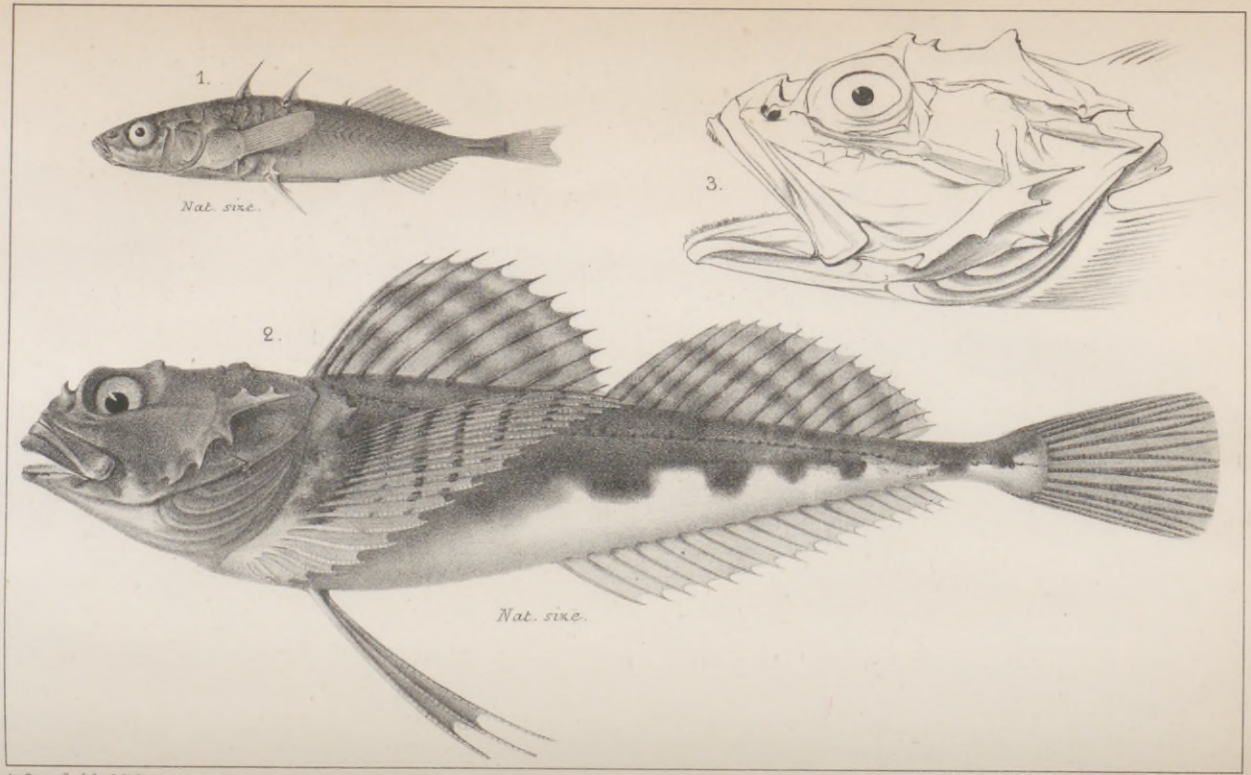
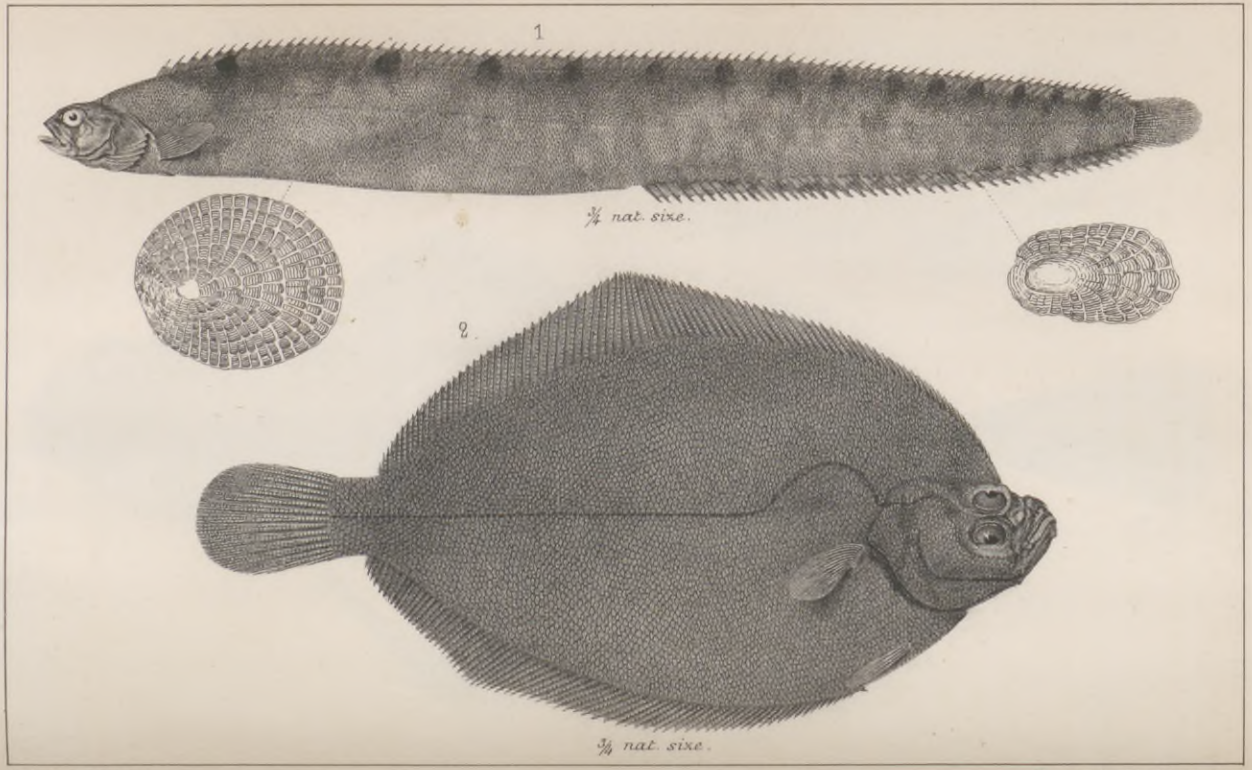


A. Sonrel del. & lith.

Tappan & Bradford's lith.

2. ACANTHOCOTTUS PATRIS. H.R. Storer.— 3. A. LABRADORICUS. Girard.— 1. GASTEROSTEUS CUVIERI. Girard.



A. Sonrel del. & lith. Tappan & Bradford's lith.

1. GUNELLUS INGENS. H.R. Storer. — 2. PLATESSA ROSTRATA. H.R. Storer.

OBSERVATIONS

ON THE

FISHES OF NOVA SCOTIA AND LABRADOR,

WITH DESCRIPTIONS OF NEW SPECIES.

By Horatio Robinson Storer.

From the Boston Journal of Natural History, Oct. 1850.

During the summer of 1849, I was enabled hastily to examine the waters of part of the coast of Nova Scotia, especially the so-called Gut of Canso, and of the southern coast of Labrador, which latter locality, at least so far as I can ascertain, appears never to have been visited by an ichthyologist. My sojourn on that coast was passed in the harbors between the Island of Anticosti on the south-west and the mouth of the Straits of Belle Isle, a region whose fishes seem what might have been expected from its situation, intermediate as it is between the comparatively warm waters of our own shores and the polar ice.

The object of this voyage was rather to gain additional knowledge concerning the limits to which the fish of our own waters range than to discover new species. But since I was fortunate enough to do both, I need make no apology for this paper, save for the lateness of the hour at which it appears.

1. Acanthocottus Labradoricus Girard.

Plate VII. fig. 3.

Mr. Girard writes me thus: —

"When I wrote my Paper on the genus Cottus,[1] I had no expectation that so short a time would elapse before I could verify my opinion that there were more than one species confounded under the name of *A. grœnlandicus*. At your request I have compared one specimen of the so-called *A. grœnlandicus* from Labrador with the species of the same name from the shores of Massachusetts. The result is, that they are two distinct species.

[1] Proc. Bost. Soc. Nat. Hist. iii. p. 183.

"My prevision, however, did not go so far as to suppose that the species from Labrador should differ from that of Greenland, and I confess in that respect I am not yet fully satisfied, not having seen authentic Greenland specimens. Nevertheless, I think it would not be proper to refer the species from Labrador to the one of Greenland before a careful comparison can be made. The attention of naturalists will thus be directed to investigate how far I am right in separating from the Greenland Acanthocottus the species here referred to. At any rate it is different from *A. grœnlandicus* of the New England coast, and this last I will consider as a different species from *A. grœnlandicus* of Greenland, since we have an intermediate range occupied by another, the *Labradoricus*. I still believe that *C. variabilis* is a young fish and as I formerly proposed, this name can be applied now to the *A. grœnlandicus* of this coast, there being no necessity of creating a new name for it.

"We shall accordingly have the following synonymy:

ACANTHOCOTTUS GRŒNLANDICUS Grd. Proc. Bost. Soc. Nat. Hist. III. p. 185. — *Cottus Grœnlandicus* CUV. & VAL. Hist. Nat. Poiss. IV. 1829, p. 185. — *Cottus scorpius* FABR. Faun. Grœnl. 1780, p. 156. Greenland; Oth. Fabricius.

ACANTHOCOTTUS LABRADORICUS Grd. The species here described. Labrador; Horatio R. Storer.

ACANTHOCOTTUS VARIABILIS Grd. — *Cottus variabilis* AYRES Proc. Bost. Soc. Nat. Hist. I. 1842, p. 68, and Bost. Jour. IV. 1843, p. 259 (Young). — *Cottus Grœnlandicus* RICH. Faun. Bor. Amer. III. 1836, p. 46, and Add. p. 297, Pl. 95, fig. 2. — STORER Rep. 1839, p. 16. — DE KAY, New York Fauna, 1842, p. 54, fig. 10. — Maine and Massachusetts; Dr. Storer. — Connecticut; W. O. Ayres. — Hellgate (N. Y.); De Kay.

"The *C. quadricornis*, Sabine, (App. to Parry's First Voy. 1821,) will belong either to the true *A. Grœnlandicus* or to

our *A. Labradoricus*, according to the shore of Davis's Strait, upon which it was found.

"Now, *A. Labradoricus* differs from *A. variabilis* in having one spine more on the inferior branch of the preoperculum, which spine is bent forwards, and at the same time is the smallest of that bone. The place where it occurs, its perfect symmetry on both sides of the head, leaves no doubt that it is not an accidental variation, like the one I have mentioned in a young *A. variabilis*.[1] Another difference consists in the presence of a double pair of spines above the orbits, the hind pair being the smallest. The occipital spines are proportionally nearer to each other than in *A. variabilis;* the frontal space they circumscribe being thus narrower behind. There exists all along the lateral line and above it, a row of hard plates, nearly circular, saucer-shaped, with the edge finely serrated. The largest, of a diameter of a line and a half, are near the head; they decrease in size in advancing towards the tail. A few are irregularly scattered on the space between the said row and the line of the back.

The formula of the fins is:

Br. 6. D. VIII. 17. A. 14. C. 4. I. 5. 5. 1. 5. V. I. 3. P. 16.

"The pectorals and ventrals appear to be longer than in *A. variabilis*. The space between the posterior edge of the dorsal and anal and the caudal is greater.

"The state of preservation of the only specimen brought home did not allow any further description.

"The same law of uniformity which prevails in the history of the egg and during the development of the embryo is also observed among young animals, especially when they belong to closely allied species. We know even instances where the young of one species assumes the form of another genus. These facts will render difficult the attempt to refer to their true species young specimens, especially when several species occur in the same locality. Those collected

[1] Proc. Bost. Soc. Nat. Hist. III. p. 187.

by yourself plainly show this difficulty, and without a minute comparison with the adult fish it would be altogether impossible to give any opinion in regard to them. The characters are but feebly expressed. Sometimes the cephalic spines do not exist in specimens of several inches in length. *A. Labradoricus* is a more slender fish than *A. variabilis*, a character to be seen in the young. The head is smaller in appreciable proportions.

"The exact range of this species cannot yet be determined. I am inclined to believe that it will be found along the Labrador coast as far north as Baffin's Bay, and as far south as Newfoundland."

I first noticed it in Yankee Harbor among the St. Mary's Islands, off the south-west coast of Labrador, in such abundance that a barrel or more might be caught in a very few moments; thence we traced it as far eastward as Bras d'Or, where it appeared to have become of somewhat rarer occurrence. No specimens were seen in the Straits of Belle Isle.

2. Acanthocottus Virginianus Girard.

Among my smaller Labrador specimens are two, which Mr. Girard, who is certainly a most competent judge, pronounces to be the young *Virginianus*. I therefore insert this species upon his authority and that of Richardson, who speaks of having received a specimen from Newfoundland, although I neither saw the adult fish on the Labrador coast, nor that of Nova Scotia.

3. Acanthocottus patris H. R. Storer.

Plate VII. fig. 2.

Color. In the living fish the top of head and upper part of body are dark brown, marbled with greenish and crossed by transverse black bands. Abdomen pure white: which color extends up upon the sides in large blotches, with golden reflections. Orbit of eye and lower jaw with a row of

white spots. Throat ferruginous. Pupils black; irides golden. Lower margin of upper jaw white. Dorsals transparent, with oblique, dark brown bands. Pectorals yellowish, their upper two thirds banded with brown. Rays of ventrals and anal, cinnamon yellow; their membrane, transparent. Caudal rays, a light green. This specimen was taken in Great Mecatina Island Harbor. In another and larger specimen, taken at Red Bay, the head and upper part of body were of a dark brown throughout. Lower part of sides very sparsely marked with white. Abdomen white; lower portion of posterior part of body a dull flesh color. Lower portion only of orbit of eye variegated. Lower jaw marked with light brown blotches beneath. Throat tinged with yellowish.

Description. Head much flattened above. Spines thereof but slightly projecting outwards. Nasal spines but slightly recurved; post-orbitar two, the anterior much the larger; occipital well marked; four spines upon preoperculum, the posterior and superior much the larger, and with two, in one instance three, branches upon its inner portion; of the other three spines, which are comparatively quite small and blunt, the posterior is directed obliquely downwards and backwards, whilst the anterior points downwards and forwards. Spine upon operculum concealed by its marginal fleshy membrane so as at first to be scarcely perceptible; posterior-superior portion of operculum deeply emarginated. Humeral spines sharp and prominent. Irregularly scattered, sturgeon-like plates noticed on head of one specimen.

The lateral line commences just above and before the base of pectorals, and pursues a straight course to just above the termination of anal, where it curves slightly downwards and thence goes straight to the tail. A deep furrow, which greatly expands posteriorly, between eyes. Eyes large; nostrils tubular. Jaws armed with several rows of numerous small, sharp teeth; upper jaw the longer. Gape moderate.

Length of head not quite one third entire length. Great-

est width same as greatest depth and about equal to one fifth the length of fish.

The first dorsal fin arises on a line just posterior to extremityof thesuperior opercular spine; sub-triangular; somewhat rounded above and posteriorly; its height about half its length. The anterior spine, which is stoutest, projects least beyond the connecting membrane.

The second dorsal, which arises abruptly almost at the very termination of the first, is quadrangular; its height about one third its length.

Pectorals large, semi-triangular; their length two thirds their greatest height; superior rays nearly six times as long as inferior. They arise beneath the humeral spine, posterior to origin of first dorsal, and their base follows the curve of the branchial aperture nearly to abdomen. They extend, as do the ventrals, to beyond the commencement of the anal.

The ventrals, whose length is one fourth that of the fish, arise on a line half way between the humeral spine and origin of first dorsal, just below the termination of anterior third of base of pectorals. Tips of rays project beyond connecting membrane.

The anal commences on a line anterior to origin of second dorsal, and extends to just posterior to the termination of that fin. Its rays like those of the dorsals and pectorals are somewhat free at extremities.

The caudal is rounded posteriorly.

D. 11—15. P. 17. V. 3. A. 17. C. 12. Length 10 inches.

In the preopercular spines this species somewhat resembles the *A. pistilliger* of the north-west coast, from which, however, it differs in all other respects. It seems not an uncommon species on the Labrador coast, inhabiting chiefly the Straits of Belle Isle, in which it takes the place, as it were, of the *Grœnlandicus*. Caught in from ten to twenty fathoms water.

In the double capacity of naturalist and son do I dedicate

this, my first species, to Dr. D. Humphreys Storer. On the one hand, for his extensive contributions to American Ichthyology; on the other, in slight token of remembrance and gratitude for the very many pleasant hours we have spent together in the study of nature.

4. Acanthocottus ocellatus H. R. Storer.

Color. Ground color of upper part of body a light brown, thickly interspersed with darker spots. Sides as well as fins marked by large yellowish irregular blotches, with sometimes one of a much darker hue. Maxillaries, lower edge of operculum, throat, branchial rays and base of pectorals strongly sprinkled with fuliginous dots. Lower part of sides and abdomen a silvery flesh color, and marked as well as ventrals with white ocelli.

Description. Length of head about one fourth entire length; greatest depth equal to length of head. Spines upon head numerous and strong, and mostly free at their extremities. Nasal spines prominent, recurved. Post-orbitar spines hardly to be distinguished. Occipital spines, also, very small. Three spines upon preoperculum; that at posterior angle very stout, directed upward and backward, and extending about half the width of the operculum; below this, another nearly as stout directed downward and backward; and at inferior angle of preopercle, a third small and stout one directed downward and forward. Two spines upon opercle; the upper and larger arises at its anterior superior portion and extends directly backwards to its posterior angle; the lower and smaller points directly downward at inferior angle. Supra-scapular spine, as well as the scapular, of moderate size. A large depression upon head, back of eyes. Head abounding in mucous pores. Eyes large; diameter rather more than distance between them; pupils black, irides golden. Nostrils small, tubular. Jaws armed with numerous sharp, compact teeth. Gape of jaws large; upper jaw the longer.

Lateral line commences just above scapular spine, arches a

little backwards, and then pursues a nearly straight course to the extremity of the second dorsal, where it suddenly curves downwards, and then passes to the middle of the tail; a few small tubercles are upon each side of it.

The first dorsal fin is sub-triangular.

Second dorsal longer than high.

Pectorals large and rounded; extremities of all the rays free, except the few first.

First ray of ventrals strongly spinous.

Anal commences just back of origin of second dorsal, and terminates on a line with that fin.

The caudal fin is even at extremity.

D. 10—17. P. 16. V. 3. A. 14. C. 16. Length 6 to 10 inches.

This species was secured by hand net at Burial Island in Wilmot Harbor, Nova Scotia, the entrance to the Gut of Canso. It seems to resemble in its habits the fresh water Cotti, lying concealed beneath the rocks and sea weed, in several inches of water, and darting swiftly to another lurking place as soon as disturbed. My description was drawn from a living specimen.

5. Cryptacanthodes maculatus D. H. Storer.

A single specimen of this species, which has hitherto been noticed only in Massachusetts and Connecticut, was picked up on the beach at Burial Island, Nova Scotia. Length 2 feet 3 inches.

6. Gasterosteus Cuvieri Girard.

Plate VII. fig. 1.

Syn. *Gasterosteus biaculeatus*, Cuv. et Val. Hist. Nat. Poiss. IV. 1829, p. 503.

Knowing that my friend Girard was engaged upon a monograph of the North American Gasterostei, I placed in his hands specimens of what was evidently the *G. biaculeatus* of Cuv., requesting him to settle whatever question there might be concerning the validity of that species. He has done so,

and has given me the following account of his investigations and their results: —

"Those specimens are a very important acquisition for American ichthyology as far as the study of species is concerned, and I have been enabled to investigate more closely the history of what is recorded under the name of '*two spined Stickleback*' (G. biaculeatus.)

"John Reynold Forster published, in 1771, 'A Catalogue of the Animals of North America, &c.,' in which we find a *two spined Stickleback*, without any special indication of the locality whence it came.

"In 1792, Pennant, in his 'Arctic Zoölogy' also records a *two spined Stickleback* on the authority of Forster, and mentions New York as the place where specimens were obtained.

"In 1803 appeared, 'Shaw's General Zoölogy,' in which the *two spined Stickleback* is cited on the authority of Pennant, the author not having seen the species; yet he gives the systematic name of *biaculeatus*, which was not hitherto done.

"In 1815 Mitchill found the *two spined Stickleback* (G. biaculeatus) in the salt waters about New York, and gave a figure of it. There is no real description, and the figure, though perhaps good at that time, is very deficient to-day. The author says that this seems to be the species described by Shaw. But Shaw himself had not seen it and cites Pennant, who does not describe it, mentioning it indeed only on the authority of Forster.

"In 1829 was published the fourth volume of Cuvier and Valenciennes's 'Histoire Naturelle des Poissons,' where it is stated that a *two spined Stickleback* had been sent to Cuvier from Newfoundland. The description given in that work is very short, and insufficient to decide the species had we not specimens in our hands. Cuvier thought it to be the species figured by Mitchill, and probably, he says, 'the one mentioned under the same name by Pennant and Shaw.'

"In 1836 that fish reappears in Dr. Richardson's 'Fauna

Boreali Americana,' quoted from the above authorities; Sir John Richardson not having seen authentic specimens.

"Again, in 1842, a *two spined Stickleback* was described and figured by Dr. De Kay in the 'Fauna of New York,' published by that State; the author having found the fish 'about New York and as far up as Albany, in the Hudson, where the water is fresh.'

"This, then, is the whole history of the so called *two spined Stickleback*. And we find in it two well marked and very different eras; the first of which comprised the last century and the beginning of this, when the necessity of accurate description was not felt among naturalists, so that we thence see animals merely recorded in Catalogues, and often even under their vulgar names. They passed from one Catalogue into another without reëxamination, nay, much more, without even comparison. Such is the case with Forster, Pennant, and Shaw. There is no certainty, therefore, in documents of this class.

"The second era is characterized by the naturalists who belong entirely to this century. They began to describe with more or less accuracy, and their writings are accordingly much more precise than those of their predecessors. And yet it is still somewhat difficult to decide upon the identity of many animals on account of the descriptions not being comparative. Recent specimens from authentic localities can alone enable us to understand them. Since Zoölogy is comparative, we still meet with instances in all its branches where different species are described under the same name.

"Thus, after scrutinizing as far as it has been in my power the documents relating to the *two spined Stickleback*, I have come to the following conclusions: —

"1. That the presence of two spines in front of the dorsal fin is not a specific character.

"2. That the specimens brought by yourself from Labrador belong to the same species as Cuvier's *G. biaculeatus*, from Newfoundland.

"3. That the *G. biaculeatus* of Mitchill is another species, which may perhaps be the one referred to by Forster, Pennant, and Shaw, though we cannot now tell.

"4. And that De Kay's *G. biaculeatus* is not Mitchill's species, unless Mitchill had not the full grown fish, which may be the case, but which can be ascertained but by endeavoring to find it again and comparing it. For these ventrals, composed of a single but strong and serrated spine, that body entirely covered with bony plates, and that size of two inches and a half, make a fish of very different aspect from what we must infer from Mitchill's description. That it is not Cuvier's *biaculeatus*, De Kay himself remarked: "I cannot reconcile," he says, "the *Epinoche à deux épines* of Cuvier and Valenciennes with its naked tail and its robust, flat, and sharp tooth at the internal base of the ventral spines on each side, with our New York species." Mitchill speaks of his *G. biaculeatus* as being of very small size, and nowhere can we find any allusion made as to whether the body be naked or covered with plates.

"As for Cuvier's *biaculeatus*, we know that the tail is naked, whence the inference that the anterior part of the body is protected by plates, which is precisely the case with our Labrador species. Therefore I consider it the same fish, and as the name of *biaculeatus* must be retained for Mitchill's species, I shall describe it under the name of *Gasterosteus Cuvieri*, and in such a manner as will, I hope, enable naturalists to make minute comparisons with any other Stickleback having two spines in front of the dorsal fin.

"Total length of fish nearly two inches and a half, that is to say, of the size of the *G. biaculeatus* of De Kay, but very much more slender, although equally compressed, and a little larger than the specimens examined by Cuvier. The greatest depth of the body, taken perpendicularly to the second spinous ray of the back, is when compared with the total length as 1 to $5\frac{1}{2}$; the thickness in the same region is equal to half the depth. The posterior half of the body is naked.

A membranous carina existing on the sides of tail. There are four osseous plates posterior to the pectoral fins. The anterior one, which is situated a little in advance of the second spine, is the largest. In front of these and above the pectorals we observe the rudiments of three other plates, occupying the space between the first spine and the head. The surface of these plates is minutely granular, as well as the odd plates of the back and the bones of the skull itself. This granulation will undoubtedly be found different in different species.

"The head is one fourth of the entire length; it is flattened above. The lower jaw the longer. Teeth very acute and more prominent on the lower than the upper jaw. The eyes, which are proportionately large, are circular and near the upper region of the head; diameter of their orbit is to the length of head as 1 to 3_3; distance from extremity of snout exactly equal to their diameter. The nostrils are placed very high also, and a little nearer to the anterior margin of the eye than to the end of the snout; they open into a little depression above the first sub-orbital plate, the largest of the three, which is of a quadrangular form and covers all the space between the eye and the upper jaw; the granular striæ of its surface are also more marked. The second sub-orbital is much smaller, narrower, and in the shape of an elongated quadrangle. Finally, the third, irregularly rounded, sends a dilatation upon the horizontal branch of the preoperculum, leaving a naked space between the vertical branch of that bone and the posterior edge of the orbit.

"The *preoperculum* has a slightly obtuse angular shape; its margins are straight; the horizontal branch reaches the articulation of the lower jaw. The operculum is sub-triangular, with the external margin rounded. The inter-operculum, crescent-shaped, is a very small plate at the inferior angle of the operculum. The sub-operculum is elongated, very narrow, and slightly curved. The smooth space in front of the pectorals is large and sub-circular. The cubital bones strong

and stout, part from the isthmus and reach close to the ossa innominata; contiguous at their anterior extremity, they diverge a little posteriorly, so that a naked space is left between them under the thoracic region; their upper margin is concave and adjoining the smooth space in front of the pectorals. The ossa innominata form a strong abdominal cuirass; they terminate in a point at a short distance from the vent, sending an ascending branch which articulates with the plates of the sides. The vent is placed at an equal distance from the extremity of the caudal fin and the isthmus.

"The spines of the back are elongated and very acute, provided on both sides with slender spars or denticulations; the first one is inserted above the base of the pectorals; the second, a quarter of an inch posterior to this; the third, much smaller than the preceding one, is still more distant from the second, and is contiguous to the anterior margin of the dorsal fin. These three spines are furnished with a triangular membrane, running from the upper third of the spine to the dorsal line of the fish and forming a somewhat concave diagonal.

"The soft dorsal contains twelve rays; the second, third, fourth, fifth, and sixth of which are dichotomized. The anal has but eight rays, of which the second, third, fourth, and fifth are dichotomized; at the anterior margin of that fin we find a small spine with a short and thick base, terminated by an acute point and furnished with lateral spars. The posterior margin of the same fin does not extend beyond the posterior margin of the dorsal. The caudal is forked; it is composed of twelve well developed rays, all of which are bifurcated except the two external ones. Each lobe has, besides, five or six rudimentary rays hidden in the thickness of the skin. The ventral fins are composed of one strong spine and a soft and slender ray; this last is kept within the membrane inside of the spine for more than half its length. The spine itself is slender, a third of an inch in length; its base is widened and furnished along the upper edge with a flattened and sharp tooth; on both sides a minute serrature is to be seen,

even on the tooth itself. Bent close to the body, the ventrals do not quite reach the posterior extremity of the ossa innominata. The pectorals are nearly half an inch long; their extremity reaching beyond the cuirassed part of the sides of the body; they are composed of ten rays, which are undivided.

"The lateral line follows the curve of the back, to which it is nearer than to the belly.

D. II. 1.12. A. I. 8. C. 6. I. 5.5. I. 5. V. I. 1. P. 10.

"*Color* of specimen preserved in spirits as follows: a uniform grayish brown on head, back, and posterior half of body. Abdomen yellowish. Neck, operculum, and naked space in front of the pectorals, silvery, minutely dotted with brown. Fins transparent."

Seen both at Bras d'Or and Red Bay, Labrador, in the sandy mouths of every little rivulet. Somewhat sluggish in its habits.

7. Gast. biaculeatus Mitchill?

Quite plenty in the brooks emptying into the Gut of Canso, on the Nova Scotian side. It has elsewhere been noticed but in Massachusetts and New York.

8. Scomber vernalis Mitchill.

Although caught in such quantities in the Bay of Chaleur and among the Magdalen Islands, this fish seems rarely to visit the northern shores of the Gulf of St. Lawrence. The past summer, however, (i. e. 1849,) they were so abundant at the Island of Little Mecatina, that had fishing vessels been at hand, large fares could easily have been obtained. As it was, they were not molested; the few settlers there neither knowing their worth, nor having fit lines or nets for taking them. It seldom if ever ventures into the Straits of Belle Isle, although, according to Richardson, it is said to be at times taken on the southern Newfoundland shores.

9. Gunnellus mucronatus De Kay.

Taken with the *Acanthocottus ocellatus,* by hand net, in Wilmot Harbor, Nova Scotia. Hitherto observed only in Massachusetts and New York.

10. Gunnellus ingens H. R. Storer.

Plate VIII. fig. 1.

Blennius (Centronotus) gunnellus, Rich. F. B. A. III. p. 91.

This fish was considered by Richardson as identical with the English species. He had seen, however, but one specimen, and this, sent to Yarrell by Audubon from Labrador, had been nearly spoiled by long immersion in rum. Yarrell, also, from the same specimen considered the two fishes to be the same.

Color, olive brown marbled with darker, assuming a banded appearance after death. Base of dorsal fin marked by twelve to fifteen black spots, sometimes circled with white, which vary much both as regards size and situation, in some cases descending upon the sides more than the width of the fin. Pectorals lemon yellow. Color of anal varies greatly. A well defined brownish band descends from eye to below angle of jaw.

Description. Body elongated, much compressed; line of back ascending till it attains its maximum at a distance posterior to opercular angle about twice the length of the head. Head small, blunt; strongly depressed back of occiput; its length one ninth that of the body. Depth of body one fourth more than length of head. Cheeks protuberant. Gape of mouth moderate, obliquely upward, so that lower jaw, which otherwise projects, equals the upper when mouth is closed. Eyes large; their diameter a third more than the distance between them. A row of mucous pores on lower jaw, preoperculum, orbit of eye and nape. Teeth detached, disposed

in two or more rows anteriorly in both jaws, in a single row behind. The lateral line arises just above origin of pectorals, curves slightly with the body, and pursues a course nearly parallel to dorsal fin. Scales small and deeply imbedded.

The dorsal fin arises on a line with the posterior angle of operculum, and is connected with the tail by its membrane. Rays spinous, their ends projecting; the first three are the shortest.

Pectorals small, subovate.

Ventrals consist of a short, deeply imbedded spine, connected with a delicate and scarcely perceptible ray. They are nearly on a line with the pectorals.

The anal commences on the median line and is connected with the tail, but its posterior rays do not, like those of the dorsal, diminish in size. The first two rays are spinous; the others flexible and branched, their tips projecting. Equal in depth to the dorsal.

Caudal small and rounded.

D. 83. P. 13. V. I. 1. A. II. 42. C. 18. Length 7 to 12 inches.

This species, which is distinct from the *Grœnlandicus* of Reinhardt, is evidently more nearly allied to the *vulgaris* of Europe than to our little *mucronatus*. But it is a much deeper fish than the *vulgaris*, whose greatest depth is only equal to length of head; this difference I found in all of the many specimens I examined. Its teeth are arranged differently, those of the *vulgaris* being placed, according to Yarrell, in a single row in each jaw. Again, in that species the anal fin is deeper than the dorsal; it is not so in this. And finally it would seem that the different size should also be taken into consideration, specimens being rarely taken of the *vulgaris* which exceed six inches in length, whereas the Labrador fish of a foot is by no means uncommon. Nevertheless, I should hardly have ventured to dispute the opinion of the eminent British Ichthyologists, had not Mr. Girard, after careful examination, coincided in my views.

I found it in abundance along the whole southern coast of Labrador from St. Mary's Islands, at the extreme south-west, to the mouth of the Straits of Belle Isle. Though so much larger, its habits are the same as those of the *mucronatus;* lying oftentimes among the sea-weed at the surface in several feet water, and again concealing itself at the bottom under rocks.[1]

11. Zoarchus anguillaris Storer.

Observed hitherto to range from New York to Maine. At Bras d'Or it is frequently taken while seining herring, and is

[1] In comparing my specimens of *Gunnellus* from Labrador with those of Massachusetts, Mr. Girard has noticed among these last, one individual which indicates the existence on our coast of a species distinct from both *G. mucronatus* and *G. ingens*. He has favored me with the following description: —

Gunnellus macrocephalus Girard.

"The size is nearly that of *G. ingens* from Labrador, and consequently much greater than that of *G. mucronatus*. It differs from *G. ingens* in having a proportionally larger head, whence a larger mouth and larger teeth. These last are longer than those of *G. ingens:* their tip is club-shaped in both. They are arranged in two rows in front of the jaws; the principal row being the inside one on the lower jaw, and the outside one on the upper jaw. The head forms one eighth of the total length; its profile is very convex above the eyes, whereas in *G. ingens* the convexity of the head is in advance of the eyes, thus giving to it a more rounded appearance. The body of my species is more compressed than that of *G. ingens;* the height is also greater. The lateral line runs straight along the middle of the body. The vent, placed under the thirty-fifth dorsal ray, is at an equal distance from the snout and the tip of the caudal, whilst it is a little farther back in *G. ingens*, and rather nearer the head in *G. mucronatus*. The dorsal and anal are much higher than in both *G. ingens* and *mucronatus*. These fins are connected with the caudal by a membrane; although a notch is observed between them, deeper between the anal and caudal. The dorsal begins a little farther back in our species than in *G. ingens*. The pectorals are larger; their tip reaches beyond a line with the seventh dorsal spine.

"D. LXXVI. A. II. 41. C. 20. P. 12. V. I. 1.

"The rays of the anal fin show the remarkable peculiarity of having at their anterior and convex margin several small rays converging in an acute angle from the tip to the third or half of the length of the principal ray itself, in imitation, on a small scale, of the finlets of Scomber and Polypterus, with this difference, however, that in these last the additional small rays are on the posterior margin.

"In *G. ingens* these rays are dichotomized; in *G. mucronatus* they are simple.

"My specimen, the only one seen, was caught alive two years since at low tide on Chelsea Beach. It is preserved in Prof. Agassiz's cabinet."

confounded by the fishermen with the Lamprey. We caught a fine specimen by the hook, and observed many others cast up on the beaches.

12. Ctenolabrus cœruleus De Kay.

Cuvier received specimens from Newfoundland; Dr. Storer next mentioning it as in the waters of Maine, whence it ranges southerly as far as New York. It is so plentiful in the Gut of Canso, that by sinking a basket with a salt fish tied therein for bait, we continually caught them by the score; and by putting a few hundreds into the "well" of our little sloop, we kept ourselves, the dogs, and a hawk (*Falco Sancti Johannis*) well supplied with fresh fish whilst at sea.

13. Hydrargyra ornata Lesueur.

A species found, thus far, but from Delaware to Massachusetts. It is abundant along the shores of the Gut of Canso. I have since taken it also in Maine.

14. Salmo salar Lin.

Everywhere along the Labrador coast.

15. Salmo fontinalis Mitch.

This trout, the common species of the New England States, has not hitherto been noticed farther to the eastward than Maine. Richardson found it in Lake Huron, and, of late, Agassiz in Lake Superior. It is abundant in all the streams of the Southern Labrador coast, and often attains a large size. In the stomachs of several I found the bodies of full grown water mice. The cod fishers sometimes seine them at the brook mouths by hundreds.

16. Salmo immaculatus H. R. Storer.

Color. Silvery on sides and abdomen; darker on back. No spots.

Description. Length of head about one sixth length of body; depth of head two thirds its length; greatest depth of body, directly in front of dorsal fin, equal to length of head. Upper jaw the longer. Jaws with numerous sharp, incurved teeth. Eyes laterally elongated; their diameter one third the distance between them. Opercles rounded posteriorly; lower portion of operculum naked, marked with concentric striæ; preopercle larger than in the *fontinalis*.

Scales larger than those of the *fontinalis*. Lateral line commences back of superior angle of opercle, and, assuming the curve of the body, is lost at the commencement of the caudal rays.

The first dorsal fin commences just anterior to median line; is nearly quadrangular.

Adipose fin situated at a distance back of the first dorsal, little less than one half the length of the fish.

Pectorals just beneath posterior angle of operculum; their length three fifths that of the head.

Ventrals just beneath posterior portion of first dorsal; the plates at their base very large.

The anal is situated at a distance back of the ventrals just equal to length of head, and terminates directly beneath the adipose fin; of the form of first dorsal.

Caudal deeply forked; its length equal to greater depth of body.

D. 9. P. 13. V. 9. A. 11. C. 30. Length $13_{\frac{3}{4}}$ inches.

But a single specimen of this beautiful fish was taken, and that by a gill net stretched across the mouth of a brook flowing into Red Bay, Labrador.

17. Mallotus villosus Cuv.

Has been noticed at Greenland by Fabricius, at Bathurst Inlet and Newfoundland by Richardson, and at Labrador by Audubon. The latter, in speaking of this favorite bait of the cod, does not exaggerate their numbers in the least. They

appear on the coast about the middle of July, and take their departure in the early part of August.

18. Clupea elongata Lesueur.

It seems somewhat surprising that the summer retreats of this fish have not hitherto been known to the naturalist, when we consider that cargoes upon cargoes of them are annually shipped from Labrador to the British Provinces, where they form so important an article of food. They have, thus far, been mentioned as found from New York to Massachusetts, and no farther.

In a Report to the Colonial Government on the Fisheries of the Gulf of St. Lawrence, made in March, 1849, and again in 1850, the Commissioner, Mr. Perley, confounds them with the European species, *harengus*, from which however they greatly differ.

We found them sparingly at Red Bay early in August, and a few days after in great abundance at Bras d'Or, farther to the westward, to which place vessels annually resort from Nova Scotia and the Magdalen Islands for the purpose of seining them. Arriving, as the herrings do, just after the Capelins retire, they form for the time the chief food of the Cod. The waste during the seining season is enormous, many more being taken than can possibly be cured, so that hundreds of barrels are left to rot upon the beach; and so fat are they that, for miles around, the water is completely covered by a thick oily scum, arising from the decaying fish. Much good oil is obtained from their entrails by exposing them to the sun in open casks.

19. Alosa cyanonoton Storer.

This fish has hitherto been noticed only at Provincetown, on Cape Cod. A single specimen was taken from a gill net in Red Bay, Labrador.

20. Morrhua Americana Storer.

Thus far, ranging from New York to Massachusetts. Is common in Wilmot Bay, Nova Scotia.

The different Labrador species of Cod, it will be impossible to ascertain with precision without a careful comparison with European specimens. Deformities are of common occurrence among them, usually consisting in a fore-shortening of the head, which gives them the name, among the fishermen, of "bull-dogs."

21. Phycis Americanus Storer.

Has, hitherto, been noticed only from New York to Massachusetts. We saw several large and fine specimens of this fish taken in the northern entrance to the Gut of Canso, as we were lying becalmed there on the twenty-ninth of August. It is a much larger species than the *P. punctatus*, described by Hamilton Smith, in Richardson, as taken off Halifax.

22. Hippoglossus vulgaris Cuv.

Fabricius mentions it in Greenland; and it has next been found on the banks off the Maine coast, whence it ranges to New York. Several specimens were taken at Red Bay, Labrador, during our stay; and I saw a fine one caught off Halifax, Nova Scotia, as we passed within hail of a fishing-smack at anchor there.

23. Platessa plana Storer.

Has, hitherto, been taken from New York to Massachusetts; I have lately seen it also in Maine. It is probably the most common flounder on the south-west Labrador coast. We met with it first, though but sparingly, at the St. Mary's Islands, and observed it as far easterly as Bras d'Or; where it is to be found in immense numbers, the bottom being almost alive with them, and of large size. It appears to be confined to harbors and inlets sheltered from the fury of the sea; as

to the nature of the bottom, it is indifferent, frequenting alike sandy and rocky situations, where it has for its neighbors only the *Acanth. Grœnlandicus* and lobsters, of which latter an abundance is to be found as far to the eastward as Bras d'Or.

24. Platessa rostrata H. R. Storer.

Plate VIII. fig. 2.

Color. Bluish slate, with yellowish spots. Outer ray of caudal both above and below, white; as is also the posterior ray of both dorsal and anal.

Description. Eyes on right side of head. Form elliptical. Length of head about one fifth length of fish. Greatest depth one half whole length. A prominent ridge between eyes, which curves upward and backward, continuing to posterior margin of operculum. Snout much projecting, so as to form a deep hollow at the anterior superior angle of upper eye orbit; just behind this hollow and over anterior half of eye, the back begins to ascend. Gape of mouth moderate. Jaws equal and fully armed with numerous minute teeth; teeth also on hyoid bone. Eyes moderate; a semicircular line, much resembling in appearance the lateral line, below lower eye, thus partly encircling it.

The lateral line, which seems to be a continuation of the ridge on operculum, curves abruptly and much over pectorals, and then pursues a straight course to middle of caudal fin. The curve here spoken of is, as well as that of the opercular ridge, much less on left side than on right; and the line itself is not so plainly perceived.

Operculum somewhat emarginated just front of pectorals. Anal spine prominent; blunt spine on chin perceptible; also that at inferior angle of preopercle. Scales on left side much more firmly imbedded than on the right. A small patch of scales on the superior portion of operculum, together with those in the immediate neighborhood of the lateral line, much the largest.

The dorsal fin arises somewhat abruptly, and attains its greatest height on a line posterior to the middle point.

Pectorals fan-shaped; the left the smaller.

Ventrals moderate, their extremities just reaching the anal fin.

Anal commences about on a line with the middle of the right pectoral. Its anterior rays as well as those of the dorsal present the appearance of being scaled; the posterior rays, on the contrary, much more delicate.

The caudal is rounded when expanded, the outer rays being the shortest.

D. 75. P. 13. V. 6. A. 56. C. 16. Length about 7 inches.

With the exception of one specimen at Red Bay, this species was met with only at Bras d'Or, where it is very abundant, inhabiting however a far different region from the *plana*, just mentioned. Instead of sheltered bays and harbors, it delights in the surf of the open beaches exposed to the waves of the whole Gulf, and is here taken in great numbers at the drawing in of the herring seines.

25. Lumpus Anglorum Will.

Mentioned by Fabricius among the fishes of Greenland; ranges from New York to Maine. Found it plenty at Bras d'Or, and sparingly at Red Bay, where I captured a large specimen with my hand, as it adhered to a rock. We also caught small specimens in abundance, that I am inclined to think must belong to this species, with the hand-net, adhering to masses of sea-weed off Nova Scotia.

26. Anguilla Bostoniensis De Kay.

Of this species, which has hitherto ranged from New York to Massachusetts, I observed a fine specimen lying in a wigwam on the western shore of the Gut of Canso. In a little

nook near by, called Pirate's Cove, we subsequently observed several others speared by the Indians by torchlight.

27. Ammodytes Americanus De Kay.

Has ranged from New York to Massachusetts. Richardson quotes from Fabricius a description of a species found in Greenland and, as he thinks, also in Labrador, which, without having seen a specimen, he decides to be the same as the European *A. lancea*.

After a careful comparison, however, of the Labrador fish with specimens from Cape Cod, and with another from Newfoundland, presented me some time since by Dr. Wheatland of Salem, I am compelled to consider them all the *Americanus*. The Labrador fish may be perhaps a little plumper, but there are not sufficient characteristics to warrant a distinct species. It certainly is not the *lancea*.

We found it abundant at Red Bay, where, like the Capelin and Herring, it is used as bait in the Cod fishery.

28. Acanthias Americanus Storer.

Has been noticed from New York to Massachusetts. I have seen it in Maine, and Dr. De Kay states also that it has been taken to the north, beyond the coast of Labrador.

We found it early in August at Bras d'Or and Red Bay, and subsequently saw large numbers taken off Shelburne at the south-west extremity of Nova Scotia.

29. Scymnus brevipinna De Kay.

A jaw of this shark was obtained at Bras d'Or, where it had been taken, and I am inclined to think that it is by no means uncommon upon the Labrador coast.