

86.—NOTES ON THE BIOLOGY OF THE SALMON AND GRILSE.

By JOHN ANDERSON.

[From a letter to Prof. S. F. Baird.]

I have had salmon fisheries to the tune of £2,000 a year for upwards of forty years. I have had also large connections with white fishermen, and for thirty years had upwards of 200 men engaged for turbot, cod, brill, and soles. During many years I have had great experience in examining what the various fishes lived on both in the sea and river, as also in the lakes.

Most people hold that the grilse is the young of the salmon. I say it is not. It is never seen on our coast till the month of May, and then it weighs $1\frac{1}{2}$ to 3 pounds, while in February we have the young of the salmon in our rivers weighing from $1\frac{1}{2}$ to 3 pounds. The salmon, if you examine it, has an oval scale, a crescent-shaped tail, and quite a different shaped body. The grilse has a diamond scale, a mackerel-shaped tail, and its teeth are quite differently placed from those of the salmon on the river Forth, where I had my fisheries. I have had in one morning 300 grilse, and among them upwards of 30 which exceeded 16 pounds each in weight. At the same time there were 60 salmon, many not over 8 pounds in weight, and some as high as 50 pounds. I have pointed out to skeptics grilse of the second year of fully 22 pounds weight, and which still retained all the above marks.

We have a salmon hatchery on the river Tay. The keeper seemed astonished to find fully one-half of his young family seemingly anxious to get to sea, while the other half were quite contented to remain in such good quarters. In November, when they capture the fish to take the spawn from them, it is generally broken weather and often the river is covered with ice or icicles, and the men getting hold of a 12 or 16 pound fish never look to see whether it is an old grilse or a salmon. Thus all get mixed together. This accounts for the half seeking to go to sea sooner than their neighbors. Then as the salmon fry seek the sea a few months earlier, it is natural for them next season to return a few months earlier than the grilse.

In some of our rivers we obtain 30 grilse for every salmon. On a portion of our sea-coast for a distance of 100 miles, they do not get 100 salmon with the 3,000 grilse caught during the season. There is another river where any quantity of fine salmon-trout are had and at times a good fine grilse, but scarcely 6 during the season.

Some people, and those in high positions, deny that salmon eat anything while in the fresh water, but I have myself found hundreds of times from three to eleven young herring in them during June, July, and

August. I have also found in them sand-eels. This is a small fish as clear as a herring, but long and thin, and buries itself in a moment in the sand whenever it hears or sees an enemy approaching. At times it is caught for bait for the white fishermen's lines with a very small meshed net, and in large quantities. I have also found in them young parr and trout, and frequently perch and minnows.

DENHAM GREEN, *Trinity, Edinburgh, December 18, 1882.*

87.—A NOTE ON THE ATLANTIC SPECIES OF THE GENUS ANGUILLA.

By SETH E. MEEK.

In the Synopsis of the Fishes of North America by Jordan & Gilbert, two species of the genus *Anguilla* are recorded, *Anguilla rostrata*, the American, and *Anguilla vulgaris*, the European, species. With a view to testing the value of the characters assumed to distinguish these two species I have carefully compared several specimens from both sides of the Atlantic.

In the American specimens, the dorsal fin is proportionately farther from the end of snout, making the distance between front of dorsal and front of anal a little shorter than in the European specimens. Otherwise no permanent difference seems to exist. We should not, therefore, in my opinion, consider the two as distinct species, but rather as geographical varieties of the same species. Below is given a table of eleven specimens, seven European and four American. The proportions are given in hundredths of the length to the end of last vertebra. All the specimens mentioned are in the collection of Jordan and Gilbert.

Dimensions.	LOCALITIES.												
	European examples, <i>Anguilla vulgaris</i> (Shaw).							American examples subs. <i>rostrata</i> (Le Sueur).					
	Genoa.	Genoa.	Paris.	Venice.	Venice.	Venice.	Venice.	Average.	Average.	Wood's Holl, Mass.	Wood's Holl, Mass.	Indian River, Fla.	Pensacola, Fla.
Length of head.....	13½	13½	12	13	12½	12½	14½	13.2	13.8	11½	13	13½	12½
Distance from end of snout to front of dorsal.....	31	30½	30	31½	30	29½	31½	30.5	33.0	20½	33½	35½	33½
Distance from end of snout to front of anal.....	45	43	44½	43	42½	43½	46	43.8	43.7	41½	44½	46	43½
Distance from front of dorsal to front of anal.....	14	13½	14½	12½	12½	14	14½	13.6	10.6	11½	10½	10½	9½
Length of mandible.....	5½	6	5	5½	5	5	6	5.5	5.3	4½	5½	6	5
Length of pectoral.....	4	3½	4	4	4	4	4½	4.0	4.0	4	4	4	4½
Depth of body at front of anal.....	5½	5	5½	5	5	5½	5½	5.2	5.5	5½	5	5	6½
Distance from gills to vent.....	27½	28½	32	29½	29½	30	30½	29.6	30.5	29½	32	30½	30
Length in inches.....	16½	16½	20½	11½	12½	12½	23½	12½	18½	10½	19½