

2.—EXTENSION OF THE RECORDED RANGE OF CERTAIN MARINE AND FRESH-WATER FISHES OF THE ATLANTIC COAST OF THE UNITED STATES.

BY W. C. KENDALL AND HUGH M. SMITH.

The purpose in view in presenting this paper is to direct attention to a number of fishes inhabiting the fresh and salt water of the Atlantic seaboard, the eastern limits of whose ascribed habitat we are able to extend. We record the occurrence of three marine and five fresh-water species at greater or less distances beyond the ranges hitherto given. One of the former belongs to the herring family (*Clupeidae*) and is a representative of the West Indian fauna; one is a diminutive member of the mullet family (*Mugilidae*), also belonging in the subtropical region; the third is a gadoid fish with an apparently restricted habitat in the South Atlantic region. Three of the fresh-water fishes are minnows (*Cyprinidae*), one is a silverside (*Menidia*), and one is a killifish (*Fundulus*). While not strictly comprehended by the title of this paper, we feel warranted in mentioning the occurrence of the Atlantic salmon (*Salmo salar*) in two localities remote from its usual range.

To Mr. Vinal N. Edwards, of the U. S. Fish Commission station at Woods Holl, Mass., the credit is due of collecting the two salt-water fishes whose distribution on our coast was thereby widened. The minnows were contained in a small collection of fishes obtained by W. C. Kendall at his home in Freeport, Cumberland County, Me. The cyprinodont was secured by the same collector in the lake region of eastern Maine, in connection with the investigation of the contiguous waters of the United States and Canada by the International Fishery Commission.

In connection with the presentation of information relating to the occurrence in Maine of the fresh-water fishes mentioned, we desire to lay stress on the very meager attempts to make collections of the fishes of this State and the consequent noticeable lack of published data concerning the ichthyology of eastern New England, resulting in an uncertain definition of the distribution of many of our common species. If we are justified in generalizing from the somewhat limited information at hand, systematic collecting in almost any part of the northeastern States may confidently be expected to yield valuable results bearing on the geographical distribution and variation of a large number of our smaller river and lake fishes. The addition of three species to the fauna of a State by the seining of a pool in one small mill stream argues favorably for similar striking developments in other parts of this region.

1. *Chrosomus erythrogaster* Rafinesque. *Red-bellied Dace*.

We record the occurrence of the red-bellied dace at Freeport, Me., where it is one of the commonest fresh-water fishes. Numerous specimens were taken in August, 1892, and November, 1893, in the shallow, muddy expansion of a small brook flowing through the dry bed of a mill pond. The fish were in association with *Salvelinus fontinalis*, *Catostomus teres*, *Notropis megalops*, *Rhinichthys atronasmus*, *Semotilus bullaris*, *Pygosteus pungitius*, and several other species referred to in this paper.

The range of this fish heretofore given is Pennsylvania to Dakota and Tennessee.*

The examples before us present the following features: Head, $3\frac{2}{3}$ to 4; depth, 4. Eye, 3. Dorsal, 8. Anal, 9. Scales, 80-27; scales before dorsal, 40. Teeth, 4-5. Lateral line absent or developed on 8 or 10 scales. Length, $1\frac{1}{4}$ to 2 inches. Color in spirits: Back, brownish; belly, silvery; a yellowish-brown band, lighter than black, extending along side; this is bordered above and below by a brownish-band, the upper straight, extending from shoulder nearly to base of caudal, becoming interrupted and faint on posterior third of body, the lower decurved and broader, running from eye to base of caudal, where it terminates in a dark spot; a dark band round snout from eye to eye involving tips of upper and lower jaws; a dark dorsal stripe from occiput to caudal, and faint parallel stripes just below.

2. *Couesius plumbeus* (Agassiz).

Owing to the somewhat confused synonymy and descriptions of *Couesius plumbeus* and *C. dissimilis*, we provisionally identify as the former species a large number of specimens of this genus obtained at Freeport, Me., September 1, 1892, and November 14, 1893. Following is a description of the fish in question:

Body rather robust, its depth $4\frac{1}{2}$ to 5 in length. Head bluntly conic, its length 4 in body; snout rounded. Mouth moderate, terminal, slightly oblique; maxillary not reaching eye; barbels small. Eye large, $3\frac{1}{2}$ in head. Dorsal, 8; inserted behind origin of ventrals, midway between nostrils and base of caudal. Anal, 8. Lateral line decurved; scales crowded anteriorly: 60 in longitudinal series; 11 above lateral line; 6 or 7 below. Teeth 2, 4-4, 2. Color dusky, with a plumbeous lateral band, disappearing in some of the larger specimens; distinct in young, and terminating in a dark spot at base of caudal in some examples; a dark band around snout, continuing as an indistinct stripe under eyes and across opercula; belly, white; dorsal and caudal dusky; anal and ventrals pale; pectorals with distal part dark and base white. Length, 2 to 4 inches.

The following diagnosis of the two species is given by Jordan:†

- a. Scales small, about 68 in the lateral line; head 5; depth 5; body rather elongate; mouth terminal *plumbeus*.
 aa. Scales larger, about 60 in the lateral line; head, $4\frac{1}{2}$; depth, $4\frac{1}{2}$; body more robust; mouth subterminal *dissimilis*.

The extent to which the descriptions of these fish are confused may be seen when it is recalled that the types of *C. dissimilis* in the National Museum have a terminal mouth and 68 scales in the lateral line; while of *C. plumbeus*, Professor Agassiz, the describer, says: "The scales are large; we can scarcely count 60 rows from the gills to the caudal."

* Synopsis of the Fishes of North America.

† Manual of the Vertebrates, 5th edition, 1890.

We have carefully examined the specimens of *C. plumbeus* and *C. dissimilis* in the National Museum, and have instituted comparisons between them and our fish. We assign our specimens to this species chiefly because of the relatively large scales and the terminal mouth; some of the fish before us have as few as fifty-five scales.

We are not aware that this fish has heretofore been detected in any part of the United States east of the Adirondacks. It has recently, however, been taken near St. John, New Brunswick, although specimens from that province in the U. S. National Museum differ from ours, in having a more inferior mouth, smaller head, and much smaller eye. The fish are larger than ours (4 to 6 inches long), and some of the differences noted may be due to this circumstance.

Our fish bears a close resemblance to the species recently described* by Dr. Jordan from the Frazer River, B. C., and named *C. greeni*. The new species differs from the Maine specimens chiefly in having a broader head, a more curved profile, and a smaller eye.

3. *Semotilus atromaculatus* (Mitchill). *Chub*; *Horned Dace*.

Western Massachusetts is the ascribed eastern limit of distribution of this common species.† While the closely related fallfish (*S. bullaris*) is known to range as far north and east as Quebec, we are not aware of the reported occurrence of *S. atromaculatus* in any part of Maine, and therefore judge that its recognized habitat is extended by the taking at Freeport, Maine, of many specimens, in September, 1892, and November, 1893. In the mill stream before alluded to, the horned dace was found to be common, in company with the fishes previously named.

4. *Clupea pseudohispanica* (Poey). *Spanish Sardine*.

The addition of this fish to the fauna of the United States dates from 1882. In March of that year, Prof. Jordan took four specimens at Pensacola, Florida.‡ An example was also obtained later by Mr. Silas Stearns from the stomach of a red snapper caught on the banks off Pensacola.§ The fish is abundant in Jamaica, Cuba, and elsewhere in the West Indies, and its occurrence on the Florida coast was to have been expected and is perhaps not unusual; its small size and its inutility as food, however, put it beyond the notice of our fishermen, and place on ichthyologists the necessity for its detection on our shores. Prof. Jordan states that the resemblance of the fish to the European sardine (*Clupea pilchardus*) is very striking, and that it is consequently known among the Cuban fishermen as *sardina de España*.

On October 3 and 4, 1892, large numbers of these fish were seined along the shore at Woods Holl and Menimsha Bight, Mass., by Mr. Vinal N. Edwards, of the Fish Commission. Numerous specimens then taken are in the collections of the Fish Commission and National Museum. For the purpose of establishing the identity of these fish, we present the following description:

Body elongate, back rather broad and round. Head 4 to 4½ in length; maxillary reaching about to vertical through anterior margin of pupil, 2½ in head; mandible joining preoperculum slightly in advance of pupil. Eye 4 in head, less than snout. Gill-rakers slender, their length about two-thirds diameter of eye, about 45 below the angle of first arch. Depth about equal to length of head. Dorsal origin much nearer

* Proc. U. S. Nat. Mus. 1893, p. 313.

† Synopsis of the Fishes of North America.—Manual of the Vertebrates.

‡ Proc. U. S. Nat. Mus. 1882, p. 247.

§ Ibid., 1884, p. 33.

end of snout than base of caudal; end of fin with a dark tip. Ventrals under dorsal, about midway between base of caudal and end of snout. Scales large, rounded, with a vertical ridge, more persistent than in *C. harengus*, about 45 in longitudinal and 12 in transverse series; 12 or 13 scales in front of dorsal. Dorsal rays about 17, anal 15 or 16. Color above bluish-purple, below uniformly golden, with purplish reflections; head golden. Peritoneum black or dark reddish-brown. Length, $3\frac{1}{2}$ to 6 inches.

The only fishes found in the vicinity of Woods Holl with which this species is liable to be confounded are the sea herring (*C. harengus*) and the summer herring or alewife (*C. aestivalis*). From examples of the former fish of similar size it differs in having a less compressed body, larger scales, weaker and somewhat shorter lower jaw shorter maxilla, and anterior position of dorsal; the coloration is also different.

In the description of this species in the Synopsis and the Proceedings of National Museum, to which reference has been made, the head is said to be contained $4\frac{1}{2}$ to $4\frac{3}{4}$ times, and the depth 5 to $5\frac{1}{2}$ times, in length. In the foregoing description we have noted the fact that in the Massachusetts specimens the depth is about equal to head. In the smaller fish the body is rather more slender than in the larger specimens (6 inches), and the depth is slightly less than or equal to the length of head; the larger fish have a relatively deep body, the depth is rather more than head, and is contained $3\frac{3}{4}$ to $4\frac{1}{2}$ times in body length. Specimens in the National Museum from Cuba (No. 33126) collected by Prof. Poey, the describer of the species, are similar to those we have in hand in having the depth equal to the length of head. Prof. Jordan also states that the peritoneum is pale; in all our specimens and in the examples from Cuba it is dark. With these exceptions, the fish from the Woods Holl region agree perfectly with the descriptions. Those from Pensacola, on which Prof. Jordan's descriptions are probably based (Nat. Mus. No. 30820, Jordan & Stearns, collectors), are considerably mutilated and much bleached, a circumstance which may account for the discrepancies noted.

5. *Salmo salar* Linnaeus. *Atlantic salmon*.

The normal southern coast-limit of this fish in recent times is given by authorities as southern New England. Dr. Goode, in his standard treatise on "American Fishes," refers to the range as follows:

The Connecticut River once teemed with them, and stragglers have been captured in the Housatonic and the Hudson. The southern limit is marked approximately by latitude $41\frac{1}{2}^{\circ}$, but they may be regarded as partially acclimated, through the efforts of the Fish Commission, in the Delaware and in the Susquehanna, which flows into the Atlantic in latitude 37° , and individuals have even been taken in the Potomac River and in North Carolina.

Since the publication of Dr. Goode's work the Hudson River has yearly had a larger run of salmon, until in 1893 between 800 and 1,000 adult fish, some weighing 25 pounds, were reported to have been caught, and the impression prevails that in a few years the fish will become so abundant under proper legal restriction that a regular fishery may be established. This noticeable result has been achieved through the planting of young salmon in the Hudson by the U. S. Commission of Fish and Fisheries.

As a meager contribution to the subject of the pelagic and coastwise distribution of the salmon, the following note is presented:

About April 10, 1893, Capt. Solomon Jacobs, of the mackerel schooner *Ethel B. Jacobs*, of Gloucester, Mass., while cruising for mackerel off the coast of the Middle Atlantic States, made a set at night in a large school of mackerel about 50 miles ESE.

from Fenwick Island light-ship (located about 10 miles off the Delaware coast), and secured among the mackerel an Atlantic salmon weighing 16 pounds, which fish was sent home to Gloucester. Capt. Jacobs, who communicated this information, says the fish was fat and in fine condition. Some of the crew of the vessel told the captain that there was another salmon which escaped over the cork-line while the seine was being "dried in."

Dr. Goode, in the paragraph quoted, mentions the capture of salmon as far south as North Carolina, but we are not aware that the fish has previously been recorded at sea in such a low latitude (38°) as that just cited.

In the Great Lake region, the western or upper limit of the natural range of the salmon is sharply drawn at the falls of Niagara, although in recent years the occurrence of the fish in Lake Ontario has been extremely rare. It was therefore with much surprise and satisfaction that on May 18, 1893, a letter was received from Dr. G. A. MacCallum, the president of the Ontario Fish and Game Commission, dated Dunnville, Ont., May 16, 1893, recording the capture of a salmon in the Grand River at that place; it had been taken in a seine a few days before.

Immediately upon receipt of this letter Dr. MacCallum was communicated with and requested to obtain the fish in question, if possible, and send the same to Washington. This the doctor was fortunately able to do, and the specimen arrived in good condition on June 5, and was examined by Hon. Marshall McDonald, the U. S. Commissioner of Fish and Fisheries, and Prof. Barton W. Evermann, scientific assistant of the Commission. Inspection of the specimen disclosed its undoubted identity as an Atlantic salmon and opened up an interesting question as to its occurrence in Lake Erie. In transmitting the specimen, Dr. MacCallum wrote that two or three years previously a similar fish was taken in the same stream, and in the summer of 1892 fishermen from Port Maitland sold several lots of them about town; Dr. MacCallum also quotes Mr. S. Wilmot, of Ottawa, as saying that a few years ago some of the same fish were taken in the Saugeen River, Ontario, which flows into Lake Huron, where fry had been planted three or four years before. Dr. MacCallum raised the question as to whether the example obtained by him belonged by descent to the same lot.

Dr. MacCallum describes the fish sent by him as follows: ♀ juv. Length of head, 75 mm.; of body, 355 mm.; of snout to orbit, 20 mm.; of orbit, 16 mm. B. 10, D. 13, A. 12, V. 9, P. 14. Pores, 113. Scales, 25-128-22. Coloration above bluish, but bluish green on head, otherwise silvery with rosy shading. Numerous x-shaped marks on flanks. Two or three teeth on transverse part of vomer, 8 irregularly disposed in two alternating rows on shaft.

Recurring to the question of the origin of the salmon in this locality, it may be said that while the possibility of such a fish finding its way into Lake Erie from Lake Ontario, by way of the Erie or Welland canals, is to be conceded, the probability of such a thing is very remote. The explanation suggested by Dr. MacCallum is entitled to consideration in view of the easily traversed continuous water-course between Lake Huron and Lake Erie. Mention may also be properly made of the experimental planting of fry of the Atlantic salmon in the basin of Lake Erie by the U. S. Fish Commission. It does not appear from the records, however, that any fry have been deposited since 1876. Tracing the occurrence of the fish to this source, the small size of the specimen would consequently indicate that some of the young fish whose acclimation in the lake was attempted reached maturity and underwent the reproductive process and that their progeny survived.

6. *Fundulus diaphanus* (Le Sueur). *Spring Minnow; Barred Killifish.*

The eastern limit of the range of this species is given as eastern Massachusetts.* We now record the taking by W. C. Kendall of numerous specimens in Washington County, Me., in August and October, 1893. The localities in which the fish was found were Boyden Lake, Pennamaquan Lake, and Grand Lake Stream.

The examples from this region present some features that deserve mention. One noticeable point of difference between them and the typical species is the more elongated body; while the species is usually described as having the greatest body depth contained $4\frac{1}{2}$ to 5 times in the body length, the specimens before us from eastern Maine have the length equal to $5\frac{3}{4}$ or 6 times the depth. The scales in our specimens are also much smaller than in southern and western examples. The scales in this species are given as 40-12† and 46-12;‡ Maine fish, however, have from 54 to 58 scales in the lateral line and 16 in a transverse series. Other morphological features of these eastern fish are not peculiar, the head being contained $3\frac{3}{8}$ or $3\frac{3}{4}$ times in length and the eye $3\frac{1}{2}$ times in head, the dorsal having 13 or 14 and the anal 11 rays. The color differences of the sexes, to which attention has recently been called,§ are well exhibited in the larger specimens.

7. *Querimana gyrans* Jordan & Gilbert.

The discovery of this diminutive species was made by Prof. Jordan at Key West, Fla., in 1883, and the description appeared in the "Proceedings of the U. S. National Museum"¶ for 1884, where the following reference to it is given:

This little fish was found to be very abundant about the market wharves at Key West, apparently feeding on the waste fishes thrown overboard by the fishermen. None of the many specimens obtained is more than three-fourths of an inch long, nor is it likely that the species attains a much greater size.

The fishes swim about in schools of about 50 at the surface of the water, the school having often something of a rotary motion, like a school of whirligig beetles (*Gyrinidae*). When so swimming the pale spot on the back is very conspicuous, and the bronze-colored ones (males?) are readily distinguished from the green ones. When alarmed, the whole school sinks to the bottom. All the specimens obtained were dipped up with a pail from the boats.

It is probable that the species obtained at Charlestown, and referred by us to *Querimana harengus*, belonged to this species. Unfortunately they have been destroyed.

In April, 1892, one of the writers found this fish in large numbers in the Albemarle region of North Carolina.¶ In the fresh waters of the Pasquotank River and Edenton Bay it was very abundant; in the Roanoke River one specimen was obtained as far up as Plymouth. In July of the same year one of the writers, while connected with the U. S. Fish Commission schooner *Grampus*, saw an abundance of these fish in the lower part of Chesapeake Bay and took a number of specimens,** which are now before us.

* Jordan, Manual of the Vertebrates.

† Synopsis of the Fishes of North America.

‡ Manual of the Vertebrates.

§ Notes on a Collection of Fishes from the Lower Potomac River, Maryland. By Hugh M. Smith, M. D. Bulletin U. S. Fish Commission, 1890. Also, Fishes of Pennsylvania. By Tarleton H. Bean, M. D.

¶ Descriptions of Ten New Species of Fishes from Key West, Florida. By David S. Jordan and Charles H. Gilbert.

¶ Report on a Collection of Fishes from the Albemarle Region of North Carolina. By Hugh M. Smith, M. D. Bulletin U. S. Fish Commission, 1891.

** Ibid, p. 192, footnote.

We are now able to extend the range of this species much farther north and east, namely, to Woods Holl, Mass. Among a collection of fishes made at that place by Mr. Vinal N. Edwards, of the U. S. Fish Commission, and recently forwarded to Washington, are three specimens of this mullet taken July 1, 1892. The fish are typical in all respects. They are about $1\frac{1}{2}$ inches long and present the following features: Head, $3\frac{1}{2}$; depth, $3\frac{1}{4}$; dorsal, IV-1,7 (or 8); anal, II,9 (or 10); scales, 28 to 30.

The National Museum also contains numerous specimens of this fish from Woods Holl, collected several years ago.

8. *Menidia beryllina* (Cope). *Silversides*.

This fish, originally described from the Potomac River at Washington, in 1866, was for a long time known only from that locality and from a single specimen. At the time of the issuance of the fifth revised edition of his "Manual," in 1890, Prof. Jordan had knowledge of only the type example. The fish, however, is not uncommon at Washington; and in the Lower Potomac, where it is found associating with *M. notata*, it is quite abundant.* According to Dr. Tarleton H. Bean,† it probably occurs in the Susquehanna River, but as yet it has not actually been observed there. In 1892 the range of the fish was extended in a southern direction by its capture at a number of places in Albemarle Sound, North Carolina, by one of the writers.‡

There is in the collection of the U. S. Fish Commission a large number of specimens of this fish from Eel Pond and other places in the vicinity of Woods Holl, Mass., and from the Acushnet River, at New Bedford. They were taken in company with *Menidia notata*, and appear to be more numerous than the latter species in some localities. Examples from the Acushnet River are larger and darker in color than those from Woods Holl. The specimens vary in length from 2 to $3\frac{1}{4}$ inches. The head is contained in the length without caudal from 4 to $4\frac{1}{2}$ times; the depth is contained in length from $4\frac{1}{2}$ to 5 times; the dorsal formula varies from V-1,8, to V-1,11, the most common number of spines and rays being V-1,9; the anal formula is I,15, I,16, or I,17. Scales, 38 to 41 in lateral series, 8 in transverse series.

9. *Phycis earllii* Bean. *Earll's hake*.

This species was first brought to public notice in 1880 by Dr. Tarleton H. Bean, who based his description on three specimens obtained in the Charleston, S. C., market by Mr. R. Edward Earll. So far as we are informed, this fish has not up to this time been recorded from any locality north of Charleston. We therefore deem the circumstance of its occurrence nearly three degrees further north worthy of mention. On December 13, 1890, a party from the U. S. Fish Commission steamer *Fish Hawk* landed at Hatteras Inlet, N. C., and found among the eelgrass on the beach inside the inlet a variety of fishes that had been left by the receding tide; among them were eels (*Anguilla chryssypa*), whiting (*Menticirrhus alburnus*), butterfish (*Stromateus alepidotus*), sea-robins (*Prionotus tribulus*), killifish (*Fundulus majalis*), and a live example of *Phycis earllii*, which was obtained and identified by W. C. Kendall. This specimen was somewhat larger than the types, being about 18 inches long; the fishes on which the species was founded were 13 to 14 inches in length.

* Notes on a Collection of Fishes from the Lower Potomac River, Maryland.

† Fishes of Pennsylvania.

‡ Report on a Collection of Fishes from the Albemarle Region of North Carolina, pp. 192, 195.