

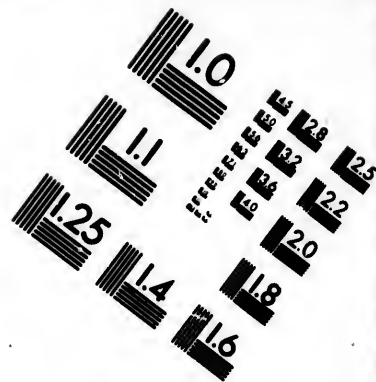
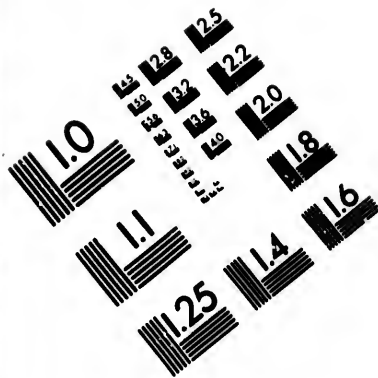
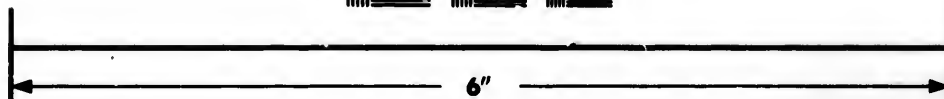
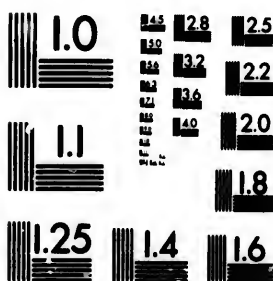


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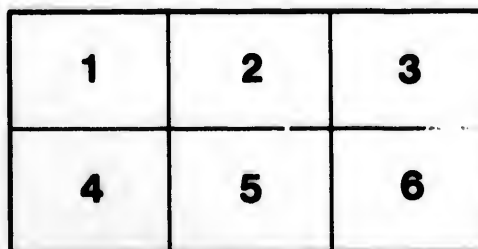
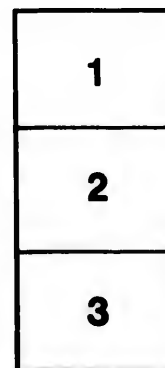
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DESCRIPTIVE CATALOGUE
OF THE
FISHES OF NOVA SCOTIA,

BY THOMAS F. KNIGHT,
AUTHOR OF "NOVA SCOTIA AND HER RESOURCES." (PRIZE ESSAY.)

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PREFACE.

THIS brief treatise on the fishes of Nova Scotia is intended to form one of a series of papers on the Fisheries of Nova Scotia, in all their aspects, historical, economical, commercial, and political. The succeeding papers will be published as circumstances will permit—the ordinary hours of labour being wholly occupied in discharging the responsible duties of a public officer.

This Catalogue is intended to include the fishes known to exist in our waters. There are doubtless many other varieties, and even species, that have never been seen beyond their *habitats*, and have not been brought to the notice of the naturalist.

The next topic will be “The Shore and Deep Sea Fisheries,” embracing, besides those on the coast of Nova Scotia, the valuable fisheries in the Gulf of St. Lawrence, which are enjoyed in common by the British North American Provinces. •

HALIFAX, N. S., October, 1866.

WORKS CONSULTED

IN THE PREPARATION OF THIS CATALOGUE.

THE ANIMAL KINGDOM. By BARON CUVIER and P. A. LATREILLE.

FISHES OF NEW YORK. By DR. J. E. DEKAY.

ZOOLOGY, (FISHES). By W. B. CARPENTER, F.R.S.

DESCRIPTIVE CATALOGUE OF FISHES OF NOVA SCOTIA AND NEW
BRUNSWICK. By M. H. PERLEY, Esq.

AMERICAN ANGLERS' BOOK. NORRIS.

TRANSACTIONS OF INSTITUTE OF NATURAL SCIENCE OF NOVA SCOTIA.

MISCELLANEOUS REPORTS ON BRITISH AMERICAN FISHERIES.

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FISHES OF NOVA SCOTIA.

DESCRIPTIVE CATALOGUE.

"FISHES are defined as vertebrated animals, with red blood; breathing by branchiæ, or gills, through the medium of water."—*Perley*.

Until recently the classification of fishes most generally received, was that of Cuvier, who made this department of Zoölogy his peculiar study. After maintaining its ground as *the* system of ichthyology for many years, this classification has been improved upon by one proposed by Professor Müller, of Berlin, which is said to furnish a much better means of arraying the numerous species of fishes in natural groups; and this is adopted, with some modifications, in the present catalogue. A system still more modern has been proposed by Professor L. Agassiz, in which he seeks to unite fossils with living species, but this system is not accepted by naturalists.

Cuvier divided fishes into two great classes, viz.: the Bony, and the Cartilaginous. These again he subdivided into distinctive groups under each class. In the system of Müller, above referred to, the primary division of the class of fishes, in accordance with the nature of the skeleton, is done away with, as it is found that, by adopting this as the first point in classification, nearly allied fishes are often widely separated. The classification of Professor Müller admits of five primary groups of fishes, which he calls *sub-classes*, but which naturalists have agreed to regard as orders. These orders are—I. SELACHII, including the *Sharks* and *Rays*; the gills are fixed, and the water which has been made use of in respiration passes out through a series of openings corresponding in number to the gills, and placed on the sides at the back of the head. The skeleton in these is always cartilaginous. II. GANOIDEI, or *Enamelled Fishes*, in which the gills are free, like those of the ordinary fishes, and concealed by an operculum, or cover. III. TELEOSTEI, or *Bony Fishes*, with a bony skeleton, complete jaws, and free branchiæ. IV. CYCLOSTOMI, or LAMPREYS, with a cartilaginous skeleton, no true jaws, a round sucking mouth, and

sac-like branchial organs, opening by a series of small holes on each side behind the head. V. LEPTOCARDII, or *Lancet Fishes*, which includes only a single small species.

The third order which comprises the greatest number of species he *subdivides* into six primary groups. These are,—**A.** PLECTOGNATHI, in which the bones of the upper jaw and face are firmly attached to, or amalgamated with, those of the skull. **B.** LOPHOBRANCHII, with the branchial filaments arranged in little tufts along branchial arches, and the face produced into a long snout. **C.** ACANTHOPTERI, with spinous rays in the anterior part of the dorsal fin, or in the first dorsal when there are more than one, and the inferior pharyngeal bones distinct. The air bladder, when present, is completely closed. **D.** PHARYNGOGNATHI, in which the inferior pharyngeal bones are completely amalgamated, and usually armed with teeth. The air bladder is closed. **E.** ANACANTHINI, with no spinous rays in the fins, and a completely closed air-bladder. **F.** PHYRSTOMI, with soft fin-rays, except the first in the dorsal, anal, and pectoral fins, which are occasionally spinous; and an air-bladder which communicates with the pharynx by an open duct. Fishes belonging to the first group of the order TELEOSTEI, are not found in our waters; and only three specimens of the second (which embraces a single family) have been met with.

The classification here referred to and explained, it will be understood, applies to the more general division, as orders, groups, and, in some cases, the families; the genera and species agreeing for the most part with those of Cuvier, except those species which are peculiar to North America, and to which the writer has attached the name of the naturalist who has categorized them. It may be necessary to explain to the unscientific reader that the name applied to each fish (printed in italics) includes both the genus and species: e. g., *Salmo Salar*, Lin. (the Salmon), the first word *Salmo* is the genus, the second word *Salar* indicates the species, and so of all the rest. For the descriptions of the fishes, their haunts, habits, &c., the writer is largely indebted to the late Mr. Perley's excellent catalogue, prepared with much care from a perusal of the best authorities and from personal observation. They are, however, wholly re-written, much condensed, and a more systematic arrangement of the material is attempted. There are also some additions to the list.

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Order I.—SELACHII; Group.—SQUALINA.

Family.—CARCHARIDÆ.

1. *Carcharias Vulpes*, Cuv. (The Thresher Shark.)

DESCRIPTION.—First dorsal triangular, a foot high, and nearly as long as its base; the second dorsal similar in shape, but much smaller, its tail long, broad, and flexible, with which it attacks, and literally threshes its enemies. It is of a slate-blue color above; beneath, soiled white, marked with faint bluish spots. It sometimes attains the length of twelve feet.

This shark is said to be common on both sides of the Atlantic; it is known from New York northwardly by the various popular names of the "thresher," "fox shark," and "swingle tail." It pursues schules of mackarel, moss-bonkers, and shad, which it devours in great numbers. In pursuit of shad it is frequently taken of large size, both in Cumberland Bay and Basin of Minas. It is a great enemy to the small whales in the Gulf of St. Lawrence; in its attacks causing the whale to spring quite out of water, and make the sea foam from the torment he endures.

Family.—LAMNIDÆ.

1. *Selachus maximus*, Cuv. (The Basking Shark).

DESCRIPTION.—Body cylindrical, fusiform, the surface with numerous wrinkles, covered with minute sharp prickles, distributed in small groups. The teeth in the upper jaws, of various forms, recurved, edged, but not serrated; in the lower jaw, seven rows, rather longer than those above. There are said to be fourteen hundred teeth in the lower jaw alone. It is of a dark slate color, and usually exceeds thirty feet in length.

The basking shark inhabits the northern seas, but occasionally visits the American coast during summer. In August 1851, one was captured in the Bay of Fundy, forty feet in length. While in pursuit of herring, it became entangled in a string of herring nets, and while so entangled, was killed after a long and severe struggle.

The basking shark has obtained its popular name from its habit of remaining occasionally at the surface of the water, quite motionless, as if enjoying the influence of the sun's rays, whence on the coasts of Great Britain and Ireland, it has obtained the name of sun-fish. Its large size, and habit of swimming near the surface, with its upper jaw projecting out of the water, has, it is supposed, suggested to the credulous, the idea of the monster called the *Sea Serpent*.

Family.—SPINACIDÆ.

1. *Spinax acanthus*, Cuv. (The Spinous Dog-fish.)

DESCRIPTION.—It varies in length from one to five feet; is of a slate color above, dull white beneath; and is distinguished by several rows of small trenchant teeth, and by a strong spine before each dorsal.

This fish is found everywhere on the coast of North America, from the Delaware to Davis' Straits. In Nova Scotia and Cape Breton it is dried in great quantities, and in the winter is fed to pigs, which are said to thrive well upon it. The livers furnish a valuable oil. It is viviparous.

Order I.—SELACHII; Group.—RAIINA.

Family.—RAIIDÆ.

1. *Raia levis*, Mitch. (The Skate.)

DESCRIPTION.—It is of square form; the body smooth, elevated in the centre; of a uniform light brown color above; the tail long and slender, larger than the body, with three rows of spines. It is found from two to four feet long. It is oviparous.

The skate is found everywhere on the coasts of Nova Scotia, and is frequently taken of large size, with hook and line, by cod-fishers. Its peculiar form adapts it to exist near the bottom; it swims with a slightly undulating motion of its pectoral fins, something between flying and swimming. It feeds principally on crustacea, which it crushes between its flattened teeth. Its flesh is not held in estimation as an article of food, as it is in Europe.

Order II.—GANOIDEI.

Family.—ACIPENSERIDÆ.

1. *Accipenser oxyrinchus*, Mitch. (Sharp-nosed Sturgeon.)

DESCRIPTION.—Body pentagonal; skin rough; the head flattened above, and slightly depressed between the eyes. The whole upper portion of the head bony; the head elongated, spatuliform, and covered with strong bony shields, roughened above and beneath. The upper part of the body is of a grayish brown colour; inferior portion of the sides, silvery; beneath, white. Mouth, beneath, purse shape, with thick folded lips. Length from two to eight feet.

The sturgeon is found in the harbors on the Atlantic coast, and in the Bay of Fundy. It prefers soft and muddy bottoms. It spawns in fresh water, before leaving it in the autumn, to return to the sea. It is said to spend the winter in very deep water, quite

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beyond the reach of nets, and as it has not been known to take a hook, is quite safe from the fishermen. The flesh of the sturgeon is like coarse beef, quite firm and compact, but very rank and unsavoury.

Order III.—TELEOSTEI; Group.—LOPHOBRANCHII.

Family.—SYNGNATHIDÆ.

1. *Hippocampus brevirostris*, Storer. (The short-nosed Sea-horse.)

DESCRIPTION.—Body of twelve segments, heptangular, protuberant, with three rows of tubercular points formed by the junction of the plates on each side, and a single row beneath; the tubercular points become more elevated at the place of the dorsal fin. Jaw tubular, straight, cleft at the extremity. A short tubercle at the base of the jaw above, and connected by an elevated crest to a distinct spine over each eye. On the summit of the head, a large bony protuberance, terminating in five distinct points. The oval branchial apertures behind this protuberance. Nostrils double, round, immediately anterior to the eyes. Eyes prominent. Anal (in the female) with three rays. Tail longer than the body, quadrangular, ending in a blunted point, finless, and composed of thirty-two segments. Color, light brown, with iridescent opercles. Irides, yellow. Length, three to six inches.

This singular fish is chiefly interesting to the naturalist, because of the peculiarities of its organization. By its prehensile tail it is enabled to climb or hold on by the stalks of marine plants. It is only in the dead specimen that the neck acquires the peculiar bend, which gives its head the resemblance to that of a horse, from which its name is derived. It is a fish of warm latitudes, as there are several allied species to be found in the Indian Ocean. It is doubtless exotic, as three specimens only have been found in Nova Scotia.

Order III.—TELEOSTEI; Group.—ACANTHOPTERI.

Family.—TRIGLIDÆ.

1. *Cottus Virginianus*, Stor. (The common Bullhead.)

2. *Cottus Groenlandicus*, Cuv. (The Greenland Bullhead.)

DESCRIPTION.—In the common sculpin the head is broad, equal to one-third the length of the body, and furnished with spines. Mouth large; eyes large, with prominent orbits. The body diminishes gradually from the head, and becomes compressed towards the tail. The *Groenlandicus* has a great angular area on the head, bounded by four tubercles. Color, dark brown, blotched, or marbled with green and yellow. Length twelve to eighteen inches.

The sculpin is very numerous on all the fishing grounds of the Nova Scotia coasts, and is sometimes a great annoyance to line-fishers, who regard it with much aversion. When freshly taken from the water, and irritated, it presents rather a formidable appearance. It is exceedingly voracious, devouring small fish, crabs, and sea-eggs. Besides the two species named, it is believed that there are several other species, as well as some varieties.

3. *Sebastes Norvegicus*, Cuv. (The Norway Haddock.)

DESCRIPTION.—Body oblong, compressed, covered with scales. All the upper part of the body and the fins of a bright carmine red; darker upon the head and back, lighter upon the sides; nearly white beneath; a brown blotch on the posterior part of the opercle. Length of the head from top of lower jaw when closed, to posterior angle of operculum, one-third the length of the fish; top of the head flattened. Eyes very large; pupils black; irides yellow; diameter of eye equal to one-third the length of the head. Jaws armed with numerous, minute, sharp teeth; upper jaw protractile; chin prominent; teeth in vomer and palatine bones. Length, two feet.

This is a northern fish, common to both sides of the Atlantic; on the coast of North America it has been found as far south as New York, where, however, it is very rare. Among fishermen, it is known by the popular names of "red sea perch," "the rose fish," and "the snapper." Mr. Perley believes it to exist along the coast of Nova Scotia, whither it wanders from the north. It is found abundantly on the coast of Newfoundland. It feeds on flounders and other small fish, and takes the hook readily. In Norway, it is eaten largely, being considered a great delicacy. In the deep bays on the southern coast of Greenland, it is caught in great numbers, on baited hooks attached to very long lines. The Greenlanders use the spines for needles.

4. *Gasterosteus biaculeatus*, Mitch. (Two-spined Stickleback.)

DESCRIPTION.—About two inches in length, with two distant spines on the back, and a third near the dorsal; and a strong serrated spine on each side, representing the ventrals.

This diminutive fish abounds in those creeks of Nova Scotia to which the sea has access. It is exceedingly active in its movements, and will throw itself a considerable distance out of water. Its appetite is voracious; it feeds on worms and insects, and the fry and roe of other fish, great quantities of which it devours. The

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gasterostei are very pugnacious, and when confined will destroy each other. They are only worthy of notice on account of their destructive propensities, and because they are sometimes used as bait for larger fish.

Family.—PERCIDÆ.

1. *Perca flavescens*, Cuv. (The American Yellow Perch.)

DESCRIPTION.—Of a greenish yellow above, with golden yellow sides, crossed by seven transverse dark bands, the broadest upon the middle of the body; beneath, white. The back and tail fins brownish; the other fins, scarlet. Length six to twelve inches.

The common yellow perch is considered one of the best known, and most widely distributed of all the fresh water fishes of North America. It is common in almost all the inland waters of Nova Scotia. It is very closely allied to the *perca fluviatilis* of Europe; and, like that fish, is much esteemed by those who cannot obtain salt water species. It is readily transported from one lake, or stream, to another. The general *habitat* of the perch is in lakes and streams, not too rapid. It delights in a clear bottom, with grassy margin, or in rivers overhung with brush, and widening into some lake-like expanse. Here the perch roam in shoals, descending and rising while seeking their food, and shading themselves from the too great heat among the aquatic plants, or under the broad leaves of the white water lily.

2. *Labrax Lineatus*, Cuv. (The Striped Bass.)

DESCRIPTION.—Body cylindrical and tapering, covered with large adhesive scales; upper part of the body silvery brown; lower part of sides and abdomen, a beautiful clear silver color; eight or more longitudinal black bands running the whole length of the fish, the lower ones terminating above the anal fin. Length, one to three feet.

The bass is a salt water fish, ascending fresh water streams to breed in the spring, and for shelter during winter. It is not very abundant in Nova Scotia; but is found in the Basin of Minas, the Basin of Annapolis, and in the rivers which flow into the Gulf of Saint Lawrence. Along the shores of the Saint Lawrence, they often make their appearance in large schules in the early part of September. They keep around the islands, and between the outer bar and the beach in the lagoons, where they are often taken in nets, and also at nights with torch and spear. As the season

advances, and the weather becomes colder they penetrate into bays and arms of the sea, and even ascend the rivers some distance, where they spend the winter resting on the mud, in a half torpid state. After the salmon family, it is the best sporting fish of America. It will take the same artificial fly (scarlet ibis and gold) as is used in salt water for the white or sea trout. It is excellent food, the flesh being very firm, white, and well flavoured.

3. *Labrax pallidus*, Mitch. (The Little White Bass.)

DESCRIPTION.—Body compressed, small, light bluish above, and paler beneath; sides and abdomen white. Base of the ventral and anal fins faint pinkish. First ray of the posterior dorsal nearly as long as the second. A few irregular horizontal bands along the sides perceptible after it has been some little time out of the water. Length three to five inches.

This diminutive bass is best known by its popular name of "white perch." It abounds in the numerous lakes of Nova Scotia, and may be taken with bait or fly. It is always found in localities where there is very little current, if any, and upon a soft bottom, in the vicinity of aquatic plants and weeds. The ordinary weight of the "white perch" is from four to six ounces; in September they are often taken above a half a pound in weight; they are very fine fish for the table, when in season.

4. *Pomotis vulgaris*, Cuv. (The common Pond-fish.)

DESCRIPTION.—The *pomotis* is of a deep green color, mixed with olive, and is easily distinguished by the bright scarlet spot behind the opercle. It is generally from six to eight inches in length.

This description of perch is very common in all those waters in which the yellow perch is found. Among rural anglers it is known as the "sun-fish," from the glittering colors it displays while basking in the sun. It is seldom dressed for eating, being an exceedingly bony, dry fish, but is often caught for amusement.

Family.—SPARIDÆ.

1. *Pagrus argyrops*, Cuv. (Big Porgee.)

DESCRIPTION.—Body much compressed, gibbous above. Scales large, adherent, rounded behind, finely denticulated. Lateral line elevated; facial line sloping, slightly arched over the orbits. Nostrils double, the posterior transversely oval; the anterior nostrils round. Eyes large. Mouth with thick lips, protracile. Upper jaw with six large blunt teeth; on the sides of the jaw two series of flat crowned

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molar teeth. Lower jaw with ten large front teeth. Dorsal fin commences above the base of the pectorals. Pectorals pointed, very branchial. Ventrals robust. Anal fin in a furrow, with three spinous and eleven branchial rays. Caudal fin deeply lunated, rather than forked. Color, deep brownish black on the top of the head, passing into light brown towards the snout. Nape and sides brilliant green, with golden reflections. Irides silvery. A black spot at the upper angle of the opercle; another just above the base of the pectoral fin. Pectorals light yellow. Length, twelve inches.

This fish is seldom found north of Cape Cod. About the year 1833, an attempt was made to introduce them into the waters north of the Cape, but with no success, the water proving too cold to enable them to breed there. The only authority that the writer possesses as to their existence on the coast of Nova Scotia, is the "Official Circular" from Mr. Gidney, the Collector of Sandy Cove, in which it is stated that *porgies* are occasionally seen in St. Mary's Bay. If they are the true *porgies* they have probably strayed from a warmer latitude in pursuit of food. In the United States, where it is found in great abundance, it is considered of excellent flavour, and if less abundant would be highly prized. It is imported in a prepared state into Nova Scotia, and extensively used by our fishermen as bait for mackerel and cod.

Family.—SCOMBERIDÆ.

1. *Scomber vernalis*, Mitch. (The Spring Mackerel.)
2. *Scomber grex*, Mitch. (The Fall Mackerel.)

DESCRIPTION.—Body fusiform, cylindrical, its greatest depth near the ultimate rays of the first dorsal. The first dorsal rises over the ventrals, longer than high, and contains thirteen simple and slender rays; the first somewhat shorter than the second, which is the longest; thence gradually to the last, which is concealed in a deep and narrow fissure, extending backward about a fourth of an inch. Pectorals moderate, acute. Five equidistant finlets behind the anal. Caudal fin deeply forked. Eyes large, nostrils single, nearly equidistant between the eyes and the end of the nose. Tongue pointed, distinct and black. Color, dark steel-blue above, becoming lighter on the sides, and mixed with metallic green near the lateral line. From 24 to 30 vertical deep blue half-bands, often waved, interrupted, and occasionally forming irregular circles. Length 16 to 18 inches. The *Scomber grex*, though with some minor differences, is scarcely distinguishable from the preceding; indeed it is doubtful whether it really is a different species, although Cuvier considered it as different, and he is followed in this opinion by Drs. Mitchell and DeKay. The *Scomber vernalis* is the ordinary mackerel of commerce.

The mackerel frequents the whole Atlantic coast of Nova Scotia; and is abundant on the Gulf coast of Cape Breton. The mackerel fishery of Nova Scotia composes one of its largest exports. In 1865 the export of mackerel from Nova Scotia reached in round numbers the large quantity of 150,000 barrels, realizing perhaps \$1,000,000. Captain Fortin estimates the quantity of mackerel taken by American fishermen on the British coast of the Gulf of Saint Lawrence at 50,000 barrels,—one-third only of the quantity taken by fishermen of Nova Scotia. This fact proves how valuable a branch of industry is contained in the fisheries of the British North American Colonies; and it suggests the adoption of such measures as may secure to the Colonies their natural right to it.

It is now considered settled, that the mackerel is not a migratory fish, but draws off into deep water at the approach of winter, and returns to the shallow water near the shores at the beginning of summer, for the purpose of depositing its spawn.

3. *Thynnus vulgaris*, Cuv. (The common Tunny.)

DESCRIPTION.—It is characterised by very large and long pectoral fins; the tail is crescent-shaped, very wide across the tips. The rays of the first dorsal are very strong, shutting into a deep groove, and, when unexpanded, is perfectly invisible. The scales on the back, in front of the first dorsal, and beneath the pectorals, are very large. Gill-covers exceedingly large, perfectly smooth, of a silvery gray color. The jaws when closed are nearly equal; the tongue large and broad; the gape of the mouth very large. The upper surface of the body is blackish; the sides, silvery; beneath, white. No colored lines or spots; tongue and inside of the mouth black. Irides golden, with greenish reflections. Length from six to twelve feet.

This fish is known by its popular name of "horse-mackerel," and "albicore." It is frequently taken on the Atlantic coast of Nova Scotia, enclosed in the seine with mackerel. It is very destructive to the nets, and sometimes causes the loss of all the other fish in them. The tunny is considered to be a wanderer from more southern latitudes. It is a common fish in the Mediterranean, and has been known and celebrated from the remotest period of antiquity. In Sicily it forms one of the most considerable branches of the commerce of the Island. In France it is much used, and is cooked in a variety of ways. In America its flesh is not held in estimation.

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4. *Xiphias gladius*, Linn. (The Sword-fish.)

DESCRIPTION.—Back and upper part of the sides of a sky-blue color; beneath, silvery grey; surface smooth. The dorsal fin in the young fish is single; in the adult it becomes effaced in the middle, and forms two distinct fins. The upper jaw is prolonged into a flattened sword; the edges, bluntly trenchant, approach each other, and terminate in a blunt point. The lower jaw is short and pointed; the gape of the mouth extends behind the orbits. It has no teeth; but slight asperities may be felt on the lower jaw, and velvet-like teeth in the throat. The tail, like that of the tunny, is crescent-shaped, with 17 rays. Length, from ten to fifteen feet.

This fish is met with along the Atlantic coast of North America. It is usually discovered by the projection of its dorsal fin above the surface of the water, when in pursuit of mackerel, upon which it feeds. They are taken by means of an instrument called a "lily-iron," from the form of its shaft, or wings, which resemble the leaves of a lily. This instrument is thrown like a harpoon, with great force into the fish, the attempt being always made to strike it in front of the dorsal fin. On the coast of the United States the flesh of the sword-fish is eaten both fresh and salted. Before being pickled, the flesh is cut into slices, and it is said to remain good for a year; in Massachusetts several hundred barrels are put up annually. The greatest number of them are taken off Martha's Vineyard. The sword-fish has been frequently seen off the Atlantic coast of Nova Scotia, but it is seldom taken.

5. *Rhombus triacanthus*, DeKay. (The Short-finned Harvest Fish.)

DESCRIPTION.—Body elliptical, much compressed; its height one half of its length nearly. Scales small, orbicular, caducous. Along the back, on each side of the base of the dorsal fin, is a series of round holes, the orifices of mucous ducts. Eyes large. Nostrils double; the posterior a vertical slit. A single series of minute crowded teeth in both jaws. Fine crowded teeth on the pharyngeal. Tongue large, spotted, smooth, free. The dorsal fin has three spinous, and forty-five rays. Pectorals long and pointed. A moveable spine anterior to pectorals, and another spine or plate occupying the place of the ventrals. Caudal fin deeply forked. Color, bright metallic green, blue, and golden; deep blue on the back. Head and opercle golden green; belly and anal, in certain lights, giving a glistening pinkish hue. Irides bluish and white. Length seven to nine inches.

Their known geographic range is at present limited. Dr. Storer speaks of them as being so abundant at Cape Cod as to be used as manure. This fish is identified by Dr. Gilpin, of Halifax, as existing on the coast of Nova Scotia.

Family.—BLENNIIDÆ.

1. *Anarrhicas lupus*, Linn. (The Wolf-fish.)

DESCRIPTION.—The general color of this fish is a leaden gray. It has 11 or 12 broad black bands on the sides, becoming indistinct towards the tail; the belly is of a brownish ash-color, tinged with pink. Its ferocious-looking cat-like head, and exceedingly coarse thick skin, covered with slime, gives it a hideous appearance, and renders it an object of disgust. It possesses no ventral fins, and the jaws and palate are armed with large tubercular teeth. Its usual length is from thirty inches to five feet; but in high northern latitudes it is said to attain the length of six and eight feet.

This fish is often caught at the entrance of the Bay of Fundy, and is caught at all seasons along the Atlantic coast of Nova Scotia. The voracious and savage character of the wolf-fish is apparent from its formidable array of teeth, and its vicious propensities when first drawn from the water. Its body, though massive, is adapted for active and energetic motion; and its powerful bite makes it a very formidable enemy. The food of the wolf-fish consists of crustaceous and testaceous animals, which its powerful jaws and rounded molar teeth enable it to break down sufficiently for its purpose. It is said to spawn in May or June, among rocks and reefs, near which it is generally caught.

Family.—GOBIIDÆ.

1. *Lumpus vulgaris*, Cuv. (The common Lump-fish.*)

DESCRIPTION.—This fish is characterized by the ventrals being united in a disc or cup-shaped form. The body is deep and rough, with bony tubercles; it is soft and flaccid, resembling a lump of jelly. By means of its cup-shaped ventrals, it adheres so firmly to any solid substance as to be removed with difficulty. It varies in length from ten to twenty inches.

In the spring it is taken in considerable numbers near the harbour of Halifax, the largest weighing about five pounds. It approaches the shores at this season to deposit its spawn. They are taken of two different colors; the one variety being of a dark blue, approaching to black, and the other quite red. Those of a red color only are used as food; they are considered good by many,

* This curious fish, as well as the sucking-fish, is placed by Cuvier in the same order with the Gadites and the Flat-fishes. DeKay affirms that the position of the sucking-fish (a fish of like characteristics) in this order is doubtful. So that, following Professor Müller, I have good reason to conclude that the lump-fish is rightly placed here.

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although very fat and somewhat oily. The dark-colored variety is considered very inferior, and is not eaten. The lump-fish feeds principally on the young of other fish, of which it devours great quantities.

Family.—LOPHIIDÆ.

1. *Lophius Americanus*, DeKay. (The American Angler.)

DESCRIPTION.—This fish has a very disgusting appearance, and its monstrous form has given rise to many popular names, such as "sea-devil," "fishing-frog," "bellows-fish," "goose-fish," "monk-fish," and various others. The family to which he assigns the genus *Lophius*, is designated by Cuvier, PEDICULATED PECTORALES, from the peculiar formation of the pectoral fins, which are palmated, and shaped not unlike the hand of a child; by these and the aid of the ventrals, which from their position perform the office of hind feet, the fish can creep on the bottom like a little quadruped. The head of this fish is wide, depressed; the mouth nearly as wide as the head. Upon its head are two long slender appendages, at the end somewhat resembling a little fish which, while crouching close to the ground, it moves about so as to lure its prey, as with a bait, and thence it derives its name. The numerous double rows of teeth, some recurved and conical, and others long and acute, give the enormous gaping mouth a frightful appearance. The color of the whole upper surface of the body is brown; fin membranes darker; under surface of the body, ventral and pectoral fins, white; tail dark brown, almost black. Its common size is about three feet.

The Angler is found all along the coasts of Nova Scotia and New Brunswick. Several specimens were seen in November, 1850, on the shores of Annapolis Basin, near Digby, where they were thrown up by a severe storm. They are said to abound in the Annapolis Basin, and to be very destructive to the shoals of herring which resort there. These fish are never eaten, but they are sometimes opened for the sake of the numerous fishes found in their stomachs, which are monstrously large, as compared with the length of the fish.

In the Museum of the College of Surgeons in Dublin, there is a skeleton of an Angler about two feet and a half in length, in the stomach of which is the skeleton of a cod, two feet long, in whose stomach again are contained the skeletons of two whittings of the ordinary size; and in the stomach of each whiting, when it was first examined, there lay numerous half-digested little fishes.

Order III.—TELEOSTEI ; Group.—PHARYNGOGNATHI.

The fishes of this group, consisting of but four families, are sometimes furnished, like the preceding group, with spinous rays in the dorsal fin, whilst in other cases these rays are wanting. By Cuvier and the subsequent writers, therefore, these fishes were divided between the two principal groups of spinous-finned and soft-finned. Owing to the peculiar structure of the inferior pharyngeal bones, they are made by Professor Müller to comprise a separate group.

Family.—LABRIDÆ.*

1. *Ctenolabrus ceruleus*, DeKay. (The Sea Perch, or Cunner.)

DESCRIPTION.—There is scarcely any fish whose colors are so variable.

In the smaller individuals the general color is blue, more or less mixed with brown; and faint, dusky, transverse bars may frequently be seen. In the larger fish, such as are twelve inches long, the colors are bright and showy, a light orange-colored tint pervading the whole body; the head and gill-covers of a beautiful chocolate color, mixed with light blue; the fins of a blue, more or less brilliant. The jaws are covered with thick fleshy lips, whence the family derives its name of *labrus*, lipped, that is, thick-lipped fishes.

This fish is common on the Atlantic coast of North America, from Delaware Bay to the shores of Newfoundland, and is known by a variety of names. In New York it is called the "bergall," a name of Dutch origin; and also the "chogset," derived from the Mohegan dialect. On account of its prevailing color, it is often called "blue-fish." At Boston, where this fish is taken in myriads, it is called "blue-perch;" but among eastern fishermen generally it is known as the "cunner." Their haunts are deep pools among rocks, where they hide themselves in *fuci*, and are said to feed chiefly on crustacea. On the coast of Maine and Massachusetts they are taken with rod and line. They are skinned before being dressed; they are sweet and palatable as food. They are very plentiful in the Gut of Canso, and abound everywhere on the Atlantic and Gulf coasts of Nova Scotia, but being of small size, are very little esteemed.

* There is a species of this family which is very abundant on the coast of the United States, and has even found its way in small numbers to the Bay of Fundy. The writer cannot, however, learn that it has been caught on the Nova Scotia shore. This fish is called the TAUTOG, or BLACK-FISH (*Tautoga Americana*), DEKAY. It is well known at Boston and New York; is a savoury fish, affording equal pleasure to the angler and the epicure. Mr. Perley states that it has occasionally been exhibited for sale in the fish-market of St. John, N. B.

Order III.—TELEOSTEI; Group.—ANACANTHINI.*

Family.—GADIDÆ.

1. *Morhua vulgaris*, Linn. (The common Cod.)

DESCRIPTION.—This fish is well known as an article of food in nearly every part of the world. Among fishermen it is designated the bank cod. It is always a thick, well-fed fish, and often attains a great weight,—sometimes 70 or 80 pounds, and even more. The color varies much in individuals, but is generally a greenish brown, fading into ash color when the fish is dead, with many reddish-yellow spots; the belly, silvery opaque white; the fins pale green; the lateral line dead white.

This fish is taken from the coast of Maine northwardly, as far as man has penetrated. It is very abundant off the coast of Nova Scotia, and on the various banks; and in the Bay of Fundy. It forms the staple of the Nova Scotia fisheries. The value of cod exported in the years 1864–5 was \$1,411,317. The value of other varieties of the cod family—hake, haddock, pollock, &c.—exported in that year was \$214,594. The cod is an exceedingly voracious fish. It attacks indiscriminately everything in its way, devouring smaller fish, crustacea and marine shell-fish. Mr. Perley remarks, "Its stomach is the great repository from which naturalists have lately obtained so many rare and undescribed species of shells inhabiting deep water, and which are unattainable by any other means."

2. *Morhua Americana*, Storer. (The American Cod.)

DESCRIPTION.—This species is slightly, though permanently, distinct from the common or bank cod. The back is of a light olive green (becoming pale ash in the dead specimens), covered with numerous reddish or yellowish spots to a short distance below the lateral line, which is an opaque white throughout its whole extent. There are several varieties of the American cod, the most usual of which are the *arenosus*, or shoal cod of Dr. Mitchell, with a greenish brown hue, and inconspicuous spots; and the *rupestris* or rock cod of the same author, of a smaller size, with a reddish hue, occasionally a bright red.

The American cod ranges from New York northwardly, along the whole coast of North America; to the Saint Lawrence. Fine specimens of the *rupestris* or rock cod may be seen in the fish-market of Halifax, during the season; their quality is admirable.

* See p. 6, for characteristics of this group.

3. *Morrhua pruinosa*, Mitch. (The Tomcod.)

DESCRIPTION.—Head small, and flattened above; the abdomen prominent; the tail long and slender; the cheeks lustrous. Length from four to twelve inches. The colors of the tomcod vary greatly, scarcely any two individuals being exactly alike; five varieties have been noticed, and it is thought the number may be still further increased. Its general color is olive green above, with irregular streaks and blotches; beneath, silvery white.

This fish ranges the whole American coast, from New York northwardly; it is taken on the shores of Nova Scotia and New Brunswick throughout the year. It is a savoury fish, and may be taken in large quantities with the greatest ease. As it seizes almost any bait greedily, it is a great source of amusement to juvenile anglers everywhere. It frequently ascends rivers, even into fresh water. In the early part of winter, after the first severe frost, it becomes very abundant in the mixed waters of estuaries, and hence the name of "frost-fish," which is frequently applied to it. At that season it is in fine condition, and is consumed in large quantities.

4. *Morrhua æglefinus*, Cuv. (The Haddock.)

DESCRIPTION.—The distinctive color of the haddock is blackish brown, above and silvery gray below the lateral line, which is jet black. The back and sides are varied by purplish and gold gleams, which disappear very soon after the fish is dead. The body is stout forward, and tapering backward; the head large and arched; the eyes large; the lower jaw the shortest.

The haddock is found everywhere on the American coast, north of New York. It is abundant in the harbours of Nova Scotia, both in the Atlantic and in the Bay of Fundy. It spawns early in spring, and the young are said to be six inches long in September. Its food is small fish, crustacea, and almost any of the inferior animals of the deep. Haddock swim in immense shoals, and are prone to change their ground after having arrived. When their numbers are considered, the consumption of food, even in a short space of time, must be enormous; and this may be one reason for their seeking new localities. The haddock is an exceedingly fine fish when eaten fresh. It is to a limited extent prepared in the same manner as the Finnan haddocks of Scotland.

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5. *Merlangus* carbonarius*, Cuv. (The Coal-fish or Pollock.)

DESCRIPTION.—Upper part of the head, and the back above the lateral line, are almost black; beneath that line (which is silvery white) the fish is much lighter in color, becoming grayish white, with golden reflections on the sides and belly; the head tapers to the snout; the upper jaw rather the shortest; the mouth black; the teeth very small. From its beauty of form and quickness of motion, the Bay of Fundy fishermen often call it the "sea salmon."

The pollock is one of the few fishes that range on both sides of the Atlantic. It is a northern fish, and the coast of New York is assigned as its southern limit on this side the Atlantic. It is found far to the north, and was the only fish met with by Lord Mulgrave on the shores of Spitzbergen. Mr. Perley remarks that he had not seen in the Gulf of St. Lawrence a single specimen of this fish; nor had he ever met a fisherman who had taken one within the Gulf, except near the northern end of the Strait of Canso. In the Bay of Fundy the pollock abounds almost everywhere, except in the muddy waters of Cumberland Bay, and the Basin of Minas.

The season for spawning is early in spring; in the early part of summer the fish is lank and worthless. It becomes in good condition in August, and improves as the season advances; it then prowls after prey in large companies. It swims at no great depth, and when attracted by bait, will keep near a boat or vessel until all are taken.

6. *Phycis Americanus*, Storer. (The American Hake.†)

DESCRIPTION.—It is of a reddish brown color, with slight metallic reflections on the cheeks, and a dark patch between the orbits; abdomen lighter, mixed with gray. It has one barbule under the chin; the ventral fins are simple rays, divided or forked, one of the divisions larger than the other. Head pointed, flattened above; snout prominent; the upper jaw projects beyond the lower; both jaws are arched with several rows of sharp, incurved teeth, which render necessary an armature of six or eight inches above the hook, as this fish readily bites off a common cod-line.

The geographical range of this fish appears to be from Cape Cod, northwardly. It is taken largely on muddy bottoms, both in the Bay of Fundy and in the Gulf of St. Lawrence, chiefly by fishing

* There is another species of the *Merlangus* which is taken on the Nova Scotia coast; but it is by no means abundant. It is generally called the *whiting* by the fishermen who bring it to the Halifax market. It is thought to differ from the "whiting" of Europe (*Gadus Merlangus*).

† There is another species of Hake which is found in the Bay of Fundy, called the Silver Hake (*Merluccius albidus*); it abounds off Cape Cod, but it is nowhere esteemed as a food fish, although sometimes called the "whiting."

during the night, at which time it feeds on the smaller crustacea, with which its stomach is generally found to be filled. It is sometimes called "ling" by the fishermen; but though classed by Cuvier with the Ling tribe, it appears to differ in many points from the Ling of Europe (*Gadus molva*).

7. *Brosmius vulgaris*, Storer. (The Torsk, Tusk, or Cusk.)

DESCRIPTION.—The color of the body is a uniform dark slate; the head rather darker than the body. The mouth large; the jaws filled with large recurved teeth; the upper jaw is a very little longer than the lower; a single barbule under the chin. The dorsal fin begins well forward on the fish, and terminates just in front of the tail; the anal fin is continued to the tail, and nearly joins it. The caudal fin is round, and, like the dorsal and anal fins, is margined with blue and edged with white. This latter peculiarity renders the torsk, or cusk, easily distinguished among all other members of the cod family. Its length is from eighteen inches to three feet, which it rarely exceeds.

This is a northern fish, and its southern limit on the North American coast is Massachusetts Bay. It is taken in deep water while fishing for cod, and is said to prefer a rocky bottom on which sea-weed grows. It is much more rare on our coasts than most of the other species. Dr. Storer is of opinion that the torsk of America cannot be distinguished from the torsk of Europe, although Lesueur conceives there is a difference, and designates the American species *B. flavescens*. In Europe this fish rarely appears below 60°, or above 73°, north latitude. It is plentiful on the coast of Norway, as far as Finmark, and also on the west and south coast of Iceland, but rare on its north and east coast.* The torsk is the finest of the cod family as an article of food.†

Family.—PLEURONECTIDÆ.

The fishes of this family present several remarkable peculiarities of structure, by which they are distinguished from all other fishes. Their body is extremely compressed or flattened at the sides; the animal, however, does not habitually swim with these sides erect in the water, but usually lies flat on the bottom, one side being in contact with it, and the other being directed upwards. The lower

* This fish is sometimes called the Ling in Europe (Cuvier and Latreille, p. 211, Note). The name Ling is also applied to it by some of our fishermen; but the proper "Ling" has two dorsal fins and two barbels on the upper jaw, and the fins are without the peculiar coloring of the torsk.

† The *Lota lota* (Spotted Burbot, or Freshwater Cusk) is said to occur in the lakes of Nova Scotia. It is often met with in New Brunswick in common with the "white fish" and "great grey trout."

side is generally white, whilst the upper is brown of various hues. Both eyes are placed on the same side of the head. In some of the individuals the eyes are placed on a different side from their usual situation, and these are termed *reversed*; more rarely it happens that both sides are colored, when they are said to be *doubled*. The fish is said to be *dextral* or *sinistral*, according as the colored side is on the right or left hand, when held with its tail to the observer and the dorsal fin uppermost. All the fishes of this family are very tenacious of life.

1. *Hippoglossus vulgaris*, Cuv. (The Halibut.)

DESCRIPTION.—Body elongated; breadth to the length as one to two and a half nearly; smooth, covered with minute oval scales. Eyes moderate, dextral. Gape of the mouth, large. Lower jaw longer than the upper, and both with large fleshy lips. Teeth in a double row in both jaws, robust, distant, acute. Branchial rays, seven. The dorsal fin commences above the eye, and ends near the caudal; pectoral oblong; ventrals beneath the base of the pectorals; first rays of the anal shortest, increasing in length to the seventh or eighth ray, thence diminishing and coterminous with the dorsal; caudal fin crescent-shaped. Length one to eight feet.

On some parts of the coast of Nova Scotia this fish is found in such abundance, and of so large size, that the localities are avoided by those engaged in cod-fishing, as a boat or small vessel becomes soon heavily laden. From some ports of Nova Scotia a considerable trade in halibut is carried on with the United States. The halibut is very voracious; it swims near the ground, and devours other flat-fish as well as shells and crustacea. In summer it is caught in shallow water, and often quite near the shore; in winter it retires to deep water. The flesh is somewhat coarse and dry, but is much esteemed by many; the fins and flaps are delicacies if the fish is in good condition. It sometimes attains the weight of five hundred pounds.

2. *Platessa plana*, Storer. (The common Flounder.)

3. *Platessa pusilla*, DeKay. (The Sand-flounder, or small Dab.)

4. *Platessa limanda*, Cuv. (The Fleuk, or common Dab.)

DESCRIPTION.—The first, or common flounder, is from six to eighteen inches in length; the eyes and colored surface are on the right. The color is variable; some are greenish, others slate-colored, but generally rusty-brown prevails. The next species, the sand-flounder, or small dab, is a little fish from four to six inches in length, nearly

of a uniform olive brown; the eyes and colored surface on the right; found in shallow and sandy bays and coves. The third species, the fleuk, or common dab, as it is called in Scotland, is readily distinguished from the common flounder, by its more uniform and lighter brown color, its more curved lateral line, and the greater roughness of the scaly surface. The eyes and color are on the right side; it is from eight to twelve inches in length.

These several species of flat-fish are found everywhere on the coast of Nova Scotia; and it is probable that other species exist. They are not much esteemed as an article of food.

Family.—AMMODYTIDÆ.

1. *Ammodytes Americanus*,* DeKay. (The American Sand-launce.)

DESCRIPTION.—The head and body above are bluish brown, intermixed with silvery and light green; beneath this, the sides and abdomen are silvery: the whole fish has a beautifully brilliant appearance. The usual length of this fish is from six to twelve inches.

It is found everywhere on the coasts of Nova Scotia, chiefly on beaches under stones. At Newfoundland, and on the coast of Labrador, the sand-launce is used largely as bait for cod. As more palatable species are easily obtained, they are not used as food. The cuttle-fish is said to prey upon them voraciously.

Order III.—TELEOSTEI; Group—PHYSOSTOMI.

In this, the last group of the bony fishes, the air-bladder is connected with the pharynx by a sort of duct, a character which only occurs elsewhere amongst the Ganoidei. Their fins are always supported by soft rays, but in some cases the first ray of the dorsal, anal, and pectoral fins is spinous. The ventral fins, when present, are always situated on the abdomen. This group includes nearly the whole of our freshwater fish, and many of the most valuable species which inhabit the seas.

Family.—SILURIDÆ.

1. *Pimelodus catus*, DeKay. (The common Cat-fish.)

DESCRIPTION.—Body elongate, depressed before the anterior dorsal, compressed behind. Head flattened, smooth declivous. The anterior nostril near the edge of the upper lip; the posterior nearly equidistant between the snout and the eye, with a short erect barbel on its

*The elongated form of this fish caused it to be classed amongst the Eels, by Cuvier. It is distinguished from the Eels by the freedom of its opercules, and by its general structure.

anterior margin, and partially concealing it. Depending from the upper jaw are two thick fleshy barbels, which reach to the middle of the pectorals. Four filaments under the lower jaw. Body smooth, scaleless. Color, dusky, becoming darker on the back and upper part of the head. Length six to ten inches.

This unsightly fish is found in all those ponds and streams where the yellow and white perch are taken, and is sometimes called the "horned pout." The cat-fish is not eaten in Nova Scotia, but in the States of Maine and Massachusetts it is highly esteemed as an article of food, and by many preferred to every other species of freshwater fishes, except trout; it is usually fried, the skin being first removed.

Family.—CYPRINIDÆ.

The Carp family is exceedingly numerous, both in species and individuals. They are inhabitants of the fresh waters, and feed upon aquatic plants, worms, and insects; a few of them also feed upon small fishes. The bream, roach, chub, dace, all common in England, belong to this family. A few species only are known to exist in Nova Scotia.

1. *Catostomus communis*, Lesueur. (The common Sucker.)

DESCRIPTION.—Body long, rounded, and tapering; the head dark green above, verging to black; the cheeks bronze and golden. The upper part of the body dark purplish, with pink and metallic tints on the sides, frequently of a resplendent golden hue, extending over the abdomen; beneath, white. The head is smooth, and without scales; the mouth protractile, with thick puckered lips; the lower lip two-lobed. Length, ten to fourteen inches.

The sucker is common to the inland waters of Nova Scotia. Its peculiarly formed mouth, by which it fastens itself to rocks and stones, has given origin to its name. It is not used for food.

2. *Leuciscus cephalus*, ———. (The Chub.)

3. *Leuciscus astronotus*, Storer. (The Brook Minnow.)

Mr. Perley remarks that the chub is well known in every river and stream of New Brunswick and Nova Scotia. "It is taken of all sizes, from four to sixteen inches. In the River Saint John, in the Miramichi, at Boiestown, and in the Hammond River, the writer has taken chub by fly-fishing, weighing three pounds and upwards. The chub also takes bait readily, but is a timid fish; the largest,

if once disturbed or frightened, will not bite again for some time. It is considered a coarse fish, but those of large size, eaten fresh, are very palatable" (Perley).

Mr. Perley enumerates five other species of the *Leuciscus*, found in New Brunswick, viz.: *L. chryssoleucas*, the yellow shiner; *L. cornutus*, the red-fin; *L. pulchellus*, the roach dace; *L. argenteus*, the shining dace. But the writer cannot learn that any other than the minnow is common in Nova Scotia. This very little fish is found in almost every brook in great numbers. It is usually about an inch and a half in length, and has three bands on its sides, running longitudinally. It is caught only as a bait for larger fish.

4. *Fundulus fasciatus*, DeKay. (The striped Killifish.)

DESCRIPTION.—Length from one to three inches; the sides of a brassy yellow, tinged with green. It presents much variety in its markings, having from twelve to eighteen blackish bars, often obscure, and two to five longitudinal stripes.

Its popular name is derived from its abundance in creeks and estuaries, which the Dutch settlers at New York termed "kills." It is also known by the Indian name of "mummachog." It abounds in all the salt water creeks and bays of Nova Scotia. It is taken only as bait for other fishes.

Family.—SALMONIDÆ.

1. *Salmo salar*, Linn. (The Salmon.)

DESCRIPTION.—Form, an elongated ellipse, its greatest breadth in front of the dorsal fin. The head of a male fish is nearly one-fourth of its length, exclusive of the caudal, that of a female is not much more than a fifth. The lateral line is straight, as in all the Salmonidæ. There are twelve branchial rays. The pectoral fin, which has thirteen rays, is a pearly gray, with the first ray black; ventrals grayish white, with nine rays; and roseate white, with nine rays; dorsal dark pearly blue, with twelve rays; the caudal is slightly lunate, and has eighteen rays, exclusive of the rudimentary rays. There is a cartilaginous projection on the tip of the lower jaw in the male fish, which closes into a cavity in the snout. The eye is one-third distant between the snout and posterior margin of the opercle. There are sharp short incurved teeth on the palate, maxillaries, pharynx, and tongue. Color: back of greenish blue; sides light silvery gray; belly white; head dark blue, steel above; two or three dark spots on the opercle.

The salmon, honest Izaak Walton justly calls "the king of fresh water fish." As in Europe, so in America, it is agreed that there

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is but one species—*Salmo salar*—THE SALMON. And the salmon of Europe and that of America is identical.

The salmon enters the rivers of Nova Scotia during the latter part of April; the female salmon first; the male fish follows about a month later than the female; and lastly, come the grilse, or young salmon, which continue to ascend during July and August. They swim with great rapidity. Before entering the rivers they live a while in the brackish water of the tide-ways, as they do also when they descend to the sea, to render the change from one to the other less abrupt. The spawn is not deposited until the water is greatly below its summer temperature. Professor Agassiz has stated that 42° Fahrenheit is the temperature at which salmon usually cast their ova. Before depositing its spawn, the salmon makes a furrow with its nose in the gravelly bed of the river; and its eggs, when deposited in this, are carefully covered up.

A series of interesting and carefully conducted experiments in Great Britain have, within a few years, led to a much more accurate knowledge of the habits of the salmon, than was before possessed, and corrected many erroneous impressions. It has been found that the eggs of the salmon are hatched in 114 days, when the temperature of the water is at 36°, in 101 days when it is at 43°, and in 90 days when it is at 45°. At the end of two months the young fish attains the length of an inch and a quarter; at the age of six months it has grown to the length of three inches and a quarter. In this state the fry are called parrs, and remain a whole year in the fresh water, not going down to the sea until the second spring after being hatched. The parr is well known to sportsmen, who, if uninjured, will immediately return them to the stream. When the parr has attained the length of seven inches, the dark bars and red spots give place to a brilliant silvery appearance. It is then termed a salmon smolt. The fish now evinces a most anxious desire to visit the sea, and will surmount every obstacle to accomplish its purpose. Its growth now is rapid; a smolt of six or seven ounces weight, after two or three months in the sea, returning a grilse of four or five pounds weight.

The food of the salmon, it is now determined by eminent naturalists, consists of the eggs of *echinodermata* and *crustaceae*, this rich aliment giving the color and flavor, for which its flesh is so highly prized.

2. *Salmo fontinalis*, Storer. (The Brook Trout.)*

DESCRIPTION.—The trout is so well known that, like the salmon, it scarcely needs a description. The principal characteristics of this species are—the vermillion dots and larger yellow spots in the vicinity of the lateral line, and the tri-colored fins, these being blackish on their edges, broadly bordered with white, and the rest scarlet.

Nearly every lake and stream in Nova Scotia is furnished with a greater or less number of this species of the salmon family. It is taken of all sizes, from six to twenty inches. The brook trout is a migratory fish; when in its power, it invariably descends to the sea, and returns to perpetuate its species, by depositing its spawn in the clearest, coolest, and most limpid waters it can find. The opinions of Mr. Herbert ("Frank Forrester"), that there is but one distinct species of the brook trout in North America cannot be disputed. Various causes have been assigned for the great variety in the color of the brook trout. One great cause is the difference of food: such as live upon fresh-water shrimps and other crustaceæ are the brightest; those which feed upon May-flies and other common aquatic insects are the next; and those which feed upon worms are the dullest and darkest of all. The color and brilliancy of the water has also a very material effect. The fish of streams rushing rapidly over pebbly beds are superior, both in appearance and quality, to those of ponds or semi-stagnant brooks.

"The brook trout," says "Frank Forrester," "is one of the most beautiful creatures in form, color, and motion, that can be imagined. There is no sportsman actuated by the true animus of the pursuit, who would not prefer basketing a few brace of good trout to taking a cart load of the coarser and less game denizens of the water. His wariness, his timidity, his extreme cunning, the impossibility of taking him in clear and much fished waters, except with the slenderest and most delicate tackle—his boldness and vigor after being hooked, and his excellence on the table, place him, without dispute, next to the salmon alone, as the first of fresh-water fishes. The pursuit of him leads into the loveliest scenery of the land; and the season at which he is fished for is the most delightful portion of the year."

* There is a species of the Salmonidæ occasionally taken in some of our lakes which I have not seen; but which Dr. Gilpin has assured me is the *Salmo confinis*. It is usually called "the white fish;" and perhaps the following definition of the *Salmo confinis*, by DeKay, may serve to describe it: "Blackish, with numerous gray spots. Body robust; correspondingly short in proportion to its depth. Caudal fin with a sinuous margin. Length two to four feet."

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In these Lower Provinces brook trout scarcely exceeds three pounds in weight; and no well-authenticated case is on record of one having reached the weight of six pounds.

3. *Salmo trutta*, Linn. (The Salmon Trout, or White Sea Trout.*)

DESCRIPTION.—The body of the salmon trout is rather deep for its length; the lateral line is very nearly straight, passing along the middle of the body, the scales adhering closely. The upper part of the head and body, a rich sea-green color; the lower part of the sides and belly a brilliant silvery white. The fins white, except the dorsal, which is nearly the color of the back. The flesh is of a brilliant pink color, and most excellent.

This beautiful trout abounds in the estuaries of those rivers of Nova Scotia which flow into the Gulf of St. Lawrence and into the Atlantic Ocean. Many sportsmen resort annually to the numerous rivers in Nova Scotia during the month of June to fish for these sea trout, which enter the rivers at this season. No specimen of this fish has yet been seen in the Bay of Fundy.

"To the epicure," writes Mr. Perley, "a fresh caught salmon trout of the Gulf of Saint Lawrence, especially early in the season, will always afford a rich treat. The sportsman will find it a thoroughly game fish, rising well at a brilliant fly of scarlet ibis and gold, and affording sport second only to salmon fishing. The most sporting fishing is from a boat, under easy sail, with a 'mackerel breeze,' and oftentimes a heavy 'ground swell.' The fly skips from wave to wave, at the end of thirty yards of line, and there should be at least seventy yards more on the reel. It is truly splendid sport, as a strong fish will oftentimes makes a long run, and give a sharp chase down the wind."

At Guysboro' and Crow Harbour, in the Strait of Canso, there is excellent sea-trout fishing at the end of June, as also in the Great Bras d'Or Lake, within the Island of Cape Breton. The largest sea-trout rarely exceeds seven pounds weight; four pounds weight is considered a fair size.

* I have given Mr. Perley's description of the *Salmo trutta*; but with it I give the opinion of Mr. Norris, which denies to the rivers of British North America the existence of the *salmo trutta* of Europe. Mr. Norris styles this particular trout of our rivers *Salmo Canadensis*. He remarks, "With a view of correcting an error which prevails in regard to this fish, I have adopted the specific name above. It is improperly referred by Mr. Perley to *salmo trutta*, an European species found in the rivers of Scotland and Ireland." Amongst the characteristics which render these two species of the Salmonidae diverse are, that the sea-trout of British America has red spots, while the *salmo trutta* has no red spots, but on the contrary, dark irregular markings somewhat resembling the letter X—the shape of those found in the salmon.

4. *Osmerus viridescens*, Lesueur. (The American Smelt.)

DESCRIPTION.—Body elongated, cylindrical, tapering gradually towards the head and tail. Lateral line straight, not concurrent with the line of the back. Head rather more than one-fifth of the total length. Eyes large. Lower jaw larger than the upper, armed with strong, acute, recurved teeth. Pectorals pointed; ventrals broad and long, with subequal rays; caudal forked. Color, pale olive-green above the lateral line; opercles and sides silvery; below the lateral line, obscure traces of a broad longitudinal satin-like band. Length, six to twelve inches.

This delicate and savory fish abounds in Nova Scotia. Very soon after the rivers are freed in spring, the smelts rush in to the smaller streams in countless thousands, and are then taken with the most wasteful profusion. The popular name of smelt is given to this fish from its peculiar smell, which resembles that of cucumbers, or of violets; this is strongest when the fish is first taken; but it may be perceived by raising the gill-covers after the fish has been some time out of the water. The smelt feeds largely on the shrimp. It bites readily at the hook, baited with a piece of any of the crustaceous animals, and affords endless sport to young anglers. They are also caught in thousands by fishing through holes cut in ice during winter, and are then greatly prized. The endless abundance of the smelt causes it to be less valued as food than it really deserves.

5. *Mallotus villosus*, Cuv. (The Capelin.)

DESCRIPTION.—The capelin is from four to seven inches in length, and is the smallest species of the salmon family. Under jaw larger than the upper; the back and top of the head a dull leek green, with bright green and yellow reflections when moved in the light; sides and belly covered with delicate and very bright silvery scales, which are dotted on the margins with black specks; the back covered with small smooth grains, like shagreens. It is very nearly allied to the genus *osmerus*, from which, however, it differs in the smallness of its teeth, and in certain other particulars.

The capelin is not abundant on the coasts of Nova Scotia. It is very abundant in Newfoundland, whence large quantities are dried and exported. As an article of bait for cod and other fish of that class, the capelin is of much importance; wherever abundant, the codfishing is excellent. Like the common smelt, it possesses the cucumber smell; but differs from the smelt in never entering fresh

water streams. The manner in which the capelin deposits its spawn, is a curious fact in natural history. The male fishes are somewhat larger than the female, and are provided with a sort of ridge, projecting on each side of their back bones, similar to the eaves of a house, in which the female capelin is deficient. The latter, on approaching the beach to deposit its spawn, is attended by two male fishes, who huddle the female between them, until the whole body is concealed under the projecting ridges, and her head only is visible. In this position all three run together with great swiftness upon the sands, when the males, by some inherent imperceptible power, compress the body of the female between their own so as to expel the spawn from an orifice near the tail. Having thus accomplished its delivery, the three capelins separate, and paddling with their whole force through the shallow water of the beach, generally succeed in regaining once more the bosom of the deep.

Family.—CLUPEIDÆ.

1. *Clupea elongata*, Storer. (Common American Herring.)

DESCRIPTION.—Body lengthened, fusiform, compressed. Back slightly arched. Scales large, silvery, and deciduous. Abdomen sharp, indistinctly serrated; about thirty spines in front of the ventrals, and fifteen behind them. Head destitute of scales, and about one-seventh of the total length. Pectorals short, rounded. Ventrals under the middle of the dorsal fin. Anal subequal, narrow, highest in front. Caudal small, forked. Back and head deep blue, tinged with yellow. Length, twelve to thirteen inches.

The herring is found everywhere on the coast of Nova Scotia; and is amongst the most valuable of our food fishes. The habits, haunts, and seasons of the herring are matters of curious enquiry. It seems, however, now to be well established that the only migration of the herring is from the deep seas to the shores at the spawning season, and from the shore to the deep seas when this is over. Their food consists of small crustacea and fishes. Dr. J. Bernard Gilpin, of Halifax, who has given much attention to this department of our Natural History, remarks:—

“1. It is of one species.

“2. With regard to teeth, those upon the tongue and vomer seem constant in all; the larger specimens very rarely upon the lower lip; the smaller usually having them there. Generalising from examining some hundred specimens, I would say the teeth became obliterated by age, and that the more readily as they have no bony origin like the genus *salmo*.

"3. Some spawn in May and June, others as late as October. This very remarkable fact, causing suggestions of how far it modifies the growth and habits of each run, stands so far without any reason.

"4. These separate runs, hatched under very different circumstances, and necessarily of different age and size, revisit their old haunts, spawn the second year, and are three years in attaining adult size, and probably by that time become absorbed in the runs of older fish.

"5. That great and small of all ages approach the surface and the land in spring, and disappear in autumn. The warm seas and calm weather of the summer being necessary for their spawning and their food,—that as far as regards our coasts their only migration is from the deep soundings of the sea banks to the coasts and back again,—though I by no means assert that in higher latitudes they do not perform greater migrations. These migrations must cause a total change in the food, the temperature, respiration and external pressure during winter and summer.

"Following DeKay and Storer, I have considered it a distinct species from the harenga, or English, though Richardson calls his taken at Bathurst inlet, harenga; and Yarrell's description of the harenga seems to vary but little from ours."

The value of herring exported from Nova Scotia in the years 1864-65 was \$452,337.

2. *Alosa sapidissima*, Storer. (The American Shad.)

DESCRIPTION.—Body deep and compressed. The width across the body, from the commencement of the dorsal fin to the caudal, is nearly equal to one-fifth the length of the fish. Abdominal ridge serrated throughout; the whole body covered with large deciduous scales, except the head, which is naked. Length, one to two feet.

The shad is but rarely seen on the Atlantic coast of Nova Scotia; in the muddy waters of the Bay of Fundy it is taken in large quantities, and owing to the great abundance there of its favorite food—the "shad worm" and the shrimp—it attains the highest perfection. Unlike most fish which frequent the northern seas, the shad comes from the south to deposit its spawn. This is inferred from the fact of its appearing along the American coast from the extreme south in each successive month from January to May. At Charleston it appears in January; at Norfolk in February; on the coast of New York at the latter end of March or beginning of April; at Boston in the latter part of April. In the Bay of Fundy it seldom appears until the middle of May. The flesh of the shad is of delicate flavor, and is esteemed next to the salmon.

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3. *Alosa tyrannus*, DeKay. (The Gaspereau, or American Alewife.)

DESCRIPTION.—Abdominal ridge serrated. Back, blue-green, approaching to purple; sides, silvery. Head, dark green above, and the tip of the lower jaw of the same color; opercles, yellow. Length, eight to ten inches.

This species is less abundant than the common herring. In spring it ascends the rivers and streams to the very sources to deposit its spawn, and is then easily caught. It would appear that the alewife also comes from the south to deposit its spawn in northern rivers, as it frequents the American coast at the same time with the shad; and, in depositing its spawn, it often frequents the same localities as the shad. It is not so much esteemed as the common herring:

Family.—MURÆNIDÆ.*

1. *Anguilla vulgaris*, Mitch. (The Common Eel.)

DESCRIPTION.—Besides the absence of ventral fins, the eels have the dorsal and caudal continued round the end of the tail, forming by their union a pointed caudal. They are at once known by their long, slender, snake-like bodies, with a soft skin, covered with a thick mucus, and having the scales very minute, and often almost invisible. The color of the Common Eel is greenish olive above, yellow beneath; this color extending along the base of the anal fin, nearly to the end of the tail. It varies greatly in size, being taken from six inches to two feet or more in length. The "Silver Eel," so called, is considered to be a variety of the Common Eel.

The eel inhabits both fresh and salt water, and is taken in every situation which it can reach. It is abundant in the harbours and rivers of Nova Scotia. In summer it is caught in long round Indian baskets, called eel-pots; it is also taken by torch-light with the spear. In winter it is taken through holes in the ice, by spearing it in the mud, where it then lies torpid. The places where this fishing takes place are termed "eel-grounds." It is very voracious, feeding on aquatic insects, small fishes, and all dead animal substances that come in its way. The structure of its branchial pouches enabling it to live out of water for a long time, it frequently quits the water in warm damp nights, and wanders over the grass, either in quest of worms, frogs, or other

* Cuvier distinguishes the Eels from the rest of this group by the term Apodal—without feet, or without ventral fins.

food, or in order to change its locality. When in good condition it is an excellent, well-flavored fish ; but it is not generally eaten.*

Order IV.—CYCLOSTOMI.†

Family.—PETROMYZONIDÆ.

1. *Petromyzon Americanus*, Storer. (The American Lamprey.)

DESCRIPTION.—Forepart of the body round, posterior part flattened. There are seven large branchial apertures back of each eye, passing backward in nearly a straight line, the first smallest. When unattached, the mouth is a longitudinal fissure ; but when attached, it is circular, the lip forming a ring, furnished with hard horny teeth, of a yellow color within. Color usually of a bluish brown, mottled with dark olive green along the back ; beneath, a uniform dull yellowish olive. It sometimes attains the length of thirty inches, with a girth of six inches.

The lamprey is common to all the fresh waters of the Lower Provinces. It ascends the rivers in May, and passing into the smaller streams, generally selecting those which have stony or gravelly bottoms, it there deposits its spawn among conical heaps of stones. They are often seen in the summer, in pairs, at work together, constructing these mounds, which are about three feet in diameter at the base, and two feet high, composed of stones from the size of an ounce bullet to that of the fist ; they often aid each other in carrying the same stone. It is not known at what time the lamprey returns to the sea, as it always moves in the night ; but there is an impression that it dies in the fresh water after spawning. This impression may have arisen from the fact that dead lampreys are often seen in the streams towards autumn. This fish is believed to do much damage to mill-dams built upon gravelly or sandy foundations, by working its way beneath the dam, through the sand and gravel, and occasioning leaks which gradually undermine the dam and eventually lead to its destruction. The lamprey, in the United States and elsewhere, is held in high estimation by epicures.

* Mr. Forley describes a species called the Sea-eel (*Anguilla oceanica*), which he saw occasionally in the Gulf of St. Lawrence. It is described as brownish on the back; pale on the sides; beneath smutty white; fins tipped with bluish white or pale blue. They had been taken by the Indians with torch and spear, three feet in length.

† For description of this Order, see p. 5.

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SUPPLEMENTARY PAPER

ON

SEA-MAMMALS AND SHELL-FISH.

"EVEN THE SEA-MONSTERS DRAW OUT THE BREAST, THEY GIVE SUCK TO
THEIR YOUNG ONES."

"SO IS THIS GREAT AND WIDE SEA, WHEREIN ARE THINGS CREEPING
INNUMERABLE."

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SEA-MAMMALS: SHELL-FISH.

THE whale, the seal, the porpoise, &c., though creatures of the sea, are not in reality fishes. They are allied to fishes in belonging to the great division of the Vertebrata, but they belong to the class Mammalia, which is characterized as comprising those animals which bring forth their young alive, and nourish them with milk. Shell-fish are included in the second and third great divisions of the animal kingdom, called Articulata and Mollusca; to the former of which belongs the lobster, the crab, the shrimp, &c.; and to the latter, the oyster, the mussel, the several varieties of the clam, and many others.

Order—CARNIVORA; Family—PHOCIDÆ.

These animals are four-limbed Mammalia, though displaying the most complete adaptation to residence in the water.

1. *Phoca vitulina*, Linn. (Common Seal.)

DESCRIPTION.—The common seal is from three to five feet in length. Its fur is of a yellowish grey color, and covered with irregular blackish spots. It is easily domesticated.

It inhabits the northern coast of the Gulf of Saint Lawrence, and the Labrador; but often strays near to the coasts of Nova Scotia. From two to four gallons of oil are obtained from the blubber of a full-grown *common seal*; and with its skin the Indian makes shoo leather.

2. *Phoca Groenlandica*, Lep. (Greenland or Harp Seal.)

DESCRIPTION.—Its skin is grey, its head is black, and it is remarkable for the change of color which it undergoes in the course of its advance towards maturity; the markings of the body are so distinct in different years that the precise age of the animal may be known by them. The young seals have a skin covered with long white woolly hair until they are three weeks old. Length from five to six feet.

This animal inhabits the Arctic seas and the coast of Greenland; but it is found on the coast of Newfoundland and in the Gulf of

Saint Lawrence, in immense flocks, during the fall and winter, and it returns to the open sea in the spring. A large number of vessels are fitted out every year at Newfoundland, the Magdalen Islands, and Pointe-des-Esquimaux, for the capture of this seal. Each seal at full adult age, produces from ten to twelve gallons of oil. The seal fishery is but little prosecuted from Nova Scotia.

3. *Phoca cristata*, Gmelin. (Hooded Seal.)

DESCRIPTION.—Its body is very large and loaded with blubber, from which (in a full-grown animal) thirty gallons of oil can be obtained. That which distinguishes this animal from the rest of its species, is a globular sack, which is moveable, and with which it can at any time cover its eyes and snout. Length from seven to nine feet. The young animals have a skin of a white color, and the adult animals of a brown color.

The hooded seal inhabits the Arctic sea and Hudson's Bay, but it is frequently found in the Gulf of Saint Lawrence, where it is seen in large numbers towards the close of the fall; later in the season it is found on floating ice in the Gulf, and the females deposit their young on the ice during the month of April. Each spring large numbers of these seals are killed by the fishermen.

The *Trichecus rosmarus*, Linnæus, (Moose or Sea Cow,) was formerly an inhabitant of our seas, but is now extinct. Its favorite haunts were Isle Miscou and the Magdalen Islands, where it found good resting places in the sandy beaches; but the early settlers hunted it with such keenness that it disappeared sixty years ago. Its tusks are occasionally found in the sand-beaches in a perfect state of preservation.

Order—CETACEA. Family.—DELPHINIDÆ.

Characterised by the moderate size of the head, and usually by the presence of teeth in both jaws.

1. *Delphinus orca*, Lacep. (Grampus.)

DESCRIPTION.—Black on the back, and whitish under the belly. It has a dorsal fin, which is remarkable on account of its pointed and crooked shape. The tail is horizontal, like that of the whale.

The grampus is found on the shore of Nova Scotia, and is common in the River and Gulf of St. Lawrence. It is from twenty to twenty-five feet in length. It is a greedy fish, and feeds on herring, capelin, &c. It is not generally sought for by fishermen, as it yields but little oil.

2. *Delphinus Phocæna* Linn. (Black Porpoise.)

DESCRIPTION.—The upper part of the body is black, and the lower part grey. It has a dorsal fin.

This animal is very common in our waters. Large shoals of them are often met with, particularly before a storm; at such times they rise out of the water, which they beat with their fan-like tails, when their sports and gambols are very amusing to sailors. The flesh furnishes very good food. A very small quantity of oil is obtained from them; and for this reason they are not sought for by fishermen. The brown porpoise, which is frequently seen, is a smaller variety of this species. The oil obtained from the brown porpoise is held in great repute as a cure for rheumatic pains.

3. *Delphinus leucas*, Gmelin. (White Porpoise.)

DESCRIPTION.—Body of a cylindrical form, and of a length from nine to fifteen feet. Its skin is white. The young are of a greyish color. The white porpoise has no dorsal fin.

The white porpoise is found in large shoals in the Gulf of Saint Lawrence. It furnishes oil of a superior quality. An excellent quality of leather is made from its skin.

Order—CETACEA. Family.—BALÆNIDÆ.

1. *Balæna mysticetus*, Linn. (Common or Greenland Whale.)

DESCRIPTION.—Like all the whale tribe, it breathes the air by means of holes situated in the upper part of the head, which communicates with the lungs, and are called "air holes." Whales have no teeth, but in their stead have horny and flexible bands of bone attached to the upper jaw (whalebone), which are sometimes twelve feet in length. These bands serve as a sieve to collect from the water the small animals, fish, crustacea, and mollusca, which compose their daily food. The average length of the Greenland whale is sixty feet, and from thirty to forty feet in circumference.

This species of whale is rarely seen on the coasts of British North America. At the time of the discovery of Canada, it was commonly met with in the Gulf of Saint Lawrence, and on the coasts of Labrador and Newfoundland. Although not the largest of its tribe, this whale is the most valuable on account of the large quantity of oil produced from the thick coating of fat which covers its flesh (sometimes from fourteen to sixteen inches in thickness); and for its whalebone. Whales usually live in pairs.

2. *Balæna gibbosa*. (Hump-back Whale.)

DESCRIPTION.—The body of the hump-back whale is rounder and smaller in proportion than the *black* or *common* whale. Its movements are slow, and it comes frequently to the surface of the water to breathe. Its length is from fifty-five to sixty feet.

This whale is very common in the Gulf of Saint Lawrence from the end of May to the fall of the year. They are frequently seen followed by a young whale from eight to twelve feet in length. The *hump-back* whale is the species which is generally hunted in the Gulf of Saint Lawrence, because it is easier to kill than the other species. The harpoon is used in killing them. The layer of blubber on the back and sides is from six to eight inches thick, and furnishes from 300 to 2400 gallons of oil, according to its age or size.

3. *Balæna physalus*, Larcép. (Northern Rorqual or Razor-backed Whale.)

DESCRIPTION.—This whale is almost as long, but more slender than the *common* or *right* whale. It is more wild, and at the same time possesses the power of moving with great rapidity.

This whale furnishes but a small quantity of oil, the layer of blubber which covers its body being seldom above four inches in thickness. It is difficult to kill, and fishermen do not take the trouble of attempting to capture it, and much prefer the *hump-back* whale.

4. *Balæna musculus*, Linn. (Broad-nose Rorqual.)

DESCRIPTION.—This species of Balænoptera is longer than the *razor-backed* whale, and is particularly remarkable on account of the longitudinal folds which are found under its belly and throat. Its body is black on the back, and white and sulphur color underneath.

The Gulf fishermen shun this species on account of their quick and precipitate movements, and, as in the case of the *razor-back*, they use the lance first in the attack, and finish with the harpoon. It has been remarked that these whales spout the water which comes out of their *air-holes* higher than the other species of the whale, and the noise produced by the spouting is also greater. It produces but little oil in proportion to its size; the layer of blubber found in its flesh rarely exceeds four to five inches in thickness. The whalebones are only from two to three feet and one-half in length.

Div.—ARTICULATA. Class.—CRUSTACEA.

Cancer pagurus, Linn. (Crab.)

Mr. Fortin, the Canadian Commissioner, remarks: "We find an enormous quantity of crabs of different kinds on our sea-coast; the most common of which is that called by the fishermen 'Tortreau.' It is caught from the rocks in places where the water is not very deep. The flesh of the crab is favorite food in England; in Canada it is seldom eaten." The crab is rare on the coast of Nova Scotia, but does occur in a few localities.

Homarus vulgaris, or *Americanus*. (Lobster.)

The lobster is found in great numbers on all the sea-girt shores of British North America. It is generally found among rocks near the shore, and in shallow water. It is caught at low water, by hooking it with large hooks fastened to long poles. It spawns in June and July. It is known that the lobster changes its shell every year. Its abundance on the coast of Nova Scotia renders it a food of marvellous cheapness. It is largely exported, prepared and packed in hermetically closed tins.

EDIBLE MOLLUSCA OF NOVA SCOTIA.

The information concerning the Mammalia and Crustacea of our waters is transcribed, with little alteration, from Mr. Fortin's report. The author is indebted to J. R. Willis, Esq., of Halifax, for the following ample description of our edible Mollusca, which has already been published in a colonial periodical; and which deserves a more permanent record than was there given to it. Mr. Willis's list embraces all the known edible Mollusca of Nova Scotia. In this department of scientific research in Nova Scotia, if not in British North America, Mr. Willis is the highest authority.

Although the variety of edible mollusca occurring in the waters of Nova Scotia is somewhat limited, yet it will be found, from the specimens sent to the great International Exhibition of 1862, that the species used as food, in point of abundance, size, and quality, will compare very favorably with like species in the Mother Country, the sister Provinces, and neighboring Republic.

It is to be noted, however, that from the fact of other more important staples of food, as meat, game, fish, lobsters, &c., being so very cheap and plentiful as to place them within the reach of all classes of the population, the eatable shell-fish, with the exception of the oyster and a few other favorite species, occupy a subordinate position as articles of food, and are only occasionally offered for sale at merely nominal prices.

In describing the series, no attention has been given to the mere history of each individual species; it is conceived that any disquisition on this head would more properly appertain to a work of ultimate research than to an Essay, this portion of which is intended to make the reader acquainted, in as brief a form as possible, with this interesting and valuable department of our Provincial Natural History. In this view of the subject, I have aimed at little more than accuracy and simplicity; giving, where I am acquainted, a description of the animal, and shell which it inhabits, its locality, popular name, and marketable value in Provincial markets, with any other interesting facts in connection therewith.

OYSTER.—There are two well defined varieties of this delicious shell-fish—*The Native* (*Ostrea Borealis*) and *Virginian*, (*O. Virginiana*) occurring in numerous extensive beds from Bay Verte to Margarie, thus stretching along the whole northern coast, thence probably around the Island of Cape Breton to many other localities around the Province, as yet unexamined. They are either imported to Halifax, fresh from the water, by railroad, in barrels containing about three bushels each, or by large schooners, in bulk. By either mode, they are rapidly disposed of at Halifax and other sea-ports in the Province, for generally about three shillings sterling per bushel, which, on the average contains about ten dozen of "*Natives*," and eight dozen of the "*Virginian*." Both varieties are easily dredged, either with the usual oyster rake, or with tongs.

Some idea may be formed of the abundance of the oyster, from the fact that in Halifax alone, one of the dealers, Mr. S. Wilson, disposed of 2000 bushels last season, and over 1000 up to this date (Nov. 1862) the present season. Mr. Wilson also informs me that the *Native*, though not attaining the great size of the *Virginian*, exceeds it and all others on this continent in delicacy and richness

of flavor. The "Virginian" is also a very fine, mild oyster, remarkable for its great size, (the specimen amongst Nova Scotia exhibition, edible mollusca, being fourteen inches long, and the animal large in proportion) and for being easily kept, if necessary, the whole season around.

Description of Ostrea Borealis, (Lamarck).—Shell, oblong ovate, with imbricated, undulated plates, upper valve somewhat convex; length, three to five inches; color, dusky brown, or whitish, intermixed with green,—within, pearly white; muscular impression, purplish; (McKay) Summit of the left valve prolonged, in very old specimens, into a sort of heel; right valve, more or less operculiform; hinge, oval, toothless; ligament, sub-interior, short, inserted in an oblong cardinal cavity, increasing with the summit; muscular impression, single, and sub-central; sub-nacreous, slightly prismatic. Animal: body, compressed; mantle, quite open, slightly adhering to the shell; edges of the mantle thick, retractile, finely fringed; a sub-central, bi-partate muscle. Locality: Tatamagouche, Sydney, &c.

Description of Ostrea Virginiana.—Shell, elongated, slightly curved, very irregular, massive, laminated; upper valve convex; lower beak, very long in adult specimens; color, brownish,—within pearly white; muscular impression, purplish; length of full grown specimen, fourteen inches—medium, eight inches. Animal, though not so orbicular as the preceding, closely resembles it. Locality—Wallaco, Tracadie, Mabou, Margarie, &c., &c.

SCALLOPS.—The Scallops, of which there are three known varieties, (*Pecten Magellanicus*, *P. Islandicus*, and *P. Concentricus*) all popularly called *Scallop*, indigenous to Nova Scotia, are only occasionally offered for sale in the Halifax markets, or elsewhere, from the fact of their not being so readily captured as the Oyster. The first and second species are, however, considered a delicacy, and I have known them to be sold here readily for one shilling sterling, each. They are both common to the whole coast of Nova Scotia, but abound on the sand beaches, particularly on Sable Island, where, after a heavy gale, the hardy Outpost Man, on going his philanthropic but dreary "beat," along the shores of the Island, to discern whether any wrecked mariner demands his assistance, frequently finds a fleet of unwary scallops cast away on

the sands, alive, but high and dry. Without any feelings of compunction, he quickly seizes the prizes, and condemns them for their careless misfortune to be roasted alive, and with the aid of a little butter, pepper, and salt, they furnish him with a supper which an epicure might envy. *Pecten Magellanicus* furnishes the residents of Lunenburg, Mahone Bay, Chester, &c., with many a rich treat. In these localities it is said to be very abundant, and more easily obtained than in most other parts of the Province.

I have dredged living specimens of *Pecten Islandicus* in Halifax Harbor, and North West Arm, Halifax Harbor. Owing to the fact of its being scarcer than *P. Magellanicus*, it is not so much sought after as an article of food, though it is considered quite as delicate. *Pecten Concentricus* does not occur in any part of the Province, so far as I am aware, except on Sable Island.

The shells of *Pecten Magellanicus* from Sable Island, are not so coarse and massive as specimens procured from other localities; they are generally very elegantly marked with light or dark pink radiations, on a light ground, while the interior presents a very beautiful satin-like, subnacreous appearance. The markings of *Pecten Islandicus*, on the other hand, are mostly not so sharp and well-defined as in specimens from other parts of the Province. The valves of *Pecten Concentricus* are also generally well rubbed down, probably caused by the continual friction of the shells on the sandy bottom. The scallop occurs in water from three to fifteen, or even forty fathoms.

General Description.—*Shell*—Suborbicular, regular, thin, auriculated; summits contiguous, resting on the right valve, with radiating lines on ribs; right valve most convex; hinge, toothless; a ligamentous membrane throughout all its extent, besides a short, thick ligament, almost altogether internal, filling a triangular excavation under the summit; a single sub-central muscular impression. *Animal*—Body more or less compressed, orbicular; mantle quite open, furnished with a single row of tentacular papillæ, with small, oculiform, pedunculated disks, with regular spaces between them; foot finger like, with a byssus in the young specimen; mouth surrounded by fleshy appendages, irregularly ramified. Maximum size of *Pecten Magellanicus*, eight inches diameter; *Pecten Islandicus*, four inches diameter; *Pecten Concentricus*, 2.5 inches diameter.

MUSSELS.—There are two varieties of mussels, so called, used as food in Nova Scotia—*Mytilus Edulus* and *Modiola Vulgaris*—which can be procured in any quantity around the whole coast. The first of these, of large size and fine flavor, can be purchased, when in season, at the Halifax market, for about two shillings sterling per bushel. Many of our mussels are pierced by some insidious foe, probably some of the *Purpura*, or *Fusus*, and in consequence, the animal in repairing the damage to his house, deposits the excrecences resembling pearls, in the interior of his shell, and in some instances his body is one mass of pearls, from the size of fine shot to that of a small pea.

The Modiola, or, as it is popularly called here, *Horse Mussel*, is but rarely used as an article of food, and is never, to my knowledge, offered for sale. It occurs in great abundance, and of giant proportions: *vide* specimens in the exhibition of Nova Scotia Edible Mollusca. These two species are so universally known, that a scientific description of either would be quite superfluous. *Maximum size*—*Mytilus Edulis*, five inches long, about 6.5 circumference; *Modiola Vulgaris*, eight inches long, twelve circumference.

BLACK QUAHOG—*Cyprina Islandica*—known here by the above curious popular name, is frequently hooked up by mistake: while the hardy fisherman is pursuing his laborious avocation on some one of the fishing grounds, his hook, on reaching the bottom, will drop into the open valves of *Cyprina*, which at once indignantly close, and retain the hook until the fisherman forcibly extracts it, often breaking the shell before it can be got out. This species is considered excellent food; though I have never seen it offered for sale. It occurs pretty generally all around the coast; the specimens in the exhibition of Edible Mollusca from Nova Scotia were dredged by me in Halifax Harbor. It is said that the wolf-fish (*Anarhicus Lupus*), with his powerful jaws and sharp teeth, will crush up the massive adult shell without difficulty. I have taken some hundreds of young specimens from the stomachs of cod and haddock.

Description.—*Shell*—With blackish brown epidermis, large, ponderous, ventricose; beaks, prominent, incurved, contiguous; ligament, stout and prominent; basal margin, simple, rounded; cardinal teeth, stout and diverging, three in each valve, or the

largest one bi-parted in the right valve ; lateral tooth inconspicuous ; pallial impression, distinct.—(DeKay's Nat. Hist. of New York.)
Maximum size: Vertical axis, 3 ; transverse ditto, 3.5 ; diameter 1.5.
Animal—Thick, oval, foot compressed, falciform, geniculated ; mantle, close behind, and pierced with two oval apertures, cirrous edges ; no veritable tubes.

ROUND CLAM.—This valuable species — *Mercenaria Violacea* (Schum.) *Venus Mercenaria* (Lin. and Lam.)—is also popularly called the Quahog, and Hard Shell Clam. It is much prized as an article of food. I am not aware of its market value, though I presume it would realize fully as much as the oyster. It is very often dredged in company with the oyster and *modiola plicatula*, at Wallace, Tracadie, and many other localities in the Province. I have collected some dead shells on Sable Island. DeKay mentions a very interesting fact relative to this species, which I have ventured to insert from his very valuable work, *The Mollusca of New York*: “From the internal purple part of the shell the colored beads of the aborigines were formerly manufactured, constituting the *seawan* or *wampum*, the specie currency of the natives. Long Island was formerly the great mint for the supply of this article, and hence its Mohigan appellation of *Seawan Hackee*, or the Isle of Shells.”

Since writing the above I have just learned from a scientific gentleman connected with the British North American Mail Service, that the French Government are so deeply impressed with the great value of *Venus Mercenaria* as an article of food, that instructions have been issued to the Acclimitization Society of France to endeavour to introduce it into French waters. The Society has promptly responded, and some hundreds of bushels will be sent from Boston, U. S., in the course of a few weeks. I think the British Acclimitization Society would do well to follow so good an example. *Not one of the twenty-two British Veneridæ* is at all comparable, in point of large size or fecundity, to the above. Nova Scotia can supply an unlimited quantity of equal or larger specimens as those to be imported from Boston for the French, if there should be any demand for them.

Description.—*Shell*—Solid, thick, regular, perfectly equivalved and close, inequilateral, sub-cordate ; summits, well-marked and inclined to the front ; hinges, sub-similar ; the middle cardinal

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tooth forked; two anterior teeth united, forming a single bifid tooth; ligament thick, convex exterior; two distinct muscular impressions; cordiform depressions beneath the beaks. Color, varying from dirty white to ash-grey, externally: within, white, with a deep purple border. *Animal*—Similar to *cyprina islandica*. *Size*—Vertical axis, 3.5, transverse ditto, 4.5, diameter, 2.3.—(DeKay's description.)

SEA CLAM.—In my collection of Nova Scotia Edible Mollusca, there are two specimens of so called *sea clams*, catalogued *Macra Polynyma* and *M. Solidissima* (Stimpson) or *M. Gigantea* and *M. Solidissima* (Gould.) I prefer, for obvious reasons, in this instance, the nomenclature of Dr. A. A. Gould. Both species of *macra* are very plentiful on all the sand-beaches of the Province. Like the *pectens*, they are frequently thrown ashore alive after a heavy gale. This is quite a common occurrence on Sable Island, where *Macra Gigantea* attains such a wonderful size as to fully justify the propriety of its name. It is considered a wholesome and nutritious article of food.

The other species, which I take to be *Macra Solidissima*, sometimes finds its way to Halifax market, and is readily disposed of. I am not aware of the marketable value of either of these fine species.

Localities.—*M. Gigantea*—Sable Island, Mahone Bay, St. Margaret's Bay: *M. Solidissima*—Chester, Lunenburg, Mahone Bay, River John (mouth of.)

General Description.—*Shell*—Large and solid, equivalve trigonal, slightly gaping, smooth, or slightly wrinkled by lines of growth; ligament, or cartilage, internal, contained in a deep triangular pit; beaks large, prominent, directed slightly forwards; hinge, with two diverging cardinal teeth, anterior hinge tooth V-shaped, very delicate, and adhering to a very small base, so that it is usually broken off in the cartilage. *Epidermis*—Thin, and olive-brown or light yellowish; beneath this, chalky white. *Size*—*M. Gigantea*—length, 7.6; breadth, 5 inches; *M. Solidissima*—length, 4.5, breadth, 3.5. *Animal*—Body, oval and pretty thick; edges of the mantle, thick, simple, augmented behind by two indistinct tubes; mouth, small and oval; labial appendages, narrow; branchial laminae, very small; foot oval, trenchant, very long.

RAZOR CLAM.—*Solen Ensis* (Lin. and Gould) is the only variety of this curious edible species that I am acquainted with occurring in Nova Scotia waters. Like the *Macra*, it is somewhat abundant on all the sand beaches, where it lives in a vertical burrow, excavated by its spade-like foot. It is easily captured at very low tides, its locality being indicated by a small orifice in the sand. Though seldom brought to market it is an excellent article of food; I have seen them sold now and then for a penny apiece in Halifax market.

Description (from DeKay).—*Shell*.—Cylindrical, elongated transversely, slightly curved, sides parallel; ends truncate, more or less convexly rounded; surface with glossy epidermis, and a long triangular space, marked by the concentric lines of growth; remaining part of the shell with lines parallel to the basal margin; hinge, at one end, with a single tooth and a sharp lateral plate of one valve entering between two teeth and a double plate of the other; the terminations of the two plates, when not broken off, rise up in a curved manner, and cross each other like teeth. *Color*.—Greenish olive; the long triangular space faded purple; interior bluish white. *Size*.—7 inches long; eight-tenths of inch in diameter. (*Vide specimen of Nova Scotia edible mollusca at Exhibition.*) *Animal*.—Mantle closed in its whole length, adhering by its edges, attached to the lower edge of the shell by a double membrane, which is reflected upon itself to form the epidermis; presenting below a tube, double within, conic, annulated, and capable of great elongation, with two simple orifices—that of the syphon larger than that of the vent; foot quite in front, large, conic, swollen in the middle; mouth small; vent, at the end of a small tube floating in the cavity; labial appendices elongated, triangular; branchia long, narrow, pointed behind, adhering on two lines in front on each side of the body, then uniting at a certain distance behind into one line.

SAND CLAM.—*Mya Arenaria* ranks amongst our most useful and valuable varieties of edible mollusca. It occurs in large size in profusion around the whole coast. When in season it can be purchased in Halifax markets, either in the shell for a shilling sterling per bushel, or taken out of the shell for about three pence per quart. Besides being used as an article of food, it also forms an important item in the fisheries. It is said to be an irresistible bait

to both haddock and codfish; is extensively collected for that purpose, and sold in barrels by some of our merchants under the name of clam-bait. This species is so well known that it is not considered necessary to offer any further description of animal or shell.

PERIWINKLE. — *Littorina littorea*. — (Ferussac.) — This species, though never introduced to our markets, may be collected at low tide very abundantly around the whole seaboard of Nova Scotia; it appears to me, after a close comparison, to be synonymous with the species of the same name occurring on the coasts of Great Britain. A quart of them, which I sent alive some time since to my scientific friends at Washington, D. C., was considered quite a prize. Strange to say, though it is found here so commonly, it has not been to my knowledge collected on any of the contiguous shores of the New England States.

Description.—*Shell* — Turbinated, thick, pointed, few-whorled; aperture rounded, outer lip acute, columella rather flattened, no umbilicus; operculum pauci spiral; color blackish grey; within purplish brown; margin white with numerous brown spots. *Animal*: With muzzle-shaped head; elongated tentacles; eyes sessile at the outer base of the tentacles; mouth only with a lingual band; foot oblong, with a marginal furrow in front; branchial plume single; operculum lobe appendaged.—(Weale's Manual of Mollusca, &c.)

EGG-CASE—PERIWINKLE. *Lunatia Heros*—(Say.) (*Natica Heros* —Say. Russell, Gould.)—Though scarcer than the preceding, this species is found most commonly about our sand-beaches, where it is often captured alive, being cast ashore after heavy gales. It attains a very large size, specimens from Sable Island having been sent to me measuring four or five inches in length, and proportionally broad. It is said to be very voracious, devouring dead fish, &c.; it is slightly sought after as an article of food, and never offered for sale in any of our markets. The *Warty Hermit Crab*, *Pagurus pollicaris* of DeKay, often takes up his residence in the dead shell of this species.

Description.—*Shell* large, thick, globular, ovate; whorls five, convex; spire considerably elevated; aperture oval; the callus reflected over a small portion of the large, patulous, and coarsely

wrinkled umbilicus; lip sharp, smooth within. *Color*—Epidermis thin and yellowish; beneath this dark reddish, mixed with ashen; aperture dark reddish brown, occasionally tinged with yellowish; operculum amber-colored. *Animal*—Head emarginate in front; two long and pointed tentacles somewhat flattened at their base; eyes sessile at the external base of these tentacles; mouth with a labial tooth, no tongue; foot short, deeply bilobed across in front, exhibiting behind a lobed appendix, supporting the operculum, which is horny.

WHELK.—*Buccinum Undatum*. (Lin. Russell, Gould, &c.)—Though occurring abundantly around the whole coasts of Nova Scotia, it is rarely sought after, and only occasionally used as an article of food; it is said to be quite as nutritious and delicate, by those who have used it, as the species which is found on the British coasts. Being synonymous with the very common and well known British Whelk, a scientific description of animal and shell is considered superfluous.

WHELK.—*Fusus Islandicus*. (Gould.) Though not found so plentifully as *Buccinum Undatum*, it is pretty common in deep water around the whole coast. Parties who have eaten it inform me that they consider it quite a delicacy. The very fine specimen amongst the Nova Scotia Edible Mollusca at the Exhibition, was collected at Sable Island, and presented to me by Dr. Bernard Gilpin, Halifax.

Description.—*Shell* elongated, fusiform, dilated in the middle; eight slightly convex volutions; spire regularly attenuated to the apex; aperture oblong-ovate, half the length of the shell; canal short, sinuous and wide; operculum horny; length 2.9, aperture and canal 1.6 inches. *Color*—Epidermis horn-colored, or soiled brown; surface beneath, whitish opalescent; within pearly white. *Animal* unknown to me; I have never as yet succeeded in capturing a living specimen for the purpose of description.

WHELK.—*Fusus Decemcostatus*. (Gould.) This fine species, like the two preceding, is popularly called *Whelk*; it is much scarcer and more esteemed as an article of food than *F. Islandicus*. I have dredged dead specimens in Halifax Harbor in twelve to fourteen

fathoms of water, and, so far as I have ascertained, it occurs at about the same depth around the whole coast; the specimen exhibited among Nova Scotia edible mollusca was presented to me by Rev. John Ambrose, A. M., Rector of St. Margaret's Bay District, and is from that locality.

Description.—*Shell* large, robust, solid, ventricose, oval; whorls six or seven, obliquely flattened above the shoulder, and with stout, coarse, revolving ribs; there are about ten of these ribs on the body, whorl gradually diminishing beneath. On the upper whorls the ribs are reduced to two or three large and coarse ones, which give a turreted appearance to the spire; aperture ovate; lip festooned by the termination of the revolving ribs; pillar lip arched, and with a broad callus; beak cancellate externally; canal short and curved; operculum horny; length 3.2; of aperture and canal, 1.10. *Color*—Brownish white, or ash-colored; within pearly white; grooves on the lip chestnut-colored. Animal unknown to me.

Mr. Willis has appended to his paper on the Edible Mollusca a complete list of the land, freshwater, and marine shells of the Province, which is chiefly interesting to the Conchologist. Of the highest class of the *Mollusca*—the *Cephalopoda*—two species are known to exist in our seas. First, the *Squid*, which is used as bait for cod. This animal is remarkable for a particular apparatus which it possesses for emitting a dark liquid when pursued. Its body is cylindrical, in the form of a bag, and terminates at the extremity by fins in the shape of wings. Its head is provided with ten arms from five to six inches long; these are armed with small cups, two of which are tentacular, and two sessile. The color of its body is brown, spotted with white. They are very voracious, and feed on small fry and on other mollusks. Second, the *Cuttlefish*, which is remarkable for the valuable secretion omitted from its body, termed its *ink*. This liquid is employed in painting, under the name of *Sepia*. The *Nutilus*, also of this class, is said to find its way to our latitude; but this belief is not well established.

In reviewing the labor and pains that have been engaged in the preparation of this catalogue, the writer has been convinced of the necessity for establishing an efficient Museum of the Natural History of the Province. It should embrace the three great Natural Kingdoms—Animal, Vegetable, and Mineral; and it would be of the most economic importance in forwarding the development of our natural resources. Some steps towards its attainment, the writer is pleased to learn, are already in progress—a room in the new Provincial Building having been assigned to this object. At present we can scarcely hope to accomplish more than a representation of our own Province in the number and variety of specimens to be collected together; but it is important to the naturalist, as well as for the advancement of education, that contributions from other countries should be placed alongside of our own.

ERRATUM.—Page 40—For "Moose," read "Morse" (or Walrus.)

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