

THE FISHES OF LABRADOR

RICHARD H. BACKUS

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INTRODUCTION

THE PRESENT STUDY is based primarily on collections of the "Blue Dolphin" Labrador Expeditions of 1949, 1950, and 1951 upon which the writer served as biologist. Marine collections were made mostly with beam and otter trawls along the coast from FORTAU Bay, Strait of Belle Isle, north to Kangalaksiorvik Fiord ($59^{\circ} 25' N.$).

Fresh-water collections were made primarily with seines and gill nets from St. Mary's River in the south ($52^{\circ} 20' N.$), north to Kangalaksiorvik Fiord but mostly in the lower portions of tributaries to the Hamilton Inlet-Lake Melville estuary. In August, 1951, a week was spent on the interior plateau on Hamilton River above Grand Falls where environmental conditions differed from those on the coast.

Additional collections, mainly from the Davis Inlet and Battle Harbor regions, in the Museum of Zoology, University of Michigan, were available for this study.

The "Blue Dolphin" collections are in the United States National Museum, Washington, D. C., except for duplicate specimens of fresh-water species in the collections at Fernow Hall, Cornell University, Ithaca, New York.

LABRADOR DEFINED

Greater Labrador, or the Labrador Peninsula, lies to the north and east of a line drawn from Seven Islands Bay, Gulf of St. Lawrence, to the southernmost part of Hudson Bay. This area of about 625,000 square miles is drained in four directions: west into Hudson and James bays, north into Ungava Bay and Hudson Strait, east into the Atlantic Ocean, and south into the Strait of Belle Isle and the Gulf of St. Lawrence. It is this area which most nineteenth and early twentieth century authors meant when referring to Labrador.

Labrador as here understood is political Labrador, or Newfoundland-Labrador as established by agreement between Newfoundland and Canada in 1927. By this agreement that portion of the Labrador Peninsula that drained into the Atlantic Ocean and the Strait of Belle Isle was to come under the jurisdiction of Newfoundland. The natural watershed boundary is deviated from only

in the south, where the boundary, fixed just east of Blanc Sablon at the western entrance to the Strait of Belle Isle, proceeds north to latitude $52^{\circ} N.$, then west to the Romaine River, and thence upstream to the head of the river. Here the boundary assumes the height of land and continues irregularly northward to Cape Chidley in Hudson Strait.

At the northern boundary of Labrador in Hudson Strait the Labrador Current proper has its origin, being formed by the junction of the cold, south-flowing Canadian Current with water flowing west from the West Greenland Current and water flowing east out Hudson Strait (Dunbar, 1951). The current then flows south along the entire coast of Labrador. In the Strait of Belle Isle, the southern boundary of Labrador, the cold waters of the Labrador Current meet the warmer waters of the Gulf of St. Lawrence.

Thus, with both natural topographic and oceanographic boundaries, Labrador is a geographical as well as a political entity.

HYDROGRAPHIC CONDITIONS IN LABRADOR

The waters of the Labrador coast might be construed as extending from the Labrador mainland east over the continental shelf and slope for some 100 miles to the edge of the Labrador Sea. The shelf and slope waters are mainly the south-flowing Labrador Current, but this current is not uniform. The current can be divided into outer and inner zones, although the transition between them is not abrupt. The outer zone is chiefly derived from the West Greenland Current and is warmer and saltier than the Canadian Current from which the inner zone is derived. In the inner zone temperatures below $-1.0^{\circ} C.$ prevail at 100 meters, while at the same depth in the outer zone temperatures close to $3.0^{\circ} C.$ obtain.

A third zone, inshore of the cold portion, may be called the immediate coastal, or shore, zone. Here the upper 50 meters are noticeably affected by local influences (mostly land drainage) and are warmer and less saline than the comparable stratum of the inner portion of the Labrador Current. Below 50 meters in the shore zone, however, conditions

are like those in the inner zone of the Labrador Current, i.e., extremely cold,¹ although in certain instances local warming occurs to such an extent that relatively high temperatures are found at considerable depths (2.5° C. to 3.0° C. at Nain in 100 meters).

It is mainly in the innermost zone where ichthyological observations have been made. The area considered in the present paper has its eastern limit at the transition between the cold and warmer portions of the Labrador Current. The fauna of the relatively warm slope water represents a different problem from the one treated here.

The eulittoral zone in Labrador may be roughly divided into that of the fiords and that of the outer coast between fiords and in the skerries. In the latter, moderately high salinities obtain (30 to 31 per mille at the surface) and summer temperatures are moderate (5° C. to 10° C. at the surface). The water is clear and green. The substrate is usually of rock and is kelp covered (with *Fucus* sp., *Laminaria* sp., and others).

The eulittoral zone of the fiords is warmer and less saline. The water may be brown and little transparent. Aquatic vegetation is often lacking. The extent of these conditions is in proportion to the amount of warm fresh water introduced at the head of the fiord. The extreme case is found in Lake Melville where summer surface temperatures may rise to 18° C. and the salinity at a point 70 miles from fresh water may be less than 10 per mille. The fiords may have beaches of sand and stone, maximum depths of about 125 fathoms, and muddy bottoms. Outside the fiords a hard bottom is the rule. The latter condition prevails across the shelf, where maximum depths of about 200 fathoms occur.

THE FRESH WATERS OF LABRADOR

From the standpoint of watershed, Labrador fresh waters consist of three parts: (1) a narrow east-west strip in the extreme south-central part, consisting of the headwaters of the Romaine, Natashquan, Little Mecatina,

¹ Labrador fiords, and immediate coastal waters below 50 meters, and the inner portion of the Labrador Current provide an arctic marine environment as defined by Dunbar (1951) wherein the water involved is of polar basin origin having a temperature of below 0° C. and a salinity of from 32 to 34 per mille.

St. Augustin, and St. Paul rivers draining south into the Gulf of St. Lawrence; (2) a coastal fringe from the Strait of Belle Isle north to Cape Chidley of numerous short rivers and streams with small basins; these run normal to the coast and drain into the Atlantic; the upper limb of Labrador (the country is shaped like an inverted T) is entirely drained by such streams; and (3) the rivers and streams of the Hamilton Inlet-Lake Melville system of which the greatest are the Hamilton, Naskaupi, Kenamu, and Goose rivers. The two largest, the Hamilton and the Naskaupi, have communicating headwaters, and all four have adjacent mouths in the almost-fresh surface waters of Lake Melville. This system drains nearly half of Labrador, mainly the western and central portions.

The interior of Labrador is a great lake-dotted plateau, and the rivers rising here lose much altitude before reaching the sea. The Hamilton River does this abruptly in the mighty Grand Falls and the great rapids immediately below, while in the Naskaupi the descent is a gradual one, the river between Lake Michikimau and Grand Lake being one of almost continual rapids. There are considerable differences in limnological conditions between the waters of the plateau and those of the coast. Low (1896) noted that brook trout in the Hamilton River above Grand Falls average much larger than those in the lower stretches of the river. This observation agrees with our recent ones. The station on the plateau at which we collected was to all appearances the most productive that we observed in Labrador.

Tributaries of the Hamilton Inlet-Lake Melville estuary are usually between 55° F. and 60° F. in July and August, while fresh waters on the northern part of the coast are generally between 50° F. and 55° F.

Tributaries to the lower Hamilton and Naskaupi rivers are of the trout-stream type. They have considerable gradient and run over rocky bottoms. The water is clear and brown. Aquatic vegetation is limited. These streams do not appear to be highly productive.

Around the Flour Lake station (an irregular expansion of the Hamilton River) on the plateau, small streams are practically non-

existent. Such as do exist are small rocky trickles connecting small ponds with the main stream. The irregular lake-like river, however, presents a variety of habitats with respect to current and bottom. Aquatic vegetation is rampant in places, and an impression of great productivity was gained.

Short coastal rivers and streams vary in their characteristics. While most have considerable gradient and run over rocky bottom (some sand occasionally), water color varies from brown to white, and productivity appears to vary between wide limits.

HISTORICAL REVIEW OF LABRADOR ICHTHYOLOGY

The first scientific expedition into Labrador waters to collect fishes was by Horatio R. Storer (1850). His travels were confined to the south coast between the Quebec-Labrador boundary and the eastern entrance to the Strait of Belle Isle. He recorded 13 species, three of which were considered new but are now in synonymy. In 1866 there was published the "List of vertebrates observed at Okak, Labrador, by Rev. Samuel Weiz, with annotations by A. S. Packard, Jr., M.D." Weiz, a Moravian missionary, lists seven species for the Okak area (57° 35' N.). Packard gave without explanation what appear to be the results of his own observations on nine species during his summer cruise of 1864 along the coast from the Quebec-Labrador boundary north to Hopedale.

In 1883 W. A. Stearns published the results of his observations during expeditions in 1875, 1880, 1881, and 1882. Stearns traveled the north shore of the Gulf of St. Lawrence from Mingan, Quebec, east through the Strait of Belle Isle and north along the Atlantic coast to Triangle Harbor (52° 50' N.). His travels were mainly in Quebec and less in Labrador as here understood. The statements of Stearns that certain species occur "all along the coast" refer, then, not to the Atlantic coast of Labrador, as suggested in some cases by Packard (1891) and Kendall (1909), but primarily to the Gulf of St. Lawrence coast of Quebec and Labrador. Stearns's list contained 12 species attributable to Labrador.

Alpheus S. Packard published in 1891 "The Labrador coast" which included a chapter on

zoology. The list of fishes contained Packard's annotations to Weiz's 1866 list and Stearns's records of 1883. A. P. Low of the Geological Survey of Canada explored much of the greater Labrador Peninsula from 1892 to 1895. His account (Low, 1896) contained a list of fishes. Ten species, most of them fresh-water fishes, pertain to Labrador. William C. Kendall published "The fishes of Labrador" in 1909. Labrador as understood by Kendall included all the greater Labrador Peninsula. Kendall listed most of the valid literature records and the results of the Bowdoin College Expedition of 1891, which collected from the Strait of Belle Isle north to Hamilton Inlet. Kendall included about 40 species pertinent to Newfoundland-Labrador. Also in 1909, Wilfred T. Grenfell, founder of the famous mission, published "Labrador, the country and its people." This book contains chapters on Labrador fisheries. In 1911 Kendall published a "Report on the fishes collected by Mr. Owen Bryant on a trip to Labrador in the summer of 1908." Bryant collected fish north along the Atlantic coast of Labrador to Komaktorvik Bay (59° 20' N.). Twelve species are recorded.

During the years 1931-1934 the "Cape Agulhas," Newfoundland research vessel, made oceanographic and fishery research cruises north along the coast to Hamilton Inlet. Lists of fishes collected were published in the Annual Reports of the Newfoundland Fishery Research Commission (1931-1933) and the Newfoundland Fishery Research Laboratory (1934). In 1932 G. W. Jeffers published "Fishes observed in the Strait of Belle Isle." Jeffers' observations were mainly confined to the Newfoundland side of the Strait, but one species is recorded from Labrador. A. C. Weed, a member of the Rawson-MacMillan-Field Museum Expedition of 1927-1928, published his observations on the salmonids of the Nain area in 1934. In 1939 Samuel F. Hildebrand published an account of fishes collected during expeditions covering 10 years to northern regions by the late Capt. Robert A. Bartlett. He listed 11 species from specific Labrador localities. Dunbar (1947) recorded six species from Hebron in northern Labrador. Munroe (1949) furnished specific records for three fresh-water species from the headwaters of the Hamilton River. Backus

(1951) recorded 11 species that had been unreported or rarely reported from Labrador taken in the "Blue Dolphin" collections of 1949 and 1950.

METHODS

My methods of measuring and counting followed Hubbs and Lagler (1947, pp. 8-15) except as noted below:

The last two fin ray bases of the dorsal and anal fins were counted as two. The length of the pectoral and pelvic fins was measured from the base to the tip of the longest ray. Rudiments of gill rakers were included in counts of these structures. In species with single, long, superficially undifferentiated dorsal and anal fins, which may contain both spines and soft rays, the latter were not distinguished, and the total number of elements are expressed in arabic numerals. Half of the caudal fin was *not* included in counts of the dorsal and anal fin rays in the genus *Lycodes*.

The phylogenetic arrangement of families is that of Berg (1940) except for the *Selachii*, where I followed Bigelow and Schroeder (1948). Within families the generic and specific arrangement is alphabetical. The recommendations of the American Fisheries Society (1948) on vernacular names have been followed. Common names for species not given in the latter have been taken from Bigelow and Welsh (1925) for marine species and from Hubbs and Lagler (1947) for fresh-water species. The local names provided are those used by the English-speaking people of Labrador and Newfoundland.

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ANNOTATED LIST OF FISHES

SQUALIDAE

Squalus acanthias Linnaeus

ATLANTIC SPINY DOGFISH

LOCAL NAME: DOGFISH

The spiny dogfish was recorded by Storer (1850) from Red Bay, Strait of Belle Isle. In 1931 and 1932, the "Cape Agulhas" collected it near by (Newfoundland Fishery Research Commission, 1932, 1933). Templeman (1944) reported it north to Batteau and the Spotted Islands (about 50° 30' N.). It is unknown from Indian Harbor (north side of Hamilton Inlet, about 54° 25' N.). Mr. R. L. Stevenson, Inspector, Newfoundland Fisheries Research Station, St. John's, Newfoundland, reports this species at Gready (about 53° 50' N.), probably close to its northern limit along the North American mainland.

DALATIIDAE

Somniosus microcephalus (Bloch and Schneider)

SLEEPER SHARK

The sleeper shark was reported "all along the coast" of Labrador by Stearns (1883). Grenfell (1909) told of its occurrence on the Atlantic Labrador coast but gave no specific localities. A specimen (U.M.M.Z. No. 72835) was taken in September, 1925, in Jack Lane's Bay (55° 40' N., 60° 30' W.) by W. Koelz. Bigelow and Schroeder (1948) reported the species plentiful in Hudson Strait, Davis Strait, Baffin Bay, and to the south in the Gulf of St. Lawrence, indicating its probable common occurrence from the Strait of Belle Isle to Cape Chidley.

RAJIDAE

Raja radiata Donovan

ATLANTIC PRICKLY SKATE

LOCAL NAME: MAIDEN RAY

Backus (1951) recorded this species from Domino Harbor and Lake Melville, but the 1932 "Cape Agulhas" collection from an off-shore bank east of Hamilton Inlet was overlooked (Newfoundland Fishery Research Commission, 1933).

"BLUE DOLPHIN" COLLECTIONS IN 1951:
Lake Melville: (53° 29' N., 59° 59' W.),

August 28, otter trawl in 15-24 fathoms over sandy mud bottom, one male, 115 mm. in total length; same position, August 26, otter trawl in 17-19 fathoms over mud bottom, one male and two females, 107-114 mm. long; (53° 35' N., 59° 55' W.), about January 15, one male, 390 mm. long. Nain: (56° 33' N., 61° 38' W.), August 8, otter trawl in 60 fathoms over sandy mud bottom, four females and one male, 159-305 mm. long; (56° 34' N., 61° 38' W.), August 5, otter trawl in 55-60 fathoms over sandy mud bottom, some stone, four females and two males, 126-170 mm. long; (56° 37' N., 61° 58' W.), August 7, otter trawl in 45 fathoms over mud bottom, one male, 135 mm. long.

Salinity at Labrador collection sites varied from 20.00 to 31.75 per mille. While the temperature ranged from -1.42° C. to 3.00° C., all but one specimen was taken from waters with temperatures above 0° C.

The closely related *Raja hyperborea* Collett occurs at greater depths and at colder temperatures than *Raja radiata*. It has not been reported from Labrador, although it occurs as far west as West Greenland.

Among 25 Labrador specimens of the Atlantic prickly skate 10 have the dorsal fins separated by a space containing from one to three spines, whereas 15 others have these fins contiguous.

Among six specimens, more than 300 mm. in length, four have dark blotches on the ventrum, confined to the inner, posterior portions of the pectoral fins and to the tail. All specimens of less than 300 mm. are immaculate beneath.

Egg cases, both empty and containing embryos, were examined that varied in length from 55 to 70 mm. and in width from 40 to 50 mm. These egg cases and the development of the embryo agree with the descriptions by Nordgaard (1917) for Norwegian egg cases and embryos and by Vladyskov (1936)¹ for Canadian egg cases.

¹ Vladyskov (1936) recognized both *R. radiata* and *R. scabrata* (now considered synonymous) and separated their egg cases on the basis of size. Those of *R. radiata* were from 66 to 68 mm. long and 48 to 49 mm. wide, and of *R. scabrata* 77 to 90 mm. long and 58 to 73 mm. wide.

"BLUE DOLPHIN" COLLECTIONS: July 28, 1950, Lake Melville, one with yolk mass 25-30 mm. in diameter, no embryo apparent. August 19, 1950, Lake Melville, one with yolk mass 25-30 mm. in diameter, embryo 80 mm. long; one with yolk mass 6 mm. in diameter, embryo almost completely developed, 110 mm. long; one with unidentifiable remnant of tissue inside, suggesting recent hatching. August 28, 1951, Lake Melville, two with yolk mass about 25-35 mm. in diameter, no embryos apparent; one with yolk mass 20 by 30 mm., embryo 39 mm. long; one with yolk mass 30 by 30 mm., embryo 41 mm. long; one with yolk mass 30 by 20 mm., embryo 54 mm. long.

The largest embryo described by Nordgaard (1917) was 103 mm. long and the smallest free specimen, 170 mm. long. As we have an embryo 110 mm. long with a yolk mass 6 mm. in diameter and a free specimen 107 mm. long with a remnant of yolk 2 mm. in diameter on its venter, it is apparent that hatching takes place at lengths of about 105 to 110 mm.

Several authors have stated that the embryo has the dorsal fin placed more in advance on the tail than does the free-living fish. In Nordgaard's 103-mm. specimen the tail extended 17 mm. beyond the second dorsal fin. In a 110-mm. specimen the tail extends 19 mm. beyond the fin. Because Nordgaard never observed this extension in free-living specimens, he suggested that "... the part behind the dorsal fin falls off just before or immediately after the young emerges from the capsule." In specimens of free-living young 107, 113, and 114 mm. long, the extended portion of the tail is present, and it appears that it merely becomes shorter as the fish increases in size. Even in sexually mature specimens there is a portion of the tail that extends beyond the second dorsal fin. This part bears a vertical fold of skin which is sometimes so produced dorsally as to give it the appearance of a small third dorsal fin.

We have observed stages from recently deposited eggs to recently hatched young in Lake Melville in late August; thus spawning must take place there at least during July and August. Nordgaard (1917) based his description of developmental stages on material collected in Trondhjem Fiord during February, indicating winter spawning there. The

spawning period is probably an extended one and may occur the year round.

ACIPENSERIDAE

Acipenser oxyrhynchus Mitchill

ATLANTIC STURGEON

LOCAL NAME: STURGEON

Backus (1951) recorded a specimen taken in Hamilton Inlet.

CLUPEIDAE

Clupea harengus harengus Linnaeus

ATLANTIC HERRING

LOCAL NAME: HERRING

Storer (1850) and Weiz (1866) reported the herring from Red Bay, Strait of Belle Isle, while Packard (1891) stated that it occurred along the whole coast. Grenfell (1909) recorded it from Snug Harbor (52° 50' N.) and Cape Mugford (57° 45' N.).

Apparently during its years of abundance in Labrador the herring occurred all along the coast. In recent years it has been scarce. We observed only seven specimens (at Niger Sound, 52° 13' N., and Hawke Harbor, 53° 03' N.) during the summers of 1949-1951, although several barrels were taken at Red Bay (Strait of Belle Isle) during late June, 1949. The export of Labrador herring in 1881 amounted to 33,300 barrels, but by 1908 it had fallen to 180 barrels (Grenfell, 1909).

During the period of scarcity in Labrador it has become commoner in Greenland, although it has not reached the peak of abundance there that it once attained in Labrador. The stock in Greenland belongs to a single race identical with the summer spawning race of Iceland. The identity of the Labrador stock is unknown.

Pomolobus pseudoharengus (Wilson)

ALEWIFE

The sole record is that of Storer (1850) for Red Bay, Strait of Belle Isle. This point is probably close to the northern limit of this species' range.

SALMONIDAE

Coregonus clupeaformis (Mitchill)

LAKE WHITEFISH

LOCAL NAME: WHITEFISH

This species was reported by Low (1896) as occurring in lakes and rivers throughout

the interior of Labrador. Blair (1943a) recorded it at the foot of Muskrat Falls, Hamilton River (53° 13' N., 60° 46' W.).

"BLUE DOLPHIN" COLLECTIONS: At temperatures between 55° F. and 60° F. and at depths under 1 fathom over muddy sand, sand, and rock: McKenzie River, tributary of the Hamilton River (53° 13' N., 60° 43' W.), July 18, 1951, 10-foot seine, three specimens 84-93 mm. in standard length. Little Lake, North West River (53° 32' N., 60° 11' W.): July 6, 1950, gill net, three specimens, 167-263 mm. long; July 7, 1951, gill net, one specimen 208 mm. long; July 26, 1951, gill net, three specimens, 193-269 mm. long. Flour Lake, Hamilton River (53° 43' N., 64° 35' W.), August 26 and 27, 1951, gill net, eight specimens 234-420 mm. long.

Labrador specimens have been examined after the methods of Koelz (1931). Certain properties of these fish are shown in tables 1-5.

The number of lateral line scales has a rather low range compared with specimens of Koelz (1931). A population of *C. clupearformis* from Hudson Bay studied by Dymond (1933) had an almost identical range of 74 to 82. The type of *Coregonus labradoricus* (Richardson), generally considered a synonym of *C. clupearformis*, from the Musquaw River, a tributary to the Gulf of St. Lawrence, has 78 scales in the lateral line (Richardson, 1836).

Of the 18 Labrador specimens examined six are sexually mature. The length, weight, sex, and age of these are found in table 6. All the mature females bear ova from 1.5 to 2 mm. in diameter. The Flour Lake specimens were apparently nearing maximum size as the outermost annuli of the scales are crowded.

TABLE 1
LATERAL LINE SCALES IN LABRADOR
Coregonus clupearformis

74	75	76	77	78	79	80	81	82	83
1	2	3	1	2	1	1	2	—	1

TABLE 2
GILL RAKERS ON FIRST ARCH IN LABRADOR
Coregonus clupearformis

24	25	26	27	28	29
1	1	6	7	1	1

TABLE 3
NUMBER OF TIMES HEAD IS CONTAINED IN
STANDARD LENGTH OF LABRADOR
Coregonus clupearformis

4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7
3	2	2	3	4	2	1	1

TABLE 4
NUMBER OF TIMES LENGTH OF PECTORAL FIN IS
CONTAINED IN PECTORAL-PELVIC DISTANCE
IN LABRADOR *Coregonus clupearformis*

1.5	1.6	1.7	1.8	1.9
5	1	3	4	3

TABLE 5
NUMBER OF TIMES DEPTH IS CONTAINED IN STANDARD LENGTH AS A FUNCTION OF SIZE
IN LABRADOR *Coregonus clupearformis*

Length Class (Mm.)	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4
0-100	—	—	—	—	—	—	—	—	—	—	—	—	3
101-200	—	—	—	—	—	—	—	—	—	—	—	2	—
201-300	—	—	—	1	—	1	—	1	2	—	—	—	—
301-400	1	—	—	2	1	—	1	—	—	—	—	—	—
400+	—	—	1	—	—	1	—	—	—	—	—	—	—

TABLE 6

LENGTH, WEIGHT, AGE, AND SEX OF LABRADOR
SPECIMENS OF *Coregonus clupeaformis*

Standard Length (Mm.)	Weight (Grams)	Age	Sex
269 ^a	357	VI+?	♀
369 ^b	1030	IX+?	♂
370	1400	X+?	♀
380	1170	VII+?	♀
410	1485	XII+?	♂
420	1770	XV+?	♀

^a Specimen collected at Little Lake, July 26, 1951.

^b This and succeeding specimens collected at Flour Lake, August 26 and 27, 1951.

Prosopium cylindraceum quadrilaterale
(Richardson)

ROUND WHITEFISH

LOCAL NAME: BOTTLEFISH

Kendall (1909) recorded two specimens from North West River.

"BLUE DOLPHIN" COLLECTIONS: Over sand and muddy sand at depths less than a fathom and at temperatures between 55° F. and 60° F.: Mud Lake, Hamilton River: stream entering on southwest shore (53° 15' N., 60° 10' W.), August 24, 1950, 10-foot seine, three specimens, 43–149 mm. long; outflow (53° 18' N., 60° 10' W.), August 24, 1950, 60-foot seine, four specimens, 47–196 mm. long. Mouth of the Kenamu River (53° 28' N., 59° 52' W.), August 25, 1950, 60-foot seine, three specimens, 119–144 mm. long. Little Lake, North West River (53° 32' N., 60° 11' W.); August 24, 1949, 60-foot seine, three specimens, 208–219 mm. long; July 6, 1950, gill net, five specimens, 202–240 mm. long; July 7, 1951, gill net, four specimens, 221–231 mm. long. Flour Lake, Hamilton River (53° 43' N., 64° 35' W.), August 25, 1951, 10-foot seine, two specimens,

TABLE 8

GILL RAKERS ON FIRST ARCH IN LABRADOR
Prosopium cylindraceum quadrilaterale

15	16	17	18	19
1	5	5	6	4

TABLE 9

NUMBER OF TIMES HEAD IS CONTAINED IN STAND-
ARD LENGTH IN LABRADOR *Prosopium*
cylindraceum quadrilaterale

4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
1	1	1	3	5	1	—	2

TABLE 10

NUMBER OF TIMES PECTORAL FIN IS CONTAINED
IN PECTORAL-PELVIC DISTANCE IN LABRA-
DOR *Prosopium cylindraceum quadrilaterale*

1.5	1.6	1.7	1.8	1.9
2	1	3	2	6

97 and 136 mm. long. Naskaupi River: about 1 mile above its mouth (53° 47' N., 60° 54' W.), July 22, 1951, 60-foot seine, 14 specimens, 27–34 mm. long, and six specimens, 66–125 mm. long; about 8 miles above its mouth (53° 50' N., 61° 00' W.), July 23, 1951, 10-foot seine, four specimens, 27–36 mm. long. English River (53° 54' N., 58° 52' W.), August 13, 1951, 60-foot seine, four specimens, 46–57 mm. long.

Although Dymond (1933) reported this species as resorting to brackish water in the Hudson Bay region, we have not observed it to do so in Labrador, although the opportunity there is great.

These specimens were examined after the methods of Koelz (1931) (tables 7–10) and

TABLE 7

LATERAL LINE SCALES IN LABRADOR *Prosopium cylindraceum quadrilaterale*

79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
1	—	1	2	2	2	—	—	3	2	1	4	1	1	1

are similar in some respects to the population named *Prosopium quadrilaterale minor* Koelz (1931) from Lake Chazy, New York, in that when compared with Great Lakes populations and most inland lake populations they have fewer lateral line scales, a longer head, and a longer pectoral fin.

Specimens 230–260 mm. long were from age VI to age VIII. Females examined that were over 200 mm. long bore ova from 1 to 2 mm. in diameter. The parr marks are lost when the fish is between 150 and 180 mm. long.

Salmo salar Linnaeus

ATLANTIC SALMON, LANDLOCKED SALMON

LOCAL NAMES: SALMON, SALMON PEEL (GRILSE AND PRE-SEA FISH), SMALL SALMON (GRILSE), INLAND SALMON (NON-MIGRATORY FISH) AND MACKEREL (NON-MIGRATORY FISH)

The statements of early authors that salmon occur all along the Labrador coast should be qualified. Numerous specific records for the anadromous form have been given for tributaries of the Hamilton Inlet-Lake Melville estuary and coastal rivers south to the Strait of Belle Isle by Weiz (1866), Packard (1891), Kendall (1909), and Blair (1943a, 1943b). Low (1896) and Munroe (1949) recorded specific localities in the Hamilton and Naskaupi River drainages for the non-migratory form. The only literature records for localities in Labrador north of Hamilton Inlet are those of Hildebrand (1939) who recorded *Gymnocanthus tricuspis* from the "stomach of a salmon" in Saglek Bay (58° 30' N.) and Huntsman (1937) who reported the capture of a specimen at near-by Ramah which had been tagged in Nova Scotia.

Actually the salmon is fished for commercially north to the Davis Inlet region (55° 50' N.) although to a reduced extent north of Hamilton Inlet. At Nain the salmon is regularly but infrequently observed. Its occurrence in Labrador north of Nain is apparently unusual, although it again becomes fairly abundant in certain tributaries to Ungava Bay (Dunbar and Hildebrand, 1952).

Over 1,000,000 pounds of Labrador salmon was marketed in 1949.

"BLUE DOLPHIN" COLLECTIONS: St. Lewis Sound: Indian Cove (52° 15' N., 55° 38' W.), July 12, 1949, 60-foot seine, one specimen, 88 mm. long; St. Mary's River (52° 23' N., 56° 00' W.), July 12, 1949, 60-foot seine, nine specimens, 102–168 mm. long. McKenzie River, tributary of the Hamilton River (53° 13' N., 60° 43' W.), July 18, 1951, fly rod, two specimens, 113 and 117 mm. long. Little Lake, North West River (52° 32' N., 60° 11' W.), July 26, 1951, gill net, one specimen, 320 mm. long. Flour Lake, Hamilton River (53° 43' N., 64° 35' W.), August 21

TABLE 11

AGE-LENGTH RELATIONSHIP IN SALMON (*Salmo salar*) FROM A NON-MIGRATORY POPULATION IN FLOUR LAKE, HAMILTON RIVER, LABRADOR, AUGUST 21–28, 1952

Standard Length (Mm.)	Age
111	I+
119	I+
133	II+
176	II+
163	III+
202	III+
205	III+
233	V+
360	VII+
410	VII+

to 28, 1951, fly rod, 10 specimens, 111–410 mm. long. Naskaupi River: about 1 mile above its mouth (53° 47' N., 60° 54' W.), July 22, 1951, 60-foot seine, one specimen, 187 mm. long; about 8 miles above its mouth (53° 50' N., 61° 00' W.), July 23, 1951, fly rod, one specimen, 89 mm. long. English River, Lake Melville (53° 54' N., 58° 52' W.), July 25, 1951, gill net, one specimen, 156 mm. long. Salmon River, Kaipokok Fiord (54° 50' N., 59° 51' W.), July 29, 1949, 10-foot seine, one specimen, 50 mm. long.

Blair (1943b) studied certain characteristics of anadromous salmon in Labrador. The age-length relationship in a sample of a non-migratory population from the Hamilton above Grand Falls is shown in table 11.

Salvelinus alpinus (Linnaeus)

ARCTIC CHARR

LOCAL NAMES: SEA-TROUT, HARDHEAD
(SMALL, NON-MIGRATORY FORM), TROUT

Storer (1850), who described the nominal species *Salmo immaculatus*¹ from Red Bay in the Strait of Belle Isle, first recorded this charr from Labrador. Packard in his annotations to the list of Weiz (1866) recorded specimens from near Hopedale (55° 25' N.) and Island of Ponds near Domino Harbor (53° 30' N.), the latter probably referable to this species. Kendall (1911) recorded specimens from Komaktorvik Fiord (59° 20' N.) in northern Labrador, and Hildebrand (1939) from Ryan's Bay (59° 35' N.) and Cape Mugford (57° 45' N.).

"BLUE DOLPHIN" COLLECTIONS: St. Mary's River (52° 18' N., 55° 54' W.), August 31, 1950, fly rod, one specimen, 184 mm. long. Hawke Harbor (53° 03' N., 55° 46' W.), July 4, 1951, gill net, three specimens, 176–204 mm. long. Little Lake, North West River (53° 32' N., 60° 11' W.), July 26, 1951, gill net, one specimen, 350 mm. long. Stream at head of Two-Mile Bay on Paul Island near Nain (56° 30' N., 61° 32' W.), August 7, 1951, 60-foot seine and fly rod, seven specimens. Nain Harbor (56° 32' N., 61° 40' W.),

August 4, 1951, gill net, four specimens, 351–500 mm. long. Small lake at head of stream emptying into head of Nain Harbor (56° 32' N., 61° 41' W.), August 7, 1951, fly rod, 12 specimens, 63–102 mm. long. Trousers Lake, Nain (56° 32' N., 61° 42' W.), August 9, 1951, fly rod, 14 specimens, 91–135 mm. long. Maligiak, the estuary of the Fraser River in Nain Bay (56° 37' N., 62° 12' W.), August 9, 1951, 60-foot seine, 85 specimens, 60–419 mm. in fork length. Pekkersoak River, Hebron Fiord (58° 12' N., 63° 08' W.), August 13, 1949, 60-foot seine, two specimens, 231 and 271 mm. in standard length. Unnamed lake and its outlet, Kangalaksiorvik Fiord (59° 23' N., 63° 54' W.), August 8, 1950, hand, eight specimens, 18–96 mm. long. Katherine River, Kangalaksiorvik Fiord (59° 23' N., 64° 04' W.): August 9, 1950, gill net and fly rod, nine specimens, 190–387 mm. long; August 10, 1950, 60-foot seine, 19 specimens, 83–199 mm. long.

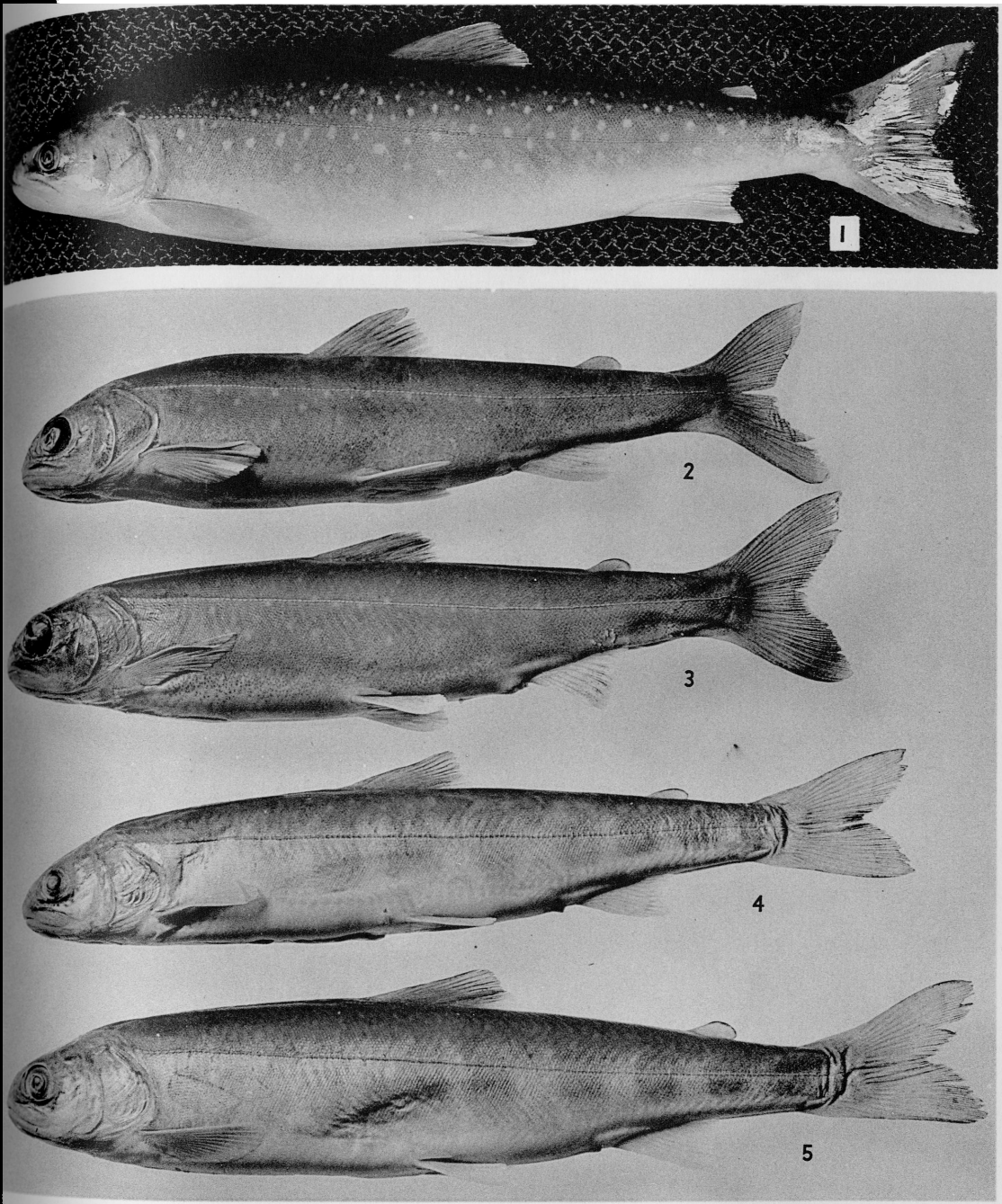
Two species of anadromous charr (*Salvelinus fontinalis* and *alpinus*) are found along the coast of northeastern North America, as was shown by Kendall (1911) who gave a description, figure, and a discussion of the proper scientific name for the Labrador *alpinus*, but his use of the name *stagnalis* for the Labrador form is not correct. *Salmo stagnalis* Fabricius (1780) applies to a large (at least 450 mm. in length), non-migratory lake fish from the mountains of

TABLE 12
MORPHOMETRY OF LABRADOR SPECIMENS OF ARCTIC CHARR, *Salvelinus alpinus*

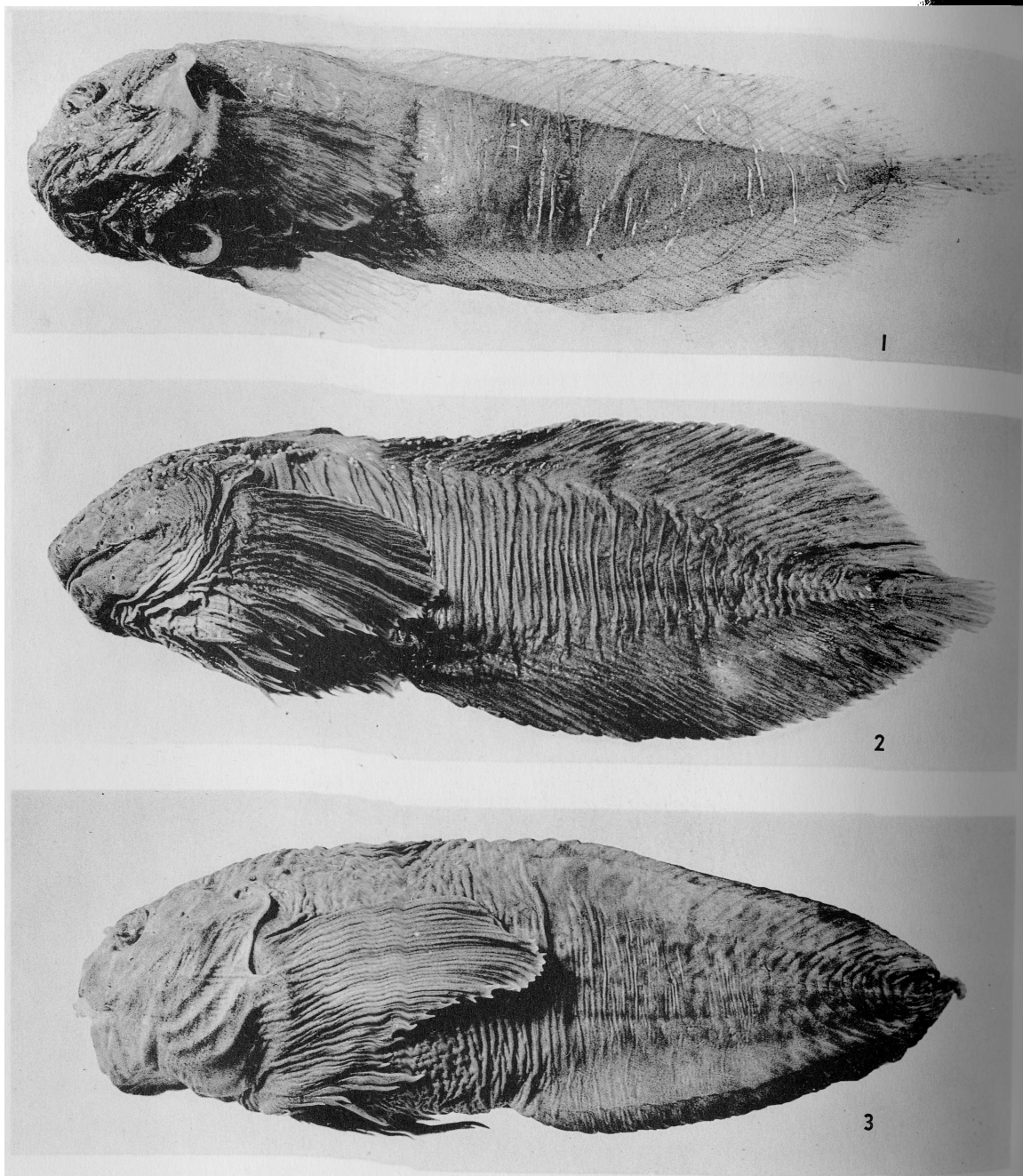
Standard length in mm.	287	292	294	310	331	362 ^a
Sex	♂	♀	♀	♀	♂	♂
Fork length ^b	110	111	110	109	112	108
Total length	114	118	113	114	116	115
Head length	22	22	22	20	26	23
Depth	23	19	22	23	23	23
Snout to dorsal fin origin	45	45	46	46	48	46
Snout to origin of P ₁	20	20	20	19	23	22
Snout to origin of P ₂	52	51	50	50	54	53
Snout to anal fin origin	75	75	73	72	76	76
Dorsal fin origin to origin of adipose fin	38	37	37	40	38	37
Origin of P ₁ to origin of P ₂	32	33	32	32	32	32
Anal fin origin to base of caudal fin	29	27	28	28	28	28

^a This specimen was collected in Unity Bay, Nain, on August 4, 1951. The other specimens were collected at Maligiak, Nain Bay, on August 9, 1951.

^b This and succeeding characters are expressed in hundredths of the standard length.



Salvelinus alpinus, anadromous adult male, 300 mm. in standard length, weight 450 grams, age VIII+, Nain Bay, August 9, 1951. 2, 3. *Salvelinus alpinus*. 2, 3. Non-migratory adults, Nain, August 9, 1951. 2. 113 mm. in standard length. 3. 113 mm. in standard length. 4, 5. Anadromous pre-sea juveniles, Katherine River, Kangalaksiorvik Fiord, 10, 1950. 4. 123 mm. in standard length. 5. 135 mm. in standard length



1. *Liparis koefoedi*, adult male, 140 mm. in standard length, Goose Bay, Lake Melville
2. *Liparis koefoedi*, adult male, 150 mm. in standard length, Hebron Fiord, August 8, 1949
3. *Liparis* sp., adult female, 156 mm. in standard length, Kaipokok Fiord, August 1, 1949

Note transparency, which is typical of the Goose Bay population

TABLE 13
MORPHOMETRY OF LABRADOR SPECIMENS OF ARCTIC CHARR, *Salvelinus alpinus*

Standard length in mm.	287	292	294	310	331	362
Head length in mm.	63	64	64	62	85	83
Sex	♂	♀	♀	♀	♂	♂
Length of upper jaw ^a	48	45	47	45	53	50
Length of snout	25	23	28	24	28	30
Length of orbit	19	17	20	18	15	17
Length of eye	16	17	17	18	15	13
Width of bony interorbital	35	31	33	34	35	31
Post-orbital head length	56	58	56	56	56	56
Length of P ₁	63	64	64	69	67	61
Length of P ₂	54	53	50	60	56	59
Length of dorsal fin base	54	55	55	61	47	58
Length of anal fin base	46	44	38	47	38	40
Length of adipose fin base	10	9	8	6	9	5
Length of depressed adipose fin	27	26	23	26	22	21
Length of depressed dorsal fin	79	76	76	81	75	69
Length of depressed anal fin	62	61	53	61	59	55
Head width	51	42	48	52	48	50
Body width at dorsal fin origin	56	45	53	58	46	62
Depth of caudal peduncle	35	31	33	35	30	32
Length of caudal peduncle	81	73	83	89	70	77
Length of pelvic axillary process	28	25	25	24	27	25
Internarial width	17	16	20	19	20	21
Greatest depth of maxillary	8	8	8	6	8	8
Diameter of largest spot	6	5	8	3	4	8
Length from snout to anterodorsal extremity of opercular opening	78	73	76	76	76	76

* This and succeeding characters are expressed in hundredths of the head length.

Greenland. That species is regarded by Jensen (1948) as a synonym of *Salvelinus alpinus* (Linnaeus), but he reassigned the name *S. alpinus stagnalis* to the Greenland lake ecological subspecies.

It is not clear what characters are of systematic importance among the Salvelini. Tables 12 and 13 contain morphometric details and table 14 has meristic data for six specimens supposed to be typical anadromous Labrador arctic charr. Plate 4, figure 1, shows a typical

specimen. The color of these specimens, taken while in their sea dress, is as follows: the back is uniformly dark, with strong emerald-green and blue prismatic hues; the green is strongest above, the blue most intense laterodorsally where it continues onto the silvery sides. The metallic luster of the sides diminishes ventrally, and the belly is an even white or creamy white without luster. The dark color of the back extends forward onto the head, then ventrally to the upper

TABLE 14
MERISTIC DATA FOR LABRADOR SPECIMENS OF ARCTIC CHARR, *Salvelinus alpinus*

Standard length in mm.	287	292	294	310	331	362
Dorsal fin rays	14	14	15	14	13	14
Anal fin rays	11	14	12	13	12	13
Pectoral fin rays	13	14	13	15	13	14
Pelvic fin rays	10	10	10	10	10	9
Branchiostegals	12	10	11	10	9	10
Lateral line scales	128	126	120	126	130	124

margin of the maxillary. From the hinder tip of the maxillary, the border between the dark above and the light beneath extends backward and upward to the origin of the lateral line. The pale white spots on the sides, mostly obscured by the silvery luster, vary in size and in shape from round to slightly quadrangular. The margins of the spots are not distinct. Anteriorly, the spots are most numerous below the lateral line, but behind the level of the dorsal fin they are most numerous above.

The pectoral, pelvic, and anal fins are uniformly creamy white. The dorsal fin is uniformly dusky, with a somewhat paler tip; the width of this pale margin is slightly greater posteriorly. The adipose and caudal fins are uniformly dusky except that the latter is slightly darker in the central portion.

The jaw teeth are weakly developed, barely extending through the soft tissue which invests them, and the palatine and vomerine teeth are of like size. The head of the vomer is moderately extended posteriorly. The basibranchial teeth are smaller than the other teeth, multiserial (about three rows) and in a long patch.

The development of a kype is rarely observed in Labrador arctic charr. An occasional old male may have such, but it is never greatly developed.

The Labrador charr is variable in coloration. There may be many or few spots. Those on the sides are almost regular in shape but when they extend onto the back, as they often do, they become both smaller and more irregular. Small individuals are more prominently spotted on the dorsum than older fish. In individuals which are prominently marked on the back the appearance approaches the vermiculated one familiar in *Salvelinus fontinalis*. Among a large series of charr collected at Maligiak near Nain there appeared to be two forms, one large-spotted and deep-bodied, the other small-spotted and slenderer with many more spots. Intermediate forms connected these, but there were more individuals in the extreme categories. Occasionally individuals with irregular dark marks in the dorsal and caudal fins were encountered. These marks were more haphazardly arranged than in *S. fontinalis*, and ordinarily their absence is a good character

for separating the arctic charr from the brook trout. Black pigment in the paired and anal fins was lacking in the specimens described above, but more typically it is present. Its distribution is similar to that described below for non-migratory specimens, but it is generally less darkly developed.

The non-migratory form of *Salvelinus alpinus* was much less frequently encountered in Labrador than the anadromous form, although the former is by no means uncommon in lakes and streams along the northern part of the coast. It was not collected south of Nain, and like the anadromous form, it appears to be largely replaced by *Salvelinus fontinalis* south of this point. A collection of land-locked charr from Belle Isle was studied through the courtesy of Mr. J. T. Nichols of the American Museum of Natural History. Its presence there emphasizes the remarkable fact that it has never been reported from Newfoundland (Frost, 1940), a few miles away.

Non-migratory charr in Labrador may become sexually mature at a length of about 4 inches, whereas anadromous charr become sexually mature at lengths of 15 to 17 inches. Non-migratory charr closely resemble anadromous charr of comparable size, although small differences probably correlated with the different growth rates do exist. The non-migratory form has longer fins, a larger eye, and a thicker caudal peduncle than the anadromous form. Certain proportional differences probably correlated with the different growth rates are shown in tables 15-17 and plate 4, figures 2-5.

In non-migratory fish in nuptial coloration the lower sides vary from intense pink to orange, the belly usually being paler. The

TABLE 15
PECTORAL FIN LENGTH IN PER CENT OF STANDARD LENGTH IN NON-MIGRATORY AND ANADROMOUS SPECIMENS OF LABRADOR *Salvelinus alpinus* OF COMPARABLE SIZE

	15	16	17	18	19
Non-migratory ^a	—	—	2	3	4
Anadromous	4	7	1	—	—

^a Specimens are sexually mature.

TABLE 16

LENGTH OF EYE IN PER CENT OF STANDARD
LENGTH IN NON-MIGRATORY AND ANADROMOUS
SPECIMENS OF LABRADOR *Salvelinus*
alpinus OF COMPARABLE SIZE

	5	6	7	8
Non-migratory ^a	—	4	3	2
Anadromous	5	4	2	—

^a Specimens are sexually mature.

light spots on the sides are of the same bright color as the lower sides. These spots are one-third to one-quarter of the diameter of the eye. The upper sides and back are of a blue-black or brown-black color which is darkest above. The dorsal and caudal fins are clear or evenly dusky and only rarely have dark spots or blotches on them. Occasionally the caudal fin has a concentration of black pigment in the central portion towards the base, and sometimes the lower portion is suffused with the bright color of the lower sides. The bright colors extend onto the pectoral, pelvic, and anal fins. The outer margin of these fins is generally of a clear white as in *fontinalis*, and when the inner red and outer white of these fins are separated by black pigment, as they often are, it is dusky and diffuse rather than boldly black and regular as in *fontinalis*. The dusky pigment varies in its extent and in some cases largely replaces the red or orange. The largest landlocked charr that I have seen (about 10 inches) still retained its parr marks. The parr marks number seven to 10 and are two to three times as broad as the pale interspace. In general, Labrador non-migratory charr are colored much like *Salvelinus oquassa* (Kendall, 1914, pl. 4)

TABLE 17

DEPTH OF CAUDAL PEDUNCLE IN PER CENT OF
STANDARD LENGTH IN NON-MIGRATORY AND
ANADROMOUS SPECIMENS OF LABRADOR
Salvelinus alpinus OF COMPARABLE SIZE

	7	8	9
Non-migratory ^a	—	8	1
Anadromous	6	5	1

^a Specimens are sexually mature.

except that they are much darker above and with no bright coloration on the head and dorsal fin (Labrador charr at the very height of nuptial coloration may, however, be so colored). Specimens not in nuptial coloration lack or have little developed the red pigment found in breeding specimens but are otherwise similar.

Through the kindness of Dr. W. Harry Everhart of the University of Maine several fine specimens of *Salvelinus oquassa* Girard, 1853, from Aroostook County (Maine) lakes have been compared with specimens of *Salvelinus alpinus* from Labrador. There appear to be no consistent differences by which these populations can be separated. The non-migratory *oquassa* is even more like anadromous Labrador specimens of comparable size than non-migratory (but smaller) Labrador specimens. That is, the differences noted between anadromous and non-migratory Labrador populations disappear when the larger-sized (probably faster growing) specimens we have of *oquassa* (10 to 12 inches) are compared with anadromous Labrador specimens of comparable size. Labrador anadromous charr are so variable that in general appearance there are greater differences among them than exist between any selected variant and the specimens of *oquassa* that we examined. That the so-called *oquassa* should so resemble Labrador *alpinus* is reasonable, as it is the Labrador population, displaced to the southward in Pleistocene times and anadromous along the New England coast, that undoubtedly provided the stock for the several New England lakes where the arctic charr exists today. There is some difference in the number of gill rakers, when Maine and Labrador specimens are compared (table 18). The present data are too fragmentary to reveal the significance of this. The number of pyloric caeca (a character thought to be of importance in the *Salvelini*) in various populations of *S. alpinus* is shown in table 19.

It appears probable from the literature that the differences between *S. oquassa* and *S. aureolus* Bean, 1887, do not warrant nomenclatorial recognition. Such small morphological differences as exist are rendered even less significant when the obvious historical facts of the origin of these forms are consid-

TABLE 18

GILL RAKERS ON FIRST ARCH IN *Salvelinus alpinus* FROM SEVERAL LOCALITIES

				7	8	9	10
Upper limb							
Maligiak, Labrador ^a				—	13	19	9
Katherine River, Labrador ^a				—	1	10	7
Trousers Lake, Labrador ^b				—	1	5	2
Aroostook County, Maine ^c				—	2	—	2
Sunapee Lake, New Hampshire ^d				1	1	—	—
Lower limb				12	13	14	15
Maligiak, Labrador ^a				—	—	13	16
Katherine River, Labrador ^a				—	—	6	6
Trousers Lake, Labrador ^b				—	—	6	2
Aroostook County, Maine ^c				1	1	2	—
Sunapee Lake, New Hampshire ^d				1	—	1	—
Total				19	20	21	22
Maligiak, Labrador ^a				—	—	—	5
Katherine River, Labrador ^a				—	—	—	10
Trousers Lake, Labrador ^b				—	—	—	5
Aroostook County, Maine ^c				—	1	1	4
Sunapee Lake, New Hampshire ^d				1	—	—	1
				23	24	25	26
Maligiak, Labrador ^a				14	14	6	4
Katherine River, Labrador ^a				2	2	8	2
Trousers Lake, Labrador ^b				1	1	1	—
Aroostook County, Maine ^c				—	—	1	—
Sunapee Lake, New Hampshire ^d				—	—	—	—

^a Anadromous.^b Non-migratory.^c "S. oquassa."^d "S. aureolus."

ered. I believe that American ichthyologists should follow current British thought wherein the dozen or so nominal species in British lakes are considered to be one (in this case, *S. alpinus*). Thus I conclude that *Salvelinus aureolus* Bean is a synonym of *Salvelinus oquassa* Girard. With respect to the name *S. oquassa*, I believe that it signifies a population of *Salvelinus alpinus* (Linnaeus). A thorough study of the arctic charr on a circumpolar basis may warrant its retention as a subspecific name. If this be so, the statement of the geographical range of *oquassa* must be broadened to include the Labrador population and probably others.

***Salvelinus fontinalis* (Mitchill)**

EASTERN BROOK TROUT

LOCAL NAMES: SEA TROUT (ANADROMOUS FISH), HARNESS TROUT (LARGE MALES IN NUPTIAL COLOR), MUD TROUT (NON-MIGRATORY FISH), HARD-HEAD (SMALL, NON-MIGRATORY, STREAM TROUT), TROUT

Storer (1850) reported this species from the "Straits of Southern Labrador" (Strait of

Belle Isle). Weiz (1866) recorded it from Square Island (52° 45' N.). Stearns (1883) reported it as occurring all along the southern coast of the Labrador Peninsula. Low (1896) confused *Salvelinus alpinus* with *fontinalis*, and his records are thus valueless. Kendall (1909) gave records for Red Bay and Chateau Bay, Strait of Belle Isle, for Collingham's Cove, Hamilton Inlet, and North West River, Lake Melville. Weed (1934) reported it from Anaktalak Bay and tributaries near Nain (56° 25' N.). Munroe (1949) gave specific records for lakes and streams near the headwaters of the Hamilton River (54° 45' N. 66° 55' W.).

This species is abundantly distributed north along the coast (including tributaries of the Hamilton Inlet-Lake Melville estuary) at least as far as Nain. (As with the salmon this species is more or less discontinuously distributed in these latitudes. It is common in certain tributaries of Ungava and Hudson bays.)

"BLUE DOLPHIN" COLLECTIONS: Pond one-half mile north of Schooner Cove, Niger Sound (52° 13' N., 55° 43' W.), July 2, 1951, fly rod, three specimens, 156–183 mm. long.

TABLE 19
PYLORIC CAECA IN *Salvelinus alpinus* FROM SEVERAL LOCALITIES

Number	Maligiak, Labrador ^a	Katherine R., Labrador ^b	Trousers L., Labrador ^b	Aroostook Co., Maine ^c	Sunapee L., N. H. ^d
24	—	1?	—	—	—
25	—	—	2?	—	—
26	—	—	—	—	—
27	—	1	1?	—	—
28	—	1	2?	—	—
29	—	—	—	—	—
30	2	1	—	—	—
31	4	—	1?	—	—
32	3	2	—	—	—
33	4	1	—	—	—
34	—	2	—	—	—
35	4	4	—	—	—
36	5	2	—	—	—
37	7	—	—	—	—
38	3	—	—	—	—
39	1	—	—	—	—
40	1	2	—	1	—
41	1	—	—	—	1
42	2	—	—	—	—
43	—	—	—	—	—
44	1	—	—	—	—
45	—	—	—	1	—
46	—	1?	—	—	—
47	—	—	—	—	1

^a Anadromous; one specimen with 49 from Maligiak, one with 22 from Katherine River.

^b Non-migratory; counts are minimum number owing to small size of specimens.

^c "*S. oquassa*"; one specimen with 49.

^d "*S. aureolus*."

St. Mary's River, St. Lewis Sound (52° 18' N., 55° 54' W.), July 12, 1949, 60-foot seine, four specimens, 168–215 mm. long. Tributary of Hamilton River between Carling's Brook and McKenzie River (53° 13' N., 60° 41' W.), July 19, 1951, fly rod, five specimens, 94–213 mm. long. McKenzie River, tributary of Hamilton River (53° 13' N., 60° 43' W.), July 18, 1951, fly rod, one specimen, 122 mm. long. Tributary entering the southwest side of Mud Lake, Hamilton River (53° 15' N., 60° 10' W.), August 24, 1950, 10-foot seine, four specimens, 35–46 mm. long. Goose River about 300 yards above the mouth (53° 22' N., 60° 22' W.), August 27, 1951, gill net, one specimen, 283 mm. long. North West River, (53° 32' N., 60° 11' W.): August 24, 1949, 60-foot seine, 12 specimens, 99–198 mm. long; August 25, 1949, 60-foot seine, six specimens, 122–133

mm. long; July 6, 1950, gill net, one specimen, 249 mm. long; July 7, 1951, gill net, four specimens, 150–175 mm. long; July 10, 1951, hook and line, one specimen, 98 mm. long; July 26, 1951, gill net, five specimens, 166–214 mm. long; late July and early August, 1951, hook and line, five specimens, 100–131 mm. long. Wattie's Brook, tributary of Grand Lake (53° 43' N., 60° 28' W.), July 25, 1951, 10-foot seine, 22 specimens, 35–76 mm. long. Flour Lake, Hamilton River (53° 43' N., 64° 35' W.), August 21 to 28, 1951, fly rod, gill net, and rotenone, 58 specimens, 50–504 mm. long. Berry Head Brook, tributary of Grand Lake (53° 45' N., 60° 46' W.), July 24, 1951, 10-foot seine, two specimens, 26 and 39 mm. long. Naskaupi River, about 8 miles above its mouth (53° 50' N., 61° 00' W.), July 23, 1951, fly rod, one specimen, 129 mm. long. English River, Lake Melville (53° 54' N.,

58° 52' W.), August 13, 1951, 60-foot seine and fly rod, eight specimens, 38–176 mm. long. Lake Melville between Haines and St. John islands (53° 55' N., 58° 55' W.), July 12, 1950, gill net, three specimens, 166–193 mm. long. Caravalla Cove, Lake Melville (54° 04' N., 58° 36' W.), August 23, 1951, fly rod, two specimens, 146 and 180 mm. long. Collingham's Cove, Hamilton Inlet (54° 13' N., 58° 14' W.): July 5, 1951, fly rod, three specimens, 81–131 mm. long; July 19, 1951, fly rod, nine specimens, 136–196 mm. long. Salmon River, Kaipokok Fiord (54° 50' N., 59° 51' W.), July 29, 1949, 10-foot seine, seven specimens, 25–33 mm. long. Central of three ponds above Wreck Bay, Webeck Harbor (54° 55' N., 58° 00' W.), July 30, 1951, fly rod, six specimens, 146–194 mm. long. Nain: Stream 1 mile west of Kauk Bay (56° 29' N., 61° 44' W.), August 8, 1951, 60-foot seine and fly rod, 34 specimens, 56–247 mm. long; stream at head of Two-Mile Bay, Paul Island (56° 30' N., 61° 32' W.), August 7, 1951, fly rod and 60-foot seine, 79 specimens, 71–160 mm. long; mouth of Tessiujarsuk (56° 30' N., 61° 57' W.), August 8, 1951, 60-foot seine, one specimen, 218 mm. long; stream entering Tessiujarsuk (56° 30' N., 61° 57' W.), August 8, 1951, fly rod, two specimens, 101 and 163 mm. long; Trousers Lake (56° 32' N., 61° 42' W.), August 9, 1951, fly rod, 49 specimens, 84–193 mm. long; Maligiak (56° 37' N., 62° 12' W.), August 9, 1951, 60-foot seine, one specimen.

Three forms of brook trout can be recognized in Labrador: non-migratory, estuarine or "slob," and migratory or "sea-run" trout. The non-migratory trout are usually landlocked but not necessarily so. They vary considerably in the maximum size attained, which may be correlated with space and food supply.

The estuarine or "slob" trout inhabit the mouths of rivers and brooks, staying mostly in brackish water but moving in and out with the tide. The average size is intermediate between that of the non-migratory and the sea-run forms.

Sea-run, or migratory, trout make extended migrations away from the river mouths into the salt water. The average size is large and the greatest of the three forms.

Our collections of the brook trout in Labrador have been confined to the non-migratory

and estuarine types. Large runs of migratory brook trout occur in the Hamilton Inlet and Sandwich Bay areas during July and August, but specimens were not secured by us.

A preliminary comparison of non-migratory Labrador brook trout with brook trout from New York State streams failed to reveal any constant difference. However, a comparison of non-migratory with estuarine Labrador trout shows that on the average the estuarine trout are smaller in the head and fins, are less deep, and have a more slender caudal peduncle and larger spots on the sides. The possible identity of this form with the *Salvelinus fontinalis hudsonicus* of Suckley is of particular interest.

Suckley (1862) described *Salmo hudsonicus* from sea-run or estuarine specimens taken in Hudson Bay. Jordan and Gilbert (1882) regarded this nominal species as a synonym of *Salvelinus fontinalis* (Mitchill) and were followed by other authors until Hubbs (1926) suggested that the name *Salvelinus fontinalis hudsonicus* (Suckley) was applicable to a population of brook trout introduced into Michigan from the Cascapedia River, Quebec. Suckley (1862) separated *hudsonicus* from *fontinalis* on the basis of the former's smaller head, larger spots, and the larger, thicker, more adherent scales. Hubbs (1926) stated that in *hudsonicus*, on the average, the body is less deep and thicker, thus more terete; that the colors are duller and more silvery; that the spots are smaller, fainter, and less red; and that the light blotches on the side are more distinct.

Our observations therefore agree with Suckley's as to the size of the head and spots. In common with Hubbs's specimens, Labrador estuarine fish possess a more terete shape and a duller and more silvery coloration. Labrador specimens differ from those of Hubbs regarding the size of the spots, which are generally two or three times as large in the estuarine form as in the non-migratory form. The differences noted by Suckley with respect to the scalation and those noted by Hubbs regarding the color of the spots and the distinctness of the pale blotches on the sides have not been detected in Labrador material.

A small head and small fins, a slender caudal peduncle, and a more terete form appear to be associated with the marine

environment in many of the salmonids which have both non-migratory fresh-water and anadromous or estuarine populations. The genetic fixity of these characters is questionable. The tendency towards larger spotting in marine salmonids apparently is not established, and the differences noted with respect to this character among Labrador trout may indicate genetic differences. Hubbs's *hudsonicus* from the Cascapedia River, which had smaller spots than Michigan *fontinalis*, retained the characters noted by Hubbs for at least two generations when raised in Michigan hatcheries with typical *fontinalis*.

***Salvelinus namaycush* (Walbaum)**

LAKE TROUT

LOCAL NAME: KOKOMISH

Low (1896) reported the lake trout to occur in "large lakes of the interior northward to Hudson Strait." Kendall (1909) recorded the capture of one individual at North West River.

Weed (1934) stated in his "Notes on the sea trouts of Labrador" that this species "is occasionally caught in the sea." He recorded it from Adlutuk Bay near Hopedale, Upaqtik Bay between Nain and Hopedale, and a lake to the westward of Davis Inlet (55° 50' N.). The first two localities are parts of the sea, but it is not stated that specimens were actually taken in salt water. This appears to be the only published evidence for the occurrence of lake trout in salt water, although Dunbar and Hildebrand (1952) report it from brackish water in Ungava Bay as does Walters (1953, 1955) for various parts of arctic America.

Munroe (1949) gave records for Guy's River and Wishart Lake (54° 45' N., 66° 55' W.) near the headwaters of the Hamilton River. This species was not collected by the "Blue Dolphin."

OSMERIDAE

***Mallotus villosus* (Müller)**

CAPELIN

LOCAL NAME: CAPELIN

Weiz (1866), Stearns (1883), Packard (1891), Kendall (1909; 1911), Hildebrand (1939), and Templeman (1948) have given capelin records covering the entire coast.

"BLUE DOLPHIN" COLLECTIONS: Forteau

Bay (51° 28' N., 56° 54' W.), June 29, 1949, 60-foot seine, 23 specimens, 59–158 mm. long. West Turnavik Island (55° 15' N., 59° 18' W.), August 11, 1951, 10-foot seine, two specimens, 44 and 50 mm. long. Hopedale Harbor (55° 25' N., 60° 13' W.), August 2, 1949, cast net, 25 specimens, 106–159 mm. long.

Although Kendall (1909) listed a specimen 49 mm. long, July 27, 1891, for North West River, the capelin appears to be unknown to natives in Lake Melville in the summertime and does not spawn on beaches there. The high surface temperature of the lake at the spawning season (11° C.–15° C.) probably excludes this, as Templeman (1948) has found that spawning proceeds at temperatures between 5.5° C. to 8.5° C. Capelin have, however, been found in stomachs of seals caught in Lake Melville in winter. Such capelin as occur there may leave the lake to spawn in Hamilton Inlet, where suitable surface temperatures are found or subsurface spawning may occur (Templeman, 1948). In 1952 the "Blue Dolphin" trawled dead capelin in the Backway, the eastern extremity of the lake. It is possible that Kendall's specimen was the young of *Osmerus mordax*, which at the size mentioned greatly resembles the capelin.

Spawning aggregations of capelin were observed in Forteau Bay, June 28, 1949; Collingham's Cove, July 15, 1950; Emily Harbor, July 31, 1950; and Hopedale Harbor, August 2, 1949.

***Osmerus mordax* (Mitchill)**

AMERICAN SMELT

LOCAL NAME: SMELT

Low (1896) reported the smelt to be abundant at North West River.

"BLUE DOLPHIN" COLLECTIONS: All are within the Hamilton Inlet-Lake Melville estuary: North West River (53° 32' N., 60° 09' W.), August 23, 1949, gill net, one specimen, 119 mm. long. Little Lake, North West River (53° 32' N., 60° 11' W.), August 24, 1949, 60-foot seine, 19 specimens, 55–71 mm. long. Lake Melville between Haines and St. John islands (53° 55' N., 58° 55' W.), July 12, 1950, gill net, one specimen, 173 mm. long.

This species was observed in Pike Run

Cove near Henrietta Island, Lake Melville (54° 06' N., 58° 20' W.), on July 13, 1950.

ESOCIDAE

Esox lucius Linnaeus

PIKE

LOCAL NAME: PIKE

Low (1896) reported the pike to be abundantly distributed throughout the interior of the Labrador Peninsula in lakes and quiet-flowing streams.

"BLUE DOLPHIN" COLLECTIONS: Tributary of the Hamilton River between Carling's Brook and McKenzie River (53° 13' N., 60° 41' W.), July 19, 1951, 10-foot seine, one specimen, 56 mm. long. McKenzie River, tributary of Hamilton River (53° 13' N., 60° 43' W.), July 18, 1951, 10-foot seine, three specimens, 58–71 mm. long. Hamilton River at the upper end of the Muskrat Falls portage (53° 14' N., 60° 45' W.), July 20, 1951, 12-foot seine, two specimens, 52 and 57 mm. long. Flour Lake, Hamilton River (53° 43' N., 64° 35' W.), August 23, 24, and 25, 1951, rotenone, 11 specimens, 71–285 mm. long.

This species was abundant in Flour Lake on the Hamilton River above Grand Falls. It was frequently observed from the canoe around large weed beds over muddy-sand bottom, and 17 specimens from 18 to 32 inches (total length) were taken in a 50-foot gill net set over all types of bottom. The gill net was lifted on 10 occasions during a week and always contained one or two pike. Of the 17 specimens, nine had empty stomachs. Of the eight with food in the stomach (fish in every case) *Catostomus* sp. occurred once, *Cottus* sp. once, *E. lucius* once, *Lota* twice, *Prosopium* twice, *Salmo salar* once, and *Salvelinus fontinalis* once.

The apparent scarcity of juvenile and adult catostomids and cyprinids in the Flour Lake area was thought to be correlated with the abundance of pike.

CATOSTOMIDAE

Catostomus catostomus (Forster)

LONGNOSE SUCKER

LOCAL NAME: SUCKER

Low (1896) recorded this sucker as *Catostomus forsterianus* Richardson and stated it to be common throughout the interior of the

Labrador Peninsula.¹ Kendall (1909) reported two specimens from North West River.

"BLUE DOLPHIN" COLLECTIONS: (Mostly in tributaries to the Hamilton Inlet-Lake Melville estuary): McKenzie River, tributary of Hamilton River (53° 13' N., 60° 43' W.), July 18, 1951, 10-foot seine, three specimens, 28–81 mm. long. Mud Lake, Hamilton River (53° 15' N., 60° 10' W.): outlet, August 24, 1950, 60-foot seine, five specimens, 52–171 mm. long; same position, July 27, 1950, one specimen, 112 mm. long; tributary on southwest shore, August 24, 1950, 10-foot seine, 34 specimens, 25–124 mm. long. Mouth of the Kenamu River (53° 28' N., 59° 52' W.), August 25, 1950, 60-foot seine, three specimens, 27–147 mm. long. Little Lake, North West River (53° 32' N., 60° 11' W.): August 24, 1949, 60-foot seine, two specimens, 66 and 181 mm. long; August 25, 1949, 60-foot seine, four specimens, 92–132 mm. long; July 6, 1950, gill net, 11 specimens, 193–251 mm. long; July 7, 1951, gill net, one specimen, 193 mm. long. Flour Lake, Hamilton River (53° 43' N., 64° 35' W.), August 23 and 25, 1951, 10-foot seine and rotenone, 505 specimens, 20–161 mm. long. Naskaupi River: About 1 mile above its mouth (53° 47' N., 60° 54' W.), July 22, 1951, 60-foot seine, 20 specimens, 57–205 mm. long; about 8 miles above its mouth (53° 50' N., 61° 00' W.), July 23, 1951, 10-foot seine, one specimen,

¹ In his "Fishes of Labrador" Kendall (1909) interpreted Low's records for *Catostomus forsterianus* Richardson and *Catostomus longirostris* Le Sueur as referring to *Catostomus commersoni* and *Catostomus catostomus*, respectively. Low's intent appears to me the opposite. Both names used by Low are regarded as synonyms of *Catostomus catostomus* Forster by modern authors, but it is clear that Low encountered two species. Low in speaking of *C. forsterianus*, which he calls the red sucking carp or red sucker, says that "Sir John Richardson gives it as a distinct species." In Richardson's "Fauna Boreali-Americana" (1836) the description of *C. forsterianus* is certainly applicable to *C. catostomus*. Moreover Low states that this species is "Preferred by the Indians for food to the gray sucker." "Gray sucker" refers to the species listed by Low as *Catostomus longirostris* Le Sueur, although in his account of the latter he gives as common names "long-nosed sucker" and "northern sucker." Although the latter names are more appropriate for *C. catostomus*, "gray sucker" is a common name often used for *C. commersoni*, and it is probable that this is the species meant by Low's *Catostomus longirostris* Le Sueur.

233 mm. long. English River, Lake Melville (53° 54' N., 58° 52' W.), July 25, 1951, gill net, one specimen, 197 mm. long. Lake Melville between Haines and St. John islands (53° 55' N., 58° 55' W.), July 12, 1950, gill net, two specimens, 230 and 252 mm. long. Salmon River, Kaipokok Fiord (54° 50' N., 59° 51' W.), July 29, 1949, three specimens, 259–297 mm. long.

All collections were made at temperatures between 55° F. and 60° F. and in fresh water save one in Lake Melville where the salinity was 5.00 per mille.

Catostomus catostomus catostomus (Forster) was described from streams about Hudson Bay. *Catostomus catostomus nannomyzon* Mather was described from Big Moose Lake in the Adirondack Mountains of New York. Hubbs and Lagler (1947) stated that *C. c.*

"BLUE DOLPHIN" COLLECTIONS: All are from tributaries to the Hamilton Inlet-Lake Melville estuary: Tributary ditch behind the Paddon sawmill, Hamilton River (53° 18' N., 60° 11' W.), August 23, 1950, 10-foot seine, 10 young, probably of this species, 17–24 mm. long. Outlet of Mud Lake, Hamilton River (53° 18' N., 60° 10' W.), July 27, 1950, 60-foot seine, one specimen, 151 mm. long; same position, August 24, 1950, eight specimens, 43–158 mm. long. Little Lake, North West River (53° 32' N., 60° 11' W.), July 6, 1950, gill net, five specimens, 226–284 mm. long.

This species occurs less commonly in Labrador than the preceding one. *Catostomus catostomus* was present in 15 "Blue Dolphin" collections, four of which contained *C. commersoni*.

TABLE 20
LATERAL LINE SCALES IN LABRADOR *Catostomus catostomus catostomus*

92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107
1	—	1	2	2	—	1	4	1	3	2	—	—	2	1	1

catostomus occupies the Labrador Peninsula while *C. c. nannomyzon* is known from eastern New York, New England, and the St. Lawrence River and several of its tributaries, including the Romaine and Natashquan rivers. As the headwaters of the last two interdigitate with tributaries of the Hamilton River, specimens from the latter system are of interest. In addition to size at maturity, *C. c. nannomyzon* being a dwarf form, the chief differentiating character between the two subspecies is the number of lateral line scales, *C. c. catostomus* usually having more than 100 and *C. c. nannomyzon* fewer. Table 20 shows the variation in number of lateral line scales for central Labrador specimens.

Catostomus commersoni commersoni (Lacépède)

WHITE SUCKER

LOCAL NAME: SUCKER

Low's record of *Catostomus longirostris* Le Sueur, stated to be common throughout the interior of the Labrador Peninsula, is interpreted as pertaining to this species (see p. 296, footnote).

CYPRINIDAE

Couesius plumbeus plumbeus (Agassiz)

LAKE CHUB

LOCAL NAME: BOTTLEFISH

Backus (1951) recorded this minnow from the Hamilton Inlet-Lake Melville watershed whence come the following additional records

"BLUE DOLPHIN" COLLECTIONS: In 1951. McKenzie River, tributary of Hamilton River (53° 13' N., 60° 43' W.), July 18, 10-foot seine, five specimens, 32–49 mm. long. North West River (53° 32' N., 60° 09' W.), July 10, hook and line, 10 specimens, 83–125 mm. long; same position in late July and early August, three specimens, 101–115 mm. long. Flour Lake, Hamilton River (53° 43' N., 64° 35' W.), August 23, rotenone, 60 specimens, 16–91 mm. long. Wattie's Brook, a tributary of Grand Lake (53° 43' N., 60° 28' W.), July 25, 10-foot seine, one specimen, 101 mm. long. Naskaupi River: About 1 mile above its mouth (53° 47' N., 60° 54' W.), July 22, 60-foot seine, eight specimens, 39–76 mm. long; about 8 miles above its mouth

(53° 50' N., 61° 00' W.), July 23, 10-foot seine, four specimens, 79–105 mm. long.

This subspecies, primarily a lake fish in the Great Lakes region, has been found in Labrador in creeks, rivers, and in the lake-like expansions of the larger rivers.

***Rhinichthys cataractae* (Cuvier and Valenciennes)**

LONGNOSE DACE

This species has not been reported from Labrador before. It is known from eastern tributaries of Hudson Bay and in the St. Lawrence River basin to the eastward at least as far as Montreal.

"BLUE DOLPHIN" COLLECTIONS: In 1951: McKenzie River, tributary of Hamilton River (53° 13' N., 60° 43' W.), July 18, 10-foot seine, two specimens, 27 and 46 mm. long. A tributary of Flour Lake, Hamilton River (53° 43' N., 64° 35' W.), August 24, by hand, four specimens, 39–48 mm. long. Naskaupi River: About 1 mile above its mouth (53° 47' N., 60° 54' W.), July 22, 60-foot seine, three specimens, 32–39 mm. long.

This species was not found in riffles, which it inhabits in the northeastern United States, but twice was collected along the edge of large rivers in slight current over sand bottom and once in a very small, rocky trickle with almost no current.

ANGUILLIDAE

***Anguilla rostrata* (Le Sueur)**

AMERICAN EEL

LOCAL NAME: EEL

Although certain accounts include Labrador in general statements of the range of the eel, there are no specific Labrador records in the literature. It occurs north to the Hamilton Inlet-Lake Melville estuary.

"BLUE DOLPHIN" COLLECTIONS: St. Mary's River, St. Lewis Sound (52° 18' N., 55° 54' W.), July 12, 1949, one specimen, 373 mm. long; same position, on August 31, 1950, two specimens, 495 and 645 mm. long. Mud Lake, Hamilton River (53° 15' N., 60° 10' W.), July 7, 1951, two specimens 565 and 785 mm. long.

Schmidt (1914) showed that *Anguilla vulgaris*, the European eel, varies in vertebral count from 110 to 119, while *A. rostrata*, the American species, varies from 103 to 110. A single Labrador specimen counted had 106

vertebrae, which is close to the mean for the American species.

GADIDAE

***Boreogadus saida* (Lepechin)**

Backus (1951) summarized the Labrador records for the polar cod. Some additional records have been secured.

"BLUE DOLPHIN" COLLECTIONS: In 1951 at Nain: (56° 34' N., 61° 38' W.), August 5, otter trawl in 55–60 fathoms over sandy-mud bottom, some stone, two specimens, 73 and 74 mm. long; (56° 37' N., 61° 58' W.), August 7, otter trawl in 45 fathoms over mud bottom, five specimens, 67–80 mm. long; (56° 37' N., 62° 04' W.), August 7, otter trawl in 35 fathoms over mud bottom, one specimen, 74 mm. long.

"Blue Dolphin" collections were made at temperatures ranging from -1.85° C. to 2.52° C., although in only one case was the temperature above -1.0° C.

Records for this species south of Labrador are those of Vladykov (1945) who reported it from the cold water of the St. Lawrence estuary.

***Gadus callarias* Linnaeus**

ATLANTIC COD

LOCAL NAMES: FISH, CODFISH, COD, ROCK COD AND ROCKLING (THE REDDISH SHOAL-WATER VARIANT), TOM COD (YOUNG)

The cod, Labrador's "first fish," need hardly be treated in this paper. Grenfell (1909) and more recently Tanner (1944) have written on the fishery and its social implications. Jeffers (1931) and Thompson (1943) studied the natural history of Newfoundland and Labrador cod. This fish is abundantly distributed along the entire coast from the Strait of Belle Isle to Cape Chidley, although it is very rare in Lake Melville. It appears on the coast in June or July and departs in October, although there are small, local wintering populations such as that in the salt-water pond Tessiujarsuk, near Nain (56° 30' N., 61° 57' W.).

"BLUE DOLPHIN" COLLECTIONS: Indian Cove (52° 15' N., 55° 04' W.), July 12, 1949, 60-foot seine, 35 specimens, 73–109 mm. long. Goose Bay (53° 24' N., 60° 04' W.), August 20, 1951, otter trawl in 32 fathoms, one specimen, 234 mm. long. Pack's Harbor (53° 54' N., 56° 59' W.), July 23, 1949, jig in

6 to 7 fathoms, two specimens, 153 and 224 mm. long. Collingham's Cove, Hamilton Inlet (54° 13' N., 58° 14' W.), July 19, 1951, by hand, one specimen, 76 mm. long. The harbor, West Turnavik Island, (55° 15' N., 59° 18' W.), July 31, 1949, 60-foot seine, 47 specimens, 62–102 mm. long.

Gadus ogac Richardson

GREENLAND COD

LOCAL NAMES: CODFISH, ROCK COD,
ROCKLING

This cod has been reported from the Strait of Belle Isle (Stearns, 1883), in the Narrows between Lake Melville and Hamilton Inlet (Kendall, 1909), at Nain (Kendall, 1911), and from Saglek Bay in northern Labrador (Hildebrand, 1939). These records embrace the entire coast.

"BLUE DOLPHIN" COLLECTIONS: Goose Bay (53° 24' N., 60° 04' W.), August 28, 1951, otter trawl in 32 fathoms over mud bottom, one specimen, 227 mm. long. Lake Melville: (53° 29' N., 59° 58' W.), July 28, 1950, beam trawl in 9 to 11 fathoms over mud bottom, three specimens, 189–289 mm. long; off Epinette Point (53° 32' N., 59° 54' W.), July 12, 1951, by hand, two specimens 17 and 22 mm. long. Pack's Harbor (53° 54' N., 56° 59' W.), July 23, 1949, jig in 6 to 7 fathoms over rock bottom, one specimen, 240 mm. long. Pike Cove (54° 06' N., 58° 20' W.), July 23, 1950, long-line in 10 fathoms over mud and rock bottom, one specimen, 447 mm. long. Collingham's Cove, Hamilton Inlet (54° 13' N., 58° 14' W.): July 15, 1950, long-line in 10 to 15 fathoms over rock bottom, one specimen, 289 mm. long; July 5, 1951, jig over rock bottom, one specimen, 215 mm. long; July 19, 1951, gill net in 4 feet over rock and sand bottom, one specimen, 184 mm. long. The harbor, West Turnavik Island (55° 15' N., 59° 18' W.), July 31, 1949, jig in 4.5 fathoms over mud and muddy sand bottom, three specimens, 234–266 mm. long. Cuthroat Harbor (57° 55' N., 62° 10' W.), August 5, 1950, jig in 9 fathoms over sand bottom, three specimens, 240–280 mm. long.

That this cod is a wholly different species from *G. callarias* cannot now be doubted. Jensen (1948) gave an excellent summary of differences between the two.

Gadus ogac resembles *G. tomcod* more than

G. callarias, ecologically speaking. *Gadus tomcod* is an estuarine and shallow-harbor fish tolerating brackish water and even ascending streams in the winter. It is usually found over soft bottom. *Gadus ogac* likewise tolerates low salinities, although it may not actually enter fresh water. It exhibits little preference for the type of bottom it lives over. In Labrador it is the common codfish of the harbors and fiords but also occurs (though less commonly) outside the headlands where it is taken with *G. callarias*. *Gadus callarias* has a low tolerance to fresh water and is a hard bottom fish. It rarely occurs in Lake Melville where salinities are reduced and the bottom is soft, but both *G. tomcod* and *G. ogac* are found there.

Gadus tomcod Walbaum¹

ATLANTIC TOMCOD

LOCAL NAME: WINTER COD

Bigelow and Welsh (1925) stated that the tomcod is distributed from Virginia north along the Atlantic coast to the Gulf of St. Lawrence. It is present north to at least the Hamilton Inlet-Lake Melville estuary.

"BLUE DOLPHIN" COLLECTIONS: Lake Melville between Haines and St. John islands (53° 55' N., 58° 55' W.), July 12, 1950, gill net in 1.5 fathoms, one specimen, 136 mm. long., temperature 13.2° C., salinity 5 per mille. Pike Cove near Henrietta Island, Lake Melville (54° 06' N., 58° 20' W.), July 13, 1950, gill net in 1.5 fathoms, two specimens, 184 and 191 mm. long. This cod is reported common in Lake Melville in the winter; thus its local name.

Lota lota lacustris (Walbaum)

BURBOT

LOCAL NAME: MUH-RYE² (VARIOUSLY SPELLED)

Low (1896) reported this species as occurring in deep lakes throughout the interior of the Labrador Peninsula.

"BLUE DOLPHIN" COLLECTIONS: McKenzie River, tributary of the Hamilton River (53°

¹ I prefer to regard *Microgadus* Gill as a synonym of *Gadus* Linnaeus.

² I had supposed this name to be a corruption of moray, but Dunbar and Hildebrand (1952) say it is of Indian origin. However, Dr. Anthony Paddon has told me that several names of European origin have been adopted by Labrador Indians, corrupted, and then passed back to the originators.

13' N., 60° 43' W.), July 19, 1951, 10-foot seine, one specimen, 29 mm. long. Mud Lake, Hamilton River (53° 18' N., 60° 10' W.), mid-August, 1950, gill net, two specimens, 420 and 465 mm. long. A tributary of Flour Lake, Hamilton River (53° 43' N., 64° 35' W.), August 23 and 25, 1951, rotenone, 42 specimens, 42–220 mm. long.

Numerous specimens up to about 12 inches in length were taken at Flour Lake in a small rocky stream with a flow of about 3 cubic feet per second. The small McKenzie River specimen was taken from a swift, rocky riffle. Large specimens appear to be confined to lakes.

Pollachius virens (Linnaeus)

POLLOCK

The sole Labrador record for the pollock comes from the "Cape Agulhas" which collected it in Sandwich Bay (53° 35' N., 57° 15' W.) in 1931 (Newfoundland Fishery Research Commission, 1932).

This species is common north to the southern portions of the Gulf of St. Lawrence, but the odd fish has been reported as far north as Hudson and Davis straits (Bigelow and Welsh, 1925).

GASTEROSTEIDAE

Gasterosteus aculeatus Linnaeus

THREESPINE STICKLEBACK

LOCAL NAMES: TARNBACK, BANTICKLE,
SPANTICKLE, CUSHIE

Numerous records for this stickleback for the area from the Strait of Belle Isle to Hamilton Inlet (including Lake Melville) have been given by Storer (1850), Weiz (1866), Packard (1891), and Kendall (1909, 1911). This species undoubtedly occurs abundantly in the proper habitats everywhere along the Labrador coast, as it is well known immediately to the north (Vladykov, 1933, recorded it from Hudson Strait).

"BLUE DOLPHIN" COLLECTIONS: Trout Brook, Forteau Bay (51° 28' N., 56° 54' W.), June 26, 1949, 10-foot seine, 56 specimens, 22–29 mm. long. St. Mary's River, St. Lewis Inlet (52° 18' N., 55° 54' W.), July 12, 1949, 60-foot seine, two specimens, 58 and 66 mm. long. McKenzie River, tributary of the Hamilton River (53° 13' N., 60° 43' W.), July 18,

1951, 10-foot seine, one specimen, 47 mm. long. A ditch behind the Paddon sawmill, tributary of Hamilton River (53° 18' N., 60° 11' W.), August 23, 1950, 10-foot seine, 50 specimens, 17–27 mm. long. Mud Lake: Outlet (53° 19' N., 60° 10' W.), August 24, 1950, 60-foot seine, four specimens, 47–67 mm. long; tributary, southwest shore (53° 15' N., 60° 10' W.), August 24, 1950, 10-foot seine, one specimen, 60 mm. long. Lake Melville at tip of Epinette Point (53° 32' N., 59° 54' W.), July 12, 1951, by hand, one specimen, 13 mm. long. North West River: (53° 32' N., 60° 09' W.), August 23 and 25, 1949, 10-foot seine, 131 specimens, 17–63 mm. long; same position, late July and early August, 1951, three specimens, 49–55 mm. long; Little Lake (53° 32' N., 60° 11' W.), August 24, 1949, 60-foot seine, 112 specimens, 17–66 mm. long; same position, July 7, 1951, gill net, one specimen, 52 mm. long. Flour Lake, Hamilton River (53° 43' N., 64° 35' W.), August 21, 1951, 10-foot seine, five specimens, 17–23 mm. long. Wattie's Brook, tributary of Grand Lake (53° 43' N., 60° 28' W.), July 25, 1951, 10-foot seine, four specimens, 55–64 mm. long. Berry Head Brook, tributary of Grand Lake (53° 45' N., 60° 46' W.), July 24, 1951, 10-foot seine, 21 specimens, 54–71 mm. long. Naskaupi River: About 1 mile above its mouth (53° 47' N., 60° 54' W.), July 22, 1951, 60-foot seine, four specimens, 51–62 mm. long; about 8 miles above its mouth (53° 50' N., 61° 00' W.), July 23, 1951, 10-foot seine, two specimens, 60 and 67 mm. long. Salmon River, Kaipokok Fiord (54° 50' N., 59° 51' W.), July 29, 1949, 10-foot seine, 31 specimens, 11–59 mm. long. The pond at the foot of the stream into the harbor, West Turnavik Island (55° 15' N., 59° 18' W.), July 27, 1949, 10-foot seine, 19 specimens, 25–63 mm. long. The harbor, West Turnavik Island (55° 15' N., 59° 18' W.), July 31, 1949, 60-foot seine, one specimen, 49 mm. long. The small pond up the left branch of the stream entering the north shore of Hopedale Harbor (55° 25' N., 60° 13' W.), August 2, 1951, 60-foot seine, 14 specimens, 45–52 mm. long. Maligiak, the estuary of the Fraser River, at the head of Nain Bay (56° 37' N., 62° 12' W.), August 9, 1951, 60-foot seine, three specimens, 53–59 mm. long.

Specimens from the North West River area

were particularly heavily infested with the stickleback tapeworm, *Schistocephalus gastrostei*.

***Pungitius pungitius* (Linnaeus)**

NINESPINE STICKLEBACK

LOCAL NAMES: TARNBACK, BANTICKLE,
SPANTICKLE, CUSHIE

Kendall (1909) recorded the ninespine stickleback from Collingham's Cove, Hamilton Inlet. The "Cape Agulhas" collected it in Sandwich Bay (Newfoundland Fishery Research Commission, 1932). This species undoubtedly occurs all along the coast, as Vladykov (1933) reported specimens immediately to the north in Hudson Strait.

"BLUE DOLPHIN" COLLECTIONS: The ditch behind the Paddon sawmill, tributary of Hamilton River (53° 18' N., 60° 11' W.), August 23, 1950, four specimens, 26-47 mm. long. North West River: (53° 32' N., 60° 09' W.), August 23 and 25, 1949, 10-foot seine, three specimens, 27-29 mm. long; Little Lake (53° 32' N., 60° 11' W.), August 24, 1949, three specimens, 30-62 mm. long. Salmon River, Kaipokok Fiord (54° 50' N., 59° 51' W.), July 29, 1949, 10-foot seine, nine specimens, 24-54 mm. long. The pond at the foot of the stream into the harbor, West Turnavik Island (55° 15' N., 59° 18' W.), July 27, 1949, 10-foot seine, 32 specimens, 12-65 mm. long. A stream entering Tessiujarsuk, near Nain (56° 30' N., 61° 57' W.), August 8, 1951, by hand, one specimen, 26 mm. long.

This species is much less abundant in Labrador waters than the preceding one.

ANARHICHADIDAE

***Anarhichas lupus* Linnaeus**

ATLANTIC WOLF-FISH

In 1933 the "Cape Agulhas" collected the pelagic young of this species in the Strait of Belle Isle and off Cape North near Cartwright (Newfoundland Fishery Research Commission, 1934). Although these are the only Labrador records for this wolf-fish (it is apparently lacking in the fiords and immediate coastal waters), it is probably common in moderately deep water over hard bottom off shore. The congeners of this species, *Anarhichas minor* Olafsen and *Anarhichas denticulatus* Krøyer, although unrecorded from Lab-

rador, may occur in similar circumstances. All three species occur in Greenland. *Anarhichas lupus* and *A. minor* are distributed south to the Gulf of Maine, while *A. denticulatus* is known south as far as Banquereau.

STICHAETIDAE

***Cryptacanthodes maculatus* Storer**

WRYMOUTH

Although Bigelow and Welsh (1925) stated the range of the wrymouth to be "from Labrador to Long Island Sound," the sole Labrador record is that of the "Cape Agulhas" which collected it in 1934 near Forteau Bay at the western end of the Strait of Belle Isle (Newfoundland Fishery Research Laboratory, 1935). This may represent the northern limit of its range.

***Eumesogrammus praecisus* (Krøyer)**

Backus (1951) gave the distribution of this blenny, together with Labrador records for St. Lewis Sound (52° 15' N.) and Kangalaksiorvik Fiord (59° 25' N.).

"BLUE DOLPHIN" COLLECTIONS: In 1951: Schooner Cove, Islet Bay, Niger Sound (52° 12' N., 55° 43' W.), July 2, beam trawl in 15-18 fathoms over mud bottom with some stone, two specimens, 41 and 143 mm. long. Emily Harbor (54° 33' N., 57° 10' W.), July 29, beam trawl in 10 fathoms over mud bottom with some rock, one specimen, 100 mm. long.

These records together with the earlier ones embrace the entire coast. The temperatures at which Labrador specimens were taken, when recorded, have ranged from -1.34° C. to 0.81° C.

Meristic variation is given in table 21.

TABLE 21

**MERISTIC VARIATION IN LABRADOR
*Eumesogrammus praecisus***

	47	48	49
Dorsal fin rays	1	3	1
Anal fin rays	33	34	35
	1	3	1
Pectoral fin rays	16	17	18
	1	2	1

Stichaeus punctatus (Fabricius)

This blenny was recorded from Battle Harbor (52° 15' N.) by Kendall (1909). Vladykov (1933) reported specimens from Red Bay, Strait of Belle Isle. This species undoubtedly occurs all along the Labrador coast.

"BLUE DOLPHIN" COLLECTIONS: Schooner Cove, Islet Bay, Niger Sound (52° 12' N., 55° 43' W.), July 2, 1951, beam trawl in 15-18 fathoms over mud bottom with some stone, one specimen, 101 mm. long. Domino Harbor, Island of Ponds (53° 30' N., 55° 50' W.), August 28, 1950, beam trawl in 10 fathoms over sand bottom, one specimen, 137 mm. long. Webeck Harbor (54° 55' N., 58° 00' W.), July 30, 1951, by hand at surface, six specimens, 27-28 mm. long. Amity Harbor, Cape Mugford (57° 48' N., 61° 57' W.), August 14, 1949, from codfish stomach, one specimen, 131 mm. long.

Dorsal fin rays numbered 49 in two specimens and 50 in one. Anal fin rays were 35 in one and 36 in two. In Red Bay specimens Vladykov (1933) observed dorsal fin rays to vary from 48 to 49. The anal fin rays numbered 36 in all cases.

Dunbar (1947) questionably referred a specimen taken at Hebron, Labrador, along with 153 specimens from Baffin Island to this species. Dunbar called attention to the resemblance of his specimens to those figured by Dannevig (1919) and referred by the latter to the present species. Dunbar also pointed out the close agreement between both his and Dannevig's specimens and the description given by Ehrenbaum (1905) for the young of *Lumpenus medius* Reinhardt. Labrador specimens 27 to 28 mm. long examined by me have been identified with *S. punctatus* because of their close similarity to the adult fish. They in no way resemble Dunbar's figure of a specimen 21 mm. long or Dannevig's figure of a specimen 30 mm. long. The possibility suggested by Dunbar that both his material and Dannevig's are referable to a lumpenid fish is probable.

PHOLIDAE

Pholis fasciatus (Bloch and Schneider)

LOCAL NAMES: TANSY, TISSY

This pholid blenny has not been reported from Labrador previously. A specimen 130

mm. long collected by W. Koelz at Jack Lane's Bay (55° 40' N., 60° 30' W.) on September 27, 1925, is in the University of Michigan Museum of Zoology (U.M.M.Z. No. 72781).

"BLUE DOLPHIN" COLLECTION: Collingham's Cove, Hamilton Inlet (54° 13' N., 58° 14' W.), July 22, 1951, spear, one specimen, 239 mm. long.

Pholis gunnellus (Linnaeus)

GUNNEL

LOCAL NAMES: TANSY, TISSY

Storer (1850) recorded this fish from the Strait of Belle Isle area as did Kendall (1909) from Hamilton Inlet.

"BLUE DOLPHIN" COLLECTIONS: St. Mary's River, St. Lewis Sound (52° 18' N., 55° 54' W.), July 12, 1949, 60-foot seine, two specimens, 207 and 233 mm. long. Collingham's Cove, Hamilton Inlet (54° 13' N., 58° 14' W.), July 19, 1951, three specimens, 138-154 mm. long. West Turnavik Island (55° 15' N., 59° 18' W.): July 29, 1949, by hand, 46 specimens, 75-210 mm. long; August 11, 1951, 10-foot seine, two specimens, 139 and 168 mm. long.

Jensen (1942) separated Greenland populations of the gunnel from the closely related *P. fasciatus* mainly by the dorsal fin ray count which varied from 79 to 82 in *P. gunnellus* and from 84 to 91 in *P. fasciatus*. Labrador populations probably achieve a similar separation, but the meristic counts for *P. gunnellus*, at least, appear to be somewhat lower. Frequency distributions for numbers of dorsal fin rays for Labrador specimens of the two species are given in table 22.

Pholis gunnellus, hidden under kelp (*Fucus* sp.) in 1 to 6 inches of water, was abundant in tide pools on West Turnavik Island. It feeds largely on the amphipod *Gammarus locusta* which also inhabits these pools. *Pholis fasciatus* does not appear to enter tide pools.

LUMPENIDAE

Leptoclinus maculatus (Fries)

SHANNY

This circumpolar arctic blenny has not been previously recorded from Labrador, although it is known in the western North Atlantic south to Massachusetts Bay.

"BLUE DOLPHIN" COLLECTIONS: At tem-

TABLE 22
COMPARISON OF NUMBER OF DORSAL FIN RAYS IN
LABRADOR SPECIMENS OF *Pholis gunnellus*
AND *Pholis fasciatus*

Number	<i>P. gunnellus</i>	<i>P. fasciatus</i>
76	1	—
77	—	—
78	9	—
79	4	—
80	1	—
81	2	—
82	—	—
83	—	—
84	—	1
85	—	—
86	—	—
87	—	—
88	—	—
89	—	1

peratures from -1.42° C. to 0.50° C.: St. Lewis Sound ($52^{\circ} 22' \text{ N.}$, $55^{\circ} 56' \text{ W.}$), July 12, 1949, otter trawl in 35 fathoms over mud bottom, one specimen, 132 mm. long. Lake Melville off Lowland Point ($53^{\circ} 50' \text{ N.}$, $59^{\circ} 25' \text{ W.}$), July 25, 1950, beam trawl in 20 fathoms over sand, rock, and mud bottom, one specimen, 113 mm. long. Nain Bay: ($56^{\circ} 37' \text{ N.}$, $61^{\circ} 58' \text{ W.}$), August 7, 1951, otter trawl in 45 fathoms over mud bottom, two specimens, 85 and 98 mm. long; ($56^{\circ} 37' \text{ N.}$, $62^{\circ} 10' \text{ W.}$), August 9, 1951, otter trawl in 15–23 fathoms over sandy-mud bottom, one specimen, 104 mm. long.

Dorsal fin rays numbered 60 in five cases. Anal fin rays numbered 37 in three cases and 38 in one case. Pectoral fin rays numbered 15 in five cases.

***Lumpenus lumpretaeformis* (Walbaum)**

SNAKE BLENNY

This species was recorded from Hamilton Inlet by Kendall (1909). It was collected by the "Cape Agulhas" in 1931 off Cape North ($53^{\circ} 45' \text{ N.}$) (Newfoundland Fishery Research Commission, 1932). Dunbar (1947) reported pelagic young from Hebron ($58^{\circ} 10' \text{ N.}$).

"BLUE DOLPHIN" COLLECTIONS: Strathcona Run, Nain: ($56^{\circ} 33' \text{ N.}$, $61^{\circ} 38' \text{ W.}$), August 8, 1951, otter trawl in 60 fathoms over sandy-mud bottom with some stone, one specimen, 117 mm. long; ($56^{\circ} 34' \text{ N.}$, $61^{\circ} 38'$

W.), August 5, 1951, otter trawl in 55–60 fathoms over sandy-mud bottom with some stone, one specimen, 101 mm. long.

These collections were from the "warm" water area at Nain where the bottom temperature in 60 fathoms was more than 2.5° C. This snake blenny is much less common in Labrador than the closely related *Lumpenus medius*, a true arctic species.

Vladykov (1935) proposed the names *L. l. americanus* and *L. l. terraenovae* for Gulf of St. Lawrence and Newfoundland populations, respectively. These subspecies were differentiated on the basis of dorsal and anal ray counts and on the per cent of standard length of the depth and head length.

Schroeder (1936) reported Gulf of Maine specimens and suggested that the recognition of western Atlantic subspecies was not warranted. The limited Labrador material tends to support this view. Dorsal fin spines for three specimens (including Kendall's) numbered 77, 77, and 74. Anal fin rays numbered 52, 53, and 50. The head length in per cent of standard length was 16.2 and 17.8 in "Blue Dolphin" specimens. Kendall (1909) reported this value as 5.4 in his specimen, certainly a misprint for 15.4. Body depth in per cent of standard length was 7.7, 7.9, and 10.1.

***Lumpenus medius* Reinhardt**

This snake blenny was reported from Labrador by Backus (1951) who recorded specimens from St. Lewis Sound ($52^{\circ} 15' \text{ N.}$) to Kangalaksiorvik Fiord ($59^{\circ} 25' \text{ N.}$).

"BLUE DOLPHIN" COLLECTION: In 1951: Lake Melville ($53^{\circ} 29' \text{ N.}$, $59^{\circ} 59' \text{ W.}$), August 28, otter trawl in 15–24 fathoms over sandy-mud bottom, one specimen, 82 mm. long.

In Labrador this species was collected at

TABLE 23
MERISTIC VARIATION IN LABRADOR
Lumpenus medius

	59	60	61	62
Dorsal fin rays	2	2	8	8
Anal fin rays	40	41	42	43
	1	6	4	5
Pectoral fin rays	14	15		
	12	4		

depths of from 9 to 50 fathoms and at temperatures from -1.34° C. to 3.0° C., although only once above 1° C. (-1° C. to 1° C. in three cases and below -1° C. in five cases).

Meristic variation is given in table 23. These data are in agreement with those of Jensen (1944) for Greenland specimens.

In living specimens from St. Lewis Sound blood-red marks in the dorsal fin were noted. These were lost after preservation.

ZOARCIDAE

Gymnelis viridis (Fabricius)

LOCAL NAME: FISH DOCTOR

The "fish doctor"¹ was recorded by Kendall (1909) from Collingham's Cove, Hamilton Inlet, and by Hildebrand (1939) from Cape Mugford ($57^{\circ} 45' N.$).

"BLUE DOLPHIN" COLLECTION: Domino Harbor, Island of Ponds ($53^{\circ} 30' N.$, $55^{\circ} 50' W.$), August 28, 1950, beam trawl in 10 fathoms over sand bottom, one specimen, 132 mm. long.

Lycodes lavalaei Vladikov and Tremblay

This eelpout is known from the mouth of the St. Lawrence River and from Newfoundland (Vladikov and Tremblay, 1936).

"BLUE DOLPHIN" COLLECTIONS: Lake Melville ($54^{\circ} 01' N.$, $58^{\circ} 42' W.$), July 13, 1950, otter trawl in 70 fathoms over mud bottom, one specimen, a male, 457 mm. in total length. Hamilton Inlet: ($54^{\circ} 15' N.$, $58^{\circ} 01' W.$), August 27, 1950, beam trawl in 45 fathoms over rocky bottom, one specimen, 337 mm. long; Collingham's Cove ($54^{\circ} 13' N.$, $58^{\circ} 14' W.$), July 15, 1950, long-line in 10-15 fathoms over rocky bottom, two specimens, a female, 381 mm. long, and a male, 463 mm. long. Nain: ($56^{\circ} 31' N.$, $61^{\circ} 11' W.$), August 6, 1951, otter trawl in 45 fathoms over rocky bottom, one specimen, a male, 552 mm. long; ($56^{\circ} 33' N.$, $61^{\circ} 38' W.$), August 8, 1951, otter trawl in 60 fathoms over sandy-mud bottom with stones, one specimen, a male, 541 mm. long; ($56^{\circ} 34' N.$, $61^{\circ} 38' W.$), August 5, 1951, otter trawl in 55-60 fathoms over sandy-mud bottom with stones, five specimens, four fe-

males, 376-472 mm. long, and a juvenile, 118 mm. long. St. John's Harbor, Saglek Bay ($58^{\circ} 36' N.$, $62^{\circ} 56' W.$), August 6, 1950, long-line in 13 fathoms over rock and mud bottom, two specimens, both males, 503 and 537 mm. long.

This animal appears to shun the coldest water of the Labrador coast. Temperatures at collection sites ranged from -1.2° C. to 2.52° C., with the warmer temperatures favored.

This species belongs to the short-tailed group of *Lycodes*. In Labrador specimens the anus to tip-of-caudal distance comprises from 51 to 58 per cent of the total length. The lateral line is composed of a single mid-lateral branch, the pores of which are often extremely vague. The scalation is moderately well developed. Scales are absent from the venter and pectoral fins but are somewhat developed on the vertical fins. Anteriorly the scalation begins at the level of the origin of the dorsal fin and continues posteriorly to the base of the caudal fin. There is considerable variation in the scalation of the dorsal and anal fins about which these generalizations may be made: (1) the upper quarter of the dorsal and lower quarter of the anal fins are unscaled; (2) the dorsal is usually better scaled than the anal; (3) the posterior portions of these fins are better scaled than the anterior portions.

In large specimens the color pattern is very variable. Basically the fish is brownish gray to gray in color, with irregular spots, blotches, or reticulations of black. There is little or no evidence of the dark vertical bars usually found in smaller specimens after about 375 mm. in total length is reached. There is often an irregular or broken light band across the nape. The outer quarter of the vertical fins is often black, with the extreme edge a creamy white. The following note was made from a fresh specimen: "pink pectorals and pink on anal."

Meristic variation is shown in table 24.

Lycodes pallidus Collett

This little-known eelpout has been previously recorded from the Laptev Sea west to east Greenland.

"BLUE DOLPHIN" COLLECTIONS: Hebron Fiord: ($58^{\circ} 09' N.$, $62^{\circ} 46' W.$), August 9,

¹ This is one of two animals called "fish doctor" in Labrador. The other is a large aegid(?) isopod which is said by some to heal wounds in codfish. Actually it feeds from open wounds of this and other fishes. Why *Gymnelis* is called "fish doctor" is not known by me.

TABLE 24
MERISTIC VARIATION IN LABRADOR *Lycodes lavalaei*

	91	92	93	94	95	96	97	98	99
Dorsal fin rays	2	—	1	2	2	2	2	1	1
Anal fin rays	72	73	74	75	76	77			
	1	1	2	3	5	1			
Pectoral fin rays	18	19	20						
	5	6	2						

1949, otter trawl in 125 fathoms over mud bottom, two males, 131 and 190 mm. in total length; 58° 11' N., 62° 34' W.), August 9, 1949, otter trawl in 95 fathoms over mud bottom, one specimen, a female, 168 mm. long.

The temperature and salinity at these collecting sites was -1.81° C. and 33.06 per mille and -1.80° C. and 33.03 per mille, respectively.

This species belongs to the long-tailed group of *Lycodes*. In the specimens at hand the distance from the anus to the tip of the caudal fin comprises 56 to 61 per cent of the total length. The lateral line consists of a distinct ventrolateral branch which becomes obscure at about the level of the tenth anal ray. Two of the three specimens possess an indistinct mid-lateral branch as well as a few widely spaced pores in the dorsolateral region. Two caeca, pouch-like and opposite each other on the pylorus, are present in all specimens.

In these specimens the scalation is moderately developed. Scales are absent from the venter as well as from the vertical and paired fins. Anteriorly the scalation begins at a level removed posteriorly from the base of the pectoral by a distance equal to 50 to 75 per cent of the longitudinal diameter of the eye and continues posteriorly to the caudal base. Dorsally, the scalation is continued to the base of the dorsal fin. Ventrally, the scalation is continued to the base of the anal fin and anterior to this structure to the ventrolateral line. In the case of the largest specimen, anteroventrally, the scalation is continued ventrally beyond the lateral line for about four scale rows.

In these specimens the basic color is yellowish brown or reddish brown. In the largest specimen there are eight faint dark cross bars. These are most conspicuous dorsally

and are continued onto the dorsal fin. In the smallest specimen these bars number 11 and are quite prominent. In the specimen of intermediate size the dark cross bars are completely lacking.

The above description agrees closely with that provided by Jensen (1904) for this species. Dorsal fin rays numbered 96, 92, and 90. Anal fin rays were 80, 78, and 74. Twenty pectoral fin rays were found in all three cases. I have not included half of the caudal fin ray count with the dorsal and anal fin ray counts as has been the habit with Jensen. To make these counts comparable with those of Jensen, about five fin rays must be added to the dorsal and anal fin ray counts, as the caudal fin in this genus consists of about 10 rays.

Lycodes reticulatus Reinhardt

ARCTIC EELPOUT

Kendall (1911) recorded this eelpout from off Cape Harrison (54° 55' N.). The "Cape Agulhas" collected it in the Strait of Belle Isle in 1932 and pelagic young off Cape North (53° 45' N.) in 1933 (Newfoundland Fishery Research Commission, 1933, 1934). Hildebrand (1939) recorded a Labrador specimen without specific locality data. An anal ray count of 74 and a pectoral ray count of 20 were recorded for the latter.

"BLUE DOLPHIN" COLLECTIONS: Goose Bay, Lake Melville: (53° 22' N., 60° 14' W.), August 20, 1951, otter trawl in 29 fathoms over mud bottom, one specimen, a male, 177 mm. in total length; (53° 24' N., 60° 04' W.), July 6, 1950, otter trawl in 30 fathoms over mud bottom, one specimen, a female, 186 mm. long; same position, August 20, 1951, otter trawl in 32 fathoms over mud bottom, one specimen, a female, 121 mm. long. Kaipokok Fiord (55° 05' N., 59° 30' W.), August 1, 1949, otter trawl, in 45 fathoms over mud

bottom, two specimens, 94 and 124 mm. long. Hebron Fiord (58° 09' N., 62° 46' W.), August 9, 1949, otter trawl in 125 fathoms over mud bottom, one specimen, 241 mm. long.

This species belongs to the short-tailed group of *Lycodes*. In Labrador specimens, the length of the tail (anus to tip-of-caudal) comprised from 54 to 56 per cent of the total length. The lateral line in all consisted of a single mediolateral branch which is very distinct.

Scalation is not highly developed. Scales are lacking on the venter and all fins. The scalation begins anteriorly at the level of the origin of the dorsal fin. Here it is confined to the region above the lateral line but does not extend dorsally to the base of the dorsal fin. Proceeding posteriorly, the lower margin of the scaled area trends downward to the origin of the anal fin. Likewise, the upper margin trends upward to meet the base of the dorsal at the level of about the sixth ray. Posteriorly, the scalation continues to the base of the caudal fin.

Meristic variation in Labrador specimens is given in table 25.

The differences between the various subspecies of *Lycodes reticulatus* have been summarized by Vladykov and Tremblay (1936). The dorsal and anal fin ray counts as performed by Vladykov and Tremblay are not comparable with those of Jensen but were made as I have made them (see above under *Lycodes pallidus*). Because of this, certain stated differences between the supposed western Atlantic subspecies (*L. r. hacheyi* Vladykov and *L. r. laurentianus* Vladykov and Tremblay) and the Greenland subspecies (*L. r. reticulatus* Reinhardt and *L. r. macrocephalus* Jensen) are largely untrue. I cannot

identify the Labrador specimens with any particular subspecies, because the western Atlantic nominal subspecies are too poorly defined. An adequate comparison between *L. r. hacheyi* and *L. r. laurentianus* is impossible, because *hacheyi* was founded on two large males, the only known specimens, whereas *laurentianus* was founded on eight specimens that were mostly much smaller. Too much importance has been placed on differences in color pattern, as even the limited Labrador material shows this character to be a highly variable one.

Lycodes turneri atlanticus Vladykov
and Tremblay

Backus (1951) recorded this eelpout from Lake Melville north to Kangalaksiorkvik Fiord (59° 25' N.).

"BLUE DOLPHIN" COLLECTION: In 1951: Hamilton Inlet (54° 15' N., 58° 00' W.), July 22, beam trawl in 48 fathoms, one specimen, 66 mm. long.

This species is a typical inhabitant of the icy waters of the Labrador fiords. Among the 15 collections in which this species occurred, 13 were in water colder than -1.0° C., while in only one case was the temperature above zero (0.30° C.).

Labrador specimens are completely unscaled, although Vladykov and Tremblay (1936) found scales to be occasionally present though poorly developed in Gulf of St. Lawrence specimens. The lateral line consists of a mediolateral branch.

This species is conspicuously barred. The pectoral fins, anal fin, venter, and ventral portions of the flanks are a bluish gray or brownish gray. This color is palest on the venter and darkest mid-laterally. The upper portion of the sides is a creamy white onto which nine to 12 dark bars extend from the dark area below. These bars continue onto the dorsal fin which is light between them. The outer edge of the vertical fins is pale throughout. The under side of the head is creamy white, while the upper side is brown. There is a clear creamy white band across the nape.

Meristic variation in Labrador specimens is given in table 26.

TABLE 25
MERISTIC VARIATION IN LABRADOR
Lycodes reticulatus

Dorsal fin rays	84	85	86	87	88	
	2	—	—	2	1	
Anal fin rays	66	67	68	69	70	71
	1	—	—	1	2	1
Pectoral fin rays	19	20				
	4	1				

TABLE 26
MERISTIC VARIATION IN LABRADOR
Lycodes turneri atlanticus

Dorsal fin rays	82	83	84	85	86	87		
	2	3	1	2	—	1		
Anal fin rays	64	65	66	67	68	69	70	71
	1	—	3	1	3	—	—	1
Pectoral fin rays	16	17	18	19				
	1	2	5	1				

Macrozoarces americanus (Bloch and Schneider)

EELPOUT

LOCAL NAMES: CATFISH, SEA-CAT

There are no previous Labrador records for this zoarcid. However, it is not an uncommon fish in the Strait of Belle Isle (Jeffers, 1932). In late June, 1949, we observed these fish swimming in 2 to 3 feet of water over sand bottom in Forteau Bay.

"BLUE DOLPHIN" COLLECTION: Indian Cove, St. Lewis Sound (52° 15' N., 55° 40' W.), July 11, 1949, two specimens, 290 and 455 mm. long.

The last locality is probably close to the northern limit of the range of this species.

AMMODYTIDAE

Ammodytes americanus De Kay

SAND LANCE

LOCAL NAME: LANCE

Storer (1850) recorded this species from Red Bay, Strait of Belle Isle, Kendall (1909) from Chateau Bay, Strait of Belle Isle, and the Ragged Islands (55° 00' N.), the "Cape Agulhas" from off Hawke Harbor (53° 00' N.) and Cape North (53° 45' N.) (Newfoundland Fishery Research Commission, 1934), and Hildebrand (1939) from Wolf Island (53° 40' N.) and Saglek Bay (58° 30' N.).

"BLUE DOLPHIN" COLLECTIONS: Indian Cove, St. Lewis Sound (52° 15' N., 55° 04' W.), July 12, 1949, two specimens, 41 and 104 mm. in standard length. Indian Tickle (53° 33' N., 55° 54' W.), August 31, 1951, 10 specimens, 38–47 mm. long. Hare Harbor (53° 43' N., 56° 46' W.), July 2, 1950, 90 specimens, 52–155 mm. long. Pack's Harbor (53° 54' N., 56° 59' W.), July 24, 1949, one specimen, 120 mm. long. Rigolet (54° 10' N.,

58° 25' W.), July 19, 1951, five specimens. Tessiuarsuk (56° 30' N., 61° 57' W.), August 8, 1951, five specimens, 91–104 mm. long.

Jensen (1941) reviewed the history of the name *Ammodytes tobianus* Linnaeus, 1758, and showed that it has been used for two species, one of which is *Ammodytes lanceolatus* Le Sauvage, 1824. Jensen gave evidence that the species later named *lanceolatus* by Le Sauvage was not the species before Linnaeus when he erected the name *tobianus*, but that Linnaeus had a mixture of two other forms later named *A. lancea* Cuvier, 1829, and *A. marinus* Raitt, 1934. The two latter forms are unquestionably distinct but upon what level is not agreed. Jensen concluded that because of the confusion attached to the name *tobianus* and because of the apparent mixture of forms on which the name *tobianus* was based (no holotype exists), *tobianus* should be discarded in favor of *lancea* Cuvier.

It is not entirely clear from Jensen's account as to whether or not syntypal material used by Linnaeus is extant in the museum at Uppsala. If this be so, a lectotype should be designated and the name *tobianus* retained.

Jensen's discussion included *Ammodytes dubius* Reinhardt, 1838, a third form closely related to *A. lancea* and *A. marinus*. Not discussed by Jensen but closely related to the three foregoing forms is *Ammodytes americanus* De Kay, 1842. After a review of published data plus his own, Jensen concluded that *A. lancea*, *A. dubius*, and *A. marinus* should be regarded as ecological subspecies named *A. lancea lancea*, *A. lancea dubius*, and *A. lancea marinus*. Jensen concluded this from the fact that if the variation in the three forms is considered throughout the range of each, intergradation in the chief differentiating character, the number of vertebrae, is demonstrated. Thus *lancea* varies from 60 to 66, *marinus* from 66 to 73, and *dubius* from 73 to 78. It should be pointed out, however, that if the variation in two of the forms be compared for any single geographic locality, the separation is complete. Thus in the Baltic Sea *lancea* varies from 61 to 65, while *marinus* varies from 66 to 72. In Greenland, *marinus* varies from 67 to 72, while *dubius* varies from 73 to 78. In every case, the separation is com-

TABLE 27

MERISTIC VARIATION IN LABRADOR *Ammodytes americanus* AND *Ammodytes dubius*

Vertebrae	64	65	66	67	68	69	70	71	72	73	74	75
<i>A. americanus</i>	2	—	2	1	5	3	—	—	—	—	—	—
<i>A. dubius</i>	—	—	—	—	—	—	—	2	3	2	2	4
Dorsal fin rays		57	58	59	60	61	62	63	64	65	66	67
<i>A. americanus</i>		2	3	4	2	—	—	—	—	—	—	—
<i>A. dubius</i>		—	—	—	—	—	2	2	3	1	3	2
Anal fin rays					28	29	30	31	32	33	34	35
<i>A. americanus</i>					2	2	5	2	—	—	—	—
<i>A. dubius</i>					—	—	—	—	6	4	1	2

plete, and this fact together with the known differences in spawning season and habitat argues for the recognition of the three forms at the specific level. The precise relationships of the western Atlantic *americanus* with the foregoing forms is not known, but in Labrador *americanus* and *dubius* do not appear to intergrade (however, the counted samples are very small), and there appear to be differences in color and size. Until an even more exhaustive study of the Atlantic forms is made, I prefer to retain the four forms discussed as species.

Meristic variation in Labrador specimens of *A. americanus* and *A. dubius* is given in table 27.

Ammodytes dubius Reinhardt

LOCAL NAME: LANCE

Packard (1891) recorded this species from Sloop Harbor.

"BLUE DOLPHIN" COLLECTIONS: Hare Harbor (53° 43' N., 56° 46' W.), July 2, 1950, three specimens, 141–202 mm. long. Pack's Harbor (53° 54' N., 56° 59' W.), July 24, 1949, 10 specimens, 147–176 mm. long.

This species is a more northern form than *Ammodytes americanus*. In Labrador it is probably the commoner species offshore, where the influence of the warm land drainage is least and the influence of the Labrador Current greatest. This is supported by the limited collections already made. Ten specimens of *A. dubius* were taken with only one of *A. americanus* at Pack's Harbor which is on an offshore island. At Hare Harbor three specimens of *A. dubius* were taken with 90 specimens of *A. americanus*. Hare Harbor is inshore, as are all other Labrador sites at which we have taken *A. americanus*. Jensen

(1941) noted similar differences between *A. dubius* and *A. marinus* in Greenland, namely, that *A. dubius* was found at offshore localities while *A. marinus* is limited to the fiords and immediate coastal waters. Labrador specimens of *A. dubius* appear to reach a much greater maximum size than specimens of *A. americanus*. Jensen (1941) has reported a similar relationship between Greenland specimens of *A. dubius* and *A. marinus*. Finally there appear to be certain differences in coloration between preserved Labrador specimens of *A. dubius* and *A. americanus*. In general, *A. dubius* is much more silvery than *A. americanus*. Furthermore, *A. americanus* is dark on the dorsum and has a dark lateral band. These dark areas are separated by a well-defined, light, laterodorsal stripe. The latter is sometimes noticed in *A. dubius* but is much less pronounced. Usually *A. dubius* is quite uniformly dark from the dorsum to the middle of the side, whence it becomes very silvery.

SCOMBRIDAE

Scomber scombrus Linnaeus

MACKEREL

LOCAL NAME: MACKEREL

Stearns (1883) reported the mackerel from Triangle Harbor (52° 50' N.), and Packard (1891) from Red Bay, Strait of Belle Isle. During the autumn cruise of the "Cape Agulhas" in 1932 it was observed at Battle Harbor (52° 15' N.) (Newfoundland Fishery Research Commission, 1933). The appearance of this species in and north of the Strait of Belle Isle is probably due to the wandering of a few individuals during unusually warm summers.

Thunnus thynnus (Linnaeus)

TUNA

Wulff (1943) reported that the bluefin tuna has been seen in Hamilton Inlet, but it certainly must be very rare there.

ICELIDAE***Icelus spatula spatula*** Gilbert and Burke

It is probably this species that was recorded from Komaktorvik Bay (59° 20' N.) by Kendall (1911) as *Icelus bicornis* (Reinhardt). Andriashev (1937) has shown that for many years *Icelus bicornis* was improperly regarded as a circumpolar species, yet that it is known with certainty only from Greenland (type locality) east to the Kara Sea. Records for northeastern America, however, have always borne this name or its probable synonym, *Icelus hamatus* Krøyer. In the Kara Sea, the range of this species overlaps that of *Icelus spatula spatula* Gilbert and Burke. The latter species was known with certainty from the Kara Sea east along the Siberian coast to Point Barrow, Alaska, until found by Jensen and Volsøe (1949) in West Greenland together with *I. bicornis*. In East Greenland only *I. bicornis* was found. In Labrador only *I. spatula* has thus far been found.

"BLUE DOLPHIN" COLLECTIONS: St. Lewis Sound: (52° 21' N., 55° 56' W.), August 30, 1950, beam trawl in 35–40 fathoms over mud bottom, one specimen, 108 mm. long; (52° 22' N., 55° 57' W.), July 12, 1949, otter trawl in 35 fathoms over mud bottom, three specimens, 39–96 mm. long. Lake Melville: (53° 29' N., 59° 59' W.), August 28, 1951, otter trawl in 15–24 fathoms over sandy-mud bottom, six specimens, 41–102 mm. long; (53° 29' N., 59° 58' W.), July 28, 1950, beam trawl in 9 to 11 fathoms over mud bottom, one specimen, 95 mm. long; (53° 50' N., 59° 25' W.), July 25, 1950, beam trawl in 20 fathoms over sand, mud, and rock bottom, three specimens, 69–78 mm. long. Hamilton Inlet: (54° 15' N., 58° 00' W.), July 22, 1951, beam trawl in 48 fathoms, two specimens, 50 and 61 mm. long; (54° 15' N., 58° 01' W.), August 27, 1950, beam trawl in 45 fathoms over rocky or stony bottom, four specimens, 38–78 mm. long; (54° 16' N., 58° 02' W.), July 22, 1951, beam trawl in 20 fathoms, one specimen, 60 mm. long; (54° 22' N., 57° 39' W.), August

24, 1951, otter trawl in 35 fathoms over hard bottom, one specimen, 61 mm. long. Kaipokok Fiord: (55° 02' N., 59° 33' W.), July 29, 1949, otter trawl in 45 fathoms over mud bottom, 11 specimens, 35–90 mm. long; (55° 05' N., 59° 30' W.), August 1, 1949, otter trawl in 45 fathoms over mud bottom, seven specimens, 39–73 mm. long. Nain Bay: (56° 37' N., 61° 58' W.), August 7, 1951, otter trawl in 45 fathoms over mud bottom, 10 specimens, 38–91 mm. long; (56° 37' N., 62° 04' W.), August 7, 1951, otter trawl in 35 fathoms over mud bottom, 14 specimens, 43–84 mm. long. Hebron Fiord: (58° 08' N., 62° 56' W.), August 12, 1949, otter trawl in 50 fathoms over mud bottom with some rock, 35 specimens, 47–83 mm. long; (58° 09' N., 62° 56' W.), August 11, 1949, otter trawl in 90 fathoms over mud bottom, three specimens, 52–78 mm. long; (58° 09' N., 62° 46' W.), August 9, 1949, otter trawl in 125 fathoms over mud bottom, two specimens, 48 and 77 mm. long; (58° 11' N., 62° 34' W.), August 8, 1949, otter trawl in 95 fathoms over mud bottom, four specimens, 41–67 mm. long; same position, August 9, 1949, otter trawl in 95 fathoms over mud bottom, seven specimens, 49–100 mm. long. Kangalaksiorvik Fiord: (59° 23' N., 64° 03' W.), August 10, 1950, beam trawl in 10–12 fathoms over stony bottom with some mud, 10 specimens, 25–38 mm. long; (59° 24' N., 63° 51' W.), August 8, 1950, beam trawl in 50 fathoms over mud bottom, 49 specimens, 42–82 mm. long; (59° 24' N., 64° 01' W.), August 8, 1950, beam trawl in 30 fathoms over mud bottom with some rock, 17 specimens, 32–70 mm. long; (59° 25' N., 63° 47' W.), August 10, 1950, beam trawl in 50 fathoms over stony bottom, one specimen, 51 mm. long.

In 22 collections the temperature ranged from -1.85° C. to 3° C. In 16 the temperature was below -1° C., while in only one above 1° C.

Our specimens agree quite closely with the original description of Gilbert and Burke (1912) and with the analysis of Andriashev (1937). The species is sexually dimorphic. Most males have a noticeably larger eye than females. The latter reach a greater maximum size.

The development of the chief opercular spine is quite variable. The length of the tips

TABLE 28
MERISTIC VARIATION IN LABRADOR
Icelus spatula spatula

Dorsal fin spines		VIII	IX	X	
		1	20	4	
Dorsal fin rays	17	18	19	20	21
	1	—	8	12	4
Anal fin rays		14	15	16	17
		2	8	13	2
Pectoral fin rays				18	19
				16	9

of this bifid spine varies as does the angle between them. As was noticed in Labrador specimens by Kendall (1911), the chief opercular spine is occasionally simple rather than bifurcate. The concavity at the nape is highly variable in its depth although usually deep. Andriashev (1937) attached some importance to this character for separating the various species of *Icelus*.

Meristic variation in Labrador specimens is shown in table 28.

COTTIDAE

Artediellus uncinatus (Reinhardt)

HOOK-EARED SCULPIN

This species was recorded from Collingham's Cove, Hamilton Inlet, by Kendall (1909).

"BLUE DOLPHIN" COLLECTIONS: At temperatures from -1.20° C. to 2.49° C.: Lake Melville: ($53^{\circ} 29' N.$, $59^{\circ} 59' W.$), August 19, 1950, beam trawl in 15 fathoms over mud bottom, two specimens, 45 and 54 mm. long; ($53^{\circ} 29' N.$, $59^{\circ} 59' W.$), August 26, 1951, otter trawl in 17–19 fathoms over mud bottom, one specimen, 57 mm. long; ($53^{\circ} 29' N.$, $59^{\circ} 59' W.$), August 28, 1951, otter trawl in 15–24 fathoms over sandy-mud bottom, two specimens, 53 and 63 mm. long. Hamilton Inlet: Collingham's Cove ($54^{\circ} 13' N.$, $58^{\circ} 14' W.$), August 13, 1951, stramin net which fouled the bottom in 7 fathoms over muddy-sand bottom, one specimen, 31 mm. long; ($54^{\circ} 15' N.$, $58^{\circ} 01' W.$), August 27, 1950, beam trawl in 45 fathoms over rocky or stony bottom, one specimen, 45 mm. long; ($54^{\circ} 22' N.$, $57^{\circ} 39' W.$), August 24, 1951, otter trawl in 35 fathoms over hard bottom, one specimen, 39 mm. long. Nain Bay: ($56^{\circ} 37' N.$,

TABLE 29
MERISTIC VARIATION IN LABRADOR
Artediellus uncinatus

Dorsal fin spines	VII		VIII	
	1		11	
Dorsal fin rays	12		13	
	8		5	
Anal fin rays	10	11		12
	5	7		1
Pectoral fin rays	21	22		
	5	8		

$62^{\circ} 10' W.$), August 9, 1951, otter trawl in 15–23 fathoms over sandy-mud bottom, five specimens, 38–48 mm. long.

Meristic variation for Labrador specimens is given in table 29.

A female 45 mm. long taken in Lake Melville on August 19, 1950, bore ova in an advanced state of development. The eggs were about 3 mm. in diameter, translucent, and of a deep orange color.

Cottus bairdi kumlieni (Hoy)

GREAT LAKES MUDDLER

LOCAL NAMES: FRESH-WATER SCULPIN, GUDGEON

Records for this sculpin from tributaries of the Hamilton Inlet-Lake Melville estuary were given by Backus (1951) as *Cottus bairdi bairdi*.¹

"BLUE DOLPHIN" COLLECTIONS: In 1951: Flour Lake, Hamilton River ($53^{\circ} 43' N.$, $64^{\circ} 35' W.$), August 22, 23, and 25, 10-foot seine and rotenone, 160 specimens, 16–73 mm. long. Wattie's Brook, tributary of Grand Lake ($53^{\circ} 43' N.$, $60^{\circ} 28' W.$), July 25, 10-foot seine, one specimen, 45 mm. long. Berry Head Brook, tributary of Grand Lake ($53^{\circ} 45' N.$, $60^{\circ} 46' W.$), July 24, 10-foot seine, four specimens, 36–52 mm. long. Naskaupi River about 1 mile above its mouth ($53^{\circ} 47' N.$, $60^{\circ} 54'$

¹ The criteria used by Hubbs and Lagler (1947) for the separation of *Cottus bairdi bairdi* and *Cottus bairdi kumlieni* are not satisfactory. C. Richard Robins of Cornell University has made a study of the eastern North American species of this genus. The present specimens were identified by him as *kumlieni*.

The collection of this form reported by Backus (1951) for Little Lake, North West River, August 24, 1949, consisted of 41 individuals, 30–65 mm., not five specimens, 44–66 mm. long.

W.), July 22, 60-foot seine, 13 specimens, 30–54 mm. long.

***Cottus cognatus gracilis* Häckel**

COMMON SLIMY MUDDLER

**LOCAL NAMES: FRESH-WATER SCULPIN,
GUDGEON**

Kendall (1909) reported specimens from North West River.

"BLUE DOLPHIN" COLLECTIONS: All are in tributaries to Hamilton Inlet-Lake Melville estuary: Tributary of Hamilton River between Carling's Brook and McKenzie River (53° 13' N., 60° 41' W.), July 19, 1951, 10-foot seine, one specimen, 58 mm. long. McKenzie River (53° 13' N., 60° 43' W.), July 18, 1951, 10-foot seine, one specimen, 26 mm. long. Little Lake, North West River (53° 32' N., 60° 11' W.), August 24, 1949, five specimens, 44–66 mm. long. Flour Lake, Hamilton River (53° 43' N., 64° 35' W.), August 22, 23, and 25, 1951, 10-foot seine and rotenone, 16 specimens, 26–47 mm. long.

This species is less common in Labrador than the preceding one.

***Gymnocanthus tricuspis tricuspis* (Reinhardt)**

STAGHORN SCULPIN

LOCAL NAME: SCULPIN

Locality records for the staghorn sculpin given by Storer (1850), Packard (1891), Kendall (1909, 1911), and Hildebrand (1939) embrace the length of the Labrador coast.

"BLUE DOLPHIN" COLLECTIONS: Red Bay (51° 44' N., 56° 25' W.), July 4, 1949, hook and line in 1 to 2 fathoms over rocky bottom, one specimen, 218 mm. long. Schooner Cove, Islet Bay, Niger Sound (52° 12' N., 55° 43' W.), July 2, 1951, beam trawl in 15–18 fathoms over mud bottom with some stones, 16 specimens, 101–179 mm. long. St. Charles Harbor (52° 13' N., 55° 38' W.), July 3, 1951, jig in 10 fathoms, two specimens, 183–199 mm. long. St. Lewis Sound: Assizes Harbor (52° 14' N., 55° 42' W.), July 14, 1949, jig in 9 fathoms over rock and sand bottom, one specimen, 193 mm. long; Indian Cove (52° 15' N., 55° 40' W.), July 11, 1949, hook and line and jig in 1 to 6 fathoms over rock and sandy-mud bottom, three specimens, 175–189 mm. long; St. Mary's Harbor (52° 18' N., 55° 54' W.), August 30, 1950, beam trawl in

10 fathoms over mud, sand, stone, and shell bottom, six specimens, 95–109 mm. long; (52° 20' N., 55° 51' W.), August 30, 1950, beam trawl in 20–35 fathoms over mud bottom with some stone, one specimen, 144 mm. long. Domino Harbor, Island of Ponds (53° 50' N., 55° 50' W.), August 28, 1950, beam trawl in 10 fathoms over sand bottom, two specimens, 40 and 46 mm. long. Off South Strand near Pigeon Island (53° 54' N., 57° 04' W.), August 27, 1951, beam trawl in 13 fathoms over sand bottom, nine specimens, 43–103 mm. long. Lake Melville: (53° 29' N., 59° 58' W.), July 28, 1950, beam trawl in 9 to 11 fathoms over mud bottom, three specimens; (53° 29' N., 60° 00' W.), August 19, 1950, beam trawl in 15 fathoms over mud bottom, two specimens, 215 and 225 mm. long; (53° 29' N., 59° 59' W.), August 26, 1951, otter trawl in 17–19 fathoms over mud bottom, three specimens, 159–220 mm. long; same position August 28, 1951, in 15–24 fathoms over mud bottom, 13 specimens, 143–192 mm. long; (53° 50' N., 59° 25' W.), July 25, 1950, beam trawl in 20 fathoms over mud, sand, and rock bottom, one specimen, 167 mm. long; Pike Run Cove (54° 06' N., 58° 20' W.), July 23, 1950, long-line in 10 fathoms over mud and rock bottom, four specimens, 180–208 mm. long. Hamilton Inlet: (54° 15' N., 57° 45' W.), August 27, 1950; beam trawl in 30 fathoms over mud and stone bottom, one specimen, 58 mm. long; Indian Harbor (54° 28' N., 57° 12' W.), July 25, 1949, jig in 4.5 fathoms over sandy mud and rock bottom, two specimens, 155 and 215 mm. long; Emily Harbor (54° 33' N., 57° 10' W.), July 29, 1951, beam trawl in 10 fathoms over mud and rock bottom, 40 specimens 33–112 mm. long. Webeck Harbor (54° 55' N., 58° 00' W.), July 30, 1951, jig in 5.5 fathoms over rock and sand bottom, one specimen, 200 mm. long. Nain Bay: (56° 37' N., 61° 58' W.), August 7, 1951, otter trawl in 45 fathoms over mud bottom, two specimens, 111 and 122 mm. long; (56° 37' N., 62° 04' W.), August 7, 1951, otter trawl in 35 fathoms over mud bottom, nine specimens, 85–172 mm. long; (56° 37' N., 62° 10' W.), August 9, 1951, otter trawl in 15–23 fathoms over sandy-mud bottom, seven specimens, 63–119 mm. long. Hebron Fiord: (58° 09' N., 62° 56' W.), August 12, 1949, otter trawl in

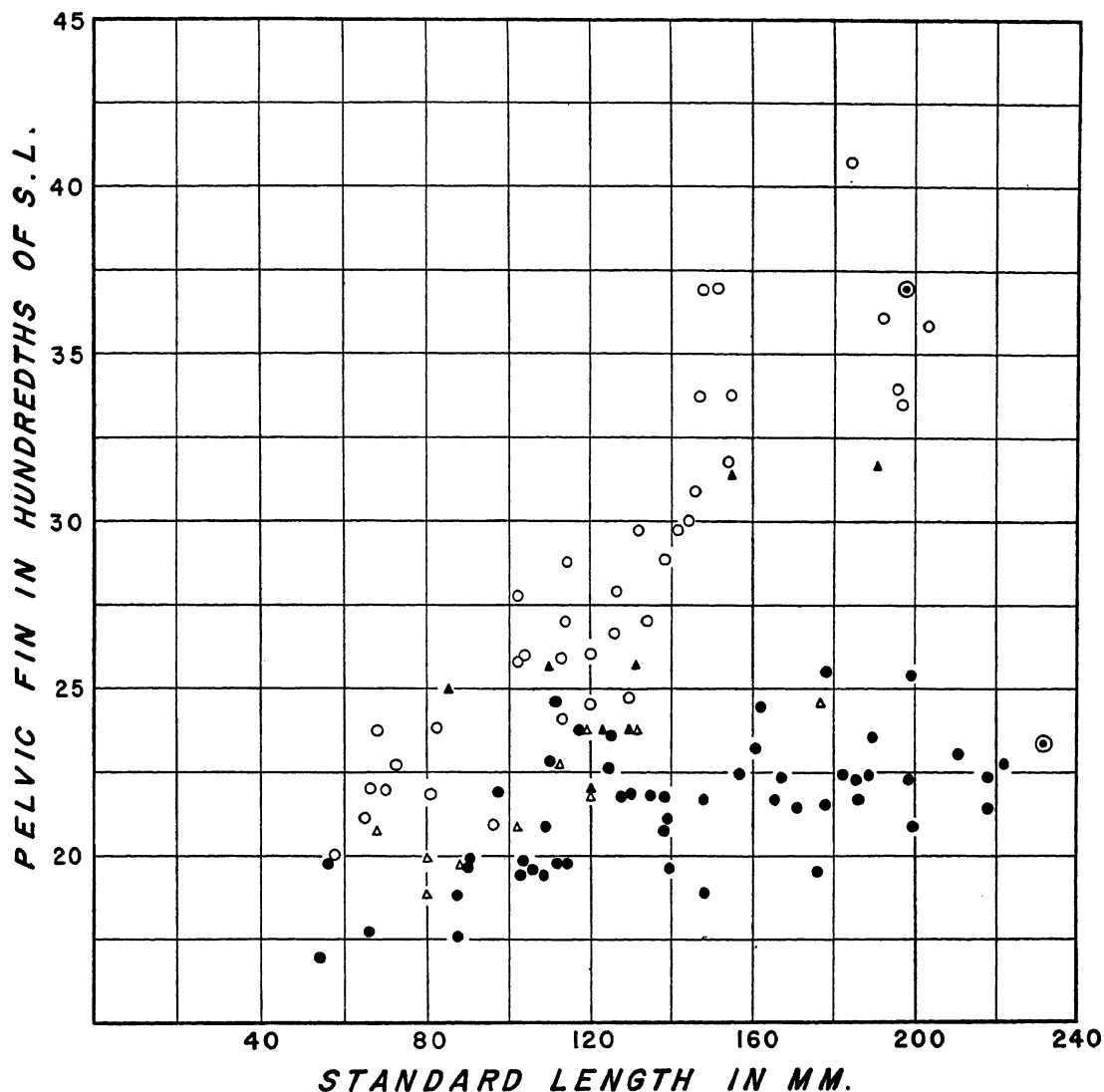


FIG. 2. *Gymnocanthus tricuspidus tricuspidus*. Circles represent Labrador males with bony granulations on the head; solid triangles, Labrador males without bony granulations; dots, Labrador females with bony granulations; open triangles, Labrador females without bony granulations; and the bull's-eyes, specimens of the nominal subspecies *G. t. hudsonius*. This shows that there is no difference between *tricuspidus* and "*hudsonius*" with respect to pelvic fin length. Note that the relative length of the fin increases as the fish grows and more rapidly in the male than in the female.

above about 10 fathoms, although we have collected several from depths of 1 or 2 fathoms. The greatest depth of capture was 95 fathoms. The salinity at collection points was as low as 21 per mille.

Vladykov (1933) described *Gymnocanthus tricuspidus hudsonius* from four specimens taken in Hudson Strait. The new subspecies was supposed to lack bony plates on the head. It

also appears from the description that there were differences in the lengths of the anal papilla and the pelvic fin.

I conclude that this nominal subspecies should be regarded as a synonym of *Gymnocanthus tricuspidus tricuspidus* (Reinhardt) for the following reasons:

1. In 112 Labrador specimens with standard lengths of 50 mm. or more (at about a

length of 50 mm. bony granulations on the head become evident) 92, or 82 per cent, possess the bony granulations while 20, or 18 per cent, lack them. The granulations when present may be reduced to a few or even one.

2. The length of the anal papilla in hundredths of the standard length in relation to the standard length is shown in figure 1. The large male specimen of *G. t. hudsonius* described by Vladykov is included, and it is apparent that no significant difference exists between *tricuspis* and *hudsonius*. Similarly with respect to the length of the pelvic fins it may be seen from figure 2 that no significant difference exists between the nominal subspecies.

3. The fact that Vladykov records both

hudsonius and *tricuspis* from Nottingham Island argues against the recognition of his subspecies.

The variation in fin ray counts for Labrador specimens is given in tables 30 to 33. Lake Melville specimens differ slightly from other specimens. This is particularly apparent in the second dorsal fin ray counts.

Hemitripterus americanus americanus (Gmelin)

SEA RAVEN

LOCAL NAMES: WHIP SCULPIN, GURNET

The literature contains no specific Labrador records for this sculpin, although general statements of its range include that place.

"BLUE DOLPHIN" COLLECTION: Collingham's Cove, Hamilton Inlet (54° 13' N., 58°

TABLE 30

VARIATION IN THE NUMBER OF PECTORAL FIN RAYS IN *Gymnocanthus tricuspis*
tricuspis FROM LABRADOR LOCALITIES

Locality	17	18	19	20	21
St. Lewis Sound and environs	—	13	15	1	—
Domino Harbor	—	2	—	—	—
Off South Strand	—	1	7	1	—
Lake Melville	1	6	18	—	—
Hamilton Inlet	—	2	8	1	—
Webeck Harbor	—	—	1	—	—
Nain	—	5	10	2	1
Hebron	2	4	5	—	—
Kangalaksiorkvik	—	1	11	1	—
Total	3	34	75	6	1

TABLE 31

VARIATION IN THE NUMBER OF ANAL FIN RAYS OF *Gymnocanthus tricuspis*
tricuspis FROM LABRADOR LOCALITIES

Locality	15	16	17	18	19
St. Lewis Sound and environs	—	—	13	16	—
Domino Harbor	—	—	1	1	—
Off South Strand	—	—	4	5	—
Lake Melville	—	8	13	4	—
Hamilton Inlet	—	—	6	5	—
Webeck Harbor	—	—	1	—	—
Nain	—	—	8	10	—
Hebron	1	1	2	6	1
Kangalaksiorkvik	—	1	2	9	1
Total	1	10	50	56	2

TABLE 32
VARIATION IN THE NUMBER OF DORSAL FIN SOFT RAYS IN *Gymnocanthus tricuspis tricuspis*
FROM LABRADOR LOCALITIES

Locality	14	15	16	17
St. Lewis Sound and environs	—	8	18	3
Domino Harbor	—	—	—	2
Off South Strand	—	2	3	3
Lake Melville	7	11	7	—
Webeck Harbor	—	—	1	—
Hamilton Inlet	—	4	6	1
Nain	—	4	12	2
Hebron	—	3	6	2
Kangalaksiorvik	—	3	10	—
Total	7	35	65	11

TABLE 33
VARIATION IN THE NUMBER OF DORSAL SPINES IN *Gymnocanthus tricuspis tricuspis* FROM
LABRADOR LOCALITIES

Locality	X	XI	XII
St. Lewis Sound and environs	1	26	2
Domino Harbor	—	2	—
Off South Strand	—	7	2
Lake Melville	4	16	5
Webeck Harbor	—	1	—
Hamilton Inlet	—	8	3
Nain	—	14	4
Hebron	—	7	4
Kangalaksiorvik	—	9	4
Total	5	90	24

14' W.), July 2, 1952, one specimen, 318 mm. long.

That this is the only specimen encountered in four summers of Labrador collecting shows this species to be an uncommon fish there, and the southeastern part of the coast is probably the northern limit of its range.

Myoxocephalus quadricornis (Linnaeus)¹

LOCAL NAME: SCULPIN

Labrador has been included in general statements of the range of this sculpin on the

basis of Girard's description of *Acanthocottus labradoricus* (Storer, 1850) from Yankee Harbor, St. Mary's Islands, Quebec (50° 20' N., 59° 40' W.).

It has been generally overlooked that *A. labradoricus* is not a synonym of *M. quadricornis* but of *M. scorpius* (Linnaeus), although Ehrenbaum (1902) included it in his list of synonyms of the latter.

The history of the name *Acanthocottus labradoricus* Girard is as follows: After its erection by Girard, Günther (1860) included the nominal species as *Cottus labradoricus*, "Coast of Labrador," in his "Catalog of acanthopterygian fishes." Bean (1881) described specimens of what is obviously *M. quadricornis* from Hudson Bay but attached the name *Oncocottus labradoricus* (Girard) to

¹ The writer tentatively accepts the decision of Berg and Popov (1932) that the genus *Oncocottus* Gill, 1862, be regarded as a synonym of *Myoxocephalus* Tilesius, 1811. If, however, *M. quadricornis* and closely related forms are to be retained in a separate genus, this genus should be *Trigloporus* Girard, 1851.

them.¹ Jordan and Gilbert (1882) listed *Cottus labradoricus* and with it a description (after Bean) of *M. quadricornis*. Jordan and Evermann (1898a) included *Acanthocottus labradoricus* Girard as a questionable synonym of *Oncocottus quadricornis* (Linnaeus) and as a synonym of *O. hexacornis* (Richardson).² Jordan, Evermann, and Clark (1930) listed *Acanthocottus labradoricus* Girard as a synonym of *Oncocottus hexacornis* (Richardson).

As Ehrenbaum (1902) presented no arguments for the synonymy of *A. labradoricus* with *M. scorpius*, it is appropriate to enter them here. The only point in Girard's description of *Acanthocottus labradoricus* fitting *quadricornis* (other than characters fitting both *scorpius* and *quadricornis*) is the count of the first dorsal fin. Girard's count of VIII is comparable to that of Labrador *quadricornis* (VII-IX), whereas Labrador *scorpius* ordinarily have IX-XI. Girard's count of the second dorsal (17) is at variance with Labrador *quadricornis* (14-16) but agrees with Labrador *scorpius* (15-18). In plate 7 (Storer, 1850) the head of *Acanthocottus labradoricus*, has two postorbital processes, a character of *scorpius* but not of *quadricornis*. Girard indicated the close relationship of *A. labradoricus* with *groenlandicus* and *variabilis*. *Groenlandicus* and *variabilis* have been shown to be synonyms of *scorpius*. On the basis of distribution alone the synonymy of *labradoricus* with *quadricornis* would be suspect; *quadricornis* is regarded as an indicator of a high arctic marine littoral environment. It has never been reported from the Labrador coast until the present paper and almost certainly does not occur in the Gulf of St. Lawrence.

"BLUE DOLPHIN" COLLECTION: Nain Harbor (Unity Bay) (56° 32' N., 61° 40' W.), August 5, 1951, spear in 1.5 fathoms, nine specimens, 183-240 mm. long.

Taken with the above specimens were 70 specimens of *M. scorpius* and two specimens of *M. scorpioides*. Meristic variation for the Labrador specimens is given in table 34.

¹ Gill erected the genus *Oncocottus* in 1862, with *Cottus quadricornis* Linnaeus as its type.

² *Oncocottus hexacornis* has been variously regarded as a synonym of, a subspecies of, or a different species from *O. quadricornis*. See below.

TABLE 34
MERISTIC VARIATION IN LABRADOR
Myoxocephalus quadricornis

Dorsal fin spines	VII	VIII	IX
	2	6	1
Dorsal fin rays	14	15	16
	3	4	2
Anal fin rays	14	15	16
	6	2	1
Pectoral fin rays	15		16
	5		4

There is considerable variation in the occipital horns or tubercles. In one specimen they are 6 to 7 mm. high, while in another they are reduced to low ridges. In only one specimen are small tubercles present among the four major ones.

The variation in the development and disposition of the bony scutes on the back and sides was considered important by Berg and Popov (1932). The total number of scutes on the left side is distributed uniformly from 19 to 49. Below the lateral line there are five in three cases and none in the remaining six, and above the anal base the number varies from six to 27.

Myoxocephalus scorpioides (Fabricius)

LOCAL NAME: SCULPIN

Stearns (1883) stated that this sculpin "occurs all along the coast" and implied that it was as abundant as *Myoxocephalus scorpius*. These statements are difficult to believe. Among the several hundreds of sculpins in this genus critically examined by me during the summers of 1949-1951 only six were *M. scorpioides*. It is significant that Dunbar and Hildebrand (1952) report this as "one of the commonest sculpins" in shallow coastal water in Ungava Bay.

"BLUE DOLPHIN" COLLECTIONS: Red Bay (51° 44' N., 56° 25' W.), July 4, 1949, hook and line, one specimen, 141 mm. long. West Turnavik Island (55° 15' N., 59° 18' W.): July 29, 1949, by hand in a tide pool, two specimens, 60 and 61 mm. long; July 31, 1949, jig in 4.5 fathoms, one specimen, 141 mm. long. Nain Harbor (56° 32' N., 61° 40' W.), August 5, 1951, spear in 1.5 fathoms, two specimens, 203 and 209 mm. long.

Vladykov (1933) and Dunbar and Hilde-

brand (1952) listed characters by which this species can be separated from *M. scorpius*. Our specimens of *M. scorpioides* show very little development of the occipital spines. In one of the large specimens these are reduced to very short tentacular processes, while in the other the posterior pair is completely lacking.

Vladykov (1933) states that the lateral line is "complete and straight" in *M. scorpioides*, a character in which it presumably differs from *M. scorpius*. In Labrador specimens there appears to be little if any difference between the lateral lines of the two species. In both it is complete to the base of the caudal rays. In both the line takes a short but abrupt downward bend at the caudal peduncle before continuing its posterior course. In this our specimens agree with those reported from Ungava Bay by Dunbar and Hildebrand (1952). Meristic variation in Labrador specimens is shown in table 35.

TABLE 35
MERISTIC VARIATION IN LABRADOR
Myoxocephalus scorpioides

	VIII	IX	X
Dorsal fin spines	1	4	1
Dorsal fin rays	15	16	
	2	4	
Anal fin rays	12		
	6		
Pectoral fin rays	15	16	
	4	2	

Myoxocephalus scorpius (Linnaeus)

SHORT-HORN SCULPIN

LOCAL NAME: SCULPIN

The literature of Labrador fishes includes records for this species that embrace the entire coast.¹ Specimens from Labrador localities

¹ Weiz's (1866) record of *Lophius laevigatus* [a synonym of *Histrio gibba* (Mitchill)] from Okak is probably referable to *M. scorpius*, as the Eskimo name "Kanajok" given by him applies to the short-horn sculpin. This probability is reinforced by the fact that no mention of *M. scorpius* is made by Weiz in his list of fishes observed at Okak where this species occurs with such abundance and conspicuousness that it could not be overlooked.

Kendall (1909) in his review of the literature of Labrador fishes made no mention of this record but did call attention to another pediculate fish recorded in

ties are in the University of Michigan Museum of Zoology.

"BLUE DOLPHIN" COLLECTIONS: Forteau Bay (51° 28' N., 56° 54' W.), June 26, 1949, one specimen, 48 mm. long. Red Bay (51° 44' N., 56° 25' W.), July 4, 1949, eight specimens, 139–240 mm. long. Indian Cove, Assizes Run (52° 15' N., 55° 04' W.), July 12, 1949, one specimen, 53 mm. long. St. Mary's River, St. Lewis Sound (52° 18' N., 55° 54'

TABLE 36
VARIATION IN THE NUMBER OF ANAL FIN
RAYS IN *Myoxocephalus scorpius* FROM
VARIOUS LABRADOR LOCALITIES
(Arranged south to north.)

Locality	12	13	14	15	16
Assizes Run	2	14	21	2	—
Pack's Harbor	—	3	10	—	—
Webeck Harbor	—	33	69	9	1
West Turnavik Island	—	19	22	4	—
Saglek Bay	1	10	19	2	—
Total	3	79	141	17	1

W.), July 12, 1949, four specimens, 51–60 mm. long. Collingham's Cove, Hamilton Inlet (54° 13' N., 58° 14' W.), July 19, 1951, seven specimens, 41–111 mm. long. Hamilton Inlet (54° 15' N., 57° 45' W.), July 20, 1951, one pelagic young, probably this species, 9 mm. long. Emily Harbor (54° 33' N., 57° 10' W.), July 29, 1951, four specimens, 22–43 mm. long. West Turnavik Island (55° 15' N., 59° 18' W.): July 26, 1949, one specimen, 195 mm. long; July 29, 1949, two specimens, 64 and 68 mm. long; August 11, 1951, 11 specimens, 22–276 mm. long. Nain: (56° 32' N., 61° 40' W.), August 9, 1951, two specimens, 188 and 236 mm. long; (56° 31' N., 61° 11' W.), August 6, 1951, one specimen.

In general, this sculpin is limited bathymetrically to the upper 15–20 fathoms in Labrador, as it shuns the intensely cold water found below this depth. In the unusual warm

error from Labrador, *Lophius cubrifrons* Richardson [*Ogcocephalus radiata* (Mitchill)]. Richardson (1836) described this species from a specimen provided by Audubon "taken on the Labrador coast and preserved in rum." This specimen was apparently mixed by Audubon into Labrador collections from material taken in Florida.

TABLE 37

VARIATION IN THE NUMBER OF DORSAL FIN
SPINES IN *Myoxocephalus scorpius* FROM
VARIOUS LABRADOR LOCALITIES
(Arranged south to north.)

Locality	IX	X	XI
Assizes Run	5	33	1
Pack's Harbor	2	10	1
Webeck Harbor	10	92	10
West Turnavik Island	3	38	4
Saglek Bay	—	30	2
Total	20	201	20

water area at Nain the species was trawled at a depth of 45–60 fathoms.

Meristic data are given in tables 36–38 for numerous unpreserved specimens not recorded above. Sex ratios and mean lengths as a function of sex for several localities are given in table 39.

The females, which are larger, are much more abundant than the males, outnumbering them by more than two to one. As these specimens were captured by a variety of methods and the sample is fairly large it is concluded that the observed ratio represents the actual situation. Craigie (1927) reported 156 males and 81 females of this species in a composite sample taken in all months of the year during an eight-year period. Hartman (1944) for *M. aeneus* reported a great disparity in the sex ratio, the females outnumbering the males. The month of capture of the specimens was not given. Morrow (1951) in a study of *M. octodecemspinosus* reported that on a year-round basis a one-to-one sex ratio existed, but that males outnumbered the females in the study area during the spring and summer, while in winter during the spawning season the females outnumbered the males about four to one. The superabundance of females of *M. scorpius* in Labrador in July and August occurs during the

TABLE 38

VARIATION IN THE NUMBER OF DORSAL FIN RAYS IN *Myoxocephalus scorpius* FROM VARIOUS
LABRADOR LOCALITIES
(Arranged south to north.)

Locality	15	16	17	18	19
Assizes Run	—	11	24	4	—
Pack's Harbor	—	4	7	2	—
Webeck Harbor	—	21	72	19	—
West Turnavik Island	1	12	24	8	—
Saglek Bay	2	7	20	2	1
Total	3	55	147	35	1

TABLE 39

MEAN LENGTHS BY SEX AND SEX RATIOS OF RANDOMLY TAKEN SAMPLES OF *Myoxocephalus scorpius* FROM VARIOUS LABRADOR LOCALITIES
(Arranged south to north.)

Locality and Date	Males		Females	
	\bar{x}	n	\bar{x}	n
Assizes Run, July 11–13, 1949	238.4	17	284.8	22
Pack's Harbor, July 24, 1949	222.8	5	254.1	8
Webeck Harbor, August 1, 1950	220.3	33	253.2	79
West Turnavik Island, July 27, 1949	219.4	10	284.4	35
Saglek Bay, August 6, 1950	233.5	8	278.0	24
Totals	226.0	73	267.4	168

non-spawning season, as the ovaries then possess little-developed ova, whitish or pinkish in color, and about 0.5 to 0.75 mm. in diameter.

The antics of this species when gathered around a fish-cleaning stage to gorge themselves on offal are amusing to watch. Individuals have been observed to roll over and over while attempting to carry off a piece of cod gut and even to pause while on their backs as if to recoup their energies or senses.

Triglops nybelini Jensen

Backus (1951) recorded the capture of a single specimen in Hebron Fiord (58° 10' N.).

This mailed sculpin is readily separated from the more widespread *T. pingeli* Reinhardt as the central of the three pelvic rays is the longest, whereas in *T. pingeli* the innermost is the longest.

Triglops pingeli Reinhardt

MAILED SCULPIN

The "Cape Agulhas" collected this sculpin (recorded as *T. ommatistius*) off Sandwich Bay (53° 35' N.) in 1931 and in the Strait of Belle Isle in 1932 (Newfoundland Fishery Research Commission, 1932, 1933).¹

"BLUE DOLPHIN" COLLECTIONS: At temperatures between -1.68° C. and 2.52° C.: St. Lewis Sound: (52° 20' N., 55° 51' W.), August 30, 1950, beam trawl in 20-35 fathoms over mud bottom with some stone, one specimen; (52° 21' N., 55° 56' W.), August 30, 1950, beam trawl in 35-40 fathoms over mud bottom, two specimens. Domino Harbor, Island of Ponds (53° 30' N., 55° 50' W.), August 28, 1950, beam trawl in 10 fathoms over sandy bottom, two specimens. Lake Melville (53° 50' N., 59° 25' W.), July 25, 1950, beam trawl in 20 fathoms over sand, rock and mud bottom, one specimen. Off South Strand near Pigeon Island (53° 54' N., 57° 04' W.), August 27, 1950, beam trawl in 13 fathoms over sand bottom, two specimens. Collingham's Cove, Hamilton Inlet (54° 13' N., 58° 14' W.), July 5, 1951, beam trawl in 15 fathoms over rocky bottom, three speci-

mens. Nain: (56° 33' N., 61° 38' W.), August 8, 1951, otter trawl in 60 fathoms over sandy-mud bottom with stones, one specimen; (56° 34' N., 61° 38' W.), August 5, 1951, otter trawl in 55-60 fathoms over sandy-mud bottom with some stones, one specimen; (56° 37' N., 62° 10' W.), August 9, 1951, in 15-23 fathoms over sandy-mud bottom, one specimen. Hebron Fiord (58° 09' N., 62° 56' W.), August 12, 1949, otter trawl in 50 fathoms over mud bottom with some rock, one specimen. Kangalaksiorvik Fiord: (59° 23' N., 64° 03' W.), August 10, 1950, beam trawl in 10-12 fathoms over mud bottom with some stone, one specimen; (59° 24' N., 63° 51' W.), August 8, 1950, beam trawl in 50 fathoms over mud bottom with some rock, two specimens; (59° 24' N., 64° 01' W.), August 8, 1950, beam trawl in 30 fathoms over mud bottom with some rock, one specimen.

A specimen in the University of Michigan Museum of Zoology collected at Jack Lane's Bay (55° 40' N., 60° 30' W.) on September 29, 1925, has also been examined. Meristic variation in Labrador specimens is given in table 40.

TABLE 40
MERISTIC VARIATION IN LABRADOR
Triglops pingeli

Dorsal fin spines	IX	X	XI	
	1	5	9	
Dorsal fin rays	22	23	24	25 26
	3	7	2	3 1
Anal fin rays	22	23	24	25 26
	2	5	4	— 2
Pectoral fin rays	17	18	19	
	2	6	7	

AGONIDAE

Agonus decagonus Bloch and Schneider

Although this sea poacher has been recorded as far south as Newfoundland in the western North Atlantic, the only Labrador records are those of the "Cape Agulhas" which collected the pelagic young at two stations off Hamilton Inlet in 1932 (Newfoundland Fishery Research Commission, 1933).

"BLUE DOLPHIN" COLLECTIONS: At temperatures from -1.85° C. to 1.4° C.: St. Lewis Sound: (52° 21' N., 55° 56' W.), August 30, 1950, beam trawl in 35-40 fathoms over

¹ The writer follows Jensen (1944) in considering *Triglops ommatistius* Gilbert a synonym of *Triglops pingeli* Reinhardt. Whether the former is deserving of subspecific recognition or not has yet to be determined.

mud bottom, eight specimens, 70–187 mm. long; (52° 22' N., 55° 57' W.), July 12, 1949, otter trawl in 35 fathoms over mud bottom, one specimen, 186 mm. long. Lake Melville: Goose Bay (53° 24' N., 60° 04' W.), July 6, 1950, otter trawl in 30 fathoms over mud bottom, one specimen, 46 mm. long; (53° 29' N., 60° 00' W.), August 19, 1950, beam trawl in 15 fathoms over mud bottom, five specimens, 127–154 mm. long; (53° 29' N., 59° 59' W.), August 26, 1951, otter trawl in 17–19 fathoms over sandy-mud bottom, two specimens, 147 and 154 mm. long; August 28, 1951, in 15–24 fathoms, nine specimens, 137–203 mm. long; (53° 50' N., 59° 25' W.), July 25, 1950, beam trawl in 20 fathoms over

TABLE 41
MERISTIC VARIATION IN LABRADOR
Agonus decagonus

Dorsal fin spines	V	VI	VII	VIII
	2	20	7	1
Dorsal fin rays	6	7		
	14	17		
Anal fin rays	7	8		
	28	3		
Pectoral fin rays	15	16	17	
	13	16	1	

sand, rock, and mud bottom, three specimens, 88–162 mm. long. Kaipokok Fiord (55° 02' N., 59° 33' W.), July 29, 1949, otter trawl in 45 fathoms over mud bottom, one specimen, 48 mm. long. Nain Bay (56° 37' N., 61° 58' W.), August 7, 1951, otter trawl in 45 fathoms over mud bottom, one specimen, 69 mm. long. Hebron Fiord (58° 09' N., 62° 46' W.), August 9, 1949, otter trawl, in 125 fathoms over mud bottom, one specimen, 87 mm. long.

Sexual dimorphism in this seapoacher is shown in the pelvic fin, the length of which in the adult female comprises between 5 and 7 per cent of the standard length and becomes relatively shorter as the fish increases in length. In the adult male it comprises between 9 and 14 per cent of the standard length and does not change as the length of the fish changes.

Meristic variation in Labrador specimens is shown in table 41.

Aspidophoroides monopterygius (Bloch)

ALLIGATORFISH

Kendall (1909) recorded this species from Collingham's Cove and Turner Bay, both in Hamilton Inlet. In 1931 the "Cape Agulhas" took it at two stations off Sandwich Bay (53° 35' N.), (Newfoundland Fishery Research Commission, 1932).

"BLUE DOLPHIN" COLLECTIONS: Domino Harbor, Island of Ponds (53° 30' N., 55° 50' W.), August 28, 1950, beam trawl in 10 fathoms over sandy bottom, two specimens, both 45 mm. long. Lake Melville: (53° 29' N., 50° 59' W.), August 26, 1951, otter trawl in 17–19 fathoms over mud bottom, three specimens, 66–134 mm. long; same position, August 28, 1951, otter trawl in 15–24 fathoms over sandy-mud bottom, four specimens, 125–146 mm. long; (53° 50' N., 59° 25' W.), July 25, 1950, beam trawl in 20 fathoms over sand, rock, and mud bottom, one specimen, 124 mm. long. Off South Strand near Pigeon Island (53° 54' N., 57° 04' W.), August 27, 1950, beam trawl in 13 fathoms over sand bottom, six specimens, 59–104 mm. long. Kaipokok Fiord (54° 52' N., 59° 50' W.), July 29, 1949, otter trawl in 15 fathoms over mud bottom, two specimens, 118 and 134 mm. long. Strathcona Run, Nain: (56° 33' N., 61° 38' W.), August 8, 1951, otter trawl in 60 fathoms over sandy-mud bottom with small stones, three specimens, 108–116 mm. long; (56° 34' N., 61° 38' W.), August 5, 1951, otter trawl in 55–60 fathoms over sandy-mud bottom with some stone, one specimen, 118 mm. long.

Temperature at the collection sites when recorded ranged from -1.07° C. to 2.52° C. In only one case was it below 0° C. Meristic variation for Labrador specimens is shown in table 42.

TABLE 42
MERISTIC VARIATION IN LABRADOR
Aspidophoroides monopterygius

Dorsal fin rays	5	6	
	9	9	
Anal fin rays	4	5	6
	2	11	6
Pectoral fin rays	10	11	
	16	3	

As in *Agonus decagonus* sexual dimorphism is seen in the length of the pelvic fin. In the female the length of this fin varies from 5 to 9 per cent of the standard length, becoming relatively less as the fish grows. In the male the length of the pelvic fin, varying from 10 to 11 per cent, does not change relative to the length as the fish grows.

There is no difference between the sexes in the length of the pectoral fin relative to the standard length. The fin length varies from 14 to 19 per cent, tending to become less as the fish grows.

In some specimens milky white pigment was present on the dorsal; dorsal and pelvic; or dorsal, pelvic, and anal fins. This pigment appears to be limited to male specimens, but not all male specimens have it. It is present in some small males and absent in some large ones.

Aspidophoroides olriki Lütken

Dunbar (1947) recorded pelagic young from Hebron (58° 10' N.) taken on July 18, 1939.

"BLUE DOLPHIN" COLLECTIONS: St. Lewis Sound (52° 22' N., 55° 57' W.), July 12, 1949, otter trawl in 35 fathoms over mud bottom, one specimen, 77 mm. long. Off South Strand near Pigeon Island (53° 54' N., 57° 04' W.), August 27, 1950, beam trawl in 13 fathoms over mud bottom, two specimens, 28 and 36 mm. long. Hamilton Inlet (54° 15' N., 58° 01' W.), August 27, 1950, beam trawl in 45 fathoms over rocky bottom, two specimens, 46 and 50 mm. long; (54° 15' N., 57° 45' W.), July 20, 1951, at mid-depth by plankton net, one specimen, 14 mm. long. Kaipokok Fiord: (55° 02' N., 59° 33' W.), July 29, 1949, otter trawl in 45 fathoms over mud bottom, three specimens, 64–70 mm. long; (55° 05' N., 59° 30' W.), August 1, 1949, otter trawl in 45 fathoms over mud bottom, one specimen, 62 mm. long. Nain: (56° 33' N., 61° 38' W.), August 8, 1951, otter trawl in 60 fathoms over sandy-mud bottom with stones, one specimen, 59 mm. long; (56° 37' N., 61° 58' W.), August 7, 1951, otter trawl in 45 fathoms over mud bottom, three specimens, 52–65 mm. long; (56° 37' N., 62° 04' W.), August 7, 1951, otter trawl in 35 fathoms over mud bottom, two specimens, both 62 mm. long; (56° 37' N., 62° 10' W.), August 9, 1951, otter

trawl in 15–23 fathoms over sandy-mud bottom, one specimen, 49 mm. long. Kangalak-siorvik Fiord: (59° 23' N., 64° 03' W.), August 10, 1950, beam trawl in 10–12 fathoms over stony bottom with some mud, one specimen, 27 mm. long; (59° 24' N., 63° 51' W.), August 8, 1950, beam trawl in 50 fathoms over mud bottom with some rock, two specimens, 40 and 57 mm. long.

The temperature at the above collection sites, where recorded, ranged from -1.85° C. to 2.52° C. It was lower than -1.0° C. in seven instances, while only once was it above 1.0° C.

Meristic variation for Labrador specimens is shown in table 43.

TABLE 43
MERISTIC VARIATION IN LABRADOR
Aspidophoroides olriki

Dorsal fin rays	5	6	7
	2	12	3
Anal fin rays	5	6	7
	3	11	2
Pectoral fin rays	14	15	
	15	4	

The milky white pigment mentioned for *Aspidophoroides monoptyerygius* was found on the dorsal and anal fins of a male fish.

CYCLOPTERIDAE

Careproctus longipinnis Burke

This little-known liparid was recorded by Burke (1930) from the Norwegian Sea (Faeroes to Bear Island). Recently, Vladykov and Tremblay (1935) recorded it from the estuary of the St. Lawrence River.

"BLUE DOLPHIN" COLLECTIONS: Goose Bay, Lake Melville (53° 22' N., 60° 14' W.): August 20, 1951, otter trawl in 29 fathoms over mud bottom, one specimen, 84 mm. long; August 28, 1951, otter trawl in 27 fathoms over mud bottom, one specimen, 42 mm. long. Lake Melville: (53° 29' N., 59° 59' W.), August 28, 1951, otter trawl in 15–24 fathoms over sandy-mud bottom, two specimens, 102 and 115 mm. long; (53° 32' N., 60° 03' W.), July 8, 1950, otter trawl, in 55 fathoms over mud bottom, one specimen, 50 mm. long.

These specimens agree with the description of Burke (1930) and the figure of Lütken

(1898, pl. 3, fig. 3) labeled *Liparis Reinhardtii* Krøyer. Burke (1930) reported dermal "prickles" as absent in this species. They are present in all Labrador specimens although but little developed in the two smallest. The "prickles" are like those figured by Burke (1930) for *Careproctus acanthodes*. The number of "prickles" per group varies but is most often six. The groups are densely distributed on the body and head forward dorsally to the nostrils and forward ventrally to the vent. They are wanting on the vertical fins and on the under sides of the pectoral fins.

The lower lobe of the pectoral is separated from the origin of the anal fin by a space about equal to the diameter of the eye and consists of about eight or nine rays of which the fifth or sixth from the lower margin is the longest. The lower lobe is separated from the upper by about three short and equal rays.

This species is exceedingly gelatinous. Ten or 15 of the anterior rays of the dorsal fin, which numbers from 51 to 55 rays, are embedded in this gelatin, there being no evidence of them at the surface. The anterior rays of the anal fin, which consists of from 45 to 50 rays, are likewise embedded, but small portions of the tips are usually visible at the surface. The pectoral fin consists of from 31 to 33 rays and the caudal fin of about nine. Twenty-three pyloric caeca were present in one specimen, the stomach of which contained the remains of amphipods.

Cyclopterus lumpus Linnaeus

LUMPFISH

LOCAL NAME: LUMP

Storer (1850), Packard (1891), and the Newfoundland Fishery Research Commission (1933 and 1934) reported this species from the Strait of Belle Isle.

"BLUE DOLPHIN" COLLECTIONS: Collingham's Cove, Hamilton Inlet (54° 13' N., 58° 14' W.), July 5, 1951, one specimen, 28 mm. long. West Turnavik Island (55° 15' N., 59° 18' W.), July 31, 1949, one specimen, 192 mm. long.

This species probably occurs all along the coast, as it is well known from Hudson Bay (Vladykov, 1933).

Eumicrotremus derjugini Popov

This spiny lumpfish, earlier known from the Kara, Barents, and Okhotsk seas, was first

reported from eastern North America by Vladykov (1933) who recorded it from Hudson Bay and Hudson Strait. Hildebrand (1939) reported a single specimen from Saglek Bay (58° 30' N.) in northern Labrador.

Eumicrotremus spinosus (Müller)

SPINY LUMPFISH

Hildebrand (1939) reported specimens from West Turnavik Island (55° 15' N.), Saglek Bay (58° 30' N.), and Seven Islands Bay (59° 30' N.).

"BLUE DOLPHIN" COLLECTIONS: At temperatures from -1.40° C. to -1.08° C.: St. Lewis Inlet (52° 20' N., 55° 51' W.), August 30, 1950, beam trawl in 20-35 fathoms over mud bottom with some stone, one specimen, 53 mm. long. Hamilton Inlet off Nat's Discovery Point (54° 15' N., 58° 01' W.), August 27, 1950, beam trawl in 45 fathoms over rocky or stony bottom, one specimen, 61 mm. long. Nain Bay (56° 37' N., 62° 04' W.), August 7, 1951, otter trawl in 35 fathoms over mud bottom, five specimens, 35-57 mm. long.

The tubercles on the sides of the body of seven Labrador specimens are arranged in regular rows. They are present in all cases on the chin where they are better developed in larger specimens. The tentacular processes on the chin appear to be better developed in the smaller specimens. In no case is the first

TABLE 44
MERISTIC VARIATION IN LABRADOR
Eumicrotremus spinosus

Dorsal fin spines	VI 3	VII 4	
Dorsal fin rays	10	11	12
	1	3	3
Anal fin rays	10	11	12
	2	3	2

dorsal fin covered with skin. The number, size, and position of tubercles arranged transversely in the interorbital space is variable but usually four or five. In hundredths of the standard length, the length of the head varied from 0.43 to 0.49, the interorbital space from 0.22 to 0.25, the longitudinal diameter of the eye from 0.13 to 0.17, and the snout to anus distance from 0.57 to 0.66. Meristic variation in Labrador specimens is shown in table 44.

Liparis atlanticus (Jordan and Evermann)

SEA SNAIL

The "Cape Agulhas" collected this species in Sandwich Bay (53° 35' N.) in 1931 (Newfoundland Fishery Research Commission, 1932). There is a specimen in the University of Michigan Museum of Zoology (U.M.M.Z. No. 160738) from Battle Harbor (52° 15' N.). The relationship of this species with the European *L. montagui*, a closely related form, is not yet satisfactorily determined.

Liparis koefoedi Parr

Labrador records for this species were given by Backus (1951).

"BLUE DOLPHIN" COLLECTIONS: In 1951: Goose Bay, Lake Melville: (53° 22' N., 60° 14' W.), August 20, otter trawl in 29 fathoms over mud bottom, two specimens, 68 and 70 mm. long; same position, August 26, 30 fathoms, five specimens, 67–140 mm. long; same position, August 28, 27 fathoms, one specimen, 72 mm. long; (53° 23' N., 60° 10' W.), August 26, otter trawl in 15–20 fathoms over mud bottom, one specimen, 75 mm. long; (53° 24' N., 60° 04' W.), July 10, beam trawl in 30 fathoms over mud bottom, two specimens, 123 and 140 mm. long; same position, August 20, otter trawl in 32 fathoms, two specimens, 68 and 72 mm. long; same position, August 26, 30–32 fathoms, nine specimens, 59–136 mm. long; same position

August 28, 32 fathoms, four specimens, 59–124 mm. long.

Also one specimen 180 mm. long from Lake Melville: (53° 32' N., 60° 03' W.), July 8, 1950, otter trawl in 55 fathoms over mud bottom.

Labrador material has been compared with the following material from other parts of the range of this species: (1) Eight specimens from Green Harbor, Spitzbergen, lent through the kindness of Dr. Johann Wilgoys, Bergens Museum, Bergen, Norway, were among the material used by Parr (1932) in defining this species. Parr designated no types but considered these specimens to be typical. (2) Six specimens from Ellesmere Island, Northwest Territories, lent by the National Museum of Canada. (3) Single specimens from East Greenland and the Beaufort Sea, data from which were provided by Dr. Norman Wilimovsky.

Considerable uniformity in meristic characters exists among the several populations (tables 45 and 46), but much variation occurs in certain body proportions.

Parr (1932) in his study of this species from Spitzbergen, the Kara Sea, the Barents Sea, and East Greenland, showed that Spitzbergen and Kara Sea specimens are of a single population. He reserved opinion as to the status of the inadequate material from East Greenland and the Barents Sea, but pointed out that the Greenland specimens differed

TABLE 45

VARIATION IN THE NUMBER OF DORSAL FIN RAYS IN VARIOUS POPULATIONS OF *Liparis koefoedi*

Locality	44	45	46	47	48	49	50
Beaufort Sea ^a	—	—	—	—	1	—	—
Ellesmere Island	—	—	1	2	1	—	1
Goose Bay, Labrador	2	1	7	9	9	—	—
Lake Melville, Labrador	—	1	—	—	—	—	—
Hebron, Labrador	—	1	3	2	3	—	—
Kangalaksiorvik, Labrador	—	—	—	1	—	—	—
East Greenland ^b	—	—	2	1	—	—	—
Spitzbergen ^c	—	13	11	4	1	1	—
Kara Sea ^c	—	2	6	1	2	—	—
Barents Sea ^c	—	1	—	—	—	—	—
Total	2	19	30	20	17	1	1

^a Courtesy of Dr. Wilimovsky.

^b From Dr. Wilimovsky and Parr (1932).

^c From Parr (1932).

TABLE 46

VARIATION IN THE NUMBER OF ANAL FIN RAYS IN VARIOUS POPULATIONS OF *Liparis koefoedi*

Locality	37	38	39	40	41
Beaufort Sea ^a	—	—	—	1	—
Ellesmere Island	1	1	1	1	1
Goose Bay, Labrador	1	6	15	5	—
Lake Melville, Labrador	1	—	—	—	—
Hebron, Labrador	—	2	4	3	—
Kangalaksiorvik, Labrador	—	1	—	—	—
East Greenland ^b	2	—	—	1	—
Spitzbergen ^c	7	7	11	5	—
Kara Sea ^c	2	5	2	—	1
Barents Sea ^c	1	—	—	—	—
Total	15	22	33	16	2

^a Courtesy of Dr. Wilimovsky.^b From Dr. Wilimovsky and Parr (1932).^c From Parr (1932).

from the typical (Spitzbergen) in that they had relatively shorter heads, longer tails (insertion of anal fin to tip of caudal), and shorter pectoral fins. One specimen had small eyes and the other large eyes. The Barents Sea specimen differed from the typical in the shorter snout and smaller eyes.

The East Greenland specimen for which Dr. Wilimovsky provided data has a head fully as long as Spitzbergen and Kara Sea specimens, while in respect to the tail length it agrees with Parr's observations for East Greenland specimens.

The Beaufort Sea specimen has a slightly longer tail, shorter caudal fin, shorter disc, and shorter head than any of the other material.

Of the Labrador material, the Kangalaksiorvik specimen is similar to the large series from Hebron except for its short tail. The collections from these adjacent localities were treated together and are referred to as the northern Labrador population. Likewise the Lake Melville specimen is like the north Labrador population except in the length of the caudal fin which is long and resembles, in this respect, the material from adjacent Goose Bay.

In the ensuing discussion little or no attention is given to the limited material from the Barents Sea, East Greenland, Lake Melville, and the Beaufort Sea. Four populations are treated in more detail—the Spitzbergen and

Kara Sea populations (called the Spitzbergen population), the Ellesmere Island population, the northern Labrador population, and the Goose Bay, Labrador, population. The critical differences between these populations are summarized in the following key:

KEY FOR THE SEPARATION OF SEVERAL
POPULATIONS OF *Liparis koefoedi*

1. Disc relatively large, comprising 10–13 per cent of the total length. Skin heavily pigmented with brown melanophores. Body firm and opaque, superficial portions not gelatinous and transparent. Caudal fin relatively short, comprising 12–15 per cent of the total length. In small specimens the pigment is distributed so as to form broken bars with intermediate blotches. Tail relatively short, comprising 56–66 per cent of the total length Spitzbergen
Disc relatively small, comprising 8–11 per cent of the total length. Tail relatively long, comprising 59–70 per cent of the total length. In small specimens the pigment is so distributed as to form regular bars which are most evident on the dorsal and anal fins 2
2. Caudal fin long, comprising 15–19 per cent of the total length. Skin sparsely pigmented with black melanophores, the body beneath it correspondingly heavily so. Superficial portions of the body extremely gelatinous and transparent Goose Bay, Labrador (pl. 5, fig. 1)
Caudal fin short, comprising 12–16 per cent of the total length 3

TABLE 47

VARIATION IN DISC LENGTH IN PER CENT OF TOTAL LENGTH IN POPULATIONS OF *Liparis koefoedi*
(Average separation is 92% when a line is drawn between 10 and 11.)

Locality	8	9	10	11	12	13
Spitzbergen and Kara Sea	—	—	2	10	16	3
Ellesmere Island and Labrador	11	15	20	5	—	—

3. Skin sparsely pigmented with brown melanophores, those on the body beneath it correspondingly dense. Superficial portions of the body gelatinous and transparent. Head short, comprising 21–23 per cent of the total length Ellesmere Island
Skin heavily pigmented with brown melanophores, those on the body beneath it correspondingly sparse. Body firm and opaque. Head length 23–26 per cent of the total length Northern Labrador (pl. 5, fig. 2)

It is apparent that, while four distinct populations are under consideration, certain ones are more closely related than others. A clear break exists between the Spitzbergen population to the east and the Ellesmere and the two Labrador populations to the west wherein the latter three have relatively small discs, longer tails, and a different pattern of coloration. With respect to the disc and tail lengths the Greenland specimens align themselves with the western populations. The relationship with respect to color pattern is uncertain.

In the west, the Ellesmere Island and

northern Labrador populations have a short caudal fin in common with the Spitzbergen material, while the long-finned Goose Bay population differs most from the typical (Spitzbergen) material.

The taxonomic level at which the populations differ from one another is found if at the appropriate step in the key above one applies the statistical measure proposed by Ginsburg (1938) to the chief differentiating character. These data, presented in tables 47–50, indicate that each of the four populations differs from the others at the subspecific level and that an exceedingly variable species is being dealt with. Each sample studied appears to represent a different subspecies, which indicates that any nomenclatorial action at this stage of our knowledge would be unwise. Only when collections of this species become more complete can a reasonable decision as to the naming of subspecies be reached.

According to Burke (1930) the only author who has recorded the presence of epidermal tubercles in this species is Lütken (1886). The

TABLE 48

VARIATION IN TAIL LENGTH IN PER CENT OF TOTAL LENGTH IN POPULATIONS OF *Liparis koefoedi*
(Average separation is 87% when a line is drawn between 64 and 65.)

Locality	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
Spitzbergen and Kara Sea	2	1	—	4	7	4	8	5	9	1	2	—	—	—	—
Ellesmere Island and Labrador	—	—	—	1	—	1	1	3	4	9	9	10	7	5	3

TABLE 49

VARIATION IN CAUDAL FIN LENGTH IN PER CENT OF TOTAL LENGTH IN
POPULATIONS OF *Liparis koefoedi*
(Average separation is 87% when a line is drawn between 15 and 16.)

Locality	12	13	14	15	16	17	18	19
Goose Bay	—	—	—	3	8	5	4	1
Northern Labrador and Ellesmere Island	1	—	8	6	2	—	—	—

TABLE 50

VARIATION IN HEAD LENGTH IN PER CENT OF TOTAL LENGTH IN POPULATIONS OF *Liparis koefoedi*
(Average separation is 91.5% when a line is drawn between 23 and 24.)

Locality	21	22	23	24	25	26
Northern Labrador	—	—	3	8	2	5
Ellesmere Island	1	2	3	—	—	—

latter work was not available to me, and the tubercles as found in Labrador material are here described.

The tubercles or "prickles" are less elongate and sharp than any figured by Burke (1930) for several species of *Liparis*. Those of *Liparis ochotensis* (fig. 11, p. 80) most nearly approach those of *L. koefoedi*. The basal portion of the tubercles is somewhat translucent and striate. The base tapers to a tip which is round, smooth, opaque, and white. The tip constitutes from one-half to one-third of the entire tubercle. In specimens showing maximum development, the tubercles are distributed most densely from between the anterior nostrils posteriorly over the top of the head to the origin of the dorsal and on the opercles ventrally to the level of the lower edge of the orbit (a few scattered below). On the body they are limited to a continuation of those on the head and form a patch on either side of the dorsal fin posteriorly to the

fourth or fifth ray and ventrally to the level of the opercular opening. The tubercles are less densely distributed on the outer portion of the dorsal fin and decrease in frequency posteriorly. A few are found on the posterior portion of the anal fin and on the basal portion of the caudal fin. In a series of individuals, showing differences in the degree of development of the tubercles it is seen that this development proceeds posteriorly from the head. The development of the tubercles in relation to sex, size, and sexual development is summarized in table 51, from which it is concluded that the tubercles are associated with sexual maturity in the male.

Liparis tunicatus Reinhardt

This liparid was first reported from Labrador by Kendall (1911) who recorded it from Komaktorvik Fiord (59° 20' N.) as *Liparis truncatus* Reinhardt. Hildebrand (1939) reported the species from Labrador without precise locality data.

"BLUE DOLPHIN" COLLECTION: Kaipokok Fiord (54° 52' N., 59° 50' W.), July 29, 1949, otter trawl in 15 fathoms over mud bottom, one specimen, 69 mm. long.

Parr (1932) suggested that the name *Liparis tunicatus* Reinhardt is possibly a synonym of *Liparis liparis liparis* Linnaeus. If so, the name of the present species would become *Liparis arcticus* Gill.

Liparis sp.

Plate 5, figure 3

A liparid of uncertain position was commonly found on the bottom of the fiords.

"BLUE DOLPHIN" COLLECTIONS: Off South Strand near Pigeon Island (53° 54' N., 57° 04' W.), August 27, 1950, beam trawl in 13 fathoms over sand bottom, one specimen, 23 mm. long. Hamilton Inlet: (54° 15' N., 57°

TABLE 51

TUBERCULATION IN SPECIMENS^a OF *Liparis koefoedi* FROM LABRADOR

Total Length	Sex	Size of Gonad	Tubercles
129	♂	Moderate	Present
132	♂	Moderate	Present
133	♂	Minute	Absent
136	♀	Minute	Absent
140	♂	Minute	Absent
140	♂	Minute	Absent
150	♂	Moderate	Present
166	♂	Moderate	Present
172	♂	Moderate	Present
180	♀	Moderate	Absent
200	♂	Moderate	Present

^a The only specimens included have been those as large as or larger than the smallest with tubercles.

TABLE 52
VARIATION IN THE NUMBER OF FIN RAYS IN CERTAIN POPULATIONS OF *Liparis*

Population	Sample	Dorsal Fin Rays		Anal Fin Rays		Pectoral Fin Rays	
		Range	Mean	Range	Mean	Range	Mean
<i>L. l. bathyarticus</i>							
Spitzbergen	15	37-41	39.6	31-34	32.6	—	—
Jan Mayen	7	39-44	42.0	32-36	34.1	—	—
Barents Sea	1	42	—	35	—	—	—
Norway	2	42-43	—	35-36	—	—	—
<i>L. l. major</i>	2	43	—	35	—	—	—
<i>L. cyclostigma</i>	—	40-44	—	33-35	—	39-43	—
<i>Liparis</i> sp. (Labrador)	11	43-44	43.5	34-36	35.6	36-42	39.3

45' W.), July 20, 1951, plankton net at mid-depth, one specimen presumably this species, 16 mm. long; (54° 15' N., 58° 00' W.), July 22, 1951, beam trawl in 48 fathoms, one specimen, 78 mm. long; (54° 15' N., 58° 01' W.), August 27, 1950, beam trawl in 45 fathoms over rocky bottom, one specimen, 71 mm. long. Kaipokok Fiord: (54° 57' N., 59° 43' W.), July 29, 1949, otter trawl in 45 fathoms over mud bottom, one specimen, 71 mm. long; (55° 02' N., 59° 33' W.), July 29, 1949, otter trawl in 45 fathoms over mud bottom, one specimen 71 mm. long; (55° 05' N., 59° 30' W.), August 1, 1949, otter trawl in 45 fathoms over mud bottom, three specimens, 58-156 mm. long. Hebron Fiord: (58° 09' N., 62° 46' W.), August 9, 1949, otter trawl in 125 fathoms over mud bottom, one specimen, 73 mm. long; (58° 09' N., 62° 56' W.), August 12, 1949, otter trawl in 50 fathoms over mud bottom, two specimens, 68 and 78 mm. long; (58° 11' N., 62° 34' W.), August 8, 1949, otter trawl in 95 fathoms over mud bottom, seven specimens 51-87 mm. long; same position, August 9, 1949, otter trawl in 95 fathoms over mud bottom, eight specimens, 53-67 mm. long.

This liparid may represent a new species or, more likely, be a subspecies in a complex of species and subspecies already described, among which the true relationship is not now recognized.¹ The material much resembles *Liparis cyclostigma*, described by Gil-

bert (1895) from the Bering Sea. The latter species has been reported more recently by Vladikov (1933) from Hudson Bay. *Liparis cyclostigma* is, in turn, closely related to *Liparis gibbus* Bean, also from the Bering Sea, and to several other species from North Pacific regions. To the eastward this material seems to have its closest relationship with *Liparis liparis bathyarticus* Parr (1932), known from Jan Mayen, Spitzbergen, Norway, and the Barents Sea, and with *Liparis L. major* (Fabricius) known only from West Greenland. Meristic and proportional variation for several of these species is shown in tables 52-54.

A comparison of the undetermined Labrador *Liparis* with *L. cyclostigma* shows close agreement in the number of fin rays and in most body proportions; however, the distance from the posterior margin of the disc to the origin of the anal fin comprises 20 per cent of the standard length in *L. cyclostigma*, whereas it comprises only 12 per cent of the standard length in the Labrador unknown. As the discs are of comparable size, this is a function of the origin of the anal fin which is placed more anteriorly in the Labrador material. The resulting broad interspace between disc and anal fin in *Liparis cyclostigma* is quite evident, even in the disfigured material which we have examined.

A considerable difference in color exists between *L. cyclostigma* and the Labrador *Liparis*. *Liparis cyclostigma* is described as being red on the head and body, with cloudy darker markings. The under sides are white. The fins are red and are mottled with black, these black marks taking the form of cross

¹ Since the manuscript of this paper was prepared, additional material has been secured from Hebron Fiord. This species proves to be *Liparis cyclostigma* Gilbert. A discussion of this matter is included in Gordon and Backus (1957).

TABLE 53

COMPARISON OF *Liparis cyclostigma* WITH A *Liparis* SP. FROM LABRADOR
WITH RESPECT TO CERTAIN BODY PROPORTIONS

Character	<i>L. cyclostigma</i>	<i>Liparis</i> (Labrador)
Head length	32 ^a	33
Snout length	12	11
Length of eye	6	5
Interorbital length	12	12
Height over disc	30	28
Disc length	14	13
Anus to anal origin	8	6
Disc to anus	12	6
Length of gill slit	13	11

* All figures are percentages of standard length.

bars on the caudal fin. The Labrador unknown has a ground color of yellowish brown upon which grayish spots and blotches are densely superimposed. These markings are, for the most part, smaller than the eye and are densest anteriorly. The belly is uniformly dusky gray, while the under side of the head is only faintly dusky, thus appearing primarily yellowish. The basic color of the vertical fins is similar to that of the body but is paler. The dark markings of the body continue onto the fins where they are somewhat larger. They are most conspicuous on the outer portions. The pectoral fins are uniformly dusky except for a pale, yellowish region on the upper portion towards the base and a nar-

row light margin. Smaller specimens are similar to the larger in general coloration but are paler underneath and on the pectoral fins. Among small specimens an interesting variant has been noticed in which the dark markings on the body take the form of wavy longitudinal stripes such as have been described for the so-called *Liparis liparis* of the New England coast (Bigelow and Welsh, 1925, p. 343).

An adequate comparison of this form with *L. cyclostigma* is prevented as the latter is known primarily from large specimens, while we have, for the most part, only small specimens of the Labrador unknown. All the material of *L. cyclostigma* that we have examined has been in very poor shape. Collections

TABLE 54

VARIATION IN CERTAIN BODY PROPORTIONS IN *Liparis liparis bathyarchticus*
AND *Liparis* SP. FROM LABRADOR

Character	<i>L. l. bathyarchticus</i> ^a	<i>Liparis</i> (Labrador) ^b
Head length	26-28 ^c	26-28
Snout length	9-12	8-12
Eye length	4-6	5-6
Caudal fin length	12-14	12-16
Pectoral fin length	21-23	18-21
Snout to dorsal fin	24-31	25-31
Snout to anal fin	40-45	36-41
Snout to disc	13-18	13-17
Snout to anus	33-38	31-40
Height over disc	18-23	19-23
Disc length	11-13	11-14

^a Seven Spitzbergen specimens, 69-102 mm. in total length.

^b 15 specimens, 59-101 mm. in total length.

^c All figures are percentages of total length.

of liparids from Ungava and Hudson bays of the sort under consideration should make clear the differences, if any, between these two forms.

Both *Liparis liparis bathyarticus* and the Labrador unknown have longer heads, bigger eyes, and a bigger disc than does *Liparis liparis major*. With respect to the first two characters *bathyarticus* and the Labrador unknown are identical. *Bathyarticus* appears, in the Spitzbergen specimens examined, to have a smaller disc than the material at hand. The Labrador fish has a shorter pectoral fin than either *major* or *bathyarticus* which are comparable in this respect. As in *L. cyclostigma*, the interspace between disc and anal origin is long in *L. l. bathyarticus* when compared with the Labrador *Liparis*, partially owing to the smaller disc in *bathyarticus* but primarily to the short snout-to-anal distance in the Labrador material. With respect to coloration, there appear to be no significant differences between small specimens of each except that *bathyarticus* is somewhat more evenly and deeply brown, possibly owing to the difference in age of the specimens since preservation. The satisfactory determination of the relationship between the Labrador material and *major* and *bathyarticus* rests, in addition to the securing of more large specimens of the Labrador form, on the collection of specimens of various sizes of *major* (known only from a few West Greenland specimens) and on the collection of specimens of *bathyarticus* from Greenland (where it most probably occurs). Unfortunately I have had no opportunity to examine large specimens of *bathyarticus*.

The Labrador form is an inhabitant of the very cold water, having been collected at temperatures from -1.85° C. to -0.8° C. Although Parr (1932) stated that *Liparis l. bathyarticus* occurs most abundantly between 125 and 300 meters at Spitzbergen, specific temperatures were not given.

PLEURONECTIDAE

Hippoglossoides platessoides (Fabricius)

AMERICAN PLAICE

LOCAL NAMES: FLATFISH, FLOUNDER

Labrador records for the plaice north to the northern shore of the Hamilton Inlet were

given by Backus (1951). At the time of that writing the records of the "Cape Agulhas" were overlooked. She took adults and pelagic young from the Strait of Belle Isle north to the 90-fathom bank off Hamilton Inlet in the years 1931-1933 (Newfoundland Fishery Research Commission, 1932, 1933, 1934). Additional material extends the range north to Nain.

"BLUE DOLPHIN" COLLECTIONS: In 1951: Goose Bay, Lake Melville: ($53^{\circ} 22' N.$, $60^{\circ} 14' W.$), August 20, otter trawl in 29 fathoms over mud bottom, one specimen, 290 mm. long; same position, August 28, 27 fathoms, two specimens, 181 and 194 mm. long; ($53^{\circ} 24' N.$, $60^{\circ} 04' W.$), July 7, beam trawl in 30 fathoms over mud bottom, one specimen, 281 mm. long. Lake Melville: ($53^{\circ} 29' N.$, $59^{\circ} 30' W.$), August 25, otter trawl in 80 fathoms over mud bottom with stones, one specimen, 45 mm. long; ($53^{\circ} 29' N.$, $59^{\circ} 59' W.$), August 26, otter trawl in 17-19 fathoms over mud bottom, eight specimens, 116-159 mm. long; same position, August 28, otter trawl in 15-24 fathoms over sandy-mud bottom, 21 specimens, 44-224 mm. long. Nain: ($56^{\circ} 37' N.$, $61^{\circ} 58' W.$), August 7, otter trawl in 45 fathoms over mud bottom, one specimen, 85 mm. long; ($56^{\circ} 37' N.$, $62^{\circ} 10' W.$), August 9, otter trawl in 15-23 fathoms over sandy-mud bottom, one specimen, 81 mm. long.

The temperature at Labrador collection sites ranged from -1.42° C. to 3.0° C., with collections above and below 0° C. about equal in number. The lowest salinities recorded ranged from 20 to 22 per mille.

Hippoglossus hippoglossus (Linnaeus)

ATLANTIC HALIBUT

LOCAL NAME: HALIBUT

Storer (1850) reported the halibut from Red Bay, Strait of Belle Isle. The "Blue Dolphin" collected a specimen at Cut-throat Harbor ($57^{\circ} 55' N.$) in northern Labrador in 1950 (Backus, 1951).

It is reported by local residents that this fish is common on the offshore banks of the coast, e.g., the 90-fathom bank off Hamilton Inlet. It is probably of common occurrence in the deeper and warmer water just beyond the outer edge of the Labrador Current where

Reinhardtius hippoglossoides (Walbaum), the Greenland halibut, as yet unreported for Labrador waters, also undoubtedly occurs.

Limanda ferruginea (Storer)

RUSTY DAB

LOCAL NAMES: FLATFISH, FLOUNDER

Labrador records for this flounder are those of Storer (1850) for Red Bay and Jeffers (1932) for Barge Bay.

"BLUE DOLPHIN" COLLECTION: Forteau Bay (51° 28' N., 56° 54' W.), June 29, 1949, one specimen, 77 mm. long.

All records are from the Strait of Belle Isle which probably represents the northern limit of this species.

Liopsetta putnami (Gill)

SMOOTH FLOUNDER

LOCAL NAMES: FLATFISH, FLOUNDER

Although this species is known north to at least Ungava Bay, there appear to be no Labrador literature records north of the Strait of Belle Isle in which place the "Cape Agulhas" collected the smooth flounder in 1931 (Newfoundland Fishery Research Commission, 1932).

"BLUE DOLPHIN" COLLECTIONS: Assizes Harbor, St. Lewis Sound (52° 14' N., 55° 42' W.), July 14, 1949, one specimen, 195 mm. long. Lake Melville between Haines and St. John islands (53° 55' N., 58° 56' W.), July 12, 1950, two specimens, 164 and 189 mm. long. Salmon River, Kaipokok Fiord (54° 50' N., 59° 51' W.), July 29, 1949, two specimens, 16 and 17 mm. long. Maligiak (56° 37' N., 62° 12' W.), August 9, 1951, five specimens, 47–198 mm. long.

TABLE 55

MERISTIC VARIATION IN LABRADOR
Liopsetta putnami

	53	54	55	56	57	58	59
Dorsal fin rays	2	1	—	1	—	3	1
Anal fin rays	37	38	39	40	41		
	1	1	1	3	2		

Estuarine conditions prevailed at all of the above collecting sites. Meristic variation is given in table 55.

Pseudopleuronectes americanus americanus
(Walbaum)

WINTER FLOUNDER

LOCAL NAMES: FLATFISH, FLOUNDER

The only specific published Labrador record for this flatfish is that of Kendall (1909) who reported the capture of a specimen at Red Bay in the Strait of Belle Isle. Stearns (1883) reported this fish from the "whole coast" but, as was stated before, what Stearns meant by this is not certain. Packard (1891) repeated Stearns' statement but qualified it, saying "whole southern coast." According to Dunbar and Hildebrand (1952) the unpublished manuscript of Lucien Turner on Ungava fishes makes it certain that the specimens of *Pseudopleuronectes* collected by him and since attributed to Ungava Bay came from Rigolet, Labrador. Thus the northernmost record for this species is from Windy Tickle, Labrador (55° 45' N.) (see below).

"BLUE DOLPHIN" COLLECTIONS: St. Mary's River, St. Lewis Sound (52° 18' N., 55° 54' W.): July 12, 1949, one specimen, 233 mm. long; August 31, 1950, one specimen, 193 mm. long. Lake Melville between Haines and St. John islands (53° 55' N., 58° 56' W.), July 12, 1950, six specimens, 92–157 mm. long. Emily Harbor (54° 33' N., 57° 10' W.), July 31, 1950, six specimens, 141–183 mm. long.

The University of Michigan Museum of Zoology has Labrador specimens from Battle Harbor and Windy Tickle.

Meristic variation is shown in table 56.

TABLE 56

MERISTIC VARIATION IN LABRADOR
Pseudopleuronectes americanus

	61	62	63	64	65	66	67
Dorsal fin rays	1	3	1	2	2	4	1
Anal fin rays	44	45	46	47	48	49	50
	1	—	3	3	3	2	2

DISCUSSION

TWELVE SPECIES (about 19 per cent) of Labrador marine fishes have a circumpolar distribution and are true arctic fishes, that is, no water is so cold as to exclude them. They live in the polar basin and in adjacent seas where the water is mainly of polar basin origin. In Labrador they are found mostly below 50 meters. The following species are included: *Boreogadus saida* (south in the western Atlantic to the Gaspé Peninsula), *Lumpenus medius* (south to Labrador), *Gymnelis viridis* (south to Nova Scotia), *Lycodes pallidus* (south to Labrador), *Lycodes turneri* (south to the estuary of St. Lawrence River), *Gymnocanthus tricuspis* (south to Maine), *Myoxocephalus quadricornis* (south to Labrador), *Triglops pingeli* (south to Cape Cod), *Agonus decagonus* (south to Newfoundland), *Aspidophoroides olrikii* (south to Newfoundland), *Eumicrotremus derjugini* (south to Labrador), and *Liparis koefoedi* (south to Labrador).

Three other species (about 5 per cent) have a circumpolar distribution but are probably temperature limited in the negative direction. Two, *Salvelinus alpinus* (southern marine limit in the western Atlantic, northeastern Gulf of St. Lawrence) and *Pungitius pungitius* (south to Cape Cod) appear to escape very low temperatures by living partly in fresh or brackish water. If *Liopsetta putnami*, a euryhaline form found south to Cape Cod, proves conspecific with *Liopsetta glacialis* (Pallas) it would be placed here.

Myoxocephalus scorpius, in its various subspecies, is found around the edges of the polar basin. In the Canadian eastern Arctic it is replaced ecologically as colder waters are entered by *M. scorpioides* and then by *M. quadricornis*. In the western Atlantic *M. scorpius* is distributed south to New York.

Icelus spatula, found in very cold water, is almost circumpolarly distributed (unknown between West Greenland and the Kara Sea).

Five species (about 8 per cent) are found throughout the northern portions of the Atlantic and Pacific oceans. They are *Clupea harengus* (south in the western Atlantic to Cape Hatteras), *Mallotus villosus* (south to Maine), *Gadus callarias* (south to Cape Hatteras), *Gasterosteus aculeatus* (south to Cape

Cod), and *Hippoglossus hippoglossus* (south to Cape Cod). Pacific and Atlantic subspecies are generally recognized for the cod, herring, and capelin. Future researches may show the latter two to be circumpolar, though neither is the extreme cold-water type.

Eight species (about 13 per cent) are essentially arctic American species. *Stichaeus punctatus*, *Eumesogrammus praecisus*, and *Pholis fasciatus* are found between Labrador and the Bering and Okhotsk seas. They are probably continuously distributed across arctic America. *Leptoclinus maculatus* (south to Cape Cod in the western Atlantic) is found from the Barents Sea west to the Bering Sea. *Gadus ogac* and *Myoxocephalus scorpioides* (south to the Gulf of St. Lawrence) are found across arctic America but neither in the eastern Atlantic nor south of Bering Strait. *Eumicrotremus spinosus* and *Arctodiellus uncinatus* are found from the Barents Sea across arctic America but not south of Bering Strait.

Hemitripterus americanus is limited to the western North Atlantic (Labrador to Chesapeake Bay) and to the North Pacific and does not occur in the intervening area.

Eleven species (about 17 per cent) are restricted to the eastern and western North Atlantic. This group may be divided into two sub-groups which I have called subarctic and "boreal." [The existence in western North Atlantic waters of a true boreal fauna comparable to that of Europe has been questioned by Ekman (1935)]. The division between these two sub-groups is somewhat arbitrary.

The subarctic sub-group contains those species which, while not tolerating the very cold water of pure polar origin, must live in water where the polar influence is considerable. Species in this sub-group occur in both East and West Greenland and often in Hudson Bay. To the south they rarely exist past Cape Cod. Included here are *Somniosus microcephalus* (south in the west to Cape Cod), *Raja radiata* (south to Cape Cod), *Lumpenus lumpretaeformis* (south to Cape Cod), *Anarhichas lupus* (south to New Jersey), *Cyclopterus lumpus* (south to Chesapeake Bay), and *Hippoglossoides platessoides* (south to Cape Cod).

The sub-group of "boreal" fishes contains those species that are much less tolerant of the polar influence than the preceding. They may exist where the polar influence is small or absent. These species are not found in East Greenland nor in Hudson Bay. For the most part, they are distributed southward to between New Jersey and Cape Hatteras. Included here are *Squalus acanthias* (south in the west to Cuba), *Salmo salar* (south to Delaware), *Pollachius virens* (south to Chesapeake Bay), *Pholis gunnellus* (south to New Jersey), and *Scomber scombrus* (south to Cape Hatteras). Several species here are rare in Labrador.

Five additional species (about 8 per cent) are tentatively placed in the eastern-western Atlantic group, but their status is imperfectly known. This list includes *Lycodes reticulatus* (south in the western Atlantic to Cape Cod), *Triglops nybelini* (south to Labrador), *Careproctus longipinnis* (south to the estuary of the St. Lawrence River), *Liparis tunicatus* (south to Labrador), and *Thunnus thynnus* (south to Cuba).

Of the species restricted to the western North Atlantic, relatively few are abundant in Labrador, although 15 species (about 24 per cent) are involved. Many of these species find their northern limit in southern Labrador. The rather warm Hamilton Inlet-Lake Melville estuary appears to be the northernmost resort of euryhaline species such as *Anguilla rostrata* (south to Gulf of Mexico), *Osmerus mordax* (south to Virginia), *Gadus tomcod* (south to Virginia), and *Acipenser oxyrinchus* (south to the Gulf of Mexico). *Pomolobus pseudoharengus* (south to Cape Hatteras), *Macrozoarces americanus* (south to Delaware), *Limanda ferruginea* (south to New Jersey), and *Cryptacanthodes maculatus* (south to New York) reach their northward limit in or near the Strait of Belle Isle. Also belonging here are *Salvelinus fontinalis* (anadromous from James Bay to New Jersey), *Aspidophoroides monopterygius* (Greenland to Cape Cod), and *Pseudopleuronectes americanus* (Labrador to Georgia). The following species are imperfectly known and are tentatively placed here: *Lycodes lavalaei* (Labrador south to the St. Lawrence River estuary), *Ammodytes americanus* (Hudson Bay to Cape Hatteras), *Ammodytes dubius* (Green-

land and Hudson Bay to Labrador), and *Liparis atlanticus* (Ungava Bay to Cape Cod).

The distribution of *Anguilla rostrata* and *Aspidophoroides monopterygius* is noteworthy. While there are a number of species found in the eastern North Atlantic and Greenland but absent in the western North Atlantic, these two are among the few that are common to the western North Atlantic and Greenland alone.

The 11 fresh-water fishes of Labrador are all widely distributed forms. *Esox lucius*, *Prosopium cylindraceum*, and *Lota lota* are found in much of northern Eurasia as well as from coast to coast in North America. *Coregonus clupeaformis*, found from British Columbia to Labrador, is represented in Eurasia by a closely related, if not identical, species, *Coregonus lavaretus*. Also distributed from coast to coast in North America are *Salvelinus namaycush*, *Catostomus catostomus*, *Rhinichthys cataractae*, and *Cottus cognatus*. If *Couesius greeni*, which occurs on the western slope of the Rockies, proves to be conspecific with *C. plumbeus*, the latter may be added to the coast-to-coast group. All the above-mentioned species are distributed throughout the Great Lakes but are found little south of this system, with the exception of *Rhinichthys* which ranges to Mexico. The remaining species, *Cottus bairdi* and *Catostomus commersoni*, are found from the Great Plains eastward and south on both sides of the Appalachian chain to Arkansas and Georgia.

The dispersion of fresh-water fishes into Labrador possibly was accomplished by an eastward dispersal from Hudson Bay or a northward and eastward spread from the lower St. Lawrence Valley. All fresh-water species that occur in Labrador are found in Hudson Bay tributaries of western Quebec and St. Lawrence tributaries of southeastern Quebec. Even at the present there appear to be connections between south-flowing tributaries to the Gulf of St. Lawrence and east- and north-flowing tributaries to the Hamilton River system of Labrador. One connection, at least, appears to exist between the Hamilton River and a westward-flowing Hudson Bay tributary. Because of the rather rich fresh-water fish fauna of the Hudson Bay region and the scant one of Labrador, it is possible

that the dispersal into Labrador was mainly accomplished from the St. Lawrence basin, as the fauna in the latter place is of about equal magnitude to that of Labrador. However, as all species in Labrador apparently closely followed the retreating ice sheet, it is possible that the dispersal into Labrador was by an early connection with Hudson Bay

which was severed before the arrival there of the Mississippi Valley fauna now present. A systematic study of the ubiquitous *Rhinichthys cataractae* might contribute evidence to this matter, should that species be broken up into a number of subspecies with different ones in the Hudson Bay and St. Lawrence regions, a situation to be expected.

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