

## Three-Spined Stickleback

*Gasterosteus aculeatus* Linnaeus 1758  
[Jordan and Evermann, 1896-1900, p. 747.]

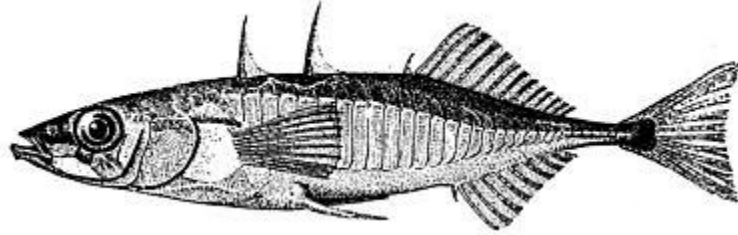


Figure 167 - Three-spined stickleback (*Gasterosteus aculeatus*), Woods Hole.  
From Jordan and Evermann. Drawing by H. L. Todd.

### Description

The three-spined stickleback has a very slender caudal peduncle, and squarish tail fin, like its nine-spined relative, but it is a stouter fish, being about one-fourth as deep as long, and it is more flattened sidewise. Its most diagnostic characters are the number of dorsal spines, of which there are three (occasionally four and rarely five), with the first two usually much the larger, and each with a small triangular fin membrane; the small size of the anal spine (this is free in the three-spined stickleback but attached to the fin by the fin membrane in the four-spined); and especially the presence of a series of 28 to 33 bony plates on each side, besides a single ventral plate [page 309] on the lower surface between and behind the ventral fins. The fact that the dorsal fin (1 spine, 10 to 14 rays) originates some distance in front of the anal (1 spine, 8 to 10 rays) is diagnostic also, while its ventral spines are longer and stouter than those of the nine-spined stickleback.

This is one of the most variable of fishes; Smitt,[63] lists no less than 32 named species or races based on its varieties. Thus its dorsal spines may be long or short, and they vary in number as noted above; its bony plates range from none at all to very well developed; and its caudal peduncle may be keeled or it may not. Most American authors have recognized an American species, at the least as contrasted with a European, the former supposedly with longer dorsal spines; the latter with shorter. But the long-spined, as well as the short-spined form is known to occur on the other side of the Atlantic with every possible gradation between the two. Seeing that we have found both in the Gulf of Maine among fish indistinguishable otherwise, we believe that the various forms are environmental races of the one species. And this is well established for the relative strength of the dermal armature, which is weak in fresh water, but strong in salt.

### Color

This stickleback is extremely variable in color, a fact hardly mentioned in most American accounts. They are deep grayish, or olive, or greenish-brown above, or sometimes blue; paler and often with silvery reflections on the sides; silvery on the belly. The fins are pale, except that the fin membranes often are red. In breeding season the males are described as turning reddish below from nose to vent and often up the sides. In females, the whole body except the top of the back may then be reddish; at the same time the back turns brownish with transverse bands, and the sides develop brassy reflections.

## Size

Maximum length about 4 inches, but few of them are more than 3 inches long. It matures sexually at a length of about 2 inches.

## Habits

This is distinctively a shore fish like all the sticklebacks, the great majority of them living their whole lives in estuarine situations. But it is equally at home in sea water of full salinity as in fresh water. And enough stray out to sea for it to be rather a common experience to pick up a few here and there in the tow net, far from land. On such occasions they usually hide in clumps of floating eelgrass (*Zostera*) or of rockweed (*Fucus*, *Ascophyllum*); indeed we have learned to expect a stickleback or two whenever we dip up bunches of weed of any size. These wanderers keep to the surface except, perhaps, in very rough weather.

It is a permanent all-the-year resident wherever it is found alongshore, entering creeks and the mouths of streams in the spring to spawn, and dropping down into slightly deeper water for the winter. In such situations it probably lies in schools in a more or less sluggish condition while the temperature is lowest.[64] It is a proverbially pugnacious fish, using its spines with good effect as weapons of offense and defense, even on other fishes much larger than itself. It feeds indiscriminately on the smaller invertebrates, on small fish fry, and on fish eggs, to which it is exceedingly destructive in fresh water. The diet list of specimens examined by Vinal Edwards at Woods Hole included copepods, of which they are often full, isopods, schizopod shrimps, and young squid, while some had fed on diatoms only. And it is not only omnivorous but very voracious.

This stickleback affords the classic instance of nest building and of the care of eggs among fishes, and its nesting has been described so often in popular natural histories that a bare outline will suffice here.[65] Recent studies in Europe make it likely that this stickleback spawns chiefly in brackish or fresh water, if not exclusively there, for which purpose it enters the estuaries and the mouths of streams. The spawning time is probably the same in the Gulf of Maine (May to June) as in north European waters,[66] when the fish assume the nuptial dress described above, and the males fight fiercely. It is the male that builds the nest, selecting some sheltered spot in shoal water for his purpose, or some rock pool. Here he makes a barrel-shaped mass of bits of grass, weed, and other vegetation an inch or so in diameter, cementing it together with mucous threads, which he spins from his kidneys, and [page 310] weighting it down with pebbles. He then escorts one or a succession of females to this nest, and each of them deposits about 100 to 150 eggs in the central cavity. The male then enters the nest to fertilize the eggs, which stick in clumps to each other and to the nest. Incubation occupies 6 to 10 days, during which period the male guards the nest, driving away intruders large or small. He tears down the nest when hatching-time approaches, but he continues to guard the fry until these can shift for themselves. Many males die after spawning. Those that survive go back to sea in summer; the females, too.

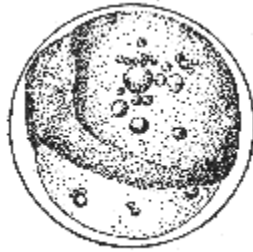


FIGURE 168.—Egg.



FIGURE 169.—Larva, newly hatched, 4.3 mm.



FIGURE 170.—Larva, 6.3 mm.

Three-spined stickleback (*Gasterosteus aculeatus*).  
After Kuntz and Radcliffe.

Figure 168 - —Egg.

Figure 169. - Larva, newly hatched, 4.3 mm.

Figure 170. - Larva, 6.3 mm.

The young fish are 4.25 to 4.5 mm. long when hatched. The yolk sac is absorbed in three or four days; when a week old they are almost 8 mm. long; and the fry are of adult form with fins and spines fully formed when 6 weeks old, and 14 to 16 mm. long.[67] they are 1¾ to 2 inches (40-50 mm.) long when 2 years old, 2 to 2½ (50-55 mm.) at 3 years, according to European studies.

### General range

Coasts and fresh waters of the northern hemisphere; from Labrador, the Strait of Belle Isle and northern Newfoundland to lower Chesapeake Bay on the eastern coast of America and represented on the northwestern coast by a form (*Gasterosteus cataphractus* Pallas 1811) that probably is identical with the Atlantic species. Its European range is from northern Norway and Iceland to Spain, the Mediterranean, and the Black Sea.

### Occurrence in the Gulf of Maine

This stickleback is very plentiful all around the shores of the Gulf from Nova Scotia to Cape Cod, living indifferently in brackish water and in salt. The ditches and creeks of the tidal marshes, brackish ponds and lagoons, rock pools, and weedy shores in shallow water are its favorite habitats. It may be found practically anywhere in such places, often in great numbers and in company with other sticklebacks, for it is the commonest of its tribe in the Gulf, as it is about Woods Hole. And so many of them drift out to sea around the shores of the open Gulf that we have taken them on the eastern part of Georges Bank; over German Bank; in the western basin off Cape Cod; near the Isles of Shoals; off Seguin Island; and off Matinicus Island. In the Bay of Fundy, however, they are known only close to land and in the mouths of estuaries.

## Importance

This little fish is of no commercial value in America. In Scandinavia, however, it is sometimes seined in such quantities that it is worth boiling down for oil.

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[63] Scandinavian fishes, vol. 2, 1895, p. 648.

[64] Large numbers are sometimes seined in winter in Scandinavian waters.

[65] Smitt (Scandinavian Fishes, vol. 2, 1895, pp. 653-656) and Regan (the fresh-water fishes of the British Isles, 1911, pp. 247-249) give accounts of the nest building on which the following is based.

[66] About Woods Hole it spawns from May until the last week in July.

[67] Figures of stages in development of this fish are given by Kuntz and Radcliffe (Bull. U. S. Bur. Fish., vol. 35, 1918, p. 131); A. Agassiz (Proc. Amer. Acad. Arts Sci., vol. 17, 1882, p. 288, plate 9), and by Ehrenbaum (Nordisches Plankton, vol. I, 1905-1909, p. 319).

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**Fishes of the Gulf of Maine** by Bigelow & Schroeder is the seminal work on North Atlantic fishes. It was originally published in 1925 with William Welsh, a Bureau of Fisheries scientist who often accompanied Henry Bigelow on his research cruises. In the late 1920's, Bigelow began a long association with William C. Schroeder, publishing a number of papers and reports on fishes of the North Atlantic, including the first revision of *Fishes of the Gulf of Maine*. This excerpt is from that 1953 edition.

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