Alewife *Pomolobus pseudoharengus* (Wilson) 1811 [approximate date]

GASPEREAU; SAWBELLY; KYAK; BRANCH HERRING; FRESH-WATER HERRING; GRAYBACK

[*Jordan and Evermann*, 1896-1900, p. 426.]

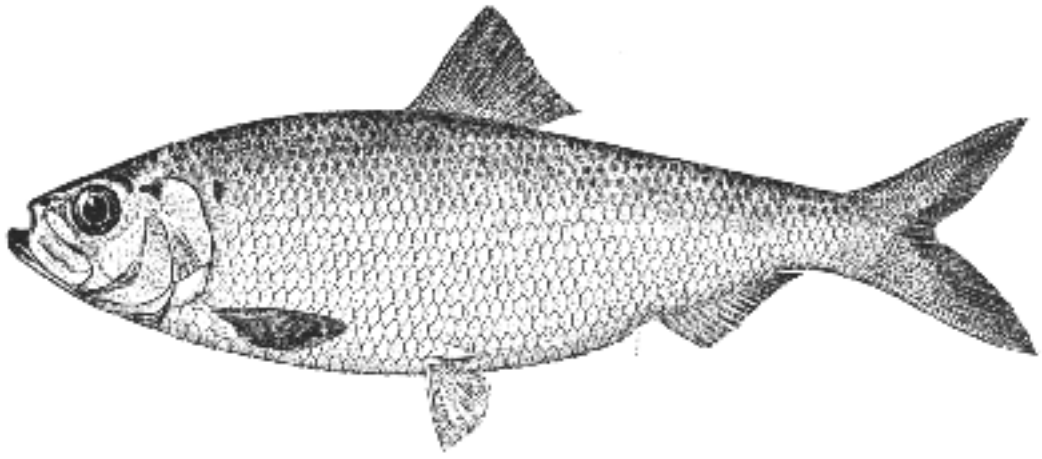

Figure 46.—Alewife (*Pomolobus pseudoharengus*), Chesapeake Bay region specimen. From Goode. Drawing by H. L. Todd.

Description—

The alewife is distinguishable at a glance from the sea herring by the greater depth of its body, which is three and one-third times as long as deep (an alewife of 13½ inches is about 4 inches deep; a herring that long has a depth of only 3 inches) also by the position of its dorsal fin, the point of origin of which is considerably nearer to the tip of the snout than to the point of origin of the central rays of the tail fin. Furthermore, the alewife is much more heavily built forward than the herring, and the serrations on the midline of its belly are much stronger and sharper (hence the local name "sawbelly"), so much so that a practiced hand can separate [page 102] herring from alewives in the dark. The most useful distinctions between the alewife and the blueback are that in the former the eye is broader than the distance from its forward edge to the tip of its snout and the back grayish green, while in the latter the eye is only about as wide as the distance from front of eye to tip of snout, and the back is dark blue (p. 107). Also the lining of the abdominal cavity is pale grayish or pinkish white in the alewife, but is usually dusky or blackish in the blueback. But this distinction may not hold in all cases.

Alewives are distinguishable from young shad by their smaller mouths with shorter upper jaws; also by the fact that the lower jaw of the alewife projects slightly beyond the upper when the mouth is closed, and by the outline of the edge of the lower jaw, the forward part of which is deeply concave in the alewife but nearly straight in the shad. The lack of teeth on the roof of the mouth distinguishes the alewife, with its brethren the hickory shad (p. 100) and blueback (p. 106) from the sea herring, anatomically.

Color—

The alewife, like the herring, is grayish green above, darkest on the back, paler and silvery on sides and belly. Usually there is a dusky spot on either side just behind the margin of the gill cover (lacking in the herring) and the upper side may be faintly striped with dark longitudinal lines in large fish. The sides

are iridescent in life, with shades of green and violet. The colors change, to some extent, in shade from darker to paler, or vice versa, to match the bottom below, as the fish run up stream in shallow water.

Size—

The alewife grows to a length of about 15 inches, but adults average only about 10 to 11 inches long and about 8 to 9 ounces in weight; 16,400,000 fish taken in New England in 1898 weighed about 8,800,000 pounds.

Habits—

The alewife, like the shad and the salmon makes its growth in the sea, but enters fresh water streams to spawn. This "anadromous" habit, as it is called, forced itself on the attention of the early settlers on our coasts. In the words of an eyewitness, "experience hath taught them at New Plymouth that in April there is a fish much like a herring that comes up into the small brooks to spawn, and when the water is not knee deep they will presse up through your hands, yea, thow you beat at them with cudgels, and in such abundance as is incredible.[67] And they are no less persevering in their struggles upstream today. Numbers of them are to be seen in many streams, any spring, alternately swimming ahead; resting in the eddy behind some irregularity of the bottom; then moving ahead again, between one's feet if one happens to be standing in midstream. And they are much more successful than the shad in surmounting fishways of suitable design. During the early runs sometimes one sex predominates, sometimes the other, but the late runs consist chiefly of males, as a rule, and these are said to outnumber the females greatly on the spawning grounds. We have no firsthand observations to contribute on this score.

Alewives are decidedly general in their choice [page 103] of streams, running indifferently up rivers as large as the St. John, Merrimac and Potomac, or streams so small that one can almost leap across, and only a few inches deep. In large rivers they run far upstream—how far they may do so we do not know—or their journey may be one of only a few yards, as it is in the artificial cuts that are kept open through barrier beaches to allow the fish access to fresh water ponds behind the latter.

The alewife spawns in ponds, including those back of barrier beaches (if there are openings to the sea, natural or artificial) and in sluggish stretches of streams, never in swift water, each female depositing from 60,000 to 100,000 eggs or more, according to her size.[68] Spawning lasts only a few days for each group of fish.

The spent fish run down stream again so soon after spawning that many of them pass others coming up, as we have often seen; fish on their return journey to salt water are familiar sights in every alewife stream.

The adults, when entering streams to spawn, make the change from salt water to fresh within a short time without damage; this is equally true of the spent fish on their return to the estuaries. But Dr. Huntsman informs us that they appear unable to endure repeated changes between salt water and fresh, and that great numbers are killed in this way in the estuaries under certain conditions of tide. The strain of spawning leaves them very thin, but they recover rapidly after they reach salt water. We have seen spent alewives that had already put on considerable fat, taken from a trap at Provincetown as early in the season as July 16 (in 1915).

Spawning ordinarily takes place at temperatures of about 55° to 60°. The eggs are about 0.05 inches in diameter, pink like those of the sea herring, and they stick to brush, stones, or anything else they may settle upon.[69] Incubation occupies about 6 days at 60°. The young alewives, which are about 5 mm. long when hatched, growing to 15 mm. when a month old, soon begin to work their way downstream.

They have been seen descending as early as June 15 in the more southerly of Gulf of Maine streams; successive companies of fry move out of the pond and down with the current throughout the summer; and by autumn the young alewives have all found their way down to salt water when 2 to 4 inches long. We have seined young alewives as long as 4 to 4½ inches (102-115 mm.) in salt water near Seguin Island, Maine, at the end of July, but others, only 3 to 3 2/3 inches long (78-92 mm.), near Mt. Desert Island as late as the first of October. Thenceforth the alewife lives in salt water until sexual maturity.

Hildebrand and Schroeder[70] found that little alewives in Chesapeake Bay had grown to about 4½ to 5 inches long by the time they were 1 year old.

The rate of growth of the older alewives, in salt water, has not been traced. But experiments in planting adult alewives in ponds in which there were none before, led, long ago, to the conclusion that they became sexually mature at 3 or 4 years of age, for none of their progeny returned until 3 or 4 years after the original plant. Specific instances, cited by Belding[71] are:

(1) Three years after a large number of alewives were hatched in Keene's Pond, Maine, tributary to the Calais River, from a "plant" of mature fish, a run of adult fish entered Keene's Pond stream where none had ever been seen before; this case was reported by the U. S. Bureau of Fisheries. (2) The establishment of a fishery, in the same way at Plymouth, Mass., in 4 years after restocking in 1865; and (3) G. M. Besse obtained results in 3 years in ponds in Wareham, Mass.

The fact that alewives have been known to return, for spawning, to streams in which their parents had been planted, lends support to the "parent stream" theory; i. e., that alewives, like shad, tend to spawn in the stream system in which they were hatched. But a much more intensive study is needed of this interesting question before any categorical statement can be made, as to how generally this is true; and to what extent their return depends on their never having wandered far afield.

Food—

The alewife is chiefly a plankton feeder like the herring; copepods, amphipods, shrimps, and appendicularians were the chief diet of specimens examined by Vinal Edwards and by Linton [page 104] at Woods Hole. However, they also take small fish, such as herring, eels, launce, cunners, and their own species, as well as fish eggs. Unlike herring, alewives often contain diatoms even when adult. Alewives fast when they are running upstream to spawn, but when the spent fish reach brackish water on their return they feed ravenously on the shrimp that abound in the tidal estuaries and which they can be seen pursuing. We have often hooked alewives on an artificial fly at such times.

Movements at sea—

The alewife is as gregarious as the herring, fish of a size congregating in schools of thousands of individuals (we find record of 40,000 fish caught in one seine haul in Boston Harbor) and apparently a given school holds together during most of its sojourn in salt water. But they are sometimes caught mixed with menhaden, or with herring. Alewives, immature and adult, are often picked up in abundance in weirs here and there along the coast[72] and it is likely that the majority remain in the general vicnity of the fresh water influence of the stream-mouths and estuaries from which they have emerged, to judge from the success of attempts to strengthen or restore the runs of alewives in various streams, mentioned above. But it is certain that some of them wander far afield, for catches of up to 3,000 to 4,000 pounds per haul were made by otter trawlers some 80 miles offshore, off Emerald Bank, Nova Scotia (lat. about 43° 15' N., long. about 63° W.) at 60 to 80 fathoms, in March 1936.[73]

Odd alewives were reported from Georges Bank and the South Channel in March, June, August, and

November of 1913. Some (up to 78 per haul) were trawled by *Albatross III* about 25 to 60 miles out off southern New England in May 1950; also 18 adults, 10 to 11 inches long, 70 odd miles off Barnegat, N. J., on March 5, 1931; and we saw 60 alewives trawled at the 25-fathom line off Marthas Vineyard[74] in late June, 1951 by the *Eugene H*. Where these wanderers come to shore to spawn, if they succeed in doing so at all, is an interesting question.

It seems likely from various lines of evidence that alewives tend to keep near the surface for their first year or so in salt water, and while they are inshore when older. But practically nothing is known as to the depths to which they may descend if (or when) they move offshore, there being no assurance that those taken by trawlers were not picked up while the trawls were being lowered or hauled up again.

General range—

Gulf of St. Lawrence and northern Nova Scotia south to North Carolina, running up into fresh water to spawn; landlocked races also exist in Lake Ontario, in the Finger Lakes of New York, and in certain other fresh-water lakes.[75]

Occurrence in the Gulf of Maine—

When the white man crossed the Atlantic probably there was no stream from Cape Sable to Cape Cod but saw its annual run of alewives unless they were barred by impassable falls near the mouth.

And while its numbers have declined during the past two centuries and its range has been restricted, both by actual extirpation from certain streams by overfishing, by the pollution of the river waters by manufacturing wastes, and by the erection of dams that it cannot pass, the alewife is a familiar fish still, all along and around our coast[76] and yields an abundant catch in many of our streams. Alewives are taken commonly about Yarmouth, Nova Scotia; in the Annapolis Basin; in Minas Channel; and farther still, up the Bay. Alewives still run in most of the streams tributary to the Bay of Fundy, many in the St. John. A few are taken in the weirs in Passamaquoddy Bay; while young ones have been taken around Campobello Island; as deep as 50 fathoms. They enter the large river systems all along the coasts of Maine and New Hampshire, likewise many small streams, the requirements being that these shall lead to ponds or have deadwaters of sufficient extent along their courses, and no dams or falls that the alewives can not surmount. At Boothbay Harbor, for instance, a considerable number of alewives annually run, or did run, up to spawn in Campbell's Pond, a small body of water that is dammed off from the harbor, and reached by a fishway only 15 feet long. This is the shortest alewife stream of which we know.

In 1896, when the alewife fishery was the subject of inquiry by the Bureau of Fisheries,[77] catches [page 105] large enough to be worth special notice were reported from the mouths of the St. Croix, Dennys, Machias, Medomak, Penobscot, St. George, Pemaquid, Damariscotta, and Kennebec Rivers; from Casco Bay; and from sundry other shore localities in Maine; from the Piscataqua River system in New Hampshire; from the mouth of the Merrimac, and from Cape Cod Bay. Few alewives enter the Merrimac, now, so polluted is it, and so obstructed by dams.[78] And Belding found them running in only about 9 or 10 streams on the Gulf of Maine coast of Massachusetts in 1920, out of 27 streams there that had formerly supported considerable alewife fisheries.[79]

At present, we learn from John B. Burns, of the Massachusetts Division of Marine Fisheries, only a few alewives manage to run up the Merrimac past the fish ladder at Lowell; there is a small but regular run in the Parker River; a few in the Ipswich; a good run in the Essex; a few in the Saugus; perhaps some in Weymouth Back River;[80] a small run in Wier River, Hingham (really a brook); a few in Bound Brook, Cohasset; a large run in Herring Brook, Pembroke (tributary to North River) yielding about 1,000

barrels yearly; increasing numbers in Jones River, Kingston, which had been restocked previous to 1938 when a fish ladder was installed; several thousand run yearly up Barnstable Mill Pond Brook; an improving run in Stony Brook, Brewster, where a ladder was built in 1945, and a good run in Herring River (really only a brook) in Wellfleet, Cape Cod.

The first alewives ordinarily appear early in April in the few streams tributary to Massachusetts Bay that they still frequent, and equally early (March or April) in the St. John River, New Brunswick, according to McKenzie;[81] but their date of arrival varies considerably from stream to stream, according to local conditions. Thus few are seen in the streams of Maine until late April or early May; the first alewives appeared in 1915, for example, in Campbell's Creek, Boothbay Harbor, on April 20. And the earliest good runs on the Nova Scotia shores of the open Gulf and of the Bay of Fundy may come as early as April (streams of Yarmouth, Annapolis, Hants, and Colchester Counties), in May (Digby and King's County streams), or not until June (Cumberland County.)[82] Successive runs follow thereafter, all around the Gulf, until well into June, the later runs, going up, passing the earlier spawners coming down. In 1915, we saw this happening in Campbell's Creek, Boothbay, on May 20. And alewives have been seen, descending, as late as August 20, in Massachusetts streams.

The extreme range of temperature within which eggs are spawned, in Gulf of Maine tributaries, is not known; probably the bulk of production takes place between about 55° and about 60°.

Numerical abundance—

In 1896[83] reported catches were 2,677,972 individual alewives (1,356,755 lb.) for Cape Cod Bay and for the Merrimac River combined; 526,500 (293,671 lb.) for New Hampshire streams; and 5,832,900 (3,388,326 lb.) from the rivers and streams and coast of Maine. The reported catch was 5,843,000 pounds[84] for the New Brunswick shore of the Bay of Fundy that year; 1,609,400 pounds for the Nova Scotia side and for the west coast of Nova Scotia, or about 10,510,000 and about 2,895,000 individual fish, respectively, assuming that the average weight was about the same as that for the alewives of Maine. We thus arrive at a total catch for the Gulf of Maine of something like 22 million individual fish at that time and actually somewhat more, for the canvass certainly was not 100 percent complete.

The run was much greater then in the St. John River system than in any other Gulf of Maine river and doubtless is still. The Damariscotta River, ranking second, was about one-third as productive as the St. John; the Merrimac, St. George, and Penobscot Rivers only something like one-tenth as productive each. Casco Bay yielded about one-sixth as many alewives as the St. John River, the shore line of Cape Cod Bay about one-fifth as many.[85] And the catch of the St. John River system (including Kennebecasis Bay) still was about five times as great in 1931 as that for any of the other counties of New Brunswick [page 106] or of Nova Scotia that border on the Bay of Fundy or on the open Gulf.[86]

The alewife population of the Gulf is much smaller, today, than it was half a century ago. Thus the catch was only about one-half as great for the Bay of Fundy in 1945 and 1946[87] as it had been in 1896, and about one-third as great for Maine (1,224,600 lb.) while the Merrimac River, yielding 472,500 pounds in 1896, yielded less than 3,000 pounds in 1945.[88] And though alewives may seem almost incredibly numerous when crowding into some stream, they made but a sparse population, even in their days of greatest plenty, when spread over the coastal waters of our Gulf, as compared to the sea herring.

Importance—

Alewives are excellent food fish and they are marketed both fresh and salted, and are preferred by many to the sea herring. They are good bait for cod, haddock, and pollock; and their scales commanded a high

price for use in the manufacture of artificial pearls for a brief period during the first world war and for a few years afterward.[89] By far the greater part of the catch of alewives is made in the lower reaches of the streams that they enter to spawn, in weirs, in dip nets or in haul seines according to locality. Most of those taken in outside waters (as in Casco and Cape Cod Bays) are either gill netted or are picked up in the fish traps.

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[67] Capt. Charles Whitborne, in "The True Travels of Capt. John Smith," 1616, vol. 2, p. 250.

[68] The average number of eggs in 644 females taken in the Potomac was 102,800 (Smith, N. C. Geol. and Econ. Survey, vol. 2, 1907. p. 123).

[69] The development of the eggs, larval stages, and young fry are described by Ryder (Report, U. S. Comm. of Fish. (1885), 1887, p. 505) and by Prince Contr. Canad. Biol. (1902-1905), 1907, p. 95).

[70] Bull. U. S. Bur. Fish., vol. 43, 1928, p. 91.

[71] Rept. Alewife Fish. Mass., Mass. Dept. Conservation. Div. Fish. and Game, 1921, p. 18.

[72] Huntsman (Contr. Canad. Biol., [1921] 1922, p. 58) reports its young at Campobello Island, Bay of Fundy, in December and March.

[73] Reported by Vladykov, Copeia, 1936, No. 3. p. 168. One vessel brought in about 10,000 pounds.

[74] At lat. 40° 58' N.; long. 70° 32' W.

[75] Such a race has been reported in Cobbett Pond, Rockingham Co., N. H. by Kendall (Occ. Pap. Boston Soc. Nat. Hist., vol. 7, No. 8, 1908, p. 38) and by Bailey (Biological Survey Merrimac Watershed, New Hampshire Fish and Game Dept., 1938, p. 162).

[76] Belding (Rept. Alewife Fish. Massachusetts, Mass. Dept. Conserv., 1921) has given a very instructive report on the alewife in Massachusetts.

[77] Smith, Rept. U. S. Comm. Fish. (1898) 1899, pp. 31-43.

[78] Fishways recently constructed now allow a few to ascend beyond Lowell, Massachusetts.

[79] See his report on the Alewife Fishery of Mass. (Mass. Dept. of Conservation, Div. Fish. and Game, 1921) which gives much information as to the status of the alewife in Massachusetts streams.

[80] Stocked with 28,000 adult fish in 1949, and fish ladders under construction.

[81] Rept. Biol. Board Canada (1931) 1932, p. 34.

[82] According to McKenzie, Rept. Biol. Board Canada (1931) 1932, p. 34.

[83] A special study of the alewife fishery was made for that year, see Smith, Rept. U. S. Comm. of Fish. (1896) 1899, pp. 33-43.

[84] The Canadian catches for the year were reported in barrels; the conversion factor used is 200 pounds per barrel.

[85] Reported catches for 1896 were about 4,234,000 pounds for the St. John River system; 1,390,612 pounds for the Damarisootta River, 385,804 pounds for the St. George River, 308,844 pounds for the Penobscot, 472,500 Pounds for the Merrimac, 701,287 pounds for Casco Bay, and 884,255 pounds for Cape Cod Bay.

[86] McKenzie, Rept. Biol. Board Canada (1931) 1932, p. 34.

[87] 5,051,100 pounds and 4,517,500 pounds, respectively.

[88] The reported catch for Essex County, Massachusetts, in that year was 2,700 pounds, only a part of which was from the region of the Merrimac.

[89] For details, see Report, Division of Fish and Game, Mass. (1920) 1921, p. 140.