

Lawrence, especially in the Miramichi Bay, it is otherwise. Here, about three-fourths of the stock have 4 free spines instead of 3, so the fish are really 5-spined Sticklebacks.

The following data from many stations will make this fact very evident.

PLACE	No. IN HAUL	No. WITH 4 FREE SPINES	%
Passamaquoddy.....	16	2	12
Passamaquoddy.....	33	0	0
St. Margaret Bay.....	65	1	1½
Shubenacadie.....	5	0	0
Newfoundland.....	3	0	0
Sambro Basin.....	129	6	4½
Barrington Passage.....	269	32	12
Magdalen Islands.....	48	3	7
Miramichi Bay.....	4	3	75
Napan estuary.....	32	18	56
Point au Car.....	21	13	62
Bay du Vin estuary.....	8	5	62
Fox Island.....	6	0	0
Portage Island.....	23	10	43
Miramichi estuary.....	24	19	79
“ “.....	3	3	100
“ “.....	187	105	56
“ “.....	7	5	71
“ “.....	31	21	68
“ “.....	30	23	76
Kennebecasis.....	16	2	12

Referring to the records of hauls in the Miramichi region, one observes that the percentage of fish with 4 free spines is greater in the upper and fresher portion of the estuary and at or about the mouths of the Napan and Bay du Vin Rivers, which empty into the lower part of the bay itself, while the lowest percentage occurs at the Fox and Portage Islands, where the salinity is the highest. In Passamaquoddy and St. Mary Bays, and at Sambro, the salinity is nearly that of the ocean, and few, if any, variants are met with. In the estuary of the Kennebecasis, on the other hand, the salinity and temperature are low, and 12% of the fish have 4 free spines. In the lagoons of the Magdalen Islands in the Gulf, the variants

are also few, but more than in the Passamaquoddy and St. Mary Bays.

A general survey of the data would seem to suggest that the variation is connected with a low salinity and a high summer temperature, for the Miramichi Bay and the estuaries of the rivers flowing into it have a higher summer temperature than any of the other places mentioned above, while the salinity is generally much less. However, if these be the determining physical factors in the biological process, the same variation would be likely to be seen in its southern range, especially in New Jersey; but the fact, if fact it be, does not seem to have been observed there.

It is not a feature due to growth, age, nor size; the young share in the variation equally with the old; nor does the extra spine seem to be due to a response of the system to a need for increased protection for a larger or longer body, for no difference in this respect is seen between the 4 and 5 spined specimens.

Apeltes quadracus is a local fish, and does not seem to perform any considerable migration. Local and peculiar influences are then more effective than they would be on widely ranging species. The flat-fishes of the Miramichi bay are also affected by the same influences, but in a way apparently the very opposite—namely, in the reduction of the fin rays. The writer discussed this matter some years ago, and showed that in the case of the Winter Flounder, *Pleuronectes americanus*, the Smooth Flounder, *L. putnami*, the Sand Dab, *L. ferruginea*, and the Window Pane, *L. maculata*, there was, in the western portion of the Gulf of St. Lawrence, a general reduction in the number of the dorsal and anal rays compared with that of the same species along the Atlantic coast generally. (Vide *Proc. Mir. Nat. Hist. Assoc.* No. III, pp. 42-7, Chatham, N.B., 1903.)

It might prove interesting to pursue the study in the case of other comparatively stationary species, inhabiting areas of high summer temperature and low salinity, such as the Killifish, the Smelt, the Striped Bass, and even the Greenland Sculpin.

A NEW STICKLEBACK FROM THE WEST COAST OF NEWFOUNDLAND
By PHILIP COX, Ph.D.



LOCALITY: Surface in Westbay, Port au Port Bay, Nfld., September 2, 1922.
A stickleback of the group of partially armoured fish, akin to *Gasterosteus* *cuvieri* on the one hand, and *G. Wheatlandi* (*G. gladiunculus*) on the other.

Gasterosteus bispinosus subsp. *Johanseni* Cox.
Total length 52 mm.; to last vertebra 45 mm. Head 3½, depth 4. Eye in head 3¼; in snout 1; D: 11-1-8; A: 1-6; lateral plates 6-6.
Body deep, compressed; caudal peduncle short, unkeeled. Pelvic plate short, not nearly to

vent, uncarinated.

Dorsal spines moderate, finely serrate on lower half; the first, when depressed, not reaching base of second; nor the second the base of the third.

Ventrals 1-2; spines stout, not reaching end of pelvic plate, serrulate, each with a *long, curved tooth* at the outer side of its base, about one third length of spine.

Colour: Upper and lateral surfaces dark bluish; lower parts pale, perhaps white in life.

Named for its discoverer, Mr. Frits Johansen, Marine and Fisheries, Ottawa, Canada.

It is to be regretted that only one example of this type was taken at the time; nor do I find

another among the very considerable collection of sticklebacks made by Mr. Johansen in the Gulf of St. Lawrence and Newfoundland this summer (1922).

There is then, room to regard it as a freak; but as the long, curved tooth at the upper (outer) side of the base of the ventral spine was exactly the same on both spines; and as the proportions of body, head and eye, as well as other features, showed a divergence from the fish of the neighbouring waters, I am inclined to believe it represents at least a race. Unfortunately I accidentally injured one tooth, but it was the counterpart of the one on the other side.

THE NECESSITY FOR VERMIN CONTROL ON BIRD SANCTUARIES

By J. A. MUNRO

THE term "bird sanctuary" is commonly used to describe any area of land or water where the shooting or molestation of birds, or the taking or destruction of their nests or eggs is prohibited by law, and it is generally assumed that the prohibition of shooting on such areas, with the preservation of nesting sites and feeding grounds, will result in an increase of the useful species of birds for whose benefit such reserves are made. That this actually takes place is open to doubt, because, a bird reserve, while giving protection to useful species against the aggressions of mankind, is at the same time attracting, protecting and fostering the increase of more deadly enemies—predacious birds and mammals. Our bird reserves, therefore, cannot be real sanctuaries so long as vermin are allowed to congregate thereon. This passive method of bird protection was tried and found wanting by the late Mr. Wm. Brewster on his farm in Massachusetts. Of this experiment Mr. H. W. Henshaw in a recent number of *The Auk* writes as follows:

"For twenty years no gun was ever fired on October Farm, nor a bird or mammal ever molested by man. Hawks, crows, bluejays, skunks, foxes and other birds and beasts, if not equally welcome in Brewster's eyes, were never molested. Each lived its own life according to its instincts, and Nature was allowed to work her own problem in her own way. Beyond providing boxes for the hole-building species to nest in and planting seed plants for their sustenance, Brewster interfered with them not at all.

"The results will surprise many. They certainly surprised Brewster. For, at the expiration of some twenty years, there were apparently as many birds on the place as there were at the beginning of the experiment, *but no more*. True, there have been changes in the distribution of the species, since the brushy haunts of the warblers and vireos had grown up, and the shrubbery loving species had shifted their quarters elsewhere.

But the number of partridges, for instance, had not increased over the original eight or ten, although each year they nested and reared most, if not all, their young. For many years also a pair of great crested flycatchers nested in the cavity of a certain apple tree and every year brought out a brood of young. Nevertheless only one pair came back each spring, and he was unable to find any in the surrounding territory. So it was with other species. Brewster's explanation in the case of the partridges was that the old birds, with the authority of vested rights, drove away the younger ones, which, had they been allowed to remain, would have overstocked the place according to their own formula. But he found that this experiment proved that to increase the number of small birds in a given area one must at least do police duty and destroy the predacious birds and mammals, large and small. And this he pointed out had been the experience on the large game estates of England and Scotland, where no small part of the keeper's business is to keep down the vermin."

Advocates of the passive method of protection insist that nature should be left entirely alone in order that she may adjust her "balance" to the various disturbing complications of modern civilization. They believe that the Accipiters, the Crow, the squirrel, and so forth, are necessary to this end.

But others feel that "the balance of nature" is not such a delicate mechanism that it cannot be artificially adjusted to meet our requirements. Surely, they argue, this "balance" has had much severe handling aforesaid, for man's history since emerging from barbarism has been a conspiracy against nature, and the present stage of civilization has been reached not as a result of natural laws but in spite of them.

Certainly at one time, not so long ago, the Accipiters, the Crow, the squirrel and other outlaws were necessary, in order that the species



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