

ART. XII. ON THE FOOD FISHES OF NOVA SCOTIA. NO. V.  
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THE COD FAMILY.

*Gadus Morhua*, (Lin., Gunther, Gill.) }  
*Morhua Americanus*, (DeKay, Storer.) } THE COD.

*Gadus Eglefinus*, (Lin., Gunther.) }  
*Morhua Eglefinus*, (DeKay, Storer.) } THE HADDOCK.  
*Melanogrammus Eglefinus*, (Gill.) }

*Gadus Virens*, (Lin., Gunther.) }  
*Gadus Carbonarius*, (Richardson.) } THE POLLACK.  
*Merlangus Carbonarius*, (DeKay, Storer.) }  
 \**Pollachius Carbonarius*, (Gill.) }

*Phyris Americanus*, (DeKay, Storer, Gunther.) }  
*Physis Chuss*, (Gill, Schœpf.) } THE HAKE.

IN my last papers which I have had the honour to read before you, you will recollect that I gave you all the facts I could collect on the herring, the gaspereaux, the mackerel, and the salmon and trout family. There remains now, the cod family, the halibut, and the shad, (which last is a congener of the gaspereaux,) to complete the food fishes of Nova Scotia. The subject of the present paper, will be the cod family—or the *Gadidæ*. Of this family we have four species, under two genera, which from their abundance in our waters may be considered as food fishes. One or two other species occur, but not in sufficient numbers to entitle them to this epithet. The common cod, the haddock, the hake and the pollack. Of all fish, this family has played the most important part in the world's history. The great northern sea kingdoms of Europe, the English, the French, and the Dutch, have from time immemorial pursued this fishery, which, commencing at their own door, and done in fishing boats, has extended successively to Greenland, and the North Sea,—to the Grand Bank of Newfoundland, and to our own shores. The fishing flats, have yielded to a vast mercantile navy, riding out the roughest gales in mid ocean, and filling our harbours with a forest of masts. Wars have been waged in this

\* Dr. Gill considers this fish identical with *M. Perporeus* of Storer, (see synopsis fishes Bay of Fundy, &c.) If Storer's and DeKay's description are accurate, it cannot be so, I have never met with it myself.

cause—continents discovered and named from it. Cape Cod, cape Baccaro, the Magdaline penny with its obverse of a stock-fish, and the three diamond port, common at Newfoundland, all attest the estimation which the learned geographer, the wealthy banker, or the poor peasant in Portugal, who toils over his arid vines that he may exchange them for fish to keep the fasts of the church he loves so well, have held for centuries this fish in. More strange is it, to think that poised upon his ever fanning fins, fathoms below the ocean, he has been the unwitting agent in so many changes moral, material, and religious, on this earth's surface. But it is rather as he concerns our own Province that he is the subject of this night's paper, Our people, dwelling many of them on the sea-board, and none of them a day's journey from it—find in him an inexhaustible supply of food. The salt provision used of necessity except by the inhabitants of towns, is thus healthily varied, and the surplus easily cured, finds its way to the city in single quintals, in tens, or in hundreds, there to be exchanged for tea and molasses, or various clothing for the winter's cold. All along our seaboard dwells a marine population, half farmer half fisher, or "navigator" in provincial idiom, who steadily pursue this employment. As we have seen that the herring, the mackerel, and the gaspereaux, are surface feeders, and are thus dependent upon the winds and the various currents, which sometimes spread their food in acres, close beside our door, and again waft it away seaward for miles, and at all events spread it only in summer, and are thus uncertain in their movements and unconstant in their frequenting certain shores, and disappear always in winter,—so this family are bottom feeders, are certain in their feeding grounds, and always to be found both summer and winter. Thus the employment is certain and the supply regular. Following, as we have noticed before, the sun in his vernal path, these bottom feeders approach the shore in spring, from the deep soundings of sixty or seventy fathoms to which they had retired in early fall. It must be that the land and shallow waters warmed by the summer heats are now swarming with creatures which they hunt for food, and that in this pursuit they approach the land. During summer and early fall, cod are caught in various sizes, from the face of the rock to five or six

miles seaward. As the winter approaches he retires, until our fishermen have to put thirty miles of sea between them and their homes, and to pull him two lines and a half, or eighty fathoms, from his feeding grounds. No doubt these migrations are partial and that there always are fish on the banks that never migrate, and others that never leave our shores. Indeed one must believe that the fish on the grand banks of Newfoundland never migrate. We learn from Mr. Ambrose's very valuable paper that there are a succession of reefs or ledges parallel with our coast and running north-east and south-west, and that on these summits of submarine hills the cod resort,—the sickly fish resorting to the inshore ledges, whilst the finer and healthy ones with longer superior jaws and more prominent eyes, are taken in the mail steamers' track, and from whence Aspotagen, the highest land in the Province, is thrown upon the horizon, about thirty miles from the coast. The pursuit of food causes these migrations. Now, as regards food, it may be said of the cod as of most fish, nothing comes amiss, he opens his jaws and every thing slips down. To satiate a craving appetite is his perpetual instinct, and yet he has some discriminating tastes, he loves squid, he will not take salt bait on shore, though taking it greedily on the banks, among mollusks the glycemeris is very sweet to him. The stomachs of those taken on the banks are usually filled with herring, young cod fish, Norway haddock, young cat fish small mackerel, various mollusks, the glycemeris, and a large black coquog, and star fishes. Should he have indulged in fish spawn, it has probably been digested. This may be called his usual fare. Near in shore he picks up crabs and lobsters, and the mollusks, or sea shells, are much more numerous and varied. Of his casual fare may be enumerated grouse heads and entrails thrown over by some passing steamer, sea ducks, which he must have picked up floating near the surface, various stones dropped over by ballast boats or adherent to muscles which he has swallowed, (one of six pounds weight was long kept in the Halifax fish market as being taken from a cod's stomach). In Newfoundland he is said to follow the capelin and feed upon them. In New Brunswick, Perley says he follows the herring to feed upon their spawn and young fry.

I have never found a fisherman who had seen cod spawning, or seen their spawn floating like herring spawn on the water. According to the most intelligent, the female fish is heaviest, the spawn the largest, and escaping from her body when dead in greatest quantities during May and June. I therefore suppose they spawn in deep soundings, in greatest numbers, somewhat later than mid summer; others say later, perhaps both accounts are right; and as in studying the herring we found that there were two or more distinct spawns during the year, so it may hold true as regards the cod. During fall the young fry are abundant about our shores, and from analogy of other fishes, one would suppose a codling of six inches, was a first year's fish, and at that period six weeks or two month's old.

#### Description of a Cod taken from the Halifax market, 1867.

From a rather obtuse snout, the outline of head rises gently to the first dorsal fin, which has its anterior edge slightly posterior to insertion of pectoral, from thence declines gently to the tail, the body here is small and tapering. The lower outline descends from the tail quickly to a point just below the first dorsal fin, thence rising rapidly to the snout, forms a very stout bellied fish that tapers off to the tail; there are three dorsal and two anal fins, and the ventral fins are inserted anterior to the pectoral. Fish of this order have the pelvic bones, or those upon which the ventral and pectoral fins are based, joined by a hooked process to the bones of the head, instead of hanging unattached. The caudal fin is square, eye large, diameter one inch, irides brownish bronze; eye two diameters from tip of nose, nostril double, nearly half way between eyes and nose. Intermaxillary bones forming the upper jaw, which is longer than the lower, the lips are fleshy, the free end of the intermaxillary is square, and fits into a narrow pouch when the mouth is closed, —a deep sulcus through both intermaxillaries running beneath the snout. A small barbel about an inch long beneath the chin. The shape of the first dorsal pointed, higher than long third, ray longest, of the second roundish, and of the third rhomboidal. The pectoral is ovate, and the ventral is narrow with the fins and second rays prolonged into soft filaments. The colour of the head and back dark greenish ash, becoming lighter upon sides, a square spot of lighter green behind the eye. The chin, throat, belly, and lower parts white, with very minute black dots. This whole green colour forms a back square, but in others they are ovate or circular, or like broken links of a chain, varying in character, but always present. The colour of the pectoral fins was light transparent green, the ventral with a border and two rays white, the dorsal, anal and caudal dark transparent green, with faint spots. Lateral line pure white and running in an arch to middle of second dorsal, then straight. In the upper jaw the teeth are contained in a lunated band passing round inside of the intermaxillaries, the mesial line being bare. An irregular row of small and larger teeth in lower jaw, the symphysis bare. A crescent of teeth on palatine arch and inside the mouth, above and in front of swallow, two roundish knobs of osseous substance, resembling the teeth of the sea-wolf.

Branchiostegal rays, 7, 1st D, 14, 2d D, 19, 3d D, 19, C about 45, 1st A 22, 2d A 17, V 6, P 19.

On opening this fish, the small single heart presented in front, a large light colored yellow liver covered the stomach and intestine running down the right side. Removing this the stomach appeared, with its pyloric end encircled with a fringe of numerous coeca. A short intestine was reflected upwards over the stomach and then descended to the vent, the gall bladder was filled with bile, the spleen was small and dark brown. Removing these, the sound or air bladder presented, strongly attached to the spinal column and its transverse processes; externally smoky white—internally, when cut into, pure white, but showing marks of extravasations of red blood in many parts. The membrane was firm and apparently fibrous, and lined by apparently serous membrane. Fibrous filiments seemed to run to each transverse process of the back bone, as if the fish should have the power of compressing the bladder. This bladder extended from an inch below the vent, nearly to the gills, where it presented a wide front, from either corner of which there proceeded two tubes, which, arching rapidly at first, passed towards the gills, where the free end seemed to remain embedded in the muscle. These tubes were hollow, and easily traced by a wire from within the bladder to the free end, which was a closed sack. This specimen was about two feet long and weighed about three pounds. They vary in our markets from one pound up to eighty. There is a tradition of a fish being sold by Mr. Lisle, a merchant of Halifax, weighing, when dried, one hundred and fourteen pounds. When taken from the sea it must have been one hundred and fifty weight.

In speaking of the colour of the cod, I have described the individual specimen before me, but on examining many hundreds, or I may say thousands, exposed for sale in the Halifax fish markets, we find that this greenish ash runs through every shade, from dark blue green, to the lightest yellow ash, in different individuals. Some are so dark that the spots are scarcely discernible. The spots, themselves, vary in shape, in size, and arrangement, in different individuals. They are square, oval, in rings and in broken links, in different fish, and sometimes one fish has every kind upon him at once. They usually are bronze, but when first taken out of the sea, almost golden. There is a variety called rock-cod, with a brilliant red wash, and another with a bright yellow, superseding the green. There are others that have black blotches on the sides, called pine-trees by the fishermen, from a fancied resemblance. I consider them to be the Greenland variety called "Ogack" by Dr. Gunther.

In comparing our fish with DeKay's figure of the American cod, it agrees well with it in colour. It does not agree so well

with Couch's figure of the English cod, in colour, and the term "mottled" on the sides is scarcely a good description of the very defined spots which our cod has over his back and sides. Yet Dr. Gunther in his catalogue of fishes, (B. Museum,) considers the English and American cod identical, and is followed by Sir John Richardson. The American authors, except Gill, though admitting the English and Newfoundland fish identical, assert there is a distinct American variety. Unfortunately they do not give the exact differences in each. I have never succeeded in finding but one species in the many thousands I have examined, and this species tallies exactly with DeKay's description of the American variety, except a very slight variation of the number of fin rays, which is too variable a mark to be considered typical. I consider our fish identical with European, with Newfoundland, and the American variety of DeKay. I have little more to add of the habits of the cod. That following the surface feeders, the herring, gaspereaux, mackerel, shad, and capelin, he migrates from the deep soundings in spring, and returns in winter—that we are ignorant of his spawning time and grounds, (some Danish authorities have lately reported he sheds his spawn in mid ocean, at various depths,) that he is a bottom feeder and voracious eater, and that he attains above one hundred pounds in weight. I beg to refer you to the very curious, exact, and graphic paper by the Rev. Mr. Ambrose, (see Transactions Inst. Nat. Science, N. S., 1865 and 66,) on this subject.

A description of the catching of this valuable fish, divided into the shore and deep sea fisheries, merits a separate paper. The various materials used—the vessels, the boats, lines, seines and nets,—the moral, intellectual, and religious influences it exerts upon the homes, the habits, and character of those employed in its pursuits,—the political questions with foreign powers, arising out of it,—the questions of protections and of bounties,—the alleged increasing scarcity of fish, and the admitted increasing distances of the fishing grounds, and diminishing supply of bait, are all subjects of the highest importance to the Maritime Provinces. Twenty thousand of our fellow subjects, upon whom depend one hundred thousand

women and children, ply the oar, or whiten the ocean with their sails, or spread their nets upon the surface, or rake the bottom with their hooks and lines of that narrow neutral ground of banks and bars, bounded on the right by the great gulf stream, flowing north-east, and on the left by the cold arctic current, flowing south-west. Its opposite flowing surfaces teem with moving masses of life, its floor is paved with stationary mollusks.

Here a great Providence spreads a daily banquet. Here is perpetually solved the great problems of consumption and supply, of reproduction and destruction. Whales, porpoises, and seals; innumerable birds, either on the wing, or nimble divers in hordes that darkened the air, once thinned the excessive reproduction of these marine hosts. Man has stepped unto the scene, and they have all vanished, and it is for our Legislatures to determine his vicarious position, to amend it by severe laws and restrictions, if his waste or wants are in excess of reproduction; or, on the contrary, if with all his powers, he but healthily keeps alive over production, then it is for them to take off every restriction founded in ignorance, and to foster by bounties our toiling fellow subjects, who follow the sea for their living.

### THE HADDOCK.

Description of a haddock taken in Halifax harbour, December, 1867:—

Length, 20 inches, of head 5 inches, a small fish. Outline more elegant than cod, the profile slightly concave, and head carinated. The whole head more bony, the lips fleshy. upper lip longest, lower with a slight barbel, scales over the cheeks and side of head, nose pointed, nostrils double, small, with the eye placed high in the head, eye large, diameter 1 1-10 inch, nearly two diameters from tip of nose, irides silvery, with bronze spots, upper lips formed of the intermaxillary bones, the free end of maxillary fitting into a side pouch when mouth closed, teeth small and in irregular bands or rows in upper and lower jaws, none in palatine arch, two round osseous masses in upper jaw, a third in lower jaw fitting to the inside of throat, in front of swallow. The first dorsal triangular with the third and fourth rays prolonged to sharp points, posterior edge concave. The second and third dorsal one half height of first, triangular, one half as high as long. Caudal forked, ventral subjugular, white, rays prolonged to filaments, pectoral ovate, reaching opposite insertion of second dorsal. First and second anal triangular, generally inserted opposite second and third dorsal.

Fin rays, 1 D. 15, 2 D. 23, 3 D. 18, C. 35 or 40, P. 18-19, V. 6, 1'A. 24, 2'A. 21.

On being opened it presented the same appearance as the cod, large and thin lobed liver, numerous *cæca*, air bladder smaller, the two appendixes very

much smaller. The stomach was filled with sea urchins, star fish, shrimps, a small clam, and a pultaceous mass. Colour when fresh from the sea, bluish ash, with purple and golden reflections, becoming darker when stale, below silvery with minute black dots, scales larger than cod, colour of fins transparent, light purple, with light yellow edges, a black oblong spot above pectoral fin, halfway from insertion reaching to lateral line, lateral line black, arching from above the opercles, nearly to back of second dorsal, then straight to tail.

In studying the haddock, we find him a weaker fish than the cod, coming nearer the shore in summer, and retiring to a less distance in winter, choosing rather mollusks, and star fishes, and sea urchins, for his food,—migrating often in large shoals, and often seen grubbing with nose downward, on the bottom. He will take a fly from the surface, at times. He never attains a size above eight or ten pounds. As a merchantable fish, he has half the value of cod, not having thickness enough for drying, and is only taken when cod are scarce, except for supplying the fresh fish-market, or for curing as “Finnie haddies.” When fresh, the superior flakiness of his flesh causes him to be preferred to cod. His spawning time is uncertain, or, perhaps, extended. In August females are taken filled with spawn in Digby basin. In the fish taken in December, the ovaries were about three inches long. With a rare want of natural history, fishermen consider him the fish St. Peter took the silver tribute from, the black spot upon his side being the mark of the Saint’s fingers. Unlike the cod, he varies but little in his colour.

#### THE AMERICAN POLLACK OR COAL FISH.

Description of a Pollack taken in Halifax harbour, December, 1867 :—

Length 2 feet 11 inches, head  $8\frac{1}{2}$  inches, weight about ten pounds. The form of the fish is strait; the back line ascending but slightly from nose to top of back. The whole figure is round, and tapers to a small, handsome, and deeply forked tail, which is about the breadth of the fish opposite first anal’s, anterior edge. The line of belly not prominent, and the fins proportionally small. The mouth is small, the lower lip longer than the upper, the eye large, nostrils double, and both sit well up in the head. Diameter of eye 1-10 inch, and about  $3\frac{1}{4}$  inches from tip of jaw. The upper lips are formed entirely of the intermaxillaries, and the free end of the maxillaries enter a cheek pouch when the mouth is closed. There are three small dorsal, and two small anal fins, the pectoral fan shaped, and ventral reduced to a few filaments. The first dorsal is triangular, nearly as high as long, fourth ray highest; the second dorsal begins more than an inch from the first, is double its length, and about its height, third ray longest; the third begins nearly two inches from the second, it is a little longer and not so high as first, the



fourth ray longest. The tail is handsomely forked and about the breadth of the fish opposite beginning of first anal. The first anal opposite third dorsal, about its length and half its height. Second anal reaching from opposite insertion of second dorsal to a little beyond posterior edge of first dorsal, vent one inch and one line anterior to it, and opposite last third of first dorsal. Colour, head and upper parts, to a little below lateral line, dark blackish blue; below, silvery dotted with minute spots, lips black, a little brownish on cheeks, chin and branchiostegal rays blue, pectoral, caudal, and dorsal fins dark blue, anal light blue, with white base, ventral white, lateral line white, nearly straight, narrow at first, it becomes broader and further from line of back as it approaches the tail, scales moderate, oval slightly striated, covered with nacre, and but a small part exposed. They cover the cheeks and side of head, and run up the base of tail. Numerous small teeth contained in an irregular band extending round the symphysis of upper jaw, a small notch in band at symphysis, a similar band extending round lower jaw, a small triangle of teeth on palate bones,—irides silvery with greyish lines.

On opening the fish the heart has three cavities, the first pearl color; liver with three lobes, right longest, middle short, numerous coeca, and air-bladder extending from gills to beyond middle of the first anal, firmly adherent to spine, with two large anterior pouches with a small filament attached to each. I could discover no communication with gills. There were the same osseous tubercles in front of swallow as in cod.

Branchiostegal rays, 7, 1'D 12, 2'D 1 S, 3'D 19, C not counted, 1'A 23, 2'A 18, P 19—29, V 7—8.

In studying this fish we find a greater divergence from the type of *Gadus*. A small and fine head to which the small snout and projecting lower jaw give a less powerful appearance. We find a round tapering body, set off with a very beautiful tail and strikingly coloured with its white lateral line and dark sides. It is lively in its motions, especially the young, who keep in shore and in shallow waters doubtless for protection. They take the fly very readily at that age. They frequent the North West Arm at Halifax in numbers, and are seen in solid masses in thousands going in and returning on the tide at Digby basin. As far as the eye will reach a dense moving mass is seen slowly passing the pier head at Digby for hours, a few feet below the surface. Apparently as they become older they become bottom feeders, not approaching the surface. Their flesh when fresh is inferior to haddock or cod, wanting their firm flakiness, yet very superior to the fresh water trouts and lake salmons. When cured it brings a less price in the market. I have never seen but one species on our coast. DeKay mentions two, which Gill by his reference to Perley considers identical.

## THE HAKE.

Description of a hake taken in Halifax harbour, December, 1867:—

Length two feet six inches, length of head seven inches. The outline rising from a moderately pointed snout runs gently upward to insertion of first dorsal, then tapers to a very small tail. The lower outline descends from tail to nearly the middle of pectoral fin, then rises rapidly to nose. A large bellied fish, with projecting upper jaws, thick shoulders, and very tapering tail. The eye large, set well up in the head, one inch diameter, two and one-half inches to tip of nose, nostril double, very close to upper edge of orbit, mouth large, upper lip formed of intermaxillary bones, free end of maxillary fitting into a side pouch, profile slightly concave, lip not so fleshy as cod, a band of at least five rows of small teeth pointing inwards lines the intermaxillaries, the symphysis bare, the lower jaw the same, with symphysis bare, teeth on palate arch in a triangle, all pointing downwards. The scales are moderate, ovate, slightly striated and cover the opercles and greater part of head, the opercles with a sharp point on posterior edge. First dorsal very small, rising about nine inches from nose, fourth ray prolonged into a long filament, second dorsal about an inch behind first and extending to within an inch of tail, tail very small and ovate. The anal fin extends from opposite posterior insertion of second dorsal to opposite three inches posterior to its anterior insertions. Pectoral long ovate, ventral very far forward and reduced to a single filament five inches long and with a double termination. Colour, light reddish brown on back and sides, head and cheeks white with minute brown dots. The dorsal, caudal, and pectoral fins follow the general colour, but lighter. The anal has the base white, edged black, and the ventral filament is white. The lateral line is black and follows generally the outline of back, but always keeping near to the back. The scales are ovate, striated, and of medium size. The inside of mouth is black. There is a most minute barbel on lower jaw. The upper jaw the longest.

Rays 1 D. 10, 2 D. 55, C. 24, A. 47, P. 14. V. a single filament.

The intestines of this fish are similar to the Gadidæ, except the sound or air bladder; this lies unattached to the spine, loosely adherent to the lower side of the intestines; its edges are beautifully fimbriated by a series of trifoliated processes. It is highly vascular, turning light pink when exposed. As in all the other members of this family, there are anterior processes as in the pollack, and anterior sacks as in the haddock and cod, projecting from the front, so, too, here the analogy is preserved by the anterior fimbriæ being double those of the sides. Whatever reason for supposing the other members of this family can compress their air bladders exists, it can not be the case in this, it being impossible to compress a loosely attached bag, resting on no firm base. The air within must be the product of secretion, as there is in none of them any external communica-

tion. In all I have examined, I have found what seemed difficult to determine, whether it was extravasated blood, or a reticulated plexus inside of the bladder. In every part of a fish one meets with quantities of extravasated blood, answering to the terrible convulsions and flappings of dying fish.

In studying the hake we find that he departs still more widely from the type of the family. His fins runs into a continuous range, his tail is very small, and as in the pollack, we found a lengthened lower jaw, giving a less powerful, or less rapacious look, so we cannot but admit that in the hake the large head, concave profile, projecting upper jaw, and bands of teeth all projecting downwards, give him a shark-like look. Hake are repeatedly drawn to the surface by their hold upon a hooked fish, and not seldom seem loth to quit their prey. A hake was caught by a set-line in Digby basin, having swallowed a haddock previously hooked, and thus entangling himself on the already occupied hook. Among fishermen he enjoys the character of a lively, saucy fish. He prefers muddy bottoms, and takes bait best at night. He also takes refuge in fresh ponds having outlets to the sea, and is said to winter there. He is caught during winter, in deep soundings on the banks, but not in such numbers as the cod. His flesh, either fresh or salted, is much less palatable than the others of this family.

In this paper I have used the nomenclature of the British Museum (Dr. Gunther), though giving the synonymes of the American writers, wherever I could obtain them. These last have followed Cuvier and Vallencennes with the exception of Dr. Gill, (Smithsonian Institute), who has reclassified the whole subject, whilst the former has returned to the old Linnean names, superseded apparently for no cause or for better generic terms, by Cuvier.

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NOTE.—I have spoken of the maxillaries and intermaxillaries as being received into a side pouch when the mouth is closed. Anatomically speaking, both maxillaries and intermaxillaries are received into a side pouch, in all this family. This arrangement has its widest divergence in the ground Shark (*S. Borealis* Yarrell,) where the maxillaries become cartilaginous, and covered with red mucous membrane—in fact a gum is received into a pouch lined also with red mucous membrane, which is in fact a secondary mouth.