer and palatines, minute, in bands; crest on top of head, fleshy; gill membranes united, joined to isthmus. Fins: dorsal (1), LIV to LX, long, slightly joined to caudal; anal, 35 to 39, free from caudal; pelvic, absent; pectoral, moderately large, length about twice diameter of eye; caudal, rounded. Lateral line: faint, visible as row of spaced pores. Scales: cycloid, small; on posterior half of body;

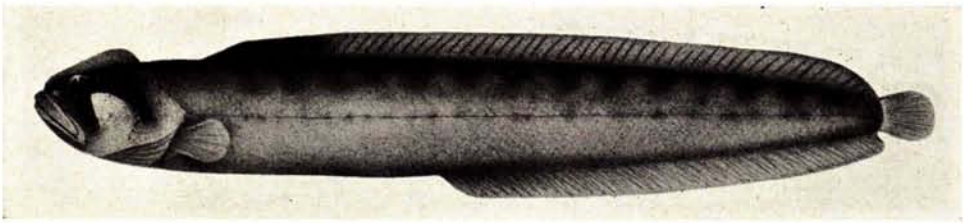

FIGURE 118. Crested blenny. *Anoplarchus purpurescens* Gill 1861

absent from anterior half. Colour: in male, dark gray, purple or black, sometimes bright red; bright red to orange on anal fin; in female, gray, variously marked with brownish gray reticulations and spots; dull gray on anal fin; in both sexes, black bar obliquely downward and backward from eye across preopercle, light bar parallel and above black bar margined with sharp red line; olive green on dorsal fin with 1 to 3 black spots anteriorly; pale gray to white band across caudal peduncle sharply defined.

Length to 7¾ inches.

Distinguished by the absence of pelvic fins, the presence of a fleshy crest on the top of the head, the scales on the posterior half of the body only and the pale sharply defined band across the base of the caudal fin.

The crested blenny was first recorded from British Columbia waters in 1861 from Vancouver island and the mouth of the Fraser river by A. Günther as *Centronotus crista galli*. The specimens were collected by Lieut.-Col. Hawkins during the voyage of H.M.S. *Plumper*. In 1881 T. H. Bean recorded two individuals from the east side of Campbell island (Port McLaughlin), collected by Capt. H. E. Nichols, as *Anoplarchus atropurpureus* (Kittlitz). This blenny is very common along the coast, occurring under rocks in the intertidal zone. Spawning takes place in very late winter or early spring. The female deposits the eggs under and between stones in a mass which usually has the form of a truncated cone containing as many as 3,000 eggs and then coils her body about them to provide protection. The eggs are small, about 1/16 of an inch in diameter, at first white, later becoming gray and showing a yellowish oil globule.

Range northern California to northwestern Alaska.

Wry-mouth *Delolepis giganteus* Kittlitz 1858

Body greatly elongate, compressed. Head oblong, flattened above; mouth terminal, large, oblique; lower jaw projecting; maxillary extending one diameter of eye behind eye; teeth: on jaws small, bluntly conical, sharp; on vomer, few; on palatines in two rows, outer larger; snout short, blunt; no crest on top of head; eye very small, high; gill membranes united, joined to isthmus. Fins: dorsal (1), LXXIII to LXXVII, confluent with caudal; anal, II, 43 to 49, confluent with caudal; pelvic, absent; pectoral, moderately large, length about three times

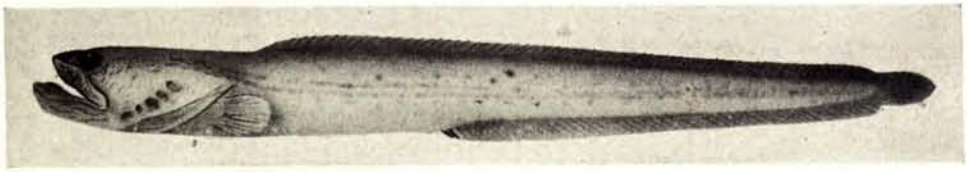

FIGURE 119. Wry-mouth. *Delolepis giganteus* Kittlitz 1858

diameter of eye; caudal, pointed to rounded. Lateral line: faint, pores closely spaced. Scales: cycloid, small; on posterior half of body; absent from anterior half except for row on lateral line. Colour: pale brown, tinged with yellow and violet; lighter on ventral surface; markings somewhat variable; one colour phase with dark stripe along base of dorsal fin, dark above and below lateral line with pale area between; irregular dark spots in series above and below bands; other phase almost uniform light fawn, dark band along lateral line; colour phases not sexual.

Length to 3 feet 10 inches.

Distinguished by the absence of pelvic fins, the projecting lower jaw, the maxillary extending well behind the eye, the scales on the posterior half of the body and the pale brown coloration with the dark bands along the sides of the body.

The wry-mouth was first taken in British Columbia waters August 2, 1881, at the head of Kingcome inlet in 18 fathoms, by Capt. H. E. Nichols, and described in the same year by T. H. Bean as the type of a new genus and species, *Delolepis virgatus*, now considered to be synonymous with *D. giganteus*. This fish has been captured along the coast at Barkley sound, Victoria, Nanaimo, English bay, Comox, Pender harbour, Alert and Hardy bays. Most of these individuals were taken on set-lines and in trawls at depths from 18 to 70 fathoms.

Range Oregon to northwestern Alaska.

Red devil *Lyconectes aleutensis* Gilbert 1895

Body elongate, slender, slightly compressed. Head short, blunt, rather square in cross section; mouth terminal, moderate; jaws almost vertical; lower jaw projecting; maxillary extending to point below eye; teeth: on jaws small, bluntly conical; on vomer, 2 or 3, bluntly rounded; on palatines, none; nostril

tube long, overhanging upper lip; eye very small, high; gill membranes united, joined to isthmus. Skin: loose. Fins: dorsal (1), LX to LXIX, confluent with caudal, tips of spines slightly projecting; anal, II, 45 to 49, confluent with caudal, spines weak; pelvic, absent; pectoral, small; caudal, rounded. Lateral line: faint, visible as row of spaced pores. Scales: absent. Colour: completely red in life due to blood in transparent skin; dull gray in preservative.

Length to 8½ inches.

FIGURE 120. Red devil. *Lyconectes aleutensis* Gilbert 1895

Distinguished by the absence of pelvic fins, the almost vertical jaws, the projecting lower jaw, the maxillary not extending behind the eye, the loose transparent skin, the naked body and the red coloration.

The red devil was first taken in British Columbia waters February 22, 1934, off Pender island. The specimen was discovered by Mr. J. Shannon in the stomach of a cod, *Gadus macrocephalus*, captured in an otter trawl operated at a depth of about 40 fathoms. Two other individuals are known from these waters taken in 1936 and 1941 in English bay by shrimp trawlers. This fish apparently inhabits muddy bottoms as indicated by the places of capture, the nature of the skin and the position of the eyes. In California waters it has been found as deep as 191 fathoms.

Range northern California to northwestern Alaska.

Family LUMPENIDAE — Eel-blennies

In the eel-blennies the gill membranes are usually united, attached far forward to the isthmus, with or without a free fold posteriorly. The lateral line is indistinct or absent. The dorsal fin is low and supported by spines only, which sometimes project slightly beyond the margin of the membranes; the vertical fins are not confluent; the pelvic fins are thoracic with 1 spine and 3 or 4 rays.

The eel-blennies usually occur in the waters beyond the intertidal zone down to depths of at least 65 fathoms, and are captured in bottom trawls. The eel-blenny, however, invades shallow water and may be taken in beach-seines and on baited hooks.

Y-blenny *Allolumpenus hypochromus* Hubbs and Schultz 1932

Body elongate, slender, somewhat compressed. Head, short; mouth terminal, small; lower jaw included; teeth small on jaws, absent from vomer and pala-

tines; snout short; gill membranes united, joined to isthmus anteriorly with wide free fold posteriorly. Fins: dorsal (1), XLIX; anal, I, 31; pelvic, I, 3, thoracic; pectoral large, pointed; caudal, rounded. Lateral line: absent. Scales: cycloid, small, covering entire body; absent from head. Colour: in preservative, light brown with dark markings; black markings on sides of body in irregular series, some forming distinct "Y"'s below midline of body; black dots along base of dorsal fin, 5, in series; black spots at base of caudal fin, 2, conspicuous, black bar connecting upper with lower.

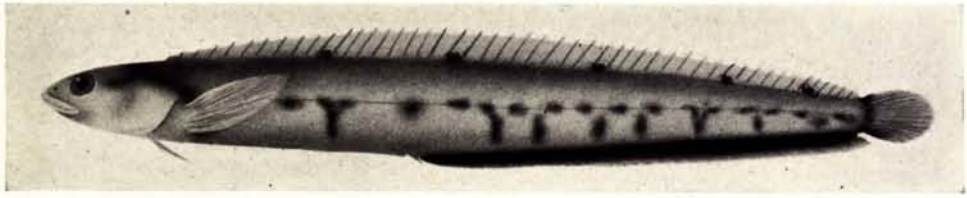

FIGURE 121. Y-blenny. *Allolumpenus hypochromus* Hubbs and Schultz 1932

Length to 2⅞ inches.

Distinguished by the gill membranes joined to the isthmus anteriorly with a wide free fold posteriorly, the dark "Y"-shaped markings along the sides of the body, the large pelvic fins each with 1 spine and 3 rays, the dorsal fin with 49 spines and the anal fin with 1 spine and 31 rays.

The Y-blenny is known from a single specimen, taken August 8, 1927, near Newcastle island, Departure bay, at a depth of 20 fathoms. It was described as the type of a new species in 1932 by C. L. Hubbs and L. P. Schultz. This is the only specimen known and is deposited in the collection of fishes at the Pacific Biological Station, Nanaimo.

Range Departure bay.

Eel-blenny *Lumpenus anguillaris* (Pallas) 1811

Body greatly elongate, very slender, moderately compressed. Head short; mouth terminal, lower jaw included; teeth small on jaws, absent from vomer and palatines; snout short; gill membranes separate, joined to isthmus anteriorly, without free fold posteriorly. Fins: dorsal (1), LXVI to LXXII; anal, I, 45 to 50, spine short, slender, sometimes absent; pelvic, I, 3 or 4, thoracic; pectoral,

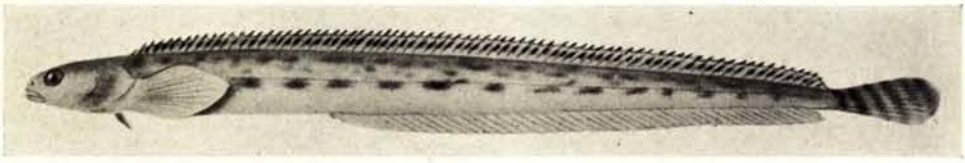

FIGURE 122. Eel-blenny. *Lumpenus anguillaris* (Pallas) 1811

large, pointed; caudal, rounded. Lateral line: straight. Scales: cycloid, covering entire body and head. Colour: light green on dorsal surface; cream on ventral surface; dark green to brown streaks on sides numerous, short; brownish green short bars and dots on dorsal and caudal fins forming rows and bands; plain on other fins; pale on lining of mouth.

Length to 20 inches.

Distinguished by the very elongate body, the gill membranes joined to the isthmus anteriorly without a free fold posteriorly, the anal fin with 1 spine or none and the short dark streaks along the sides of the body.

The eel-blenny was first taken in British Columbia waters in May, 1882, in Esquimalt harbour by Capt. H. E. Nichols and recorded in 1883 by T. H. Bean. Apparently it is common along the coast having been captured at Victoria, Ucluelet, strait of Georgia (including Stuart channel, English bay, Burrard inlet, Howe sound and Comox), and Massett inlet, from shallow water to 50 fathoms. It will take marine worms as bait.

Range northern California to northwestern Alaska.

White-barred blenny *Poroclinus rothrocki* Bean 1890

Body elongate, slender, compressed. Head short; mouth terminal, small; lower jaw included; teeth small on jaws, vomer and palatines; snout short; eye large; gill membranes united, joined to isthmus anteriorly, without free fold posteriorly. Fins: dorsal (1), LVII to LXVII, membrane of last spine slightly

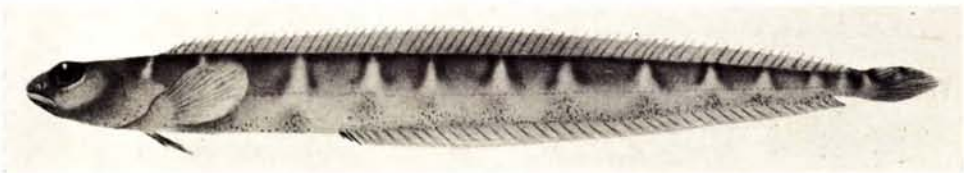

FIGURE 123. White-barred blenny. *Poroclinus rothrocki* Bean 1890

joined to base of uppermost ray of caudal; anal, III, 40 to 44, second spine longer and stronger than third; pelvic, I, 3, thoracic, spine short, sharp, rays relatively long; pectoral broad, rounded; caudal, pointed. Lateral line: faint, straight. Scales: cycloid, small; covering body and cheeks. Colour: light brown on dorsal surface; white on ventral surface; white vertical bars margined with brown in series on each side of body above lateral line, 10 to 12, confluent with white of ventral surface; pale cream on lining of mouth.

Length to 10 inches.

Distinguished by the pelvic fins each with 1 short spine and 3 long rays, the gill membranes joined to the isthmus anteriorly without free fold posteriorly, the anal fin with 3 spines and the white vertical bars along the sides of the body.

The white-barred blenny was first taken in British Columbia waters April 6, 1929, in Burrard inlet at Deep cove, by Dr. A. A. Berkeley Needler who obtained

one specimen from a shrimp trawl operating at a depth of probably 50 fathoms or more. Other individuals have been secured as follows: one June 10, 1935, in Rennell sound, Queen Charlotte islands, at a depth between 60 and 70 fathoms; two in 1939, near Porlier pass in an otter trawl at a depth of about 25 fathoms; and three in 1941, in shrimp trawls in Burrard inlet.

Range southern California to northwestern Alaska.

Long-snouted blenny

Lumpenella longirostris (Evermann and Goldsborough) 1907

Body elongate, slender, compressed. Head short; mouth terminal, small; lower jaw included; teeth small on jaws, absent from vomer and palatines; snout long; cheek somewhat inflated; gill membranes united, joined to isthmus anteriorly, without free fold posteriorly. Fins: dorsal (1), LXI to LXXI, spines stiff;

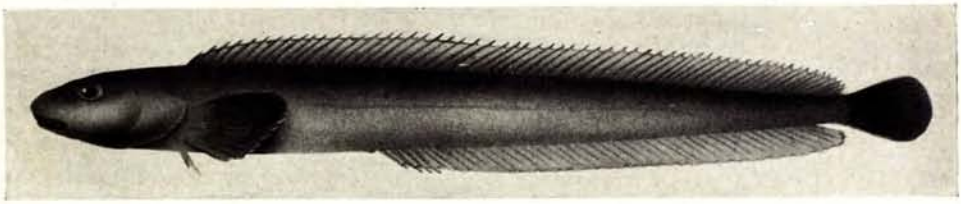

FIGURE 124. Long-snouted blenny. *Lumpenella longirostris* (Evermann and Goldsborough) 1907

tips exposed; anal, III to V, 36 to 42; pelvic, I, 3, thoracic, small, spine short, length about half that of rays, sharp; pectoral, broad, rounded; caudal, rounded. Lateral line: faint, straight. Scales: cycloid, small; covering entire body and head. Colour: bluish brown on dorsal surface; silvery to sooty blue on ventral surface; sooty blue on cheeks, opercles and gill membranes; dusky black on all fins, particularly pectorals, anal and caudal; dusky to black on lining of mouth. Some preserved specimens lose the brown colours, the sides then show irregular dark blotches on paler ground.

Length to 10 inches.

Distinguished by the long blunt snout with the included lower jaw, the inflated cheeks, the stiff spines with naked tips in the long dorsal fin, the anal fin with 3 to 5 spines and the bluish coloration on the body and the blackish coloration on the fins.

The long-snouted blenny was first taken in British Columbia waters January 4, 1929, in Burrard inlet at Deep cove, by Dr. A. A. Berkeley Needler who obtained three individuals in a shrimp trawl at a depth of about 60 fathoms. All records, consisting of nineteen specimens, are from Burrard inlet near the entrance to the North arm at depths from 50 to 65 fathoms. The long-snouted blenny is associated in this area with *Bathyagonus nigripinnis*, *Furcimanus diapterus* and *Lycodes brevipes*. Apparently this is a northern form.

Range Burrard inlet to northwestern Alaska.

Family PTILICHTHYIDAE Quill-fishes

In the quill-fishes the body is extremely elongate, tapering gradually to a short free fleshy portion. The gill membranes are united and free from the isthmus. The lateral line is absent. The dorsal fin is low and spinous anteriorly, high and rayed posteriorly; the pelvic and caudal fins are absent.

The family includes a single species which occurs in the northeastern Pacific.

Quill-fish *Ptilichthys goodei* Bean 1881

Body extremely elongate, slender, tapering gradually posteriorly, ending in short free fleshy portion beyond attenuated vertebral column. Head small; mouth terminal, small; lower jaw greatly projecting to form fleshy tip; teeth on jaws closely set, sharp; gill membranes broadly united, free from isthmus. Fins:

FIGURE 125. Quill-fish. *Ptilichthys goodei* Bean 1881

dorsal (1), XC, 137 to 145, very long, beginning close behind nape, anterior portion for about half body length composed of very low, stiff spines, tips free, hooked, posterior portion of fin much higher, rays slender, unsegmented, unbranched, connected by membranes; anal, 185 to 196, very long, high, rays slender, unsegmented, unbranched; pelvic, absent; caudal, absent. Lateral line: absent. Scales: absent. Colour: amber green, yellow or orange; dark longitudinal stripe on each side of body on some specimens.

Length to 13½ inches.

Distinguished by the extremely elongate body ending in a free fleshy portion beyond the attenuated vertebral column, the protruding lower jaw with the fleshy tip, the free hooked tips of the spines in the anterior portion of the dorsal fin and the absence of pelvic and caudal fins.

The quill-fish was first taken in British Columbia waters in August, 1925, off the Nass river at Haystack island in a salmon-trap by Dr. H. C. Williamson who recorded it in 1927. The species has since been secured July 8, 1928, off Porlier pass in Trincomali channel in a beam trawl and July 13, 1935, at Flamingo inlet in a dip-net. Little is known of the life history. These fish may be attracted at night to bright lights suspended over the water, toward which they slowly swim with snake-like undulations. Upon alarm they dart swiftly. The majority of known specimens have been taken at the surface.

Range Puget sound to northwestern Alaska.

Family ZOARCIDAE Eel-pouts

In the eel-pouts the head is elongate; the mouth is moderately large and the upper jaw overhangs the lower; the eyes are placed high on the head. The gill

membranes are joined to the isthmus and the gill openings are large. The lateral lines, when present, may be continuous or in two parts. The dorsal and anal fins are supported by rays only and are confluent with the rounded caudal fin; the pelvic fins, when present, are thoracic, small and composed of rays only.

The eel-pouts number about sixty species of which eight occur in British Columbia waters. They are bottom-living, usually in muddy areas at depths between 10 and 1,000 fathoms. Some of the species, possibly all, give birth to young.

Wattled eel-pout *Lycodes palearis* Gilbert 1895

Body elongate, slender, compressed. Head elongate, slightly compressed; snout angular; mouth terminal, large, upper jaw greatly overhanging lower; teeth small on jaws, vomer and palatines; fold of skin overhanging maxillary, prominent; cartilaginous folds on ventral surface of head parallel to mandibles, 2,

FIGURE 126. Wattled eel-pout. *Lycodes palearis* Gilbert 1895

prominent, ending anteriorly in wide, free, closely approximated lobes; gill membranes broadly joined to isthmus. Fins: dorsal (1), 94 to 105, confluent with caudal; anal, 83 to 90, confluent with caudal; pelvic, 3, thoracic, small, length 1.25 to 1.5 in diameter of eye; pectoral, entire; caudal, narrow, rounded. Lateral line: faint or absent. Scales: cycloid, small, embedded, covering body. Colour: light brown to blue black on dorsal surface; dark margin on dorsal and anal fins, narrow; pale on pelvic fins; in young, white vertical bars across body, sometimes onto anal fin, second white bar entirely in front of dorsal fin; creamy white to pink on peritoneum.

Length to 15½ inches.

Distinguished by the conspicuous lobed cartilaginous folds on the ventral surface of the head, the small pelvic fins, the angular snout, and in the young the second white bar across the body entirely in front of the dorsal fin.

The wattled eel-pout was first taken in British Columbia waters January 17, 1934, in Active pass by Mr. J. Shannon, who secured a specimen in an otter trawl at a depth of approximately 40 fathoms. This specimen is now in the fish collection of the University of British Columbia. Three other individuals have been secured since in otter trawls, two, February 26, 1941, in Satellite channel between 30 and 50 fathoms, and one, February 27, 1942, in Active pass at 35 fathoms. These captures were recorded in 1945 by G. C. Carl and G. V. Wilby.

Range Puget sound to northwestern Alaska.

Short-finned eel-pout *Lycodes brevipes* Bean 1890

Body elongate, moderately slender, compressed. Head elongate, compressed; snout rounded; mouth terminal, large, upper jaw much overhanging lower; teeth small, on jaws, vomer and palatines; fold of skin overhanging maxillary, moderate; cartilaginous folds on ventral surface of head parallel to mandibles, 2, small moderately conspicuous, without lobes; gill membranes broadly joined to isthmus. Fins: dorsal (1), 85 to 96, confluent with caudal; anal, 74 to 85, confluent with caudal; pelvic, 3, thoracic, minute, length 2.5 to 3 in diameter of eye; pectoral

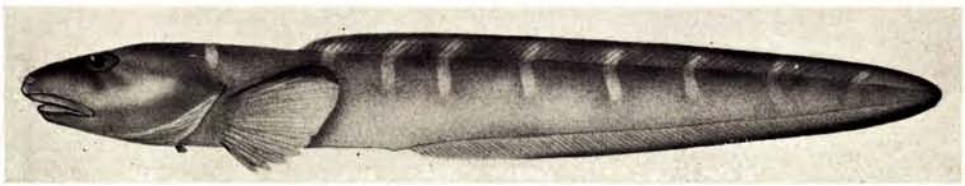

FIGURE 127. Short-finned eel-pout. *Lycodes brevipes* Bean 1890

large, broad, entire; caudal, narrow, rounded. Lateral line: faint or absent. Scales: cycloid, small, embedded, covering body. Colour: light brown on dorsal surface; pale to dusky on ventral surface; white vertical bars across body and dorsal fin, 9 to 13, second distinctly behind origin of dorsal fin; dark margin on dorsal and anal fins, narrow; pale on pelvic fins; creamy white to pink on peritoneum.

Length to 10¾ inches.

Distinguished by the moderately conspicuous folds without lobes on the ventral surface of the head, the minute pelvic fins, the rounded snout and the second white cross bar on the body distinctly behind the origin of the dorsal fin.

The short-finned eel-pout was first taken in British Columbia waters June 25, 1903, in Queen Charlotte sound off Fort Rupert by the *Albatross*, station 4201, lat. 50° 45′ N., long. 127° 16′ W., depth 138 fathoms and recorded in 1907 by B. W. Evermann and E. L. Goldsborough. It is probably not uncommon along the coast, particularly in moderately deep water. Specimens have been obtained frequently in English bay and Burrard inlet in shrimp trawls at depths between 15 and 65 fathoms. One individual was found in the stomach of a lingcod caught in the Victoria area.

Range Puget sound to northwestern Alaska.

Black-finned eel-pout *Furcimanus diapterus* (Gilbert) 1891

Body elongate, slender, somewhat compressed. Head elongate; snout rounded; mouth terminal, moderate, upper jaw overhanging lower; teeth small, on jaws, vomer and palatines; fold of skin overhanging maxillary, moderate; gill membranes broadly joined to isthmus. Fins: dorsal (1), 109 to 117, confluent with caudal; anal, 101 to 107, confluent with caudal; pelvic, 3, thoracic, small,

length about 2 in diameter of eye; pectoral, large, deeply notched, middle rays much shorter than either upper or lower, rays in lower lobe thickened; caudal, narrow, rounded. Lateral line: single, wavy, passing along lower portion of body, sometimes indistinct. Scales: cycloid, small, embedded, covering body. Colour: dusky brown on dorsal surface; blue black on ventral surface; white punctulations over scales fine, prominent; white vertical bars across side of body, 8 or 9, extending somewhat onto dorsal fin, spreading or furcate on lower portion of side; in adults, bars frequently faint or absent; black on margin of dorsal and anal fins;

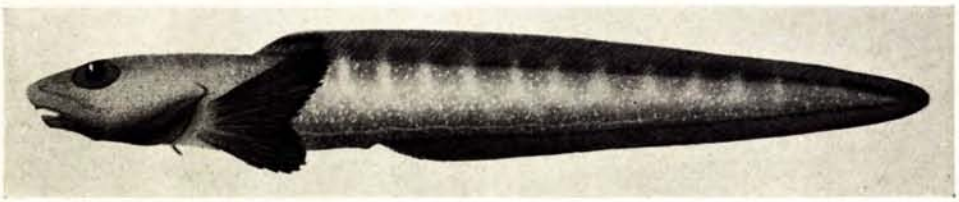

FIGURE 128. Black-finned eel-pout. *Furcimanus diapterus* (Gilbert) 1891

blue black on pectoral, pelvic and anal fins; blue black on lining of mouth and gill cavity; dusky to black on peritoneum. In male, elongate black blotch anteriorly on dorsal fin.

Length to 12½ inches.

Distinguished by the deeply notched pectoral fins, the dark lining on the mouth and gill cavities and the blue black coloration on the ventral surface of the body, the pectoral, pelvic and anal fins.

The black-finned eel-pout was first taken in British Columbia waters June 20, 1903, near Nanaimo by the *Albatross*, station 4198, lat. 49° 19′ N., long. 123° 47′ W., depth 157 fathoms, and recorded in 1907 by B. W. Evermann and E. L. Goldsborough as *Furcimanus diaptera* (Gilbert). The species has since been obtained in English bay, Burrard inlet and Howe sound. The habitat is in the deeper waters with a range from 30 to 391 fathoms. Small numbers are secured in shrimp trawls in Burrard inlet where it is associated with the black-finned sea-poacher, *Bathyagonus nigripinnis*.

Range southern California to northwestern Alaska.

Big-finned eel-pout *Aprodon corteziana* Gilbert 1890

Body elongate, slender, compressed. Head elongate, broad, greatly depressed; snout long, rounded, depressed; mouth terminal, large, upper jaw greatly overhanging lower; teeth small, on jaws and palatines, absent from vomer; fold of skin overhanging maxillary not conspicuous; cartilaginous folds on ventral surface of head parallel to mandibles, 2, little developed, without lobes; gill membranes broadly joined to isthmus. Fins: dorsal (1), 106 to 108, confluent with caudal; anal, about 89, confluent with caudal; pelvic, 3, thoracic, small, length about 1.7 in diameter of eye; pectoral large, margin entire, lower rays

thickened; caudal, narrow, rounded. Lateral line: faint. Scales: cycloid, small, embedded, covering most of body, less evident ventrally. Colour: brown to blue black on dorsal surface and sides; lighter on ventral surface; white on scale pockets of body; black blotch on body at base of upper pectoral fin rays; black on anterior border of dorsal fin, on posterior third of pectoral fins and posterior of anal fin and on caudal fin; white on margins of pectoral fins; white to dusky on pelvic fins; white on lining of mouth; dusky on lining of gill cavity; jet black on peritoneum.

Length to 18 inches.

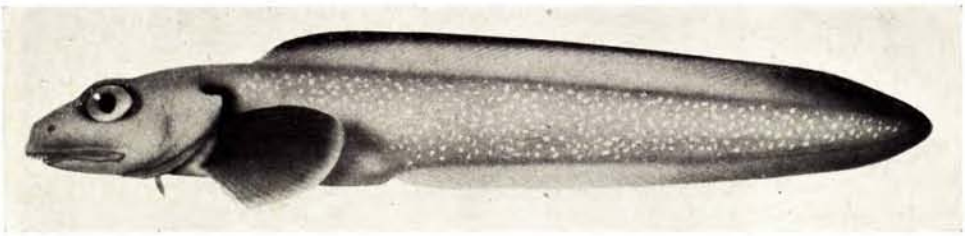

FIGURE 129. Big-finned eel-pout. *Aprodon cortesiana* Gilbert 1890

Distinguished by the broad depressed head, the absence of teeth from the vomer, the large entire pectoral fins and the jet black peritoneum.

The big-finned eel-pout was first taken in British Columbia waters in June, 1944, at Barkley sound in an otter trawl at a depth of 50 fathoms by Mr. G. H. Smith and was recorded in 1945 by G. C. Carl and G. V. Wilby. The single specimen, a female, is now in the fish collection of the Provincial Museum at Victoria. This is the only individual known to have been obtained north of California where the species has been reported at depths in excess of 239 fathoms.

Range southern California to Barkley sound.

Black-bellied eel-pout *Lycodopsis pacificus* (Collett) 1879

Body elongate, slender, somewhat compressed. Head elongate, somewhat compressed, larger in male; snout rounded; mouth terminal, moderate; upper jaw overhanging lower; teeth small on jaws, absent from vomer and palatines; fold of skin overhanging maxillary, moderate; gill membranes broadly joined to

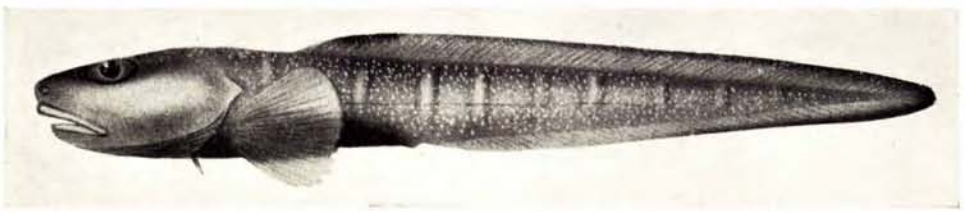

FIGURE 130. Black-bellied eel-pout. *Lycodopsis pacificus* (Collett) 1879

isthmus. Fins: dorsal (1), 90 to 100, confluent with caudal; anal, 70 to 85, confluent with caudal; pelvic, 3, thoracic, small, length about 2 in diameter of eye; pectoral, broad, entire; caudal, narrow, rounded. Lateral line: along midline of body, faint. Scales: cycloid, small, embedded, covering body and vertical fins. Colour: light gray to light reddish brown; light spots where pigment is less dense over scales; light bars vertical, margined with black across body, sometimes faint in adult; black on margin of dorsal fin and elongate spot at anterior end; black on margin at posterior end of anal fin; pale on pelvic fins; jet black on peritoneum.

Length to 18 inches.

Distinguished by the conspicuous jet black peritoneum, the absence of teeth from the vomer and palatines and the elongate black spot on the anterior portion of the dorsal fin.

The black-bellied eel-pout was first recorded from British Columbia waters in 1898 by J. Fannin as *Lycodopsis pacificus* Collett, one of the fishes in the collection of the Provincial Museum at Victoria. This is the commonest member of the family found in these waters. In the strait of Georgia area it is obtained in shrimp trawls, in which it frequently becomes enmeshed, and in otter trawls, at depths between 10 and 120 fathoms, especially on muddy bottoms. The black-bellied eel-pout has been recorded from depths of over 200 fathoms in California waters. The food includes marine worms, crustaceans, small bivalves and brittle-stars.

Range central California to northwestern Alaska.

Soft eel-pout *Bothrocara mollis* Bean 1890

Body elongate, moderately slender, compressed. Head elongate, compressed; snout angular; mouth terminal, slightly oblique; upper jaw overhanging lower; teeth small, on jaws, vomer and palatines; fold of skin overhanging maxillary, moderate; gill membranes joined far forward to isthmus so that gill opening

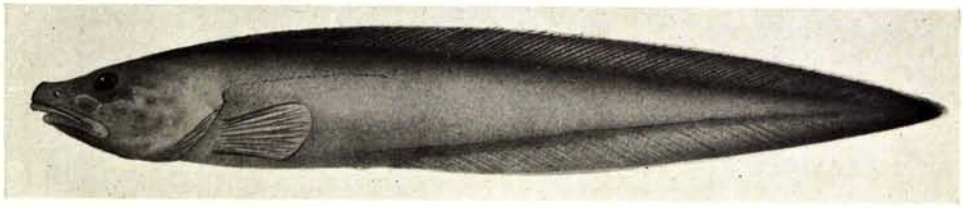

FIGURE 131. Soft eel-pout. *Bothrocara mollis* Bean 1890

extends well under head. Fins: dorsal (1), 100 to 107, moderately high, confluent with caudal; anal, 89 to 95, confluent with caudal; dorsal and anal fins enveloped anteriorly in soft gelatinous tissue; pelvic, absent; pectoral, entire; caudal, narrow, rounded. Lateral line: in two parts, upper beginning above pectoral fin base passing upward, parallel to back, ending just behind vertical from anus; lower

commencing on middle of under portion of body about over anus, passing above base of anal fin almost to posterior end of body, frequently becoming faint. Scales: cycloid, minute, covering body and vertical fins. Colour: uniform light brown, semi-translucent; blue or black toward margins of dorsal and anal fins, colour more intense posteriorly; transparent on narrow margins of vertical fins; light on lining of mouth; black on peritoneum.

Length to 18 inches.

Distinguished by the lateral line on each side of the body in two parts, the projecting upper jaw and the absence of pelvic fins.

The soft eel-pout has been taken but once in British Columbia waters, August 29, 1888, off the Queen Charlotte islands near cape St. James, by the *Albatross*, station 2860, lat. 51° 23′ N., long. 130° 34′ W., depth 876 fathoms. This specimen was the type, described in 1890 by T. H. Bean, and is now in the collection of the United States National Museum.

Range southern California to northwestern Alaska.

Pearly eel-pout *Lycodapus fierasfer* Gilbert 1890

Body elongate, slender, somewhat compressed. Head elongate, concave from snout to occiput, viewed laterally; snout angular; mouth terminal, large, oblique; lower jaw slightly projecting; teeth small, on jaws, vomer and palatines; fold of skin overhanging maxillary, moderate; gill membranes joined far forward to

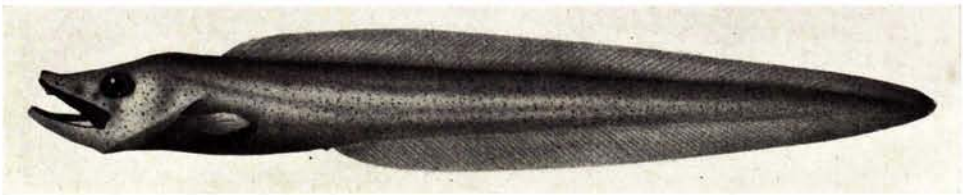

FIGURE 132. Pearly eel-pout. *Lycodapus fierasfer* Gilbert 1890

isthmus. Skin: on body and bases of fins loose, translucent. Fins: dorsal (1), 82 to 85, moderately high, confluent with caudal; anal, 70 to 74, confluent with caudal; pelvic, absent; pectoral, small, entire; caudal, narrow, rounded. Lateral line: absent. Scales: absent. Colour: absent from skin except for dusting with fine black speckling; jet black on jaws, lining of mouth, gill cavity and peritoneum.

Length to 6 inches.

Distinguished by the oblique mouth with the projecting lower jaw, the concave lateral view of the head, the translucent skin, the black lining on the mouth, gill cavities and peritoneum and the absence of pelvic fins and scales.

The pearly eel-pout is known from British Columbia waters by a small specimen about 1¼ inches in length taken from the mouth of a black-finned eel-pout, *Furcimanus diapterus*, which was obtained August 29, 1928, in Howe sound

at a depth of 120 fathoms in a shrimp trawl. This specimen was recorded in 1932 by C. L. Hubbs and L. P. Schultz and is now in the fish collection at the Pacific Biological Station, Nanaimo. Off the California coast the pearly eel-pout has been found at depths ranging from 27 to 1,076 fathoms.

Range southern California to northwestern Alaska.

Pale eel-pout *Lycodapus mandibularis* Gilbert 1915

Body elongate, moderately slender, compressed. Head elongate, straight from snout to occiput, viewed laterally; snout, rounded; mouth terminal, small; jaws equal; teeth moderately canine-like, on jaws, vomer and palatines; gill membranes joined far forward to isthmus. Skin: on body and bases of fins, loose,

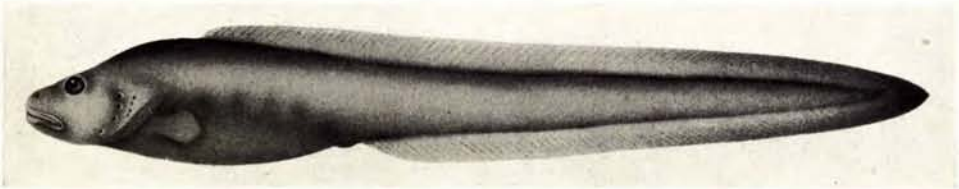

FIGURE 133. Pale eel-pout. *Lycodapus mandibularis* Gilbert 1915

translucent. Fins: dorsal (1), 86 to 88, confluent with caudal; anal, 76 to 78, confluent with caudal; pelvic, absent; pectoral, small, entire; caudal, narrow, rounded. Lateral line: absent. Scales: absent. Colour: absent from skin except for sparse and minute speckling with black; speckling more intense posteriorly; black on posterior lining of mouth; dusky on lining of gill cavity; black on peritoneum.

Length to 6¾ inches.

Distinguished by the terminal mouth with the equal jaws, the absence of pelvic fins and scales, the translucent skin and the black lining on the mouth, gill cavities and peritoneum.

The pale eel-pout was taken once in British Columbia waters March 9, 1934, off the northwest coast of Graham island by the International Fisheries Commission, station 1094A, lat. 54° 19′ N., long. 133° 13′ W., in a vertical haul between 116 and 54 fathoms. This specimen was recorded in 1940 by W. M. Chapman as *Bothrocara mollis* Bean, but upon re-examination it was found to be *Lycodapus mandibularis* Gilbert and was recorded as such in 1941 by C. L. Hubbs and L. P. Schultz. In Monterey bay, California, this species has been taken at depths between 32 and 609 fathoms.

Range southern California to Queen Charlotte islands.

Family DEREPODICHTHYIDAE Cusk-pouts

In the cusk-pouts the gill opening is reduced to a small vertical slit in front of the pectoral fin. The lateral line is absent. The dorsal and anal fins are

supported by rays only and are confluent with the small pointed caudal fin; the pelvic fins are filamentous, each supported by a minute unbranched ray situated below the eye.

In this family there is but a single species based upon a single known specimen obtained from a great depth off the Queen Charlotte islands.

Cusk-pout *Derepodichthys alepidotus* Gilbert 1895

Body very elongate, slender, terete. Head elongate, terete; snout, rounded; mouth terminal, moderate; upper jaw slightly overhanging lower; teeth small, cardiform, on jaws, vomer and palatines; gill opening reduced to small vertical slit in front of pectoral fin. Skin: thick, enveloping vertical fins, concealing rays.

FIGURE 134. Cusk-pout. *Derepodichthys alepidotus* Gilbert 1895

Fins: dorsal (1), long (count unknown), confluent with caudal; anal, long (count unknown), confluent with caudal; pelvic, 1, thoracic, inserted below vertical from posterior margin of eye, fins arising from common base, closely approximated, each reduced to slender unbranched filament; pectoral, slender; caudal, pointed. Lateral line: absent. Scales: absent. Colour: brown on dorsal surface; blue black on ventral surface; soiled white on dorsal and pectoral fins; dark margin on anal fin becoming black posteriorly.

Length to 4½ inches.

Distinguished by the extremely forward position of the minute pelvic fins, the very elongate terete body, the small slit-like gill openings and the absence of scales and lateral lines.

The cusk-pout is known from a single specimen, the type, taken September 3, 1890, west of Moresby island, by the *Albatross*, station 3342, lat. 52° 39′ N., long. 132° 38′ W., depth 1,588 fathoms. This specimen was described in 1895 by C. H. Gilbert and was deposited in the United States National Museum.

Range Queen Charlotte islands.

Family SCYTALINIDAE Burrowing blennies

In the burrowing blennies the gill membranes are united and free from the isthmus. The lateral line is absent. The dorsal and anal fins are confined to the posterior half of the body, composed of rays only, and are confluent with the caudal fin; the pelvic fins are absent.

In this family there is but a single species, the type specimen of which was discovered near cape Flattery in 1880. This blenny is an inhabitant of the intertidal zone and is able to burrow rapidly in the sand or gravel.

Burrowing blenny *Scytalina cerdale* Jordan and Gilbert 1880

Body elongate, moderately slender, deeper behind anus than anteriorly. Head elongate, depressed; mouth terminal, moderate, oblique; lower jaw projecting; teeth small, conical, on jaws, vomer and palatines; eye very small, high on head; cheek distended; gill membranes united, free from isthmus. Fins: dorsal (1), 41 to 51, low, commencing near middle of body, confluent with caudal, rays slender, anterior rays embedded in flesh, not visible without dissection; anal, 36 to 41, confluent with caudal; pelvic, absent; pectoral, very small; caudal,

FIGURE 135. Burrowing blenny. *Scytalina cerdale* Jordan and Gilbert 1880

rounded. Lateral line: absent. Scales: absent. Colour: pale pink, finely mottled with pale purple.

Length to 6 inches.

Distinguished by the elongate scaleless body with the greatest depth in the posterior half, the dorsal and anal fins commencing about the middle of the body of almost equal length confluent with the caudal fin and the absence of pelvic fins.

The burrowing blenny was first taken in British Columbia waters May 31, 1934, off Esteban point by Mr. E. G. Hart, who obtained one individual in a seine. Two other specimens were secured June 13, 1934, off the west coast of Vancouver island, at Maquinna point, Nootka island, and three June 22, 1935, at Moresby island in Kaisun bay. It occurs in tide-pools and on beaches amongst loose gravel and stones and burrows in the sand.

Range southern California to northwestern Alaska.

Family ZAPRORIDAE Prow-fishes

In the prow-fishes the body is stout and compressed. The gill membranes are united and free from the isthmus. The lateral line is absent. The long dorsal fin is supported by spines and the short anal fin by rays, each fin well separated from the broad caudal fin; the pelvic fins are absent.

There is but one species in this family.

Prow-fish *Zaprora silenus* Jordan 1896

Body elongate, stout, compressed; caudal peduncle deep. Head short, broad profile abruptly convex; mouth terminal, small, oblique; lower jaw heavy, slightly projecting; lips thick; teeth small, close-set; snout blunt, high; eye small; gill membranes united, free from isthmus. Fins: dorsal (1), LIV to LVIII, long, high; anal, 24 to 30, short; pelvic, absent; caudal, broad, truncate to rounded.

Lateral line: absent. Scales: cycloid, small, elongate; in oblique rows above midline of body, about 200; on head, except snout and around eye; on basal two-thirds of all fin membranes. Pores: on head numerous, large. Colour: gray to dark green on dorsal surface; lighter on ventral surface; punctulated with dark spots; lemon yellow to orange on sides of head and behind each pectoral fin; dark at base of each pectoral fin, lighter in central portion, black distally, white on margin.

Length to 2 feet 10½ inches.

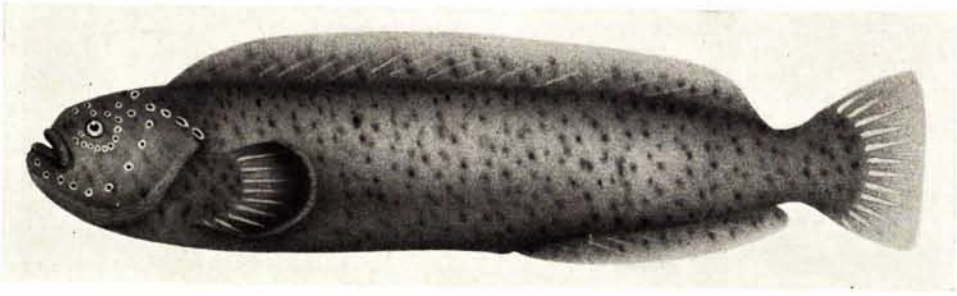

FIGURE 136. Prow-fish. *Zaprora silenus* Jordan 1896

Distinguished by the high blunt snout, the long high dorsal fin, the short anal fin, the absence of pelvic fins, the absence of a lateral line and the large pores on the head.

The prow-fish was first taken in British Columbia waters in November, 1895, in Nanaimo harbour by Mr. George Marsh. Two specimens were obtained, one of which was described in 1896 by D. S. Jordan as the type of the species and both individuals are now in the collection of the Provincial Museum at Victoria. Since this time several specimens have been reported at various points from Juan de Fuca strait to Dixon entrance, some being obtained in pilchard and herring seines. Between May 13, 1930, and June 8, 1932, the International Fisheries Commission took thirty-six small specimens, ranging in length from ½ inch to 3 inches, in plankton-nets operated in waters north and west of British Columbia at depths between 16 and 195 fathoms. While the flesh is firm and the red colour is attractive, this fish is not marketed.

Range Oregon to northwestern Alaska.

Suborder OPHIDIOIDEA

The fishes in this suborder have an elongate body. The teeth are small and villiform. All fins are supported by rays only; the dorsal and anal fins are long, sometimes confluent with the caudal and their rays are more numerous than the vertebrae; the pelvic fins, when present, are thoracic, usually elongate, each with 1 or 2 filamentous rays.

In this suborder are included three families, only one of which, the Brotulidae, is represented in British Columbia waters. The Ophidiidae and Fierasferidae are comprised of tropical fishes which frequently inhabit sea-cucumbers, mollusc shells, etc.

Family BROTULIDAE — Brotulids

In the brotulids the body is elongate, compressed and covered with thick lax skin which also envelops the dorsal and anal fins. The pelvic fins are thoracic. The scales, when present, are cycloid, minute and embedded.

The brotulids are closely related to the eel-pouts in spite of various external resemblances to the cods. The species are numerous and diverse in habitat. Some members of the family inhabit great ocean depths, others the shallow coastal waters. Two species have penetrated fresh water in Cuba. These are blind as adults, live in subterranean caves and are viviparous.

The family is represented in British Columbia waters by a single species.

Red brotulid — *Brosmophycis marginatus* (Ayres) 1854

Body elongate, compressed. Head elongate, length greater than depth of body; snout bluntly rounded anteriorly; mouth terminal, large, upper jaw slightly overhanging lower; premaxillaries forming entire border of upper jaw; maxillary received under loose fold of skin; teeth small, villiform, in narrow band on pre-

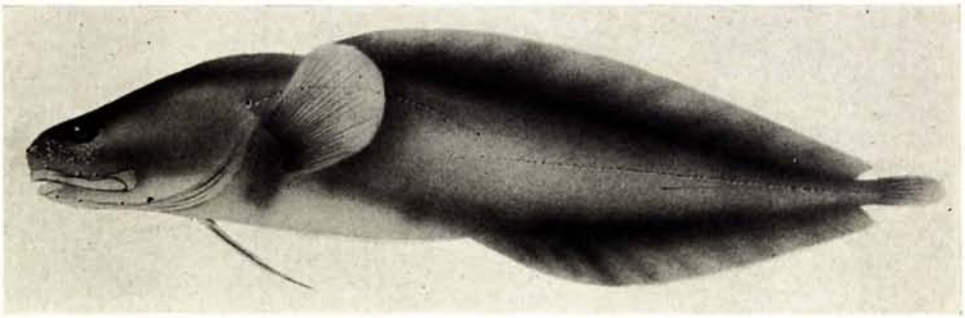

FIGURE 137. Red brotulid. *Brosmophycis marginatus* (Ayres) 1854

maxillaries, lower jaw, vomer and anterior part of palatines; eye small, diameter about half length of snout; papillae numerous on head, more numerous, larger, on snout and lower jaw; gill membranes united, free from isthmus. Skin: on head, on dorsal and anal fins, lax; everywhere covered with thick mucous secretion. Fins: dorsal (1), 92 to 101, long, low, rays slender; anal, 70 to 72, similar to dorsal; pelvic, 2, thoracic, long, slender, filamentous, outer ray twice length of inner; pectoral, rounded; caudal, narrow, rounded. Lateral line: in two parts, upper highly arched, ending at point above midlateral position, directly above

anus; lower almost straight, commencing directly below posterior end of first, extending to caudal fin. Scales: cycloid, small, embedded; in oblique rows above midline of body, about 170. Pores: below nostril, 1, large; above upper jaw, 3; along lower jaw, 3; behind lower jaw above isthmus, 1; in angle of dentaries, 1, large; in upper angle of operculum, 1, tubular. Colour: bright red to brown on dorsal surface; nearly white on ventral surface; pale red on ventral surface of head and margins of fins; reddish tinge on entire mucous secretion.

Length to 18 inches.

Distinguished by the pelvic fins thoracic in position each consisting of 2 rays forming a slender filament, the thick mucous secretion on the head and the body, the large pores on the head and the lateral line on each side of the body in two parts.

The red brotulid has been taken once in British Columbia waters, October 11, 1941, in English bay at about 30 fathoms in a shrimp trawl and collected by Mr. P. H. Nasmyth. It is apparently a fish of moderate depths. Nothing is known of its life history.

Range southern California to southeastern Alaska.

Suborder STROMATEOIDEA

The fishes in this suborder have an elongate, compressed body. The posterior part of the pharynx is expanded to form a muscular sac lined with papillae or plications usually bearing teeth.

The suborder comprises four or more families, two of which, the Stromateidae and Centrolophidae, are represented in British Columbia waters.

Family STROMATEIDAE — Butter-fishes

In the butter-fishes the body is moderately elongate, deep and strongly compressed. The papillae of the pharyngeal sac have bristle-like teeth. The dorsal and anal fins are long, highest anteriorly, each preceded by 3 spines; the pelvic fins are thoracic and minute or absent in the adult; the pectoral fins are long and falcate; the caudal fin is deeply furcate.

The butter-fishes inhabit the warm open seas. They are highly attractive in their form and bright coloration and are much prized because of their excellent flavour.

California pompano — *Peprilus simillimus* (Ayres) 1860

Body elongate, deep, greatly compressed; caudal peduncle short, slender. Head rounded in profile; mouth terminal, small; teeth: on jaws minute, weak; on pharyngeal papillae, bristle-like; snout bluntly rounded; gill membranes united, free from isthmus. Fins: dorsal (1), III, 45 to 47, long, high anteriorly; anal, III, 40 to 44, similar to dorsal; pelvic, absent in adult; pectoral long, reaching nearly to middle of dorsal fin, falcate; caudal, deeply furcate. Lateral line: slightly decurved anteriorly. Scales: cycloid, small. Colour: metallic blue on dorsal

surface; bright silvery on sides and ventral surface; entirely iridescent; dusky on margin of lobes of dorsal and anal fins.

Length to 11 inches.

Distinguished by the greatly compressed deep scaly body, the long falcate pectoral fins and the absence of pelvic fins.

The California pompano was first taken in British Columbia waters in September, 1903, in Juan de Fuca strait and the specimen is now in the collection of the Provincial Museum. It was recorded in 1909 by F. Kermode as *Palometa*

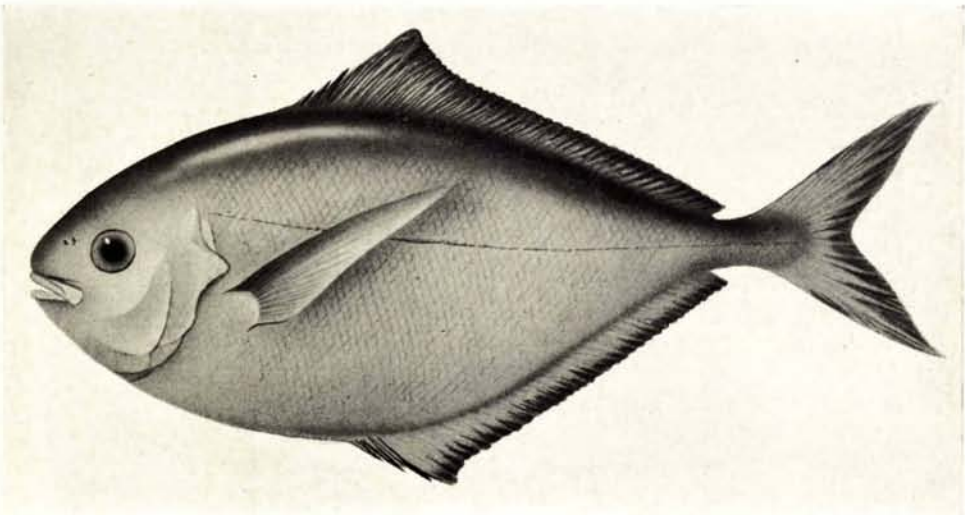

FIGURE 138. California pompano. *Peprilus simillimus* (Ayres) 1860

simillima Ayres. Other individuals have been obtained as follows: two in 1908 off Victoria; one, December 15, 1940, off the Chemainus river in an otter trawl; one, August 26, 1941, at Sooke in a salmon-trap. This is a fish of southern distribution and only an occasional stray reaches western Canadian waters. It has a ready sale on the fresh-fish market of California because of the richness and delicacy of its flesh.

Range southern California to strait of Georgia.

Family CENTROLOPHIDAE Rudder-fishes

In the rudder-fishes the body is elongate, moderately deep, and compressed. The plications of the pharyngeal sac have weak needle-like teeth. The dorsal and anal fins are highest posteriorly, each preceded by 3 weak spines; the pelvic fins are thoracic, small, each composed of 1 weak spine and 5 rays; the caudal fin is rounded.

The rudder-fishes are pelagic, frequently extending into deep water.

Brown rudder-fish *Icichthys lockingtoni* Jordan and Gilbert 1880

Body elongate, slender, compressed, flexible; narrowly compressed at bases of dorsal and anal fins. Head small, dorsal surface spongy, with free margin posteriorly overlapping anterior of occipital region; mouth terminal, moderate, slightly oblique; maxillary extending to point below pupil; teeth: on jaws only, minute, slender, sharp, weak; on pharyngeal plications, needle-like, weak; operculum striate; gill membranes separate, free from isthmus. Fins: dorsal (1), III, 34 to 39, spines slender, fin low anteriorly, higher posteriorly, maximum

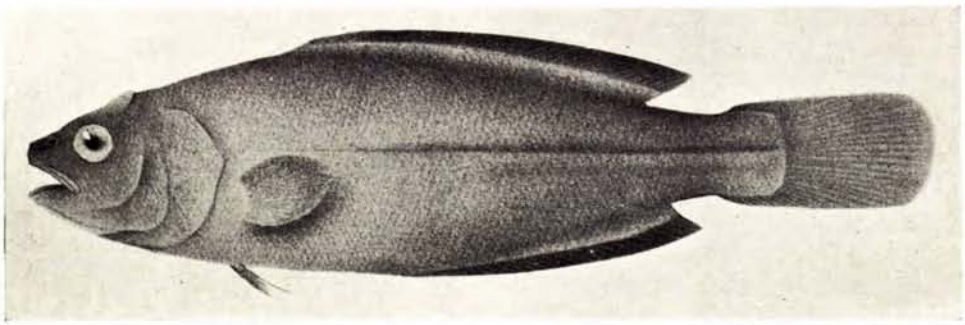

FIGURE 139. Brown rudder-fish. *Icichthys lockingtoni* Jordan and Gilbert 1880

height near posterior end; anal, III, 20 to 25, similar to dorsal; pelvic, I, 5, thoracic, spine slender, weak, fifth ray slender, filamentous; pectoral small, rounded, base fleshy; caudal, rounded, rudder-like. Lateral line: nearly straight, indistinct. Scales: cycloid, deciduous; covering body and head; on lateral line, 115 to 121, small. Colour: bluish gray to brown; darker on scale pockets; dusky to black on fins.

Length to 8 inches.

Distinguished by the flexible slender compressed scaled body, the spongy crown with the free flap on the head, the pelvic fins each with 1 spine and 5 rays, the fifth ray slender, filamentous and the rudder-like caudal fin.

The brown rudder-fish is known in British Columbia waters from two specimens. The first, 8 inches in length, was taken August 5, 1935, from a fish-trap at Sooke by Mr. T. Spouse. It was recorded in 1938 by I. McT. Cowan and is now in the Provincial Museum at Victoria. The second, 4 inches in length, was obtained August 22, 1935, from Esperanza inlet by Mr. M. Brevik and is now in the collection of the Pacific Biological Station. The skeleton of this fish is very flexible because of the weak ossification, a characteristic of many deep-sea fishes such as the rag-fishes with which the brown rudder-fish has sometimes been grouped in classification. The young are found frequently near the surface and in California waters have been observed in association with jelly-fishes.

Range northern California to west coast of Vancouver island.

Suborder MUGILOIDEA

The fishes in this suborder have two dorsal fins, well separated, the first spinous, the second rayed, sometimes with 1 spine; the pelvic fins are thoracic and are situated well behind the pectoral fins, each with 1 spine and 5 rays; the pelvic bones sometimes are attached to the cleithra by a long ligament.

The suborder includes three families: the Sphyraenidae, barracudas; Mugilidae, mullets; and the Atherinidae, silversides, only the first of which appears in British Columbia waters.

Family SPHYRAENIDAE — Barracudas

In the barracudas the body is elongate, slender, more or less terete. The head is very long, pointed, pike-like; the mouth is large; the lower jaw is projecting; the teeth are large, strong, sharp-edged, unequal in size on jaws and palatines. The first dorsal fin is depressible in a groove; the second dorsal fin is placed far back on the body over the anal fin.

The barracudas are large swift-swimming precadeous fish, reaching a length of 8 feet and a weight of about 100 pounds. They are voracious and occasionally attack bathers. For the most part the distribution of this family is subtropical and tropical.

Barracuda *Sphyraena argentea* Girard 1854

Body elongate, slender, subterete. Head very elongate, sharply pointed; mouth terminal, large; lower jaw strongly projecting; teeth well developed, large, sharp, fang-like, on jaws and palatines; snout acute; gill membranes separate, free from isthmus. Fins: dorsal (2), V—I, 9 or 10, widely separated; anal, I,

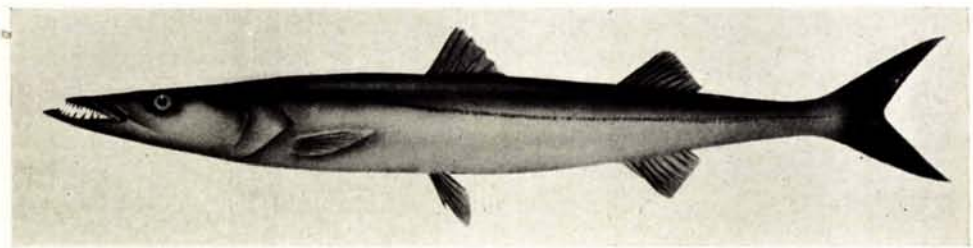

FIGURE 140. Barracuda. *Sphyraena argentea* Girard 1854

8 to 10, origin slightly behind that of rayed dorsal; pelvic, I, 5, thoracic, some distance behind pectorals; pectoral, low; caudal, furcate. Lateral line: high anteriorly, decurved gradually. Scales: cycloid, small; on lateral line, about 166; in row above lateral line, about 274. Colour: bluish brown on dorsal surface; silvery white on ventral surface.

Length to 5 feet.

Distinguished by the slender subterete body, the sharply pointed head, the large fang-like teeth, the presence of two widely separated dorsal fins, the first spinous, the second with 1 spine and 9 or 10 rays and the pelvic fins thoracic in position but situated well behind the pectoral fins.

The barracuda was first taken in British Columbia waters July 27, 1904, at Otter point near Sooke in a fish-trap. Three specimens were obtained, presented to the Provincial Museum at Victoria and recorded in 1909 by F. Kermode. The barracuda is captured occasionally along the coast from Juan de Fuca strait to the Queen Charlotte islands and the vicinity of Prince Rupert. It is common off the coast of California where spawning takes place chiefly during June in the open ocean. A length of 32 inches may be reached at the end of the sixth year and sexual maturity may be attained in the second or third years at lengths of 16 to 25 inches. The food consists of various fishes. This is an important commercial species in California where its rich, firm, well-flavoured flesh is in much demand. It is also a sport fish, being taken with jigs, slugs and live bait.

Range southern California to northwestern Alaska.

Order SCLEROPAREI

In this order are included fishes which are related to those in the order Percomorphi. They differ, however, in having the third suborbital bone greatly enlarged and forming a rod or stay or plate extending downward and backward from below the eye, touching or nearly touching the preopercle. In some instances the stay is outwardly evident but usually its presence and form cannot be determined without dissection.

The order comprises many families, of which nine are represented in British Columbia waters.

Family SCORPAENIDAE — Rock-fishes

In the rock-fishes the body is elongate and stout. The head is large and usually bears prominent ridges and spines in definite positions. The scales are large and ctenoid. The dorsal fin is single with 13 to 15 spines and 9 to 16 rays; the anal fin has 3 stout spines and 5 to 9 rays; the pelvic fins are thoracic, each with 1 spine and 5 rays.

The rock-fishes constitute a group of many species largely in the north temperate seas. Over fifty species are known along the eastern shores of the Pacific ocean from California to Alaska and at least twenty-one of these are found in British Columbia waters, in two genera, *Sebastodes* and *Sebastolobus*.

These fishes frequently are called rock-cods but since they have no close relationship with the true cods, Gadidae, it seems advisable to adopt the term rock-fishes and discard the term "cod" in reference to members of this family.

Many species inhabit rocky shores but the family has representatives in a vertical range from tide-water to 822 fathoms. Species living near the surface are for the most part brown in colour while those in deep water often have red predominating.

All of the members of the genus *Sebastodes* give birth to young. These are less than ½ inch in length and are produced in large numbers during the summer months.

The rock-fishes have firm white flesh which is very palatable and of excellent food value. The market demand for them has been increasing steadily. The bulk of the catch is filleted for the fresh-fish trade.

Bocaccio *Sebastodes paucispinis* (Ayres) 1854

Body rather elongate, slender, depth 3.6 to 3.75 in standard length. Head elongate, pointed; upper profile moderately sloping, straight from tip of upper jaw to origin of dorsal fin; mouth terminal, large; lower jaw greatly projecting, more so than in any other species of *Sebastodes*, extending beyond upper profile

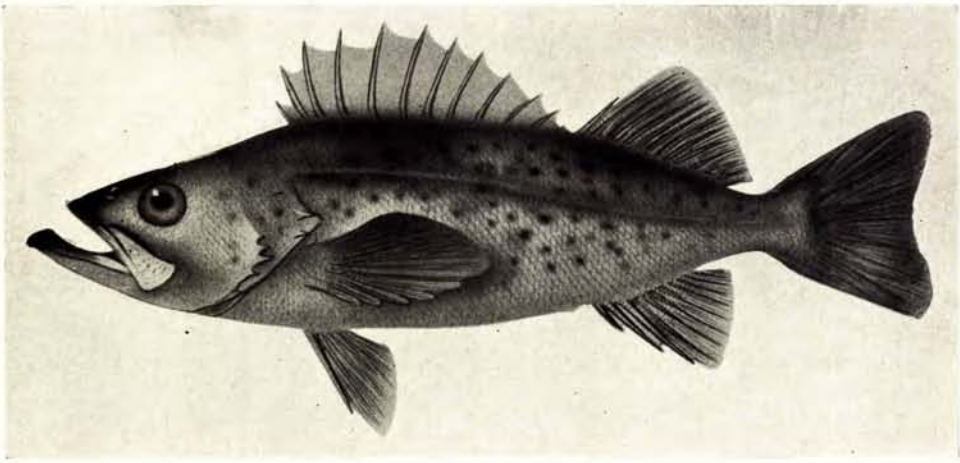

FIGURE 141. Bocaccio. *Sebastodes paucispinis* (Ayres) 1854

of head; symphyseal knob large; interorbital space convex, broad; cranial spines: parietal; supracleithral; cleithral; all minute; opercular, 2, upper larger; preopercular sharp, third distinctly largest; lacrymal lobes, 2, second minutely spinous. Fins: dorsal (1), XIII or XIV, 13 or 14, very deeply notched so that spinous and rayed portions almost separate, membranes of spinous portion slightly incised; anal, III, 7 to 9; pelvic, I, 5, thoracic, relatively short, not reaching anus; pectoral, 15, not reaching anus. Scales: weakly ctenoid, very small; in oblique rows above lateral line, 90 to 105. Pores: on lateral line, 56 to 70. Colour: light green to dark brown on dorsal surface; shading into dull reddish bronze to white on ventral surface; everywhere flushed with clear pale red, often with intense black spots on body; red on lower jaw, black on tip; white to silvery on peritoneum.

Length to 3 feet.

Distinguished by the convex interorbital space, the large mouth with the

greatly projecting lower jaw, the 15 rays in each pectoral fin and the deeply notched dorsal fin.

The bocaccio was first recorded from British Columbia waters in 1866, without date or locality of capture, by J. K. Lord as *Sebastes paucispinis*. On September 27, 1888, a specimen 8 inches in length was secured by the *Albatross* in Barkley sound and recorded in 1907 by B. W. Evermann and E. L. Goldsborough. Subsequent records have been from Barkley and Howe sounds and in September, 1942, from Bates pass at Bull harbour. It is frequently included in commercial catches of rock-fishes from Juan de Fuca strait and the west coast of Vancouver island. The species usually occurs at depths below 40 fathoms. The food consists of small fishes. It is a relatively swift-moving rock-fish and in Howe sound has become a popular sport fish in deep trolling with light tackle using herring skin for a lure. In California it is an important commercial species. The word bocaccio means large mouth.

Range southern California to Queen Charlotte sound.

Yellow-tailed rock-fish *Sebastodes flavidus* Ayres 1862

Body elongate, moderately deep, depth 2.9 to 3.5 in standard length. Head with upper profile steep, slightly curved; mouth terminal, large; lower jaw strongly projecting, not extending beyond upper profile of head; symphyseal knob prominent; snout sharply pointed; eye moderate, diameter 3.4 to 4.5 in length of head; interorbital space highly convex, broad; cranial spines: nasal; supracleithral (sometimes absent); cleithral; all minute; opercular, 2, small; preopercular small, second and third largest; lacrymal lobes and spines, absent. Fins: dorsal (1), XIII, 14 or 15, moderately notched, membranes of spinous portion deeply incised;

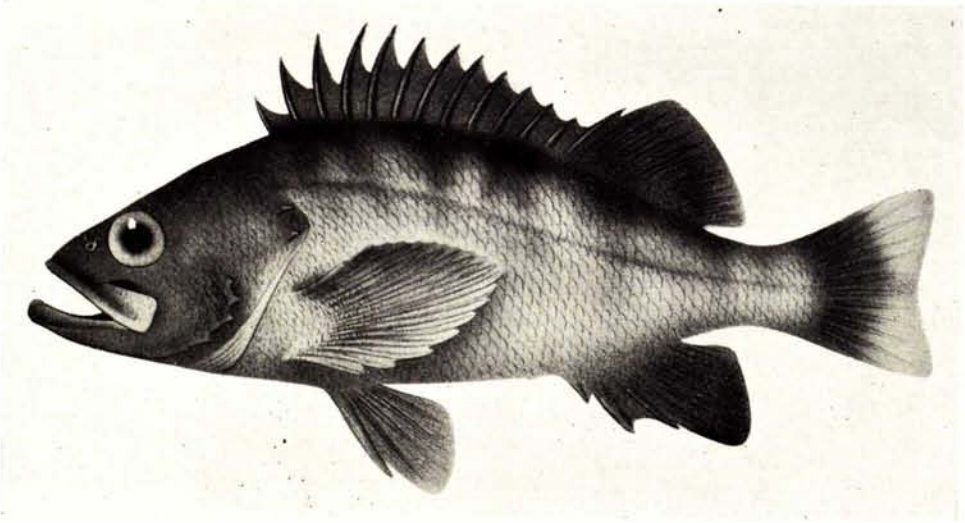

FIGURE 142. Yellow-tailed rock-fish. *Sebastodes flavidus* Ayres 1862

anal, III, 7 to 9; pelvic, I, 5, thoracic, not reaching anus; pectoral, 17 or 18, rarely 19, not reaching anus, lower 7 to 9 rays moderately thickened. Scales: weakly ctenoid; in oblique rows above lateral line, 60 to 70. Pores: on lateral line, 50 to 60. Colour: dark gray, vaguely streaked and mottled with black and washed with dusky green; dusky green with faint yellow on fins (pronounced after death); dusky yellow on tip of caudal fin; white on peritoneum.

Length to 2 feet 2 inches.

Distinguished by the highly convex interorbital space without spines, the deeply incised membranes of the spinous portion of the dorsal fin, the dark gray coloration on the body washed with dusky green, the dusky yellow on the tip of the caudal fin and the white peritoneum.

The yellow-tailed rock-fish was first taken in British Columbia waters March 18, 1934, when two large specimens were caught off Departure bay. Other individuals have been examined from Clayoquot sound near Flores island, taken May 23, 1934, from Baynes sound, February 12, 1942, at depths of 30 to 40 fathoms and three juveniles from Sooke traps, August 17, 1942. Additional specimens have been reported from various localities around Vancouver island taken in trawls, on trolls and on lingcod lines. In California waters the food consists of crustaceans and small fishes. The yellow-tailed rock-fish is considered an excellent food fish.

Range southern California to Vancouver island.

Black rock-fish *Sebastodes melanops* (Girard) 1856

Body elongate, deep, depth 2.5 to 2.9 in standard length. Head with upper profile steep, almost straight; mouth terminal, large; lower jaw slightly projecting,

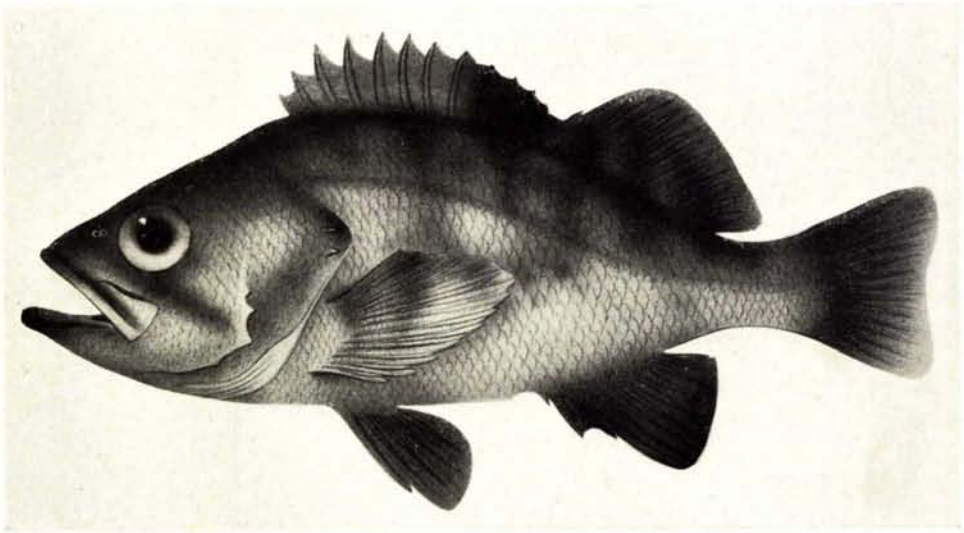

FIGURE 143. Black rock-fish. *Sebastodes melanops* (Girard) 1856

blunt, not extending beyond upper profile of head; symphyseal knob moderate; snout rather blunt; eye moderate, diameter 4.1 to 5.5 in length of head; interorbital space highly convex, broad; cranial spines: nasal; supracleithral (sometimes absent); cleithral; all minute; opercular, 2, small; preopercular small, second and third largest; lacrymal lobes and spines, absent. Fins: dorsal (1), XIII, 13 to 16, moderately notched, membranes of spinous portion moderately incised; anal, III, 7 to 9; pelvic, I, 5, thoracic, barely reaching anus; pectoral, 19, rarely 18 or 20, not reaching anus, lower 10 rays thick, leathery. Scales: ctenoid; in oblique rows above lateral line, 60 to 70. Pores: on lateral line, 51 to 53. Colour: olive brown to black on dorsal surface; paler on sides; soiled white on ventral surface; dusky black above on head, dark streak from eye across cheek, dark streak on maxillary; usually black spot on posterior of spinous portion of dorsal fin (conspicuous in young); black on all fins; sometimes carmine red on mandible and all fins except dorsal; white on peritoneum.

Length to 20 inches.

Distinguished by the highly convex interorbital space without spines, the moderately large eyes, the black coloration sometimes blotched with carmine red and the white peritoneum.

The black rock-fish was first recorded from British Columbia waters in 1866, without date or locality, by J. K. Lord, as *Sebastes melanops*. On September 23, 1888, it was taken in Barkley sound by the *Albatross* and recorded in 1907 by B. W. Evermann and E. L. Goldsborough. Two specimens obtained in 1895 in Juan de Fuca strait near Victoria were recorded in 1898 by J. Fannin as *Sebastichthys melanops*. Apparently the species is widely distributed along the coast of British Columbia. It is a common shore form amongst the rocks and is taken frequently on hand-lines. The black rock-fish and the priest-fish are confused by fishermen who call them "black bass" indiscriminately.

Range northern California to northwestern Alaska.

Priest-fish *Sebastodes mystinus* (Jordan and Gilbert) 1880

Body elongate, deep, depth 2.7 to 2.9 in standard length; dorsal and ventral profiles evenly curved. Head relatively short, bluntly pointed; mouth terminal, large, lower jaw slightly projecting, not extending beyond upper profile of head; symphyseal knob, evident; eye small, diameter 4.5 to 5 in length of head; interorbital space highly convex, broad; cranial spines: nasal; prefrontal; supracleithral; cleithral; short, delicate; opercular, 2, moderate; preopercular, rather strong; lacrymal lobes and spines, absent. Fins: dorsal (1), XIII, 15, moderately notched, membranes of spinous portion slightly incised, very low, spines much shorter than longest rays; anal, III, 9 or 10; pelvic, I, 5, thoracic, not reaching anus; pectoral, 17 or more, short, not reaching anus. Scales: ctenoid; in oblique rows above lateral line, 62 to 66. Pores: on lateral line, 50 to 55. Colour: grayish black on dorsal surface; paler below; often vaguely dappled or blotched with darker and

lighter shades on back and sides; black streaks radiating downward and backward from eye, 2; dusky to black on all fins; black on peritoneum.

Length to 20 inches.

Distinguished by the highly convex interorbital space without spines, the small prefrontal spines, the low spinous portion of the dorsal fin, the small eyes and the grayish black coloration on the body and on the peritoneum.

The priest-fish was first taken in British Columbia waters in 1885 from Queen Charlotte strait by Dr. G. M. Dawson at a depth of 10 fathoms and recorded in 1887 by J. F. Whiteaves as *Sebastodes mystinus* Jordan and Gilbert. There was no further report of occurrence until the summer of 1940, when two specimens were captured in the strait of Georgia in an ottertrawl and were on display in the Vancouver Aquarium. This is not a shallow-water species and hence is not taken as frequently as the black rock-fish.

Range southern California to northwestern Alaska.

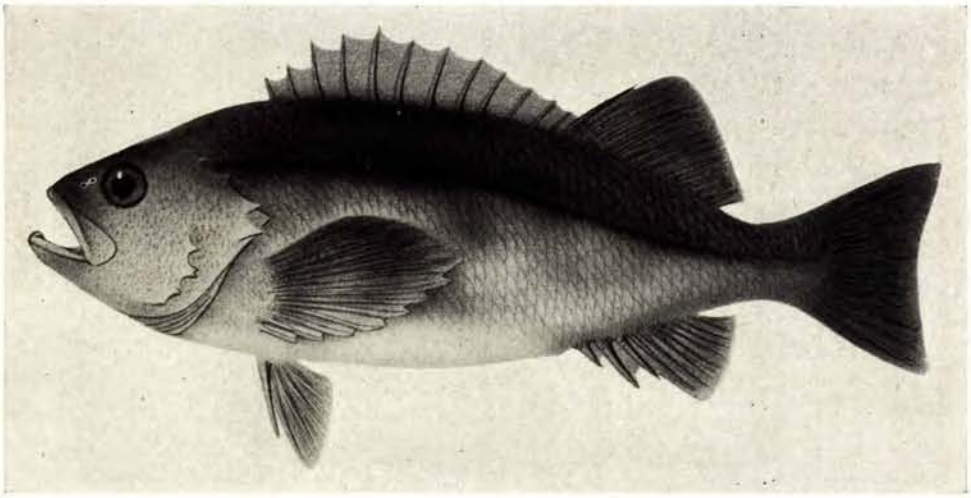

FIGURE 144. Priest-fish. *Sebastodes mystinus* (Jordan and Gilbert) 1880

Orange rock-fish *Sebastodes pinniger* (Gill) 1864

Body elongate, modertately deep, depth 2.5 to 3 in standard length. Head with upper profile somewhat curved; mouth terminal, large; lower jaw projecting, not extending beyond upper profile of head; symphyseal knob moderate; interorbital space convex, broad; cranial spines: nasal; prefrontal; frontals, II, III, minute; parietal, small; supracleithral, large; cleithral, large; opercular, 2, large; preopercular, slender, sharp; lacrymal lobes, 2, sharp spine on each, anterior small, sometimes absent; rakers on first gill arch, 12 to 15 + 26 to 28, long, rough. Fins: dorsal (1), XIII, 14, slightly notched, membranes of spinous portion moderately incised; anal, III, 7; pelvic, I, 5, thoracic, long, barely reaching

anus; pectoral, barely reaching anus. Scales: ctenoid on body; cycloid on head and mandible; in oblique rows above lateral line, 45 to 51. Pores: on lateral line, 40 to 47. Colour: light olive gray with clear orange red or light orange yellow, red predominating, on dorsal surface; paler, nearly white on ventral surface; reddish orange streak along upper portion of body below dorsal fin; pale grayish streak immediately above posterior two-thirds of lateral line; orange blotch above pectoral fin; orange saddle over caudal peduncle; golden blotches on side of caudal peduncle, 2; yellow orange stripes radiating from eye, 3, bright; bright orange on all fin membranes; usually black blotch on membranes of spinous portion of dorsal fin between seventh and tenth spines, large, very distinct in young; pale red, with dusky mottling, on lining of mouth; black on peritoneum, pale gray to black in young.

Length to 2 feet 6 inches.

Distinguished by the orange coloration, the three bright orange stripes across

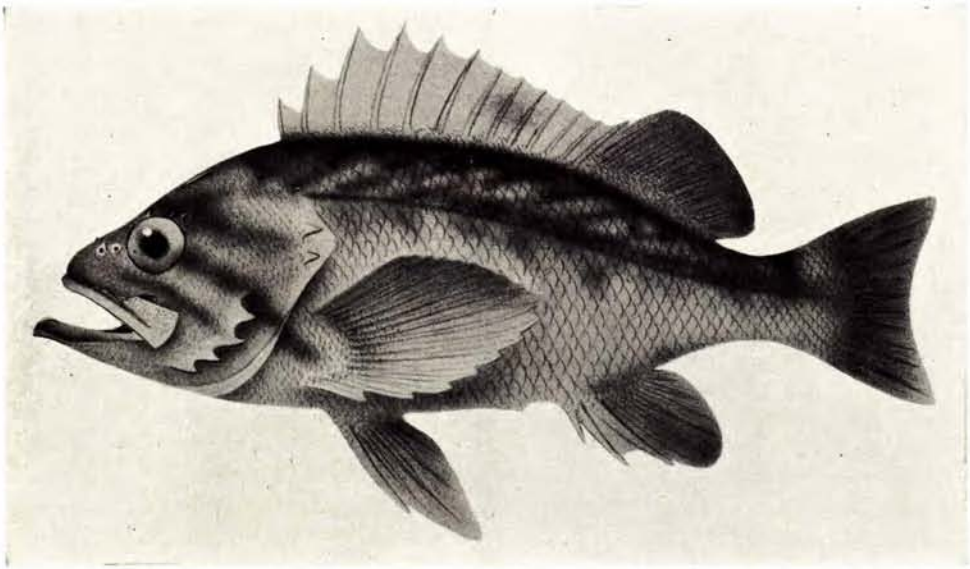

FIGURE 145. Orange rock-fish. *Sebastodes pinniger* (Gill) 1864

the head, the pale red with the dusky mottling on the lining of the mouth, the spines on the lacrymal lobes and the smooth scaly mandible.

The orange-rock-fish was first recorded from British Columbia waters in 1891 from the vicinity of Victoria by Ashdown Green as *Sebastichthys pinniger*. On June 20, 1903, a specimen 4½ inches in length was obtained in the strait of Georgia off Bowen island by the *Albatross*, station 4193, lat. 49° 20′ N., long. 123° 43′ W., depth 23 fathoms. The species is rather common along the coast. The young inhabit shore waters while the older fish are distributed in the deeper

waters, very large individuals occurring at depths of at least 100 fathoms. Females with embryos somewhat less than $\frac{3}{8}$ of an inch in length have been observed in February and early March. Large individuals may contain as many as 600,000 young. Commercial catches are made in trawls and on jigs baited with live herring. The fish is very palatable and finds a ready market.

Range southern California to Dixon entrance.

Vermilion rock-fish *Sebastodes miniatus* (Jordan and Gilbert) 1880

Body elongate, moderately deep, depth about 3 in standard length. Head with upper profile somewhat curved; mouth terminal, large; lower jaw slightly projecting, not extending beyond upper profile of head; dentary elevation fitting into notch in upper jaw; symphyseal knob moderate; interorbital space slightly convex, width medium; cranial ridges: low, broad, weak; cranial spines: nasal; prefrontal; frontals, I, II, III; parietal; delicate; supracleithral large; cleithral large; opercular, 2, large; preopercular moderately long, sharp, radiating; lacrymal lobes and spines, absent; rakers on first gill arch 9 or 10 + 26, long, slender. Fins: dorsal (1), XIII, 14, deeply notched, membranes of spinous portion deeply incised; anal, III, 7; pelvic, I, 5, thoracic, long, reaching behind anus almost to anal fin; pectoral, not reaching anus. Scales: ctenoid on body, head and mandible; in oblique rows above lateral line, 45 to 53. Pores: on lateral line 43 to 51. Colour: deep vermilion on dorsal surface; pinkish mottling on sides; light red on ventral surface; black dots in clusters everywhere on back and sides giving dusky shade to body; red on lips, mottled with darker; red streak on maxillary; orange

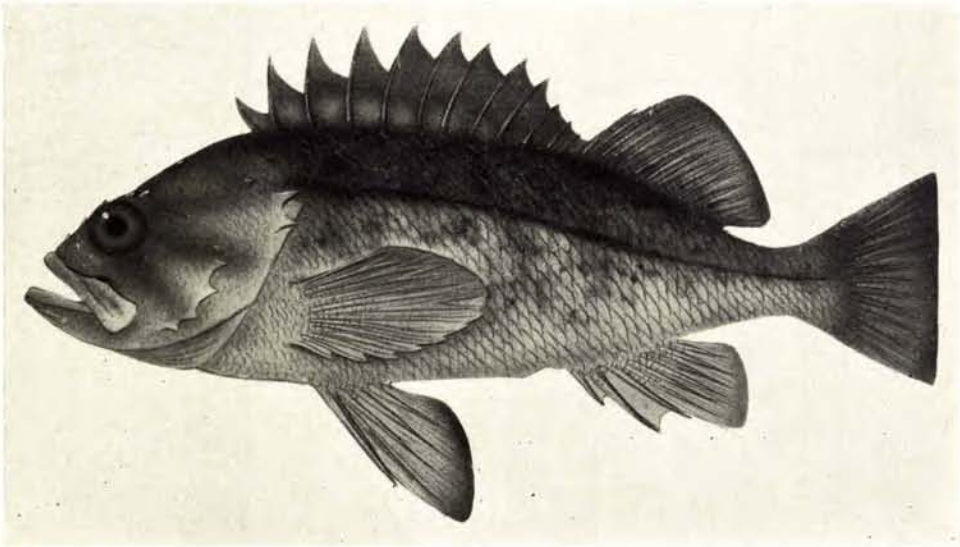

FIGURE 146. Vermilion rock-fish. *Sebastodes miniatus* (Jordan and Gilbert) 1880

stripes radiating from eye, 3, obscure; cross blotches on top of head, faint; bright vermilion scattered on all fins; black on margins, black dots on membranes; olive gray spots on base of spinous portion of dorsal fin, somewhat black on posterior margin; dark olive streak on each membrane, vertical; red on lining of mouth; white to dusky on peritoneum.

Length to 3 feet.

Distinguished by the vermilion coloration, the three obscure orange stripes radiating from each eye, the red mouth and the rough scaly mandible.

The vermilion rock-fish was first taken in British Columbia waters May 14, 1934, in Clayoquot sound near Flores island at a depth of about 30 fathoms in a trawl, by Mr. E. G. Hart, and is now in the collection of the Pacific Biological Station. A second specimen, three feet in length, was obtained in the summer of 1934 in the strait of Georgia and was observed at the Deep bay reduction plant.

Range southern California to Vancouver island.

Wilson's rock-fish *Sebastodes wilsoni* Gilbert 1915

Body elongate, depth 3.1 to 3.7 in standard length. Head with upper profile straight; mouth terminal, moderate; lower jaw projecting, not extending beyond upper profile of head; symphyseal knob small; interorbital space flat, width medium; cranial ridges: well developed; cranial spines: nasal; prefrontal; frontal,

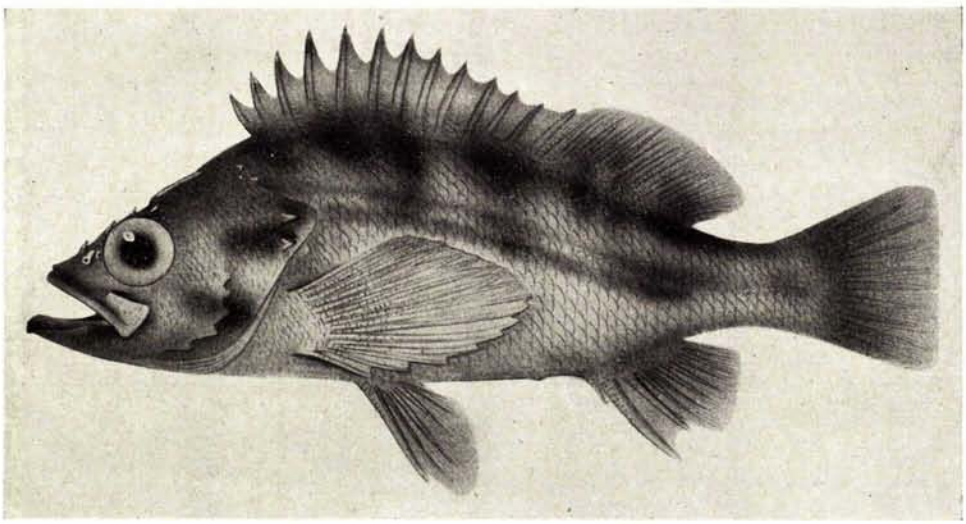

FIGURE 147. Wilson's rock-fish. *Sebastodes wilsoni* Gilbert 1915

II, III; parietal; strong; supracleithral, 2; cleithral; opercular, 2; preopercular, strongly developed; lacrymal lobes, 2, spines absent; rakers on first gill arch, 12 or 13 + 29 to 31, long, slender. Fins: dorsal (1), XIII, 14, very slightly notched, membranes of spinous portion moderately incised; anal, III, 6 or 7, short; pelvic,

I, 5, thoracic, just reaching anus; pectoral, just reaching anus. Scales: ctenoid; in oblique rows above lateral line, 45 to 48. Pores: on lateral line, 41 to 44. Colour: very light brown, flushed with clear red; dark blotches in series along base of dorsal fin, 4, extending somewhat onto fin; brownish red stripe along side below lateral line; silvery on ventral surface; black on peritoneum.

Length to 7¼ inches.

Distinguished by the coloration, the 45 to 48 scales in oblique rows above the lateral line, the 2 supracleithral spines, the elongate body and the short anal fin with 6 or 7 rays.

Wilson's rock-fish was first taken in British Columbia waters September 10, 1912, off Swiftsure shoal at a depth of 23 fathoms by Professor J. P. McMurrich and was recorded in 1932 by C. L. Hubbs and L. P. Schultz. The specimen is now in the collection of the Pacific Biological Station. Three other individuals have been obtained between Esteban point and Sydney inlet at depths of 61 and 30 fathoms. Apparently it is an off-shore species since all Canadian records are from the west coast of Vancouver island.

Range northern California to west coast of Vancouver island.

Red-striped rock-fish *Sebastodes proriger* (Jordan and Gilbert) 1880

Body elongate, slender; depth 3.2 to 3.6 in standard length. Head with upper profile almost straight; mouth terminal, moderate; lower jaw projecting, not extending beyond upper profile of head; symphyseal knob prominent; interorbital space slightly convex, width medium; cranial ridges: low, weak; cranial spines: nasal; prefrontal; frontals, II, III; parietal; supracleithral; cleithral; opercular, 2; well developed, delicate; preopercular sharp, second longest; lacrymal lobes, 2, spines absent; rakers on first gill arch, about 15 + 28, long, slender. Fins:

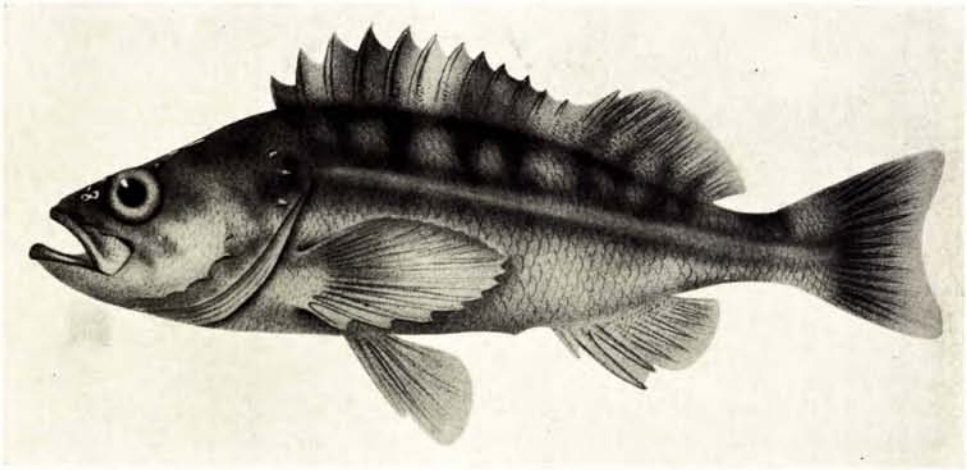

FIGURE 148. Red-striped rock-fish. *Sebastodes proriger* (Jordan and Gilbert) 1880

dorsal (1), XIII, 13 to 15, slightly notched, membranes of spinous portion moderately incised, longest spine about equal to longest ray; anal, III, 7 or 8, second spine longer and stronger than third; pelvic, I, 5, thoracic, barely reaching anus; pectoral, reaching anus. Scales: ctenoid; in oblique rows above lateral line, 65 to 75. Pores: on lateral line, 47 to 51. Colour: bright light red, mottled on dorsal surface with dusky olive green; light red stripe along lateral line, continuous, distinct; olive stripes radiating from eye, 2, wide; purplish cross shades on head; dusky to black on lips and tip of lower jaw; bright light red on fins; black on spinous portion of dorsal fin, olive on rayed portion; olive speckling on caudal fin; black on peritoneum.

Length to 2 feet.

Distinguished by the shallow notch in the dorsal fin, the 65 to 75 scales in oblique rows above the lateral line, the red stripe along the lateral line and the black peritoneum.

The red-striped rock-fish was first taken in British Columbia waters August 6, 1881, near Campbell island (Port McLaughlin), by Capt. H. E. Nichols in 14 fathoms and recorded in the same year by T. H. Bean in error as *Sebastodes paucispinis* (Ayres). A second specimen was obtained June 19, 1928, from Departure bay and is now in the collection of the Royal Ontario Museum of Zoology at Toronto. The species is taken more commonly to the southward.

Range southern California to southeastern Alaska.

Long-jawed rock-fish *Sebastodes alutus* (Gilbert) 1890

Body elongate; depth 3 to 3.5 in standard length. Head with upper profile nearly straight; mouth terminal, large; lower jaw greatly projecting, not extending

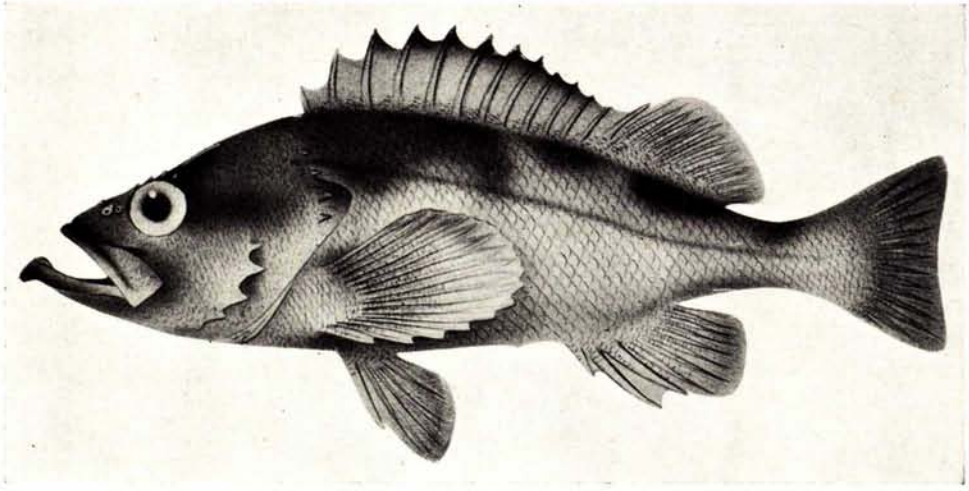

FIGURE 149. Long-jawed rock-fish. *Sebastodes alutus* (Gilbert) 1890

beyond upper profile of head; symphyseal knob, very prominent; dentary elevation fitting into notch in upper jaw; interorbital space slightly convex to flat, width medium; cranial ridges: moderately developed; cranial spines: nasal; prefrontal; frontals, I, II, III; parietal; slender, delicate; supracleithral; cleithral; opercular, 2; preopercular, broad, flat; lacrymal lobes weakly developed, spine sometimes present; rakers on first gill arch, 11 or 12 — 25 or 26, long, clavate. Fins: dorsal (1), XIII, 15, moderately notched, membranes of spinous portion slightly incised; anal, III, 8; pelvic, I, 5, thoracic, reaching anus; pectoral, reaching slightly behind anus. Scales: ctenoid, large; in oblique rows above lateral line, 60 to 75. Pores: on lateral line, 47 to 52. Colour: bright carmine red; lighter on ventral surface with some silvery; olive brown blotches at base of spinous portion of dorsal fin, 2, below rayed portion of fin, 1; dark blotch on upper surface of caudal peduncle, small; blotches or bars on side of head, irregular; black on lower lip and tip of mandible; red on all fins, black on margin of spinous portion of dorsal fin; dusky on lining of mouth; dusky to black on peritoneum.

Length to 15 inches.

Distinguished by the slightly convex to flat interorbital space, the long lower jaw not extending beyond the upper profile of the head, the very large symphyseal knob and the carmine red coloration with black markings.

The long-jawed rock-fish was first taken in British Columbia waters August 28, 1891, in Juan de Fuca strait off Port San Juan, by the *Albatross*, station 3449, lat. 48° 29′ N., long. 124° 40′ W., depth 135 fathoms. Two other individuals were obtained the following month in the same region and all were recorded in 1895 by C. H. Gilbert. On June 5, 1934, four specimens were captured off the west coast of Vancouver island near Esteban point at 61 fathoms. The species is reported to be abundant in northern waters at depths between 38 and 350 fathoms. It is found frequently to be a part of the food of the halibut.

Range southern California to northwestern Alaska.

Olive-backed rock-fish *Sebastodes saxicola* (Gilbert) 1890

Body elongate; depth 3 to 3.25 in standard length. Head with upper profile somewhat curved; mouth terminal, moderate; lower jaw slightly projecting, not extending beyond upper profile of head; symphyseal knob, small; premaxillaries not produced into prominent dentigerous lobes; interorbital space flat, width medium; cranial ridges: moderately developed; cranial spines: nasal; prefrontal; frontals, I, II, III; parietal; moderately developed; supracleithral, large; cleithral; opercular, 2; preopercular, pointed, sharp; lacrymal lobes usually bluntly triangular, sometimes minute spine on each lobe, directed backward; rakers on first gill arch, 9 to 11 + 21 to 23, long, slender. Fins: dorsal (1), XIII, 12 or 13, slightly notched, membranes of spinous portion moderately incised; anal, III, 7 or 8, second spine longer and stronger than third; pelvic, I, 5, thoracic, usually not reaching anus; pectoral, moderate, reaching almost to anus. Scales: ctenoid, large; in oblique rows above lateral line, about 50. Pores on lateral line: 35 to 39.

Colour: olive brown on dorsal surface; silvery on ventral surface, overlaid with light red; usually black on tips of all fins, sometimes faint on pectorals; olive brown bands on caudal fin, conspicuous; white on lining of mouth; black on peritoneum.

Length to 13½ inches.

Distinguished by the absence of prominent dentigerous lobes from the upper jaw, the white lining of the mouth and gill cavity, the black peritoneum and the olivaceous coloration of the body.

The olive-backed rock-fish was first taken in British Columbia waters in 1888 in Barkley sound by the *Albatross* and recorded in 1907 by B. W. Evermann and E. L. Goldsborough. Another specimen was obtained in July, 1934, 16 miles off Nootka sound in 74 fathoms by Mr. E. G. Hart, and a third individual was secured in 1939 near Porlier pass in an otter trawl. It occurs at depths ranging from 25 to 391 fathoms in waters outside the Province.

Range southern California to southeastern Alaska.

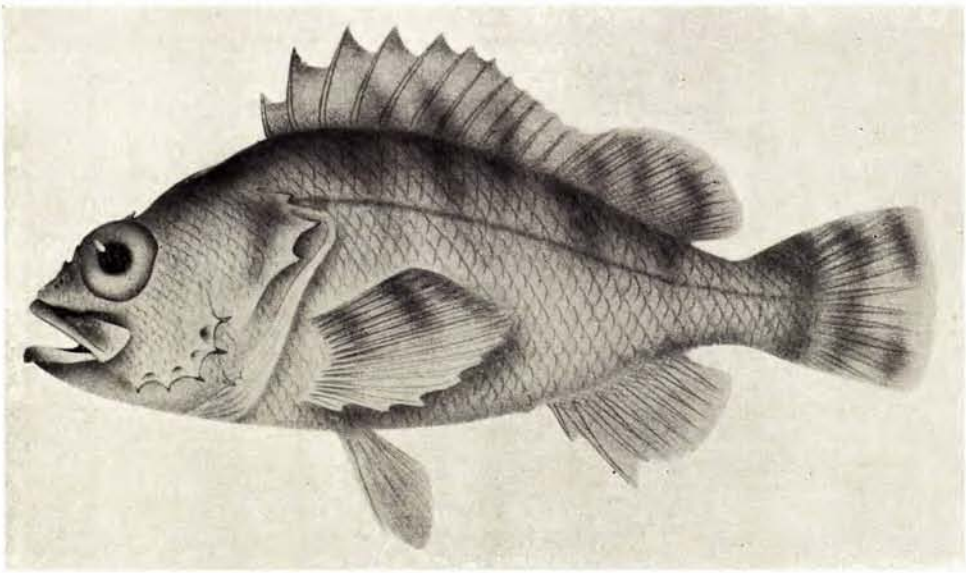

FIGURE 150. Olive-backed rock-fish. *Sebastodes saxicola* (Gilbert) 1890

Lobe-jawed rock-fish *Sebastodes diploproa* (Gilbert) 1890

Body elongate; depth 2.75 to 3.1 in standard length. Head with upper profile straight; mouth terminal, moderate; jaws about equal; symphyseal knob, very small; premaxillaries, greatly produced on each side of median line of snout forming 2 prominent forwardly projecting dentigerous lobes, widely separated; dentigerous areas on lower jaw forming single median lobe at symphysis, fitting

into notch of upper jaw; interorbital space flat, width medium; cranial ridges: moderately developed; cranial spines: nasal; prefrontal; frontals, II, III; parietal; thin, sharp, moderately developed; supracleithral, small; cleithral, large; opercular, 2, large; preopercular, pointed, sharp, almost evenly spaced, second and third longest; lacrymal lobes, 2, large spine on each, pointing downward; rakers on first gill arch, 9 to 11 + 23 to 25, long, slender. Fins: dorsal (1), XIII, 11 to 13, moderately notched, membranes of spinous portion moderately incised; anal, III, 7 or 8, second spine longer and stronger than third; pelvic, I, 5, thoracic, barely reaching anus; pectoral, long, reaching slightly behind origin of anal fin. Scales: ctenoid, large, deciduous; in oblique rows above lateral line, about 48. Pores: on lateral line, 33 to 37. Colour: uniform rose red to brick red on dorsal surface; bright silvery on sides and ventral surface; sometimes sparsely spotted with black; dusky bar faint behind pectoral fin; rose red on lining of mouth and gill cavity; jet black on peritoneum.

Length to 12½ inches.

Distinguished by the large projecting toothed lobes on the upper jaw into which fit the united dentigerous lobes of the lower jaw, the two prominent sharp lacrymal spines pointing downward, the rose red lining of the mouth and gill cavity, the jet black peritoneum and the rose red and silver coloration of the body.

The lobe-jawed rock-fish was first taken in British Columbia waters June 19, 1903, near Nanaimo by the *Albatross*, station 4191, lat. 49° 11′ N., long. 123° 54′ W., depth 54 fathoms, when two specimens 3¼ inches and 3½ inches in length respectively, were obtained and were recorded in 1907 by B. W. Evermann

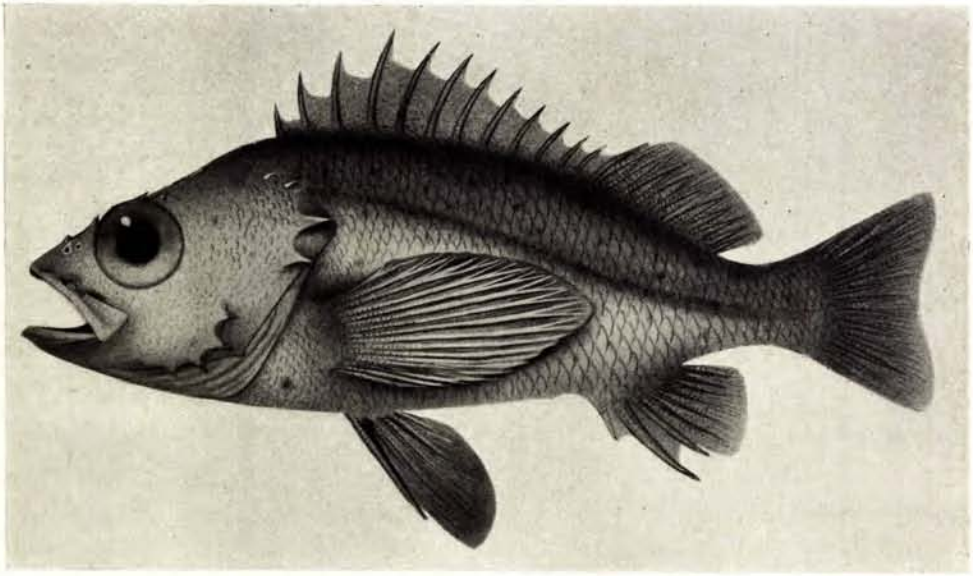

FIGURE 151. Lobe-jawed rock-fish. *Sebastodes diploproa* (Gilbert) 1890

and E. L. Goldsborough. Others have been secured in shrimp trawls off English bay at depths between 50 and 70 fathoms. In 1934, an individual was obtained from the west coast of Vancouver island south of Flores island. This rock-fish inhabits deep water for the most part having been taken at depths from 50 to 369 fathoms.

Range southern California to Vancouver island.

Black-throated rock-fish *Sebastodes introniger* (Gilbert) 1890

Body elongate; depth 2.7 to 2.9 in standard length. Head with upper profile almost straight; mouth terminal, moderate; lower jaw slightly projecting, not extending beyond upper profile of head; symphyseal knob, small; premaxillaries somewhat produced into widely separated toothed lobes; dentigerous areas on

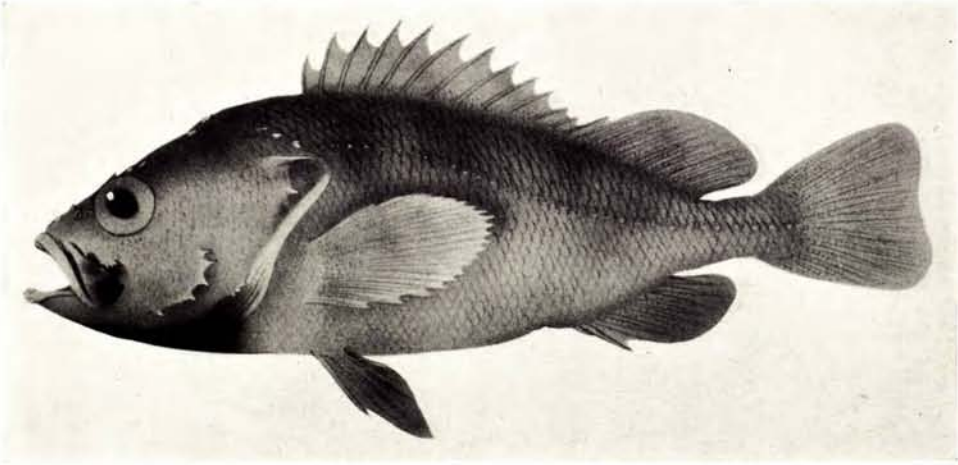

FIGURE 152. Black-throated rock-fish. *Sebastodes introniger* (Gilbert) 1890

lower jaw forming 2 lobes slightly separated at symphysis; interorbital space flat to barely convex, width medium; cranial ridges: moderately developed; cranial spines: nasal; prefrontal; frontals, I, II, III; parietal, 2; sharp, moderately developed; supracleithral, 2; cleithral broad, sometimes bifid; opercular, 2; preopercular pointed, upper 2 closely approximated; lacrymal lobes large, large spine on anterior lobe, 3 to 5 on posterior lobe; rakers on first gill arch, 8 or 9 + 20 to 23, long, somewhat clavate. Fins: dorsal (1), XIII, 13 or 14, moderately notched, membranes of spinous portion moderately incised; anal, III, 7 or 8, second spine longer and much stronger than third; pelvic, I, 5, thoracic, reaching about half distance to anus; pectoral short, usually not reaching to anus. Scales: ctenoid, large, deciduous; in oblique rows above lateral line, 50 to 55. Pores: on lateral line, 31 to 36. Colour: bright clear orange red on dorsal surface, somewhat blotched with darker red; silvery on ventral surface overlaid with light red;

black blotches on maxillary, isthmus, branchiostegal membranes and in axil of pectoral fin; dusky areas on all fins, darkest on pelvics and anal; black and red on lining of mouth and gill cavity; gray, speckled with black on peritoneum.

Length to 2 feet.

Distinguished by the separated dentigerous lobes on the upper and lower jaws, the 3 to 5 spines on the posterior lobe of the lacrymal bone, the red and black lining of the mouth and gill cavity; the gray coloration of the peritoneum speckled with black and the bright orange red coloration on the body.

The black-throated rock-fish was first taken in British Columbia waters February 23, 1943, at Seymour narrows. This is the only specimen authoritatively identified although fish dealers state that the species has long been recognized as distinguishable from the red snapper, which it superficially resembles. This individual was 23½ inches in total length and weighed 7 pounds, a female with large ovaries containing eggs about 1/25 of an inch in diameter.

Range southern California to northwestern Alaska.

Red snapper *Sebastodes ruberrimus* Cramer 1895

Body elongate, deep; depth 2.5 to 2.8 in standard length. Head with upper profile slightly curved; mouth terminal, large; lower jaw slightly projecting, not extending beyond upper profile of head; symphyseal knob, small; interorbital space, concave to flat, narrow; cranial ridges: well developed, sharp, in adult broken up into irregular spines and tubercles; cranial spines: nasal; prefrontal;

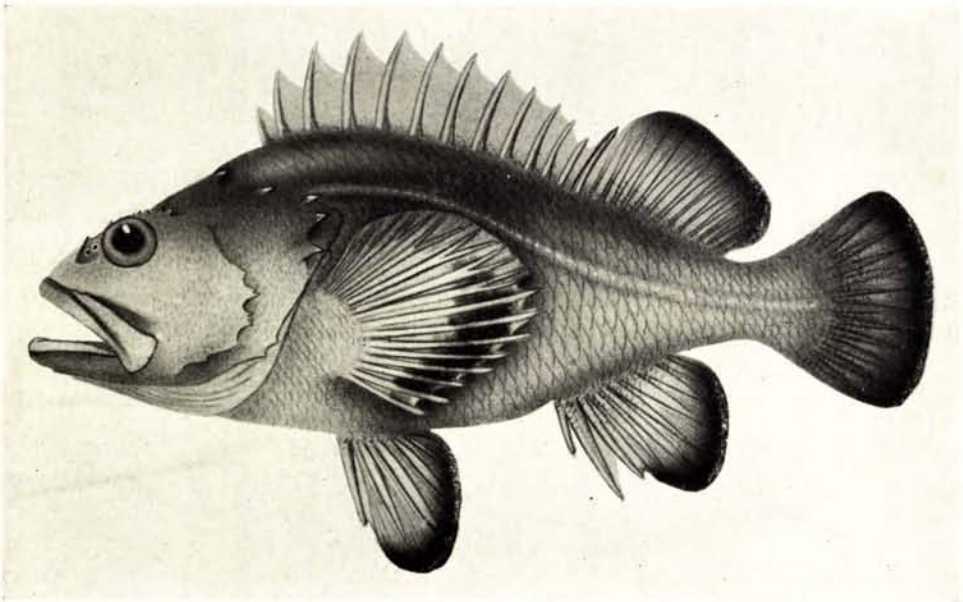

FIGURE 153. Red snapper. *Sebastodes ruberrimus* Cramer 1895

frontals, I, II, III; parietal; well developed, blunt; supracleithral; cleithral; opercular, 2; preopercular broad, third multifid, others sometimes bifid; lacrymal lobes little developed, spines absent; rakers on first gill arch, 8 or 9 + 18 to 20, short, rough, clavate. Fins: dorsal (1), XIII, 14 or 15, moderately notched, membranes of spinous portion moderately incised; anal, III, 7, second spine slightly longer and stronger than third; pelvic, I, 5, thoracic, not reaching anus; pectoral, broad, not reaching anus. Scales: ctenoid, on body and head; in oblique rows above lateral line, 50 to 52. Pores: on lateral line, 44 or 45. Colour: deep vermilion red; paler on ventral surface; whitish streak along lateral line, becoming rather indistinct in adults; in very large specimens from deep water, body and head frequently much dotted and blotched with black; red on fins, usually black on margins of rayed fins; white on peritoneum.

Length to 3 feet.

Distinguished by the multifid points on the third preopercular spine, the broken up spiny cranial ridges and the red coloration.

The red snapper was first recorded from British Columbia waters in 1881 by D. S. Jordan and C. H. Gilbert who reported seeing large specimens at Victoria and recorded then as *Sebastichthys ruber* (Ayres). These were undoubtedly *S. ruberrimus*, described in 1895 by F. Cramer. The species is common along the coast occurring at depths between 30 and 150 fathoms and is captured in trawls and on halibut, lingcod and dog-fish lines. In February, 1942, several large catches of red snappers were seen at the Vancouver fish docks, the fish having been caught in Pender harbour on dog-fish lines at depths between 100 and 150 fathoms. These were mostly of large size up to 3 feet in length. Little is known of the life history but Dr. J. L. Hart states that a female weighing 19½ lbs. contained approximately 2,700,000 eggs. This fish is of high quality and is sold in the round and as fillets.

Range southern California to northwestern Alaska.

Green-striped rock-fish *Sebastodes elongatus* (Ayres) 1859

Body very elongate, slender; depth about 3.3 in standard length. Head with upper profile straight; mouth terminal, moderate; lower jaw distinctly projecting, not extending beyond upper profile of head; symphyseal knob, very small; eye about 4 in length of head; interorbital space concave, narrow; cranial ridges: moderately developed; cranial spines: nasal; prefrontal; frontals, II, III; parietal; small, slender, sharp; supracleithral, 2, small; cleithral; opercular, 2; preopercular narrow, very sharp; lacrymal lobes little developed, spines absent; rakers on first gill arch, 9 or 10 + 20 to 22, long, strong. Fins: dorsal (1), XIII, 12 to 14, deeply notched, membranes of spinous portion moderately incised; anal, III, 6 or 7, second spine much longer than third; pelvic, I, 5, thoracic, not reaching anus; pectoral, reaching anus, lower rays not thickened. Scales: ctenoid, on body and head; in oblique rows above lateral line, 55 to 58. Pores: on lateral line, 43 to 45. Colour: green on dorsal surface; white on ventral surface; every-

where suffused with clear pale red; olive green stripes irregular, interrupted, strongly developed on sides; two below lateral line becoming confluent posteriorly; pale pink stripe along lateral line; olive on head, blotched dorsally, pale red ventrally; black on tip of chin; olive on dorsal, pectoral and caudal fins; pale red on pelvic and anal fins; dusky on peritoneum.

Length to 12 inches.

Distinguished by the slender body, the medium sized eye and the irregular olive green stripes along the sides of the body.

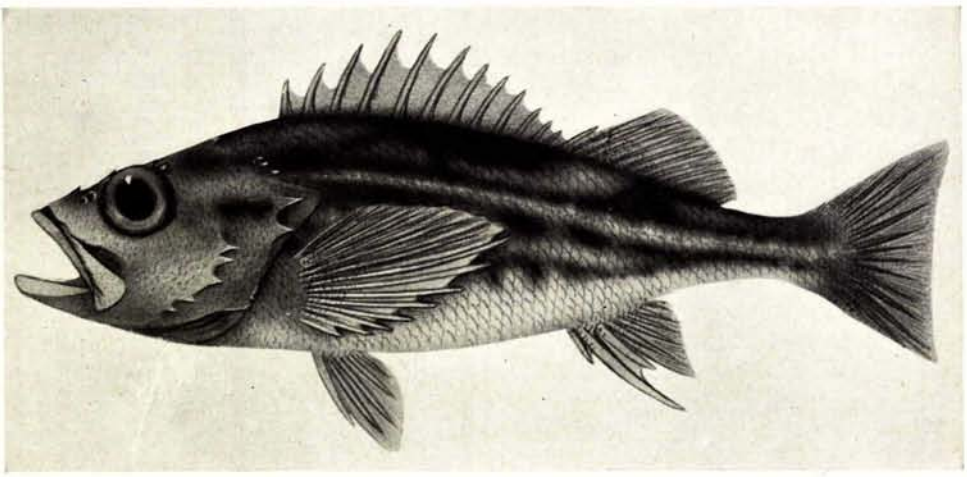

FIGURE 154. Green-striped rock-fish. *Sebastodes elongatus* (Ayres) 1859

The green-striped rock-fish was first taken in British Columbia waters July 18, 1928, in Boat harbour by Professor J. R. Dymond and the specimen is now in the collection of the Royal Ontario Museum of Zoology at Toronto. The species is fairly common in the strait of Georgia, Burrard inlet, Pender harbour and Baynes sound, inhabiting the deeper waters. In California there are records of its capture at depths down to 496 fathoms. This rock-fish is often obtained in commercial trawls but is seldom marketed.

Range southern California to strait of Georgia.

Big-eyed rock-fish *Sebastodes zacentrus* (Gilbert) 1890

Body very elongate, slender; depth 3.1 to 3.4 in standard length. Head with upper profile straight; mouth terminal, moderate; lower jaw projecting, not extending beyond upper profile of head; symphyseal knob, small; eye large, diameter about 3 in length of head; interorbital space concave, width medium; cranial ridges: moderately developed; cranial spines: nasal; prefrontal; frontals, II, III; parietal; strong; supracleithral; cleithral; opercular, 2; preopercular, slender, sharp; lacrymal lobes, 2, sometimes minute spine on posterior lobe;

rakers on first gill arch, 9 to 11 + 24 to 26, long, very slender. Fins: dorsal (1), XIII, 14 or 15, slightly notched, membranes of spinous portion moderately incised; anal, III, 7 or 8, second spine stout, usually longer than third; pelvic, I, 5, thoracic, reaching anus; pectoral, reaching anus, lower rays not thickened. Scales: weakly ctenoid, on body and head; in oblique rows above lateral line, about 70. Pores: on lateral line, 41 to 46. Colour: brown on dorsal surface; white on ventral surface; everywhere suffused with clear pale red; dark brown irregular blotches on body, 5, extending onto dorsal fin; dark brown on dorsal surface of

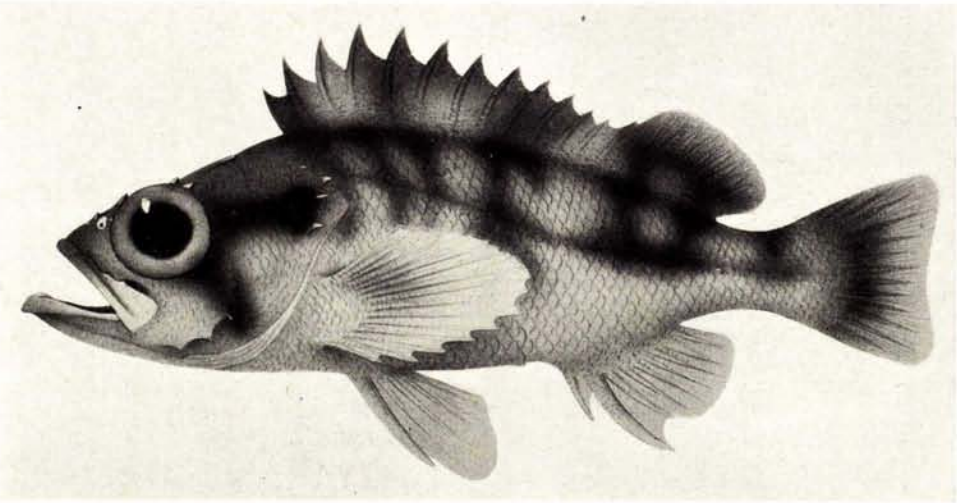

FIGURE 155. Big-eyed rock-fish. *Sebastodes zacentrus* (Gilbert) 1890

head; very dark brown stripes radiating from eye, 2, upper ending in large blotch; brownish on caudal fin; jet black on peritoneum.

Length to 6½ inches.

Distinguished by the very large eyes, the slender body and the brownish coloration suffused with clear pale red.

The big-eyed rock-fish was first taken in British Columbia waters March 17, 1941, in Burrard inlet by a shrimp trawler at a depth of about 40 fathoms and was given to the second author. The specimen is 5⅜ inches in standard length and is now in the fish collection of the University of British Columbia. This is the only known individual from these waters.

Range southern California to southern British Columbia.

Brown rock-fish *Sebastodes dallii* (Eigenmann and Beeson) 1894

Body elongate; moderately slender; depth 2.6 to 3 in standard length. Head with upper profile nearly straight; mouth terminal, moderate; jaws nearly equal; symphyseal knob, small; interorbital space flat to concave, narrow; cranial ridges:

moderately developed, high, thick; cranial spines: nasal; prefrontal; frontals, II, III; parietal; moderately developed, slender, sharp; supracleithral; cleithral; opercular, 2; preopercular short, bluntly pointed; lacrymal lobes, 2, anterior little developed, spine on posterior lobe; rakers on first gill arch, 7 + 15 to 18, short. Fins: dorsal (1), XIII, 13 or 14, moderately notched, membranes of spinous portion moderately incised, longest spine about 2.3 in length of head; anal, III, 6, second spine equal to and stronger than third; pelvic, I, 5, thoracic, not reaching anus; pectoral, not reaching anus, lower rays thickened. Scales: weakly ctenoid;

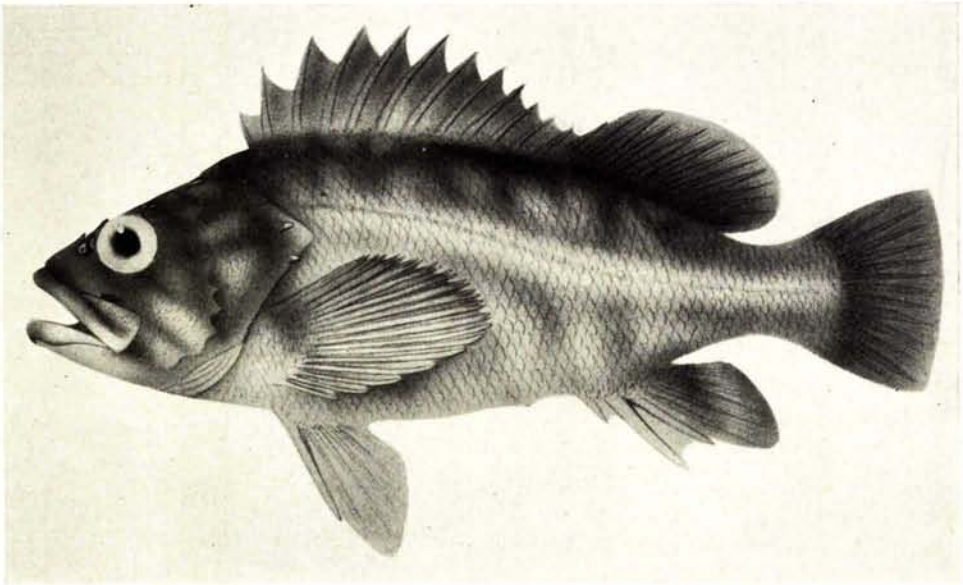

FIGURE 156. Brown rock-fish. *Sebastodes dallii* (Eigenmann and Beeson) 1894

in oblique rows above lateral line, 61 or 62. Pores: on lateral line, about 49. Colour: light brown, much streaked with dusky; dark streaks radiating from eye, 4, vague; dark bars, 4, oblique, one from occiput across base of pectoral fin, two from spinous portion of dorsal fin—first from sixth and seventh spines toward anus—second from eighth to tenth spines toward lateral line, one broad, irregular, below rayed portion of dorsal fin toward lateral line; pale streak along lateral line, conspicuous on posterior two-thirds; dusky on all fins, least on pelvics; pale on peritoneum.

Length to 14 inches.

Distinguished by the short pectoral fins, the 61 or 62 scales in oblique rows above the lateral line and the light brown coloration with four oblique dark rows across the body.

The brown rock-fish was first recorded from British Columbia waters in 1881 from the vicinity of Vancouver island by T. H. Bean as *Sebastichthys auriculatus*

(Girard), apparently on the basis of an earlier record by Theodore Gill. There seems to be little doubt but that this record is actually that of *Sebastodes dallii* which was described in 1894 by Eigenmann and Beeson. A second record is that of a specimen taken June 23, 1903, at Union bay by the *Albatross* and recorded in 1907 by B. W. Evermann and E. L. Goldsborough as *Sebastodes dalli* (Eigenmann and Beeson). The only other known occurrence of this species in these waters is that of an individual 14 inches in total length obtained January 20, 1942, in Jervis inlet which is now in the collection of the University of British Columbia.

Range southern California to southeastern Alaska.

Copper rock-fish *Sebastodes caurinus* (Richardson) 1844

Body elongate, moderately deep, depth 2.6 to 2.9 in standard length. Head with upper profile slightly curved; mouth terminal, moderate; lower jaw slightly projecting; symphyseal knob, very small; interorbital space slightly concave, narrow; cranial ridges: moderately developed; cranial spines: nasal; prefrontal;

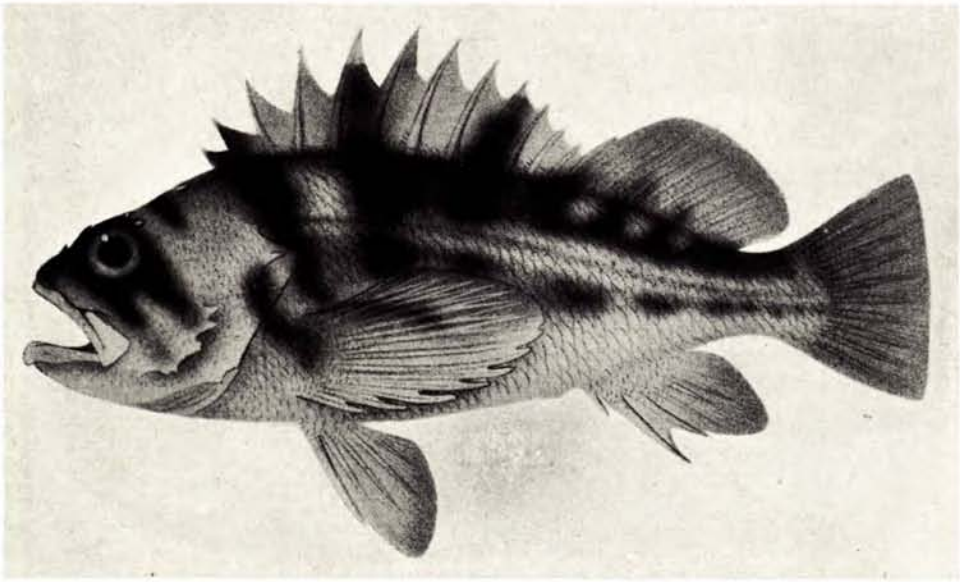

FIGURE 157. Copper rock-fish. *Sebastodes caurinus* (Richardson) 1844

frontals, II, III; parietal; moderately developed, sharp; supracleithral; cleithral; opercular, 2; preopercular, upper 2 narrow, sharp, other 3 broad, sometimes bifid; lacrymal lobes, 2, spine on posterior lobe; rakers on first gill arch, 8 or 9 + 19 to 21, moderately short, stout, rough, somewhat clavate. Fins: dorsal (1), XIII, 12 to 14, deeply notched, membranes of spinous portion moderately incised, spines moderately high, length of longest spine 2 or more in that of head; anal, III, 6 or 7,

second spine longer and stronger than third; pelvic, I, 5, thoracic, usually reaching anus; pectoral, reaching behind anus, lower rays slightly thickened. Scales: ctenoid; in oblique rows above lateral line, 40 to 48. Pores: on lateral line, 40 to 44. Colour: dark brown to dark green, more or less washed with copper or dull yellow, sometimes black with copper or yellow obscured; greenish brown stripes often radiating from eye, 2 or 3; black area in upper posterior angle of operculum; coppery black on all fins; white on peritoneum.

Length to 20 inches.

Distinguished by the long blackish pectoral fins with slightly thickened rays, the 40 to 48 scales in oblique rows above the lateral line and the coppery brown coloration.

The copper rock-fish was first taken in British Columbia waters July 26, 1881, in Departure bay, when two specimens were obtained at a depth of 20 fathoms by Capt. H. E. Nichols. These were recorded in the same year by T. H. Bean as *Sebastichthys caurinus* (Richardson). The species is abundant in the strait of Georgia and occurs along the coast of the Queen Charlotte islands. It is perhaps the most common rock-fish in shallow water in the strait of Georgia area. Commercial catches are made in gill-nets and sold as fillets.

Range Oregon to southeastern Alaska.

Orange-spotted rock-fish *Sebastodes maliger* (Jordan and Gilbert) 1880

Body elongate, stout, deep, depth 2.3 to 2.8 in standard length. Head with upper profile slightly curved; mouth terminal, large; jaws, nearly equal; symphyseal knob, small; interorbital space concave, narrow; cranial ridges: strongly developed, high, thick; cranial spines: nasal; prefrontal; frontals, II, III; parietal; strongly developed, moderately sharp; supracleithral; cleithral, 2; opercular, 2; preopercular short, narrow; lacrymal lobes little developed, spines absent; rakers on first gill arch, 8 to 10 + 19 to 22, short, stout, clavate. Fins: dorsal (1), XIII, 12 to 14, deeply notched, membranes of spinous portion between first and fifth spines very deeply incised so that attachment to front of each spine is less than half length of that spine, spines very high, higher than in any other species, length of longest spine about 1.8 in length of head; anal, III, 6 or 7, second spine equal to third in length and stoutness; pelvic, I, 5, thoracic, barely reaching anus; pectoral, reaching anus or behind, lower rays thickened. Scales: ctenoid; in oblique rows above lateral line, 47 to 55. Pores: on lateral line, 46 to 48. Colour: yellow to brown; usually yellow or orange on anterior of body, closely covered with small round spots of clear orange to brownish orange; darker brown to black on posterior of body, variously mottled; pale brownish stripes radiating from eye, 3, sometimes faint; pale to bright yellow area commencing on spinous portion of dorsal fin between third and fifth spines extending in form of wedge to lateral line, sometimes absent in adults; slaty black on rayed fins; pale on peritoneum.

Length to 2 feet.

Distinguished by the high dorsal fin with the deeply incised membranes and the yellow to brown coloration with the orange to brownish orange spotting.

The orange-spotted rock-fish was first taken in British Columbia waters August 5, 1881, at Campbell island (Port McLaughlin), when a specimen 15 inches in length was obtained at a depth of 14 fathoms by Capt. H. E. Nichols. This was recorded in the same year by T. H. Bean as *Sebastichthys maliger* Jordan and

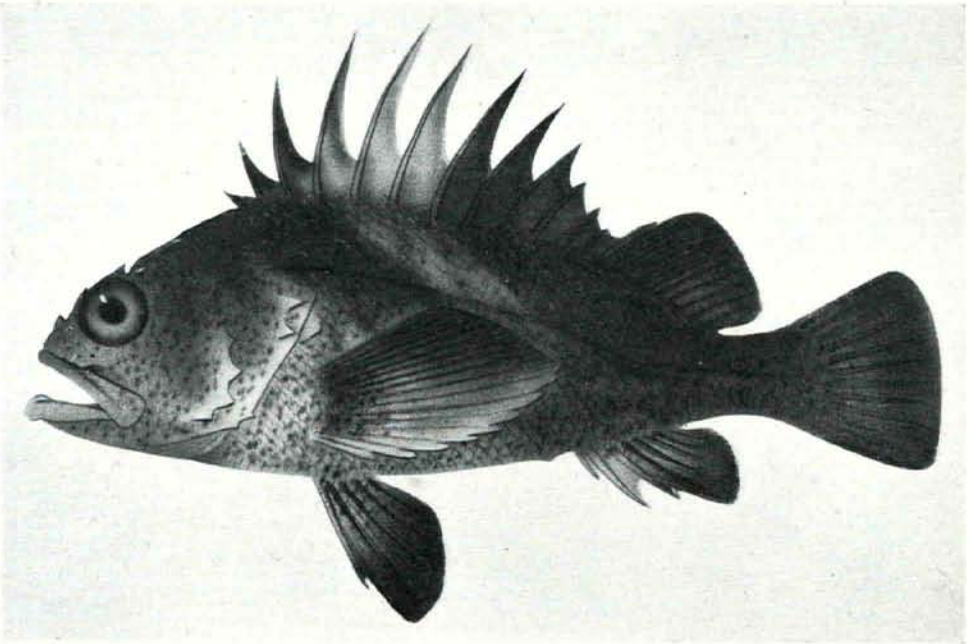

FIGURE 158. Orange-spotted rock-fish. *Sebastodes maliger* (Jordan and Gilbert) 1880

Gilbert. The species is common in the strait of Georgia at all depths down to 150 fathoms, the young occurring along the shores and the adults usually in deeper waters. Commercially the orange-spotted rock-fish is taken in trawls and marketed as fillets. As a sport fish it is taken on rod and line at depths between 30 and 40 fathoms with herring bait and provides excellent sport on light tackle because of its splendid fighting ability.

Range southern California to southeastern Alaska.

Yellow-striped rock-fish *Sebastodes nebulosus* (Ayres) 1854

Body elongate, deep, depth 2.5 to 2.75 in standard length. Head with upper profile nearly straight; mouth terminal, moderate; jaws about equal; symphyseal knob very small; interorbital space deeply concave, narrow; cranial ridges: strongly developed, high, blunt; cranial spines: nasal; prefrontal; frontals, II, III; parietal; strongly developed, sharp; supracleithral, large; cleithral, large; opercular, 2; preopercular, short, broad, points single; lacrymal lobes, 2, spines absent;

rakers on first gill arch, about 8 + 19, short, clavate. Fins: dorsal (1), XIII, 13, deeply notched, membranes of spinous portion moderately incised, highest spine about 2 in length of head; anal, III, 7, second spine longer, stronger, than third; pelvic, I, 5, thoracic, not reaching anus; pectoral, reaching anus, lower rays much thickened. Scales: ctenoid; in oblique rows above lateral line, 45 to 51. Pores: on lateral line, 42 to 46. Colour: blue black of varying intensities; bright yellow stripe commencing on membrane of spinous portion of dorsal fin between third and fourth spines, broad, passing obliquely backward to, thence along, lateral

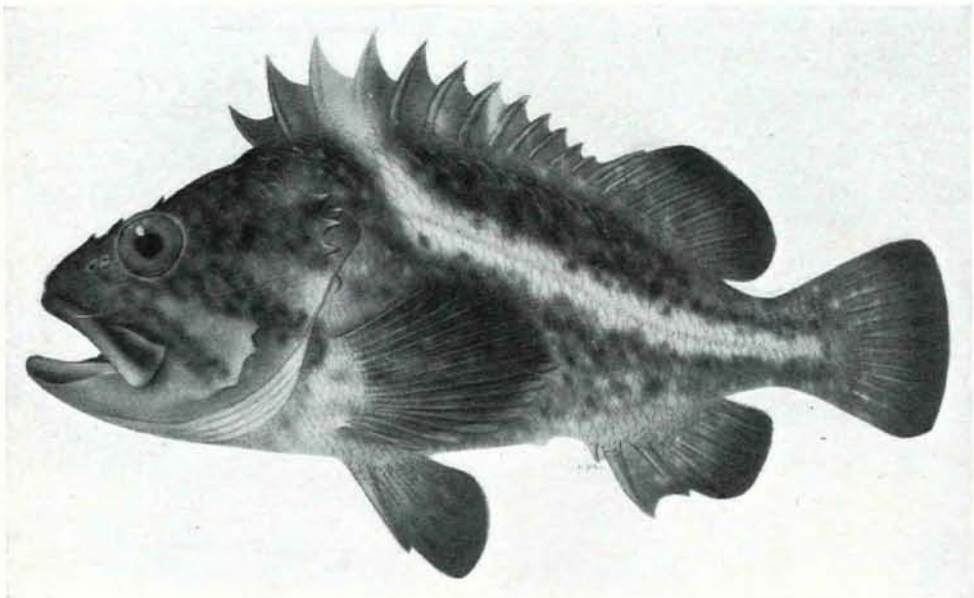

FIGURE 159. Yellow-striped rock-fish. *Sebastodes nebulosus* (Ayres) 1854

line to caudal fin; yellowish or whitish speckling, sometimes tinged with blue, everywhere on body and head; blue black on all fins; white on peritoneum.

Length to 12 inches.

Distinguished by the broad bright yellow stripe on each side of the blue black body.

The yellow-striped rock-fish was first recorded from British Columbia waters in 1881 from Vancouver island by T. H. Bean as *Sebastichthys nebulosus* (Ayres). In 1882, T. Gill recorded a second individual on the basis of a colour sketch of a specimen observed May 20, 1859, at Mayne island in Deep bay and labelled *Sebastomus fasciatus* (Girard). A later definite locality record is that of a specimen 2½ inches in length taken June 23, 1903, off Fort Rupert by the *Albatross*, station 4204, lat. 50° 43′ N., long. 127° 19′ W., depth 69 fathoms and recorded in 1907 by B. W. Evermann and E. L. Goldsborough. The yellow-striped rock-fish

occurs around Vancouver island, in Pender harbour and is obtained commonly in Hecate strait on halibut gear at moderate depths.

Range northern California to southeastern Alaska.

Banded rock-fish *Sebastodes nigrocinctus* (Ayres) 1859

Body elongate, deep, depth 2.6 to 2.8 in standard length. Head with upper profile nearly straight; mouth terminal, moderate; lower jaw slightly projecting; symphyseal knob, small; interorbital space concave, very narrow; cranial ridges:

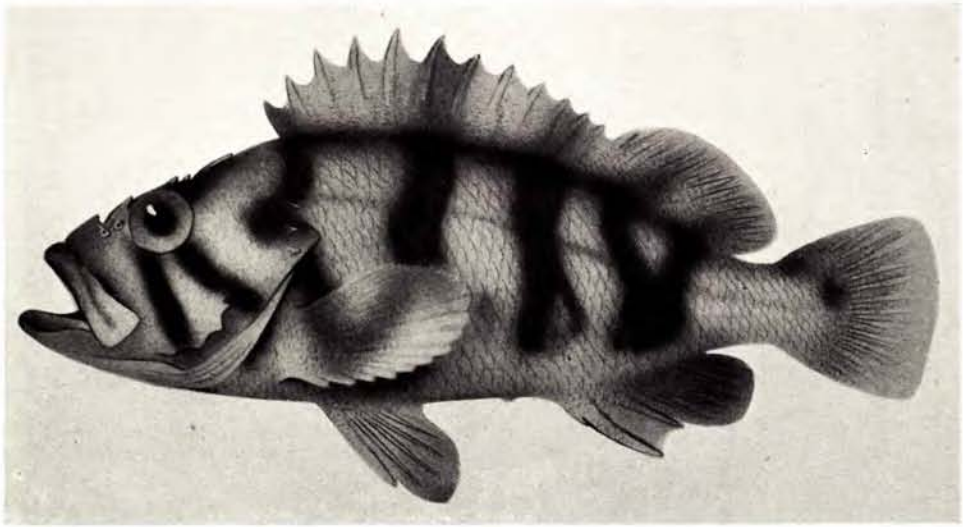

FIGURE 160. Banded rock-fish. *Sebastodes nigrocinctus* (Ayres) 1859

strongly developed, blunt, higher than in any other species of *Sebastodes:* median frontal ridges well developed, spinous; cranial spines: nasal; prefrontal; frontals, I, II, III, sometimes I and II fused; parietal; all strongly developed, short, sharp to blunt; accessory spines present; supracleithral, 1 or 2; cleithral, sometimes bifid; opercular, 2; preopercular short, upper 3 moderately sharp, lower 2 blunt; lacrymal lobes, 2, spines absent; rakers on first gill arch, 8 or 9 + 19 to 21, short, stiff, rough, clavate. Fins: dorsal (1), XIII or XIV, 14 or 15, slightly notched, membranes of spinous portion slightly incised, highest spine more than 2 in length of head; anal, III, 7, second spine slightly shorter and stronger than third; pelvic, I, 5, thoracic, barely reaching anus; pectoral, reaching anal fin in male, not reaching anus in female, lower rays somewhat thickened in female. Scales: ctenoid; in oblique rows above lateral line, 50 to 64. Pores: on lateral line, 44 to 50. Colour: gray to pale rose with 5 carmine vertical bars, or bright orange red with 5 jet black vertical bars, on each side of body; dark stripes downward and backward from eye, 2, prominent; white on peritoneum.

Length to 2 feet.

Distinguished by the high blunt cranial ridges, the well developed spinous median frontal ridges and the 5 well defined carmine or black vertical bars on each side of the body.

The banded rock-fish was first recorded from British Columbia waters in 1881 from Vancouver island by T. H. Bean as *Sebastichthys nigrocinctus* (Ayres). The species is taken occasionally in rather large numbers in Juan de Fuca strait. In February, 1940, several specimens were caught by lingcod fishermen in the strait of Georgia and in February, 1942, many were secured on dog-fish set-lines in Pender harbour at depths between 30 and 150 fathoms. During the winter of 1941-1942, three individuals captured in the strait of Georgia were maintained in the Vancouver Aquarium for some time. In the bright light they were in the colour phase with carmine bars but as the fish passed into a dark portion of the tank they changed to the colour phase with the jet black bars. This change and the reversal were effected in a matter of less than a minute. In November, 1944, three specimens, two males and a female, were obtained from a fish dealer in Victoria in the carmine phase. After a week's preservation in formalin only the males retained the vertical bars and these became brownish black. The banded rock-fish apparently is an inhabitant of the deeper waters and is not observed very frequently along the shore.

Range northern California to southeastern Alaska.

Spiny-cheeked rock-fish *Sebastolobus alascanus* Bean 1890

Body elongate, slender; depth about 3.5 in standard length. Head with upper profile slightly curved; mouth terminal, large; jaws about equal; symphyseal knob prominent; cranial ridges and spines numerous, strongly developed; cranial

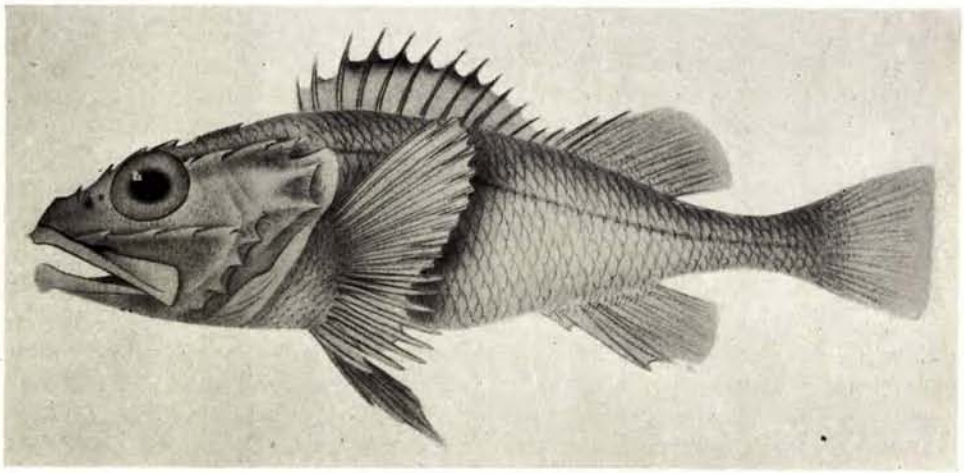

FIGURE 161. Spiny-cheeked rock-fish. *Sebastolobus alascanus* Bean 1890

spines: nasal; prefrontal; frontals, I, II, III; parietal; postorbital series sharp; supracleithral; cleithral; opercular, 2; preopercular, 5, uppermost longest; suborbital ridge sharp, knife-like, spines prominent; lacrymal lobes, 2, spine on posterior lobe; rakers on first gill arch, 18 to 22, short, stiff, rough, clavate. Fins: dorsal (1), XV to XVII, 9 or 10, very deeply notched, membranes of spinous portion deeply incised anteriorly, fourth or fifth spine longest, 3 to 4.3 in length of head; anal, III, 5, second spine equal to third, stronger; pelvic, I, 5, thoracic; pectoral, 20 to 22, large, lower portion extended to form distinct lobe of 7 to 9 exserted rays. Scales: ctenoid, large; in oblique rows above lateral line, 44 to 48; absent from branchiostegal membranes. Pores: on lateral line, 32 or 33. Cirri: nasal, 2, narrow, filamentous. Colour: uniform bright red; black markings on fins.

Length to 2 feet.

Distinguished by the knife-like spinous suborbital ridge on each side of the head, the lobed pectoral fins with the lower rays exserted and the large number of spines together with the small number of rays in the dorsal fin.

The spiny-cheeked rock-fish was first taken in British Columbia waters August 31, 1888, off Fort Rupert by the *Albatross*, station 2862, lat. 50° 49′ N., long. 127° 36′ W., depth 238 fathoms and recorded in 1926 by C. L. Hubbs. A second specimen was captured September 2, 1891, off Jordan river by the *Albatross*, station 3460, at a depth of 53 fathoms and recorded in 1895 by C. H. Gilbert. Additional individuals have been taken in the strait of Georgia in trawls at depths of 50 fathoms and greater. It is a deep-water species ranging down to 822 fathoms. An individual captured in March, 1941, in English bay was maintained in the Vancouver Aquarium until November of the same year. This fish is sometimes erroneously called the gurnard or gurnet by fishermen who consider it one of the choicest of the rock-fishes.

Range southern California to northwestern Alaska.

Family HEXAGRAMMIDAE — Greenlings

In the greenlings the head is without ridges or spines but possesses cirri. There is a fully developed anterior nostril on each side; the posterior, if present, is reduced to a small pore. Multiple lateral lines are frequently present. The scales are cycloid or ctenoid and completely cover the body. The dorsal fin is single with 16 to 27 spines and 11 to 24 rays; the anal fin has 1 to 3 weak spines or none; the pelvic fins are thoracic, each with 1 spine and 5 rays.

The various members of the family usually have a bright coloration which evidently is associated with the prevailing hues of the seaweeds and rocks of the habitat. In some species there is a marked difference in the colours and colour patterns of the sexes.

Kelp greenling — *Chiropsis decagrammus* (Pallas) 1810

Body elongate, moderately deep anteriorly; caudal peduncle slender. Head short, conical; mouth terminal, small; teeth small; nostril single; gill membranes

united, free from isthmus. Fins: dorsal (1), XXI or XXII, 24, moderately notched; anal, I, 23 or 24, spine short, stout, closely applied to first ray; pelvic, I, 5, thoracic; caudal, slightly emarginate. Lateral lines: 5; first, from occipital region close to dorsal fin ending at point below middle of rayed portion (closer to dorsal fin than to second lateral line); second, from occipital region to base of caudal fin; third (usual lateral line), from immediately above opercle to base of caudal fin; fourth, from gill opening below pectoral, passing above pelvic, terminating near posterior end of anal fin; fifth, from isthmus, branching in front of

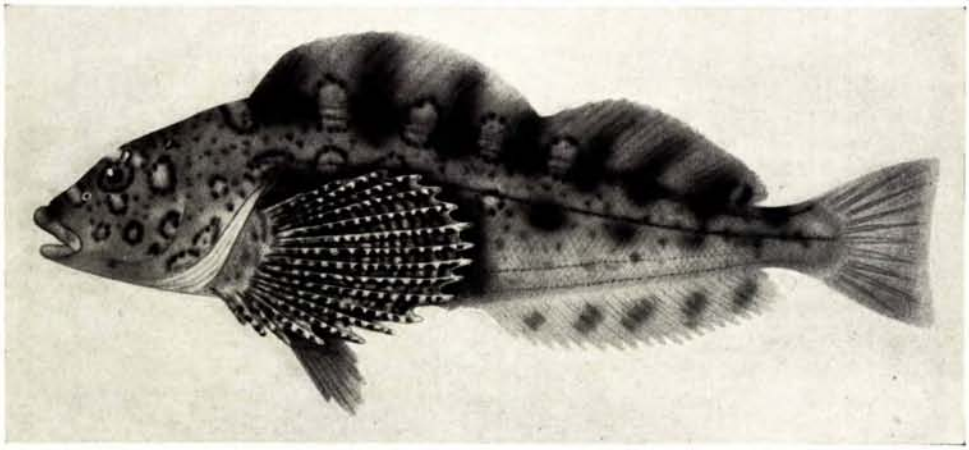

FIGURE 162. Kelp greenling. *Chiropsis decagrammus* (Pallas) 1810

anus, ending at base of caudal fin. Scales: ctenoid; covering body, top of head, cheeks and opercles. Cirri: 4, multifid, thick; supraocular, 2, prominent; occipital, 2, very small, each in slight depression almost midway on straight line from middle of front of eye to origin of dorsal fin. Colour in male: brownish olive, often tinged with blue or copper; blue spots on head and anterior part of body, each surrounded by reddish brown ring of small spots; mottled brown on dorsal fin; dusky blue on pelvic and anal fins; brown to black on pectoral fins, spotted with white giving appearance of transverse bars. Colour in female: from light brown, with small reddish spots, to light blue with rows of round orange spots; red to orange on dorsal fin, clouded with blue; orange or pale yellow on pectoral fins, without markings. In both sexes: conspicuous ocellus at posterior end of rayed portion of dorsal fin.

Length to 21 inches.

Distinguished by the two pairs of cirri on the head, the single small spine at the front of the anal fin and the conspicuous ocellus on the posterior end of the rayed portion of the dorsal fin.

The kelp greenling was first recorded from British Columbia waters in 1866 by J. K. Lord, without date of capture or exact locality, as *Chirus constellatus* and

Chirus decagrammus (probably not distinguishing between male and female). The first definite record is that of three specimens taken September 13, 1881, in Nootka sound at Friendly cove by Capt. H. E. Nichols and recorded in the same year by T. H. Bean as *Hexagrammus decagrammus* (Pallas). The species is fairly common in British Columbia waters, particularly along the west coast of Vancouver island, and is found along rocky shores, reefs and around kelp beds. Spawning occurs in October and November when the pale blue eggs are laid in large masses. The food consists to a large extent of worms, crustaceans and small fishes. The kelp greenling is seldom brought to market by commercial fishermen but is caught by handlines and speared by Indians for food purposes. The flesh is very palatable, not unlike that of certain rock-fishes in flavour. This is one of the most strikingly coloured of our sea fishes and hence is sometimes erroneously called rock-trout and kelp-trout. The classic description of J. K. Lord bears quoting here:

"THE CHIRUS . . . a handsome shapely fish, about eighteen inches in length. Its sides, though somewhat rough, rival in beauty many a tropical flower; clad in scales, adorned with colours not only conspicuous for their brilliancy, but grouped and blended in a manner one sees only represented in the plumage of a bird, the wing of a butterfly, or the petals of an orchid, this 'ocean swell' is known to the ichthyologist as the Chirus—the *Terpugh* (a file) of the Russians—the *Idyajuk* of the Aleutian Islanders—the *Tath-le-gest* of the Vancouver Islanders.

. . . to give the faintest conception of the colourings that adorn the chirus red, blue, orange, and green are so mingled, that the only thing I can think of as a comparison is a floating flower-bed, and even then the gardener's art, in grouping, is but a bungle contrasted with Nature's painting!"

Range southern California to northwestern Alaska.

White-spotted greenling *Hexagrammos stelleri* Tilesius 1809

Body elongate, rather slender; caudal peduncle slender, depth 3 or more in length of head. Head short, conical; mouth terminal, small; teeth small; nostril single; gill membranes united, free from isthmus. Fins: dorsal (1), XXII to XXV, 19 to 24, moderately notched; anal, 23 to 25; pelvic, I, 5, thoracic; caudal, slightly

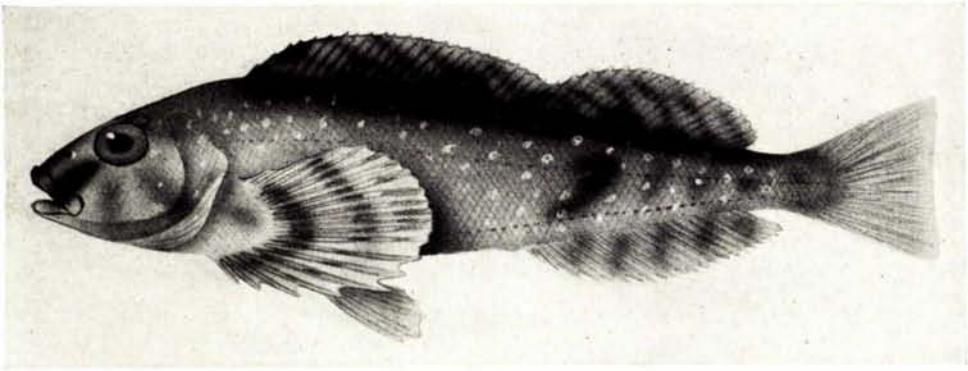

FIGURE 163. White-spotted greenling. *Hexagrammos stelleri* Tilesius 1809

emarginate. Lateral lines: 5; first short, from occipital region close to dorsal fin, ending at point below middle of spinous portion; second, from occipital region to base of caudal fin; third (usual lateral line), from immediately above opercle to base of caudal fin; fourth, very short, from gill opening below pectoral fin to point above pelvic fin; fifth, from isthmus, branching in front of anus, ending at base of caudal fin. Scales: ctenoid; covering body and top of head; cycloid, on cheek and opercle in 1 or more patches. Cirri: 2; supraocular, small, multifid, length less than diameter of eye. Colour: varying from light brown to green, sometimes tinged with pale red, barred or blotched with dusky; white spots conspicuous on body; pale yellow on anal fin with 6 dark bars; light reddish yellow on pectoral fins, barred with dark stripes.

Length to 16 inches.

Distinguished by the small cirrus above each eye, the conspicuous white spots on the body, the short first and fourth lateral lines and the slender caudal peduncle.

The white-spotted greenling was first recorded from British Columbia waters in 1866, without date of capture or locality, by J. K. Lord as *Chirus hexagrammus*. The first definite record is that of a specimen taken August, 1881, at Port Simpson by Capt. H. E. Nichols, and recorded in the same year by T. H. Bean as *Hexagrammus asper* Steller. The species occurs along the whole coast and is the commonest greenling in the strait of Georgia. It inhabits areas along the rocky shores but is also found frequently in shallow waters over sandy beaches. An individual spawned February 10, 1942, in the Vancouver Aquarium depositing a large cluster of light blue eggs on a rock. The food consists of worms, crustaceans and small fishes. Youthful anglers find this species a good sport fish and very inappropriately call it "tommy-cod" or "rock-trout." The flesh has a good flavour not unlike that of the best of the rock-fishes.

Range northern California to northwestern Alaska.

Fringed greenling *Lebius superciliosus* (Pallas) 1810

Body elongate, moderately deep; caudal peduncle stout, depth about 2 in length of head. Head short, conical; mouth terminal, small; teeth small; nostril single; gill membranes united, free from isthmus. Fins: dorsal (1), XX or XXI, 23 or 24, moderately notched; anal, 21 or 22; pelvic, I, 5, thoracic; caudal, rounded. Lateral lines: 5; first, from occipital region close to dorsal fin, ending at point below middle of rayed portion (closer to dorsal fin than to second lateral line); second, from occipital region to base of caudal fin; third (usual lateral line), from immediately above opercle to base of caudal fin; fourth, from gill opening below pectoral, passing above pelvic, terminating near posterior end of anal fin; fifth, from isthmus, branching in front of anus, ending at base of caudal fin. Scales: ctenoid, small, covering body and top of head; cycloid on cheeks and opercles. Cirri: 2; supraocular, large, slender, multifid, length equal to, or greater than, diameter of eye. Colour: usually bright, extremely variable; ground colour dark green, brown or bright red, especially in adult; red stripes downward and back-

ward from eye, 2; bright red on isthmus and branchiostegal membranes; dark conspicuous spot above base of pectoral fin; usually pale to bright round spots or blotches on sides of body which may be bright cherry red at times; brown, light green or red on pectoral fin, usually with 3 dusky crescent-shaped cross bands; sometimes red spots or bars on pelvic and anal fins; dull green on caudal fin margined with red.

Length to 2 feet.

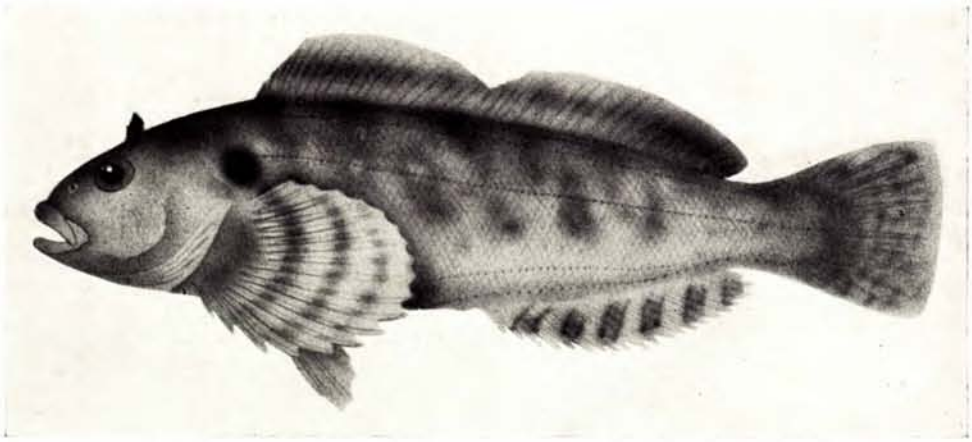

FIGURE 164. Fringed greenling. *Lebius superciliosus* (Pallas) 1810

Distinguished by the very large fringed cirrus above each eye and the round dark spot above the base of each pectoral fin.

The fringed greenling was first taken in British Columbia waters September 18, 1881, in Rose harbour by Capt. H. E. Nichols and was recorded in the same year by T. H. Bean as *Hexagrammus superciliosus* (Pallas). Other records are from Departure and English bays, the west coast of Vancouver island and Port Simpson. Undoubtedly it occurs in other localities.

Range southern California to northwestern Alaska.

Painted greenling *Oxylebius pictus* Gill 1862

Body elongate, moderately deep; caudal peduncle moderately stout. Head elongate, pointed, compressed; mouth terminal, small; maxillary not reaching to anterior margin of eye; teeth small; nostril single; preopercular spines, absent; gill membranes broadly united, free from isthmus. Fins: dorsal (1), XVI, 14 to 16, slightly notched; anal, III or IV, 12 or 13, notch between spinous and rayed portions, shallow; pelvic, I, 5, thoracic; caudal, somewhat rounded. Lateral line: nearly straight. Scales: ctenoid, small, covering body, head and opercle; cycloid on cheek. Cirri: 4, multifid; supraocular, 2, moderate; occipital, 2, small.

Colour: light brown to gray; dark bars, 7, vertical, across body, dorsal, anal and caudal fins; bars on pectoral and pelvic fins, irregular.

Length to 10 inches.

Distinguished by the elongate pointed head with two pairs of cirri, the small mouth, the single lateral line and the vertical dark bars on each side of the body.

FIGURE 165. Painted greenling. *Oxylebius pictus* Gill 1862

The painted greenling was first recorded from British Columbia waters in 1881 by D. S. Jordan and C. H. Gilbert on the basis of a specimen seen in Saanich arm. The species occurs in the vicinity of Victoria and an occasional individual is captured in beach-seines in Departure bay. It may be more numerous than is indicated here as it does not take a bait even when it may be seen in its habitat along rocky shores and amongst seaweeds. As its name implies it is a strikingly marked fish and is sometimes called the "convict-fish" because of the vertical bars.

Range southern California to strait of Georgia.

Long-spined greenling *Zaniolepis latipinnis* Girard 1857

Body elongate, slender, tapering gradually to very slender caudal peduncle. Head short, conical; mouth terminal, small; maxillary reaching behind anterior margin of eye; teeth small; nostril single; preopercular spines, 3 to 5, upper two closely approximated, sharp; gill membranes united anteriorly, free from isthmus. Fins: dorsal (1), XX or XXI, I, 11 or 12, very deeply notched, first three spines with connecting membranes very low, first three spines elongate, second greatly prolonged, length about equal to half that of body; anal, III, 16 or 17, slightly notched between spinous and rayed portions, spines small, rays increasing in length to fourth last; pelvic, I, 5, thoracic, first two rays fleshy, extending beyond anus; caudal, slightly emarginate. Lateral line: somewhat high, following dorsal contour of body throughout its length. Scales: ctenoid, very small, firmly set in tough skin, covering body and head except portion of snout. Cirri: 4; supra-

ocular, 2, small, multifid, often absent; maxillary, 2, small, on anterior tip. Colour: varying from olive green to light yellowish brown; brown or black spots on body, faint; dark spots in bars on all fins; black streak from front of eye to tip of snout.

Length to 12 inches.

Distinguished by the long second spine in the spinous portion of the dorsal fin, the rough scales firmly set in the tough skin and the thickened first two rays in each pelvic fin.

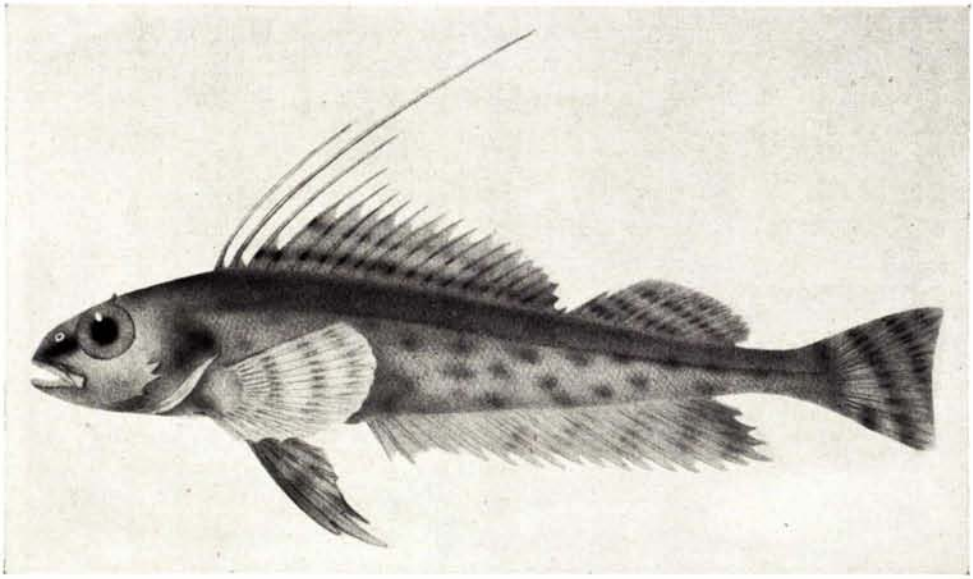

FIGURE 166. Long-spined greenling. *Zaniolepis latipinnis* Girard 1857

The long-spined greenling was first taken in British Columbia waters in 1889, in the strait of Georgia, and in 1890, near Victoria, and these specimens were recorded in 1898 by J. Fannin as being in the Provincial Museum at Victoria. Other individuals have been secured near Alberni, in Saanich inlet, near Nanaimo and in Nanoose bay. The long-spined greenling occurs at moderate depths down to 62 fathoms. It feeds to some extent upon crustaceans.

Range southern California to Vancouver island.

Lingcod *Ophiodon elongatus* Girard 1854

Body elongate, moderately deep; caudal peduncle slender. Head elongate, conical, depressed; mouth terminal, small; lower jaw projecting; maxillary reaching behind anterior margin of eye; teeth large, canine-like; nostril double, posterior small; preopercular spines, 3 to 5; gill membranes slightly united anteriorly, free from isthmus. In male, anal papilla small. Fins: dorsal (1), XXIV to XXVII, 21 to 24, moderately notched; anal, III, 21 to 24, spines buried in flesh

in adult, third closely applied to first ray; pelvic, I, 5, thoracic; caudal, truncate. Lateral line: high on side of body bending slightly downward to midlateral position below rayed portion of dorsal fin, then straight. Scales: cycloid, small, covering body. Pores: tubular; on lateral line, 154 to 180. Cirri: 2, supraocular, large, thick, multifid. Colour: dark on dorsal surface, ranging from black, brown, blue to green; dusky greenish gray or dusky cream on ventral surface; frequently mottled on back, sides, and dorsal and caudal fins; grayish green on pectoral, pelvic and anal fins; males often with large dark greenish brown areas on back

FIGURE 167. Lingcod. *Ophiodon elongatus* Girard 1854

and sides outlined with tracings of pale blue or orange; females similarly marked but usually lighter, with orange tracings rather than blue, small orange spots scattered amongst the larger areas; colours and colour patterns varying with habitat and subject to rapid changes.

Length to 5 feet.

Distinguished by the pelvic fins thoracic in position each with 1 spine and 5 rays, the long continuous notched dorsal fin, the small smooth scales covering the body and the head, the large mouth and teeth and the large fleshy cirrus above each eye.

The lingcod was first recorded from British Columbia waters in 1881 by D. S. Jordan and C. H. Gilbert on the basis of a specimen seen at Victoria. It is common along the northeastern shores of the Pacific with the centre of abundance in British Columbia waters. It is taken by trolling, in otter trawls and on jigs using live herring for bait. The habitat is near the bottom of the intertidal zone down to at least 60 fathoms, amongst kelp-beds, and reefs, especially where there are strong tidal movements. The fish when resting on the bottom supports its weight on its pectoral and pelvic fins. Spawning takes place from late December to February or March. The female deposits her eggs in a sheltered rocky location in large adhesive pinkish white masses below the lowest tide level. Individuals 34 and 46½ inches in length have been found to contain 170,000 and 476,000 eggs respectively. After fertilizing the eggs the male guards them until

they are hatched. He fans the eggs with his pectoral fins to keep up a good circulation of water and drives off all enemies with fierce rushes, biting at any approaching intruder. The young hatch with a small yolk-sac attached and can be identified by the bright yellow oil globule near the liver, the large blue eyes and the elongate body. Little is known of the post-larval stages but young fingerlings from 3 to 5 inches in length are taken occasionally by seining in the eel-grass during the summer. Tagging operations have not indicated a regular migration but merely local random movements, the greatest distance recorded being 80 miles. The lingcod feeds chiefly upon herring and other fishes such as flounders, hake, cod, whiting and younger lingcod although various crustaceans and squid remains have been found in stomach contents. The juveniles feed upon copepods and other small crustaceans. The lingcod is highly esteemed as a fresh fish. It is used extensively in all restaurants and is available at all seasons of the year. The flesh of the adults is almost white and of the young is sometimes intensely green. The green colouring matter is not harmful and all trace of it disappears upon cooking. This fish has been found to be one of the richest sources of insulin amongst the fishes of the world. The liver oil is remarkably rich in vitamins "A" and "D", having the highest ranges of potency of any known fish or selachian oil from British Columbia waters so far assayed. The value of livers landed in 1942 was approximately $60,000.

Range southern California to northwestern Alaska.

Family ANOPLOPOMIDAE — Skil-fishes

In the skil-fishes the head is without ridges, spines or cirri. There are two well developed nostrils on each side. The lateral line is single. The dorsal fins are two, the anterior composed of spines and the posterior with 1 or 2 spines preceding the rays; the pelvic fins are thoracic, each with 1 spine and 5 rays.

Included in this family are the sable-fish and skil-fish which differ widely in appearance from each other. They are fishes of the north Pacific.

Sable-fish — *Anoplopoma fimbria* (Pallas) 1811

Body elongate, slightly compressed, tapering into rather long slender caudal peduncle. Head conical, rather elongate; mouth terminal, moderate; lower jaw included; maxillary very narrow, reaching to point below front of pupil; teeth small, cardiform, on jaws, vomer and palatines; nostril double; gill membranes united, joined to isthmus. Fins: dorsal (2), XVII to XXI – I, 16 to 19, well separated, interspace about twice diameter of eye; anal, III, 15 to 19, spines usually embedded in adult, difficult to locate, origin below that of rayed dorsal; pelvic, I, 5, thoracic; caudal, deeply emarginate. Lateral line: moderately high, following dorsal contour. Scales: weakly ctenoid, small, elongate, covering body and head; in oblique rows above lateral line, about 190. Cirri: absent. Colour: slaty black or greenish gray on dorsal surface, somewhat reticulated; light gray on ventral surface; pale on outer margins of all fins except spinous dorsal; black margin narrow, on spinous dorsal fin; black on lining of operculum. In young,

colours brighter and more contrasting, often light green with dusky bars on dorsal surface.

Length to 3 feet 4 inches.

Distinguished by the well separated dorsal fins, the pelvic fins each with 1 spine and 5 rays, the long slender caudal peduncle and the black lining of each operculum.

The sable-fish was first recorded from British Columbia waters in 1872 from Vancouver island by W. Peters who described it as a new genus and species,

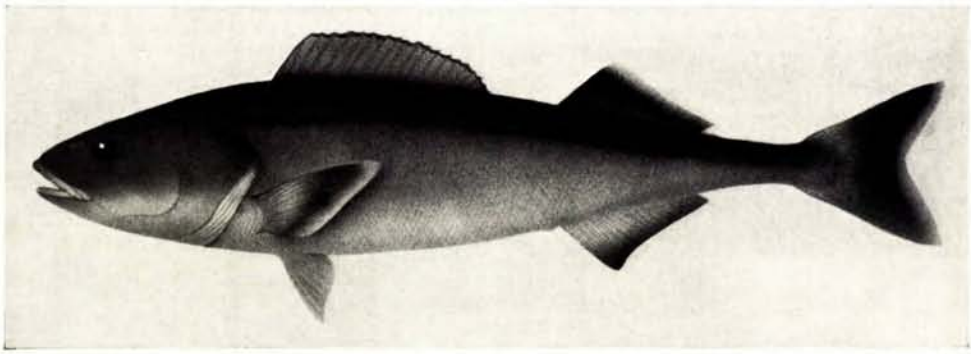

FIGURE 168. Sable-fish. *Anoplopoma fimbria* (Pallas) 1811

Scombrocottus salmoneus. The second recorded occurrence is that of a specimen 13¼ inches in length which was taken August 2, 1881, in Kingcome inlet at a depth of 18 fathoms by Capt. H. E. Nichols and properly recorded in the same year by T. H. Bean as *Anoplopoma fimbria* (Pallas). This fish is fairly common in the strait of Georgia and very abundant northward. The methods of capture are, for the most part, by set-line and trawl in deep water. The spawning season is in the early spring. A partially spawned female was obtained March 4, 1941, off cape St. James. The eggs are pelagic. Postlarval individuals about an inch in length have been secured at the surface at distances of 100 and 185 miles off the coast of Oregon in the latter part of May. Frequently considerable numbers of small individuals, about 18 inches in length, are secured on hand-lines in various parts of the strait of Georgia in comparatively shallow water. Large individuals 3 feet in length and 40 pounds in weight have been captured on the halibut banks at depths down to 170 fathoms. The food is said to consist of crustaceans, worms and small fishes. The sable-fish is considered one of the best of the smoked fishes but is not sold fresh to any extent because of the high oil content. Small quantities are drysalted. The liver oil has a very high vitamin "A" and "D" content, ranking close to that of the lingcod. Various names have been applied to the sable-fish such as skil, coal-fish and black cod, the latter term being inappropriate since the fish is not a cod.

Range southern California to northwestern Alaska.

Giant skil-fish *Erilepis zonifer* (Lockington) 1880

Body elongate, stout, somewhat compressed. Head large; mouth terminal, moderate; lower jaw projecting; maxillary reaching to point about below centre of pupil; teeth slender; recurved on jaws; small on vomer and palatines; nostril, double; gill membranes united, joined to isthmus. Fins: dorsal (2), XII to XIV – I or II, 15 to 17, closely approximated, interspace equal to diameter of eye or less, two spines in rayed fin may be inconspicuous or buried in flesh; anal, III, 11 to 14, origin posterior to that of rayed dorsal; pelvic, I, 5, thoracic; caudal, slightly

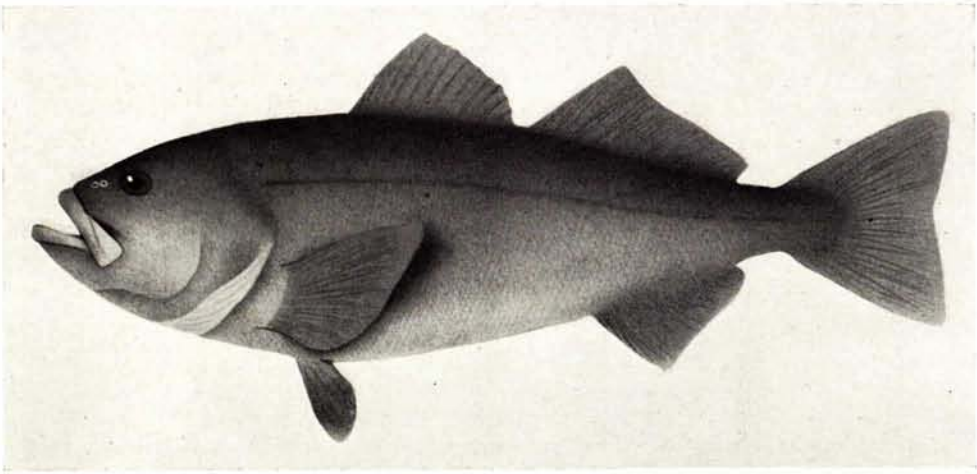

FIGURE 169. Giant skil-fish. *Erilepis zonifer* (Lockington) 1880

emarginate. Lateral line: moderately high, following dorsal contour. Scales: ctenoid; covering body, head and soft-rayed fins; in oblique rows above lateral line, 122 to 134. Cirri: absent. Colour: very dark; black on dorsal surface and sides; gray to white on ventral surface; soiled white on margins of scales.

Length to 6 feet.

Distinguished by the approximated dorsal fins, the pelvic fins each with 1 spine and 5 rays, the anal fin with 3 spines and 11 to 13 rays and the scales on the rayed fins.

The giant skil-fish was first taken in British Columbia waters November 1, 1916, off the west coast of the Queen Charlotte islands and recorded in 1917 by W. F. Thompson. The three individuals were obtained on halibut gear at a depth of over 200 fathoms. One of them, a specimen 5 feet 9½ inches in length and weighing 159 pounds, was presented to the Provincial Museum by the Canadian Fishing Company. It is now represented in the Museum by a cast covered with the skin. An individual recorded in 1916 by W. F. Thompson as having been taken in Frederick sound or Chatham strait, Alaska, at a depth of 150 fathoms, was recorded again in 1917 as possibly having been captured off the

west coast of the Queen Charlotte islands. The species is known to attain a weight of 200 pounds.

Range northern California to southeastern Alaska.

Family COTTIDAE — Sculpins

In the sculpins the head is usually large with the eyes placed high. The preopercle is armed with one or more spines, variously developed, sometimes antler-like. The scales, when present may be: typically ctenoid and never completely covering the body below the lateral line; or of various modifications of the reduced ctenoid type and may or may not completely cover the body below the lateral line; or the scales may be modified into thick tuberculate plates confined on the body to the lateral line. The pectoral fins are large, frequently procurrent; the pelvic fins, when present, are thoracic, each with 1 spine and 5, 4, 3, or 2 rays.

The colours in many species are extremely variable according to the environments. In some species there are marked colour differences between the sexes. In several tide-pool sculpins a striking similarity in colours and colour patterns may be exhibited by individuals of different species.

The majority of the sculpins are small fishes but a few attain large sizes. They inhabit tide-pools, shallow shore waters and also waters of considerable depths. A few species occur in fresh water and are known as bullheads, millers' thumbs and muddlers.

Giant marbled sculpin — *Scorpaenichthys marmoratus* Girard 1854

Body elongate, stout. Head large; mouth terminal, large; snout bluntly rounded; spines: nasal, stout, sharp; preopercular, 3, upper 2 longest; gill membranes united, free from isthmus. Anus immediately in front of anal fin. Anal

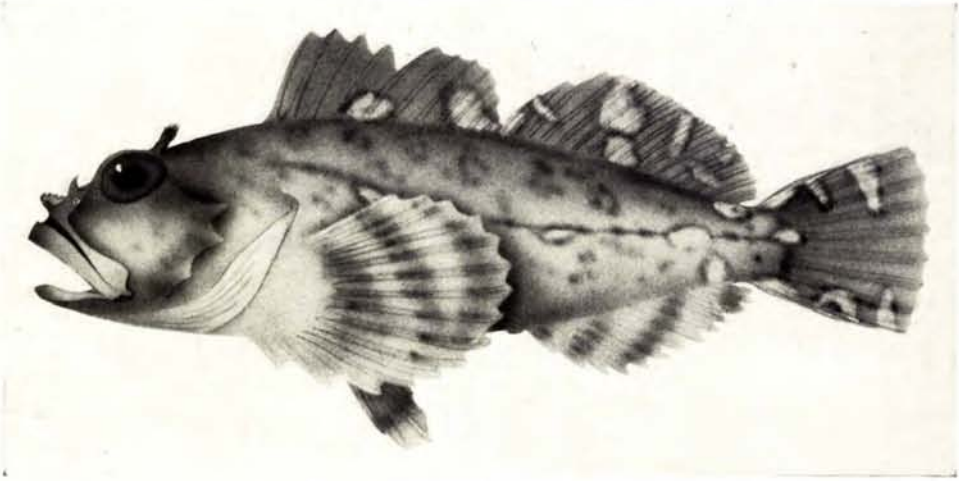

FIGURE 170. Giant marbled sculpin. *Scorpaenichthys marmoratus* Girard 1854

papilla small, rounded. Skin: thick, smooth. Fins: dorsal (1), VIII to XII, 15 to 18, deeply notched between spinous and rayed portions, spinous portion emarginate, membranes between first and fifth spines progressively more deeply incised; anal, 11 to 13; pelvic, I, 5, thoracic; caudal, truncate to rounded. Lateral line: slightly decurved, then straight. Scales: absent. Pores: on lateral line, 71 to 88. Cirri: premaxillary, 1, median, prominent, projecting forward from tip of snout; maxillary, 1, at posterior tip; supraocular, 1, large, lacinate, posterior in position. Colour: olive green to brown, mottled with large light areas frequently margined with darker shades of body colour, coloration exceedingly variable, changing rapidly with environment through shades of blue, green, to grayish black.

Length to 2 feet 6 inches.

Distinguished by the stout body, the smooth skin without scales, the prominent cirrus on the snout, the emargination of the spinous portion of the dorsal fin, the pelvic fins each with 1 spine and 5 rays and the large pale areas on the body.

The giant marbled sculpin was first recorded from British Columbia waters in 1881 by D. S. Jordan and C. H. Gilbert who reported having seen the species in Victoria. It is common along the whole coast to the Queen Charlotte islands at moderate depths, particularly in kelp beds. This is one of the largest of the sculpins. It is a bottom fish, sluggish in movement except when capturing prey. Spawning occurs during the winter months from January to March, the eggs being deposited in a large mass attached to a rock. The food consists of a varied diet of crustaceans, particularly crabs and shrimps as well as fishes and fish eggs.

Range southern California to northern British Columbia.

Brown Irish lord *Hemilepidotus spinosus* (Ayres) 1855

Body elongate, stout. Head large, broad; mouth terminal, large; snout bluntly rounded; spines: nasal large, stout, sharp; preopercular, 4, upper two simple, strong, sharp, lower two blunt, usually embedded in skin; opercular, 4,

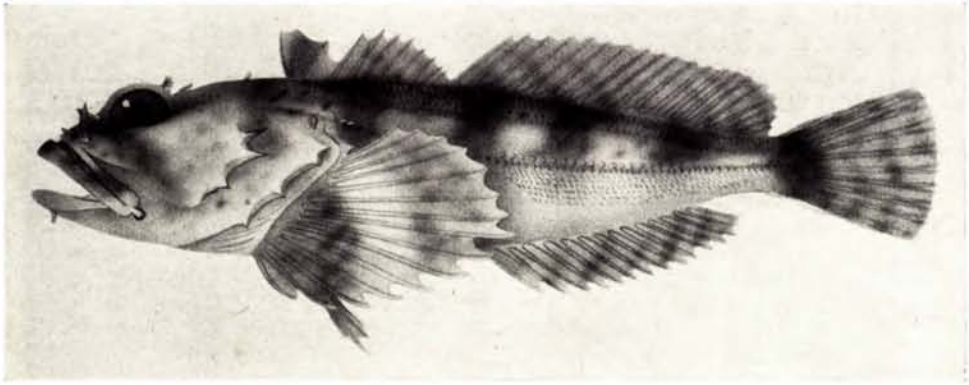

FIGURE 171. Brown Irish lord. *Hemilepidotus spinosus* (Ayres) 1855

short, sharp; gill membranes united, broadly joined to isthmus. Anus immediately in front of anal fin. Anal papilla small, rounded. Skin: thin, loose. Fins: dorsal (1), XI, 18 to 20, deeply notched between spinous and rayed portions, spinous portion emarginate; anal, 14 to 16; pelvic, I, 4, thoracic; caudal, rounded. Lateral line: high anteriorly, decurved to midline, then straight. Scales: ctenoid, small, some in pediculate papillae; in band closely encircling base of dorsal fin, six or seven rows in width diagonally at widest part; in row immediately above and contiguous with middle third of lateral line, about 19; on lateral line, 57 to 66, small; in rows of varying lengths below and contiguous with lateral line; in small patch behind base of pectoral fin. Cirri: on anterior third of lateral line, few, small, filamentous; on head: prenasal, nasal, postocular, postfrontal, occipital, opercular, maxillary, mostly multifid. Colour: brown, often tinged with red on dorsal surface, mottled and barred with dark brown; white on ventral surface.

Length to 10 inches.

Distinguished by the emarginate spinous portion of the dorsal fin, the bands of scales encircling the dorsal fin six or seven rows in width diagonally at the widest part and the gill membranes united and broadly joined to the isthmus.

The brown Irish lord has been taken but once in British Columbia waters. A single specimen, 5 inches in length, was obtained June 26, 1934, on Nootka island at Bajo point in a beach-seine, by Mr. E. G. Hart of the *Wm. J. Stewart* expedition. It is now in the collection of the Pacific Biological Station. The species is not uncommon along the California coast where it is caught in rather deep water and it is said to feed upon crustaceans.

Range southern California to Vancouver island.

Red Irish lord *Hemilepidotus hemilepidotus* (Tilesius) 1810

Body elongate, stout. Head large, broad; mouth terminal, large; snout bluntly rounded; spines: nasal, large, stout, sharp; preopercular, 4, upper two simple, strong, sharp, lower two blunt, usually embedded in skin; opercular, 4, short, sharp; gill membranes united, narrowly joined to isthmus. Anus immediately in front of anal fin. Anal papilla small, rounded. Skin: thick, firm. Fins: dorsal (1), X to XII, 18 to 20, moderately notched between spinous and rayed portions, spinous portion emarginate; anal, 13 to 16; pelvic, I, 4, thoracic; caudal, rounded. Lateral line: high anteriorly, decurved to midline, then straight. Scales: ctenoid, small, some in pediculate papillae; in band closely encircling base of dorsal fin, four rows in width diagonally at widest part; in row immediately above and contiguous with middle third of lateral line, about 17; on lateral line, 59 to 69, small; in rows of varying lengths below lateral line, separated from lateral line anteriorly; in triangular patch behind base of pectoral fin. Cirri: on anterior third of lateral line, small, filamentous; on head: prenasal, nasal, postocular, postfrontal, occipital, opercular, maxillary, multifid. Colour: dull to brilliant red on dorsal surface, more or less mottled, barred with brownish red; pale red to grayish green on ventral surface, profusely covered with rusty to black spots.

Length to 20 inches.

Distinguished by the emarginate spinous portion of the dorsal fin, the bands of scales encircling the dorsal fin four rows in width diagonally at the widest part and the gill membranes united and narrowly joined to the isthmus.

FIGURE 172. Red Irish lord. *Hemilepidotus hemilepidotus* (Tilesius) 1810

The red Irish lord was first taken in British Columbia waters in June, 1882, in Duncan bay near Port Simpson, by Capt. H. E. Nichols and recorded in 1883 by T. H. Bean as *Hemilepidotus trachurus* (Pallas). The species is common along the coast and is obtained frequently in shore-seines. The red Irish lord is one of the large sculpins and one to which the term "bullhead" is sometimes applied. It spawns in March, laying the pink eggs in masses. The food consists of crabs, shrimps, barnacles and mussels.

Range northern California to northwestern Alaska.

Silver spot *Blepsias cirrhosus* (Pallas) 1811

Body elongate, much compressed. Head compressed; mouth terminal, moderate, lower jaw barely included; snout bluntly rounded; cranial ridges: posterior to eye, 3 blunt; spines: nasal, blunt; preopercular, 2, small, bluntly rounded; gill membranes united, free from isthmus. Anus one-third distance between insertion of pelvic fins and origin of anal fin. Anal papilla, small, rounded. Fins: dorsal (2), VI to IX — 20 to 25, spinous fin emarginate, first three or four spines elevated, rayed fin long, high, higher than spinous fin; anal, 18 to 21; pelvic, I, 3, thoracic, short, spine short; pectoral, 12, low, narrow; caudal, rounded. Lateral line: high anteriorly, slightly decurved, then straight. Scales: reduced ctenoid, in form of minute plates, each with minute spine embedded in erect fleshy papilla, covering body except along lateral line, caudal peduncle and large silvery white areas on each side of body; on head in small

scattered patches. Pores: on lateral line, 43 to 57. Cirri: long, slender; on snout, 3, two lateral, one median; on lower jaw, 6, three on each side. Colour: light olive brown or green of varying shades on dorsal surface; white to coppery yellow on ventral surface; black spots on upper anterior portion of body, 4 to 6, rounded; silvery white spots below lateral line anteriorly, 3 or 4, large, rounded; black bars radiating from eye, 3; black bar between eyes; brown to black with large translucent areas on all fins except pelvics.

Length to 7½ inches.

FIGURE 173. Silver spot. *Blepsias cirrhosus* (Pallas) 1811

Distinguished by the prominent cirri on the snout and on the lower jaw, the emarginate spinous dorsal fin, the high rayed dorsal fin, the silvery white spots on each side of the body, the translucent areas on the fins and the minute spines embedded in papillae.

The silver spot was first recorded from British Columbia waters in 1886 by J. F. Whiteaves on the basis of a specimen in the National Museum at Ottawa which may have been taken by Dr. G. M. Dawson. The species is common in the strait of Georgia and has been secured on the west coast of Vancouver island at Maquinna point, Alert bay and off Moresby island. Spawning occurs in the summer months. The eggs are a clear light brown colour and are attached in clusters to rocks in shallow water. This is one of the handsomest of the cottids. It is a shallow-water form, usually frequenting seaweed areas and is often captured in shrimp trawls at depths down to 20 fathoms.

Range northern California to northwestern Alaska.

Crested sculpin *Histiocottus bilobus* (Cuvier and Valenciennes) 1829

Body elongate, deep anteriorly, much compressed. Head conical, depressed; mouth terminal, moderate; snout bluntly rounded; cranial ridges: numerous,

irregular, bluntly rounded, posterior to eye, 3, prominent, forming crest; spines: nasal, blunt; preopercular, 3, bluntly rounded, shorter than diameter of eye; gill membranes united, free from isthmus. Anus one-fifth distance between insertion of pelvic fins and origin of anal fin. Anal papilla small, rounded. Fins: dorsal (2), VIII or IX — 21 or 22, spinous fin entire, rayed fin long, high, higher than spinous fin; anal, 18 to 20; pelvic, I, 3, thoracic, very short, spine short, stout; pectoral, 16, low, long; caudal, truncate. Lateral line: almost straight. Scales: reduced ctenoid; in form of minute round plates, each with spine in centre, em-

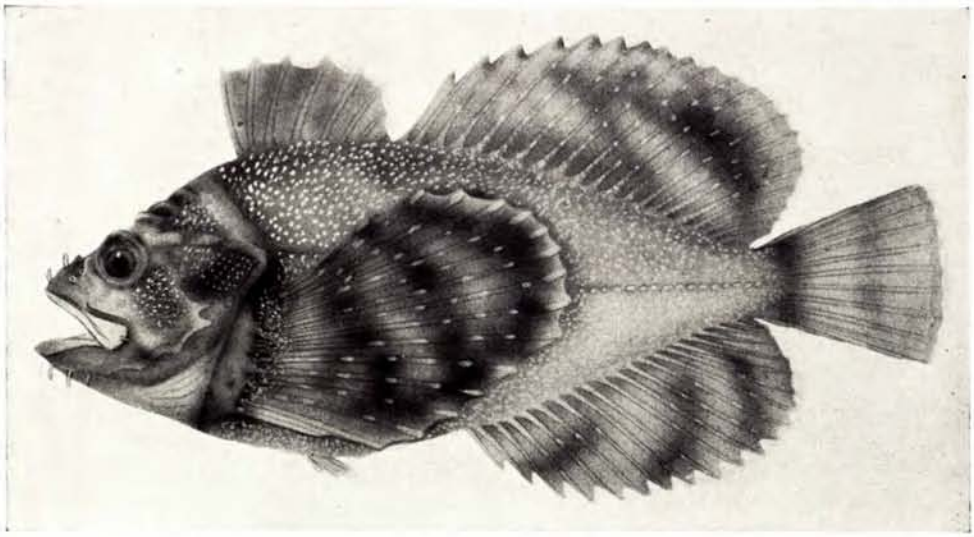

FIGURE 174. Crested sculpin. *Histiocottus bilobus* (Cuvier and Valenciennes) 1829

bedded in thick conical fleshy papilla, covering body, head and bases of all fins except pelvics. Pores: on lateral line, about 52. Cirri: long, slender; on snout, 3, two lateral, one median; on lower jaw, 6, three on each side. Colour: olive green on dorsal surface; paler on ventral surface; dusky blotches across body, 4 or 5, faint; dusky bars on rayed dorsal, pectoral, anal and caudal fins.

Length to 10 inches.

Distinguished by the prominent cirri on the snout and on the lower jaw, the entire spinous dorsal fin, the high rayed dorsal fin, the prominent cranial ridges and the conical fleshy papillae covering the scales.

The crested sculpin was first taken in British Columbia waters in September, 1938, in Dean channel, opposite Cascade inlet, by Captain Jack and is now in the collection of the Pacific Biological Station at Nanaimo. This is the only known specimen taken south of Alaska. Nothing is known of the life history.

Range northern British Columbia to northwestern Alaska.

Plumose sculpin *Artedius harringtoni* (Starks) 1896

Body elongate, slender to stout. Head moderate to large, depressed; mouth terminal, moderate to large; teeth on jaws, in male, large anteriorly, cardiform posteriorly, in female, small; snout bluntly rounded; eye, large; spines: nasal, long; preopercular, 2, upper broad or weakly bifid, often covered with thick skin, lower minute; gill membranes united, free from isthmus. Anus, in male, about midway between insertion of pelvic fins and origin of anal fin, in female, immediately in front of anal fin. Anal papilla in mature male large, cylindrical, with

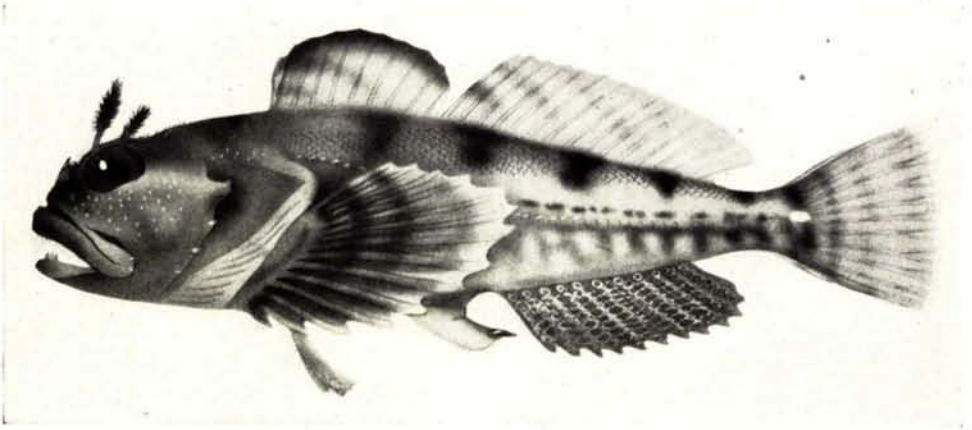

FIGURE 175. Plumose sculpin. *Artedius harringtoni* (Starks) 1896

small conical tubular filament asymmetrically placed at tip, in immature male small, conical. Fins: dorsal (2), IX or X — 16 to 18; anal, 10 to 14; pelvic, I, 3, thoracic; caudal, truncate. Lateral line: slightly decurved, then straight. Scales: ctenoid; in broad band on upper part of body 8 to 10 rows in width diagonally at widest part, not contiguous with lateral line, extending backward almost to origin of caudal fin, bands of each side meeting behind rayed dorsal fin; in longitudinal series, 38 to 51; on lateral line, 35 to 39; on head, in patches. Cirri: on lateral line, paired or single, short, filamentous, 1 to 3 on each scale pocket, in anterior portion; on head, supraocular, 2, in male multifid, anterior very large, posterior large, in female, anterior small, filamentous, posterior small, bifid or multifid; behind eye, several, short, filamentous. Colour in male: brownish olive on dorsal surface; dusky cream on ventral surface; dark saddles across back, 5 to 7; white spots on lower portion of body numerous, round, sometimes not clear-cut, lower spots often incomplete; brilliant orange yellow on ventral surface of head in adults; inconspicuously mottled with reddish brown on dorsal, pectoral and caudal fins; golden yellow on anal fin with interlocking series of white hexagons. Colour in female: brown to olive brown on dorsal surface; creamy white on ventral surface; dark saddles across back, 5 to 7; white spots on lower portion of body and head

numerous, round, clear-cut, on sides becoming larger below, lower spots often incomplete, fusing with white of ventral surface; white to pink or red on pelvic and anal fins; dark streaks on other fins, wavy; white spot on caudal peduncle conspicuous in male, less so in female.

Length to 4 inches.

Distinguished by the bifid partially embedded upper preopercular spine on each side of the head, the band of scales along the upper side of the body meeting its fellow on the opposite side behind the rayed dorsal fin, the scales on the top of the head, the large cardiform teeth and the pattern of white hexagons on the golden yellow anal fin of the mature male and the row of complete and incomplete white spots along the ventral margin of the dark pigmentation of the body of the female.

The plumose sculpin was first taken in British Columbia waters in July, 1909, in Barkley sound at Ucluelet, at low tide by Mr. C. H. Young and recorded in 1920 by B. A. Bean and A. C. Weed as the type of a new genus and species, *Pterygiocottus macouni*, on the basis of a male specimen 3¼ inches in length. Dr. R. L. Bolin has shown recently that this species is actually the mature male of *Artedius harringtoni*. The male at maturity becomes robust, develops a large head, enlarged anterior teeth and very large plumose cirri and assumes a series of colours and colour patterns quite unlike the female or the immature male. In 1911 Dr. E. C. Starks recorded a specimen from Nanaimo as *Axyrias harringtoni* Starks. The species is taken rather infrequently near Nanaimo, in Burrard inlet and English bay and in the Queen Charlotte islands area. It occurs at moderate depths and in most cases has been secured in beam trawls.

Range southern California to northern British Columbia.

Padded sculpin *Artedius fenestralis* Jordan and Gilbert 1882

Body elongate, stout anteriorly, slender posterior to anus. Head large, depressed, broad; mouth terminal, large; snout blunt; spines: nasal short, sharp, recurved; preopercular, 3, frequently covered with skin, uppermost enlarged, with 3 spinules; gill membranes united, free from isthmus. Anus immediately in front of anal fin. Anal papilla very small, conical. Fins: dorsal (2), VIII or IX — 16 to 18; anal, 12 to 14; pelvic, I, 3, thoracic; caudal, truncate to rounded. Lateral line: gradually decurved, then straight. Scales: weakly ctenoid, in fleshy pad-like papillae; on upper part of body in broad band about 9 rows in width diagonally at widest part, extending backward almost to origin of caudal fin, bands of each side meeting behind rayed dorsal fin, in longitudinal series, 26 to 29; on lateral line, 35 to 37, small, deeply embedded, smooth except for few at anterior end; on head, stellate, in small patch in postocular and subocular regions. Cirri: on lateral line, slender, filamentous; on head few, small, filamentous, except for multifid pairs with bulbous bases behind eyes. Colour: extremely variable, variously orange, yellow, light green, occasionally cream on dorsal surface; dusky on ventral surface of male, cream to pale brown on ventral surface of female; green, brown or black saddles across body, 4, one below spinous dorsal

fin, two below rayed dorsal fin, one at base of caudal fin; white spots on body irregularly scattered; green, brown or rusty bars on fins except pelvics and anal; dusky to black on pelvic and anal fins in male; cream to pale brown on pelvic and anal fins in female; in male: black spots on spinous dorsal fin, 2, anterior small, posterior large; breeding colours: body becomes very dusky to almost black, particularly on lower portion, other colours become very intense; black spots on spinous dorsal fin joined by three bands of colour, upper dusky, middle pale blue, lower golden yellow.

Length to 5½ inches.

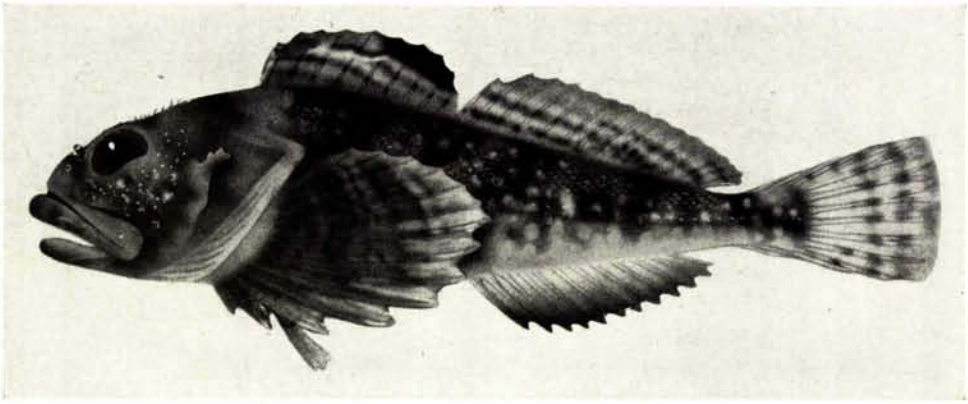

FIGURE 176. Padded sculpin. *Artedius fenestralis* Jordan and Gilbert 1882

Distinguished by the enlarged uppermost preopercular spine with the 3 spinules partly or entirely covered with skin, the stellate scales on the head, the dorsal band of scales in fleshy pad-like papillae meeting its fellow behind the rayed dorsal fin and the smooth embedded scales on each lateral line.

The padded sculpin was first taken in British Columbia waters July 27, 1881, in Drew harbour by Capt. H. E. Nichols and recorded in the same year by T. H. Bean as *Artedius notospilotus* Girard. In 1910 a specimen was obtained in the strait of Georgia by Mr. W. Spreadborough and was recorded in 1920 by B. A. Bean and A. C. Weed as *Astrolytes fenestralis* (Jordan and Gilbert). The padded sculpin is abundant in the strait of Georgia and Burrard inlet and has been captured at Ucluelet. It inhabits waters down to 30 fathoms. Spawning occurs from January to March, the female depositing salmon-coloured eggs. The food consists to a considerable extent of shrimps and small fishes.

Range northern California to northwestern Alaska.

Round-nosed sculpin *Artedius lateralis* (Girard) 1854

Body elongate, moderately stout; lower profile nearly straight. Head much depressed, broad; mouth terminal, moderate; snout bluntly rounded, in dorsal

view; spines: nasal, short, blunt; preopercular, 1, strongly bifid, covered with skin; gill membranes united, free from isthmus. Anus immediately in front of anal fin. Anal papilla small, bluntly conical. Fins: dorsal (2), VIII to X—16 or 17; anal, 12 to 14; pelvic, I, 3, thoracic; caudal, truncate to rounded. Lateral line: slightly decurved, then straight. Scales: weakly ctenoid; on upper part of body in broad band 7 or 8 rows in width diagonally at widest part, not contiguous with lateral line, terminating before posterior end of rayed dorsal fin, in longitudinal series, 24 to 31; on lateral line, 35 or 36, embedded in skin; on head, none. Cirri: along anterior of lateral line, slender, filamentous, sometimes paired; on

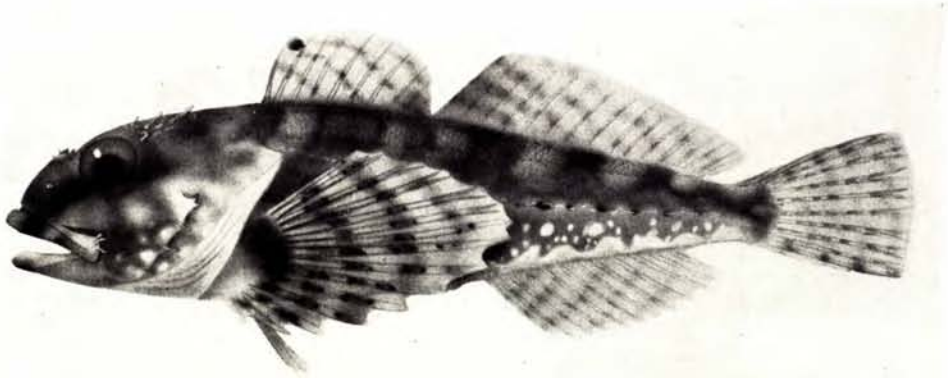

FIGURE 177. Round-nosed sculpin. *Artedius lateralis* (Girard) 1854

nasal spine, small, multifid; on dorsal surface of head, numerous, small, slender. Colour: olive green to dark brown on dorsal surface; cream to faint green on ventral surface; dark saddles across back, 6, light between first two; pale cream spots on lower portion of body and head numerous, roundish, becoming larger below, lower spots often incomplete, fusing with cream of ventral surface of body; conspicuous dark bars on all fins except pelvics. In male: small black spot on membrane of spinous dorsal fin between first and second spines; in breeding season duskiness pronounced.

Length to 5 inches.

Distinguished by the bifid preopercular spines, the straight lower profile of the body, the bluntly rounded snout as viewed from above, the depressed head without scales, the narrow band of scales on the upper part of each side of the body terminating before the posterior end of the rayed dorsal fin and the embedded scales on the lateral lines.

The round-nosed sculpin was first taken in British Columbia waters in 1893 at Comox by Mr. J. Macoun and recorded in 1920 by B. A. Bean and A. C. Weed. However the first published record is 1901 for the Queen Charlotte islands by W. H. Osgood. The species is generally distributed along the coast in tide-pools

and shallow water. Spawning occurs in February. The small bright cherry red eggs are deposited in a mass in a protected location amongst rocks and hatch in about sixteen days.

Range southern California to Queen Charlotte islands.

Rough-backed sculpin *Chitonotus pugetensis* (Steindachner) 1877

Body elongate, moderately slender. Head moderate; mouth terminal, large; snout bluntly rounded; spines: nasal, small, sharp; sphenotic, 2 or 1; parietal, 1; preopercular, 4, uppermost stout, antler-like, with 3 upwardly directed spinules;

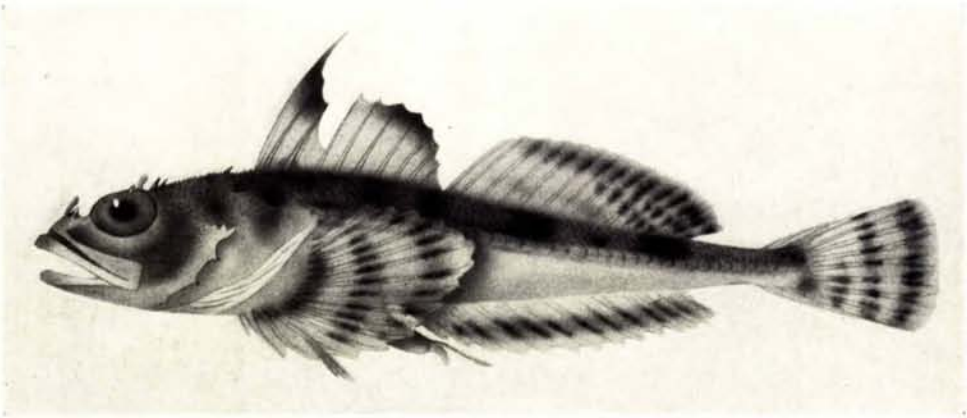

FIGURE 178. Rough-backed sculpin. *Chitonotus pugetensis* (Steindachner) 1877

gill membranes united, free from isthmus. Anus midway between insertion of pelvic fins and origin of anal fin. Anal papilla stout, narrower posteriorly, ending in curved tip with slender tubular filament attached near end. Fins: dorsal (2), X or XI — 14 to 17, spinous fin deeply emarginate, first spine longest, second and third successively shorter; anal, 14 to 17; pelvic, I, 3, thoracic; caudal, slightly rounded. Lateral line: slightly decurved, then straight. Scales: ctenoid; covering body above lateral line; on lateral line, 36 to 39, large, rough. Cirri: nasal, 1, conspicuous, broad; on eyeball, 1, small, slender, filamentous; postocular, 1, moderate, broad. Colour: dark grayish green to brown with series of dark brown to black blotches on dorsal surface; white below lateral line; brownish red area often present behind base of each pectoral fin below lateral line and brilliant red blotch below anterior portion of rayed dorsal fin, especially during breeding season; dusky on margins of dorsal fins.

Length to 9 inches.

Distinguished by the emarginate spinous dorsal fin and the rough scales completely covering the body above the lateral line on each side.

The rough-backed sculpin was first taken in British Columbia waters in July, 1906, at Port Simpson and the specimen is now in the collection of the

Pacific Biological Station at Nanaimo. The first published record is that of two individuals collected in June, 1909, at Ucluelet by Messrs. C. H. Young and W. Spreadborough and recorded in 1920 by B. A. Bean and A. C. Weed. The species is common in the strait of Georgia in waters of moderate depth, probably not much beyond 40 fathoms. The food consists to a large extent of shrimps and other crustaceans.

Range southern California to northern British Columbia.

Northern sculpin *Icelinus borealis* Gilbert 1895

Body elongate, rather slender. Head moderate; mouth terminal, moderate; snout bluntly rounded; spines: nasal, short, sharp; preopercular, 3, uppermost stout, antler-like, with 3 to 6 upwardly directed spinules; gill membranes united, free from isthmus. Anus three-quarters distance between insertion of pelvic fins

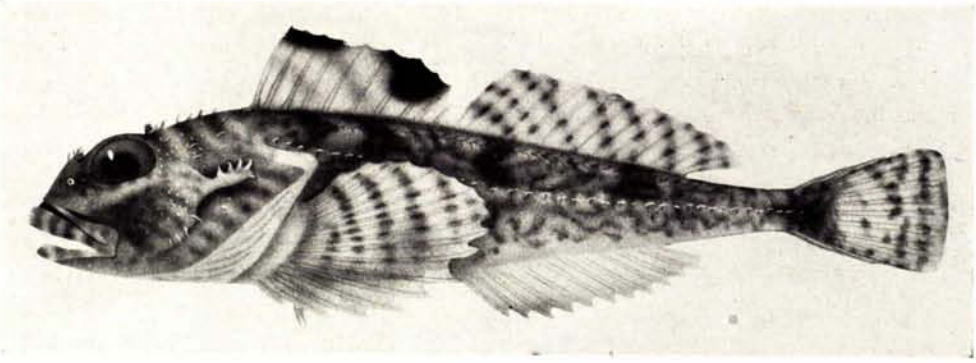

FIGURE 179. Northern sculpin. *Icelinus borealis* Gilbert 1895

and origin of anal fin. Anal papilla small, short, conical. Fins: dorsal (2), IX or X — 15 to 17, spinous fin not emarginate, none of spines elongate; anal, 12 to 14; pelvic, I, 2, thoracic, short, frequently curved; caudal, truncate to rounded. Lateral line: slightly decurved, then straight. Scales: ctenoid; on upper part of body in two rows close to dorsal fins beginning below first or second spine, upper row ending behind rayed fin, lower row not extending to end of rayed fin; on lateral line, 37 to 40, rough. Cirri: along lateral line, filamentous; on head, nasal, 1, long, slender, supraocular, 1, moderate, multifid; elsewhere numerous, filamentous, slender. Colour: dark olive gray or brown on dorsal surface; white to cream on ventral surface, sometimes with fine red reticulations; dark saddles across body, 4, one below spinous dorsal fin, two below rayed dorsal fin, one at base of caudal fin; brown bars narrow, on lips, cheeks and all fins except pelvics and anal. In male: jet black spots on spinous dorsal fin, 2, anterior long, narrow, posterior large, nearly round, spots sometimes connected.

Length to 4 inches.

Distinguished by the antler-like uppermost preopercular spines each with 3 to 6 upwardly directed spinules, the numerous slender filamentous cirri on the head and the double row of scales below the dorsal fins the upper of which extends beyond the posterior end of the rayed dorsal fin to meet the corresponding row of the opposite side.

The northern sculpin was first taken in British Columbia waters September 2, 1891, west of Jordan river by the *Albatross*, station 3460, lat. 48° 25′ N., long. 124° 10′ W., depth 53 fathoms and recorded in 1895 by C. H. Gilbert. Many specimens have been secured off the south and west coasts of Vancouver island, in the strait of Georgia and in Burrard inlet. The species is found at depths from 10 to 60 fathoms. The food consists to a considerable extent of shrimps.

Range Puget sound to northwestern Alaska.

Lesser filamented sculpin *Icelinus tenuis* Gilbert 1890

Body elongate, rather slender. Head moderate; mouth terminal, moderate; snout bluntly rounded; spines: nasal, moderate, sharp; parietal, 2; preopercular, 4, uppermost stout, antler-like, with 4 or 5 upwardly directed spinules; gill membranes united, free from isthmus. Anus two-thirds distance between

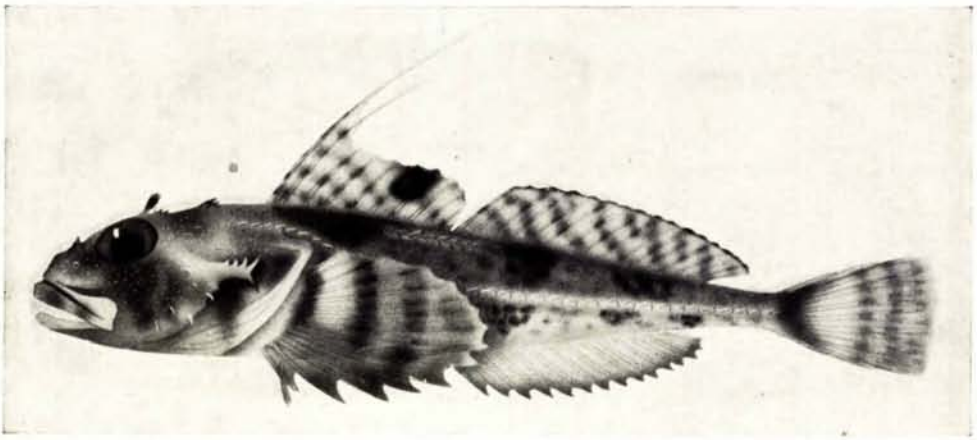

FIGURE 180. Lesser filamented sculpin. *Icelinus tenuis* Gilbert 1890

insertion of pelvic fins and origin of anal fin. Anal papilla very small, conical. Fins: dorsal (2), IX or X — 16 to 19, first spine elongate, filamentous, reaching middle of rayed dorsal fin, second spine shorter; anal, 13 to 17; pelvic, I, 2, thoracic; caudal, truncate to rounded. Lateral line: sharply decurved, then straight. Scales: ctenoid; on upper part of body in two rows close to dorsal fins, beginning below middle of spinous fin or slightly behind, ending approximately below fourth or fifth ray of rayed fin, in each row, 9 to 14; on lateral line, 38 to 43, rough. Cirri: along lateral line, small, filamentous; on head, nasal, absent, supraocular, 1,

moderate, flattened, multifid, on various other parts of head, slender, filamentous. Colour: light brown on dorsal surface, variously blotched with orange; creamy white on ventral surface with dusky blotches below lateral line; dark saddles across upper part of body, 4, one below spinous dorsal fin, two below rayed dorsal fin, one at base of caudal fin; jet black on supraocular cirri; bright yellow on lateral line cirri; white to cream, variously barred with orange to brown, on all fins except pelvics and anal; dusky on margins of dorsal and anal fins; male with large black spot about the sixth spine of spinous dorsal fin; white band near base of each pectoral fin, prominent.

Length to 5½ inches.

Distinguished by the somewhat elongate first spine in the spinous dorsal fin reaching the middle of the rayed fin when depressed, the second spine not reaching this point, the two short rows of scales on the upper part of the body extending slightly behind the origin of the rayed dorsal fin and the presence of two moderate flattened supraocular cirri.

The lesser filamented sculpin was first taken in British Columbia waters June 20, 1903, in the strait of Georgia off Bowen island, when two small specimens were obtained by the *Albatross*, station 4193, lat. 49° 20′ N., long. 123° 43′ W., depth 23 fathoms and recorded in 1907 by B. W. Evermann and E. L. Goldsborough as *Tarandichthys tenuis* (Gilbert). Other individuals have been obtained from False narrows, near Nanaimo, northward to Tasu harbour in the Queen Charlotte islands. The depth range recorded from British Columbia waters is 20 to 70 fathoms, but in California it is from 18 to 204 fathoms. The food consists in part of shrimps.

Range southern California to Queen Charlotte islands.

Filamented sculpin *Icelinus filamentosus* Gilbert 1890

Body elongate, moderately slender. Head moderate; mouth terminal, moderate; snout bluntly rounded; spines: nasal small, sharp; preopercular, 4, uppermost stout, antler-like, with 3 or 4 upwardly directed spinules; gill membranes united, free from isthmus. Anus two-thirds distance between insertion of pelvic fins and origin of anal fin. Anal papilla short, stout, conical. Fins: dorsal (2), IX to XI — 15 to 18, first two spines elongate, filamentous, reaching middle or beyond of rayed fin; anal, 13 to 15; pelvic, I, 2, thoracic; caudal, truncate to rounded. Lateral line: sharply decurved, then straight. Scales: ctenoid; on upper part of body in two rows close to dorsal fins, beginning below third or fourth spine, ending below last ray, in each row, 28 to 31; on lateral line, 36 to 39, rough. Cirri: along lateral line in short series, small, filamentous; on head, nasal, 1, supraocular, 1, large, flattened, multifid, between supraocular and origin of spinous dorsal fin, 2, on posterior tip of maxillary, 1, on cheek, 1, on preopercle, 3. Colour: olive green to light brown on dorsal surface; creamy yellow to light brown on ventral surface; dark saddles across body, 4, one below spinous dorsal fin, two below rayed dorsal fin, one at base of caudal fin; jet black on supraocular cirri;

barred with rows of black blotches on all fins except pelvics and anal; dusky along margin of anal fin; males sometimes variously blotched with orange to red.

Length to 10¼ inches.

Distinguished by the first two very elongate spines in the spinous dorsal fin reaching at least to the middle of the rayed dorsal fin when depressed, the two rows of scales on the upper part of the body reaching merely to the posterior end of the rayed dorsal fin and the presence of two large flattened supraocular cirri.

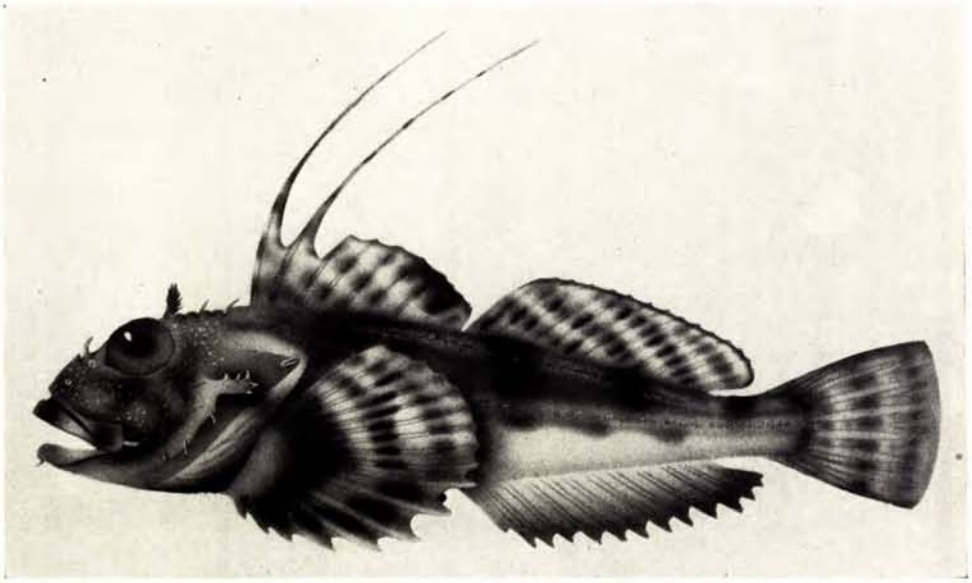

FIGURE 181. Filamented sculpin. *Icelinus filamentosus* Gilbert 1890

The filamented sculpin was first taken in British Columbia waters June 20, 1903, in the strait of Georgia off Bowen island by the *Albatross*, station 4193, lat. 49° 20′ N., long. 123° 43′ W., depth 23 fathoms. This specimen was 2½ inches in length and was recorded in 1907 by B. W. Evermann and E. L. Goldsborough as *Tarandichthys filamentosus* (Gilbert). Single individuals have since been obtained: in 1928, near Porlier pass, at 25 to 30 fathoms; in 1934, at Active pass, depth 40 fathoms; in 1934, in Burrard inlet, depth 10 to 20 fathoms; also in 1934, from southwest of Esteban point on the west coast of Vancouver island, depth 60 fathoms; in 1941, from the strait of Georgia at approximately 40 fathoms. The food consists of a varied diet of crustaceans, including shrimps and isopods.

Range southern California to southeastern Alaska.

Cabezon *Leptocottus armatus* Girard 1854

Body elongate, moderately stout anteriorly. Head depressed, moderately broad; mouth terminal, large; lower jaw included; snout bluntly rounded; spines:

nasal, absent; preopercular, 3, uppermost large, antler-like, spinules, 4, three prominent, one minute, lower two spines small; gill membranes united, broadly joined to isthmus. Anus immediately in front of anal fin. Anal papilla small, conical. Fins: dorsal (2), VI to VIII — 15 to 20; anal, 15 to 20; pelvic, I, 4, thoracic; caudal, truncate. Lateral line: almost straight. Scales: absent. Pores: on lateral line, 37 to 42. Cirri: absent. Colour: grayish olive to green with some yellow on dorsal surface; orange yellow to white on ventral surface;

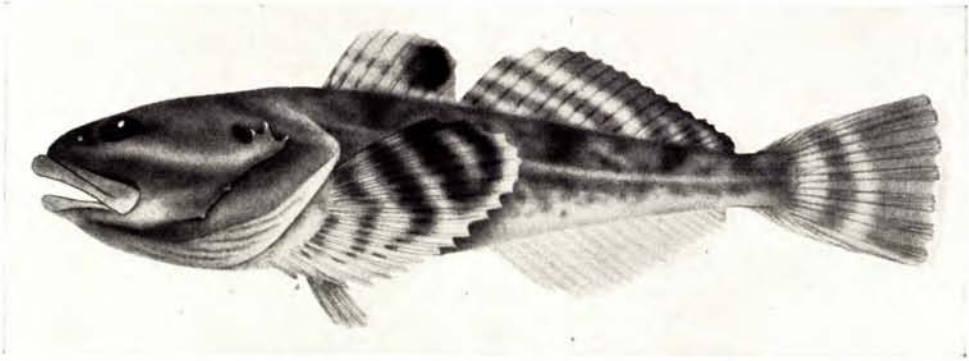

FIGURE 182. Cabezon. *Leptocottus armatus* Girard 1854

creamy yellow with green or black bars on all fins except pelvic and anal; orange on margin with large black spot on posterior portion of spinous dorsal fin.

Length to 12 inches.

Distinguished by the scaleless body, the prominent antler-like uppermost preopercular spine on each side of the head, the grayish olive to green coloration with the yellow and black markings and the conspicuous black spot on the posterior portion of the spinous dorsal fin.

The cabezon was first taken in British Columbia waters by H.M.S. *Plumper* near Vancouver island and was recorded in 1860 by A. Günther as *Centridermichthys armatus*. In June, 1882, it was collected near Port Simpson by Capt. H. E. Nichols and recorded in 1883 by T. H. Bean as *Leptocottus armatus* Girard. In 1901 it was listed as from the Queen Charlotte islands by W. H. Osgood as *Leptocottus maculosus* (evidently an error for *armatus*). The species is very abundant along the whole coast in shallow water. It is to be found frequently in tide-pools and will expand its gill covers and erect its preopercular spines when disturbed. The juvenile sportsman takes it on a hand-line using a marine worm for bait and occasionally on a trout spinner. The food consists of a countless variety of invertebrates. The cabezon is eaten to a considerable extent by waterfowl, especially ducks.

Range southern California to northwestern Alaska.

Buffalo sculpin *Enophrys bison* (Girard) 1854

Body elongate, very stout anteriorly. Head large, broad; mouth terminal, moderate; snout blunt; occipital ridges, 2, prominent; spines: nasal, broad, rough; preopercular, 4, uppermost greatly elongate, simple, sharp, rough tuberculate at base anteriorly, lower three much smaller, two pointing backward, one downward; preopercular, 3, uppermost greatly elongate, length two or three times diameter of eye, sharp, rough tuberculate; gill membranes united, broadly joined to isthmus, without free fold posteriorly. Anus immediately in front of anal fin.

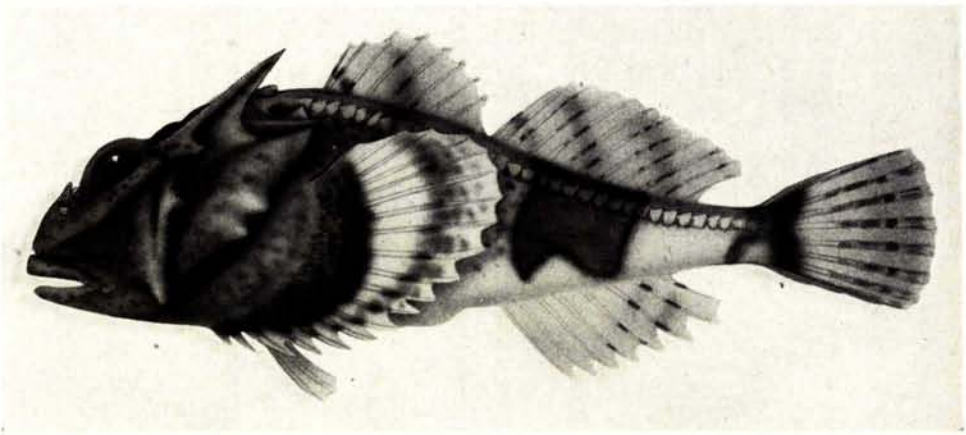

FIGURE 183. Buffalo sculpin. *Enophrys bison* (Girard) 1854

Anal papilla small, rounded. Fins: dorsal (2), VII to IX — 9 to 12; anal, 8 to 10; pelvic, I, 3, thoracic; caudal, truncate to rounded. Lateral line: high, following dorsal contour. Scales: in form of large rough raised tuberculate plates; absent from body above and below lateral line; on lateral line, 29 to 33; on head, numerous, irregular. Cirri: absent. Colour: dark green to brown on dorsal surface; yellow to white on ventral surface; black saddles across body, 3, broad; yellowish white on bands across back and sides, on pectoral fins and at base of caudal fin; colours various on slender bands across all fins except pelvics.

Length to 12 inches.

Distinguished by the very long rough uppermost preopercular spines, the gill membranes joined to the isthmus without a free posterior fold and the large raised tuberculate plates on the high lateral lines.

The buffalo sculpin was first taken in British Columbia waters in May, 1882, at Esquimalt by Capt. H. E. Nichols and recorded in 1883 by T. H. Bean as *Aspidocottus bison* Girard. It was listed in 1901 by W. H. Osgood from the Queen Charlotte islands as *Euophrys bison* (evidently a misprint for *Enophrys*). The species is very common along the whole coast and is found frequently in shallow water where it feeds upon shrimps, crabs, amphipods, mussels, small

fishes such as herring, young salmon, sea-perches and sand-lances as well as upon considerable quantities of sea-lettuce, *Ulva*. The buffalo sculpin spawns in February and March and the orange brown eggs are laid in small clusters. When disturbed it expands the preopercles so that the spines are greatly elevated thus presenting a formidable appearance. This fish will take a bait readily and provides sport for the juveniles, who frequently suffer hand wounds from the jagged spines.

Range southern California to northwestern Alaska.

Great sculpin *Myoxocephalus polyacanthocephalus* (Pallas) 1811

Body elongate, stout anteriorly. Head large, depressed, broad; mouth terminal, large; snout bluntly rounded; cranial ridges and spines numerous, low; spines: nasal, short, blunt; preopercular, 3, uppermost long, equal to diameter of eye, straight, usually simple, sometimes bifid at tip, lowermost pointing down-

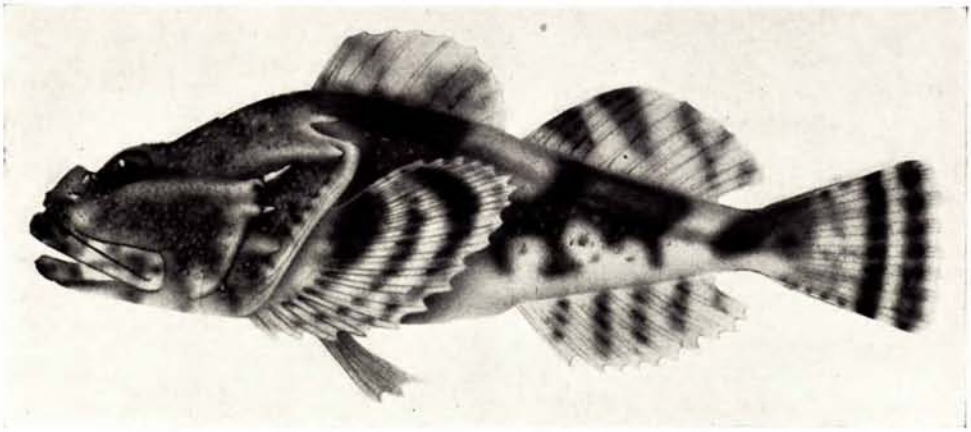

FIGURE 184. Great sculpin. *Myoxocephalus polyacanthocephalus* (Pallas) 1811

ward, usually covered with skin; gill membranes united, free from isthmus. Anus slightly in advance of anal fin. Anal papilla small, rounded. Fins: dorsal (2), IX or X — 13 to 16; anal, 11 to 13; pelvic, I, 3, thoracic; pectoral, broad, procurrent; caudal, truncate. Lateral line: high, following dorsal contour. Scales: reduced ctenoid in form of small plates embedded in fleshy papillae, each usually with small embedded or projecting spine; on body scattered; on head numerous, small, rounded, especially behind eye. Pores on lateral line: about 35. Cirri: absent. Colour: dark olive to black on dorsal surface; white to cream on ventral surface; creamy white bands across body, 2; black mottling or barring on all fins except pelvics.

Length to 2 feet 6 inches.

Distinguished by the stout body with scattered small papillae, the long straight uppermost preopercular spine on each side of the head and the large head covered with small rounded papillae.

The great sculpin was first recorded from British Columbia waters in 1866 by J. K. Lord as *Cottus polyacanthocephalus*, without definite locality or date of capture stated. The first specific record is that of two specimens taken in 1880 at Victoria from the stomach of a big skate, *Raja binoculata*, and recorded in the same year by D. S. Jordan and C. H. Gilbert as *Cottus polyacanthocephalus* Pallas. The species is common along the whole coast at moderate depths. The food consists to some extent of small fishes such as sculpins and blennies.

Range Puget sound to northwestern Alaska.

Long-finned sculpin *Jordania zonope* Starks 1895

Body elongate, slender. Head moderate; mouth terminal, small; snout blunt; spines: nasal, long, sharp, recurved; preopercular, 2, lower well developed, upcurved; gill membranes united, free from isthmus. Anus immediately in front of anal fin. Anal papilla small, conical. Skin: in plate-like folds extending

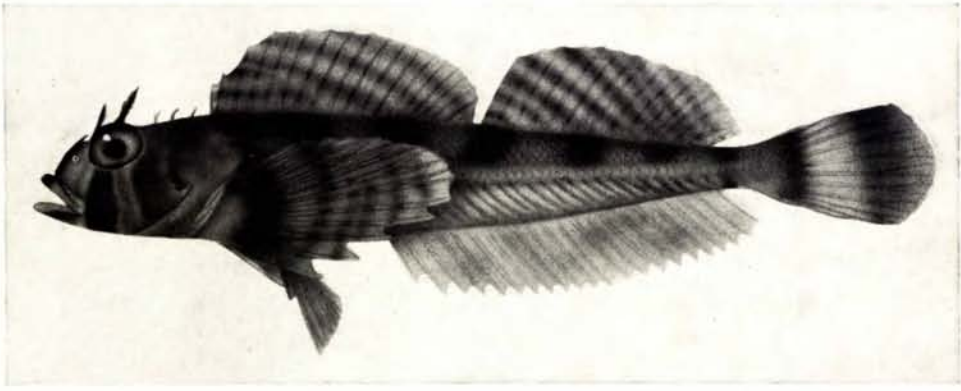

FIGURE 185. Long-finned sculpin. *Jordania zonope* Starks 1895

obliquely from lateral line to within short distance of base of anal fin. Fins: dorsal (2), XVII or XVIII — 15 to 17; anal, 22 to 24, origin below posterior third of spinous dorsal; pelvic, I, 5, thoracic; caudal, rounded. Lateral line: slightly decurved, then straight. Scales: strongly ctenoid, covering body above lateral line; on lateral line, 48 to 50; on posterior margins of skin folds below lateral line, small, finely, sharply serrate. Cirri: nasal, 2, one large, one small; supraocular, 2, large, plumose, posterior larger; frontoparietal, 3, moderate. Colour: olive green, spotted with red; dark cross saddles on dorsal surface of body, 6 or 7; dark bands across dorsal, pectoral and caudal fins, narrow; black on snout and upper lip; chocolate brown bars radiating downward from eye, 2.

Length to 4 inches.

Distinguished by the slender body, the long spinous dorsal fin, the plate-like folds of skin below the lateral line, the scales completely covering the body above the lateral line and on the posterior margins of the folds of skin below the lateral line and the pelvic fins each with 1 spine and 5 rays.

The long-finned sculpin has so far been represented by a single specimen from British Columbia waters, taken in June, 1909, near Ucluelet, Vancouver island, by Messrs. C. H. Young and W. Spreadborough and recorded in 1920 by B. A. Bean and A. C. Weed.

Range northern California to Barkley sound.

Rough-spined sculpin *Prionistius macellus* Bean 1883

Body elongate, very slender, tapering to very slender caudal peduncle; lower profile nearly straight. Head elongate, somewhat depressed; mouth terminal, moderate; snout moderately long, rounded; spines: nasal, short, sharp; preopercular, 2, upper sharp, lower blunt; gill membranes united, free from isthmus. Anus

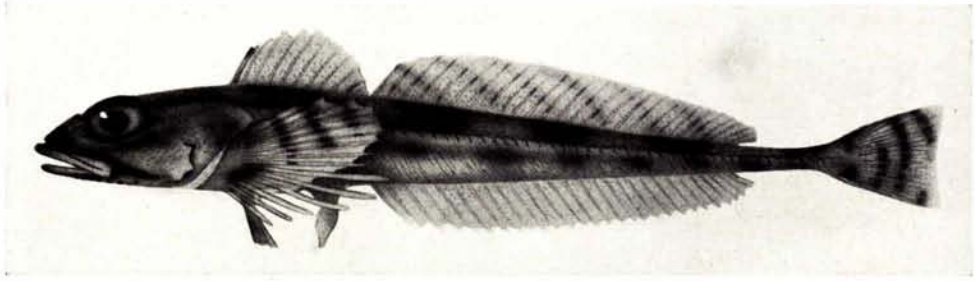

FIGURE 186. Rough-spined sculpin. *Prionistius macellus* Bean 1883

about midway between insertion of pelvic fins and origin of anal fin. Anal papilla elongate, conical, constricted at tip. Skin: in series of oblique folds along each side of body below lateral line. Fins: dorsal (2), XI — 28 or 29; anal, 28 or 29, origin below that of rayed dorsal; pelvic, I, 3, thoracic; pectoral, 15 to 17, lower 5 to 7 rays greatly exserted; caudal, emarginate. Lateral line: high, slightly decurved below spinous dorsal fin, then straight. Scales: ctenoid; covering body above lateral line, very small; no row of enlarged scales near bases of dorsal fins; on lateral line, 50 to 53, moderately large, without keels, forming rough ridge; below lateral line, on posterior margins of oblique folds of skin, minute; on top of head, dense, minute; on eyeball, in row across upper part; on spines and rays of all fins in form of minute prickles. Cirri: absent. Colour: olive green to light brown on dorsal surface; cream on ventral surface; dark saddles across body, 5; jet black spot on each side of snout near tip; fins translucent, barred with brown on rayed dorsal, pectoral and caudal fins, faint on rayed dorsal fin; jet black spot on tip of membrane between first and second spines of spinous dorsal fin.

Length to 8 inches.

Distinguished by the slender body, the oblique folds of skin on each side of the body below each lateral line margined with minute scales, the greatly exserted lower rays in the pectoral fin, the absence of a row of large scales from each side of the body near the bases of the dorsal fins and the row of scales across each eyeball.

The rough-spined sculpin was first taken in British Columbia waters in August, 1882, in Carter bay by Capt. H. E. Nichols. This was described in 1883 as the type of a new genus and species by T. H. Bean and was deposited in the United States National Museum. A second individual was obtained in the following year in the same locality. Additional specimens have been secured in Burrard inlet, English bay and Howe sound in shrimp trawls at depths ranging from 10 to 50 fathoms, as well as one from Safety cove and one from near Prince Rupert.

Range Puget sound to northwestern Alaska.

Ribbed sculpin *Triglops beani* Gilbert 1895

Body elongate, stout anteriorly, tapering to slender caudal peduncle; dorsal surface highly arched; lower profile nearly straight. Head elongate, depressed; mouth terminal, moderate; snout long, pointed; spines: nasal, short, sharp to blunt; frontal, 2, blunt; preopercular, 4, upper two sharp; gill membranes united,

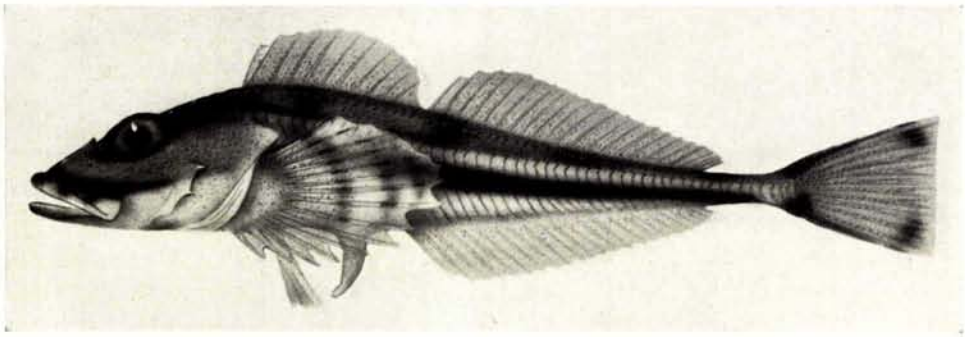

FIGURE 187. Ribbed sculpin. *Triglops beani* Gilbert 1895

free from isthmus. Anus midway between insertion of pelvic fins and origin of anal fin. Anal papilla elongate, conical. Skin: in series of oblique folds along body below lateral line. Fins: dorsal (2), X or XI — 23 to 26; anal, 23 to 26, origin below that of rayed dorsal; pelvic, I, 3, thoracic; pectoral, 17 or 18, not thickened, not exserted; caudal, truncate. Lateral line: high, decurved below spinous dorsal fin, then straight. Scales: ctenoid; above lateral line and on head numerous, small, of various sizes and shapes; in row near bases of dorsal fins commencing above preopercle, extending to point below middle of rayed fin,

moderately large, upright, spines large; on lateral line, 49 or 50, large, without keels, forming rough ridge; below lateral line on posterior margins of oblique folds of skin, represented by minute prickles; across eyeball in 3 rows; on spines and rays of all fins, in form of minute prickles. Cirri: absent. Colour: light olive brown on dorsal surface; white on ventral surface; dark saddles across body, 5; in male, narrow black stripe along body below lateral line, separated therefrom by narrow silvery streak; in female, stripe represented by disconnected series of irregular dark areas.

Length to 8 inches.

Distinguished by the slender tapering body, the slender caudal peduncle, the oblique folds of skin below the lateral line on each side of the body margined with minute prickles, the row of enlarged scales near the bases of the dorsal fins and the three rows of scales across each eyeball.

The ribbed sculpin was first taken in British Columbia waters September 4, 1891, near Victoria, by the *Albatross*, station 3465, lat. 48° 21′ N., long. 123° 14′ W., depth 48 fathoms and recorded in 1895 by C. H. Gilbert. A second specimen was obtained in 1908 near Esquimalt and is now in the Provincial Museum at Victoria.

Range Puget sound to northwestern Alaska.

Darter sculpin *Radulinus asprellus* Gilbert 1890

Body elongate, very slender, dorsal surface flattened, forming prominent ridge with lateral surface. Head elongate, somewhat depressed; mouth terminal, small; snout bluntly rounded; eye large; spines: nasal long, strong; preopercular, 2, short, simple, sharp; gill membranes united, free from isthmus. Anus two-

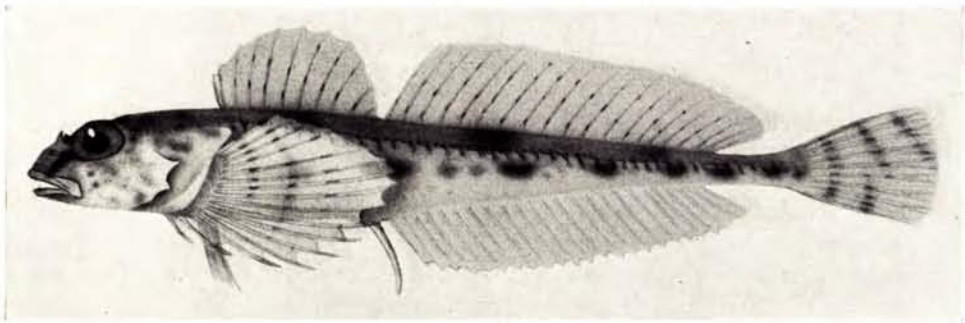

FIGURE 188. Darter sculpin. *Radulinus asprellus* Gilbert 1890

thirds distance between insertion of pelvic fins and origin of anal fin. Anal papilla very elongate, slender. Fins: dorsal (2), VIII to XI — 20 to 23, close together; anal, 22 to 25, origin below that of rayed dorsal; pelvic, I, 3, thoracic; pectoral barely reaching origin of anal in male, slightly shorter in female, lower rays not thickened, slightly exserted; caudal, rounded. Lateral line: high,

almost straight, following conspicuous dorsolateral ridge of body. Scales: strongly ctenoid; small, in single row commencing in median position on posterior area of interorbital space, passing around posterior margin of eye, thence backward above and contiguous with lateral line, extending to point below middle of rayed dorsal fin; on lateral line, 38 to 41, large, keeled, spinous; absent from occipital area. Cirri: absent. Tubercles: in row across upper margin of eyeball, minute. Colour: light brown to gray on dorsal surface; lighter brown to creamy white on ventral surface; dark saddles and blotches across back, 3 or 4, faint; brownish black streak downward and forward in front of eye; fins translucent without colour except for fine red dots on spines and rays of dorsal, anal and pectoral fins.

Length to 6 inches.

Distinguished by the very slender angular body, the absence of scales from the top of the head, the long nasal spines, the high lateral line with very spinous keeled scales and the row of small scales contiguous with the lateral line extending onto the head.

The darter sculpin was first taken in British Columbia waters June 19, 1903, near Nanaimo by the *Albatross*, station 4191, lat. 49° 11′ N., long. 123° 54′ W., depth 54 fathoms and recorded in 1907 by B. W. Evermann and E. L. Goldsborough. The species is fairly common in the strait of Georgia and Burrard inlet at moderate depths and is caught frequently in shrimp trawls. Specimens have been obtained off the west coast of Vancouver island in the Nootka area in 1934 by the *Wm. J. Stewart*, near Fort Rupert in 1903 by the *Albatross*, station 4204, and in 1935 near Graham island by the *Wm. J. Stewart*; the depth range in the above areas was 10 to 70 fathoms. In southern California waters individuals have been recorded from depths as great as 155 fathoms.

Range southern California to northwestern Alaska.

Taylor's sculpin *Asemichthys taylori* Gilbert 1912

Body elongate, moderately stout; dorsal surface slightly arched. Head elongate, moderately deep; mouth terminal, small; snout bluntly rounded; eye large; spines: nasal long, strong; preopercular, 3, upper two short, flat, triangular, lowermost minute, all spines covered with skin; gill membranes broadly united, free from isthmus. Anus two-thirds distance between insertion of pelvic fins and origin of anal fin. Anal papilla elongate, conical. Fins: dorsal (2), X or XI — 15 or 16; anal, 15 to 17, origin below that of rayed dorsal; pelvic, I, 3, thoracic; pectoral, reaching third or fourth ray of anal fin, lower 10 or 11 rays thickened, slightly exserted; caudal, rounded. Lateral line: high, slightly arched, then straight. Scales: ctenoid; above lateral line in single row or in 4 rows, lowermost contiguous with lateral line; on lateral line, 34 to 36, in form of spinous plates with slight keels forming rough ridge; on occipital area, numerous, small, forming ill-defined row toward row above lateral line. Cirri: below lateral line in row, slender, filamentous; on posterior margin of orbital rim, 1, short. Tubercles: in row on anterior and upper margin of eyeball, minute. Colour: olive brown on dorsal

surface; lighter on ventral surface; dark saddles across body, 4; dark bars on dorsal, pectoral and caudal fins; unmarked on pelvic and anal fins.

Length to 2¼ inches.

Distinguished by the moderately stout body, the presence of scales on the top of the head, the long nasal spines, the high lateral line of slightly keeled spinous scales, the 1 or 4 rows of scales immediately above and contiguous with the lateral line and the long pectoral fins.

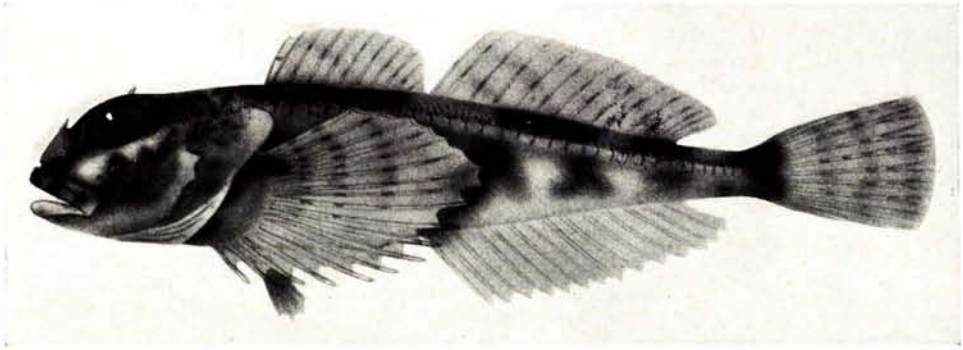

FIGURE 189. Taylor's sculpin. *Asemichthys taylori* Gilbert 1912

Taylor's sculpin is represented by three known specimens. The type, a female, was taken some time prior to 1910 in Departure bay by the Rev. G. W. Taylor, first director of the Pacific Biological Station. It was described in 1912 by C. H. Gilbert as a new genus and species and is now lodged in the museum of Stanford University. The second specimen, a male, was secured January 4, 1934, in Burrard inlet in a shrimp trawl at a depth of 20 fathoms and is now in the collection of the University of British Columbia. The third, also a male, was obtained June 27, 1935, in Tasu harbour, Queen Charlotte islands, in a dredge at a depth of 7 to 25 fathoms by the *Wm. J. Stewart* expedition and is in the collection at the Pacific Biological Station, Nanaimo.

Range strait of Georgia to the Queen Charlotte islands.

Manacled sculpin *Synchirus gilli* Bean 1889

Body elongate, slender. Head elongate; mouth terminal, small; lower jaw included; snout sharply pointed; eye large; spines: nasal, stout, sharp; preopercular, 1, sharp, widely bifid; gill membranes united, free from isthmus. Anus one-quarter distance between insertion of pelvic fins and origin of anal fin. Anal papilla large, cylindrical, constricted to slender filamentous tip, between two lateral inwardly curved processes, cylindrical portion in groove between anus and anal fin. Fins: dorsal (2), VIII to XI — 19 to 21; anal, 18 to 20; pelvic, I, 3, thoracic, long, tips of fins expanded, bent inward, used as holdfasts; pectoral large, completely united anteriorly and ventrally, rays curved inward; caudal,

rounded. Lateral line: slightly wavy. Scales: ctenoid; in row near bases of dorsal fins; on lateral line, 38 to 40. Cirri: postocular, 1, small. Colour: green to yellowish brown on dorsal surface; paler on ventral surface; light blotches across back, about 7; coloration extremely variable depending upon habitat. Membranes of all fins transparent, black pigment sparse, minute, confined to rays of rayed dorsal, pectoral, anal and caudal fins.

Length to 2 inches.

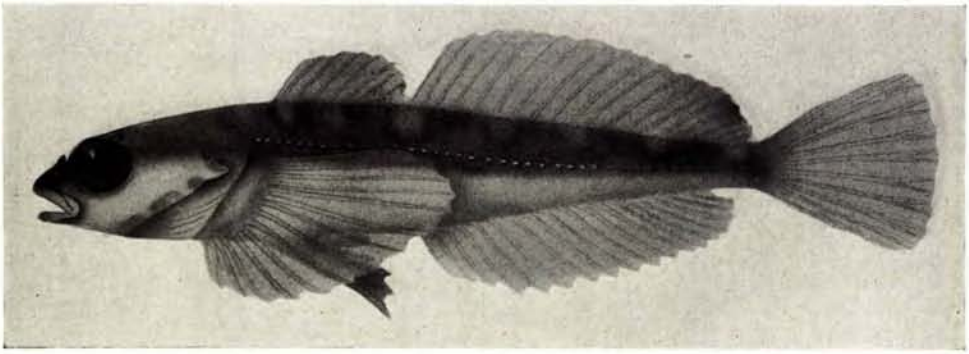

FIGURE 190. Manacled sculpin. *Synchirus gilli* Bean 1889

Distinguished by the united pectoral fins.

The manacled sculpin was first taken September 27, 1888, in Barkley sound by the *Albatross*. Three specimens from 1½ to 1¾ inches in length were obtained, one of which was selected as the type of the genus and species, recorded as such in 1889 by T. H. Bean and deposited in the United States National Museum. Since that time individuals have been obtained in Departure bay, and at Gabriola island in Taylor bay. The manacled sculpin inhabits the shallow waters of bays and tide-pools and is also found around wharf piles and rocks clinging to barnacles by means of its pectoral and pelvic fins.

Range Puget sound to Vancouver island.

Sailor-fish *Nautichthys oculo-fasciatus* (Girard) 1857

Body elongate, slender, compressed, anteriorly rising abruptly above head. Head compressed; mouth terminal, moderate; lower jaw slightly included; snout blunt; eye large, very high; interorbital space depressed; occiput depressed, rough; cranial ridges: bluntly spinous; spines: nasal, large, sharp; preopercular, 2, small, sharp; gill membranes united, broadly joined to isthmus. Anus about half distance between insertion of pelvic fins and origin of anal fin. Anal papilla bulbous, rounded, ending in long slender filament. Fins: dorsal (2), VIII or IX — 27 to 30, spinous fin very high, first five spines very elongate, remaining four or five diminishing rapidly, rayed fin very long, moderately high; anal, 18 to 20, long, low; pelvic, I, 3, thoracic, moderately long, spine short, slender; pectoral,

13 or 14, long, placed low; caudal, obliquely rounded, asymmetrical, lower rays longer than upper. Lateral line: slightly decurved, then straight. Scales: reduced ctenoid, in form of small slender spines; everywhere on body and head; on rayed dorsal and caudal fins to tips; on bases of pectoral and anal fins; on lateral line, large, in form of long stout bifid spines, preceding each pore. Pores on lateral line: 41 to 45. Cirri: on nasal spines; on eyeball above pupil, 4, first large, multifid, plumose, followed by three small, filamentous; on maxillary, small,

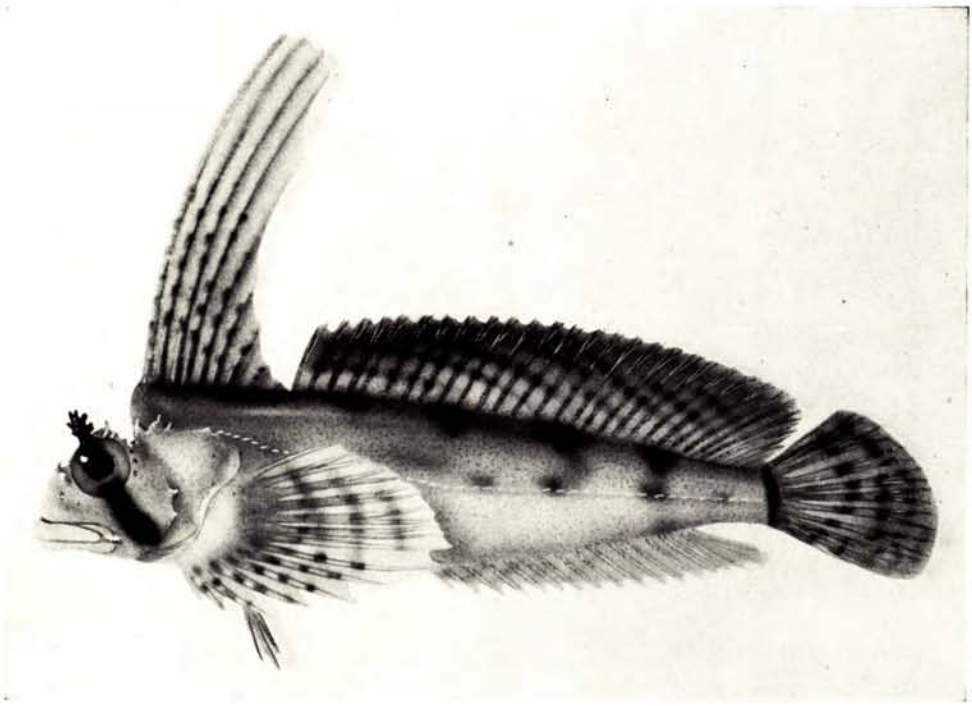

FIGURE 191. Sailor-fish. *Nautichthys oculo-fasciatus* (Girard) 1857

weakly multifid. Colour: light brown to dark gray on dorsal surface; very light brown to cream on ventral surface; black blotches across body, 5; black spots in series along lateral line; jet black band on supraorbital cirrus, downward through eye across cheek, conspicuous; barred with green on dorsal fins, sometimes flecked with light brick red on rayed dorsal fin; heavily barred with black on base of pectoral fins, on posterior of anal and caudal fins.

Length to 8 inches.

Distinguished by the high spinous dorsal fin, the large plumose cirrus on each eyeball, the black band downward through each eye and across the cheek, the depressed occiput and the asymmetrically rounded caudal fin.

The sailor-fish was first taken in British Columbia waters September 4, 1891, east of Victoria, by the *Albatross*, station 3465, lat. 48° 21′ N., long. 123° 14′ W., depth 48 fathoms and was recorded in 1895 by C. H. Gilbert. The species is often obtained in Burrard inlet in shrimp trawls and has been reported from Victoria, Sydney, Ucluelet, Departure bay and Jervis and Rivers inlets. This fish is a sluggish inhabitant of the shore waters but is known to range to a depth of at least 50 fathoms. The food consists in part of crustaceans.

Range northern California to northwestern Alaska.

Prickly sculpin *Oligocottus rimensis* (Greeley) 1901

Body elongate, slender. Head moderate, front profile very steep; mouth terminal, moderate; snout bluntly rounded; spines: nasal, small, sharp; preopercular, 1, small, simple, curved upward; gill membranes united, free from isthmus. Anus immediately in front of anal fin. Anal papilla small, slender,

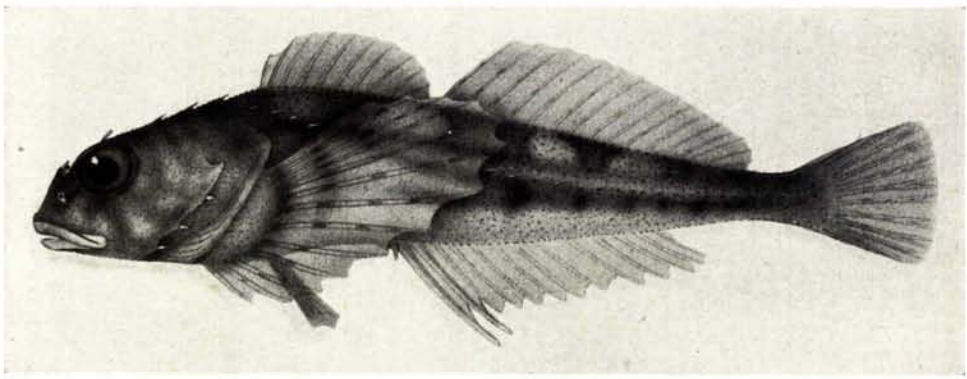

FIGURE 192. Prickly sculpin. *Oligocottus rimensis* (Greeley) 1901

usually curved forward. Skin: thick, firm. Fins: dorsal (2), VIII to X — 16 to 19; anal, 13 to 15, origin below posterior end of spinous dorsal fin (in male, first two rays greatly enlarged, subequal, membranes deeply incised); pelvic, I, 3, thoracic; pectoral, very large; caudal, rounded. Lateral line: high anteriorly, decurved, then straight. Scales: reduced ctenoid, in form of minute plates, each with long slender spine; everywhere on body, minute, weak; on head, scattered, smaller. Pores: on lateral line, 35 to 41. Cirri: long, filamentous, in row along anterior half of lateral line; on head, sparse, scattered. Colour: light olive green or reddish brown on dorsal surface; creamy white to pale green on ventral surface; dark blotches across body, 5, irregular, bordered by light blue; faintly barred with green or reddish brown on rayed dorsal, pectoral and caudal fins. In young, colours often much brighter.

Length to 2 inches.

Distinguished by the almost vertical profile of the snout, the single upcurved preopercular spine on each side of the head, the minute scales in form of prickles and the anus immediately in front of the anal fin below the spinous dorsal fin.

The prickly sculpin was first taken in British Columbia waters July 27, 1926, at Gabriola island in Taylor bay, by Professor J. R. Dymond and was recorded in 1928 by C. L. Hubbs as *Rusciculus rimensis* Greeley. This individual is now in the Royal Ontario Museum of Zoology at Toronto. On July 29, 1930, a second specimen was obtained in Barkley sound by Dr. V. E. Shelford in a tide-pool, recorded in the same year by L. P. Schultz as *Rusciculus rimensis* Greeley. On August 24, 1942, three males were secured by Dr. G. C. Carl and the second author at Victoria on Gonzales point in a tide-pool at extreme low tide. The species is one of the smallest of the tide-pool forms.

Range northern California to Vancouver island.

Tide-pool sculpin *Oligocottus maculosus* Girard 1856

Body elongate, moderately stout, slightly compressed. Head conical; mouth terminal, small; snout bluntly rounded; spines: nasal, stout, blunt; preopercular, 1, small, bifid, one spinule pointing upward, other backward; gill membranes united, free from isthmus. Anus immediately in front of anal fin. Anal papilla

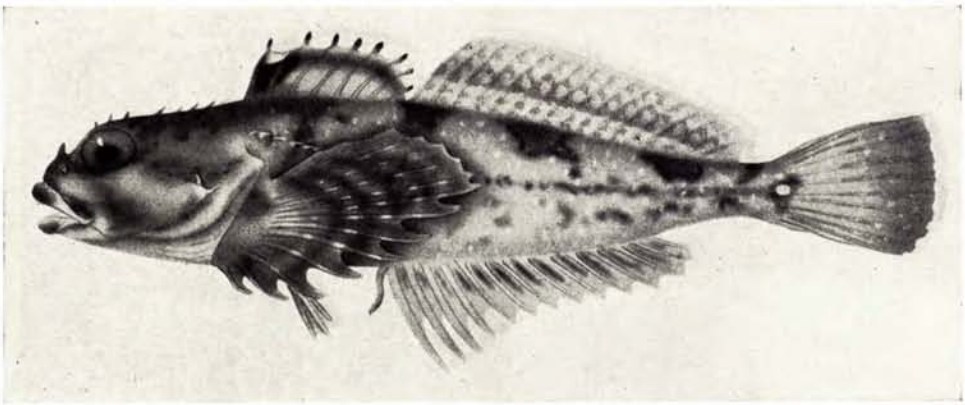

FIGURE 193. Tide-pool sculpin. *Oligocottus maculosus* Girard 1856

long, slender, usually curved forward. Skin: thick, smooth, firm. Fins: dorsal (2), VIII or IX — 16 to 18; anal, 12 to 14, origin below posterior third of spinous dorsal fin (in male, first 3 or 4 rays longest, stoutest, membranes deeply incised; in female, first ray very short); pelvic, I, 3, thoracic; pectoral large, lower rays somewhat exserted; caudal, rounded. Lateral line: high anteriorly, decurved, then straight. Scales: absent. Pores: on lateral line, 34 to 39. Cirri: single or paired, filamentous; along lateral line anteriorly for about distance of fifteen pores; on head, numerous; in breeding male, on tips of dorsal fin spines, fleshy.

Colour: reddish brown, green or crimson on dorsal surface, according to surroundings; white to cream, diffused with green or blue, on ventral surface; dark blotches across body, 5, irregular; white spot at base of caudal fin, prominent; variously mottled and barred on rayed dorsal, pectoral and caudal fins. In male, small orange spot on anterior membranes of spinous dorsal fin margined below by jet black which becomes broader and less intense posteriorly.

Length to 3½ inches.

Distinguished by the forked preopercular spine on each side of the head, the filamentous cirri on the head and on the anterior portion of each lateral line, the anus immediately in front of the anal fin and below the rayed dorsal fin and the 3 or 4 stout rays in the anal fin of the male.

The tide-pool sculpin was first taken in British Columbia waters at Vancouver island by H.M.S. *Plumper* and recorded in 1860 by A. Günther as *Centridermichthys maculosus*. An individual captured in 1893 at Comox by Mr. J. Macoun was recorded in 1920 by B. A. Bean and A. C. Weed as *Oligocottus borealis* Jordan and Snyder. The species is exceedingly abundant in the shallow waters, especially in tide-pools around rocky shores, where it darts from one protective spot to another with great speed. Spawning was observed February 17, 1942, in the Vancouver Aquarium. The male clasped the female with one pectoral fin and fertilized the pale greenish blue eggs as they were deposited on a rock.

Range northern California to northwestern Alaska.

Fluffy sculpin *Oligocottus snyderi* Greeley 1901

Body elongate, moderately stout, slightly compressed. Head conical; mouth terminal, small; snout pointed; spines: nasal, stout, blunt; preopercular, 1, small, bifid, one spinule pointing upward, other backward; gill membranes united, free from isthmus. Anus immediately in front of anal fin. Anal papilla long, slender, conical. Skin: thick, smooth, firm. Fins: dorsal (2), VII to IX — 17

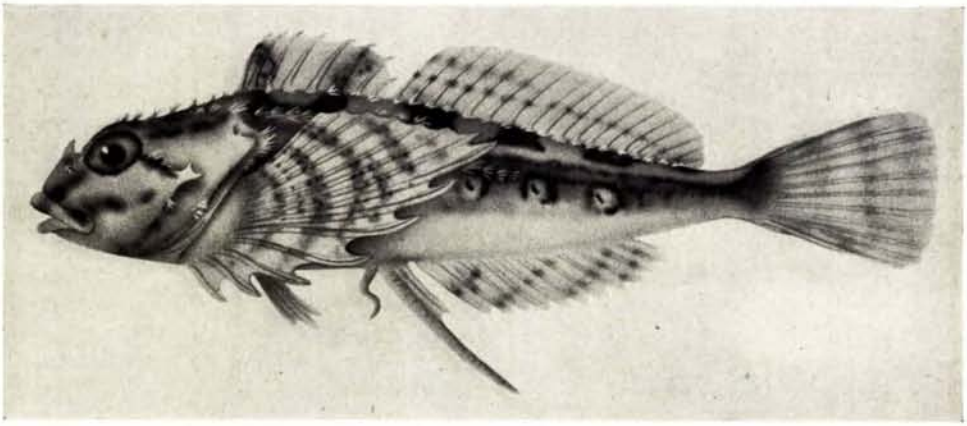

FIGURE 194. Fluffy sculpin. *Oligocottus snyderi* Greeley 1901

to 19; anal, 12 to 15, origin below posterior third of spinous dorsal fin (in male, first ray long, stout, second not enlarged, separated from remainder of fin; in female, membranes between first 3 or 4 rays deeply incised); pelvic, I, 3, thoracic; pectoral large, lower rays exserted; caudal, rounded. Lateral line: high anteriorly, gradually decurved, then straight. Scales: absent. Pores: on lateral line, 36 to 39. Cirri: very numerous, filamentous, usually in groups of 3 or 4; in row along bases of dorsal fins from third spine in spinous fin to sixteenth or seventeenth ray in rayed fin; in row along anterior two-thirds of lateral line; between these two rows, short row extending from under last two spines in spinous dorsal fin to beneath third or fourth ray in rayed fin; on head in groups of 3 or 4, joined at bases; on spinous dorsal fin, single, immediately behind tip of each spine. Colour: green to light reddish brown but frequently pink or lavender; dark blotches across body, 5 or 6, irregular; dark brown circles along lateral line, 5; white spots on body numerous, small; dusky blotches on spinous dorsal fin, 2, anterior and posterior; lightly barred with dusky dots on rayed dorsal, pectoral, anal and caudal fins.

Length to 3¼ inches.

Distinguished by the forked preopercular spine on each side of the head, the 3 rows of cirri in groups along each side of the body, the anus immediately in front of the anal fin and the long stout first ray in the anal fin of the male.

The fluffy sculpin was first taken in British Columbia waters in June or July, 1909, by W. Spreadborough at Ucluelet and recorded in 1920 by B. A. Bean and A. C. Weed as *Dialarchus snyderi* (Greeley). The species has been collected from Vargas island to Kyuquot on the west coast of Vancouver island and from Skidegate inlet in the Queen Charlotte islands. This is one of the small colourful tidepool sculpins.

Range southern California to Queen Charlotte islands.

Globe-headed sculpin *Clinocottus globiceps* (Girard) 1857

Body elongate, moderately stout. Head blunt, anterior profile rounded; mouth terminal, small; lower jaw included; lips thick; snout very blunt; spines: nasal, blunt; preopercular, 1, small, blunt, covered with skin; gill membranes united, free from isthmus. Anus two-thirds distance from insertion of pelvic fins to origin of anal fin. Anal papilla stout, conical, usually curved forward. Skin: thick, smooth. Fins: dorsal (2), IX or X — 15 to 17; anal, 10 to 12, membranes greatly incised, origin below anterior third of rayed dorsal fin; pelvic, I, 3, thoracic; pectoral, large; caudal, rounded. Lateral line: high anteriorly, decurved, then straight. Scales: absent. Pores: on lateral line, 34 to 40. Cirri: multifid; in row along anterior half of lateral line; on head, numerous, dense, large. Colour: olive to reddish brown on dorsal surface; cream to light brown on ventral surface; black blotches across body, 6; heavily barred with dark brown or black on fins except pelvics. Colours often very bright with yellow, orange, green and blue in various distributions according to habitat.

Length to 7½ inches.

Distinguished by the bluntly rounded head, the single blunt preopercular spine on each side of the head, the dense multifid cirri on each lateral line and the head and the somewhat forward position of the anus.

The globe-headed sculpin was first recorded from British Columbia waters in 1866 by J. K. Lord as *Centridermichthys globiceps*, but from no specific locality. It was listed in 1901 from the Queen Charlotte islands by W. H. Osgood as

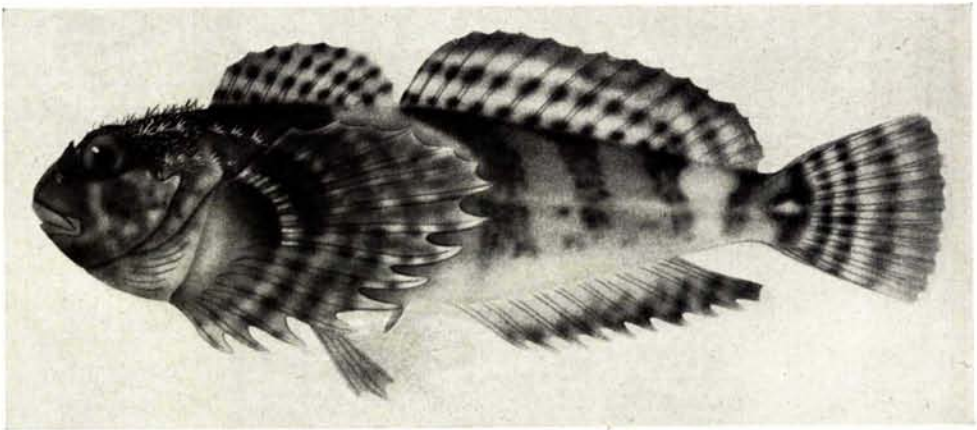

FIGURE 195. Globe-headed sculpin. *Clinocottus globiceps* (Girard) 1857

Blenicottus globiceps (evidently a misprint for *Blennicottus*). Probably the species is not uncommon in the tide-pools and shallow waters of the exposed coast. Specimens have been taken at Victoria, on the west coast of Vancouver island from Ucluelet to Kyuquot and from the Queen Charlotte islands. The name "*globiceps*" refers to the globular shape of the head.

Range southern California to northwestern Alaska.

Mossy sculpin *Clinocottus embryum* (Jordan and Starks) 1895

Body elongate, moderately slender, slightly compressed. Head acute, anterior profile pointed; mouth terminal, small; lower jaw barely included; lips thick; snout blunt; spines: nasal, short, blunt; preopercular, 1, small, blunt, covered with skin; gill membranes united, free from isthmus. Anus about half distance between insertion of pelvic fins and origin of anal fin. Anal papilla stout, conical, usually curved forward. Skin: moderately thick, smooth. Fins: dorsal (2), VIII to X — 15 to 17; anal, 9 to 12, membranes deeply incised, origin below anterior third of rayed dorsal fin; pelvic, I, 3, thoracic; pectoral, very large; caudal, truncate to rounded. Lateral line: high anteriorly, decurved, then straight. Scales: absent. Pores: on lateral line, 34 to 38. Cirri: multifid; in row on anterior third of lateral line; on head, scattered, large. Colour: light olive green to pink or rich maroon on dorsal surface; light green to dusky on ventral surface; brownish

green blotches across body, 5 or 6; brown to black triangular spot surrounded by light brownish orange below each eye; brown to orange bars on all fins except pelvics.

Length to 2¾ inches.

Distinguished by the sharp pointed head in dorsal view, the single blunt preopercular spine on each side of the head, the triangular dark spot below each

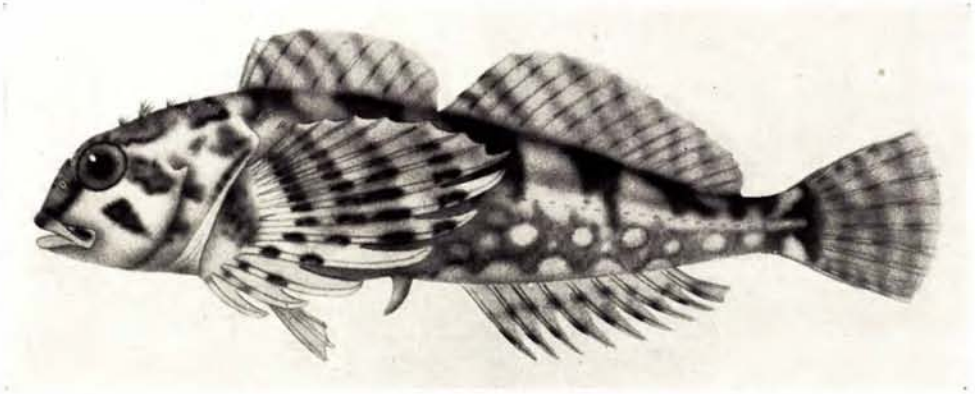

FIGURE 196. Mossy sculpin. *Clinocottus embryum* (Jordan and Starks) 1895

eye, the multifid cirri on the anterior third of each lateral line and on the head and the forward position of the anus.

The mossy sculpin was first taken in British Columbia waters in June, 1909, at Ucluelet by Messrs. C. H. Young and W. Spreadborough. This was a single individual 2¾ inches in length and was recorded in 1920 by B. A. Bean and A. C. Weed as *Oxycottus embryum* (Jordan and Starks). The species has been secured in Departure bay and on the west coast of Vancouver island from Ucluelet to Nootka island. It probably is not uncommon in the rocky littoral areas.

Range northern California to northwestern Alaska.

Sharp-nosed sculpin *Clinocottus acuticeps* (Gilbert) 1895

Body elongate, slender, slightly compressed. Head acute, anterior profile pointed; mouth terminal, small; lower jaw barely included; snout sharply pointed; spines: nasal, short, sharp; preopercular, 1, small, simple, sometimes weakly bifid, slender, sharp, curved upward and inward, tip exposed; gill membranes united, free from isthmus. Anus one-third distance between insertion of pelvic fins and origin of anal fin. Anal papilla large, flattened anteroposteriorly, expanded laterally, ending abruptly in narrow conical tip beyond lateral expansions. Skin: smooth, firm. Fins: dorsal (2), VII to IX — 14 to 16; anal, 10 to 13, origin below anterior third of rayed dorsal fin; pelvic, I, 3, thoracic; pectoral, large; caudal, rounded. Lateral line: high anteriorly, decurved, then straight. Scales:

absent. Pores: on lateral line, 33 to 36. Cirri: simple; in row along lateral line to point opposite tip of pectoral fin, small filamentous; on head, scattered, filamentous; on eyeball, 1, filamentous, sometimes minute or absent in female. Colour: green to light brown on dorsal surface, varying with surroundings; white to cream on ventral surface; irregular dark brown band along each side of body extended dorsally to form 6 saddles across back; variously blotched with light colours along lateral line and below; dark bars radiating from eye, 3; dusky area on spinous dorsal fin between first and third spines.

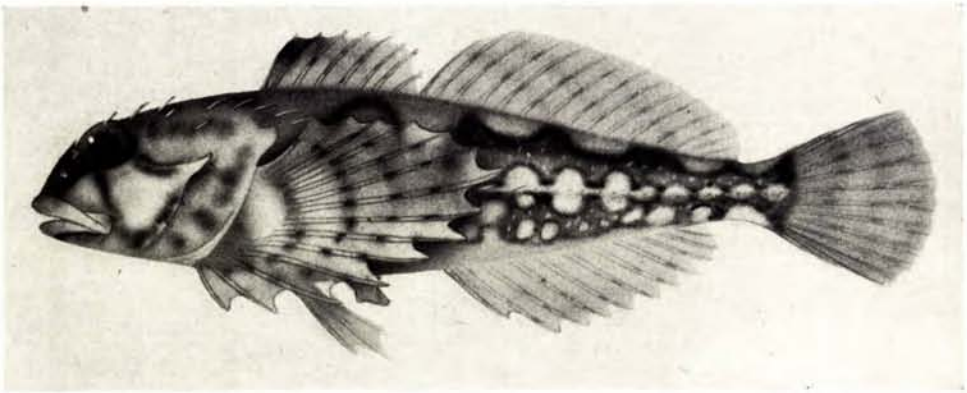

FIGURE 197. Sharp-nosed sculpin. *Clinocottus acuticeps* (Gilbert) 1895

Length to 2 inches.

Distinguished by the acute snout, the slender sharp incurved preopercular spine on each side of the head, the forward position of the anus, the filamentous cirri, the small cirrus on each eyeball and the dusky area on the anterior tip of the spinous dorsal fin.

The sharp-nosed sculpin was first taken in British Columbia waters between May 10 and May 13, 1890, in Departure bay, by the *Albatross*, in a shore seine and recorded in 1895 by C. H. Gilbert as *Oligocottus acuticeps* Gilbert. The species is found along the coast in tide-pools and on sandy beaches. Specimens have been obtained near Victoria, at False narrows, in Departure and Deep bays, along the west coast of Vancouver island from Vargas island to Kyuquot, in Dean channel and in Prince Rupert harbour.

Range northern California to northwestern Alaska.

Rosy-lipped sculpin *Ascelichthys rhodorus* Jordan and Gilbert 1880

Body elongate, stout anteriorly, compressed posteriorly. Head depressed, broad; mouth terminal, large; lower jaw included; snout bluntly rounded; spines: nasal, covered with skin; preopercular, 1, small, simple, sharp, curved upward, usually covered with skin; gill membranes united, free from isthmus. Anus

slightly in advance of anal fin. Anal papilla small, rounded. Skin: smooth, loose. Fins: dorsal (1), VIII to X, 17 to 20, deeply notched, spinous portion low, weak, rayed portion about twice height of spinous portion; anal, 13 to 16; pelvic, absent; caudal, rounded. Lateral line: faint, decurved, then straight. Scales: absent. Pores: on lateral line, 34 to 38. Cirri: on head above and behind eye, 1, multifid; above base of pectoral fin, 5 to 9, filamentous. Colour: dark olive brown to black on dorsal surface; lighter on ventral surface; dark blotches across body vague; bright rosy red on lips, dusky on spinous portion of dorsal fin,

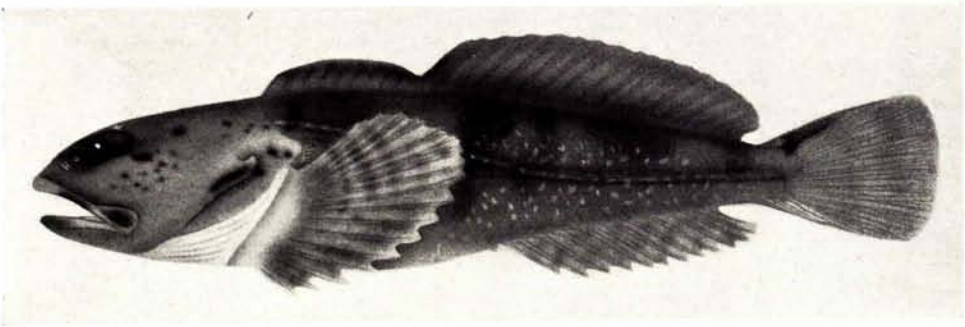

FIGURE 198. Rosy-lipped sculpin. *Ascelichthys rhodorus* Jordan and Gilbert 1880

margined with bright crimson; dusky on other fins, pale on margins; faintly barred with dark green to black on pectoral, anal and caudal fins.

Length to 4½ inches.

Distinguished by the absence of pelvic fins, the low spinous portion of the dorsal fin and the hooked preopercular spine on each side of the head.

The rosy-lipped sculpin was first taken in British Columbia waters at Victoria by Messrs. Dall and Brown and recorded in 1881 by T. H. Bean. The species has been obtained along the coast near Victoria, Telegraph and Departure bays, Comox, on the west coast of Vancouver island from Ucluelet to Nootka island, and around the Queen Charlotte islands. It is a tide-pool fish and is often found under rocks at low tide.

Range northern California to southeastern Alaska.

Spiny-headed sculpin *Dasycottus setiger* Bean 1890

Body elongate, stout anteriorly. Head large; mouth terminal, large, oblique; snout bluntly rounded; spines: nasal, absent; cranial, numerous, large, upright, blunt, occipital largest; preopercular, 4, simple, upper 2 shorter than diameter of eye, slender, lower 2 small, usually covered with skin; gill membranes united, free from isthmus. Anus two-thirds distance between insertion of pelvic fins and origin of anal fin. Anal papilla small, rounded. Skin: thin, loose; thick at bases of dorsal and anal fins. Fins: dorsal (2), IX or X — 13 to 15, slightly connected

at bases by low membrane; anal, 13 or 14; pelvic, I, 3, thoracic; pectoral, large, procurrent; caudal, rounded. Lateral line; slightly decurved, then straight. Scales: reduced ctenoid, in form of dome-shaped plates embedded in papillae, each with numerous spines: below spinous dorsal fin in row, 7 to 9; on head, behind occipital spine, 5; on upper margin of eyeball, scattered, minute. Pores: on lateral line, 14 or 15. Cirri: on lateral line pores, filamentous; on head, numerous, filamentous, longer ones in and about jaws; on upper margin of eyeball, minute. Colour: gray with chocolate brown spots on dorsal surface; pale brownish

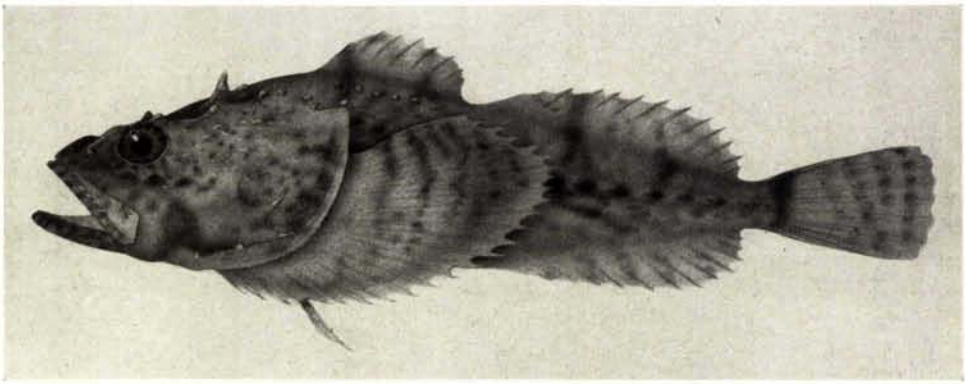

FIGURE 199. Spiny-headed sculpin. *Dasycottus setiger* Bean 1890

white on ventral surface, darker posteriorly; dark brown saddles across body, 5 or 6; black punctulations on all fins, minute; broad bars on all fins except pelvic.

Length to 9 inches.

Distinguished by the large head with the upright blunt spines, the loose skin, the short row of conical spinous papillae near the base of the spinous dorsal fin and the dorsal fins slightly connected at their bases by low membranes.

The spiny-headed sculpin was first taken in British Columbia waters June 19, 1903, in Nanaimo harbour by the *Albatross*, station 4191, lat. 49° 11′ N., long. 123° 54′ W., depth 54 fathoms and the single specimen secured was recorded in 1907 by B. W. Evermann and E. L. Goldsborough. The species is common in the strait of Georgia and is obtained in shrimp trawls in Burrard inlet and English bay at depths between 10 and 60 fathoms, in otter trawls in the channels amongst the islands along the east coast of Vancouver island between Sidney and Nanaimo, and has been collected off the west coast of Graham island at a depth of 60 fathoms.

Range Puget sound to northwestern Alaska.

Black-finned sculpin *Malacocottus kincaidi* Gilbert and Thompson 1905

Body elongate, stout anteriorly. Head large; mouth terminal, moderate; snout bluntly rounded; spines: cranial, absent; preopercular, 4, simple, upper

three sharp, shorter than diameter of eye, lowermost very short, usually not projecting through skin; gill membranes united, broadly joined to isthmus. Anus two-thirds distance between insertion of pelvic fins and origin of anal fin. Anal papilla small, rounded. Skin: thin, smooth, loose, on body and along bases of fins. Fins: dorsal (2), VIII or IX — 14 or 15, slightly connected at bases by low membrane, spines weak; anal, 11 or 12; pelvic, I, 3, thoracic, small; pectoral large, procurrent; caudal, rounded. Lateral line: slightly decurved, then straight. Scales: absent. Pores: on lateral line, 14 or 15. Cirri: on anterior nasal openings,

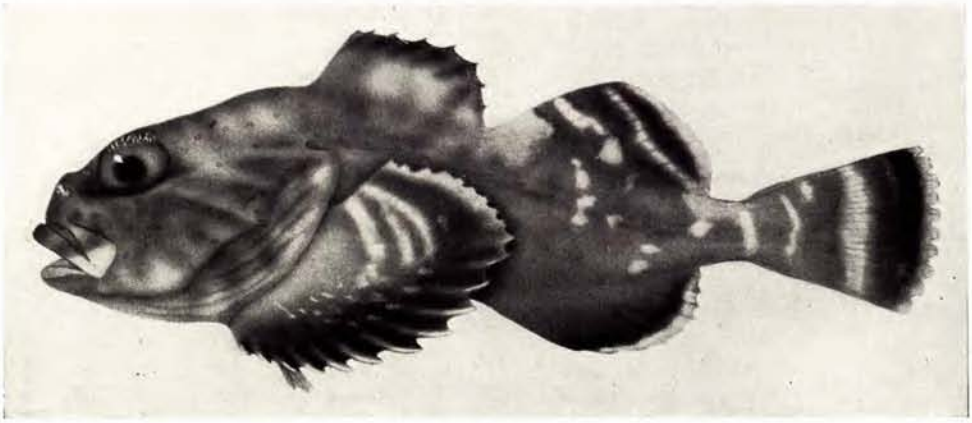

FIGURE 200. Black-finned sculpin. *Malacocottus kincaidi* Gilbert and Thompson 1905

multifid; on head few, filamentous; on eyeball, small. Colour: gray to light brown with several irregular brown blotches on dorsal surface; bluish to purplish black with fine black punctulations on ventral surface; white in narrow band on margins of all fins, jet black in broad band below each margin; white bands on pectoral, rayed dorsal and caudal fins. In mature male, white margins of dorsal fins become golden in breeding season.

Length to 8 inches.

Distinguished by the thin smooth loose skin, the gill membranes broadly joined to the isthmus and the jet black coloration on the fins with the white margins.

The black-finned sculpin was first taken in British Columbia waters off Entrance island, near Nanaimo, June 20, 1903, by the *Albatross*, station 4198, lat. 49° 19′ N., long. 123° 47′ W., depth 157 fathoms. It was recorded in 1907 by B. W. Evermann and E. L. Goldsborough as *Malacocottus zonurus* Bean in error, the type of *M. kincaidi* having been described in 1905, probably while the *Albatross* records were in press. The species is common in the strait of Georgia at depths ranging from 15 to 65 fathoms and is often captured in shrimp trawls in Burrard inlet and in otter trawls along the east coast of Vancouver island.

Range Puget sound to strait of Georgia.

Family PSYCHROLUTIDAE Mud-sculpins

In the mud-sculpins the body is somewhat tadpole-shaped, covered with smooth loose skin devoid of scales. The head is large without spines. The dorsal fin is low anteriorly and buried in the skin; the pelvic fins are thoracic, each with 1 spine and 3 rays.

The mud-sculpins sometimes are referred to as degenerate fishes but perhaps more correctly they should be considered as specialized for life in muddy waters.

Tadpole sculpin *Psychrolutes paradoxus* Günther 1861

Body elongate, stout anteriorly, somewhat tadpole-shaped; caudal peduncle short, distinct. Head large, broad; mouth terminal, small; jaws equal; snout very blunt; spines: absent; gill membranes broadly joined to isthmus. Anus midway between insertion of pelvic fins and origin of anal fin. Skin: smooth,

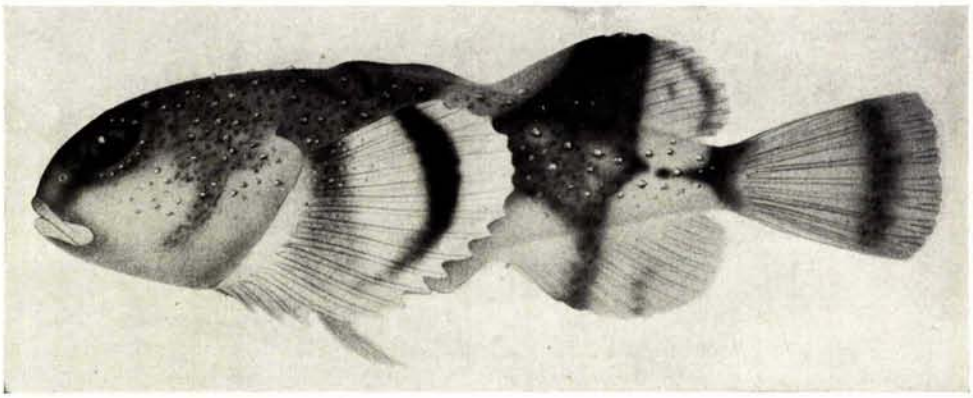

FIGURE 201. Tadpole sculpin. *Psychrolutes paradoxus* Günther 1861

somewhat loose, on body, head and fins. Fins: dorsal (1), X to XII, 12 to 17, continuous, spinous portion and anterior of rayed portion very low, buried in ridge of skin, delicate spines and first few rays not countable without dissection, posterior of rayed portion high; anal, 12 to 14, high; pelvic, I, 3, thoracic; pectoral, 20 to 23; caudal, truncate to rounded. Lateral line: straight, indistinct. Scales: absent; papillae small, scattered, on body, head and fins, on eyeball in row on upper margin. Pores: on lateral line, about 10. Colour: gray to light brown on dorsal surface; creamy white on ventral surface; black cross bands and light cross blotches across back, irregular; pale orange, pink and yellow variously marking pectoral fins; black bar across each pectoral fin toward tip, prominent; dark cross bar toward tip of caudal fin.

Length to 2½ inches.

Distinguished by the general tadpole-like appearance, the anus situated midway between the insertion of the pelvic fins and the origin of the anal fin, the low

spinous portion of the dorsal fin and the smooth somewhat loose skin on the head and body with the scattered small papillae.

The tadpole sculpin was first taken in British Columbia waters in the strait of Georgia during a voyage of H.M.S. *Plumper*, and the specimen, 21 lines (1¾ inches) in length, was presented by the Lords of the Admiralty to the British Museum. It was described in 1861 by A. Günther as the type of a new genus and species. The next record was August 28, 1891, west of Jordan river by the *Albatross*, station 3460, lat. 48° 25′ N., long. 124° 10′ W., depth 53 fathoms, and recorded in 1895 by C. H. Gilbert as *Psychrolutes zebra* Bean. The species apparently is well distributed along the coast, many individuals having since been secured off the southern end of Vancouver island, at Pender island in Otter bay, and in Burrard and Skidegate inlets. It inhabits waters from moderate depths down to at least 120 fathoms.

Range Puget sound to northwestern Alaska.

Soft sculpin *Gilbertidia sigalutes* (Jordan and Starks) 1895

Body elongate, stout anteriorly, somewhat tadpole-shaped; caudal peduncle hidden in loose skin connecting anal and caudal fins. Head large, broad; mouth terminal, moderate; lower jaw projecting; snout blunt; spines: absent; gill membranes broadly joined to isthmus. Anus immediately in front of anal fin. Skin:

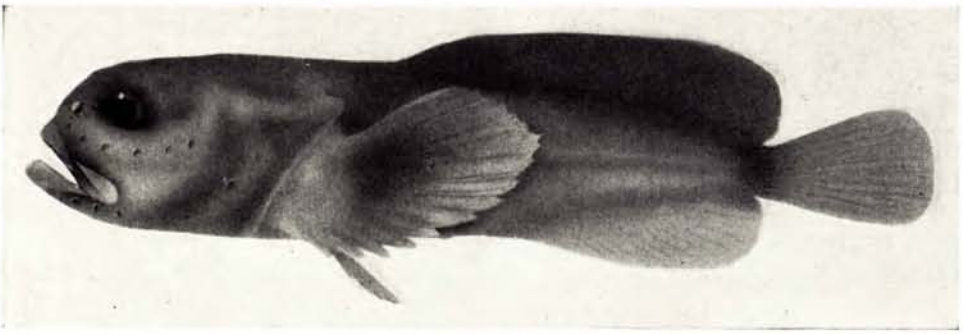

FIGURE 202. Soft sculpin. *Gilbertidia sigalutes* (Jordan and Starks) 1895

smooth, very loose on body, head and fins. Fins: dorsal (1), about VIII, 18, continuous, anterior portion very low, buried in skin, becoming elevated posteriorly, spines and rays not countable without dissection; anal, about 14, high posteriorly; pelvic, I, 3, thoracic; pectoral, 16 or 17; caudal, rounded. Lateral line: straight, indistinct. Scales: absent. Pores: on lateral line, 12 to 14. Colour: dusky olive brown on dorsal surface; lighter on ventral surface; blue tinge on fins, sometimes on body.

Length to 3¼ inches.

Distinguished by the general tadpole-like appearance, the anus immediately in front of the anal fin, the low anterior portion of the dorsal fin, the very loose skin on the head and body and the projecting lower jaw.

The soft sculpin was first taken in British Columbia waters May 23, 1936, in English bay off Jericho beach in a shrimp trawl at a depth of 35 fathoms. The single specimen obtained is now in the collection of fishes at the University of British Columbia. In July, 1937, a specimen was taken from the stomach of a handsaw-fish, *Alepidosaurus aesculapius*, captured off Quatsino sound near Kains island on a trolling spoon at a depth of approximately 30 fathoms, and is now in the Provincial Museum at Victoria. These captures were recorded in 1945 by G. C. Carl and G. V. Wilby. In the Puget sound area this sculpin has been found in sponges at a depth of 60 fathoms.

Range Puget sound to southeastern Alaska.

Family RHAMPHOCOTTIDAE Big-headed sculpins

In the big-headed sculpins the head is very large with prominent fronto-parietal ridges; the snout is long and pointed. The gill openings are small and situated above the bases of the pectoral fins. The pectoral fins are large and exserted; the pelvic fins are thoracic, each with 1 spine and 3 rays.

The grunt-fish is the only species in the family.

Grunt-fish *Rhamphocottus richardsoni* Günther 1874

Body short, stout, compressed; caudal peduncle slender. Head very large, elongate, length about half standard length, broad, with large fronto-parietal ridges; mouth terminal, small; lower jaw included; lips thick; snout long, pointed; eye deep-set; spines: nasal, stout, sharp; preopercular, 1, weakly bifid; post-temporal, moderate; clavicular large, sharp; gill opening small, above base of pectoral fin. Anus three-quarters distance between insertion of pelvic fins and origin of anal fin. Anal papilla short, conical. Fins: dorsal (2), VII or VIII — 12 or 13, spinous fin small, weak, folding in groove; anal, 6 or 7, far back; pelvic, I, 3, thoracic; pectoral very large, lower rays thickened, greatly exserted; caudal, rounded. Lateral line: high anteriorly, roughly following dorsal contour. Scales: on body and head reduced to minute plates bearing stiff multifid spines, each embedded in erect fleshy papilla; on eyeball, minute, in four or five rows on upper margin. Pores: on lateral line, about 25, small, elevated. Colour: creamy yellow on dorsal surface, barred with dark brown streaks passing downward and forward; creamy yellow to pale red on ventral surface; creamy brown on head with dark brown blotches; dark streaks around eye extending onto cornea; clear coral red margined with crimson on rayed dorsal, pectoral, anal and caudal fins; orange on exserted rays of pectoral fins and on pelvic fins; black spots scattered on spinous dorsal fin and in series at base of each ray of rayed dorsal fin.

Length to 3 inches.

Distinguished by the large head with the prominent fronto-parietal ridges,

the prolonged snout, the restricted gill openings, the greatly exserted lower rays of the large pectoral fins and the brown and cream coloration.

The grunt-fish was first taken in British Columbia waters at Fort Rupert by H.M.S. *Plumper* and the British Museum obtained the specimen by purchase. This was described in 1874 by A. Günther as the type of a new genus and species. The grunt-fish occurs along the whole coast in tide-pools and shallow water usually

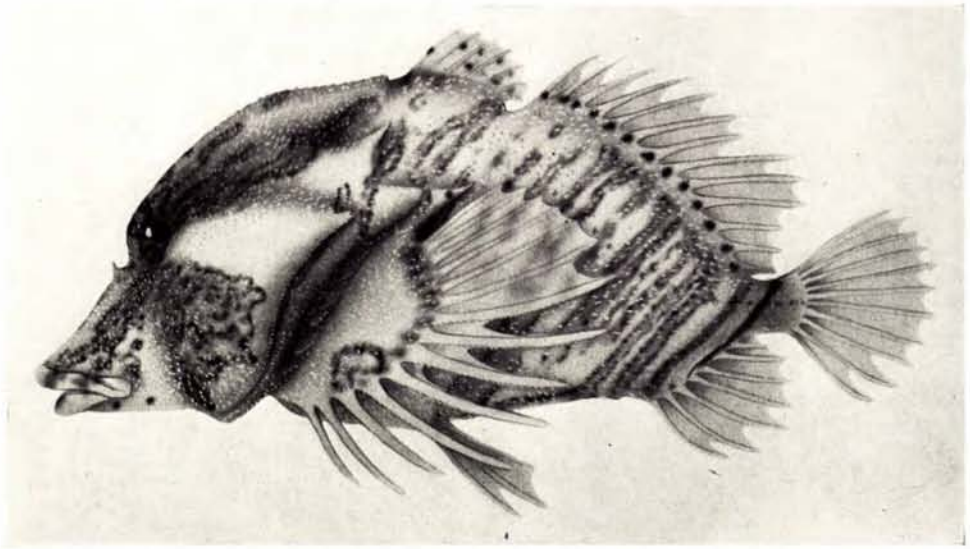

FIGURE 203. Grunt-fish. *Rhamphocottus richardsoni* Günther 1874

along rocky shores but it has been secured in seines on sandy beaches and in trawls down to a depth of 90 fathoms. The food consists to some extent of small crustaceans. This bizarre highly-coloured fish is, perhaps, the comedian amongst fishes. It crawls deliberately over rocks and seaweeds on its long pectoral fin rays, using them as "fingers" and turns its head slowly from side to side. When it rolls its eyes independently of one another, suddenly bringing the dark streaks on the eyeball alternate with those surrounding it, the observer has the feeling that he has been winked at. When removed from the water this fish makes a half grunt, half hissing sound, hence the name grunt-fish.

Range northern California to northwestern Alaska.

Family AGONIDAE — Sea-poachers

In the sea-poachers the body is completely covered with an armour of bony plates which do not overlap and do not have free margins. The pelvic fins are thoracic, each with 1 spine and 2 rays, and are frequently shorter in the female than in the male.

The sea-poachers are distributed, for the most part, in the cold waters of northern regions, living on rocky or muddy bottoms at depths ranging from 10 to 339 fathoms and are seldom taken except in the trawls of commercial fishermen or of scientific expeditions. Two species, however, are found occasionally in tide-pools.

Four-horned sea-poacher

Hypsagonus quadricornis (Cuvier and Valenciennes) 1829

Body elongate, stout anteriorly, compressed; outline rising abruptly at origin of spinous dorsal fin, rising slightly before origin of rayed dorsal fin. Head somewhat compressed, slightly depressed at occiput; mouth terminal, small; lower jaw projecting; snout bluntly rounded; eye large, elevated; cranial ridges high; spines:

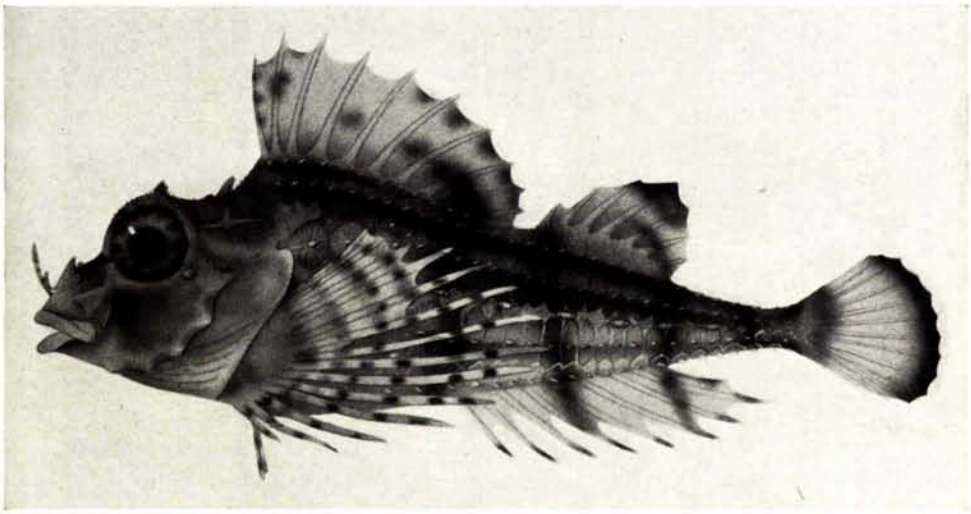

FIGURE 204. Four-horned sea-poacher. *Hypsagonus quadricornis* (Cuvier and Valenciennes) 1829

nasal, sharp, curved; frontal, erect; preopercular, 4, blunt; gill membranes united, free from isthmus. Fins: dorsal (2), IX to XI — 6 or 7; anal, 9 or 10; pelvic, I, 2, thoracic; caudal, asymmetrically rounded. Lateral line: nearly straight. Plates: on body, spinous. Pores: on lateral line, 15 to 19, first single, remainder paired, each pair, separated by spine, on body plate. Cirri: nasal, single, median, elongate, sometimes branched. Colour: senna brown with various markings of yellow to carmine on dorsal surface; paler on ventral surface; brown to black bars across body and fins, several, narrow; black on posterior margin of caudal fin.

Length to 2½ inches.

Distinguished by the stout body with spinous plates, the high-set eyes, the prominent spines on the top of the head, the prominent elevation of the body

under the spinous dorsal fin, the gill membranes free from the isthmus and the elongate cirrus on the snout.

The four-horned sea-poacher was first taken in British Columbia waters September 4, 1891, in Juan de Fuca strait by the *Albatross*, station 3465, lat. 48° 21′ N., long. 123° 14′ W., depth 48 fathoms, recorded in 1895 by C. H. Gilbert. Two other individuals, also obtained by the *Albatross*, were secured June 19, 1903, in Queen Charlotte strait off Fort Rupert, station 4204, at a depth of 69 fathoms. The species occurs in shallow water, including tide-pools, and at depths down to 70 fathoms. A hydroid, *Perigonimus pugetensis* Heath, is found frequently in large numbers on this fish giving it a somewhat plumose appearance.

Range Puget sound to northwestern Alaska.

Warty sea-poacher *Occa verrucosa* (Lockington) 1880

Body elongate, stout anteriorly. Head depressed; mouth terminal, small; lower jaw prominently projecting; snout bluntly rounded; eye moderate; cranial ridges, low; spines: nasal small, sharp; others minute or absent; gill membranes united, free from isthmus. Fins: dorsal (2), VII to IX — 7 or 8; anal, 10 to 12;

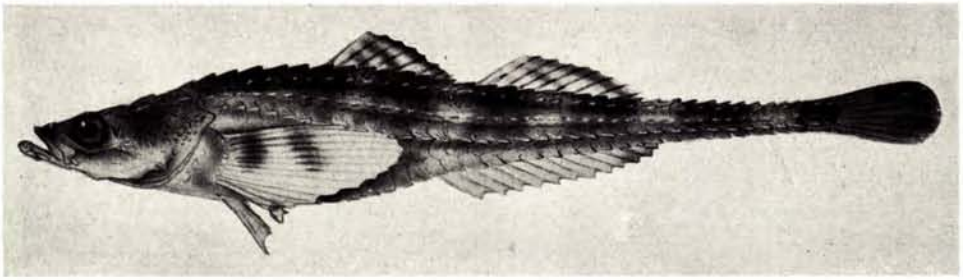

FIGURE 205. Warty sea-poacher. *Occa verrucosa* (Lockington) 1880

pelvic, I, 2, thoracic; caudal, rounded. Lateral line: nearly straight. Plates on body: spinous on ridges, smooth elsewhere. Pores: on lateral line, 36 to 38, single. Cirri: near posterior tip of maxillary, 1. Colour: dark gray or light brown on dorsal surface; paler on ventral surface; brownish black saddle-like markings in series of six or more across back and sides; dusky on dorsal fins, black on caudal fin; pectoral fins washed with orange, dark blotches on upper portion, 2. In male, orange yellow on pelvic fins; in female, pale.

Length to 8 inches.

Distinguished by the prominently projecting lower jaw, the weakly developed spines on the top of the head and the gill membranes free from the isthmus.

The warty sea-poacher was first taken in British Columbia waters August 20, 1945, in Wickaninnish bay off Florencia island by Mr. W. E. Barraclough and the three specimens are now in the collection of the Pacific Biological Station.

This is the first record known from north of Oregon. The species occurs in waters from 11 to 36 fathoms.

Range California to Vancouver island.

Sturgeon-like sea-poacher *Agonus acipenserinus* Tilesius 1811

Body elongate, moderately stout anteriorly, general appearance somewhat sturgeon-like. Head large; mouth ventral, weakly protrusible; snout depressed, broadly pointed; spines: on tip of snout, 4, sharp, naked, anterior pair horizontal, parallel, posterior pair directed backward; nasal, sharp, sometimes multifid;

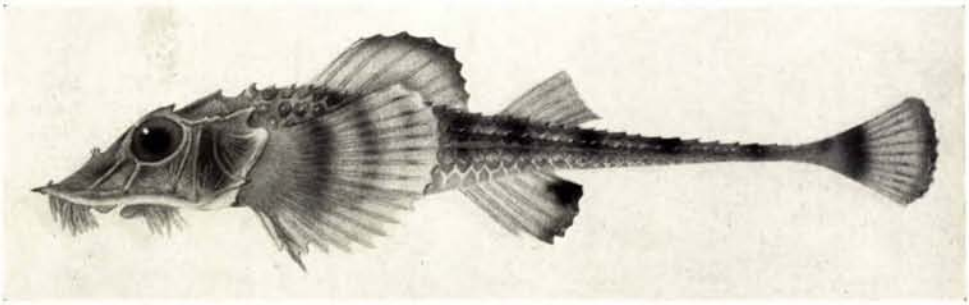

FIGURE 206. Sturgeon-like sea-poacher. *Agonus acipenserinus* Tilesius 1811

frontal, sharp, slightly curved; gill membranes united, joined to isthmus with narrow fold posteriorly. Anus immediately behind bases of pelvic fins. Fins: dorsal (2), VIII to X — 7 to 9; anal, 6 to 9; pelvic, I, 2, thoracic, in male length about equal to that of snout, in female length about half that of snout; caudal, truncate to rounded. Lateral line: high anteriorly, sharply decurved, then straight. Plates: on body spinous; on caudal peduncle, weakly spinous in older individuals. Pores: on lateral line, 37 to 40. Cirri: large, in two groups on each lower side of snout, outer simple, inner multifid; in group at each angle of mouth, on broad pedicel. Colour: light grayish brown on dorsal surface; light yellow to orange on ventral surface; orange spot under each eye; brownish black saddle-like markings in series of six or more across back and sides, with intermediate narrow brownish black streaks; dusky on dorsal, pectoral and caudal fins; obscurely barred on pectoral and caudal fins; creamy white on pelvic fins, sometimes black tipped in male; creamy white on anal fin with brownish black blotch near posterior tip.

Length to 12 inches.

Distinguished by the sturgeon-like appearance, the four sharp naked spines at the tip of the snout, the inferior mouth and the large clusters of elongate cirri below the snout and on pedicels at each angle of the mouth.

The sturgeon-like sea-poacher was first taken in British Columbia waters near Vancouver island by H.M.S. *Plumper* and was presented to the British

Museum by the Lords of the Admiralty where it was identified and recorded in 1860 by A. Günther. In 1881, T. H. Bean recorded this species from Vancouver island as *Podothecus acipenserinus* (Pallas). This sea-poacher is common along the whole coast of the province with records from Victoria and English bay to Graham island at Rose spit. It is obtained chiefly in shrimp trawls on muddy bottoms and is probably the commonest sea-poacher in waters between 10 and 30 fathoms. The food consists in part of crustaceans and marine worms.

Range Puget sound to northwestern Alaska.

Window-tailed sea-poacher *Averruncus emmelane* Jordan and Starks 1895

Body elongate, moderately stout anteriorly. Head moderate; mouth subterminal, small; snout depressed, narrowly pointed, with median pit near tip; spines: on tip of snout, 4, anterior pair directed forward and upward, covered with skin, posterior pair sharp, naked, directed backward; nasal, sharp, sometimes

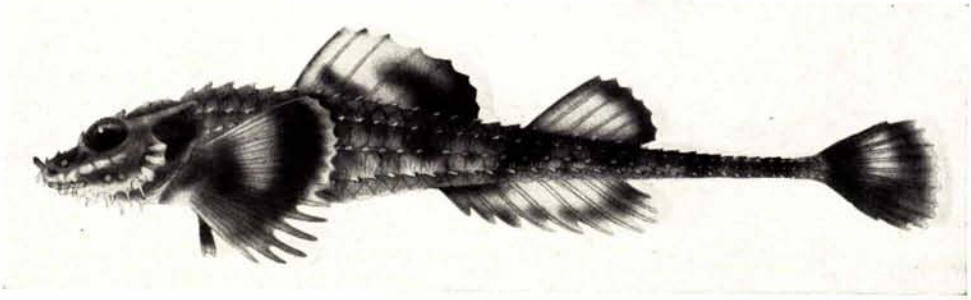

FIGURE 207. Window-tailed sea-poacher. *Averruncus emmelane* Jordan and Starks 1895

multifid; prefrontal, multifid; frontal, blunt; on eyeball in three or four rows, variable in number and size; occipital pit with slight longitudinal median ridge; gill membranes united, joined to isthmus. Anus behind bases of pelvic fins by width of two plates. Fins: dorsal (2), VIII to XI — 7 or 8; anal, 10 to 12; pelvic, I, 2, thoracic, in male, extending well beyond anus, in female, extending barely beyond anus; pectoral, broad, lower rays exserted; caudal, rounded. Lateral line: nearly straight. Plates: on body spinous; on caudal peduncle, weakly spinous in older individuals. Pores on lateral line: 38 to 42. Cirri: simple, small; in rows on lower side of snout, lower jaw and branchiostegal membranes. Colour: light brown on dorsal surface; white to brownish white on ventral surface; dark brown to black saddle-like markings in series of six or more across back and sides; black on tip of snout; black and white on all fins; white on tips of pectoral, pelvic, anal and caudal fins; conspicuous semi-transparent light spot, not reaching margin, on caudal fin.

Length to 8 inches.

Distinguished by the pointed snout with the two blunt skin-covered spines, the slightly inferior mouth, the small cirri in rows below the snout, on the lower

jaw and on the branchiostegal membranes and the conspicuous semi-transparent light spot on the caudal fin not reaching the margin.

The window-tailed sea-poacher was first taken in British Columbia waters March 20, 1907, at Mayne island and the single specimen is now in the collection of fishes at the Pacific Biological Station. In 1908 two individuals were obtained at Esquimalt and these are now in the Provincial Museum at Victoria. The first published record of the species from the province is that of three specimens secured in June and July, 1909, at Ucluelet, by Messrs. C. H. Young and W. Spreadborough at a depth of 30 fathoms and recorded in 1920 by B. A. Bean and A. C. Weed. The window-tailed sea-poacher is common in the strait of Georgia and Burrard inlet and it also has been found at Victoria and off the west coast of Vancouver island. One individual from the latter locality was removed from the stomach of a handsaw-fish, *Alepidosaurus aesculapius*. This sea-poacher is taken frequently in shrimp trawls on muddy bottoms at depths between 10 and 75 fathoms.

Range southern California to southeastern Alaska.

Black-finned sea-poacher *Bathyagonus nigripinnis* Gilbert 1890

Body elongate, slender. Head somewhat depressed; mouth terminal, small; lower jaw projecting; snout depressed, broadly rounded; rostral plate terminal, movable; spines: on rostral plate, 5, minute, upright, diverging; nasal, small, sharp, recurved; frontal, small, erect; on eyeball, absent; gill membranes united,

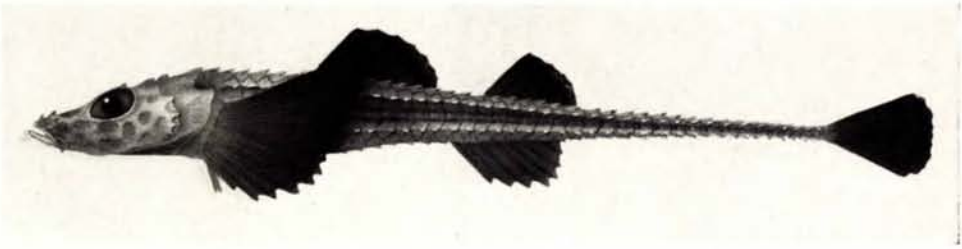

FIGURE 208. Black-finned sea-poacher. *Bathyagonus nigripinnis* Gilbert 1890

broadly joined to isthmus. Fins: dorsal (2), VI to VIII — 6 or 7; anal, 7 to 9; pelvic, I, 2, thoracic; pectoral, broad; caudal, truncate to rounded. Lateral line: nearly straight. Plates: on body spinous, except ventral series behind anal fin. Pores: on lateral line, 40 to 44; on suborbital and dentary bones, large. Cirri: near posterior tip of maxillary, 2. Colour: light brown on dorsal surface; dusky light brown on ventral surface; blue black on ventral surface of head; intensely blue black on all fins.

Length to 8 inches.

Distinguished by the blue black fins, the broadly rounded snout and the protruding lower jaw.

The black-finned sea-poacher was first taken in British Columbia waters June 19, 1903, in Nanaimo harbour by the *Albatross*, station 4191, lat. 49° 11′ N., long. 123° 54′ W., depth 54 fathoms, and recorded in 1907 by B. W. Evermann and E. L. Goldsborough. It has been secured only in the vicinity of the strait of Georgia at depths ranging from 50 to 230 fathoms. It is known to occur at much greater depths off the coasts of Washington and Alaska and even to 682 fathoms off Kamchatka. In English bay and in Burrard inlet at Bedwell bay it is captured frequently in shrimp trawls when operated at 50 fathoms and lower.

Range Washington to northwestern Alaska.

Pigmy sea-poacher *Odontopyxis trispinosus* Lockington 1879

Body elongate, slender. Head somewhat depressed; mouth terminal, small; jaws about equal; snout depressed, narrowly pointed; rostral plate terminal, movable; spines: on rostral plate, 1, small, upright; nasal, sharp; frontal, strongly recurved; on eyeball, 3 to 5, in single row; occipital pit shallow to deep, with

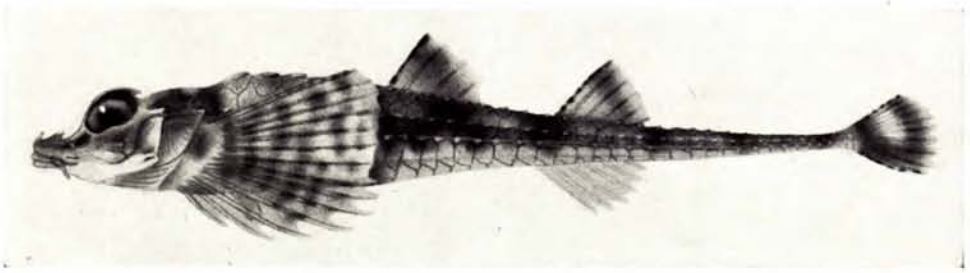

FIGURE 209. Pigmy sea-poacher. *Odontopyxis trispinosus* Lockington 1879

slight median longitudinal ridge; gill membranes united, joined to isthmus. Fins: dorsal (2), III to VI — 6 or 7; anal, 5 to 7; pelvic, I, 2, thoracic; pectoral broad, lower 5 to 7 rays exserted; caudal, rounded. Lateral line: decurved anteriorly, then straight, wavy posteriorly. Plates: on body, spinous; dorso-lateral ridges usually separate, continuous on either side of spinous dorsal fin to occiput, in some individuals ridges join on median line anterior to spinous dorsal fin for short distance but separate posterior to occiput. Pores: on lateral line, 35 to 38. Cirri: near posterior tip of maxillary, 1, small. Colour: gray to olive green on dorsal surface; lighter on ventral surface; brownish black saddle-like markings in series of six or more across back and sides; dusky on dorsal and caudal fins with white on margin; black and brown in narrow bars on pectoral fins; white on pelvic and anal fins.

Length to 3⅛ inches.

Distinguished by the small slender body, the pointed snout with the single upright rostral spine and the partially-divided occipital pit.

The pigmy sea-poacher was first taken in British Columbia waters June 20, 1903, in the strait of Georgia near Bowen island by the *Albatross*, station 4193,

lat. 49° 20′ N., long. 123° 43′ W., depth 23 fathoms and recorded in 1907 by B. W. Evermann and E. L. Goldsborough. It is common in the strait of Georgia, Burrard inlet and Nanoose bay and has been collected at Ucluelet. The pigmy sea-poacher inhabits sandy or rocky bottoms and is taken in shrimp trawls at depths from 10 to 40 fathoms. In California waters it has been recorded as being found at depths down to 204 fathoms.

Range southern California to southeastern Alaska.

Deep-pitted sea-poacher *Bothragonus swanii* (Steindachner) 1877

Body elongate, stout anteriorly, compressed posteriorly. Head large, depressed, broad posteriorly; mouth terminal, small; jaws about equal; snout bluntly pointed; rostral plate terminal, rigid, bluntly rounded; spines: absent from rostral plate and nasal bones; on eyeball, small, sharp, in two rows, middle spine of lower row large; occipital pit very large, deep, depth nearly half that of head, transverse, somewhat oval, spinous processes several, small, blunt, extending from posterior margin into cavity; gill membranes united, broadly joined to isthmus. Fins: dorsal (2), III — 5, small; anal, 5; pelvic, I, 2, thoracic; caudal,

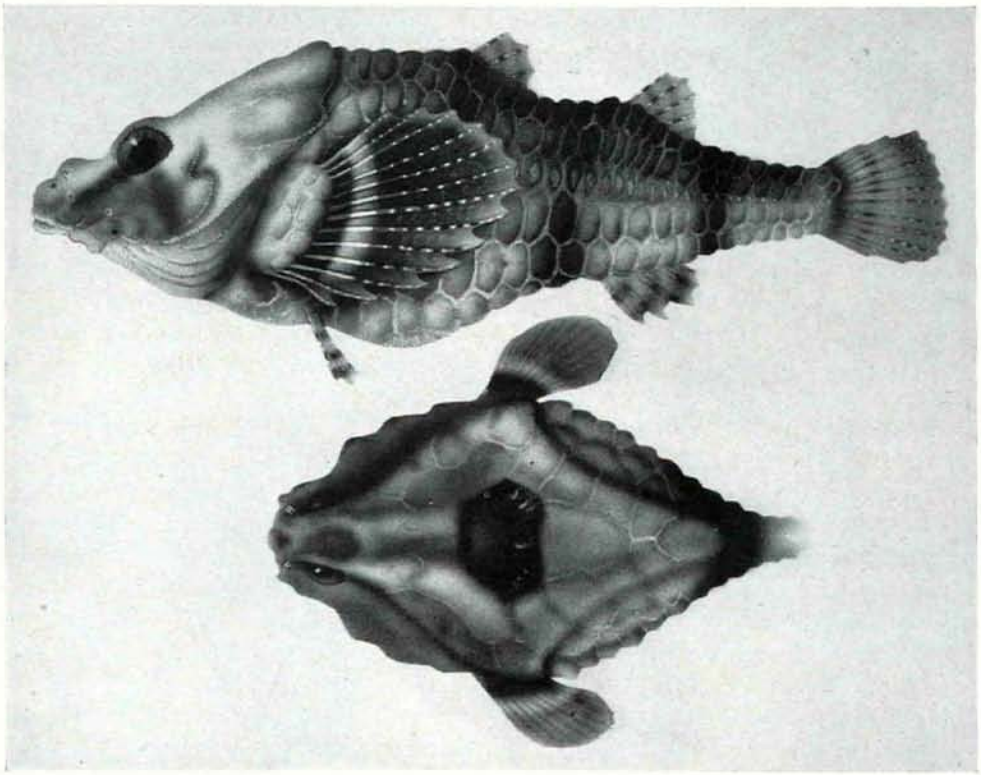

FIGURE 210. Deep-pitted sea-poacher. *Bothragonus swanii* (Steindachner) 1877

rounded. Lateral line: high anteriorly, decurved, then straight. Plates: on body, smooth; on head very bluntly rounded; on isthmus and branchiostegals, small, elevated. Pores: on lateral line, about 32. Cirri: on lips numerous, short, filamentous; on dentary pores, in rows; on isthmus, scattered. Colour: brown with black bars, orange with bluish bars or scarlet with brown bars, coloration very variable corresponding to environment; brown to black bars on dorsal, pelvic, anal and caudal fins; brown to black on pectoral fins, white band near base of each, prominent; white spots along rays of all fins.

Length to 2½ inches.

Distinguished by the stout body, the smooth plates and the broad head with the large cavity on the top.

The deep-pitted sea-poacher was first taken in British Columbia waters in the summer of 1909, when four specimens from 1¾ inches to 2¼ inches in length were collected at Ucluelet by Messrs. C. H. Young and W. Spreadborough and recorded in 1920 by B. A. Bean and A. C. Weed. Other individuals have been obtained from William head, Quatsino and Port Hardy in tide-pools.

Range Washington to Queen Charlotte strait.

Black-tipped sea-poacher *Xenopyxis latifrons* (Gilbert) 1890

Body elongate, slender. Head somewhat depressed; mouth terminal, small; jaws about equal; snout pointed; rostral plate small, terminal, rigid; spines: on rostral plate, 1, large, curved, upright; nasal, sharp, diverging; frontal, sharp; on eyeball, 3 to 5, well developed, sharp, in single row; gill membranes united,

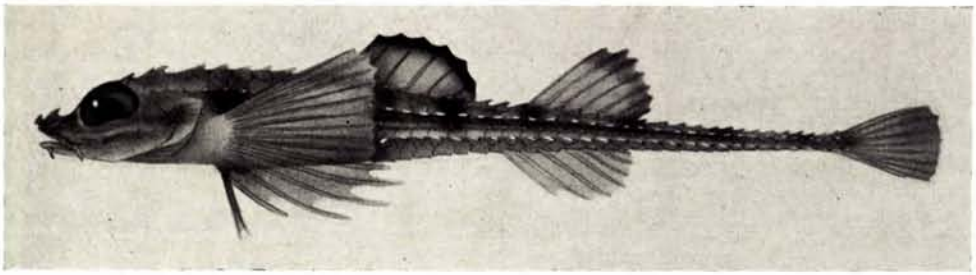

FIGURE 211. Black-tipped sea-poacher. *Xenopyxis latifrons* (Gilbert) 1890

joined to isthmus with free fold posteriorly. Fins: dorsal (2), VI or VII — 6 to 8; anal, 7 to 9; pelvic, I, 2, thoracic; pectoral, frequently with some of lower rays exserted; caudal, truncate to rounded. Lateral line: high anteriorly, sharply decurved, then straight. Plates: on body spinous except on ventral surface behind anal fin. Pores: on lateral line, 39 to 41. Cirri: near posterior tip of maxillary, 1, stout; near anterior tips of dentaries, 4, small. Colour: light brown on dorsal surface; lighter brown to cream on ventral surface; dark brown saddle-like markings in series of seven or eight across back and sides; pale brownish gray

on all fins; jet black on margin of spinous dorsal fin; dusky on margins of rayed dorsal and caudal fins.

Length to 7½ inches.

Distinguished by the single large rigid rostral spine and the black margin on the spinous dorsal fin.

The black-tipped sea-poacher was first taken in British Columbia waters June 20, 1903, in the strait of Georgia off Bowen island by the *Albatross*, station 4193, lat. 49° 20′ N., long. 123° 43′ W., depth 23 fathoms. This capture was recorded in 1907 by B. W. Evermann and E. L. Goldsborough as *Xenochirus pentacanthus* Gilbert. The error was discovered upon re-examination of the specimen by Dr. L. P. Schultz of the United States National Museum. The black-tipped sea-poacher is fairly common in southern British Columbia waters. It has been taken at Ucluelet, Porlier pass and in Northumberland channel at a depth of 60 fathoms, not infrequently in Burrard inlet and English bay from 10 to 50 fathoms. An individual was obtained April 20, 1933, in Sechelt inlet at Narrows arm from about 45 fathoms in water low in oxygen and having a strong odour of hydrogen sulphide. In California waters it has been recorded at depths from 50 to 218 fathoms.

Range southern California to southern British Columbia.

Gray star-snout *Asterotheca alascana* (Gilbert) 1895

Body elongate, slender. Head somewhat depressed; mouth terminal, small; jaws about equal; snout moderately pointed; rostral plate small, terminal, erect, movable; spines: on rostral plate, 5 or more, small, in form of star, three diverging upward, backward, one at each lower lateral angle, one or two additional spines

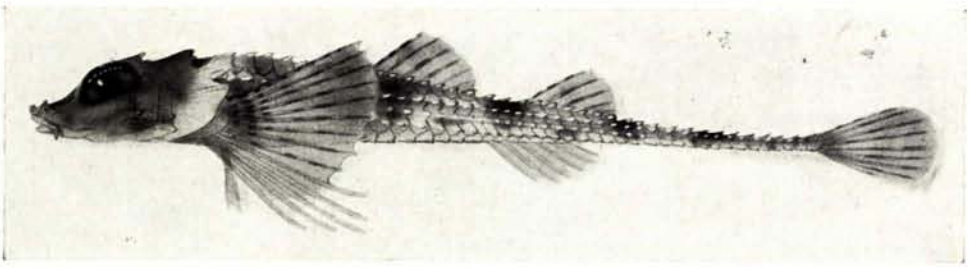

FIGURE 212. Gray star-snout. *Asterotheca alascana* (Gilbert) 1895

usually projecting downward between lateral spines; nasal, sharp; frontal, sharp; lacrymal, absent; on eyeball, 6 to 8, in single row; occipital pit moderately deep, transverse; gill membranes united, joined to isthmus, without free fold posteriorly. Fins: dorsal (2), V to VIII — 5 to 8, small, weak; anal, 6 to 8, origin below interspace between dorsal fins; pelvic, I, 2, thoracic; pectoral, broad, lower rays exserted; caudal, rounded. Lateral line: high anteriorly, sharply decurved, then

straight. Plates: on body, spinous; on ventrolateral series, spines absent; on lower lateral series, spines weak. Pores: on lateral line, 39 or 40. Cirri: at posterior tip of maxillary, 2, large; near anterior tips of dentaries, 2, small. Colour: greenish gray to light greenish brown on dorsal surface; very light brown on ventral surface; dark brown saddle-like markings in series of five or six across back and sides; dark brown bars on pectoral, dorsal and caudal fins; white on pelvic and anal fins.

Length to 5 inches.

Distinguished by the erect movable many-spined rostral plate, the absence of spines from the lacrymal bones and the anal fin origin below the interspace between the dorsal fins.

The gray star-snout was first taken in British Columbia waters August 27, 1891, in Juan de Fuca strait west of Race rocks, by the *Albatross*, station 3445, lat. 48° 16′ N., long. 123° 45′ W., depth 100 fathoms and was recorded in 1895 by C. H. Gilbert as *Xenochirus alascanus* Gilbert. The species is common along the coast and is captured frequently in Burrard inlet and English bay in shrimp trawls at depths ranging from 10 to 30 fathoms. It has been taken off Graham island in Rennell sound by the *Wm. J. Stewart* at 60 fathoms.

Range Puget sound to northwestern Alaska.

Spiny-cheeked star-snout *Asterotheca infraspinata* (Gilbert) 1904

Body elongate, slender. Head somewhat depressed; mouth terminal, small; jaws about equal; snout moderately pointed; rostral plate small, terminal, erect, movable; spines: on rostral plate, 5 or more, small, in form of star, three diverging upward, backward, one at each lateral angle, one or two additional spines usually

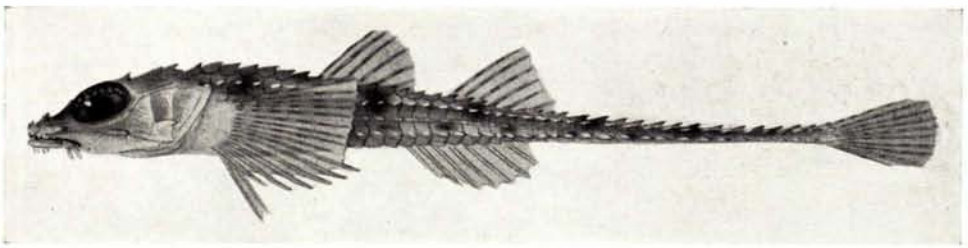

FIGURE 213. Spiny-cheeked star-snout. *Asterotheca infraspinata* (Gilbert) 1904

projecting downward between lateral spines; nasal, sharp; frontal, blunt; lacrymal, 3 or more, sharp; on eyeball, 5 to 7, low, blunt, in single row; occipital pit transverse, very shallow; gill membranes united, joined to isthmus with slight free fold posteriorly. Fins: dorsal (2), V to VIII — 5 to 8, small, weak; anal, 6 to 8, origin below insertion of spinous dorsal fin; pelvic, I, 2, thoracic; pectoral, broad, lower rays exserted; caudal, rounded. Lateral line: high anteriorly, sharply decurved, then straight. Plates: on body, spinous; on anterior of ventrolateral series, spines

short, strong; on lower lateral series, spines strong, anterior five or six only smooth. Pores: on lateral line, 37 to 39. Cirri: at posterior tip of maxillary, 2, large; near anterior tips of dentaries, 2, small. Colour: light olive green to light brown on dorsal surface; white on ventral surface; dark brown saddle-like markings in series of five or six across back and sides; dark brown bars on pectoral, dorsal and caudal fins; white on pelvic and anal fins.

Length to 4½ inches.

Distinguished by the erect movable many-spined rostral plate, the spines on the lacrymal bones and the anal fin origin below the insertion of the spinous dorsal fin.

The spiny-cheeked star-snout was first taken in British Columbia waters September 19, 1913, at Nanoose bay and the specimen is now in the fish collection of the Pacific Biological Station. It has also been obtained off the west coast of Vancouver island, at Porlier pass, Boat harbour and Burrard inlet. The depths range from 10 to 30 fathoms.

Range Washington to northwestern Alaska.

Smooth sea-poacher *Anoplagonus inermis* (Günther) 1860

Body elongate, slender, depressed anteriorly. Head depressed, broad; mouth terminal, very small; jaws about equal; snout roundly pointed; rostral plate, small; spines: on upper tip of operculum in patch, small, conical; gill membranes narrowly joined to isthmus with free fold posteriorly. Fins: dorsal

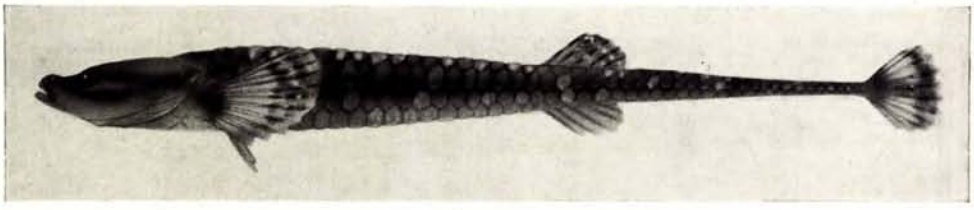

FIGURE 214. Smooth sea-poacher. *Anoplagonus inermis* (Günther) 1860

(1), 5 or 6; anal, 4 or 5, origin below that of dorsal fin; pelvic, I, 2, thoracic; pectoral, small; caudal, rounded. Lateral line: high anteriorly, decurved, then straight. Plates: on body, without spines. Pores: on lateral line, 41 to 44. Cirri: absent. Colour: brown on dorsal surface; brownish gray on ventral surface; black band from mouth across cheek to pectoral fin, continuing, with interruptions, along body; dusky mottling and spotting on posterior half of dorsal fin; dark brown bars on pectoral, dorsal and caudal fins; brown spots minute on anal fin; white on pelvic fins; white band near base of each pectoral fin; semi-translucent patches near base of caudal fin, 2.

Length to 5 inches.

Distinguished by the slender body covered with smooth plates, the single rayed dorsal fin immediately above the anal fin and the two light patches on the caudal fin.

The smooth sea-poacher was first taken in British Columbia waters near Victoria by H.M.S. *Plumper*. The single specimen obtained was 32½ lines (2 7/10 inches), in length, was described in 1860 by A. Günther as the type of a new genus and species, *Aspidophoroides inermis*, and deposited in the British Museum. The smooth sea-poacher has since been secured in Nanoose bay and is common in English bay and Burrard inlet. It is taken by shrimp trawls near and on rocky bottoms at depths between 15 and 30 fathoms.

Range Washington to northwestern Alaska.

Family CYCLOPTERIDAE — Lump-suckers

In the lump-suckers the body is short and stout with a thick skin in which usually are embedded plates with spines or tubercles. The dorsal fins are usually two, short, the first spinous and the second rayed, the spinous dorsal is sometimes absent; the anal fin is short; the rayed dorsal and anal fins are separate from the caudal; the pelvic fins are thoracic and modified to form an adhesive disk.

The lump-suckers are fishes of the colder northern seas, mostly of Arctic distribution. Because of their body form they are slow-moving and attach themselves to rocks, frequently in currents. The food consists of worms, crustaceans and even small fishes. Their eggs are deposited in masses among rocks and guarded by the male until hatched.

The species are fairly numerous and at least one reaches a length of 23 inches.

Spiny lump-sucker — *Eumicrotremus orbis* (Günther) 1861

Body short, deep, stout anteriorly, compressed posteriorly. Head globular, bluntly rounded; mouth terminal, small; snout broad, profile steep; nostrils paired, tubular; interorbital space flat, broad; opercular opening small, above base of pectoral fin. Fins: dorsal (2), VI or VII — 9 to 11; anal, 8 to 11; pelvic, thoracic, modified into large adhesive disk with fringed thickened margin; caudal, truncate to rounded. Lateral line: absent. Scales: in form of spinous conical tubercles of various sizes, scattered on body, head and spinous dorsal fin. Cirri: in series below and behind lower jaw. Colour: light to dark green, sometimes light brown, on dorsal surface; light brown or plum on ventral surface; lavender on lips.

Length to 5 inches.

Distinguished by the short body and globular head, the conical spinous tubercles and the adhesive pelvic disk with the thickened fringed margin.

The spiny lump-sucker was first taken in British Columbia waters at Esquimalt by H.M.S. *Plumper* and presented to the British Museum by Lord John Russell. It was a small specimen, 22 lines in length (1 5/6 inches), and was described in 1861 by A. Günther as the type of a new species, *Cyclopterus orbis*.

The species was recorded by Ashdown Green as *Cyclopterus spinosus* and by Bean and Weed as *Eumicrotremus spinosus* (Müller), thus considering the Pacific and Atlantic species identical. The spiny lump-sucker is taken frequently in shrimp trawls in Burrard inlet and English bay in rocky localities. It has also been

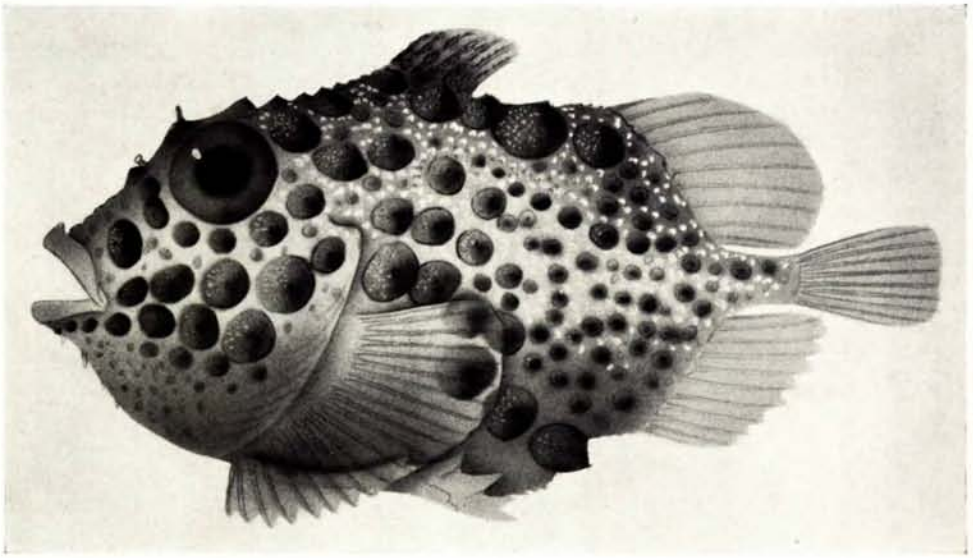

FIGURE 215. Spiny lump-sucker. *Eumicrotremus orbis* (Günther) 1861

obtained at low tide in the Nanaimo area, in Wickaninnish bay north of Ucluelet, around the Queen Charlotte islands and in Nass harbour. Three individuals from Alaska were secured from the stomach of a handsaw-fish, *Alepidosaurus aesculapius*. These lump-suckers have frequently been observed attached to rocks in fast-moving tidal waters at extremely low tide and they have been recorded from a depth of 80 fathoms.

Range Puget sound to northwestern Alaska.

Family LIPARIDAE — Liparids

In the liparids the body is elongate, usually with thin loose skin and usually without scales. The dorsal fin is long, the anterior portion of which is supported by very weak spines, which are not countable without dissection, and the posterior portion supported by rays; the spines and rays are not distinguished herein and are recorded as rays; the anal fin is long; the dorsal and anal fins usually reach to or extend onto the caudal fin; the pelvic fins, when present, are thoracic and modified to form an adhesive disk.

The species range from shallow intertidal waters to depths as great as 2,000 fathoms. In the shallow-water group the eye is small, the gill opening is long,

the disk is large and thoracic, the anus is slightly in advance of the anal fin and the colours are shades of brown variously marked with stripes and mottlings. In the deep-water group the eye is large, the gill opening is short, the disk is progressively more anterior and smaller and in some species is absent, and the anus moves forward, corresponding to the advance of the disk, until in some species the disk disappears and the anus is so far advanced in position as to be located below the vertical from the eyes.

In the very deep-water species the skin is very thin, loose and translucent to transparent, white to pale pink in colour, while the flesh is pink to jet black. Although *Nectoliparis pelagicus* has previously been considered to belong to the deep-water fauna, specimens have been taken in waters where the bottom is less than 40 fathoms.

The liparids are widely distributed in the colder north temperate waters and the Arctic and Antarctic seas.

Approximately thirteen genera and over one hundred and fifteen species are known.

Ring-tailed liparid *Liparis rutteri* (Gilbert and Snyder) 1898

Body elongate, terete anteriorly, compressed posteriorly. Head depressed, broad; mouth terminal, small; lower jaw included; teeth trilobed; snout bluntly rounded; nostril double; eye diameter 6 to 7 in length of head; gill opening entirely above base of pectoral fin. Skin: very loose. Fins: dorsal (1), 30 to 32, low,

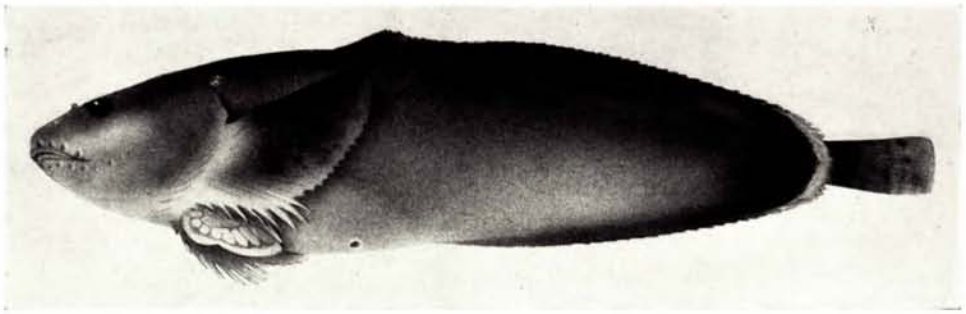

FIGURE 216. Ring-tailed liparid. *Liparis rutteri* (Gilbert and Snyder) 1898

lobed anteriorly, just reaching base of caudal fin; anal, 23 to 27, extending onto caudal fin about one-fifth to one-sixth length of caudal fin; pelvic adhesive disk, thoracic, nearly circular, margin thickened, length 1.4 to 1.8 in length of head, posterior margin behind vertical from gill opening; pectoral, 30 to 33, lobed, lower rays slightly exserted; caudal, truncate to rounded. Lateral line: absent. Scales: absent. Pyloric caeca: 23 to 31. Colour: jet black to bluish slate or brown; white band across base of caudal fin extending to posterior tips of dorsal and anal fins; somewhat white sometimes on margins of dorsal, pectoral and anal fins; light brown irregular longitudinal stripes sometimes present.

Length to 4½ inches.

Distinguished by the small gill openings above the pectoral fins, the white band across the base of the caudal fin and the large adhesive pelvic disk.

The ring-tailed liparid was first taken in British Columbia waters in July, 1909, at Ucluelet by Messrs. C. H. Young and W. Spreadborough. Twelve specimens were secured up to 2½ inches in length, and recorded in 1920 by B. A. Bean and A. C. Weed as *Neoliparis rutteri* Gilbert and Snyder. In February, 1934, five specimens were obtained in Burrard inlet at a depth between 10 and 12 fathoms, and December 10, 1940, a single individual was secured in English bay in a shrimp trawl at a depth between 30 and 40 fathoms. It is a moderately shallow-water species.

Range Oregon to northwestern Alaska.

Pallas's liparid *Liparis callyodon* (Pallas) 1811

Body elongate, stout anteriorly, compressed posteriorly. Head somewhat depressed; mouth terminal, small; lower jaw included; teeth trilobed; snout bluntly rounded; nostril double; eye diameter 6 to 7 in length of head; gill opening above pectoral fin, or at most not below first ray of pectoral fin. Skin: loose.

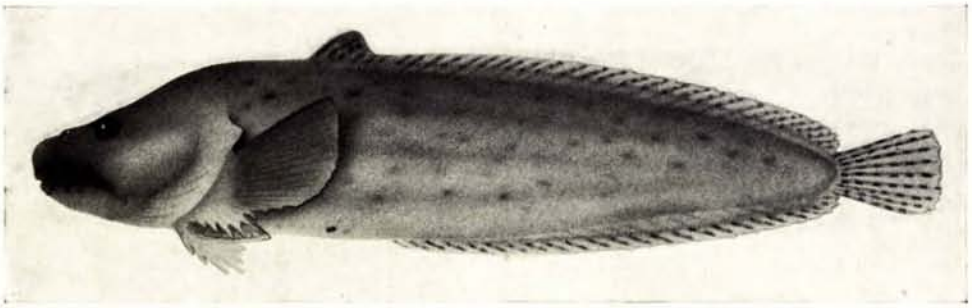

FIGURE 217. Pallas's liparid. *Liparis callyodon* (Pallas) 1811

Fins: dorsal (1), 33 to 35, lobed anteriorly, just reaching base of caudal fin; anal, 25 to 27, extending onto caudal fin less than one-fifth length of caudal fin; pelvic adhesive disk thoracic, nearly circular, margin thickened, length 2.2 to 3 in length of head, posterior margin behind vertical from gill opening; pectoral, 28 to 31, lobed, lower rays slightly exserted; caudal, truncate to rounded. Lateral line: absent. Scales: absent. Pyloric caeca: 42 to 66. Colour: olive brown on body and fins, spotted with larger areas about size of pupil; dusky on chin; dark spots on rays of dorsal, anal and caudal fins forming bands.

Length to 5 inches.

Distinguished by the lobe in the dorsal fin, the very small gill openings and the dark spotting on the rays of the dorsal, anal and caudal fins.

Pallas's liparid was first taken in British Columbia waters in 1885 in Johnstone strait, Discovery passage, by Dr. G. M. Dawson and the three specimens

were recorded in 1920 by B. A. Bean and A. C. Weed as *Neoliparis callyodon* (Pallas). Other records are from the strait of Georgia and the Queen Charlotte islands. This is a shore species frequently found in tide-pools.

Range Washington to northwestern Alaska.

Shore liparid *Liparis florae* (Jordan and Starks) 1895

Body elongate, stout anteriorly, compressed posteriorly; greatest depth slightly behind origin of anal fin. Head depressed; mouth terminal, small; lower jaw included; teeth trilobed; snout bluntly rounded; nostril double; eye diameter 6 to 7 in length of head; gill opening extending downward to between third and

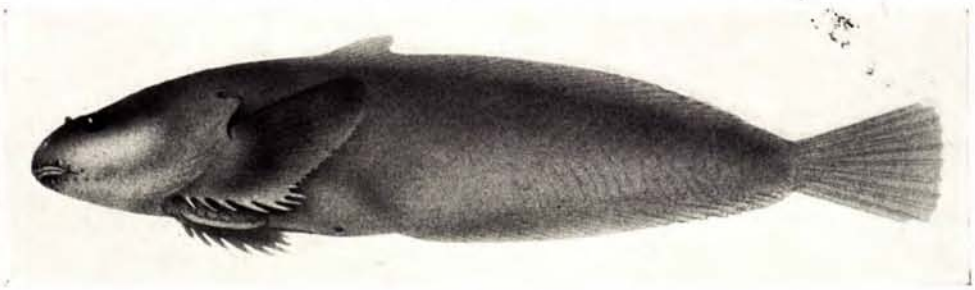

FIGURE 218. Shore liparid. *Liparis florae* (Jordan and Starks) 1895

fifth rays of pectoral fin. Skin: loose. Fins: dorsal (1), 31 to 33, lobed anteriorly, scarcely reaching caudal fin; anal, 25 to 27, scarcely reaching caudal fin; pelvic adhesive disk thoracic, slightly longer than wide, margin thickened, length 2 to 2.4 in length of head, posterior margin behind vertical from gill opening; pectoral, 29 to 33, lobed; lower rays slightly exserted; caudal, truncate to rounded. Lateral line: absent. Scales: absent. Pyloric caeca: 70 or fewer. Colour: uniform dark brown, varying from olive green to dusky purple.

Length to 5 inches.

Distinguished by the greatest depth of the body slightly behind the origin of the anal fin, the oval adhesive disk and the gill openings extending downward to between the third and fifth rays of the pectoral fins.

The shore liparid was first taken in British Columbia waters May 30, 1934, at False narrows, by Dr. W. A. Clemens and the specimen is now in the fish collection of the Pacific Biological Station. Other records are from Burrard inlet and the west coast of Vancouver island as far north as Esperanza inlet. This is a shore species whose coloration varies with the environment.

Range northern California to Esperanza inlet.

Günther's liparid *Liparis cyclopus* Günther 1861

Body elongate, stout anteriorly, compressed posteriorly; greatest depth behind posterior margin of disk. Head depressed; mouth terminal, small; lower

jaw included; teeth trilobed; snout bluntly rounded; nostril double; eye diameter 5 to 6.2 in length of head; gill opening extending downward to between fifth and tenth rays of pectoral fin. Skin: moderately firm. Fins: dorsal (1), 35 to 37, not lobed, extending onto caudal fin less than one-fifth length of caudal fin; anal, 29 to 31, extending onto caudal fin less than one-fifth length of caudal fin; pelvic adhesive disk thoracic, circular, margin thickened, length 2 to 2.5 in length of head, posterior margin behind vertical from gill opening; pectoral, 29 to 32, lobed, lower rays much exserted; caudal, truncate to rounded. Lateral line:

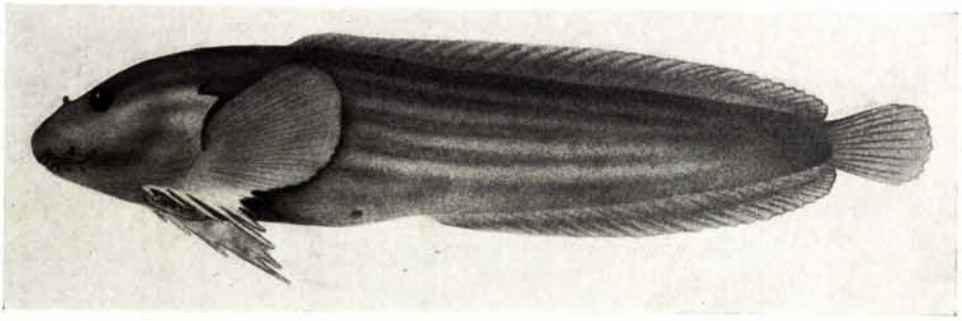

FIGURE 219. Günther's liparid. *Liparis cyclopus* Günther 1861

absent. Scales: absent. Pyloric caeca: 32 to 39. Colour: olivaceous, speckled with olive brown on body and fins; brown longitudinal stripes on body in some specimens.

Length to 4½ inches.

Distinguished by the entire dorsal fin extending onto the caudal fin for less than one-fifth length of caudal fin, the gill openings extending downward to between the fifth and tenth rays of the pectoral fins and the circular pelvic adhesive disk.

Günther's liparid was first taken in British Columbia waters in Esquimalt harbour by H.M.S. *Plumper* and presented to the British Museum by Lord John Russell. This specimen was used by Dr. A. Günther as the type and it was recorded as such in 1861. Other specimens have been secured in Juan de Fuca strait and in the Queen Charlotte islands in Massett and Skidegate inlets. The only depth recorded in these instances was 100 fathoms in Juan de Fuca strait.

Range Puget sound to northwestern Alaska.

Juan de Fuca liparid *Liparis fucensis* Gilbert 1895

Body elongate, stout anteriorly, compressed posteriorly. Head depressed; mouth terminal, small; lower jaw included; teeth trilobed; snout bluntly rounded; nostril double; eye diameter 5 to 6.5 in length of head; gill opening extending downward to point between twelfth and sixteenth rays of pectoral fin. Skin: thin, loose. Fins: dorsal (1), 33 to 35, lobed anteriorly, extending onto caudal

fin less than one-fifth length of caudal fin; anal, 27 to 29, extending onto caudal fin less than one-fifth length of caudal fin; pelvic adhesive disk thoracic, circular, margin thickened, length 2 to 3 in length of head, posterior margin behind vertical from gill opening; pectoral, 37 to 43, lobed, lower rays greatly exserted, usually extending behind anus; caudal, truncate to rounded. Lateral line: absent. Scales: absent. Pyloric caeca: 55 or fewer. Colour: olive brown to blackish brown, frequently tinged with pink, variously mottled or striped; dusky on fins; red, brown and black bars on pectoral and caudal fins.

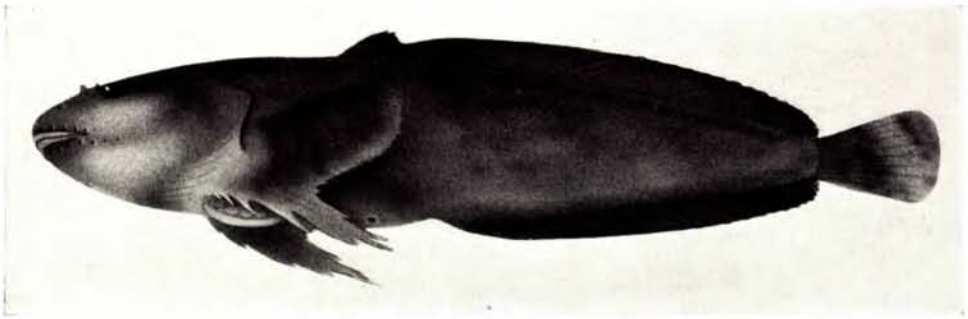

FIGURE 220. Juan de Fuca liparid. *Liparis fucensis* Gilbert 1895

Length to 7 inches.

Distinguished by the diameter of the eye 5 to 6.5 in the length of the head, the anal fin extending onto the caudal fin for less than one-fifth of the length of the caudal fin and the gill openings extending downward to between the twelfth and sixteenth rays of the pectoral fins.

The Juan de Fuca liparid was first taken in British Columbia waters August 27, 1891, in Juan de Fuca strait by the *Albatross*, station 3445, lat. 48° 16′ N., long. 123° 45′ W., depth 100 fathoms and recorded in 1895 by C. H. Gilbert. Since then it has been found in English bay, Burrard inlet, Lowe inlet and on Moresby island at Kaisun bay. It ranges from shallow water to 212 fathoms. The food consists in part of crustaceans.

Range northern California to southeastern Alaska.

Denny's liparid *Liparis dennyi* Jordan and Starks 1895

Body elongate, stout anteriorly, compressed posteriorly. Head moderately depressed; mouth terminal, small; lower jaw included; teeth trilobed; snout bluntly rounded; nostril double; eye diameter 7 to 7.5 in length of head; gill opening extending downward to point between tenth and fifteenth rays of pectoral fin. Skin: thin, loose. Fins: dorsal (1), 37 to 40, slightly lobed anteriorly (lobe usually absent in large individuals), extending onto caudal fin for about one-fifth length of caudal fin; anal, 30 to 34, extending onto caudal for about two-fifths length of caudal fin; pelvic adhesive disk thoracic, almost circular,

margin thickened, length 2.2 to 2.4 in length of head, posterior margin behind vertical from gill opening; pectoral, 36 to 39, lower rays much exserted, usually not extending to anus; caudal, truncate to rounded. Lateral line: absent. Scales: absent. Pyloric caeca: 19 to 31. Colour: olive to dark brown or black, with wavy stripes and mottlings or with white dots.

Length to 12 inches.

Distinguished by the diameter of the eye 7 to 7.5 in the length of the head, the anal fin extending onto the caudal fin for about two-fifths of the length of the

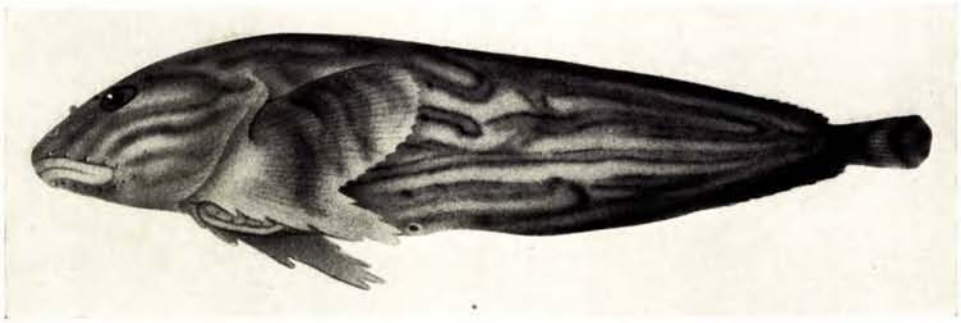

FIGURE 221. Denny's liparid. *Liparis dennyi* Jordan and Starks 1895

caudal fin and the gill openings extending downward to a point between the tenth and the fifteenth rays of the pectoral fins.

Denny's liparid was first taken in British Columbia waters August 27, 1891, in Juan de Fuca strait off Race rocks by the *Albatross*, station 3445, lat. 48° 16′ N., long. 123° 45′ W., depth 100 fathoms, and in the following month at four stations around the southern end of Vancouver island at depths from 48 to 123 fathoms. These were recorded in 1895 by C. H. Gilbert. On January 17, 1934, two 6-inch specimens were secured by trawling in Active pass at a depth of 40 fathoms. These contained mature eggs, faintly pink in colour, which flowed freely from the body. Other individuals have been obtained in English bay and Burrard inlet in shrimp trawls at depths between 10 and 20 fathoms. The food consists in part of crustaceans.

Range Puget sound to northwestern Alaska.

Continuous-finned liparid *Liparis pulchellus* Ayres 1855

Body elongate, compressed. Head depressed, broad; mouth subterminal, small; lower jaw included; teeth trilobed; snout bluntly rounded to truncate; nostril double; eye diameter 4.5 to 5.4 in length of head; interorbital space broad; gill opening above pectoral fin or not extending downward below fourth ray. Skin: thin, loose. Fins: dorsal (1), 47 to 53, without lobe; anal, 39 to 41; both dorsal and anal connected to caudal more than four-fifths length of caudal fin; pelvic adhesive disk thoracic, circular, margin thickened, length 2.3 to 2.4 in

length of head, posterior margin behind vertical from gill openings; pectoral, 36 or 37, lower rays slightly exserted; caudal, truncate. Lateral line: absent. Scales: absent. Pyloric caeca: about 32. Colour: light to dark brown on dorsal surface; lighter on ventral surface; dots or wavy longitudinal dark lines sometimes present; black on dorsal, anal and caudal fins, or light brown with oblique black bars, especially pronounced in young; usually barred on pectoral fins.

Length to 10 inches.

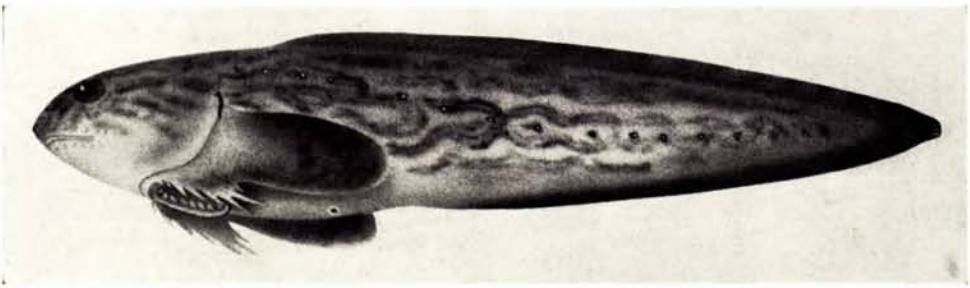

FIGURE 222. Continuous-finned liparid. *Liparis pulchellus* Ayres 1855

Distinguished by the extremely long connection of the dorsal and anal fins with the caudal fin, the broad head with the eyes widely spaced and the subinferior mouth.

The continuous-finned liparid was first taken in British Columbia waters in 1885 by Dr. G. M. Dawson in Queen Charlotte sound at a depth of 30 fathoms and recorded in 1887 by J. F. Whiteaves as *Liparis pulchella* Ayres. It occurs along the whole coast and apparently is rather common in the strait of Georgia, in English bay, Burrard inlet, Departure and Nanoose bays. It is obtained in shrimp trawls at depths of 10 to 50 fathoms as well as in shore seines.

Range northern California to northwestern Alaska.

Green's liparid *Polypera greeni* (Jordan and Starks) 1895

Body elongate, little compressed. Head somewhat depressed, broad; mouth terminal, small; lower jaw included; teeth simple and trilobed; snout bluntly rounded; nostril double; eye diameter about 10 in length of head; gill opening above pectoral fin or not extending downward below fourth ray. Skin: thin, loose. Fins: dorsal (1), 37 to 40, lobed anteriorly, extending onto caudal fin for less than one-fifth length of caudal fin; anal, 31 or 32, barely reaching caudal fin; pelvic adhesive disk thoracic, nearly circular, margin thickened, length 2.3 to 2.8 in length of head, posterior margin below or slightly anterior to vertical from gill opening; pectoral, 33 to 37, lower rays much exserted; caudal, truncate to rounded. Lateral line: absent. Scales: absent. Pyloric caeca: more than 300. Colour: light brown to bluish black on dorsal surface; cream to light brown on ventral surface.

Length to 12 inches.

Distinguished by the small eyes, the posterior margin of the pelvic adhesive disk placed below or slightly anterior to the vertical from the gill openings, the lobed dorsal fin, the short gill openings not extending below the upper four rays of the pectoral fins and the large number of pyloric caeca.

Green's liparid was first taken in British Columbia waters in 1895, in Esquimalt harbour, by Mr. Ashdown Green and recorded in the same year by D. S.

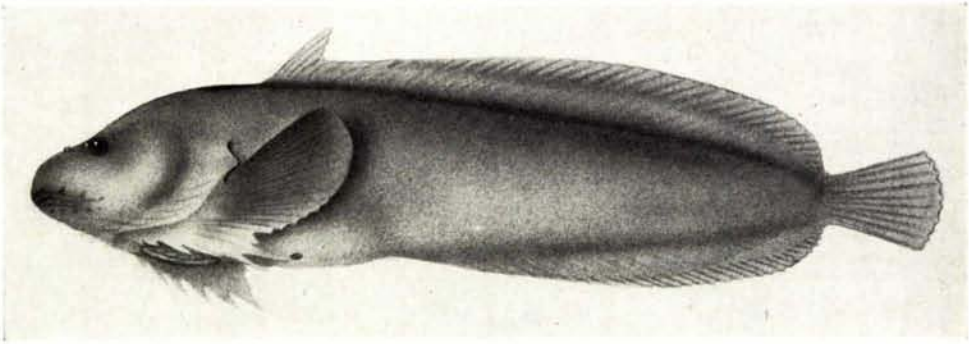

FIGURE 223. Green's liparid. *Polypera greeni* (Jordan and Starks) 1895

Jordan and E. C. Starks as the type of a new species, *Neoliparis greeni*, in honour of its discoverer and first British Columbia ichthyologist, Mr. Ashdown Green. The specimen was deposited in the Provincial Museum at Victoria. A second specimen, 12 inches in length, was captured December 19, 1944, in Porlier pass in a herring seine by Capt. J. McGinnis. This individual is now in the fish collection of the University of British Columbia.

Range Puget sound to northwestern Alaska.

Abyssal liparid *Careproctus ovigerum* (Gilbert) 1895

Body elongate, greatest depth anterior to origin of dorsal fin, compressed. Head large, deep, broad; mouth terminal, moderate; lower jaw included; teeth simple, slender; snout bluntly rounded; nostril single; eye diameter 6 or 7 in length of head; gill opening extending downward to about eighth ray of pectoral fin. Anus near posterior margin of pelvic disk. Skin: thin, loose. Fins: dorsal (1), 43, high, extending onto caudal fin for about two-fifths length of caudal fin; anal, 34, extending onto caudal fin for about two-fifths length of caudal fin; pelvic adhesive disk thoracic, nearly circular, margin thickened, large, length 2.9 in length of head, posterior margin anterior to vertical from gill openings; pectoral, 34, lower rays much exserted; caudal, narrow, pointed. Lateral line: absent. Scales: absent. Pyloric caeca: 19. Colour: pale, dusted with light brown.

Length to 12½ inches.

Distinguished by the high dorsal fin, the single nostrils, the gill openings extending downward to the upper eight rays of the pectoral fins and the anterior position of the pelvic adhesive disk.

The abyssal liparid was first taken in British Columbia waters September 3, 1890, west of Moresby island, by the *Albatross*, station 3342, lat. 52° 39′ N., long.

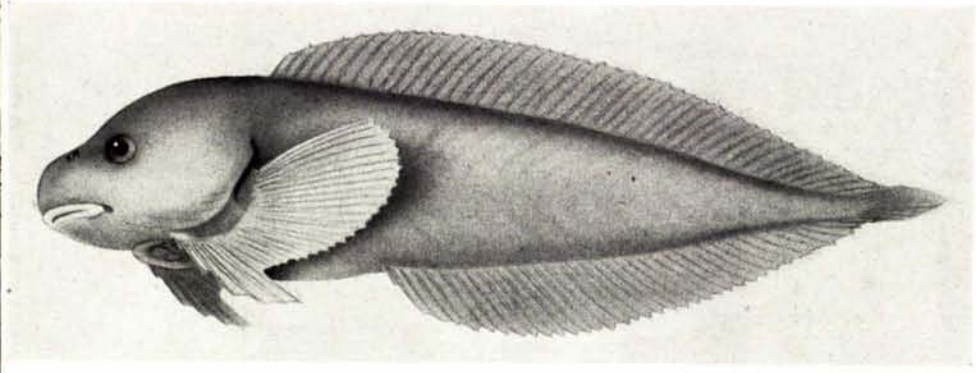

FIGURE 224. Abyssal liparid. *Careproctus ovigerum* (Gilbert) 1895

132° 38′ W., depth 1,588 fathoms, recorded in 1895 by C. H. Gilbert as the type of a new genus and species, *Bathyphasma ovigerum* and deposited in the United States National Museum. This is the only known specimen, a male. The name *ovigerum*, meaning "egg-bearing", was given because the fish when captured contained a mass of eggs in its mouth.

Range near the Queen Charlotte islands.

Small-disked liparid *Careproctus gilberti* Burke 1912

Body elongate, greatest depth at origin of dorsal fin, compressed. Head large, deep, compressed; mouth terminal, moderate; lower jaw included; teeth simple, few with lateral lobes; snout bluntly rounded; eye large, diameter about 3.5 in length of head; gill opening extending downward to about fourteenth ray of pectoral fin. Anus near posterior margin of pelvic disk. Skin: very thin, loose. Fins: dorsal (1), about 55, without lobe, extending onto caudal fin for about half length of caudal fin; anal, 46 to 48, extending onto caudal fin for about half length of caudal fin; pelvic adhesive disk thoracic, below eye, slightly wider than long, margin thickened, very small, length 7.3 to 9 in length of head; pectoral, about 31, lower rays greatly exserted, middle rays very short; caudal, truncate to rounded. Lateral line: absent. Scales: absent. Pyloric caeca: 10 to 12. Colour: creamy white to pale pink, sometimes light brown on dorsal surface; pale to dusky on fins; silvery on lower half of eye; viscera showing as dark mass.

Length to 3½ inches.

Distinguished by the very small pelvic adhesive disk vertically below the large eye, the single nostrils and the gill openings extending downward to the fourteenth rays of the pectoral fins.

The small-disked liparid was first taken in British Columbia waters August 31, 1888, off Fort Rupert by the *Albatross*, station 2862, lat. 50° 49′ N., long. 127° 36′ W., depth 238 fathoms, and recorded in 1930 by C. V. Burke. It has not been recorded since in these waters. This is a deep-water species ranging between 102 and 482 fathoms.

Range northern end of Vancouver island to southeastern Alaska.

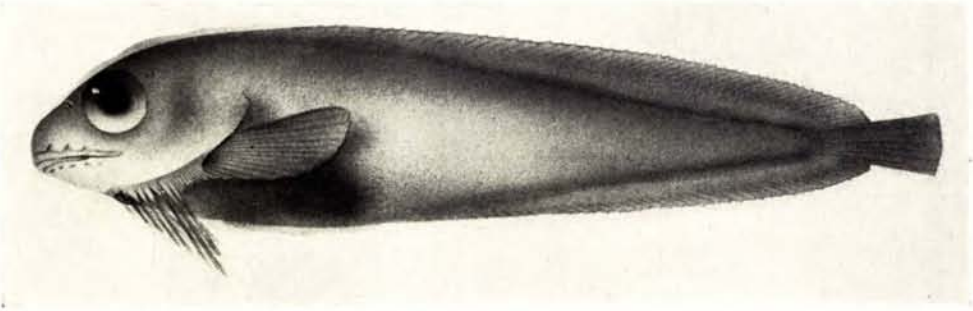

FIGURE 225. Small-disked liparid. *Careproctus gilberti* Burke 1912

Black-tailed liparid *Careproctus melanurus* Gilbert 1891

Body elongate, greatest depth at origin of dorsal fin, compressed. Head short, compressed; mouth terminal, small; lower jaw included; teeth simple, few with lateral lobes; snout bluntly rounded; nostril single; eye moderately large, diameter 3.5 to 4 in length of head; gill opening entirely above pectoral fin. Anus near posterior margin of pelvic disk. Skin: very thin, loose. Fins: dorsal (1), 54 to 58, without lobe, extending onto caudal fin for half length of caudal fin; anal, 47 to 50, extending onto caudal fin for half length of caudal fin; pelvic adhesive disk thoracic, below eye, nearly circular, margin thickened, very small, length 6.4 to 6.9 in length of head; pectoral, 30 or 31, lower rays very slightly

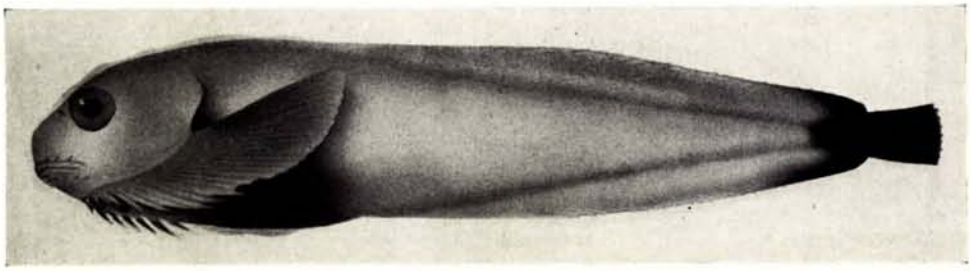

FIGURE 226. Black-tailed liparid. *Careproctus melanurus* Gilbert 1891

exserted, thickened; caudal, truncate to rounded. Lateral line: absent. Scales: absent. Pyloric caeca: 20 to 27. Colour: white to pale rose red on body and portions of pectoral, dorsal and anal fins; dusky on abdomen; black on caudal fin, on posterior portions of dorsal and anal fins, on inner surface of pectoral fins, inside of mouth and gill openings.

Length to 9 inches.

Distinguished by the very small pelvic adhesive disk vertically below the eye, the single nostrils and the gill openings entirely above the pectoral fins.

The black-tailed liparid was first taken in British Columbia waters August 29, 1888, between the northern end of Vancouver island and the southern end of the Queen Charlotte islands by the *Albatross*, station 2860, lat. 51° 23′ N., long. 130° 34′ W., depth 876 fathoms and recorded in 1930 by C. V. Burke. This is the only record from these waters.

Range southern California to northern British Columbia.

Prickly liparid *Paraliparis deani* Burke 1912

Body elongate, greatest depth at origin of dorsal fin, very slender posteriorly, attenuate, compressed. Head short, deep, compressed; mouth terminal, small; lower jaw included; teeth simple, few with slight lateral lobes, on both jaws in bands; snout bluntly rounded; nostril single; eye moderately large, diameter 3 to

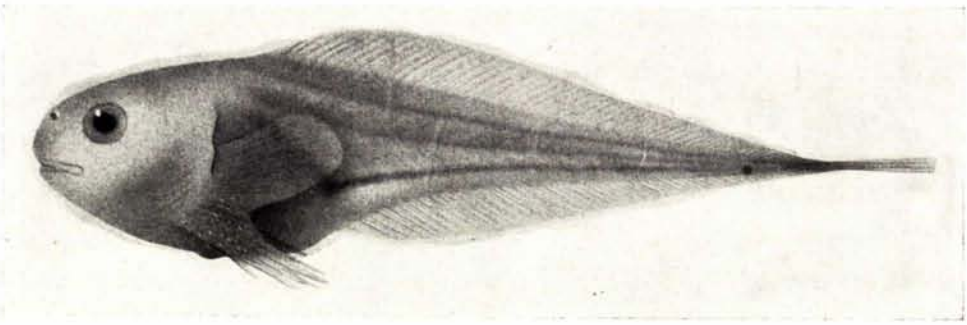

FIGURE 227. Prickly liparid. *Paraliparis deani* Burke 1912

4.5 in length of head; gill opening extending downward to point between tenth and thirteenth rays of pectoral fin. Anus below vertical from gill opening, opening downward; genital opening immediately posterior to anus. Skin: very thin, loose. Fins: dorsal (1), 56 to 59, without lobe, extending onto caudal fin for half length of caudal fin; anal, 44 to 49, extending onto caudal fin for half length of caudal fin; pelvic fins (adhesive disk), absent; pectoral, 18 to 21, lower rays greatly exserted, middle rays short; caudal, 6, slender, truncate. Lateral line: absent. Scales: in form of minute "thumb-tack" prickles on lower portion of pectoral fins. Pyloric caeca: about 9. Colour: white to opaque on dorsal surface; silvery on

ventral surface, translucent; pale pinkish red on lips and fins; dusky to black on peritoneum.

Length to 3 5/8 inches.

Distinguished by the attenuated posterior portion of the body, the absence of a pelvic disk, the anus opening downward and the extremely minute prickles on the greatly exserted lower rays of the pectoral fins.

The prickly liparid was first taken in British Columbia waters June 20, 1903, in the strait of Georgia by the *Albatross*, station 4194, lat. 49° 19′ N., long. 123° 43′ W., depth 111 fathoms, and recorded in 1907 as *Paraliparis holomelas* Gilbert by B. W. Evermann and E. L. Goldsborough. *P. deani* was described as a new species in 1912 and the specimen mentioned above, upon re-examination, was found to be the new species and was recorded in 1930 by C. V. Burke. The prickly liparid also was obtained off Fort Rupert by the *Albatross*, station 4203, in 36 fathoms. Twenty-five specimens were secured in February, 1934, in English bay at depths between 50 and 70 fathoms in shrimp trawls. In May, 1936, one male and three females were obtained in English bay at 35 fathoms. The females contained what appeared to be fully mature eggs 2 mm. in diameter.

Range northern California to northwestern Alaska.

Tadpole liparid *Nectoliparis pelagicus* Gilbert and Burke 1912

Body elongate, greatest depth at origin of dorsal fin, slender posteriorly, attenuate, compressed. Head short, deep, moderately compressed; mouth terminal, small; lower jaw included; teeth minute, simple, on lower jaw only, in single row; snout bluntly rounded; nostril single; eye large, diameter 2.4 to 2.7 in

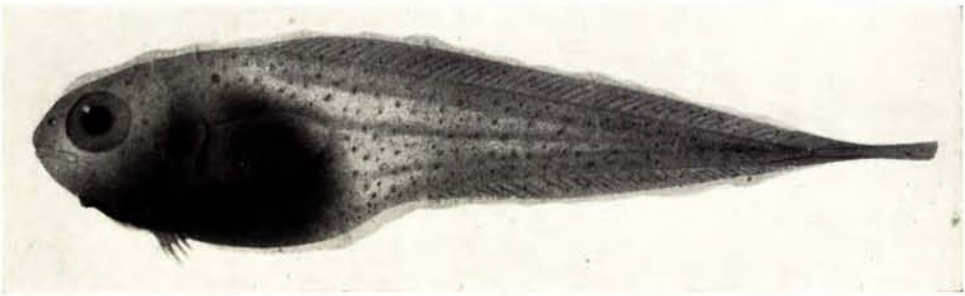

FIGURE 228. Tadpole liparid. *Nectoliparis pelagicus* Gilbert and Burke 1912

length of head; gill opening entirely in front of pectoral fin, extending from first to fourteenth ray. Anus below vertical from eyes, in deep dorsally flattened groove, pointing forward; genital pore ventral to anus, pointing forward; anal papilla ventral to genital pore, pointing downward. Skin: very thin, loose. Fins: dorsal (1), about 53, without lobe, extending onto caudal fin for half length of caudal fin; anal, about 48, extending onto caudal fin for half length of caudal fin; pelvic fins (adhesive disk), absent; pectoral, 18 to 21, in two wholly distinct

lobes, rays in upper lobe, 13 or 14, well developed, in lower lobe, 3 or 4, greatly exserted, in portion between lobes, rays 2 or 3 sometimes developed, very short; caudal, 6, slender, truncate. Lateral line: absent. Scales: absent. Pyloric caeca: about 8. Colour: pale, silvery on body beneath loose transparent skin; dark area on cheek; dark spots scattered over head and posterior part of body, small, irregularly shaped; dark on lining of mouth and gill cavity; jet black on peritoneum.

Length to 2½ inches.

Distinguished by the tadpole shape, the absence of a pelvic disk, the gill openings entirely in front of the pectoral fins, the forwardly-projecting anus located in a groove at a point below the eyes and the widely separated lobes of the pectoral fins.

The tadpole liparid was first taken in British Columbia waters April 20, 1933, in Sechelt inlet at Narrows arm, by Dr. N. M. Carter, at a depth of 130 fathoms in a grab dredge. The bottom consisted of green mud and debris, chiefly leaves and twigs, from which came a strong odour of hydrogen sulphide. The bottom water was stagnant and practically devoid of oxygen. Previous records of this fish from American waters give a depth range of 300 to 633 fathoms. In 1936, however, two specimens were obtained in English bay from a shrimp trawl at a depth of 35 fathoms and in 1940 another from the same area at a depth between 30 and 40 fathoms.

Range southern California to northwestern Alaska.

Order HETEROSOMATA

In this order the body is greatly compressed, somewhat rounded on the eyed side, flat on the blind side. In the adult flat-fishes both eyes are on one side of the head. The scales are cycloid or ctenoid, or both. The fins are all composed of soft rays with one exception (*Psettodes*, in tropical waters); the dorsal and anal fins are long; the pelvic fins are thoracic, usually with 6 rays, occasionally with 5; the pelvic girdle is directly attached to the cleithra.

In the young flat-fishes the body is upright and symmetrical with an eye on each side of the head. Very soon a metamorphosis takes place, during which one eye migrates to the opposite side of the head, so that eventually both eyes are on the upper, or darker-coloured, side. The fish then settle to the bottom and swim horizontally. Although the flat-fishes are a very specialized group they have certain characters which indicate a relationship with the Percomorphi.

Flat-fishes have the remarkable ability of being able to change their shades and colour patterns to blend with the immediate surroundings. This is effected by controlling the contraction and expansion of the chromatophores of various colours.

The order comprises five families, of which two are represented in British Columbia waters.

In the sand dabs the body is left-handed (sinistral), that is, the eyes and coloured surface are on the left side of the fish. The pelvic fin of the eyed side is exactly on the edge of the abdominal ridge.

The term sand dab is here applied to the members of the family Bothidae only.

Mottled sand dab *Citharichthys sordidus* (Girard) 1854

Body elongate, moderately slender, much compressed, sinistral. Head deep; mouth terminal, moderate; lower jaw projecting; snout rounded; diameter of lower eye longer than length of snout; interorbital space moderate, concave; ridge above lower eye high, sharp, bony, naked. Fins: dorsal (1), 86 to 102;

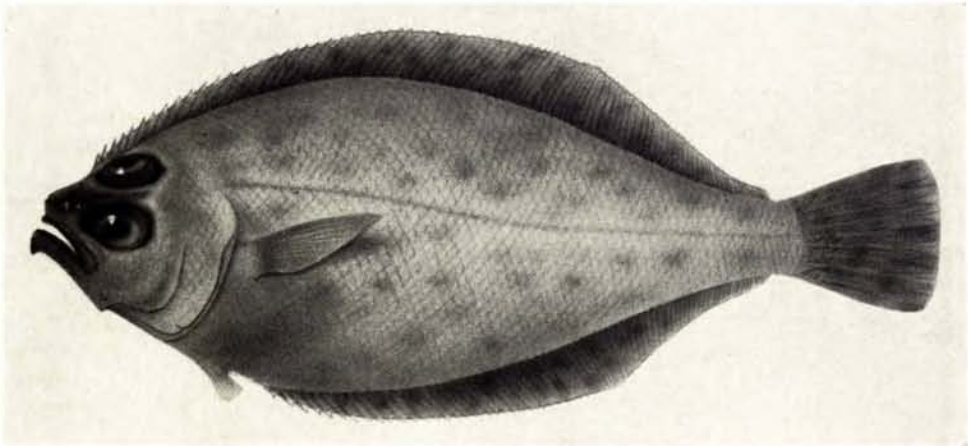

FIGURE 229. Mottled sand dab. *Citharichthys sordidus* (Girard) 1854

anal, 67 to 81; pelvic, 6, thoracic, that of eyed side on edge of abdominal ridge; caudal, truncate to rounded. Lateral line: nearly straight. Scales: imbricated, rather thin, deciduous, cycloid on both sides of body; on lateral line, 61 to 70. Colour: dull brown on eyed side, irregularly mottled with black; soiled white to light brown on blind side; black on dorsal, anal and caudal fins; dull orange spots and blotches on males in life; in young, light olive green on eyed side, finely and sparsely speckled with brown, black and orange, particularly on fins.

Length to 12 inches.

Distinguished by the mottled coloration on the eyed side of the body, the pelvic fin of the eyed side being exactly on the edge of the abdominal ridge and the 61 to 70 scales on the lateral line.

The mottled sand dab was first taken in British Columbia waters June 21, 1882, at Calvert island in Safety cove by Capt. H. E. Nichols and recorded in 1883 by T. H. Bean. It is fairly common in the strait of Georgia and has been

captured off the west coast of Vancouver island, in Johnstone strait and in Milbanke sound in waters of moderate depths. At the present time this sand dab is utilized only by Orientals who split and dry it. Fishermen from the British isles sometimes refer to this fish as the megrim.

Range southern California to northwestern Alaska.

Speckled sand dab *Citharichthys stigmaeus* Jordan and Gilbert 1882

Body elongate, moderately slender, much compressed, sinistral. Head deep; mouth terminal, moderate; jaws equal; snout rounded; diameter of lower eye equal to length of snout; interorbital space narrow, flat to convex; ridge above lower eye, absent. Fins: dorsal (1), 79 to 92; anal, 59 to 72; pelvic, 6, thoracic,

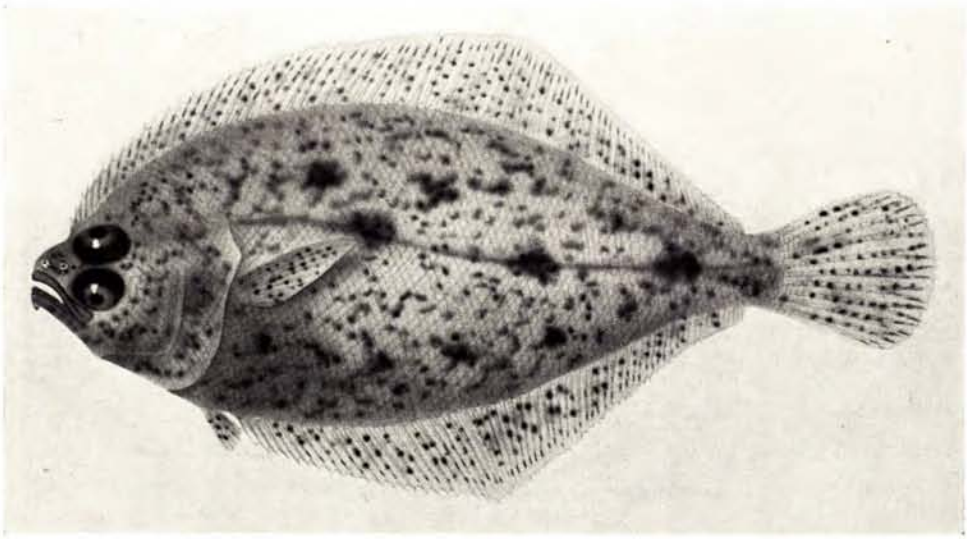

FIGURE 230. Speckled sand dab. *Citharichthys stigmaeus* Jordan and Gilbert 1882

that of eyed side on edge of abdominal ridge; caudal, truncate to rounded. Lateral line: nearly straight. Scales: imbricated, deciduous, cycloid on both sides of body; on lateral line, 52 to 58. Colour: olive brown on eyed side, finely and sharply speckled with black; soiled white to cream on blind side; in young, on eyed side, nearly uniform gray, finely speckled with black, resembling sandy beach in coloration.

Length to 6 inches.

Distinguished by the speckled coloration on the eyed side of the body, the pelvic fin of the eyed side being exactly on the edge of the abdominal ridge and the 52 to 58 scales on the lateral line.

The speckled sand dab was first taken in British Columbia waters in June and July, 1909, at Ucluelet by C. H. Young and W. Spreadborough when 5

specimens were obtained and were recorded in 1920 by B. A. Bean and A. C. Weed. The speckled sand dab is known from the west coast of Vancouver island and the west coast of Moresby island and is secured frequently in trawls in the strait of Georgia from shallow water to 40 fathoms. It is of little commercial importance because of its small size.

Range southern California to southeastern Alaska.

Family PLEURONECTIDAE Flounders

In the flounders the body is right-handed (dextral), that is, the eyes and coloured surface are on the right side of the fish. The pelvic fins are symmetrically arranged, one on each side of the abdominal ridge.

The family may be divided into two groups. In one, as exemplified by the halibuts and related species, the mouth is large and symmetrical, the maxillary extends to the pupil of the eye or behind and the teeth are well developed on both sides of the jaws; associated with the habit of actively pursuing fishes for food. In the other, the mouth is small and asymmetrical, the maxillary does not extend to the pupil of the eye, and the teeth are largely confined to the sides of the jaws on the unpigmented side of the head, associated with the habit of feeding upon bottom-living invertebrates and small fishes.

Although the flounders are typically dextral there is an occasional exception, as for example the starry flounder, which frequently may be sinistral, and the halibut, which occasionally is so. There are, as well, cases in which pigmentation may develop on both sides of the body. This condition is known as ambicoloration.

In regard to the common names used in referring to members of the family Pleuronectidae in western Canadian waters, there is a confusion of terminology. Early settlers from the borders of the North sea were faced with a new fauna, quite unlike that to which they were accustomed. Instead of applying new names to the new fishes they attempted to use the names of fishes which they already knew. For example, the term brill has attained common usage, although the species *Scophthalmus rhombus* does not occur in these waters, and the term sole has been applied loosely to many species, none of which are in the family Soleidae.

The common names as herein used have been selected from a list drawn up by a local committee of fishery biologists and representatives of the fishing industry in the attempt to attain uniformity of usage for market and statistical purposes.

The flounders are confined to Arctic seas.

Long-jaw flounder *Atheresthes stomias* (Jordan and Gilbert) 1880

Body rather elongate, slender, much compressed, dextral. Head elongate; mouth terminal, very large, nearly symmetrical, gape wide; maxillary extending to point behind eye; teeth well developed on both sides of jaws, arrow-shaped; snout pointed; upper eye on margin of head. Fins: dorsal (1), 93 to 115; anal, 81 to 99; pelvic, 6, thoracic; caudal, slightly lunate. Lateral line: slightly de-

curved, then straight, no arch or accessory branch. Scales: unevenly imbricated, rather large, irregular in size, thin; ctenoid on both sides of body; on lateral line, about 135. No spine before anal fin. Colour: brown on eyed side, darker on margins of scales; white on blind side, finely dotted with black.

Length to 2 feet 6 inches.

Distinguished by the very large jaws extending behind the eyes, the arrow-shaped teeth and the left eye on the upper margin of the head.

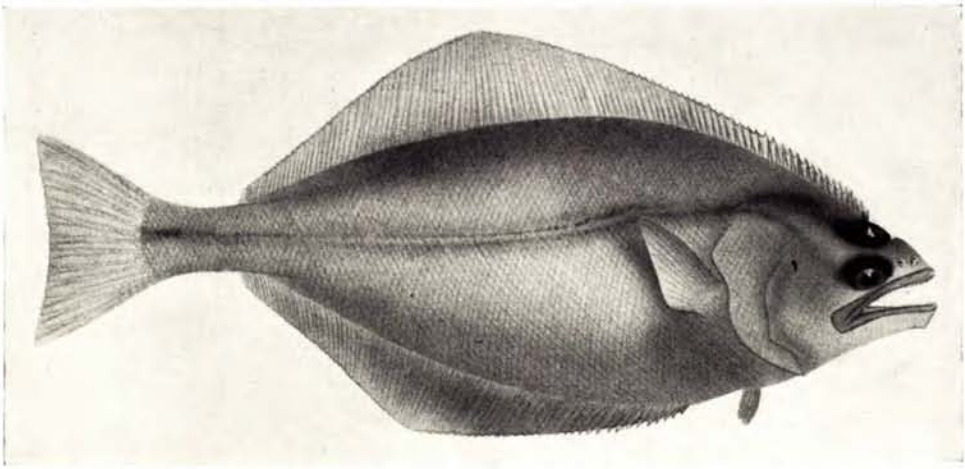

FIGURE 231. Long-jaw flounder. *Atheresthes stomias* (Jordan and Gilbert) 1880

The long-jaw flounder was first taken in British Columbia waters August 28, 1891, west of Port San Juan by the *Albatross*, station 3448, lat. 48° 31′ N., long. 124° 39′ W., depth 98 fathoms and recorded in 1895 by C. H. Gilbert. The species is common along the whole coast, especially northward, where it occurs in shallower water than to the southward. It is obtained frequently with the halibut in 10 to 100 fathoms but up to the present has been little marketed in Canada. The food consists at least in part of shrimps. Other names applied to this fish are arrow-toothed halibut and bastard halibut.

Range northern California to northwestern Alaska.

Halibut *Hippoglossus stenolepis* Schmidt 1904

Body elongate, rather slender, compressed, dextral, very rarely sinistral. Head elongate; mouth terminal, large, nearly symmetrical, gape wide; maxillary extending to point below eye; teeth well developed on both sides of jaws, conical; snout pointed; eyes large, upper eye slightly posterior to lower. Fins: dorsal (1), 89 to 109; anal, 64 to 81; pelvic, 6, thoracic; caudal, slightly lunate. Lateral line: distinctly arched over pectoral fin, no accessory branch. Scales: imbricated, very small, narrow, cycloid on both sides of body; on lateral line, 150 or more.

No spine before anal fin. Colour: dark brown on eyed side, irregularly blotched with lighter; white on blind side, rarely with dark.

Male: length to 4 feet 7 inches.

Female: length to 8 feet 9 inches.

Distinguished by the lunate caudal fin, the arched lateral line and the narrow smooth scales.

The halibut was first recorded from British Columbia waters in 1866 by J. K. Lord as "*Pleuronectes hippoglossus* of Linnaeus", on the basis of the exami-

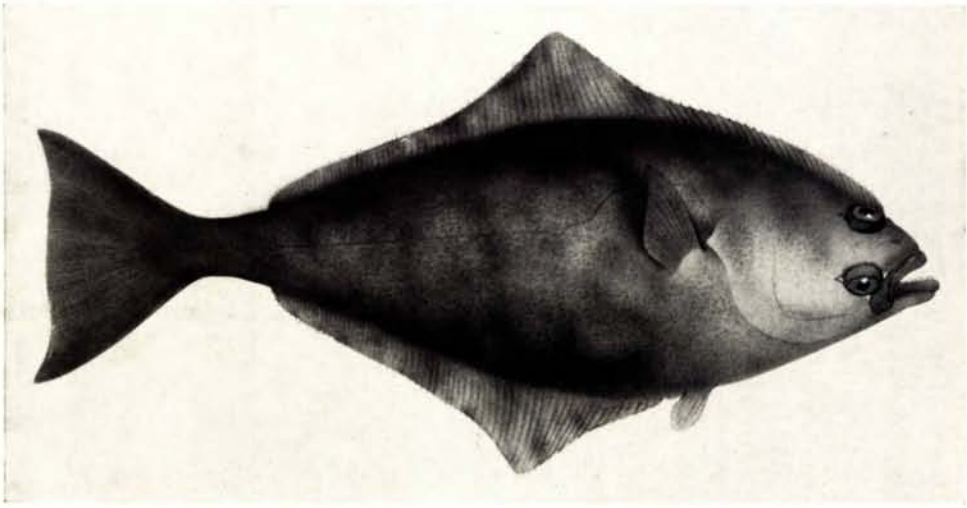

FIGURE 232. Halibut. *Hippoglossus stenolepis* Schmidt 1904

nation of a single specimen over 300 pounds in weight. In 1891 Ashdown Green recorded the species as *Hippoglossus vulgaris*. Subsequently the species was considered identical with the Atlantic species, *Hippoglossus hippoglossus*, until P. J. Schmidt, in 1904, proposed the new specific name *stenolepis* on the basis of certain scale characters. The halibut at one time was very abundant along the whole Pacific coast of Canada, which, in fact, appeared to be the area of greatest primeval abundance. It occurs from very shallow waters to depths of at least 600 fathoms, but for the most part from 30 to 225 fathoms. Spawning takes place from November to January in well defined areas of depths from 150 to 225 fathoms. A large female of 140 pounds may have as many as 2,700,000 eggs. The eggs and larvae drift passively with the currents at depths down to 375 fathoms gradually rising toward the surface as development proceeds and drifting into shallow water with the inshore surface currents. By early spring transformation is complete and the young fish settle to the bottom in the shallow waters of sandy bays and inshore banks. With advancing size and age they appear to move into deeper waters. The females are faster growing than the

males. The age of maturity of females is 8 to 16 years with an average of 12, while that of the males is considerably earlier. Males may attain a weight of 40 pounds and an age of 25 years; females may attain a weight of 470 pounds and an age of 35 years or more. Tagging operations have shown that the immature halibut move within very restricted areas whereas mature fish migrate extensively to and from the spawning grounds, a few individuals travelling as much as 2,000 miles. The food consists of fishes, crabs, clams, squid, worms, etc. Much of the information concerning the life history of the halibut is the result of the extensive investigations of the International Fisheries Commission.

The halibut is caught on set-lines, the unit of line being the "skate"; these are run out on off-shore relatively shallow areas known as banks, ranging in depth from 10 to 150 fathoms, rarely to 500 fathoms. The bait is usually frozen herring. In the early days of the fishery the gear was set from dories but at the present time the baited lines are payed out directly from the power-boats.

The 1943 catch in Canadian and American Pacific coast waters amounted to 53½ million pounds, of which 13 million pounds were landed by the Canadian fleet. The total value of the above catch to the fishermen was about $8,000,000, of which about $1,250,000 represented the value of livers and viscera used for the production of vitamin "A". Landings at British Columbia ports for transshipment amounted to about 47 per cent of the combined American and Canadian production.

Range northern California to northwestern Alaska.

Sand sole *Psettichthys melanostictus* Girard 1854

Body elongate, moderately deep, much compressed, dextral; caudal peduncle deep. Head deep; mouth terminal, moderate, nearly symmetrical, gape wide; maxillary extending to point below pupil of eye; teeth large, well developed on both sides of jaws; snout rounded; eyes small; interorbital space broad. Fins: dorsal (1), 72 to 88, beginning in front of eye, first 8 or more rays greatly elongate, exserted; anal, 53 to 66; pelvic, 6, thoracic; caudal, rounded. Lateral line: slightly decurved, then straight; accessory dorsal branch short, close to base of dorsal fin, passing backward to point above posterior tip of operculum, ending in small crook. Scales: imbricated; ctenoid on eye side; cycloid on blind side; on lateral line, 98 to 112; on bases of dorsal, anal and caudal fin rays. Spine before anal fin well developed, exposed. Colour: light green on eyed side with tinge of light brown, everywhere finely speckled with black; general colour that of the sandy beach; white on blind side; dull yellow on tips of dorsal and anal fins in large specimens.

Length to 20 inches.

Distinguished by the long free rays in the anterior end of the dorsal fin, the deep caudal peduncle and the accessory dorsal branch of the lateral line.

The sand sole was first recorded from British Columbia waters in 1891 by Ashdown Green. The first definite locality is for the Queen Charlotte islands

given in 1901 by W. H. Osgood. The species is common in the strait of Georgia and no doubt occurs along the whole coast since it has been reported from the west coast of Vancouver island. It is taken commonly on sandy bottoms in trawls. Crustaceans, worms and small molluscs probably constitute the chief food, while anchovies have been reported in some specimens from California waters. The sand sole is of delicate flavour.

Range northern California to southeastern Alaska.

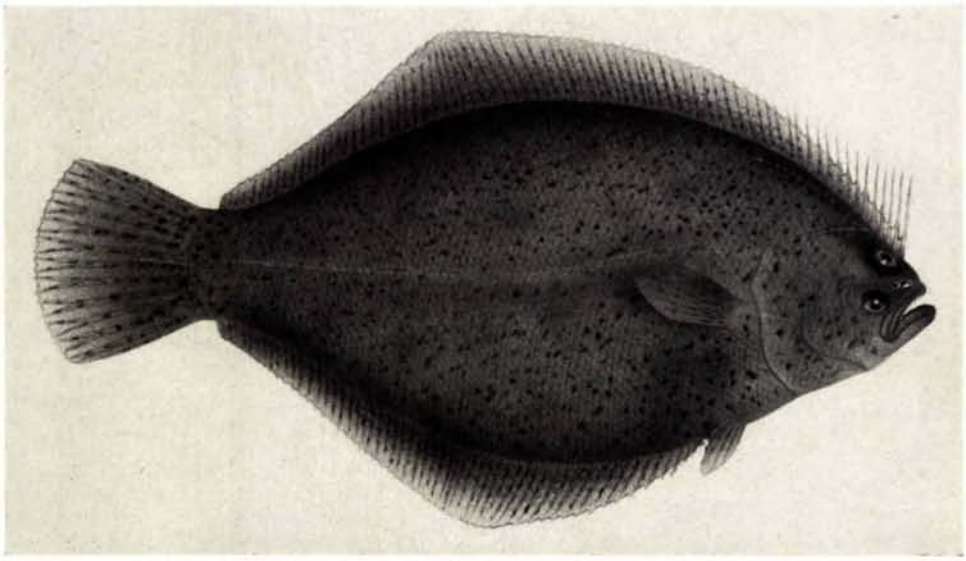

FIGURE 233. Sand sole. *Psettichthys melanostictus* Girard 1854

Slender sole *Lyopsetta exilis* (Jordan and Gilbert) 1880

Body elongate, slender, much compressed, dextral. Head narrow, pointed; mouth terminal, moderate, symmetrical, gape wide; maxillary extending to point below anterior margin of eye; teeth moderate, well developed on both sides of jaws; snout bluntly pointed; eyes large. Fins: dorsal (1), 72 to 88, first rays not elongate; anal, 57 to 65; pelvic, 6, thoracic; caudal, rounded. Lateral line: slightly decurved, then straight; no accessory branch. Scales: imbricated, large, thin, deciduous; ctenoid on both sides of body; in diagonal row between dorsal fin and lateral line at widest part of body, 20 to 24; on lateral line, 65 to 73; on dorsal, anal and caudal fin rays, small. Spine before anal fin well developed, exposed. Colour: pale brown on eyed side, minute dark points outlining margin of each scale; pale orange yellow to white on blind side.

Length to 12 inches.

Distinguished by the slender body, the moderately large mouth, the large rough deciduous scales on both sides of the body and the pale brown coloration.

The slender sole was first taken in British Columbia waters June 19, 1903, in Nanaimo harbour by the *Albatross*, station 4191, lat. 49° 11′ N., long. 123° 54′ W., depth 54 fathoms and recorded in 1907 by B. W. Evermann and E. L. Goldsborough. The species is common in the strait of Georgia and has been obtained

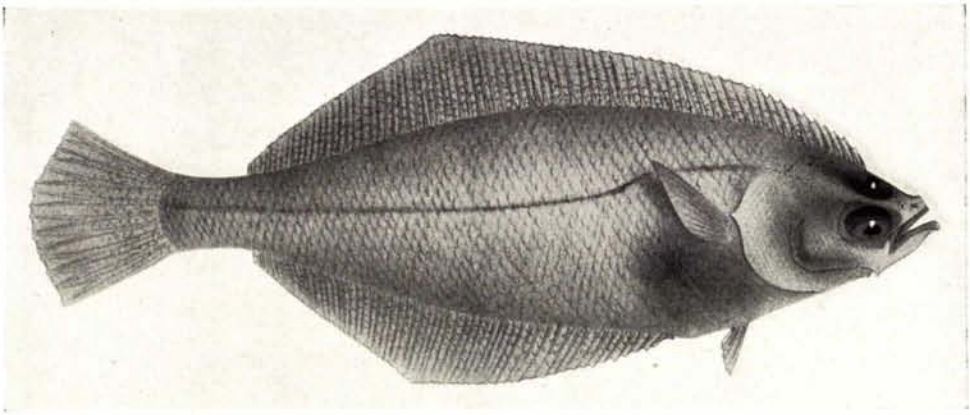

FIGURE 234. Slender sole. *Lyopsetta exilis* (Jordan and Gilbert) 1880

on the west coast of Vancouver island. It frequently occurs in the vicinity of rocky areas. While inhabiting moderate depths it has been reported in California waters from 280 fathoms. The slender sole is captured in trawls but is seldom placed on the market.

Range southern California to southeastern Alaska.

Flat-head sole *Hippoglossoides elassodon* Jordan and Gilbert 1880

Body elongate, moderately slender, much compressed, dextral. Head moderately deep; mouth terminal, large, symmetrical, gape wide; maxillary reaching to point below pupil of eye; teeth well developed on both sides of jaws, in single row on each jaw; snout pointed. Fins: dorsal (1), 72 to 90, first rays not elongate; anal, 57 to 71; pelvic, 6, thoracic; caudal, double truncate. Lateral line: slightly decurved, then straight; no accessory branch. Scales: imbricated, small, not deciduous; ctenoid on eyed side; cycloid on blind side, except on caudal peduncle and on band on each side of lateral line; in diagonal row between dorsal fin and lateral line at widest part of body, 40 to 50; on lateral line, 87 to 100. Spine before anal fin well developed, exposed. Colour: uniform gray to olive brown on eyed side, sometimes blotched with dusky brown; white on blind side; dusky blotches on dorsal and anal fins.

Length to 18 inches.

Distinguished by the small scales with 40 to 50 in a diagonal row from the dorsal fin to the lateral line at the widest part of the body, the smooth scales on

the blind side of the body except on the caudal peduncle and along the lateral line and the teeth in one row on each side of the upper jaw.

The flat-head sole was first taken in British Columbia waters September 2, 1891, west of Jordan river by the *Albatross*, station 3460, lat. 48° 25′ N., long. 124° 10′ W., depth 53 fathoms and recorded in 1895 by C. H. Gilbert. The

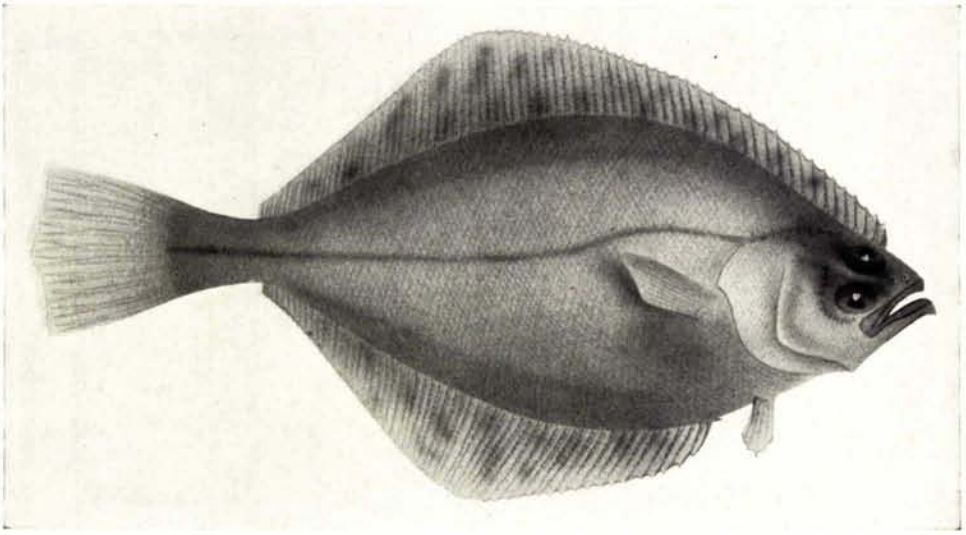

FIGURE 235. Flat-head sole. *Hippoglossoides elassodon* Jordan and Gilbert 1880

species is common in the strait of Georgia area in moderately shallow water and occurs northward through Hecate strait. The food consists of annelids, crustaceans and molluscs. This sole is obtained frequently in shrimp and otter trawls and sold in the round or as fillets. Local names include jowl, paper sole and cigarette paper, the latter being applied to immature individuals.

Range Puget sound to northwestern Alaska.

Brill *Eopsetta jordani* (Lockington) 1879

Body elongate, moderately slender, much compressed, dextral. Head deep; mouth terminal, large, nearly symmetrical, gape wide; maxillary extending to point slightly behind pupil of eye; teeth well developed on both sides of jaws, on upper jaw in two rows, on lower jaw in single row; snout rounded. Fins: dorsal (1), 87 to 101, first rays not elongate; anal, 67 to 79; pelvic, 6, thoracic; caudal, double truncate. Lateral line: slightly decurved, then straight; no accessory branch. Scales: imbricated, small, not deciduous; ctenoid on eyed side; cycloid on blind side; in diagonal rows between dorsal fin and lateral line at widest part of body, about 30; on lateral line, 88 to 100. Spine before anal fin well developed,

exposed. Colour: uniform olive brown on eyed side; white on blind side; dusky blotches on dorsal and anal fins, faint.

Length to 20 inches.

Distinguished by the small scales with about 30 in a diagonal row between the dorsal fin and the lateral line at the widest part of the body, the smooth scales completely covering the blind side of the body and the teeth in 2 rows on each side of the upper jaw.

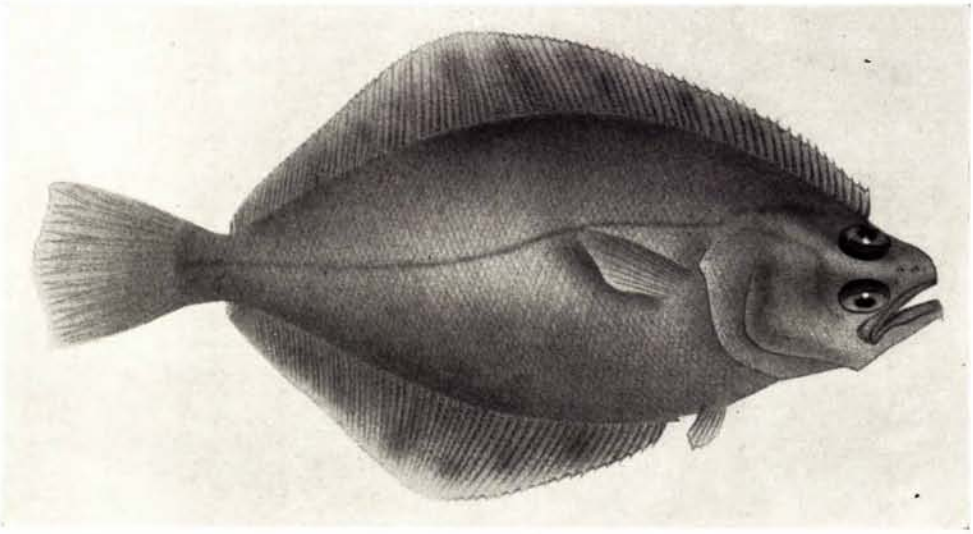

FIGURE 236. Brill. *Eopsetta jordani* (Lockington) 1879

The brill was first taken in British Columbia waters August 4, 1881, at Calvert island in Safety cove by Capt. H. E. Nichols, at a depth of 16 fathoms and recorded in the same year by T. H. Bean as *Hippoglossoides Jordani* Lockington. The species has been secured at Victoria and is abundant on the west coast of Vancouver island and in Hecate strait where it is captured in otter-trawls. The food has been reported to consist of crustaceans and anchovies. The specific name was given in honour of the great ichthyologist, Dr. David Starr Jordan. In American waters this fish is known as the petrale and petrale sole. The word petrale is Mexican and means rocky.

Range southern California to northwestern Alaska.

Rock sole *Lepidopsetta bilineata* (Ayres) 1855

Body elongate, deeply ovate, much compressed, dextral. Head deep; mouth terminal, small, asymmetrical, gape narrow; teeth chiefly on blind sides of jaws; snout bluntly rounded. Fins: dorsal (1), 67 to 82; anal, 51 to 64, very high; pelvic, 6, thoracic; caudal, double truncate. Lateral line: prominently arched

over pectoral fin, then straight; accessory dorsal branch short, close to dorsal fin, passing backward to point anterior to posterior tip of operculum. Scales: imbricated; ctenoid on eyed side, some tuberculate; chiefly cycloid on blind side; extending onto dorsal, anal and caudal fin rays; on lateral line, 72 to 85. Spine before anal fin sharp, exposed. Colour: variable, usually deep brown on eyed side, frequently mottled with darker, occasionally with scattered small red spots or pale blotches; reddish yellow to white on blind side; brown to black interrupted streaks on rays of dorsal, anal and caudal fins.

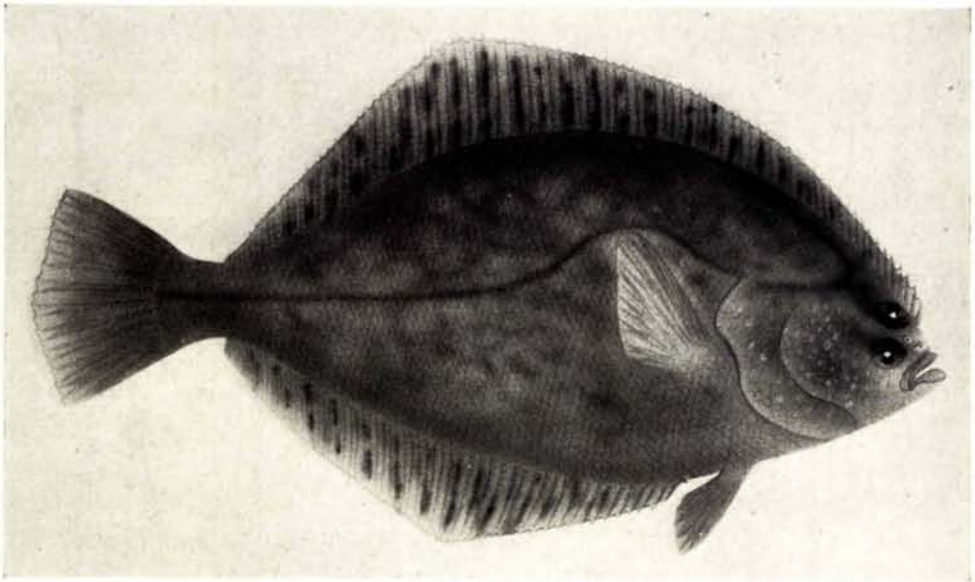

FIGURE 237. Rock sole. *Lepidopsetta bilineata* (Ayres) 1855

Length to 18 inches.

Distinguished by the deeply ovate body, the prominent arch in the lateral line, the short accessory dorsal branch and the rough tuberculated scales on the eyed side of the body.

The rock sole was first recorded from British Columbia waters in 1866 by J. K. Lord as *Pleuronectes bilineates* and *P. umbrosus*, without date or locality of capture. The first specific record was that of a specimen taken in June, 1882, at Broughton island in Carter bay by Capt. H. E. Nichols and recorded in 1883 by T. H. Bean. The species is abundant along the coast and is common in the shallow waters where it is captured frequently with beach-seines in sandy to gravelly areas just offshore from eel-grass beds. In Alaskan waters it has been obtained from a depth of 70 fathoms. While casting with a wet-fly for cut-throat trout in Departure bay, Mr. C. J. Keighley took several of these soles weighing about one-half pound each. Spawning takes place from late winter to early

spring. The eggs are bright yellow orange in colour. The food consists of small crabs, shrimps, worms, clam siphons, etc. The flesh is very palatable, although not considered quite as desirable as that of the lemon sole, *Parophrys vetulus*. This fish is also known as the rough-back.

Range southern California to northwestern Alaska.

Curl-fin sole *Pleuronichthys decurrens* Jordan and Gilbert 1880

Body elongate, deeply ovate, much compressed, dextral; caudal peduncle, deep. Head deep; mouth terminal, small, asymmetrical, gape narrow; lips thick; teeth chiefly on blind sides of jaws; snout short, blunt; eyes large, protruding, closely set, obscuring interorbital space; interorbital ridge narrow, prominent

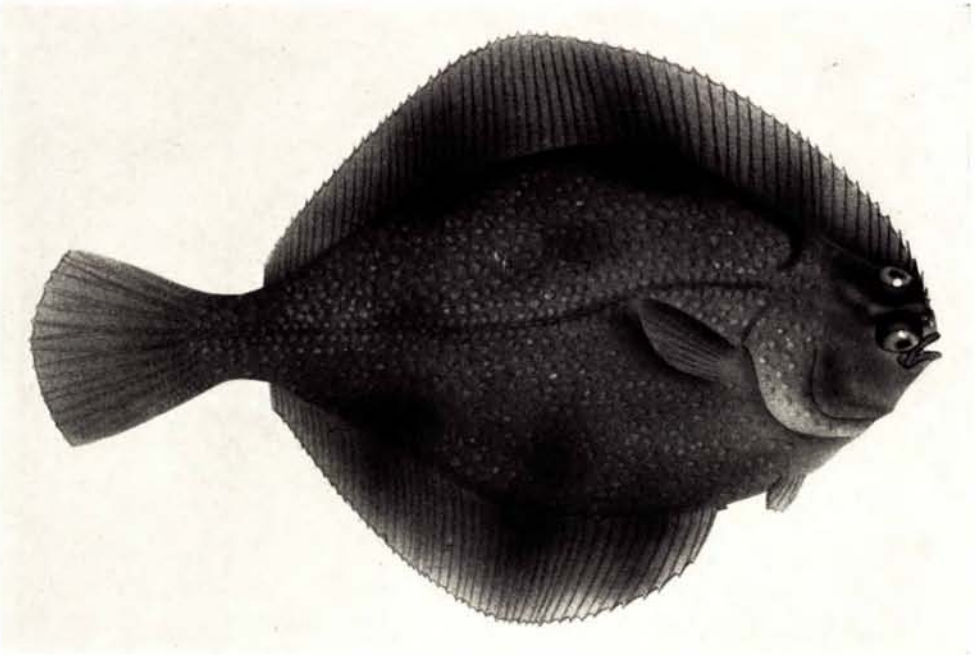

FIGURE 238. Curl-fin sole. *Pleuronichthys decurrens* Jordan and Gilbert 1880

tubercle at each end, two or three other tubercles behind upper eye. Fins: dorsal (1), 67 to 79, high, origin on blind side at angle of mouth, first 9 to 12 rays on blind side; anal, 46 to 52, high; pelvic, 6, thoracic; caudal deep, rounded. Lateral line: slightly decurved, then straight; accessory dorsal branch long, close to dorsal fin, passing backward to point about midlength of body. Scales: well separated, deeply embedded in tough skin; cycloid on both sides of body; on lateral line, 80 to 91; present on fins. Spine before anal fin small, exposed, sharp.

Colour: brown to black on eyed side, mottled, finely spotted, no black spot on middle of body; creamy white on blind side; very dark on all fins.

Length to 12 inches.

Distinguished by the deeply ovate body with the high dorsal and anal fins, the embedded scales and the origin of the dorsal fin on the blind side of the body at the angle of the mouth with the first 9 to 12 rays on the blind side of the body.

The curl-fin sole was first taken in British Columbia waters July 21, 1916, near Rivers inlet and was recorded in 1936 by L. P. Schultz and A. C. DeLacy. The specimen is now in the Royal Ontario Museum of Zoology at Toronto. A second individual has been examined through the kindness of Dr. J. L. Hart. It was obtained October 31, 1944, in Queen Charlotte strait off Hope island in an otter trawl at a depth of 25 fathoms and is now in the collection of the Pacific Biological Station. In California waters this species has been taken at depths ranging from 21 to 291 fathoms. This is not a commercial species in Canada.

Range southern California to northwestern Alaska.

C-O sole *Pleuronichthys coenosus* Girard 1854

Body elongate, deeply ovate, much compressed, dextral; caudal peduncle deep. Head deep; mouth terminal, small, asymmetrical, gape narrow; lips thick;

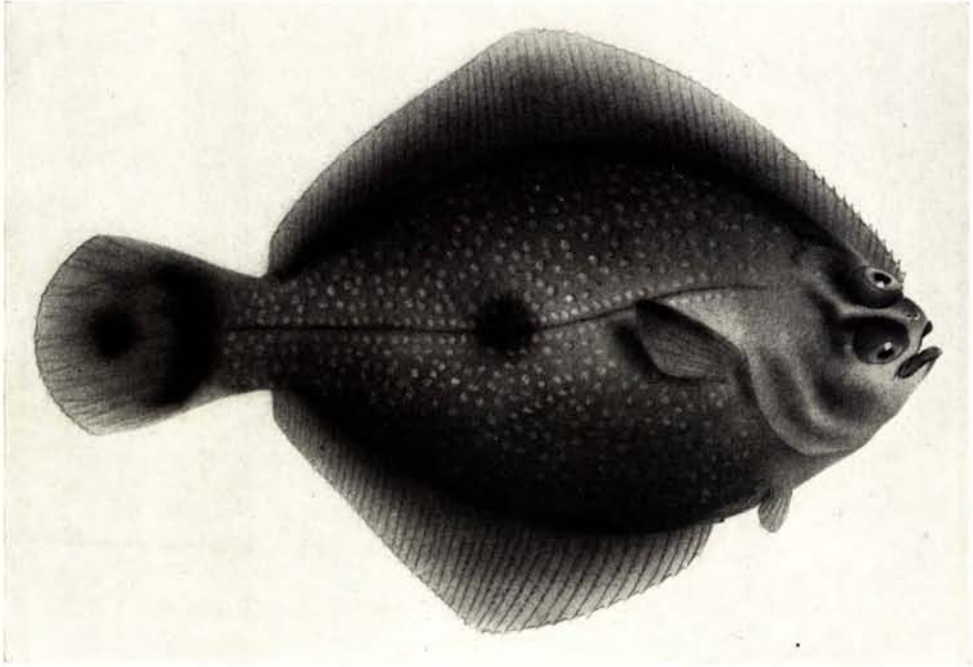

FIGURE 239. C-O sole. *Pleuronichthys coenosus* Girard 1854

teeth chiefly on blind sides of jaws; snout short, blunt; eyes large, protruding, closely set, obscuring interorbital space; interorbital ridge prominent, small downwardly projecting tubercle posteriorly. Fins: dorsal (1), 65 to 78, high, origin on blind side opposite anterior margin of upper eye, first 5 or 6 rays on blind side; anal, 46 to 56, high; pelvic, 6, thoracic; caudal deep, rounded. Lateral line: slightly decurved, then straight; accessory dorsal branch long, close to dorsal fin, passing backward to point about midlength of body. Scales: deeply embedded in tough skin, well separated; cycloid on both sides of body; on lateral line, 61 to 70; present on fins. Spine before anal fin small, exposed, sharp. Colour: dark brown to black on eyed side, conspicuous black spot approximately size of eye on middle of body, sometimes similar spot on middle of caudal fin; dark bar sometimes across base of caudal fin, particularly conspicuous in young fish; creamy white on blind side; very dark on all fins.

Length to 14 inches.

Distinguished by the deeply ovate body with the high dorsal and anal fins, the embedded scales and the origin of the dorsal fin on the blind side of the body opposite the anterior margin of the upper eye with the first 5 or 6 rays on the blind side of the body.

The C-O sole was first recorded from British Columbia waters in 1891 by Ashdown Green. The first definite locality record is that of four specimens taken in 1908 in Departure bay by Messrs. C. H. Young and W. Spreadborough and recorded in 1920 by B. A. Bean and A. C. Weed. The species is abundant in the strait of Georgia and has been taken off the west coast of Vancouver island. The young are common in summer in shallow water but the adults frequently inhabit deep water. The C-O sole is captured in small quantities by trawls in deep water, and small numbers are marketed although the tough skin makes filleting somewhat difficult. Fishermen sometimes call these fish pop-eyes because of the protruding eyes.

Range southern California to southeastern Alaska.

Lemon sole *Parophrys vetulus* Girard 1854

Body elongate, slender, much compressed, dextral. Head slender, pointed; mouth terminal, small, asymmetrical, gape narrow; teeth chiefly on blind sides of jaws; snout bluntly pointed; eyes large, upper somewhat posterior to lower, entering profile; interorbital space narrow, ridge high. Fins: dorsal (1), 72 to 92; anal, 54 to 70; pelvic, 6, thoracic; caudal, truncate. Lateral line: slightly decurved, then straight; accessory dorsal branch long, close to dorsal fin, passing backward to point above pectoral fin, varying from midpoint to tip. Scales: imbricated; cycloid on both sides of body anteriorly; ctenoid posteriorly; on lateral line, 89 to 105; ctenoid on cheek; absent from fins. Colour: uniform yellowish brown on eyed side; light yellow to white, tinged with reddish brown on blind side; young variously coloured from gray to brown, minutely spotted, often of sandy appearance on dorsal surface; in young less than 2 inches in length often bright yellow line on ventral surface below base of dorsal fin and of anal fin.

Length to 21 inches.

Distinguished by the pointed head, the accessory dorsal branch of the lateral line and the scales on the body smooth anteriorly, rough posteriorly.

The lemon sole was first recorded from British Columbia waters in 1862 from Victoria by A. Günther as a new species, *Pleuronectes digrammus*, on the basis of two specimens, each about 8 inches in length, obtained by H.M.S. *Plumper* and presented to the British Museum by Earl Russell. The species is common along

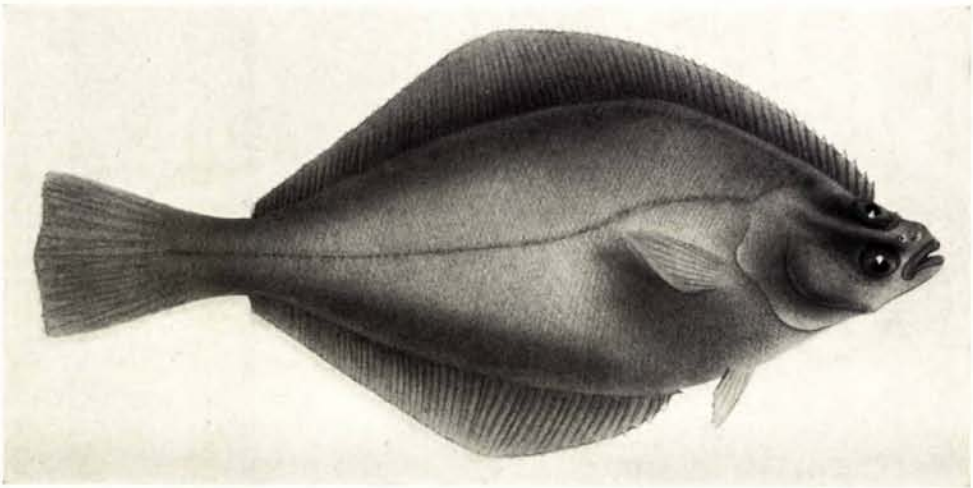

FIGURE 240. Lemon sole. *Parophrys vetulus* Girard 1854

the whole coast and is taken frequently in trawls at depths between 20 and 50 fathoms on sandy to muddy bottoms. Spawning occurs from February to April. The eggs are pelagic and transparent white to pale bluish purple in colour. The food consists of small crabs, shrimps, worms, clam siphons and small molluscs. This is the choicest of the smaller flat-fishes, having a very delicate flavour, and fillet of sole in the local markets is usually this species. It has been given the name lemon sole because of its resemblance in shape and colour to the lemon sole of European waters. There is a faint lemon odour to the freshly-caught fish. In American waters the name of English sole is applied.

Range southern California to northwestern Alaska.

Butter sole *Isopsetta isolepis* (Lockington) 1880

Body elongate, slender, much compressed, dextral. Head slender; mouth terminal small, asymmetrical, gape narrow; teeth chiefly on blind sides of jaws; snout bluntly rounded; eyes small; interorbital space narrow, flat. Fins: dorsal (1), 78 to 92; anal, 58 to 69; pelvic, 6, thoracic; caudal, rounded. Lateral line: slightly decurved, then straight; accessory dorsal branch close to dorsal fin,

passing backward to point above pectoral fin, varying from midpoint to tip. Scales: imbricated, rather large, strongly ctenoid on eyed side; chiefly cycloid on blind side; on lateral line, 78 to 84; ctenoid on head and fin rays. Colour: gray, irregularly blotched and spotted with yellow or green on eyed side; white on blind side; bright lemon yellow on tips of dorsal and anal fin rays.

Length to 18 inches.

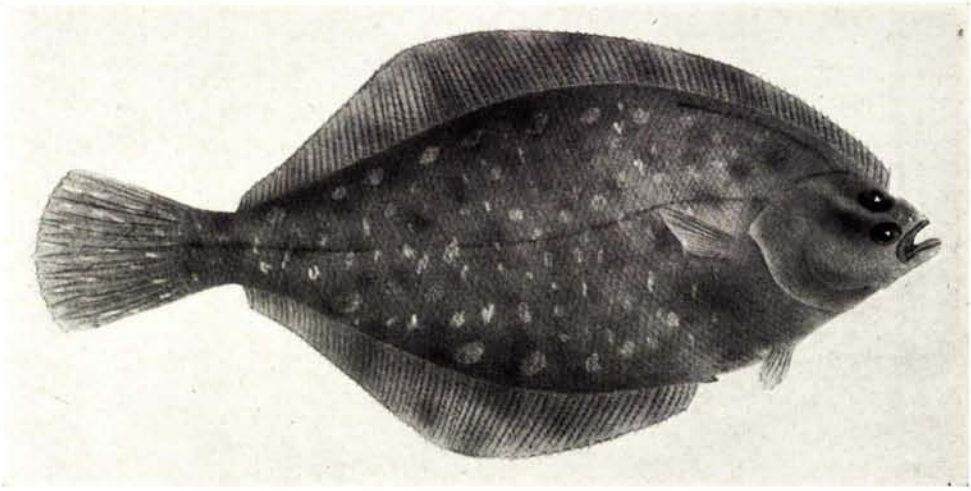

FIGURE 241. Butter sole. *Isopsetta isolepis* (Lockington) 1880

Distinguished by the rough scales on the eyed side of the body including the head and the fins and the bright lemon yellow coloration on the tips of the dorsal and anal fins.

The butter sole was first taken in British Columbia waters in the summer of 1928, off San Juan harbour and the specimen is now in the Royal Ontario Museum of Zoology at Toronto. An individual was secured May 16, 1934, in Clayoquot sound west of Flores island at a depth of 27 fathoms by the *Wm. J. Stewart* expedition. Occasionally specimens are obtained in the strait of Georgia and large numbers are taken in Hecate strait in otter trawls. Usually this species is found on a soft silty bottom. Spawning occurs from March to late April. The eggs are white in colour. Considerable quantities are marketed as fillets.

Range southern California to northwestern Alaska.

Yellow-fin sole *Limanda aspera* (Pallas) 1811

Body elongate, deeply ovate, compressed, dextral. Head moderately deep; mouth terminal, small, asymmetrical, gape narrow; teeth chiefly on blind sides of jaws; snout bluntly rounded, shorter than diameter of eye; eyes moderately large; interorbital space narrow. Fins: dorsal (1), 61 to 67; anal, 49 to 58;

pelvic, 6, thoracic; caudal, truncate. Lateral line: prominently arched over pectoral fin; no accessory branch. Scales: slightly imbricated; ctenoid on both sides of body; on lateral line, 49 to 58; extending onto anterior rays of dorsal and anal fins. Colour: light brown on eyed side; narrow black line following contour of body at bases of dorsal and anal fins; white on blind side, sometimes faintly tinged with yellow; orange yellow on fins.

Length to 15 inches.

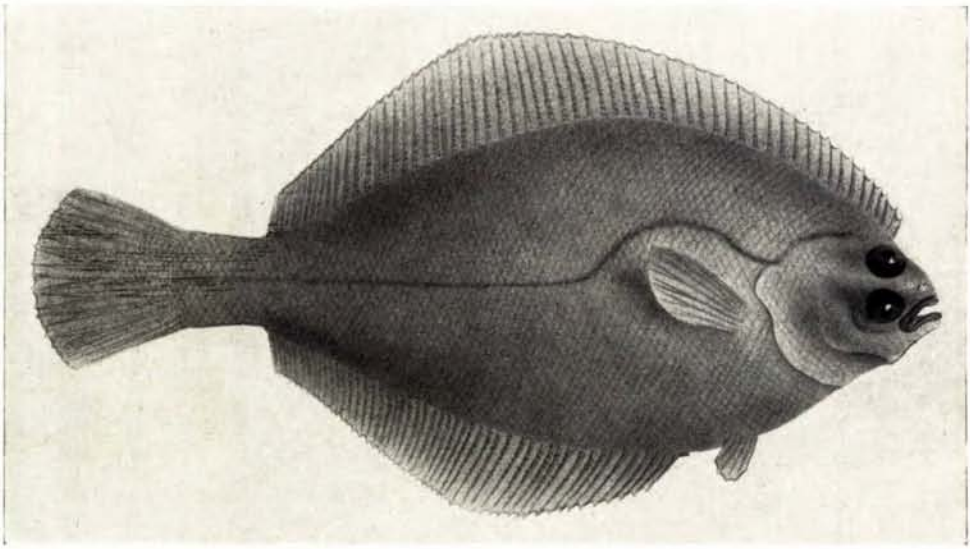

FIGURE 242. Yellow-fin sole. *Limanda aspera* (Pallas) 1811

Distinguished by the prominent arch in the lateral line over the pectoral fin, the absence of an accessory branch, the orange yellow coloration of the fins and the distinct black line on the eyed side of the body at the bases of the dorsal and anal fins.

The yellow-fin sole was first taken in British Columbia waters in June, 1882, at Port Simpson and in Cardenas bay by Capt. H. E. Nichols and recorded in 1883 by T. H. Bean. The species has been recorded from the Queen Charlotte islands and is commonly taken in Hecate strait by otter trawls. The food consists in part of hydroids, worms, molluscs and brittle-stars. With the increase in trawling in northern waters this fish has come into the markets and is sold chiefly as fillets. It is also known as the northern sole.

Range northern British Columbia to northwestern Alaska.

Starry flounder *Platichthys stellatus* (Pallas) 1811

Body elongate, deep, much compressed, dextral or sinistral. Head deep; mouth terminal, small, asymmetrical, gape narrow; lower jaw projecting; teeth

chiefly on blind sides of jaws; snout bluntly rounded; eyes small. Fins: dorsal (1), 52 to 66; anal, 38 to 47; pelvic, 6, thoracic; caudal, truncate. Lateral line: slightly decurved, then straight; no accessory branch. Scales: well separated, small, cycloid, chiefly on posterior portion of body; in form of spinous stellate plates, well separated, numerous, on eyed side, more or less in bands on blind side; absent from lateral line. Pores: on lateral line, 38 to 47. Colour: dark brown to nearly black, on eyed side; white to creamy white, on blind side; black

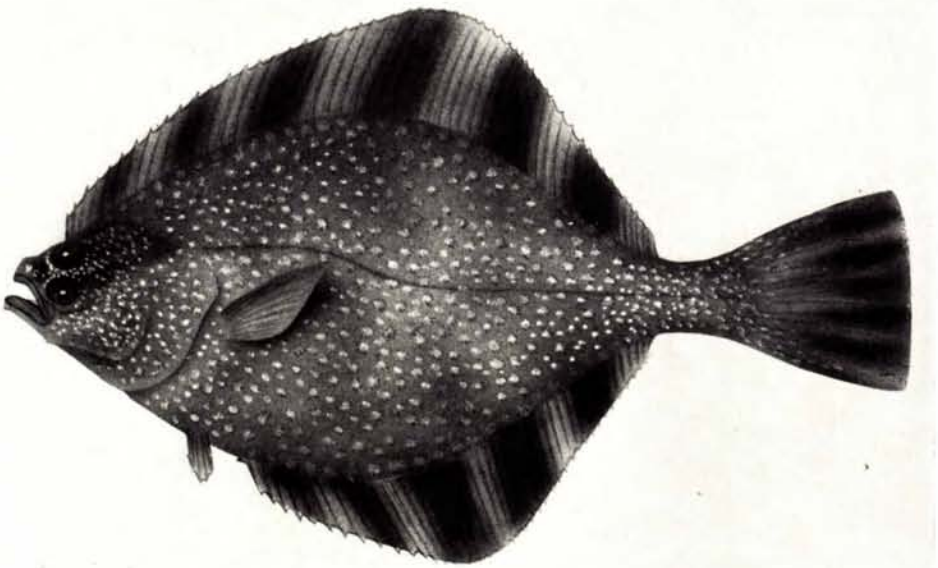

FIGURE 243. Starry flounder. *Platichthys stellatus* (Pallas) 1811

bands on dorsal and anal fins, 4 to 7, vertical; black stripes on caudal fin, 4 to 6, longitudinal; white, orange yellow or reddish orange areas between bands and stripes, occasionally bands and stripes tinged with orange, more pronounced on large individuals taken in shallow water.

Length to 3 feet.

Distinguished by the black bands on the dorsal and anal fins, the black stripes on the caudal fin and the spinous stellate plates.

The starry flounder was first recorded from British Columbia waters in 1862 by A. Günther as *Pleuronectes stellatus* Pallas, on the basis of a skin from Esquimalt harbour, collected by H.M.S. *Plumper* and presented to the British Museum by Earl Russell. In 1866, J. K. Lord recorded the species from British Columbia waters under the names of *Platichthys rugosus* and *Pleuronectes stellatus*. This fish is very abundant along the whole coast, living in shallow water on sandy bottoms for the most part, but occasionally occurring in deeper water where it is

taken on halibut gear. Spawning occurs in late winter and early spring. The eggs are pale orange yellow in colour. The young frequently move into streams for some distances. The food consists of crabs, shrimps, worms, clams and clam siphons, small molluscs and small fishes, including *Lycodopsis pacificus*. This is the flounder which is most commonly "left-handed" or sinistral, some collections containing as high as 60% of such individuals. Rarely the halibut and the flathead sole may be sinistral, while the sand dabs are normally so. Weights up to 20 pounds have been recorded. This fish is also known as the grindstone or emery wheel because of its extreme roughness.

Range southern California to northwestern Alaska.

Rex sole *Glyptocephalus zachirus* Lockington 1879

Body elongate, slender, much compressed, dextral; caudal peduncle very short. Head slender, short; mouth terminal, small, asymmetrical, gape narrow, smaller on eyed side than on blind side; teeth chiefly on blind sides of jaws; snout bluntly rounded; eyes large, lower slightly in advance of upper; gill opening

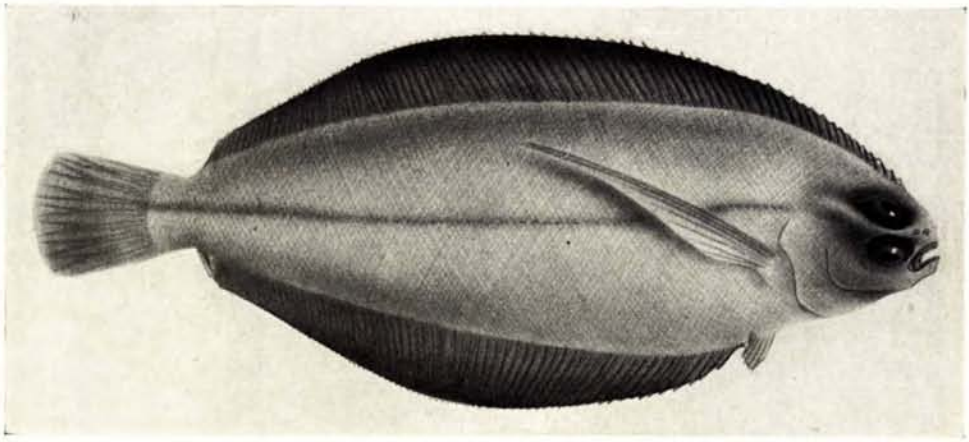

FIGURE 244. Rex sole. *Glyptocephalus zachirus* Lockington 1879

extending above base of uppermost pectoral fin ray. Fins: dorsal (1), 87 to 110; anal, 78 to 93; pelvic, 6, thoracic; pectoral (2), that on eyed side greatly elongate, pointed, much longer than that on blind side, shorter in young but always longer than that on blind side; caudal, rounded. Lateral line: nearly straight; no accessory branch. Scales: imbricated, small, cycloid, uniform over body; on lateral line, 132 to 138. Colour: uniform light brown on eyed side; white to faintly dusky on blind side; dusky on fins.

Length to 18 inches.

Distinguished by the long pectoral fin on the eyed side of the body, the nearly straight lateral line without an accessory branch and the gill openings extending above the bases of the pectoral fins.

The rex sole was first taken in British Columbia waters August 28, 1891, west of Port San Juan, by the *Albatross*, station 3447, lat. 48° 30′ N., long. 124° 36′ W., depth 116 fathoms, and recorded in 1895 by C. H. Gilbert. The species is fairly common in the strait of Georgia and specimens have been obtained from the west coast of Vancouver island, from the north end of Vancouver island near Fort Rupert, from Hecate strait and from the Queen Charlotte islands at Rose spit. The rex sole is captured in trawls operating at depths from 10 to 136 fathoms, but off the Alaskan coast it has been secured at depths down to 350 fathoms. While it usually is considered as very palatable only small numbers appear on the market. The name *Errex zachirus* has been applied to this species in some publications. The terms witch and long-fin sole frequently are applied to this fish.

Range southern California to northwestern Alaska.

Dover sole *Microstomus pacificus* (Lockington) 1879

Body elongate, slender, compressed, dextral; caudal peduncle very short. Head slender, short; mouth terminal, small, asymmetrical, gape narrow, nearly equal on each side; teeth chiefly on blind sides of jaws; snout bluntly rounded; eyes small, lower in advance of upper; gill opening not extending above base of

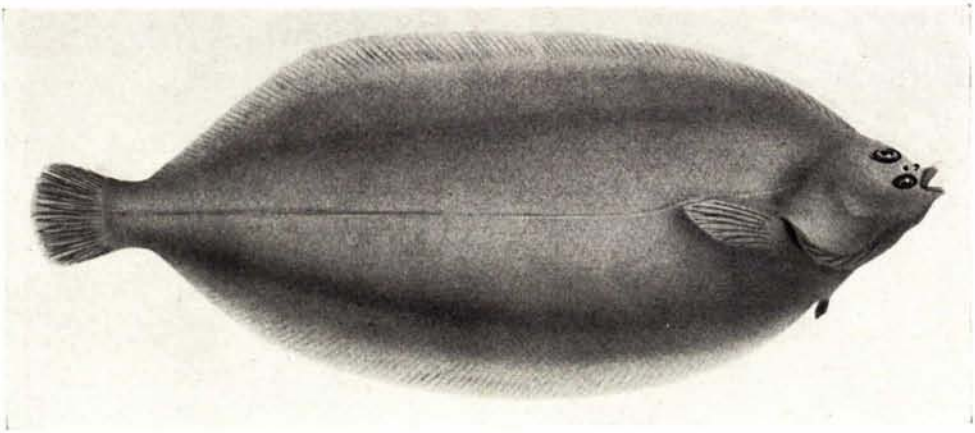

FIGURE 245. Dover sole. *Microstomus pacificus* (Lockington) 1879

uppermost pectoral fin ray. Fins: dorsal (1), 90 to 116; anal, 80 to 96; pelvic, 6, thoracic; pectoral, small, that on eyed side not elongate, length much less than that of head; caudal, rounded. Lateral line: nearly straight, rather indistinct; no accessory branch. Scales: imbricated, very small, cycloid, deciduous, uniform over body; on lateral line, 137 to 146. Mucous secretion in form of profuse slime. Colour: uniform light to dark brown on eyed side; somewhat lighter on blind side; dusky on fins, more intense towards tips of rays.

Length to 2 feet.

Distinguished by the abundance of slime, the nearly straight and indistinct lateral line without an accessory branch and the gill openings not extending above the bases of the uppermost pectoral fin rays.

The Dover sole was first taken in British Columbia waters August 28, 1891, west of Port San Juan by the *Albatross*, station 3447, lat. 48° 30′ N., long. 124° 36′ W., depth 116 fathoms and recorded in 1895 by C. H. Gilbert. The species is distributed generally along the coast from Juan de Fuca strait to the Queen Charlotte islands, occurring on muddy bottoms usually at depths below 30 fathoms. In western American waters it has been found at depths from 33 to 516 fathoms. The Dover sole is fairly abundant in the strait of Georgia off the mouth of the Fraser river where it is secured in trawls along with the lemon sole, *Parophrys vetulus*. A large amount of slime is produced which is particularly undesirable in the trawl as it covers other fishes giving the catch a whitish mucilaginous coating. Because of this characteristic the Dover sole is frequently discarded by the fishermen although the flesh is very palatable. This fish is also known as the slime or slippery sole.

Range southern California to northwestern Alaska.

Order DISCOCEPHALI

In this order there is a large dorsal adhesive disk extending forward on the head to the tip of the snout. This disk is developed by a flattening of the spinous dorsal fin together with a division of each spine to form a paired series of flattened laminae. The resulting structure is a flat, oval, transversely laminated disk with the laminae denticulated along their free posterior margins. As the disk is applied to the object of attachment, such as fishes, sea-turtles, whales or ships, the laminae are raised, creating a series of suction chambers. Backward pressure tends to engage and hold the disk, while a forward movement on the part of the fish releases the suction. Fossil species show a small narrow disk entirely behind the head and having a form more like a normal dorsal fin.

The order is closely related to the Percomorphi and comprises one family with four genera and about ten species, mostly of tropical waters.

Family ECHENEIDAE — Remoras

The remoras are mostly small fishes but the largest attains a length of over 3 feet. They are predaceous, feeding upon a variety of small fishes, particularly those that school.

Ordinarily these fishes attach themselves to external surfaces but some individuals have been found adhering within the mouths and gill chambers of such fishes as mantas, tunas, sword-fishes, ocean sun-fishes, etc. This attachment is usually stated to be for protection but is more likely to be a means of increasing the opportunity of gaining food and reducing the labour of getting it.

Remoras have been used to catch fishes, turtles, etc. A ring to which a cord is attached is fastened around the tail. When the remora is liberated it promptly attaches itself to the moving objects which may then be pulled slowly ashore.

Whale-sucker *Remilegia australis* (Bennett) 1840

Body elongate, depressed anteriorly, compressed posteriorly. Head elongate, much depressed, broad; mouth terminal, small, gape wide; maxillary reaching to point below vertical from nostril; upper jaw broad, slightly notched; lower jaw projecting, narrower than upper; teeth in bands, small, villiform, outer row slightly enlarged; snout truncate; gill membranes separate, free from isthmus. Fins: dorsal (2), XXV to XXVII — 20 to 23, spinous fin forming large adhesive disk on upper surface of head and anterior of body, extending to vertical well

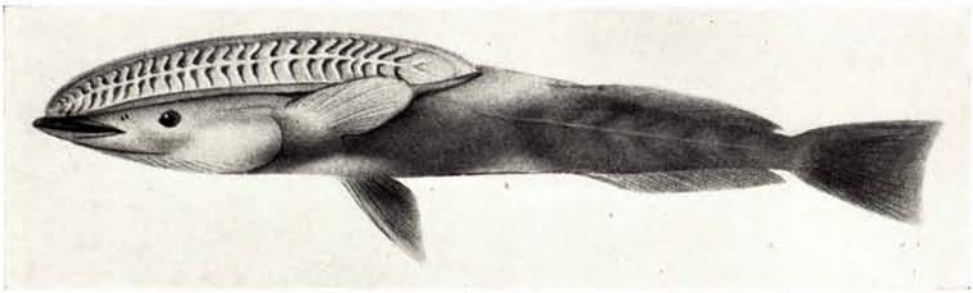

FIGURE 246. Whale-sucker. *Remilegia australis* (Bennett) 1840

behind tips of pelvic fins, length about 2 1/3 in total length, disk broader than head and body, subelliptical, obtusely rounded anteriorly and posteriorly, laminae minutely denticulate, large smooth area on posterior portion roughly triangular, rayed fin low; anal, 20 to 24, low, opposite rayed dorsal; pelvic, I, 5, thoracic, depressible into groove on abdomen, membrane of fifth ray partially adnate to groove; pectoral, rounded, high on body; caudal, slightly concave. Lateral line: high, decurved anteriorly, straight posteriorly. Scales: embedded, cycloid, minute. Colour: dark gray to brown on dorsal surface; darker on ventral surface.

Length to 20 inches.

Distinguished by the very large adhesive disk on the top of the head and anterior portion of the body with the 25 to 27 laminae.

The whale-sucker was first taken in British Columbia waters in June, 1907, at Sechart by Mr. T. Kermode and recorded in 1936 by L. P. Schultz and A. C. DeLacy as *Remora remora* (Linnaeus). Three specimens, all about 8 inches in length, were obtained from a sulphur-bottom whale and are now in the Provincial Museum at Victoria. This is a fish of the tropical seas and is rarely obtained, having been reported from the Indian ocean, from the Atlantic ocean southwest of the Cape Verde islands attached to a dolphin and from the coast of Texas in the vicinity of Corpus Christi.

Range Vancouver island.

Order PLECTOGNATHI

In this order the mouth is small with short powerful jaws; the premaxillaries and maxillaries are more or less fused. The gill openings are restricted in size and do not extend below the bases of the pectoral fins. The body is covered with scales, rough shields or bony plates, or is naked. The spinous dorsal fin, when present, consists of a small number of spines; the rayed dorsal and anal fins are opposite and far back on the body; the pelvic fins are absent.

The order includes a varied group of fishes such as the trigger-fish, parrot-fish, file-fish, trunk-fish, porcupine-fish, burr-fish and ocean sun-fish. These are chiefly tropical in distribution and the flesh of many of them is poisonous.

Family MOLIDAE — Ocean sun-fishes

In the ocean sun-fishes the body is deep, compressed, truncate posteriorly and covered with a thick, rough, scaleless skin. The teeth are fused forming a single bony sharp-edged plate, or "beak", in each jaw.

These are fishes of the open sea and are often observed at the surface in calm weather. They are reported to swim by moving the dorsal and anal fins sidewise with a twisting motion which results in a propellor effect. The pectoral fins move continuously and act as stabilizers while the caudal fin serves as a rudder. The adults become large and grotesque often drifting passively in the current although at times they dive to considerable depths. Specimens have been known to attain a length of 9 feet and a weight estimated at about a ton.

Ocean sun-fish — *Mola mola* (Linnaeus) 1758

Body short, deep, ovate, greatly compressed. Head deep, compressed; mouth terminal, small; teeth beak-like; eye small; gill opening in front of pectoral fin, smaller than diameter of eye. Skin: thick, rough, leathery. Fins: dorsal (1), 17 or 18; anal, 16 to 18; both fins short, very high, far back on body; pelvic, absent; pectoral, small; caudal short, very broad, outline wavy. Lateral line: absent. Scales: absent. Colour: dark gray on dorsal surface; grayish brown on sides with silvery reflections; light gray band at bases of dorsal, anal and caudal fins.

Length to 9 feet.

Distinguished by the short deep greatly compressed body, the high dorsal and anal fins placed far back on the body and the absence of pelvic fins.

The ocean sun-fish was first taken in British Columbia waters July 14, 1915, off Ucluelet by Indians, presented to the Provincial Museum by Mr. A. Jansen, and now represented by a model. It was recorded in 1916 by F. Kermode. Individuals appear occasionally off the west coasts of Vancouver and the Queen Charlotte islands and one has been reported from inside waters near Butedale. This is a southern or tropical form and small to medium-sized specimens up to 3 feet in length arrive in British Columbia waters in certain years. The fish frequently swim slowly or drift at or near the surface but smaller individuals are

capable of more active movements, even to leaping clear of the water. The ocean sun-fish reaches a weight of about a ton. In spite of its size it has a relatively small brain and a very short spinal cord. The eggs are produced in enormous quantities, estimated as high as 300,000,000 in a pair of ovaries. These are set free in the open ocean, and when hatched, each produces an elongate larva about

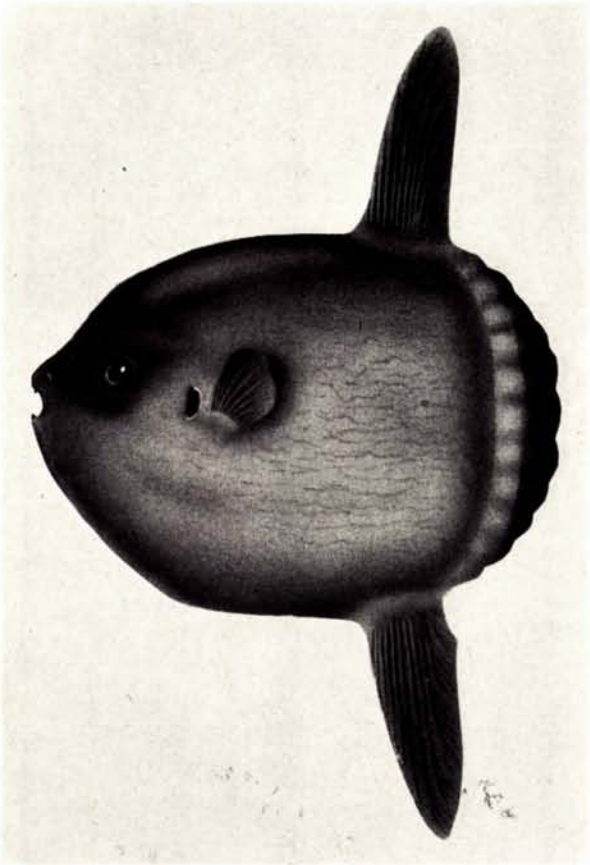

FIGURE 247. Ocean sun-fish. *Mola mola* (Linnaeus) 1758

1/10 of an inch in length with a well developed caudal fin. The caudal fin soon disappears and at the same time the body becomes covered with numerous spines, five of which grow very large. The body then changes in shape, becoming deeper than long and truncate posteriorly; the spines get smaller and finally disappear while a new short broad tail develops. The approximate length at this stage is about ½ inch. From this point the fish gradually gets larger, assuming the adult shape. The food consists of jelly-fishes, crustaceans and molluscs, brittle-

stars and small fishes. The word *Mola* means millstone which perhaps would be a more appropriate common name than head-fish used by some authors.

Range southern California to southeastern Alaska.

Order MALACICHTHYES

In this order the body is moderately deep and compressed. Scales are absent or reduced to a few spiny tubercles or spinules. The skeleton is weakly ossified so that the body is limp. All fins are supported by rays only; the pelvic fins, when present, are thoracic.

One family is represented in the order, the Icosteidae.

Family ICOSTEIDAE — Rag-fishes

While the rag-fishes probably inhabit the deeper parts of the north Pacific ocean, the majority of the specimens taken in British Columbia have been from moderately shallow waters.

Fan-tailed rag-fish *Icosteus aenigmaticus* Lockington 1880

Body elongate, oblong, moderately deep, much compressed, flexible, entirely limp; regions along bases of dorsal and anal fins strongly compressed; caudal peduncle, slender. Head short; mouth terminal, small; jaws about equal; teeth minute; snout, blunt. Skin: smooth, encroaching upon all fins except caudal.

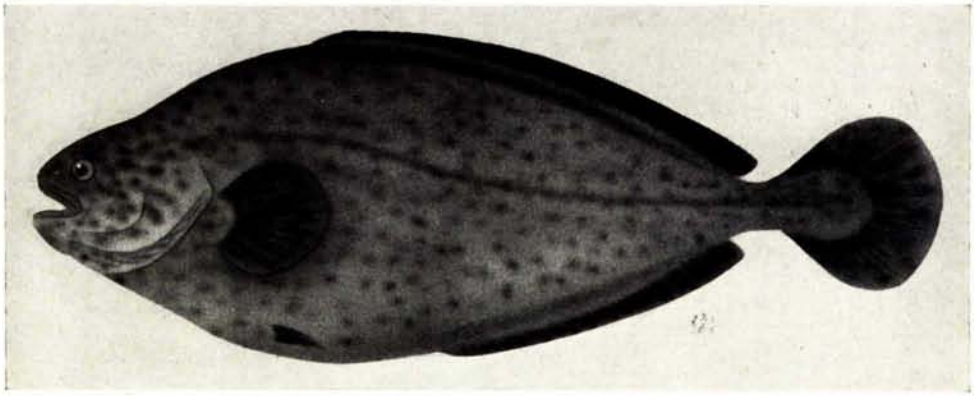

FIGURE 248. Fan-tailed rag-fish. *Icosteus aenigmaticus* Lockington 1880

Fins: dorsal (1), 52 to 55, low anteriorly, higher posteriorly, maximum height near posterior end; anal, 37 to 40, similar to dorsal; pelvic, 5, thoracic, small, narrow; pectoral and caudal, fan-shaped, symmetrically rounded, bases swollen. Lateral line: flatly arched, then straight. Scales: on lateral line, reduced to groups of small spines, sometimes referred to as spiny tubercles; on fins, numerous, very

small, reduced to spinules; otherwise absent from body. Colour: pellucid yellow and brown, irregularly spotted and blotched with faint purple; dusky on fins.

Length to 16½ inches.

Distinguished by the limp compressed oblong body with the smooth skin, the groups of spines on each lateral line, the pelvic fins each with 5 rays and the rounded pectoral and caudal fins with the swollen bases.

The fan-tailed rag-fish was first taken in British Columbia waters September 25, 1928, in the Queen Charlotte islands area at Werner bay by Messrs. G. J. Alexander and J. R. Townsend in a purse-seine. This individual was recorded in 1929 by A. L. Pritchard and deposited in the fish collection of the Pacific Biological Station. A second specimen was obtained July 22, 1941, in Barkley sound by Mr. F. H. Carroll and is now in the Provincial Museum at Victoria. The species occurs at rare intervals along the coast. Apparently it is an inhabitant of deep water for its body is exceedingly soft and flexible and "can be doubled up as readily as a piece of soft thick rag".

Range southern California to Queen Charlotte islands.

Brown rag-fish *Acrotus willoughbyi* Bean 1887

Body elongate, moderately deep, elliptical, greatly compressed, limp; caudal peduncle very slender. Head very short; mouth terminal, small; jaws approximately equal; snout blunt; eye very small. Skin: thick, rough. Fins: dorsal (1), 38 to 42, very low anteriorly, higher posteriorly, maximum height near

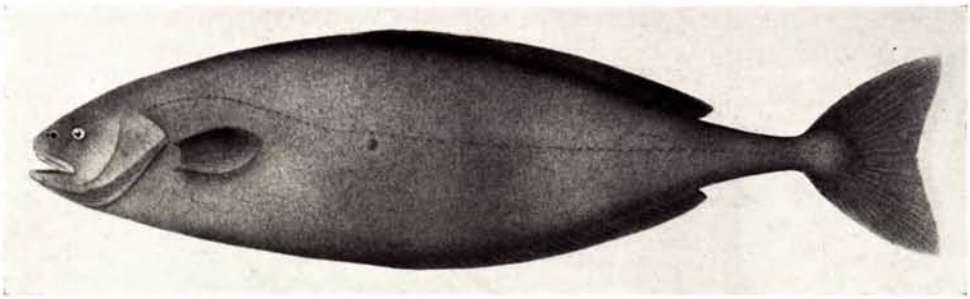

FIGURE 249. Brown rag-fish. *Acrotus willoughbyi* Bean 1887

posterior end; anal, 34 to 38, similar to dorsal; pelvic, absent; pectoral, small, pointed; caudal, broad, emarginate. Lateral line: slightly arched, then straight. Scales: absent. Colour: chocolate brown; rich dark brown on inside of mouth and gill openings.

Length to 7 feet.

Distinguished by the elongate, elliptical, greatly compressed limp body without scales, the very slender caudal peduncle, the absence of pelvic fins, the broad emarginate caudal fin, the small eyes and the plain brown coloration.

The brown rag-fish was first taken in British Columbia waters July 19, 1912, near Victoria, by Mr. J. Dixon and recorded in 1913 by F. Kermode. During the summers of 1936 and 1937 individuals were found commonly in stomachs of sperm whales taken 30 miles off Rose harbour in the Queen Charlotte islands. The species has been reported from time to time along the Pacific coast.

Range southern California to southeastern Alaska.

Order XENOPTERYGII

In this order the head is depressed. Scales are absent. The dorsal and anal fins are supported by rays only; the pelvic fins are thoracic and united anteriorly, forming with a fold of skin a large cleft adhesive disk.

The order includes a single family, the Gobiesocidae.

Family GOBIESOCIDAE — Cling-fishes

The cling-fishes are chiefly found in tropical waters although some extend into temperate seas. They inhabit the littoral zone, adhering to rocks and shells. The food consists largely of small invertebrates. Their body colours vary from pale brown to cherry red which blend with their immediate surroundings.

Common cling-fish *Sicyogaster maeandricus* (Girard) 1858

Body elongate, stout, depressed anteriorly, compressed posteriorly. Head very large, depressed, broad; mouth terminal, large; lower jaw included; snout bluntly rounded; gill membranes united, free from isthmus. Anus about mid-point between posterior margin of adhesive disk and origin of anal fin. Anal

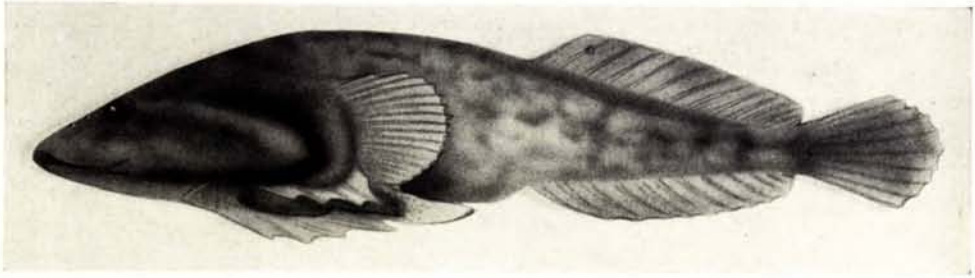

FIGURE 250. Common cling-fish. *Sicyogaster maeandricus* (Girard) 1858

papilla short, conical. Fins: dorsal (1), 13 to 16, far back on body; anal, 12 to 14, origin slightly posterior to that of dorsal; pelvic, thoracic, large, united anteriorly by membrane to form anterior portion of large adhesive disk whose posterior portion formed by broad fold of skin from ventral surface of body, anterior and posterior portions separated by lateral clefts; pectoral short, broad; caudal, rounded. Lateral line: absent. Scales: absent. Colour: light olive

brown to cherry red; everywhere reticulated with brownish orange; sometimes streaked or speckled with black; pale brown bar between eyes, another across cheek.

Length to 6 inches.

Distinguished by the broad flat head, the single rayed dorsal fin set far back on the body and the large cleft adhesive disk.

The common cling-fish was first taken in British Columbia waters in June, 1893, at Comox, when fourteen specimens under 3½ inches in length were secured by Mr. J. Macoun. This collection was recorded in 1920 by B. A. Bean and A. C. Weed as *Caularchus maeandricus* (Girard), although the first published record was that of W. H. Osgood in 1901 for the Queen Charlotte islands, also listed as *Caularchus maeandricus*. The common cling-fish occurs along the whole coast as far north as the Queen Charlotte islands and is particularly abundant in the strait of Georgia. It clings to the rocks in the intertidal zone and feeds upon small crustaceans and molluscs.

Range southern California to southeastern Alaska.

Slender cling-fish *Rimicola eigenmanni* (Gilbert) 1890

Body elongate, slender. Head small, much depressed, narrow; mouth terminal, small; lower jaw included; snout bluntly rounded; gill membranes united, free from isthmus. Anus much nearer anal fin than adhesive disk. Anal papilla long, slender, conical. Fins: dorsal (1), 6 to 8, far back on body, first one or two

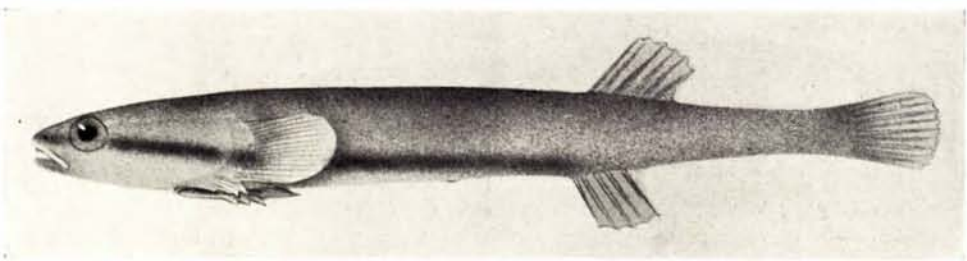

FIGURE 251. Slender cling-fish. *Rimicola eigenmanni* (Gilbert) 1890

rays embedded; anal, 6 to 8, origin slightly anterior to that of dorsal, first one or two rays embedded; pelvic, thoracic, united anteriorly by membrane to form anterior portion of small adhesive disk whose posterior formed by broad fold of skin from ventral surface of body, anterior and posterior portions separated by lateral clefts; pectoral, short, broad; caudal, rounded. Lateral line: absent. Scales: absent. Colour: light olive green to brown; in female, sometimes sparsely covered with distinct brownish red spots as large as pupil of eye.

Length to 1½ inches.

Distinguished by the slender body, the single small rayed dorsal fin set far back on the body and the small cleft adhesive disk.

The slender cling-fish has been taken once only in British Columbia waters. Four individuals, all males, were secured May 3, 1935, during an extremely low tide on the west coast of Vancouver island in Clayoquot sound on Round island flats by Dr. J. L. Hart and are now in the collection of the Pacific Biological Station at Nanaimo. These specimens were recorded in 1936 by G. V. Wilby. This is the first record of the species north of Monterey, California.

Range southern California to west coast of Vancouver island.

Order HAPLODOCI

In this order the body is stout anteriorly. Scales, if present, are ctenoid. The gill openings are somewhat restricted. The spinous dorsal fin is small, supported by 2 to 4 spines; the rayed forsal and anal fins are long; the pelvic fins are thoracic, with 1 spine and 2 or 3 rays.

The order comprises a single family, the Batrachoididae.

Family BATRACHOIDIDAE — Toad-fishes

The toad-fishes are chiefly tropical in distribution, living on the bottom in shallow to moderately deep water. In some species the spines of the head and dorsal fin are hollow and each is connected with a poison gland. A poisonous secretion is discharged through the hollow spine in a similar manner to the ejection of the venom from the fang of a snake.

Midshipman — *Porichthys notatus* Girard 1854

Body elongate, stout anteriorly. Head large, much depressed, broad; mouth terminal, large; lower jaw projecting; maxillary reaching to point below posterior margin of eye; teeth large, recurved; snout bluntly rounded; eyes placed high, protrusible; interorbital space broad; opercular spine, 1, strong, concealed by skin; gill openings somewhat restricted, membranes broadly united to isthmus. Fins: dorsal (2), II—33 to 37, well separated, spinous fin small, low, in groove, rayed fin long; anal, 29 to 34, long; pelvic, 1, 2, thoracic, broad, rays much branched; pectoral large, broad; caudal, rounded. Lateral lines: 4. Scales: absent. Photophores: on body and head in rows of varying lengths, each in form of shiny round area covering minute lens. Pores: on head in several rows. Cirri: rounded to multifid; in pairs along lateral lines and along rows of pores on head. Colour: olive brown to dark iridescent blue on dorsal surface; silvery gray on sides; golden yellow on ventral surface; white space under eye with black crescent below; white on posterior margin of maxillary; dusky to black on margins of vertical fins.

Length to 15 inches.

Distinguished by the numerous rows of photophores or "buttons", the broad flat head, the prominent widely separated protrusible eyes and the small spinous dorsal fin.

The midshipman was first taken in British Columbia waters near Vancouver island by H.M.S. *Plumper* and the individual obtained was recorded in 1861 by A. Günther as *Porichthys porosissimus*. In 1920, B. A. Bean and A. C. Weed recorded the species from Ucluelet, collected in 1909, as *Porichthys notatus* Girard, and from Vancouver island, collected in 1915, as *P. margaritatus* (Richardson). The midshipman is common in the strait of Georgia and on the west coast of Vancouver island as far north as Nootka island. It is found frequently in the intertidal zone and ranges to depths of at least 145 fathoms. In the shoreward

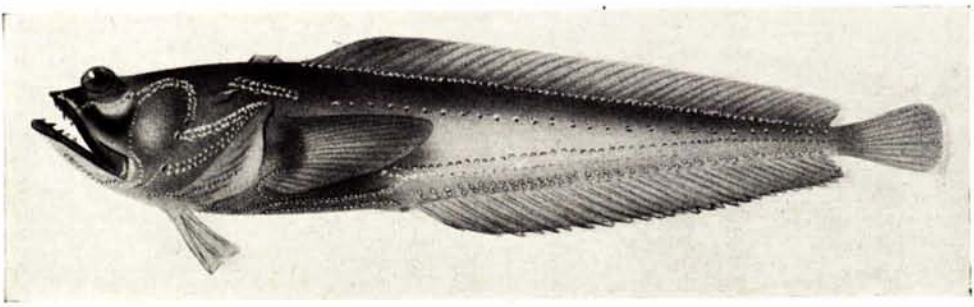

FIGURE 252. Midshipman. *Porichthys notatus* Girard 1854

areas these fish may be found beneath rocks. The breeding season is in the spring and the large pale pink to yellow eggs are attached singly to the lower surface of a rock or shell until a large mass is formed. This mass is guarded carefully by the male and the fry emerge in early July, at which time they are about $\frac{3}{8}$ of an inch in length, and are attached to the rocks by the outer wall of the yolk-sac. They remain thus attached for two or three weeks until the yolk is absorbed, after which the young fish, about one inch in length, become free-swimming. The food of the adults consists of fishes and crustaceans. The rows of photophores with fancied resemblance to buttons have suggested the name midshipman. This fish is known also as the singing-fish on account of the loud humming sounds which are produced by vibrations in the air-bladder.

Range southern California to southeastern Alaska.

Order PEDICULATI

In this order the body is broad, globular to greatly depressed. The gill openings are small and never in front of the pectoral fins. Scales usually are absent. The spinous dorsal fin is usually represented by one or more free spines, the first of which is situated on the head and may be subtended by a short globular luminous organ, or a long whip-like lure called an illicium; the pelvic fins, when present, are thoracic, with 1 spine and 5 rays.

The order comprises some sixteen families. While most species dwell on the bottom of fairly deep waters, or are bathypelagic, one or two are known to inhabit floating seaweeds.

Among the common names applied to these fishes are: angler, fishing-frog, monk-fish, sargassum-fish, sea-devil and bulb-fish.

Family ONEIRODIDAE — Sea-devils

In the sea-devils the body is short, oval to globular. The mouth is large with acute depressible teeth. The rayed dorsal and anal fins are short and placed far back on the body and approximately equal in size. The skin is scaleless except in one genus, and usually black.

Bulb-fish — *Oneirodes bulbosus* Chapman 1939

Body short, deep, broad, nearly globular; caudal peduncle, short. Head large, very deep, broad, pointed; mouth terminal, very large; teeth long, slender, depressible; snout long, acute; eye very small, somewhat protruded; interorbital space deeply concave to base of illicium; spines: sphenotic, 1, above and behind

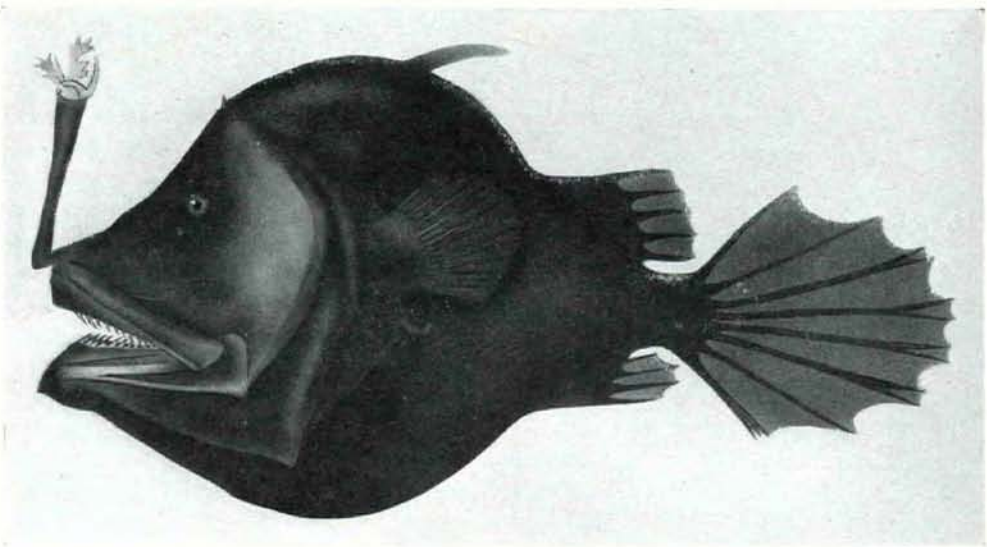

FIGURE 253. Bulb-fish. *Oneirodes bulbosus* Chapman 1939

eye; gill membranes joined to body, gill opening small, below and behind pectoral fin. Fins: dorsal (3), I — 1 - 5, first fin, known as illicium, elongate, arising from snout, jointed anterior thereto, cirri at tip, 4, three much branched, one posterior, curved, unbranched, second fin a single lax fleshy ray above gill opening, third fin far back on body, directed backward; anal, 4, similar to third dorsal;

pelvic, absent; pectoral, 13, high on body; caudal, large, fan-shaped. Lateral line: absent. Scales: absent. Colour: jet black; pale on bulb and appendages of illicium.

Length to 3¼ inches.

Distinguished by the almost globular shape of the body, the jointed illicium on the snout, the small eyes, the small gill openings below and behind the pectoral fins and the jet black coloration.

The bulb-fish is known from a single specimen taken March 11, 1934, west of Graham island by the International Fisheries Commission, station 1109C. lat. 53° 50′ N., long. 133° 54′ W., in a vertical haul at a depth between 487 and 379 fathoms. This specimen, the type, and only one known, was described in 1939 by W. M. Chapman and is now in the collection of the United States National Museum.

Range Queen Charlotte islands.

GLOSSARY OF TERMS USED

Abdomen. Externally the ventral surface of the body, ordinarily between the pectoral fins and the anus.

Abdominal. Pertaining to the abdomen.

Abyssal. Pertaining to waters of great depths, below 1500 fathoms.

Accessory lateral line. See lateral line.

Adhesive disk. A modified portion of the external anatomy forming a sucker, *e.g.* around the mouth of the lamprey; the modified first dorsal fin in the whale-sucker; the pelvic fins in the liparids.

Adipose fin. A fleshy fin on the dorsal median line of the body behind the rayed dorsal fin, as in the salmons, smelts, etc. Technically a dorsal fin but for convenience because of its fleshy nature, without rays, it is referred to in the text and key as a separate fin.

Anal. Pertaining to the anus.

Anal fin. The fin on the ventral median line of the body behind the anus.

Anal papilla. A protuberance in front of, or bearing, the genital pore, behind the anus in certain groups of fishes, functioning as a penis, *e.g.* in certain sculpins, etc.

Anterior. In front.

Anus. The posterior opening of the digestive tract, sometimes referred to as the vent. Varying in position from near the posterior end of the body, as in the hag-fish, to below the lower jaw, as in the tadpole liparid. More usually found in the middle third of the body on the ventral surface.

Asymmetrical. Not symmetrical: one side not the mirror image of the other, *e.g.* the body and head of a flounder.

Barbel. An elongate fleshy projection under the snout, around the mouth or below the lower jaw, as in the sturgeons, cods, etc.

Base of fin. The area of contact of a fin with the body; the distance from the first ray or spine to the last ray or spine.

Bathypelagic. Living freely in open waters below 200 fathoms.

Bifid. Having a forked end, as of the preopercular spine in some members of the family Cottidae.

Bifurcate. Divided into two branches.

Body. That portion of a fish between the head and the base of the caudal fin.

Branchial. Pertaining to the gills.

Branchiostegal membrane. The membrane enclosing the gill chamber ventrally. Also called gill membrane.

Branchiostegals. The bony rays which support the branchiostegal membrane.

Buccal. Pertaining to the mouth, *e.g.* the buccal or mouth cavity.

Caecum (*pl. caeca*). A blind sac, *e.g.* the pyloric caeca, connected with the anterior portion of the intestine. Used in the identification of the salmons and liparids.

Canines. Teeth that are enlarged and conical.

Cardiform teeth. Teeth that are small and sharp, arranged like a series of combs, or like wool cards.

Caudal. Pertaining to the tail, as caudal fin, caudal peduncle, etc.

Caudal peduncle. The posterior end of the body upon which rests the base of the caudal fin. Usually considered as the part of the body from the posterior margin of the anal fin to the end of the vertebral column.

Chondrocranium. A cartilaginous skeleton enclosing the brain, as in the sharks, rays, etc.

Claspers. Extensions of the pelvic fins in male sharks, skates, etc., for the transference of sperms to the female.

Cleithrum (*pl. cleithra*). A bone forming the dorsal, and usually anterior, part of the pectoral girdle.

Compressed. Flattened from side to side.

Confluent. Meeting smoothly without a notch.
Corselet. A patch of scales posterior to the base of the pectoral fin of some members of the mackerel family.
Cranial. Pertaining to the brain case or skull.
Cranial ridge. A bony ridge on the top of the skull.
Cranial spine. A spine on the skull.
Crenulate. Scalloped.
Cusp. A projection or point on the crown of a tooth.
Deciduous. Falling off; loosely attached.
Decurved. Curved downward; said of a lateral line which curves downward from its origin to or below the mid-lateral position.
Depressed. Flattened from above downward.
Dentary. The bone forming the anterior portion of each half of the lower jaw.
Dentary elevation. An elevation at the symphysis or junction of the dentary bones which may fit into an emargination between the symphysis of the premaxillary bones of the upper jaw.
Denticles. Minute teeth; tooth-like growths.
Dentigerous. Bearing teeth.
Dentition. Having reference to the arrangement and character of the teeth.
Depth of the body or head. The vertical distance through the body or the head at its greatest distance dorsoventrally, not including the fins.
Dermal. Pertaining to the skin.
Diameter of eye. The greatest diameter of the orbit or eye-socket.
Distal. Farthest away; most distant.
Dorsal. Pertaining to the upper surface or back.
Dorsolateral. Refers to the position of the area or line where the back and side meet.
Elongate. Lengthened; longer than deep; very long.
Emarginate. Having the margin notched.
Embedded. With reference to scales: the scale margin is so enveloped in skin that there is no free edge, *e.g. Pleuronichthys*, the scales appear as if punched into the skin.
Exserted. Fin rays much projecting beyond the fin membrane. Usually used with reference to pectoral fin rays.
Falcate. Sickle or scythe-shaped; long, narrow, curved.
Filament. A thread-like projection, *e.g.* the very elongate first spine of the dorsal fin of *Icelinus filamentosus.*
Frenum. The fold of skin joining the lower lip to the symphysis of the lower jaw, as in some members of the family Embiotocidae.
Furcate. Forked.
Fusiform. Spindle-shaped; tapering towards each end but rather more abruptly anteriorly, *e.g.* the mackerels.
Gill. The structure by means of which gases are exchanged between the blood of the fish and the water environment.
Gill arch. The bony support to which the gill filaments and gill rakers are attached.
Gill chamber. The space around the gills enclosed by the operculum and the gill or branchiostegal membranes.
Gill filaments. The slender delicate fringe-like structures composing the gill.
Gill membrane. The membrane supported by the branchiostegal rays, which closes off the gill chamber, in part. Also known as the branchiostegal membrane.
Gill membranes separate. The gill membranes are free from one another posteriorly.
Gill membranes united. The membrane covering the gill cavity on one side is united to its fellow of the opposite side to form a fold over the isthmus, (the forward pointed projection of the body).
Gill membranes, free from isthmus. The membranes are free so that a needle may be run across the isthmus from side to side under the gill membranes posteriorly.

Gill membranes, joined to isthmus. The membranes are attached laterally or ventrally to the isthmus.

Gill rakers. The protuberances on the gill arch opposite the gill filaments; these are short and usually rough in carnivorous fishes, long and very slender in plankton-feeding fishes. The formula 15 + 25, indicates 15 rakers on the upper limb of the arch and 25 on the lower.

Girdle, pectoral. The internal bony or cartilaginous structure supporting the paired pectoral fins.

Girdle, pelvic. The internal bony or cartilaginous structure supporting the paired pelvic fins.

Heterocercal. Referring to a caudal fin in which the upper lobe is longer than the lower and encloses the end of the vertebral column.

Homocercal. Referring to a caudal fin with the upper and lower lobes of equal, or nearly equal, length.

-id (suffix). Indicating a member of a family, a non-scientific terminology, *e.g.* salmonid, a salmon; cottid, a sculpin.

-idae (suffix). Indicating a family, a scientific terminology, *e.g.* Clupeidae, herrings.

Illicium. A whip-like structure on the head derived from a modified dorsal fin spine or ray, sometimes luminescent.

Imbricated. Overlapping, referring to the scales of a fish.

Incised. Cut in, referring to the membranes between the tips of the rays or spines of a fin.

Included. Said of a lower jaw which is overlapped by the upper.

Inferior. Below; not terminal, *e.g.* the mouth of a sturgeon and some agonids.

Insertion of a fin. The posterior end of the base of a fin.

Interorbital space. The least width of the skull between the eyes. In the Scorpaenidae the interorbital space is broad when it is 4 or less in the length of the head; medium width, 4 to 5 in length of head; narrow, 5 or more in length of head. The shape, (convex, flat or concave), refers to the portion of the skull between the eyes and not including the cranial ridges or spines.

Interspace. The space between vertical fins, usually referring to dorsal fins.

Isthmus. The narrow triangular portion of the body beneath the head and between the gill chambers.

Keel. A ridge extending longitudinally along the midline of the side; on the caudal peduncle of certain sharks, on the scales of certain fishes such as the shad and the darter sculpin, etc. On the middorsal line of the head in gobies, etc.

Lamina. A small thin plate.

Lanceolate. Shaped like the blade of a lance, *e.g.* the caudal fin of the rat-fish.

Larva. The early stage after hatching from the egg, frequently different in appearance from the adult.

Lateral. Pertaining to the side.

Lateral line. A sensory canal along the side of the body with a series of pores opening to the exterior. The lateral line may be single or multiple.

Lateral line pore. One of a series of openings from the sensory lateral line canal to the outside.

Lateral line with accessory dorsal branch. The lateral line system beginning on the head has an extra or accessory dorsal branch passing above the main lateral line more or less close to the dorsal fin, *e.g.* in certain blennies, greenlings, flat-fishes, etc.

Littoral. Along the shore; shore-dwelling.

Luminous organ. A specialized area on the body or head, capable of producing light, without a lens and usually irregular in shape.

Lunate. Having the shape of a half moon; a broadly rounded, rather shallow fork.

Mandible. The main bone forming the lower jaw.

Maxillary. The main bone forming the upper jaw.

Median. Situated on the vertical axis of the body.

Metamorphosis. Change in body structure or form; having reference to marked changes occurring in fishes during development from the larval to the adult stages.

Molar. An enlarged tooth for grinding or crushing.

Mouth oblique. The mouth is modified so that the jaws, when closed, are not in a horizontal position, *e.g.* some blennies.

Mouth subterminal. The mouth is almost at the anterior tip of the head and opens anteriorly, *e.g.* anchovy, grenadiers.

Mouth terminal. The mouth is at the anterior end of the head.

Mouth ventral. The mouth is located far behind the tip of the head and opens ventrally, *e.g.* sharks, sturgeons.

Muciferous. Carrying mucus.

Mucous. Slimy. The adjective of mucus.

Mucus. A slimy secretion from the skin.

Multifid. Having many branches or forks.

Nasal. Pertaining to the nose.

Neural processes. Broad plate-like structures arising dorsally from the vertebrae, exposed in the silvery hatchet-fish.

Notch. In the case of the dorsal and anal fins, an indentation partially dividing the fin into two parts, *e.g.* rock-fishes; in the case of the pectoral fin, a broad indentation resulting from the shortening of some of the rays thus dividing the fin into two lobes, *e.g.* black-finned eel-pout.

Occipital. The most posterior bone on the top of the head; pertaining to the occiput.

Occiput. The posterior portion of the upper part of the head; in some fishes the cross line separating the head from the body, *e.g.* some blennies.

Ocellus (plural, ocelli). An eye-like spot, *e.g.* big skate.

Ocular. Pertaining to the eye.

Operculum. Gill-cover. Supported by the following bones: opercle, preopercle, interopercle, subopercle.

Orbit. The eye socket.

Orbital. Pertaining to the orbit of the eye.

Origin of a fin. The anterior end of the base of a fin.

Palatines. A pair of bones on the roof of the mouth, one on each side, extending outward and backward, from the head of the vomer, sometimes bearing small teeth.

Papilla. A small fleshy projection, sometimes tubular.

Pectoral. Pertaining to the pectoral girdle, the pectoral fins or the area adjacent to the pectoral fins.

Pedicel. A small or slender support for a larger structure, *e.g.* the oral cirri of the sturgeon-like sea-poacher.

Peduncle. See caudal peduncle.

Pelagic. Living freely in open waters.

Pelvic. Pertaining to the pelvic girdle, the pelvic fins or the area adjacent to the pelvic fins.

Peritoneum. The lining of the abdominal cavity.

Pharyngeal. Pertaining to the region of the pharynx.

Pharynx. The region posterior to the mouth into which open the internal branchial clefts.

Photophore. A specialized organ, on the body or head, capable of producing light, usually with a lens and round reflector.

Plankton. Minute aquatic plants and animals, sometimes microscopic.

Plications. A series of small folds.

Posterior. Behind.

Premaxillary. One of two bones, on either side of the midline of the upper jaw, immediately in front of the nasal bones, sometimes overlapping the maxillary bone laterally.

Preopercle. The bone in the operculum in front of the opercle.

Preopercular spine. A bony protuberance from the preopercle. The spine, or spines, may be barely discernible to very elongate, simple or multifid.

Prickle. A scale reduced to a sharply pointed spine.

Procurrent fin. The base of the fin is broad and curved forward and the lowest ray is inserted well forward, as in the pectoral fin of some cottids, *e.g.* the spiny-headed sculpin.

Profile. The contour of the body or head, from the side view unless otherwise stated.

Protractile. Capable of being extended forward, *e.g.* premaxillary and maxillary bones.

Protrusible. Capable of being thrust forward or outward, *e.g.* the mouth of a sturgeon.

Pyloric caeca. See caecum.

Ray. In this text the term, when applied to a fin, refers to the segmented support to the fin membranes, the segmentation usually being visible by transmitted light, (sometimes referred to as "soft" rays by authors).

Recurved. Curved upward and inward, *e.g.* the preopercular spine in the sharp-nosed sculpin.

Reticulations. Markings in the form of a network of lines.

Rostral. Pertaining to the snout.

Rostral plate. A small plate on the anterior tip of the snout, as in some sea-poachers.

Rostral spine. A spine on the rostral plate.

Serrate - ed. Notched like a saw.

Sessile. Attached without a stem or pedicel.

Snout. The portion of the head which projects in front of the eyes.

Snout, rounded. Usually referring to the dorsal aspect.

Spine. In this text the term when applied to a fin refers to the unsegmented supports of the fin membranes regardless of whether or not they are stiff.

Spinule. A small spine, *e.g.* on the uppermost preopercular spine of some cottids.

Spiracle. The opening behind the eye of a shark or ray connected with the branchial chamber and through which water may be taken and passed over the gills.

Stellate. Star-like; ridges or lines radiating from a central point; said of the tubercles on the starry flounder.

Striae. Fine lines or ridges, as on the opercula of some fishes, *e.g.* the pilchard and eulachon.

Subequal. Not quite equal.

Suborbital. Below the eye.

Suture. A line of junction between two immovably connected bones.

Symmetrical. Having symmetry. Each side a mirror image of the other.

Symphyseal knob. A projection or swelling below and in front of the symphysis or point of junction of the two dentaries or lower jaw bones.

Symphysis. Point of junction of two bones, *e.g.* the two dentaries or lower jaw bones.

Synonymy. A list of technical names which have been applied to certain species. Occasionally the same species has been described independently by two or more scientists. In this case the name which was first applied, in 1758 or subsequently, must be given priority. The later names are then said to go into synonymy.

Tail. The part of the body posterior to the body cavity; in most fishes this is applied to the caudal peduncle and fin inclusive.

Terete. Round in cross section, *e.g.* lamprey, pilchard, barracuda, etc.

Terminal. At the end.

Thoracic. In the region of the thorax, or "chest".

Truncate. Ending abruptly or square-cut, as the tails of some fishes.

Tubercle. A modified scale, sometimes represented by a hard or soft excrescence, or a small rounded hump.

Tuberculate. Covered with tubercles.

Type locality. The particular locality in which a type specimen was collected.

Type specimen. The particular specimen upon which was based the original description of a species.

Ventral. Pertaining to the lower surface of the body or head.

Ventrolateral. The area in which the side and ventral surfaces meet.

Vermiculations. Fine lines more or less worm-like in shape.

Villiform teeth. Very small slender teeth, crowded into bands or patches.

Vomer. The bone in the roof of the mouth immediately behind the premaxillaries, frequently bearing teeth.

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Fishes of the Pacific coast
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