

REPORT
OF THE
STATE COMMISSIONERS
OF
FISHERIES,
FOR THE
YEARS 1889-90-91.

WITH APPENDIX BY DR. T. H. BEAN, OF THE SMITHSONIAN INSTITUTION.

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THE
FISHES OF PENNSYLVANIA,

**With Descriptions of the Species and Notes on their Common
Names, Distribution, Habits, Reproduction, Rate
of Growth and Mode of Capture.**

BY

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INTRODUCTION.

Early in 1891 Mr. Henry C. Ford requested me to prepare a paper upon the fishes of the State of Pennsylvania for the current report of the Fish Commission of which he is president. The scope of the article was, by mutual agreement, to be limited to brief descriptions of the species, with notes upon their common names, distribution, size, habits, reproduction, rate of growth and mode of capture. Inasmuch as the plan of the work involved the illustration of all the important fishes it was not considered essential to introduce keys for the identification of the species.

The descriptions are chiefly original, and are based upon specimens contained in the collection of the United States National Museum at Washington, D. C. The popular notes have been obtained largely from original investigations and, in part, by compilation from the writings of Goode, Gill, Cope, and Jordan. In connection with field work in the service of the United States Fish Commission the writer has derived much information of value, which is here for the first time recorded.

The colored plates were made by Mr. Sherman F. Denton of Wellesley, Mass., from living or fresh specimens. The major portion of the illustrations in black have been reproduced from original drawings belonging to the United States Fish Commission. In addition to these, a number of new illustrations were made by Mr. J. C. Van Hook and Mr. A. H. Baldwin.

Acknowledgments are due to James Thompson of Erie, John W. Hague, Esq., of Pittsburg, A. B. Burns and D. T. Webster, Esq., of Montrose, Ben. L. Hewitt, Esq., Hollidaysburg, Dr. B. H. Warren of West Chester, Hon. Henry C. Ford and John Gay of Philadelphia, and W. L. Powell of Harrisburg, for valuable notes upon the distribution and habits of the species. Mr. Barton A. Bean, assistant curator of the department of fishes, United States National Museum, rendered much assistance in preparing the descriptions and drawings of the species.

The scope of this paper does not include statistics of the commercial fisheries, but it may be of interest to remark that, considering the short lake coast of the state, amounting to only forty-seven miles, it is the scene of the most important fisheries of the state. According to the *Review of the Fisheries of the Great Lakes in 1885*, published in the report of the United States Fish Commission, Erie then had nineteen pound-nets and 10,700 gill-nets. Erie fishermen caught nearly two-thirds of all the white fish taken in the lake in that year, their catch amounting to more than 2,000,000 pounds out of a total of 3,500,000 pounds. The wholesale value of the fish products is said to have been

\$412,750. The principal commercial fishes were blue pike, lake herring, white fish, suckers and other fish of the same family, sturgeon, perch, pike perch, lake trout, cat fish, saugers, bass, grass pike and muscalonge, these being named in the order of their aggregate in weight. The total catch of these species for the year amounted to 10,793,500 pounds.

Only a few lake trout were taken off Erie and those were large, weighing from twenty five to forty pounds each. White fish are caught in Erie county chiefly in July, August and November. Lake herring and blue pike are taken chiefly in April and the early part of May.

The whole number of species credited to Pennsylvania is one hundred and fifty-seven. The families which are represented by the largest number of species are those including the cat fishes, suckers, minnows, sun-fishes and darters.

The following is a provisional statement of the distribution of the species with reference to the Lake Erie basin, the Ohio valley, and the streams of the Atlantic drainage system. The fish fauna of Lake Erie is not sufficiently known to enable me to present it with certainty and completeness.

DISTRIBUTION OF PENNSYLVANIA FISHES.

	Lake Erie.	Ohio valley.	Atlantic basin.
1. <i>Ammocætes niger</i> ,	X	X	
2. <i>Petromyzon marinus</i> ,			X
3. <i>Petromyzon concolor</i> ,	X	X	
4. <i>Polyodon spathula</i> ,	X (?)	X	
5. <i>Scaphirhynchus platyrhynchus</i> ,		X	
6. <i>Acipenser sturio</i> ,			X
7. <i>Acipenser brevirostrum</i> ,			X
8. <i>Acipenser rubicundus</i> ,	X	X	
9. <i>Lepisosteus osseus</i> ,	X	X	X
10. <i>Lepisosteus platystomus</i> ,	X	X	
11. <i>Amia calva</i> ,	X	X	X
12. <i>Ictalurus punctatus</i> ,	X	X	*
13. <i>Amiurus nigricans</i> ,	X	X	
14. <i>Amiurus albidus</i> ,			X
15. <i>Amiurus natalis</i> ,	X	X	
16. <i>Amiurus vulgaris</i> ,	X	X	
17. <i>Amiurus nebulosus</i> ,	X	X	X
18. <i>Amiurus melas</i> ,	X	X	
19. <i>Gronias nigrilabris</i> ,			X
20. <i>Leptops olivaris</i> ,		X	
21. <i>Noturus flavus</i> ,	X	X	
22. <i>Noturus insignis</i> ,			X
23. <i>Noturus gyrinus</i> ,			X
24. <i>Ictiobus urus</i> ,		X	
25. <i>Ictiobus bubalus</i> ,		X	
26. <i>Ictiobus carpio</i> ,		X	
27. <i>Ictiobus difformis</i> ,		X	
28. <i>Ictiobus velifer</i> ,	X	X	
29. <i>Ictiobus cyprinus</i> ,		X	X
30. <i>Cycleptus elongatus</i> ,		X	
31. <i>Catostomus catostomus</i> ,	X	X	X
32. <i>Catostomus teres</i> ,	X	X	X
33. <i>Catostomus nigricans</i> ,	X	X	X
34. <i>Erimyzon sucetta</i> ,	X	X	X
35. <i>Minytrema melanops</i> ,	X	X	

DISTRIBUTION OF PENNSYLVANIA FISHES—Continued.

	Lake Erie.	Ohio valley.	Atlantic basin.
36. <i>Moxostoma anisurum</i> ,	x	x	
37. <i>Moxostoma macrolepidotum</i> ,	x	x	x
38. <i>Moxostoma aureolum</i> ,	x	x	
39. <i>Moxostoma crassilabre</i> ,		x	
40. <i>Placopharynx carinatus</i> ,		x	
41. <i>Campostoma anomalum</i> ,		x	x
42. <i>Chrosomus erythrogaster</i> ,		x	x
43. <i>Hybognathus nuchalis</i> ,		x	x
44. <i>Hybognathus regius</i> ,			x
45. <i>Pimephales promelas</i> ,		x	
46. <i>Pimephales notatus</i> ,	x	x	
47. <i>Exoglossum maxillingua</i> ,			x
48. <i>Notropis bifrenatus</i> ,			x
49. <i>Notropis procne</i> ,			x
50. <i>Notropis hudsonius</i> ,	x		x
51. <i>Notropis amarus</i> ,	x		x
52. <i>Notropis whipplei</i> ,	x	x	x
53. <i>Notropis megalops</i> ,	x	x	x
54. <i>Notropis chalybaeus</i> ,			x
55. <i>Notropis jejunus</i> ,		x	
56. <i>Notropis scabriceps</i> ,		x	
57. <i>Notropis ardens</i> ,		x	
58. <i>Notropis photogenis</i> ,			x
59. <i>Notropis dilectus</i> ,		x	
60. <i>Notropis atherinoides</i> ,	x	x	
61. <i>Ericymba buccata</i> ,		x	
62. <i>Phenacobius teretulus</i> ,		x	
63. <i>Rhinichthys cataractæ</i> ,			x
64. <i>Rhinichthys atronasus</i> ,		x	x
65. <i>Hybopsis dissimilis</i> ,		x	
66. <i>Hybopsis amblops</i> ,		x	
67. <i>Hybopsis kentuckiensis</i> ,		x	x
68. <i>Semotilus bullaris</i> ,			x
69. <i>Semotilus atromaculatus</i> ,		x	x
70. <i>Phoxinus elongatus</i> ,		x	
71. <i>Phoxinus funduloides</i> ,			x
72. <i>Phoxinus margaritus</i> ,			x
73. <i>Notemigonus chrysoleucus</i> ,			x
74. <i>Carassius auratus</i> ,	*	*	*
75. <i>Cyprinus carpio</i> ,	*	*	*
76. <i>Hyodon alosoides</i> ,	x	x	
77. <i>Hyodon tergisus</i> ,	x	x	
78. <i>Clupea vernalis</i> ,			x
79. <i>Clupea chrysochloris</i> ,	x	x	
80. <i>Clupea sapidissima</i> ,			x
81. <i>Brevoortia tyrannus</i> ,			x
82. <i>Dorosoma cepedianum</i> ,	x	x	x
83. <i>Osmerus mordax</i> ,			x
84. <i>Coregonus quadrilateralis</i> ,	x		
85. <i>Coregonus clupeiiformis</i> ,	x		
86. <i>Coregonus artedi</i> ,	x		
87. <i>Coregonus tullibee</i> ,	x		
88. <i>Thymallus ontariensis</i> ,			*
89. <i>Oncorhynchus chouicha</i> ,			*
90. <i>Salmo salar</i> ,			*
91. <i>Salmo irideus</i> ,			*
92. <i>Salmo fario</i> ,			*
93. <i>Salvelinus fontinalis</i> ,	x	x	x
94. <i>Salvelinus namaycush</i> ,	x		
95. <i>Percopsis guttatus</i> ,	x	x	x
96. <i>Fundulus majalis</i> ,			x
97. <i>Fundulus diaphanus</i> ,	x	x	x
98. <i>Fundulus heteroclitus</i> ,			x
99. <i>Zygonectes notatus</i> ,		x	

* Species so marked have been introduced.

DISTRIBUTION OF PENNSYLVANIA FISHES—*Continued.*

	Lake Erie.	Ohio valley.	Atlantic basin.
100. <i>Zygonectes dispar</i> ,		X	
101. <i>Umbra limi</i> ,	X	X	
102. <i>Umbra pygmaea</i> ,			X
103. <i>Esox americanus</i> ,			X
104. <i>Esox vermiculatus</i> ,	X	X	
105. <i>Esox reticulatus</i> ,	X		X
106. <i>Esox lucius</i> ,	X	X	X
107. <i>Esox nobilior</i> ,	X	X	
108. <i>Anguilla rostrata</i> ,	X	X	X
109. <i>Tylosurus marinus</i> ,			X
110. <i>Eucalia inconstans</i> ,		X	
111. <i>Gasterosteus aculeatus</i> ,			X
112. <i>Apeltes quadracus</i> ,			X
113. <i>Menidia beryllina</i> ,			X
114. <i>Labidesthes sicculus</i> ,		X	
115. <i>Aphredoderus sayanus</i> ,	X	X	X
116. <i>Pomoxys sparoides</i> ,	X	X	
117. <i>Pomoxys annularis</i> ,	X	X	
118. <i>Ambloplites rupestris</i> ,	X	X	*
119. <i>Acantharchus pomotis</i> ,			X
120. <i>Enneacanthus obesus</i> ,			X
121. <i>Enneacanthus simulans</i> ,			X
122. <i>Mesogonistius chætodon</i> ,			X
123. <i>Lepomis cyanellus</i> ,	X	X	
124. <i>Lepomis macrochirus</i> ,		X	
125. <i>Lepomis pallidus</i> ,	X	X	X
126. <i>Lepomis auritus</i> ,			X
127. <i>Lepomis megalotis</i> ,	X	X	
128. <i>Lepomis gibbosus</i> ,	X		X
129. <i>Micropterus dolomieu</i> ,	X	X	*
130. <i>Micropterus salmoides</i> ,	X	X	*
131. <i>Etheostoma pellucida</i> ,		X	
132. <i>Etheostoma olmstedii</i> ,			X
133. <i>Etheostoma nigrum</i> ,	X	X	
134. <i>Etheostoma aësupus</i> ,		X	
135. <i>Etheostoma blennioides</i> ,		X	
136. <i>Etheostoma caprodes</i> ,	X	X	X
137. <i>Etheostoma macrocephalum</i> ,		X	
138. <i>Etheostoma peltatum</i> ,			X
139. <i>Etheostoma aspro</i> ,		X	
140. <i>Etheostoma variatum</i> ,		X	
141. <i>Etheostoma zonale</i> ,		X	
142. <i>Etheostoma maculatum</i> ,		X	
143. <i>Etheostoma flabellare</i> ,		X	
144. <i>Etheostoma cœruleum</i> ,		X	
145. <i>Perca flavescens</i> ,	X	X	X
146. <i>Stizostedion vitreum</i> ,	X	X	X
147. <i>Stizostedion salmoneum</i> ,	X	X	
148. <i>Stizostedion canadense</i> ,	X	X	
149. <i>Roccus lineatus</i> ,			X
150. <i>Roccus chrysops</i> ,	X	X	
151. <i>Morone americana</i> ,			X
152. <i>Morone interrupta</i> ,	X	X	*
153. <i>Aplodinotus grunniens</i> ,	X	X	
154. <i>Uranidea richardsoni</i> ,	X	X	
155. <i>Uranidea viscosa</i> ,			X
156. <i>Uranidea gracilis</i> ,		X	X
157. <i>Lota maculosa</i> ,	X	X	X

* Species so marked have been introduced.

It is hoped that this report will stimulate investigation of the waters of the state with the result of bringing together collections to form the basis of a much more extensive and satisfactory account of the fishes of this great commonwealth. The author will gladly undertake the preparation of a final report provided he can secure the co-operation of collectors in various parts of the state, and particularly in localities wherein the fishes are comparatively little known.

TARLETON H. BEAN.

U. S. FISH COMMISSION, WASHINGTON, D. C.,
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ORDER EVENTOGNATHI.

FAMILY CATOSTOMIDÆ. THE SUCKERS.

GENUS ICTIOBUS RAFINESQUE. BUFFALO FISHES.

24. *Ictiobus urus* AGASSIZ.The Big-mouthed Buffalo Fish. (*Figure 27.*)

The big-mouthed buffalo fish has a stout body and head, the back elevated, and a large mouth. The depth of the body is equal to one-third of the total length without tail. The head is contained three and one-fourth times in the standard length. The eye is of moderate size, its length about one-sixth that of the head. Mucus pores well developed. The mouth is somewhat oblique; the maxillary not reaching vertical through eye. The caudal peduncle is broad, its least depth almost half length of head. The rather long dorsal fin commences on middle of body, the length of its base equal to depth of body; the anterior rays high, longest half length of dorsal base; beginning with the ninth the rays are about of equal length, and not much more than one-third length of longest rays.

Caudal forked. Pectoral moderate, its length about equal to that of longest dorsal rays. The anal is short, its base equal to one-half the length of its longest ray, which equals longest dorsal ray. D. 25 or 26; A. 8 or 9. Scales, 7-36-6, large and striated. Lateral line complete and straight. The specimen described, No. 35,882, United States National Museum, from the Missouri river, is fourteen inches long.

The black buffalo, big-mouthed buffalo or mongrel buffalo of authors, occurs in the Mississippi and Ohio valleys, but is less abundant than the other species of the genus. It grows to a length of two and one-half feet, and is extensively used for food. The species is found only in the larger streams, and is distinguished from all the other buffalo fishes by its darker colors, as well as by its large mouth and stout body.

25. *Ictiobus bubalus* (RAFINESQUE).

The Red-mouthed Buffalo Fish.

The red-mouthed buffalo fish has the back elevated, body robust more or less compressed, mouth terminal with little developed lips, opercle very large and strong, large scales and a long, low, dorsal fin. The depth of the body equals one-third of its length; the length of the head is contained three and one-half times in the standard length; the dorsal base two and two-thirds in the same length. Diameter of eye equals about one-seventh length of the head. Teeth small and numerous. D. 29; A. 9; V. 10. Scales 7-44-6. The example described, No. 20,774, United States National Museum, from Illinois, is eighteen inches long.

The red-mouthed buffalo fish, also known as the brown buffalo, high-backed buffalo, small-mouthed buffalo, sucker-mouthed buffalo and buffalo fish, is a common inhabitant of the Mississippi and Ohio valleys, but does not occur east of the Alleghenies.

This species reaches a length of two and one-half feet and a weight of fifteen pounds. It frequents large streams. Prof. Forbes has been informed by fishermen that one or more species of buffalo fish have the

“peculiar habit of whirling around in shallow water or plowing steadily along, with their heads buried in the mud, and their tails occasionally showing above the surface. These operations have nothing to do with spawning, and it is likely that fishes thus engaged are burrowing for small mollusks and for mud-inhabiting larvæ.” The food of this buffalo fish consists of aquatic plants, in the Illinois river chiefly duck weed and *Ceratophyllum*. The animal food includes mollusks, insects and their larvæ and crustaceans. Worms are rarely found in their stomachs. The buffalo is not a choice fish and its flesh is filled with innumerable small bones, yet it is abundant and is eaten in very large quantities. These fish do not take the hook and are usually caught in seines.

26. *Ictiobus carpio* RAFINESQUE.

The Carp Sucker. (*Figure 28.*)

The body of the carp sucker is fusiform, back little elevated and sides compressed. The depth of the body at the origin of the dorsal is contained about three and one-fourth times in the length without caudal, the length of the head three and three-fourths times. Muzzle more or less conic, rounded on top; mouth small, horizontal and inferior, with thin lips. Muciferous system on head moderately developed. The eye is of moderate size, its diameter contained five times in length of head. The distance from tip of snout to origin of dorsal equals nearly one-half the distance from tip of snout to caudal base. First and second rays of dorsal partly ossified, first very small, one-third as long as the second which is less than one-half as long as the third or longest ray, which is slightly more than one-half dorsal base. The rays gradually decrease in length from the third to the tenth, which is contained three and one-half times in the third, and are of equal size from this ray back. The pectorals are placed low; ventrals with a broad base and caudal well forked. The scales are large and about equal in size all over the body. D. 28 (to 30); A. 8; V. 10. Scales 7-37-6. The lateral line is well marked and slightly decurved.

Described from No. 36,509, United States National Museum, nine and one-half inches long, from the Rio Colorado, Texas.

The big carp sucker or olive sucker is an inhabitant of the Ohio and Mississippi valleys. It is a common species and grows to a moderately large size, reaching eighteen inches in length, and is the largest of the carp suckers. In the Ohio river and its tributaries it is one of the most abundant fishes. In the Mississippi valley its range extends southward to Texas. The species has not been recorded from Lake Erie.

The food of the carp sucker is similar to that of other species of the genus. It includes soft-shelled mollusks, small crustaceans, worms and aquatic plants.

Although this is not a choice fish it is extensively used for food.

27. *Ictiobus difformis* (COPE).

The Deformed Carp Sucker.

This species is fusiform, sides compressed, back much elevated, the head conic, rounded on top, with very blunt muzzle. The eye is longer than the snout, one-fourth length of head. Mouth small, horizontal. The greatest depth of the body is at the origin of the dorsal and is contained two and two-thirds times in the total length without caudal; length of head four and one-fourth times. Anterior rays of dorsal

much produced, as long as dorsal base and almost equal to depth of body; the posterior rays low. Caudal large, deeply forked. D. 24 (developed rays); A. 8 or 9; V. 9; scales 6-35-7. The scales are large and about equal in size all over the body.

Described from No. 26,274, United States National Museum, nine and one-half inches long, from Alabama.

The deformed carp sucker occurs in the Ohio valley. Prof. Cope records it from the Ohio river. Dr. Jordan reports it from the Wabash and the lower Ohio.

This singular species may be recognized by the great bluntness of its head and by the dorsal fin beginning in front of the middle of the body. It is not a common fish and its size is small, the maximum length being about one foot. It is too rare to be of any commercial importance even if its size were larger. Its habits are similar to those of other members of its genus.

28. *Ictiobus velifer* (RAFINESQUE).

The Sail Fish.

The sail-fish has an oblong body with the back much arched; head sub-conic, broad between the eyes. The depth of the body almost equal to one-third of the length with tail; the head is one-fourth of the standard length. The rather large eye is as long as snout, more than one-fourth length of head. The snout projects beyond the mouth, which is small. Lips rather thick, papillose. Gill rakers very numerous, long and slender. The dorsal fin commences over the tenth scale of the lateral line, its first three rays very high, equal to length of dorsal base, or four times length of short rays, which are most numerous. The very short anal is placed opposite end of dorsal, the length of its base less than one-half that of head; its longest ray equal to twice the length of its base. The pectorals are short and placed low on body. The ventrals reach vent. Caudal deeply forked with slender lobes, the upper the longer. Scales large, striated. Lateral line straight, slightly below middle of body. D. 26; A. 8; V. 10. Scales, 6-36-5.

Common names of this species include the following: Quill-back, skim-back, sail fish, spear fish, carp sucker and sailing sucker. In some localities it is called river carp.

In Pennsylvania, according to Prof. Cope, this species of quill-back is found only in the Ohio river and its tributaries. It is extremely common in the Mississippi and Ohio valleys, and occurs, also, in the great lakes and lakes of western New York.

The quill-back reaches a length of one foot, and is not an important food fish. The majority of the common names are bestowed with reference to the very high anterior part of the dorsal fin.

The food of this fish includes small mollusks, insect larvæ, crustaceans and aquatic plants. Prof. Forbes finds that worms and protozoans are rarely present in the stomachs of this species. The amount of vegetation eaten is rather small, and it is much mingled with mud. The mollusk most commonly found is a thin-shelled *Sphaerium*.

29. Ictiobus cyprinus (LE SUEUR).**The Quill Back.**

The quill-back is robust, somewhat compressed, with an arched dorsal profile. The depth of the body equals one-third of the length; and the length of the head is contained three and one-half times in the standard body length. Eye slightly more than five times in length of head. Length of dorsal base slightly more than depth of body. This fin originates a little in advance of middle of body. Its first rays very high, the third two-thirds length of longest, thence gradually decreasing in length. D. 25; A. 8; V. 10. Scales, 6-43-5. Described from No. 33,073, United States National Museum, nine inches long, from Havre de Grace, Maryland.

This is called the carp sucker, silvery carp sucker, quill-back, skim-back, spear-fish, sail-fish and carp. As now limited, its range is stated to be from Pennsylvania to Virginia, and its center of abundance the region about Chesapeake Bay. Prof. Cope also recognized it as occurring in the Allegheny river and generally throughout the Ohio valley.

The best account of the food of this fish is given by Prof. S. A. Forbes, who records the fish from the large rivers of Illinois and their principal tributaries, also from Lake Michigan and small lakes of northern Illinois. He found it abundant in the lakes and ponds of the river bottoms, and less common than other species of carp suckers in running water. The species consumes less vegetation than the other fishes of its genus, and more mud is mingled with its food. It devours fewer of the large insect larvæ, and no pond snails. "Mollusks made about one-fourth of the food—all the thin-shelled *Sphærium*. Insects averaged about one-third, and *Entomostraca* made nearly one-fourth." No worms or polyzoans were observed, but occasionally protozoa were noticed.

This species reaches a length of one foot.

GENUS CYCLEPTUS RAFINESQUE.**30. Cycleptus elongatus (LE SUEUR).****The Black Horse. (Figure 29.)**

The black horse has an oblong, elongate, somewhat compressed body, very small head, long caudal peduncle and a forked tail. The greatest depth of the body is at the origin of the dorsal fin, and is one-fourth of the standard length; the length of the head is one-seventh length of body. The eye is small, being contained three times in its distance from tip of snout. Mouth small; the upper lip is thick and has several rows of tubercles, the lower lip not so thick and deeply incised behind. The pharyngeal bones are strong, with stout, wide-set teeth, which increase in size downward.

The fins are large; the pectoral falcate; first three rays of dorsal high, the rest low; its base is considerably more than one-third length of body; anal very short. The scales are of moderate size, equal all over the body. D. 30; A. 8; V. 10. Scales, 9-62-9. Lateral line perfect, almost straight. The specimen described is No. 10,790, United States National Museum, from Ohio; length ten and one-half inches.

This is known as the black horse, Missouri sucker, gourd-seed sucker

and suckerel. It inhabits the Mississippi valley, is not uncommon in the Ohio river, and Prof. Cope records it as occasional in the Allegheny.

The black horse reaches a length of two and one-half feet and a maximum weight of fifteen pounds. It is the best food fish of the sucker family. The sexes differ in color; the males have the upper parts jet black while the sides are black with coppery luster. The females are olivaceous with coppery shadings. The male has minute tubercles on the snout in the breeding season in spring. Dr. Kirtland noted a migration down stream at the approach of winter. The mouth of this sucker is small and the lips are covered with numerous tubercles.

GENUS **CATOSTOMUS** LE SUEUR

31. **Catostomus catostomus** FORSTER.

The Northern Sucker. (*Figure 30.*)

The northern sucker has an elongate body, rounded and tapering, with a long and rather slender head. The depth of the body is contained about four and one-half times in the length, and equals length of head. The snout is much longer than in *C. teres*, considerably overhanging the mouth, which is large, with thick coarsely tuberculated lips. D. 10 to 11; A. 7; scales about one hundred in lateral line and about twenty-eight between dorsal and ventral fins.

The northern sucker, long-nosed sucker, or red-sided sucker, as the above species is styled, occurs in the great lakes and northwest to Alaska in clear cold waters. It is very common in Lake Erie. It grows to a length of two feet and is largest and most abundant northward, in Alaska reaching a weight of five pounds. As a food fish the long-nosed sucker is little esteemed; but in cold countries the head and roe are used in making a palatable soup.

The males in the breeding season, in spring, are profusely covered with tubercles on the head and fins and have a broad rosy band along the middle of the body. In the Yukon river, Alaska, Dr. Dall found the fish filled with spawn in April. The eggs are of moderate size and yellow in color. Nelson has seen this species seined by Eskimo in brackish estuaries of streams flowing into Kotzebue Sound. W. J. Fisher has collected specimens on the peninsula of Alaska.

32. **Catostomus teres** (MITCHILL).

The Common Sucker.

The common sucker has a moderately stout body, heavy at the shoulders and tapering to the tail. Its greatest depth is contained four and one-half times in length to tail, slightly more than length of head. Head conical, flattened on top. Mouth rather large and the lips strongly papillose. Dorsal fin situated in middle of length; ventral opposite; anal far back. Second and third branched rays of dorsal highest, two-thirds length of head; third and fourth rays of anal longest, almost equal to length of head. D. 12; A. 7; V. 9. Scales 64; from dorsal to lateral line and from lateral line to ventral 9 or 10. The specimen described, No. 10,548, United States National Museum, from Ecorse, Michigan, is fourteen and one-half inches long.

The common sucker, also known as the pale sucker, white sucker, grey sucker and brook sucker, styled by the Canadian French the *Carpe blanche*, is the commonest member of its genus in waters east of the Rocky mountains. It is found from Canada to Florida and westward to Montana. Covering such a wide range of territory the species is naturally variable and has been described over and over again by many authorities under a great variety of names. The male of this sucker in spring has a faint rosy stripe along the middle of the side. The young are brownish in color and somewhat mottled and have a dark median band or a series of large blotches. The adults are light olive varying to paler and sometimes darker; sides silvery. The species reaches a length of twenty-two inches, and a weight of five pounds. It is a very common inhabitant of ponds and streams of the lowlands, and a small race occurs in certain cold mountain streams of the Adirondack region, where it is dwarfed in size and changed in color, but does not differ in essential characters. Dr. Rothrock, also, obtained a mountain race of this sucker in Twin Lakes, Colorado, at an elevation of 9,500 feet above the sea level.

The common sucker is a very indifferent food fish in the estimation of most people, but when taken from cold waters and in its best condition its flesh is very palatable. It takes the hook readily when baited with common earth worms.

Dr. Richardson says: "It is a common fish in all parts of the fur countries, abounding in the rivers and even in landlocked marshes and ponds, but preferring shallow grassy lakes with mud bottoms. In the beginning of summer it may be seen in numbers forcing its way up rocky streams, and even breasting strong rapids, to arrive at its proper spawning places in stony rivulets; soon afterwards it returns to the lakes. Its food, judging from the contents of the stomachs of those which I opened, is chiefly soft insects; but in one I found the fragments of a fresh-water shell. In the winter and autumn it is common in nets, and in the spawning season (June) may be readily speared, or even taken by the hand, in shallow streams. It is a very soft watery fish, but devoid of any unpleasant flavor, and is considered to be one of the best in the country for making soup. Like its congeners it is singularly tenacious of life, and may be frozen and thawed again without being killed."

33. *Catostomus nigricans* LE SUEUR.

The Stone Toter. (*Figure 31.*)

The stone toter has a peculiar physiognomy; the head is flattened on top, the interorbital space concave and the frontal bone short, broad and thick. The body is sub-terete, its depth being contained four and one-third times in the length without caudal or equal to length of head. The eye is rather small, being contained three times in length of snout. Mouth large, lips well developed and strongly papillose.

Fins all large; the dorsal base equals two-thirds length of head, while the pectoral is considerably longer than dorsal. Caudal moderately forked. Lateral line fully developed, on median line of body. Scales moderate, equal. D. 11; A. 7; V. 9; Scales, 7-52-7. Specimen examined, No. 8446, United States National Museum, from Cayuga lake, New York.

The stone roller has a wide distribution and a wonderful variety of common names. Among them are hammer head, stone lugger, stone toter, crawl-a-bottom, hog molly, hog mullet, mud sucker, hog sucker, banded sucker, large-scaled sucker and black sucker. The name shoemaker was formerly applied to this species in Lake Erie, perhaps on account of the resemblance of its color to that of shoemaker's pitch.

Prof. Cope says that this species in Pennsylvania is most abundant in tributaries of the Ohio and in the Susquehanna, while in the Delaware it is uncommon. It ranges from western New York to North Carolina and westward to Kansas. It is the most remarkable looking of all the suckers in Pennsylvania, and may always easily be distinguished by the shape of its head. The species grows very large, reaching a length of two feet. It delights in rapid streams of cold, clear water. Its habit is to rest quietly on the bottom, where its color protects it from observation. It is sometimes found in small schools. The spawning season is in spring and the young are found abundantly in small creeks as well as in the rivers. The food consists of insect larvæ and small shells, and it is especially fitted for securing its prey under stones in the rapids.

As a food fish this sucker has little value.

GENUS **ERIMYZON** JORDAN.

34. Erimyzon sucetta (LACÉPÈDE).

The Chub Sucker.

The body of the chub sucker is oblong, rather deep and compressed, its depth one-third of the standard length. The head is rather short, broad above, its length one-fourth of total length to caudal. The mouth is rather small and but slightly inferior, protractile. The eye is contained five times in length of head, and slightly less than twice in its distance from tip of snout. Dorsal short, rather high, placed in middle of length; ventrals directly underneath dorsal. Highest dorsal ray (fourth), not quite equal to second anal ray; about two-thirds length of head. Caudal slightly forked. No lateral line. D. 11; A. 7; V. 7. Scales, 37; transverse, 13. Described from No. 27,867, United States National Museum, from Illinois; length, nine inches.

This is known as the chub sucker, sweet sucker, rounded sucker, creek fish and mullet. It has a wide range, practically including all the waters of the United States east of the Rocky mountains. In Pennsylvania it inhabits slow muddy streams in all parts of the state, especially the eastern. From the other Pennsylvania suckers it may be readily distinguished by the absence of the lateral line. In the South, notably in Florida, the variety *oblongus*, to which the Pennsylvania form belongs, is replaced by the variety *sucetta*, which is a handsomer fish, with larger dorsal fin, and beautiful striated scales. The chub sucker grows to a

length of about one foot. It is very tenacious of life, and is a ready biter, but has little value for food. The young, up to the length of several inches, have a very distinct black lateral band. They are often found in the shelter of water lillies and other aquatic plants close to brackish waters.

In the market of New York, according to De Kay, the chub sucker makes its appearance in October, November and December. Its food consists of minute crustaceans, insect larvæ and aquatic plants.

GENUS **MINYTREMA** JORDAN.

35. Minytrema melanops RAFINESQUE.

The Striped Sucker. (*Figure 32.*)

The striped sucker is robust; the greatest depth of its body is contained four times in the length without caudal; length of head four and one-half times. Eye moderate, its diameter contained five times in length of head. The caudal peduncle is stout, its least depth a little more than twice in length of head.

The mouth is of moderate size, and horizontal in position. D. 12 to 14. Scales, 46-13. The lateral line is almost complete in adults, but absent in the young. "Color dusky, coppery below, a dusky blotch behind dorsal; each scale with a dark spot at its base, most distinct in adult, these forming longitudinal stripes; male tuberculate in spring."

The striped sucker, also called soft sucker, sand sucker and black-nosed sucker, is found in the great lakes, and south to South Carolina and Texas. In Pennsylvania it is limited to Lake Erie and the Ohio valley.

The striped sucker grows to a length of eighteen inches. Old males have the head tuberculate in the breeding season in the spring. The species is very readily distinguished by the dark stripes along the sides produced by spots at the base of each scale. In the young of this sucker there is no lateral line, but in adults it is almost entire.

This species prefers clear, sluggish waters and grassy ponds. It readily adapts itself to life in the aquarium. It feeds almost entirely on mollusks, insects and insect larvæ. The species is not much esteemed as a food fish, although it is sold in large numbers.

GENUS **MOXOSTOMA** RAFINESQUE.

36. Moxostoma anisurum (RAFINESQUE).

The White-nosed Sucker.

The body of the white-nosed sucker is elongate, little compressed, slightly arched anteriorly. Its depth is contained three and one-third times in the length to end of scales. The head is moderately large, its length being contained less than four times in total length without tail-fin. Eye large, nearly twice in its distance from tip of snout. The mouth is moderate, with well-developed lips. Snout rather blunt and scarcely projecting beyond the mouth. Fins all well developed. The dorsal fin is large; its first ray is as long as the dorsal base, or about seven-eighths length of head. D. 15; A. 7; scales, 5-43-4. The specimen described, No. 10,793, United States National Museum, from Ohio, is sixteen inches long.

The white-nosed sucker is known also as the carp mullet, small-mouthed red horse and long-tailed red horse. This sucker has a wide-distribution, occurring in the Great Lake region and northward, the Ohio valley and the eastern states south to North Carolina. It is not, however, an abundant species. In Pennsylvania Prof. Cope records it as common in Lake Erie and the Allegheny river, and generally confounded by fishermen with the red horse (*M. macrolepidotum*). The white-nosed sucker is a small species, seldom exceeding one foot in length. It is not a valuable food fish, and there is nothing on record concerning its habits.

In some North Carolina streams this is the commonest species of sucker.

37. *Moxostoma macrolepidotum* (LE SUEUR).

The Red Horse. (*Figure 33.*)

The red horse has a stout and more or less rounded body, whose depth is one-fourth of the total length without the caudal. The least depth of the caudal peduncle is equal to almost half length of head. The head is broad, flattened above; snout blunt, overpassing mouth. The length of the head is contained four and two-thirds times in the total length without caudal. The eye equals about one-fourth length of head. The mouth is large, with full lips, the lower being especially well developed. A line of muciferous pores connects the lateral line of one side with that of the other across the nape, and from this line there extends on either side of the head a line which branches back of the eye, and is continued forward by two lines, one above the eye, ending at nostrils, and one under eye, passing nostrils to tip of snout; there is still another line of these pores on lower margin of cheeks.

The dorsal fin is short, its highest ray but slightly longer than dorsal base. Anal fin very short, with long rays, the longest two and a half times as long as the base of the fin, or equalling length of longest dorsal ray. Caudal forked.

D. 13 to 14; A. 8. Scales, 6-15-6. Described from No. 12,316, United States National Museum, a specimen fourteen inches long, from the Potomac river.

The common red horse, known also as the white sucker, mullet and large-scaled sucker, is an extremely variable species occurring in the Great Lake region, Chesapeake Bay region, south to Georgia and Alabama, and west to Dakota. It is a large species and reaches a length of two feet. The principal varieties are noted in Pennsylvania; one of them, *duquesnei*, is found in the Ohio river, the other, *macrolepidotum*, is common in the Susquehanna, and less abundant in the Delaware. It is abundant in Lake Erie. DeKay described the fish from Oneida lake, where it is called mullet and sucker.

The red horse inhabits clear waters and ascends small streams in May to spawn. As a food fish it ranks low, but the species is freely sold. Its food consists principally of mollusks and a small percentage of plants and insects. Minute crustaceans also form a small portion of its food.

38. *Moxostoma aureolum* (LE SUEUR).**The Golden Sucker.**

The body of the golden sucker is oblong, the back in front of the dorsal elevated and compressed, head short, conic, broad between eyes. The eye is rather large, one-fourth length of head, which is contained five times in total length without caudal. The depth of the body is contained three and one-half times in this length. Caudal peduncle deep, compressed, its least depth equal to one-half length of head. Mouth small, the snout somewhat projecting.

Fins all well developed. The anterior rays of dorsal longest, as long as dorsal base; pectoral and longest anal rays equalling length of head. Caudal forked. Scales large, about equal in size all over body and finely striated. D. 15; A. 8; scales, 6-46-6. Lateral line complete.

Described from a specimen fifteen and one-half inches long, No. 31,942, United States National Museum, obtained in Lake Winnipeg, Manitoba.

The golden sucker has the additional names of lake mullet, lake red horse and golden red horse. It inhabits the great lakes and the region northward, also the Ohio valley. It is common in Lake Erie, but not in the Ohio.

This species grows to a length of eighteen inches, and is one of the handsomest of the suckers. Prof. Forbes records it from lakes of northern Illinois, also abundantly in the central part of that state. Its food, according to this author, consists chiefly of mollusks and insects. Although freely eaten it has little to recommend it for the table.

39. *Moxostoma crassilabre* (COPE).**The Long-tailed Red Horse.**

The long-tailed red horse has a moderately elongated body, its depth contained three and one-fourth to three and one-half times in the total length without caudal. The head is short, forming one-fifth or nearly one-fifth of the standard length. The snout is pointed, and overhangs the mouth, which is very small. The small eye is one-fifth as long as the head. The dorsal is high, the longest rays one and one-third to one and one-half times the base of the fin. The margin is concave, making the fin falcate. The anal is large, shaped like the dorsal, its tip reaching beyond the base of the caudal. The lobes of the caudal are unequal, the upper produced. D. 12 to 14; A. 7. Scales, 5-44-5. The dorsal and caudal fins are bright red, the sides silvery tinged with dusky above, some dark spots at the bases of the scales and the lower fins white.

The long-tailed red horse is an inhabitant of the Ohio valley, and ranges southward to North Carolina. It is described as having the form of a white-fish, the body deep, the head small and with a sharply conic and projecting snout; the lobes of the tail are unequal, the upper one being much the longer. This is a handsome species, the sides silvery with copper reflections. The dorsal and caudal fins bright are red. Prof. Cope found it in western Pennsylvania. Its habits are doubtless similar to those of other species of the genus, but there is nothing on record about this subject, so far as we know.

GENUS **PLACOPHARYNX** COPE.**40. Placopharynx carinatus** COPE.**The Big-jawed Sucker.** (*Figure 34.*)

The big-jawed sucker has the body moderately long, heavy forwards, particularly at the shoulders, and the tail comparatively slender. The greatest depth equals one-fourth of the total length without the caudal, and the least depth of the caudal peduncle is two-fifths of the greatest depth. The head is short, thick, with a deep and nearly vertical snout; its length is contained about four and one-half times in the standard length. The snout is about twice as long as the eye, and more than one-third as long as the head. The eye is moderate in size, one-fifth as long as the head, placed high; the interorbital width one-half length of head. The mouth is large, inferior, with strongly plicate lips, the maxilla reaching to below the posterior nostril. The sickle-shaped pharyngeal bone has about ten of its teeth enlarged, increasing rapidly in size to the lowermost, the crowns of the large teeth with a concave grinding surface. The dorsal origin is above the thirteenth, and the ventral origin below the seventeenth scale of the lateral line. The dorsal base is as long as the head without the snout, and the longest ray is three-fourths as long as the head; the last ray is one-half as long as the longest. The ventral does not reach nearly to the vent; its length equals two-thirds that of the head. The anal origin is under the thirty-first scale of the lateral line; the anal base is one-third as long as the head; the longest anal ray is four-fifths as long as the head, and nearly three times as long as the last ray. The caudal is large and deeply forked, the middle rays about two-fifths as long as the external rays. The pectoral is large, its length six-sevenths that of the head. D. ii, 12; A. iii, 7; V. 9; P. 16; scales, 6-42-5. Color in spirits pale yellowish brown, the fins paler; in life brassy green above, the lower fins red. Length of the specimen described, No. 36,090, United States National Museum, from the Black Warrior river, 13½ inches.

The big-jawed sucker was, until recently, considered a very rare fish, but has been rediscovered in numerous localities, and its range is now known to extend from Ohio to Georgia and Arkansas. It is a large-scaled fish with a remarkably large mouth. Its color is brassy green, paler below, and the ventral and anal fins are red. Externally there is very little to distinguish this sucker from some species of buffalo fish, but the teeth in the pharynx are very different from those of all other suckers. The lower seven to twelve teeth on each side are very large, scarcely compressed, truncate and resembling in this respect the teeth of some of the minnows rather than suckers. Recent collectors in western streams have found this curious large sucker to be a very common fish in numerous localities. It grows to a length of two feet, and is extensively used for food. According to Prof. S. A. Forbes it is probable that the enlarged teeth of the pharynx are related to a preference for molluscan food. In large individuals taken from the Illinois river, Prof. Forbes found the food to consist of small shells and insects, the latter consisting chiefly of the larvæ of water beetles. Aquatic plants are occasionally mixed with the food, but probably by accident.



Figure 25.

THE COMMON CATFISH.

Page 16.

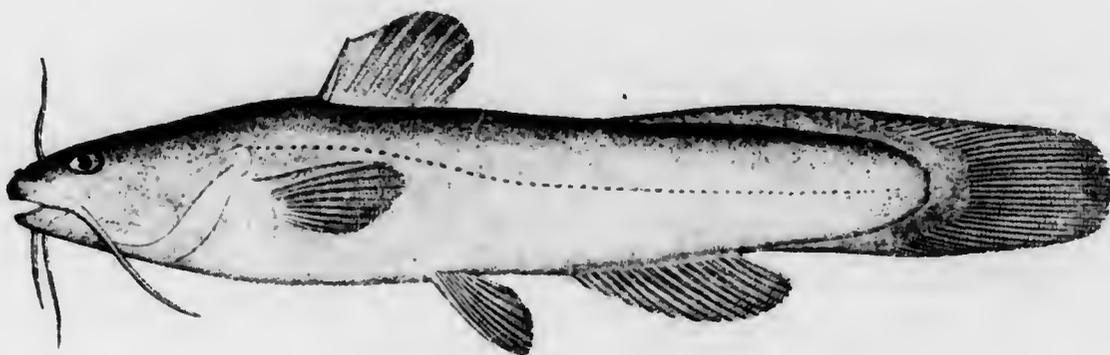


Figure 26.

THE MARGINED STONE CATFISH.

Page 19.

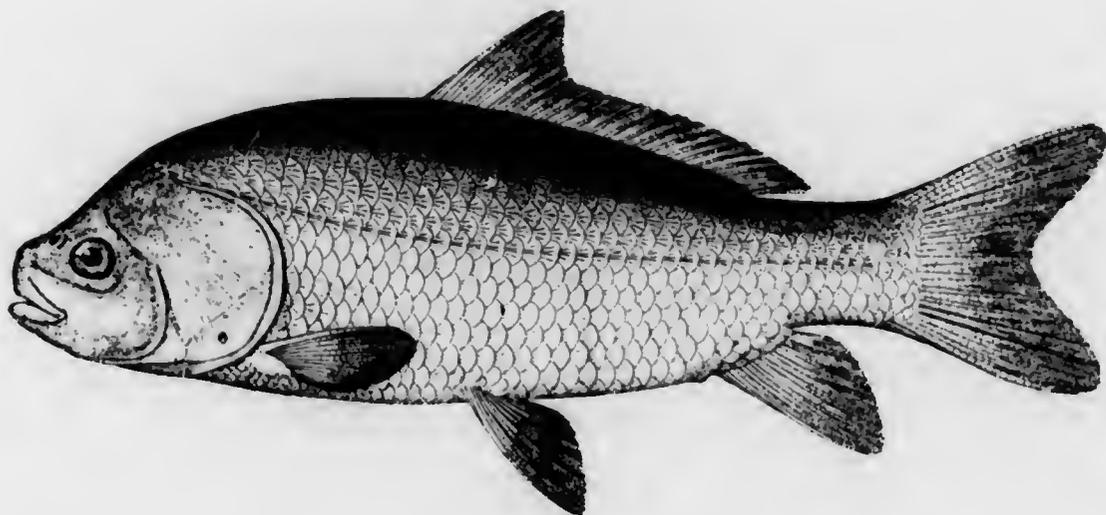


Figure 27.

THE BIG-MOUTHED BUFFALO FISH.

Page 21.



Figure 28.

THE CARP SUCKER.

Page 22.

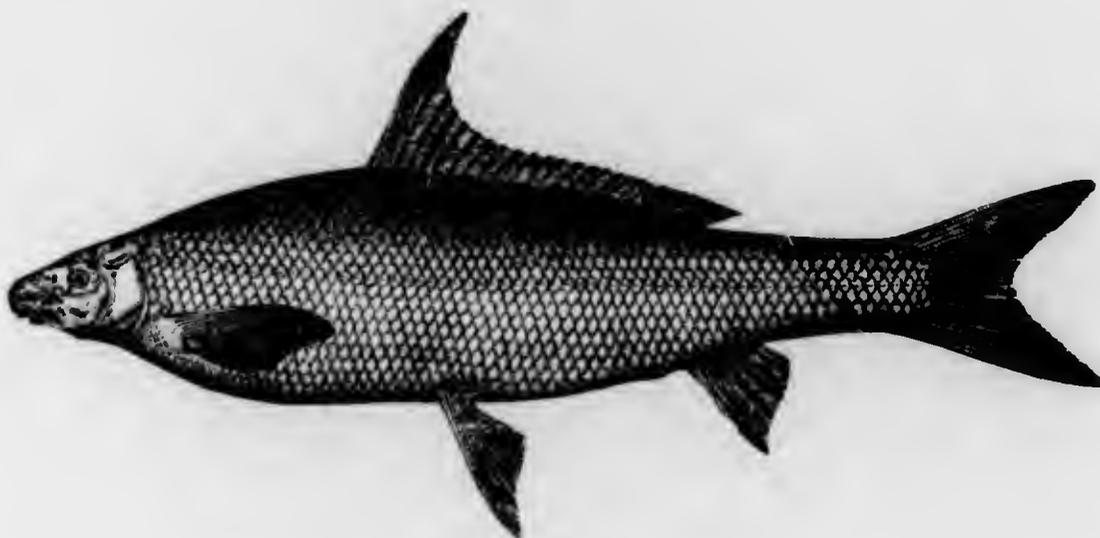


Figure 29.

THE BLACK HORSE.

Page 24.

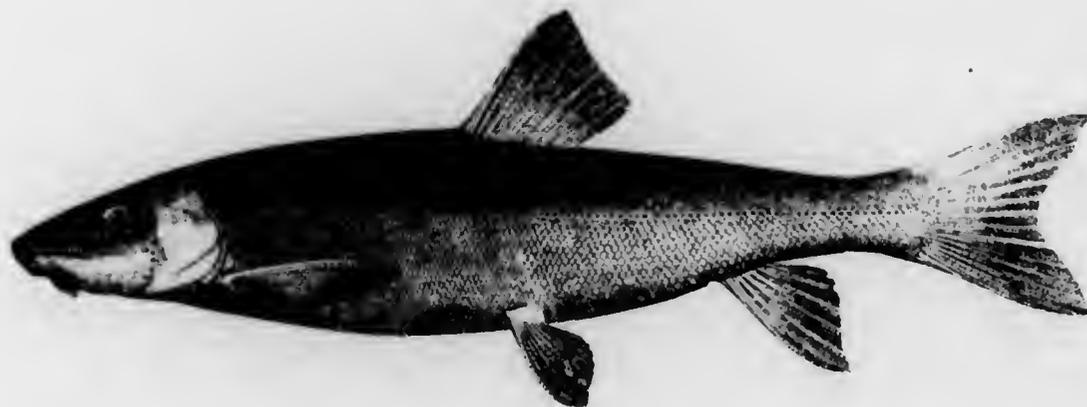


Figure 30.

THE NORTHERN SUCKER.

Page 25.

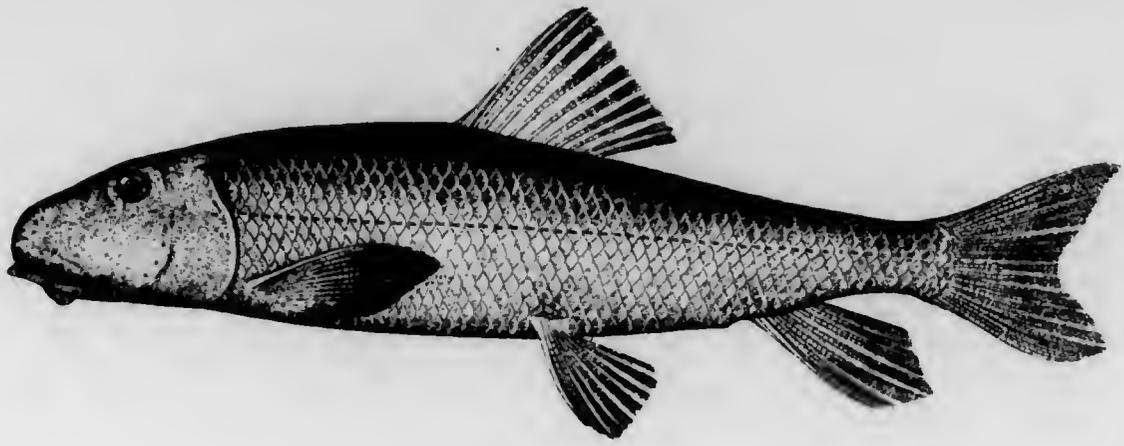


Figure 31.

THE STONE TOTER.

Page 26.

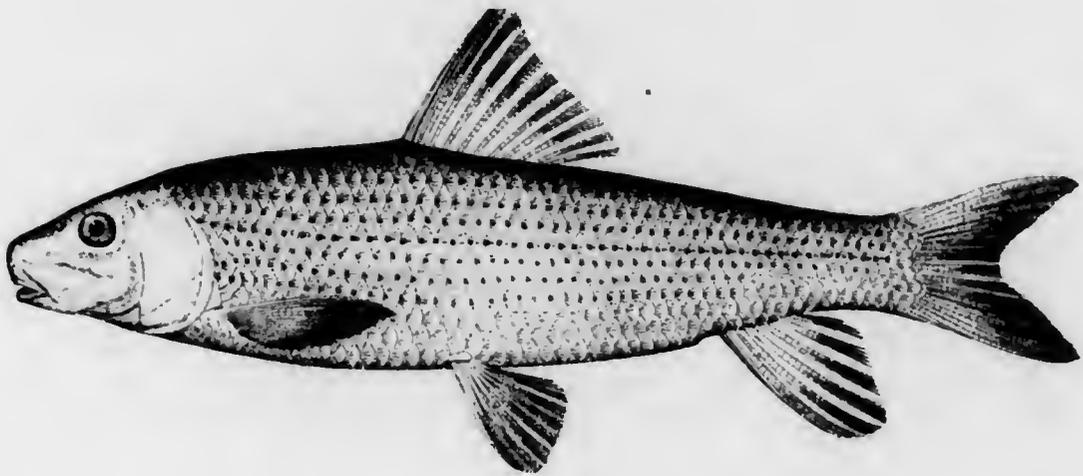


Figure 32.

THE STRIPED SUCKER.

Page 28.



Figure 33.

THE RED HORSE.

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Figure 34.

THE BIG-JAWED SUCKER.

Page 31.

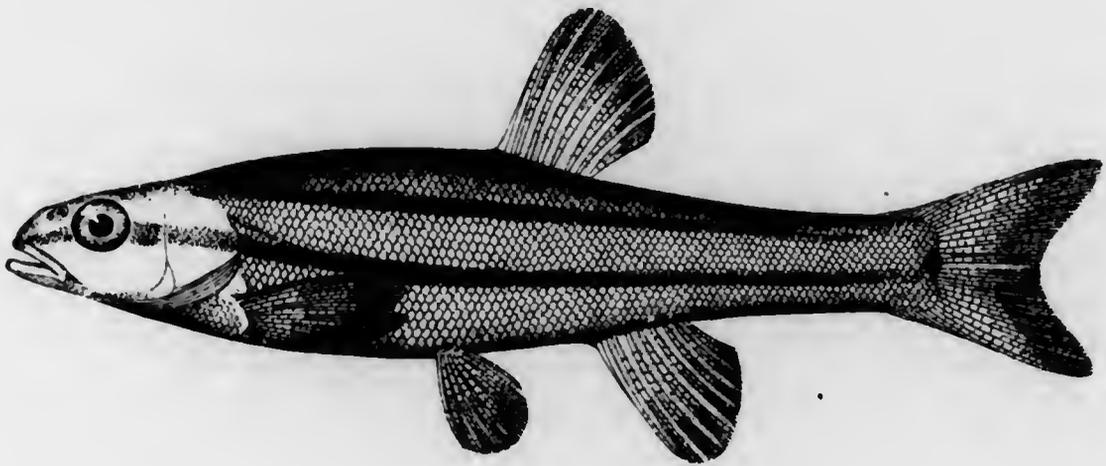


Figure 35.

THE RED-BELLIED DACE.

Page 32.

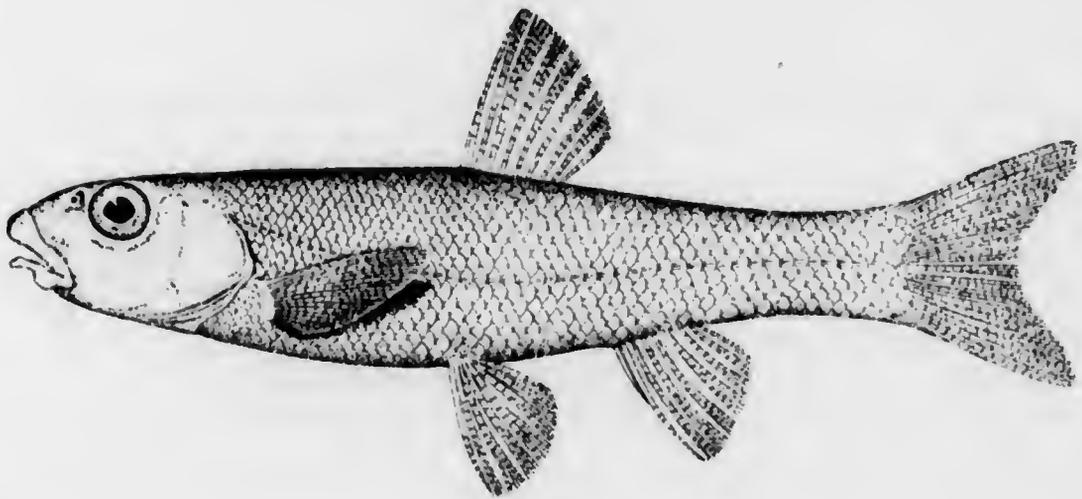


Figure 36.

THE CUT-LIPS OR CHUB.

Page 36.