

## REPORT ON A COLLECTION OF STICKLEBACKS FROM MAINE

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During the week of August 11, 1980 I was on vacation in Bar Harbor, Maine. Bar Harbor is on Mount Desert Island, the highest island on the Atlantic coast and about the most easterly part of the United States. The area is in the middle of the coast of the Maine, in a region characterized by spruce-fir mature forests blanketing the volcanic and mountainous slopes, and well below the treeless zone to the north. This entire part of the coastal zone is characterized by rocky headlands, deep coastal waters, rocky beaches, and only rare coves where the beach is sandy. Tidal fluctuations are strong, and most coves are bedded with rock, cobblestone and shingle. Many rivers course to the sea in this part of Maine, and tidal intrusion up those rivers extends a long distance inland. The offshore area is characterized by numerous steeply banked and sloping islands, generally at about 45 degrees, for the entire region is a sunken mountain range. To the south is Cape Cod, and to the north are the Maritime Provinces of Canada. This entire coastal region borders on the Gulf of Maine, a distinct geographical and zoological zone, dominated by boreal and subarctic species, with intrusions of temperate species from below Cape Cod. The coastal waters are spotted with vari-colored floats, marking the thousands of lobster traps laying in the nearshore waters. My goal was the capture of sticklebacks, a group of fishes that do not occur south of Chesapeake Bay.

Collecting gear consisted of a landing net frame on a short handle, and quarter inch braided nylon netting. With the firm, tubular aluminum frame, the net was easily worked among masses of shoreline algae. Rubber soled shoes (old running shoes) provided relatively safe footing on the algal-covered rocks, and were washable. In addition I carried plastic bags

and a styrofoam shipping box with fitting cardboard carton.

At this point let me interject that I was insufficiently prepared. I should also have carried heavy rubber bands (they were difficult to find in the few stores handling sundries), more plastic bags for the fishes (the spines of the sticklebacks punctured several), and one or two large, plastic trash bags for enclosing the small bags within the box (which turned out to be a leaker, compounding the problem of the leaky spined little bags). These additional materials would have made things more convenient overall.

There are several kinds of coastal sticklebacks, in addition to the freshwater species, Culea inconstans and Pungitius pungitius. The latter species does occur in brackish waters, and I was searching for it (the seven spined stickleback), Apeltes quadracus (fourspine), Gasterosteus aculeatus (three-spine) and G. wheatlandi (which some consider just a variant of the three-spine). The last is also more often associated with full-strength sea water than estuarine waters.

In searching just about every shallow cove and grassy tidal flat region I could locate, my major finding was that most of these waters were barren of sticklebacks, and many were barren of other kinds of fishes as well. For this finding, I was completely unprepared, as my literature indicated quite the opposite, that indeed these coves and creeks should be teeming with sticklebacks and mummichogs (Fundulus heteroclitus). I did find the Fundulus at many localities (but not all), and this is the only killifish found in the coastal waters in this region, all other coastal species having dropped out at about the level of the north side of Cape Cod. Thus, there were no Fundulus majalis and no Cyprinodon variegatus. The mummichogs were different from those farther south, in that they were very stubby, i.e., short bodied, and they seemed to average a much smaller total length than their more southerly kin.

I found one locality where there were very few sticklebacks (four-spine) associated with a community of many mummichogs and juvenile Menidia menidia (the only silverside species in the area, other coastal species having dropped out well to the south of this area).

Finally, I found one locale where sticklebacks were abundant, after three days of searching the island. This place is located between Northeast Harbor and Seal Harbor, located on the outer part of the island (seaward frontage), and is a tidal creek that passes under a road as it leads to a cove. The water is clear, shallow (wadable), and the bottom varies from rock to silt-gravel mixture. While slippery in places, it is not very soft and there is no danger of sinking into the bottom. Fucus grows attached to the rocks, and lush tufts of filamentous algae rise upward at slack tide or bend with the tidal flow, these tufts often as thick as a person's leg, but generally as thick as an arm or wrist, and varying in length from six inches to about two feet. Sticklebacks were common in these tufts, which were simply scooped up and picked through. Even small sticklebacks, easily able to slip through the net's mesh, were entrapped in the algal tufts, from which they were easily removed with my fingers, having been easily spotted by their metallic yellow or silver coloration.

Despite what I had read, there were no mummichogs associated with these sticklebacks. This was strictly a stickleback spot, with neither killies nor silversides sharing the habitat. All the adult fish I found were fourspines (Apeltes quadracus), although I had expected to find threespines in even greater abundance, since they were supposed to be the most common of the group around the edges of the Gulf of Maine. I found a number of tiny juveniles (1/2") which may be little threespines, as they seem shorter, with a longer belly region, and a silvery color rather than a gold coloration. If that's what they are, then it appears that that

species only comes inshore to fourspine territory for breeding, and then leaves for areas outside the marsh. It is known that threespines move up to freshwater for breeding, and these babies, if threespines, may have come downstream since that time, or have been spawned here. It seems likely that threespines would spawn here in addition to freshwater, rather than move strictly up into freshwater habits where predation could be a real problem. I tend to the feeling that these little ones are indeed threespines and that they were spawned right where I found them. The water here was almost full strength sea water (sp. gr. 1.020, pooled samples from both low tide and high tide collections), which might have been guessed at by the absence of marsh grasses and the presence of Fucus. The filamentous algae grows where-ever the wave or tidal action is insufficient to destroy it, and is not an indicator of any specific salinity range.

Of about fifty fish brought back in three bags, only one was lost en route (caught in a twisted part of a bag). A third of the fish were placed in a marine aquarium in full strength sea water, where they proceeded to immediately feed on the abundant invertebrates. There were no other fish in that aquarium. The remaining fish were gradually acclimated (two days) to freshwater, and are now in a freshwater aquarium to which had been added a water hardening and alkalizing agent (a block of plaster of paris). All fishes are doing very well, and it remains to be seen what those little silvery sticklebacks will grow up to be. All fish are taking frozen brine shrimp (which they pick) and some dried foods. They appear very hardy and adaptable to aquarium conditions.

I can offer some of the fourspines in trade for other interesting natives, but none of my fishes are for sale.