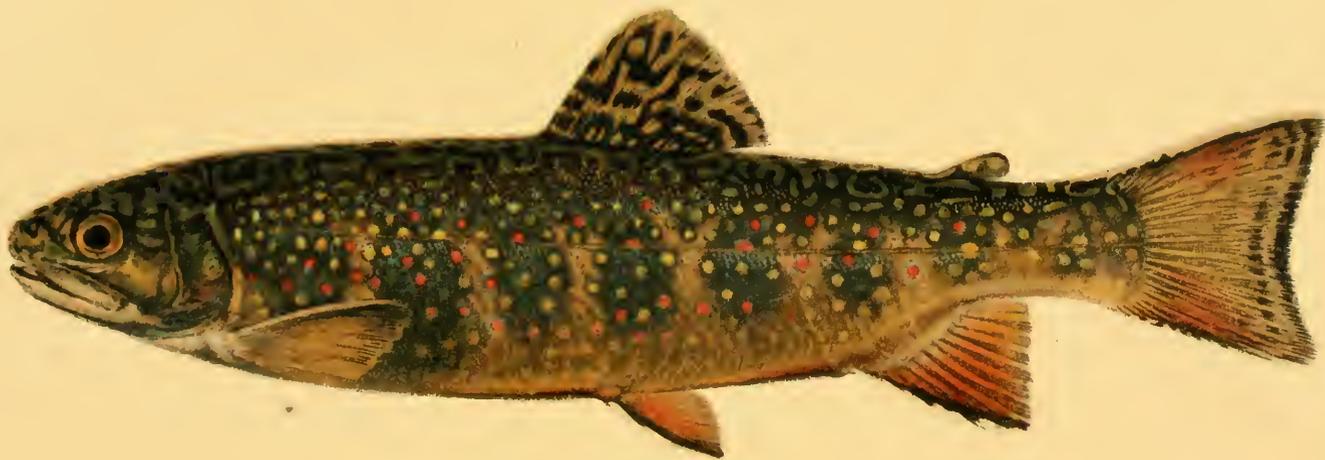


AMERICAN
FOOD & GAME FISHES



DAVID STARR JORDAN
BARTON W. EVERMANN



EASTERN BROOK TROUT (*SALVELINUS FONTINALIS*).

Drawn from a live female in spawning condition $7\frac{3}{8}$ inches long, 14 months old, artificially hatched at Wytheville, Va., from egg taken from domesticated

AMERICAN FOOD AND
GAME FISHES. A POPULAR
ACCOUNT OF ALL THE SPECIES
FOUND IN AMERICA NORTH OF
THE EQUATOR, WITH KEYS FOR
READY IDENTIFICATION, LIFE HIS-
TORIES AND METHODS OF CAPTURE

BY

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*ILLUSTRATED WITH COLORED PLATES AND TEXT DRAWINGS, AND
WITH PHOTOGRAPHS FROM LIFE BY A. RADCLYFFE DUGMORE*

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THE SUCKERS

Family IV. Catostomidæ

Body elongate, usually more or less compressed; head rather conical; opercles normally developed; nostrils double; no barbels; mouth usually greatly protractile and with fleshy lips; jaws toothless; lower pharyngeal bones falciform, armed with a single series of numerous comb-like teeth; branchiostegals 3; gill-membranes more or less united to the isthmus, restricting the gill-openings to the sides; gills 4, a slit behind the fourth; pseudo-branchiæ present; scales cycloid; lateral line decurved, sometimes absent; head naked; fins not scaly; dorsal fin comparatively long (of 10 to 30 rays); anal fin short; pectorals placed low; ventrals abdominal; no adipose fin; fins without true spines; alimentary canal long; stomach simple and without pyloric cœca; air-bladder large, divided into 2 or 3 parts by transverse constrictions.

The sucker family is a large one, embracing some 15 genera and more than 70 species, 2 of which occur in Eastern Asia, while the others are inhabitants of the fresh waters of North America.

The members of this family are very widely distributed over the United States, there being scarcely a State which has not several species, and at least two extend their range far into Canada and Alaska, while others are found southward into Mexico.

The family includes not only the species commonly known as suckers, but also those known as redhorses, buffaloes, quill-backs, and freshwater mullets. Most of the species do not exceed a weight of 4 or 5 pounds, though some of them reach an immense size.

As food fishes they do not occupy a high rank. Though the flesh is well flavoured, it is exceedingly full of bundles of small fagot-bones, which are very troublesome to one who attempts to eat it. The great abundance and the large size of many of the species, however, render them of considerable commercial importance, thus entitling them to a place in this work.

None of the species has any rank as a game fish. They rarely or never take a hook, except on set-lines. The methods employed in their capture are varied, but haul-seines, gill-nets, pounds and other traps, and set-lines are the kinds of apparatus in most general use.

The habits of all the species are much the same. They are all bottom feeders, feeding chiefly upon vegetation and the less active and soft forms of smaller animal life such as worms, larvæ, and eggs of various kinds.

They are all spring spawners, and nearly all have the habit of running up stream at spawning time. Illinois is called the "Sucker State" because its first settlers came *up the river* in the spring when the suckers were running.

Only the genera and species of some commercial importance are considered at length.

- a. Dorsal fin long, with 24 to 30 rays; air-bladder in 2 parts.
- b. Fontanelle present; body ovate; scales large.
- c. Mouth large, more or less terminal, protractile forward. Large species, dark in color;.....*Ictiobus*, 38
- cc. Mouth small, inferior, protractile downward. Smaller species of pale coloration;.....*Carpionides*, 41
- bb. Fontanelle obliterated by the union of the parietal bones; body elongate;.....*Cycleptus*, 44
- aa. Dorsal fin short, with only 10 to 18 rays.
- d. Air bladder in two parts.
- e. Lateral line complete; scales small, 55 to 115 in lateral line.
- f. Fontanelle nearly or quite obliterated in adult; jaws with hard sheaths; posterior division of air bladder slender; *Pantosteus*, 45
- ff. Fontanelle broad and evident at all stages of growth; posterior division of air bladder broad.
- g. Nuchal region without a hump, the interneural spines normally developed.
- h. Mouth small, inferior, with thick papillose lips;..*Catostomus*, 46
- hh. Mouth very large, terminal, oblique; lips thin and nearly smooth.
- i. Gillrakers simple, fringe-like;.....*Chasmistes*, 54
- ii. Gillrakers broad, shaped like the Greek letter Δ (delta), their edges entire and unarmed;.....*Deltistes*, 57
- gg. Nuchal region with a high, sharp-edged hump;..*Xyrauchen*, 57
- ee. Lateral line interrupted or wanting; scales large, 40 to 50 in a longitudinal series.
- j. Lateral line entirely wanting;.....*Erinyzon*, 58
- jj. Lateral line more or less developed, especially in adult; *Minytrema*, 59

- dd.* Air bladder in three parts.
k. Mouth normal, the lower lip entire or merely lobed.
l. Pharyngeal bones moderate, the teeth compressed, gradually larger downward;.....*Moxostoma*, 60
ll. Pharyngeal bones very strong, with the lower teeth much enlarged, subcylindrical and truncate;.....*Placopharynx*, 64
kk. Mouth singular, the upper lip not protractile, greatly enlarged, the lower lip developed as two separate lobes....
Lagochila, 65

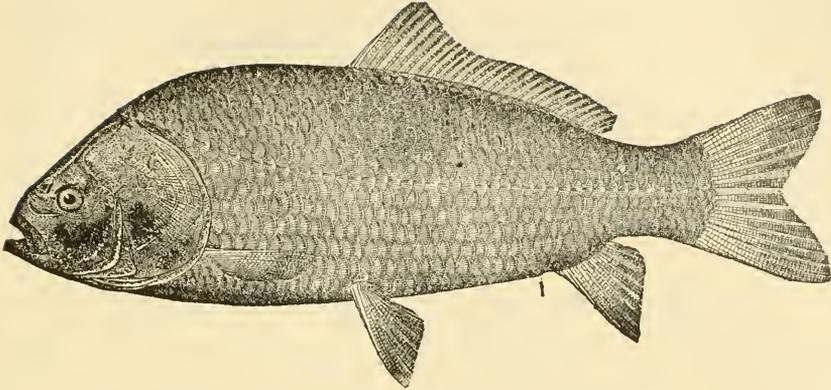
GENUS ICTIOBUS RAFINESQUE

The Buffalo Fishes

Body robust; head very large and strong; fontanelle large; well-open; opercular apparatus well developed, the subopercle broad, the opercle strongly furrowed; mouth large, terminal, protractile; mandible strongly oblique; lips little developed, the upper narrow and smooth, the lower full on the sides, but narrow in front; pharyngeal bones rather weak, the teeth numerous; scales large, thick, and nearly equal over the body; lateral line well developed, slightly decurved anteriorly; dorsal rays numerous, the anterior somewhat elevated; caudal not much forked.

Large, coarse fishes, usually dark in colour, inhabiting chiefly the larger rivers and some of the small lakes of the Mississippi Valley. Only four species known, the three following and a fourth from Guatemala.

- a.* Mouth large, terminal, protractile forward; lips very thin; lower pharyngeals and teeth weak;.....*cyprinella*, 39
aa. Mouth smaller, more or less inferior, protractile downward, and with thicker lips; lower pharyngeals stronger, the teeth comparatively coarse and large.
b. Back scarcely elevated, the depth 3 to $3\frac{1}{4}$ in length.
c. Mouth rather large and oblique, approaching that of *l. cyprinella*, more oblique than in the next;.....*urus*, 40
cc. Mouth small, inferior;.....*meridionalis*, 41
bb. Back elevated and compressed, the depth $2\frac{1}{2}$ to $2\frac{3}{4}$ in length;
bubalus, 41



Common Buffalo Fish

Ictiobus cyprinella (Cuvier & Valenciennes)

This species reaches a length of 3 feet, and a weight of 50 pounds or more.

In certain lakes in the Mississippi Valley (notably Lake Washington, Minnesota and the Okeboji lakes in northwestern Iowa) extraordinary runs of very large buffalo fish occur occasionally. These runs take place in the spring at the spawning time of the fish, and usually at the time of a heavy rain when the tributary streams are full and the connecting marshes are flooded. Then these fish come up from the lake, in great numbers, crowding the inlets and spreading over the flooded marshes. They remain only a few days, and soon disappear as suddenly and mysteriously as they came; but their brief stay has been long enough to permit great slaughter by the farmers of the surrounding country, who kill great numbers with pitchforks, clubs and other primitive weapons, and haul them away in wagon loads. After returning to the lakes nothing more is seen of them until the next spring, or possibly not for several years.

In these northern lakes these fish rarely or never take the hook, nor can they be successfully gilled, but in the lower Mississippi Valley they are frequently taken on set-lines baited with balls of dough.

In Louisiana, where they are known as the gourdhead buffalo, they are of considerable commercial interest. The flesh, though

The Buffalo Fishes

nutritious, is coarse and not highly flavoured. This species is also known as the red-mouthed buffalo, and big-mouthed buffalo.

Head $3\frac{1}{2}$; depth $2\frac{1}{2}$ to $3\frac{1}{2}$; D. 27 to 29; A. 9; V. 10; scales 7-37 to 41-6. Body stout, moderately compressed, the outline somewhat elliptical, but the back rather more curved than the belly; opercular apparatus very strong, the opercle itself nearly half length of head. Colour, dull brownish-olive, not silvery; fins dusky.

Black Buffalo; Mongrel Buffalo

Ictiobus urus (Agassiz)

This species is close to the common buffalo, from which it can be distinguished by its smaller, more oblique mouth, and its much darker colour. It occurs throughout the Mississippi Valley in the larger streams, it being most abundant in those of the South, where it is said to spawn in March and April. It reaches a weight of 5 to 35 pounds, and resembles the preceding species in habits and food value. In Louisiana it is sometimes called "chopper."

Head very stout, about 4 in length, strongly convex; depth 3 to $3\frac{1}{4}$; eye about equal to snout, $5\frac{1}{2}$ in head; D. 30; A. 10; scales 8-41-7. Body much less elevated and less compressed, the head thicker, larger and less pointed, and the eye much smaller than in the small-mouthed buffalo; back not at all carinated; axis of body above ventrals about at the lateral line, and but little farther from the dorsal outline than from the ventral; mouth large, well forward, considerably oblique, approaching that of the common buffalo; mandible longer than the eye; premaxillaries somewhat below the suborbital; dorsal fin low and less rapidly shortened than in the next species, the longest ray scarcely half as long as base of fin; anal rounded, its rays not rapidly shortened, the middle ones not much shorter than the longest. Colour, very dark, the fins almost black.

Small-mouthed Buffalo; White Buffalo

Ictiobus bubalus (Rafinesque)

This is the most abundant and best known of all the buffalo fishes. It reaches a weight of 35 pounds or more and

a length of 3 feet. It is found in all the larger rivers of the Mississippi Basin and in some of the small lakes, where its habits are essentially the same as those of the big-mouthed buffalo, the latter species, however, being less of a bottom feeder than either of the two others here described. In the South all three species spawn in March and April; as we go northward the spawning season is correspondingly later, it being in May and June in Minnesota and Wisconsin.

Head 4; depth $2\frac{1}{2}$; snout $3\frac{1}{8}$; eye 5; D. 28 or 29; A. 10 or 11; V. 10; scales 8 or 9-35 to 39-5 or 6, 12 or 13 before the dorsal. Body short and compressed, the dorsal strongly arched and subcarinate from occiput to origin of dorsal fin; ventral outline only slightly convex; head small; mouth small, subinferior, and protractile downward; lips papillose; opercle strongly striate; caudal peduncle deep and compressed, its least depth $1\frac{3}{4}$ in head; axis of body above the ventrals, below the lateral line, and nearly twice as far from back as from belly; fins moderate, the first 7 or 8 dorsal rays lengthened, as long as head, rays of short portion $3\frac{1}{2}$ in head; longest anal ray $1\frac{1}{6}$; pectoral short, not reaching base of ventral, $1\frac{2}{5}$ in head; ventrals longer, 1.1 in head; caudal deeply lunate, the lobes longer than head. Colour, pale, almost silvery; fins scarcely dusky.

Ictiobus meridionalis is a southern species known only from the Rio Usumacinta, Mexico.

GENUS CARPIODES RAFINESQUE

The Carp Suckers

This genus is very close to *Ictiobus*, the species being smaller, the colour paler, and the dentition weaker, but there are no important technical characters separating the two groups.

Of the five species referred to under this genus, one occurs in the Potomac and Delaware and the streams about Chesapeake Bay, one in the St. Lawrence basin, and the other three in the Mississippi Valley and Texas. Only two of the species are of any commercial value.

- a.* Body subfusiform, the depth about 3 in length; *carpio*, 42
aa. Body ovate-oblong, the back elevated, the depth about $2\frac{1}{2}$ in length.

The Carp Sucker

- b. Opercles strongly striate.
- c. Lips thin, silvery-white in life, the halves of the lower lip meeting in a wide angle, as in *C. carpio*.
- d. Head large, the snout blunt, the nostril near its tip; eye large, $3\frac{1}{2}$ to 4 in head.....*difformis*, 42
- dd. Head small and pointed, the snout projecting; eye small, 5 to $5\frac{1}{2}$ in head.....*thompsoni*, 42
- cc. Lips full, thick, reddish in life, the halves of the lower meeting at an acute angle; first ray of dorsal usually very long.
velifer, 43
- bb. Opercles nearly smooth; otherwise essentially as in *C. velifer*.
cyprinus, 43

Carp Sucker

Carpionides carpio (Rafinesque)

The carp sucker is the largest of the genus, reaching a weight of 2 or 3 pounds. It occurs in the Ohio Valley and southward to central Texas, but does not appear to be very abundant anywhere.

It is used for food along with the other members of the family, but is perhaps inferior to most of them. It is caught on setlines and in seines.

Head 4 to 5; depth $2\frac{2}{3}$ to 3; eye $4\frac{1}{2}$ in head; D. 30; A. 7; scales 36. Body more fusiform than in any other species, compressed, but not much arched; head rather short; muzzle short, but projecting beyond the mouth; anterior rays of dorsal short, and notably thickened and long at the base, especially in the adult, the first ray nearer muzzle than base of caudal fin, the longest ray a little more than half base of fin; caudal moderately forked.

C. difformis is an unimportant species occurring in the Ohio Valley and westward in the upper Mississippi Valley. It closely resembles the quillback, but differs in the character of the lower lip.

C. tumidus is perhaps a distinct species found in the lower Rio Grande and southward.

Lake Carp

Carpionides thompsoni Agassiz

This fish occurs in the Great Lakes and lakes tributary to the St. Lawrence. It reaches a considerable size; an example taken

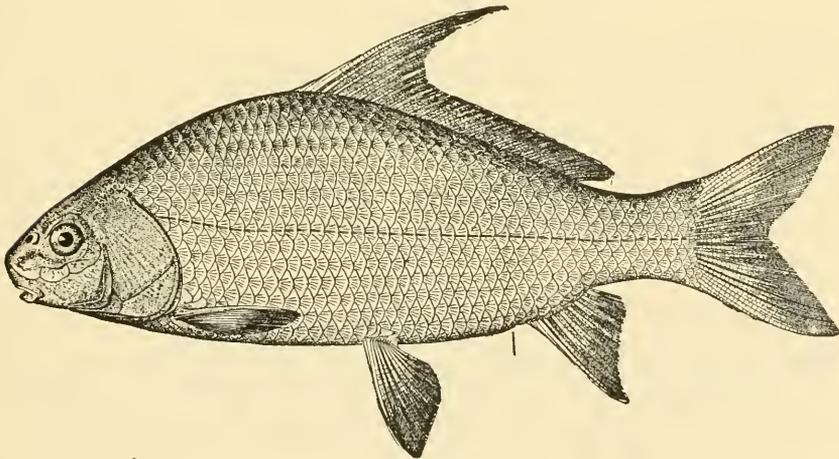
in Lake Champlain about April 23 was 21 inches long and weighed 7 pounds. It was a nearly ripe female and the roe alone weighed 2.5 pounds.

The food value of the flesh of this fish is essentially the same as that of the species of *Ictiobus*.

By the fishermen of Lake Champlain this species is known as "buffalo," "carp sucker," or "drum."

Head 4 to 4.5; depth 2.5; eye small, 5 to 5.5 in head; D. 27; A. 7; V. 10; scales 8-39 to 41-6. Body short and stout, the back much arched; head small, the snout pointed; lips thin and white, meeting at a wide angle; tip of lower jaw much in advance of nostrils; maxillary reaching vertical at front of orbit; scales closely imbricated; dorsal rays considerably elevated, $\frac{2}{3}$ as long as base of fin; origin of dorsal fin about midway of body.

C. velifer, the quillback, spearfish, sailfish, or skimfish, is a small species found pretty well throughout the Mississippi Valley. It is distinguished from other species in the same waters by the produced first dorsal ray and the character of the lower lip whose halves meet at an acute angle.



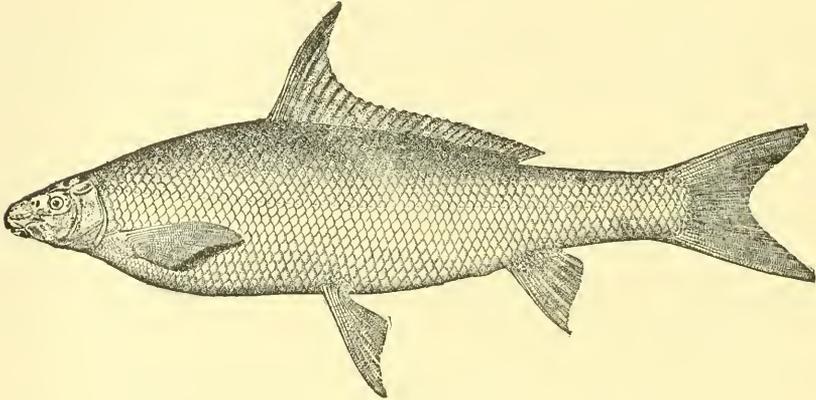
Eastern Carp Sucker

Carpiodes cyprinus (Le Sueur)

In the Potomac and the streams about Chesapeake Bay occurs *C. cyprinus*, the Eastern carp sucker, which resembles *C. velifer* except that its opercles are smooth. Neither of these species is of much or any food-value.

GENUS *CYCLEPTUS* RAFINESQUE

This genus differs from *Ictiobus* and *Carpiodes*, the only other genera having a long dorsal fin, in having the fontanelle obliterated by the union of the parietal bones, and in the very elongate body. Only one species is known.



Gourd-seed Sucker; Blackhorse

Cycleptus elongatus (Le Sueur)

This singular and interesting fish is known only from the Mississippi Valley, where it is rather common in the larger streams.

It reaches a length of 2 to 2.5 feet, and is perhaps more highly esteemed as a food-fish than any other member of the family. It is usually caught in seines or on set-lines.

Besides the vernacular names given above, it is also known as "Missouri sucker," "sweet sucker," and "suckerel."

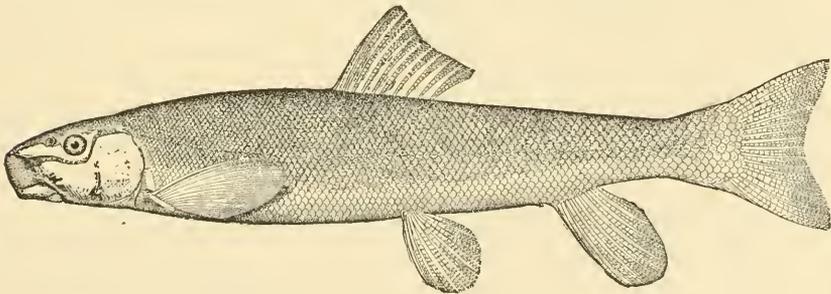
Head 6 to 8.5; depth 4 to 5; eye 6 to 7 in head; D. 30; A 7 or 8; V. 10; scales 9-56-7. Body unusually long and slender, moderately compressed, not much elevated; caudal peduncle long; head very small, short and slender, its upper surface rounded; mouth small, entirely inferior, overlapped by the projecting snout; upper lip thick, pendant, covered with several rows of tubercles; lower lip moderate, formed somewhat as in *Catostomus*, but less full, incised behind; jaws with rudimentary

cartilaginous sheath; eye small, behind middle of head, not high up; suborbital bones small and narrow; opercle smooth and narrow; isthmus moderate; gillrakers moderate, soft; pharyngeal bones strong, the teeth rather wide apart, increasing in size downward; scales about equal over the body, with wide, exposed surfaces; lateral line nearly straight, well developed; fins rather large, the dorsal beginning in front of ventrals and ending just before anal, strongly falcate in front, the length of the first and second developed rays more than half base of fin, the following rays rapidly shortened to about the eighth, the remaining rays all short; caudal fin large, widely forked, the lobes equal; anal fin quite small, low and scaly at the base; pectoral long and somewhat falcate; air-bladder in two parts, the anterior short, the other long; sexual peculiarities marked, the males in spring with black pigment and the head covered with small tubercles. Colour very dark, the males in spring almost black.

GENUS *PANTOSTEUS* COPE

The Mountain Suckers

This genus resembles *Catostomus*, from which it differs chiefly in having the fontanelle nearly obliterated, and in having a more or less developed cartilaginous sheath on each jaw. The species are all western, chiefly in the Rocky Mountain region and westward, mostly in rocky brooks in the arid districts. The 8 known species are each of rather small size, and scarcely valued as food.



Mountain Sucker

Pantosteus jordani Evermann

Pantosteus arizonæ reaches a length of 9 inches, and is known only from Salt River at Tempe, Arizona. *P. generosus*,

known as the mountain sucker, is abundant in the streams in the Salt Lake basin, and southwest in the Sevier basin. It reaches 8 or 10 inches in length. *P. plebeius* reaches a foot in length and is found in the Rio Grande basin and southward into Chihuahua. It is very common. *P. delphinus*, the blue-headed sucker, attains the length of a foot, and is abundant in the upper portion of the basin of the Colorado. *P. guzmaniensis* is known only from Lake Guzman, Chihuahua. *P. jordani* grows to a foot or more in length, and is found pretty generally distributed in clear streams in the upper portions of the Missouri and Columbia basins. It is of more value as a food fish than any other species of the genus. *P. aræopus* from the rivers of Nevada and the Kern River, California, and *P. clarki* from the Gila basin, are rare and little known species.

GENUS *CATOSTOMUS* LE SUEUR

Fine-scaled Suckers

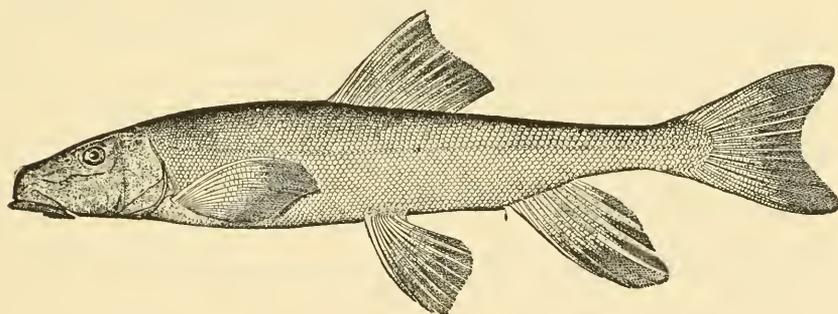
Body rather elongate, more or less fusiform, subterete; head rather long; eye small and high up; mouth rather large, inferior; upper lip thick, papillose, protractile; lower lip greatly developed, with broad, free margin, usually deeply incised behind, so that it forms two lobes which are often more or less separated; opercle moderate; pharyngeal bones moderate, the teeth rather short, compressed, rapidly diminishing in size upward; scales small and crowded anteriorly; lateral line nearly straight and well developed; origin of dorsal nearly midway of body; anal short and high; ventrals inserted under middle or posterior part of dorsal; caudal forked, the lobes nearly equal; sexual peculiarities not marked, the fins usually higher in the male and the anal somewhat swollen and tuberculate in the spring; breeding males in most species with a rosy or orange lateral band.

Species about 20, all belonging to North America except one (*C. rostratus* Tilesius) which is said to occur in Siberia. Our species are not well differentiated and are difficult to distinguish.

In the following key have been included only those which are of commercial value:

- a. Head transversely convex above, the orbital rim not elevated; scales in lateral line 60 or more.

- b. Scales very small, much reduced and crowded anteriorly, the number in lateral line 80 to 115.
- c. Upper lip broad, with 5 or 6 rows of papillæ.
- d. Dorsal fin with 11 to 13 rays and very high; *Latipinnis*, 47
- dd. Dorsal fin with 10 to 12 rays and only moderately developed;.....*griseus*, 48
- cc. Upper lip comparatively thin and narrow, with 2 to 4 rows of papillæ.
- c. Scales in lateral line 95 to 115;.....*catostomus*, 49
- bb. Scales small, but larger than in the preceding group, the number in lateral line 56 to 75.
- f. Scales in lateral line 70 to 75; lower lip broad.
- g. Dorsal fin short, of 11 to 13 rays; head small, conical; *occidentalis*, 50
- gg. Dorsal fin long, of about 15 rays; head large;...*macrocheilus*, 50
- ff. Scales in lateral line larger, 58 to 70 in number; lower lip with about 4 rows of papillæ.
- h. Mandible short, $3\frac{1}{2}$ to $3\frac{2}{3}$ in head; upper lip narrow; *commersonii*, 51
- hh. Mandible longer, 3 to $3\frac{1}{3}$ head; upper lip broader; ..*ardens*, 52



Flannel-mouth Sucker

Catostomus latipinnis Baird & Girard

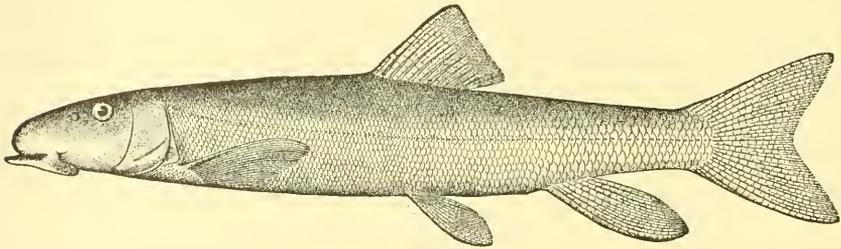
This sucker is known only from the Colorado River of the West, and its larger tributaries. It is said to be quite abundant and ascends the rivers in spring.

As a food fish it is of some importance, particularly to the Indians.

Head $4\frac{3}{4}$; depth $5\frac{1}{4}$; D. 11 to 13; scales 17-98 to 105-17. Body elongate, the caudal peduncle long and slender; head rather slender, with prominent snout and rather contracted, inferior mouth; outline of mouth triangular, the apex forward; lips very thick, greatly

Platte River Sucker

developed, the lower incised to the base, its posterior margin extending backward to opposite the eye; tubercles on lower lip small behind; jaws with a slight cartilaginous sheath; eye small and high up; scales long and low, posteriorly rounded; fins greatly developed, especially in old males, the free border of the dorsal deeply incised; height of vertical fins in the male greater than length of head; origin of dorsal nearer snout than base of caudal; caudal very strong, the rudimentary rays unusually developed. Colour, dark olive, abruptly paler below; sides and fins largely orange in both sexes, the anal and lower lobe of caudal tuberculate in breeding males. Length 2 feet or less.



Platte River Sucker

Catostomus griscus (Girard)

Upper Missouri River basin, particularly abundant in the Platte and the Yellowstone.

This species is close to *C. catostomus*, apparently differing chiefly in the larger mouth and the broader upper lip.

Head 4 in body; depth $5\frac{1}{2}$; D. 10 to 12; scales 16-90 to 110-14. Body long and slender, subterete, compressed behind, the form essentially that of *C. catostomus*; head large, the interorbital space broad and flat, $2\frac{1}{2}$ in length of head; eye small, high up and rather posterior; mouth large, about as in *C. latipinnis*, the upper lip very large, pendant, and with 5 to 8 series of tubercles; lower lip incised to base, the lobes long; horny sheath pretty well developed; dorsal fin not long, nor especially elevated, its origin rather nearer base of caudal than tip of snout; caudal long and strongly forked; anal long and high, reaching base of caudal; ventrals not reaching vent. Colour, dusky brown, sometimes with a dusky lateral band, sometimes irregularly mottled or barred; snout dark. Length 1 to 2 feet.

Long-nosed Sucker; Northern Sucker

Catostomus catostomus (Forster)

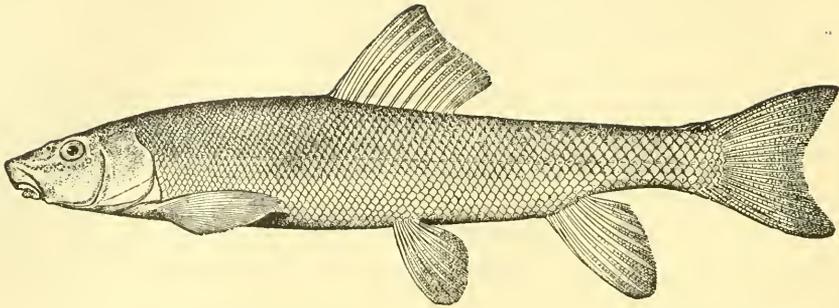
The long-nosed sucker is one of the largest of the family, reaching a length of 2 to $2\frac{1}{2}$ feet, and a weight of several pounds. It is found from the St. Lawrence River and the Great Lakes westward in the Upper Missouri basin and to the Upper Columbia, thence northward to Alaska; the most widely distributed sucker; but probably not occurring south of 40° north latitude, except in West Virginia where recently obtained by Prof. W. P. Hay.

In the Great Lakes and northward this species is a food fish of considerable value. It is usually taken in hoop or trap nets, or gillnets.

Its spawning time is in the spring, in most localities as early as May.

Head $4\frac{1}{4}$ to $4\frac{2}{3}$; depth $4\frac{1}{4}$ to 6; eye 6 to 8; D. 10 or 11; A. 7; scales 14 to 17-90 to 117-13. Body elongate, subterete; head very long and slender, depressed and flattened above, broad at base, but tapering into a long snout, which overhangs the large mouth; lips thick, coarsely tuberculate, the upper lip narrow, with 2 or 3, sometimes 4 rows of papillæ; lower lip deeply incised, the lobes shorter than in *C. griseus*, and the mouth narrower; lower jaw with a slight cartilaginous sheath; eye small, behind middle of head; scales very small, much crowded anteriorly.

Males in spring with the head and anal fin profusely tuberculate, and the side with a broad, rosy band.



Sacramento Sucker

Catostomus occidentalis Ayres

Streams of California, especially abundant in the Sacramento and San Joaquin rivers. This species was formerly of considerable importance to the Indians, who caught it in great numbers. It reaches a foot in length.

Columbia River Sucker ; Yellow Sucker

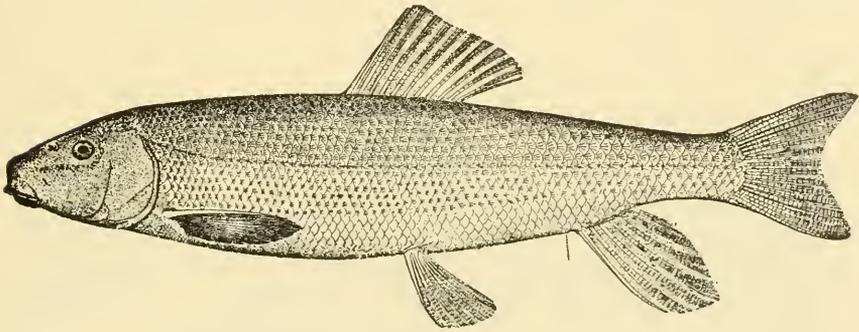
Catostomus macrocheilus Girard

Columbia River basin and other rivers and lakes of Oregon and Washington, generally abundant; not known from the Snake River basin above Shoshone Falls. It is abundant in the Redfish Lakes of Idaho and in Flathead Lake of Montana. During the spring and early summer it is found in the streams, but in July or earlier it retires to deeper water, entering lakes whenever opportunity offers. It attains a length of 12 to 17 inches, and is a food-fish of considerable importance, particularly to the Flathead Indians and other Indians in the regions where it is found. Its flesh is sweet, firm and flaky, the fish usually inhabiting cold waters.

At the Redfish Lakes in Idaho this sucker was noticed in August and September toward the close of the day swimming about in great schools at the surface of the water, sometimes with their noses projecting. The schools would gather about

the mouth of some inlet and swim slowly about in this way for an hour or more just at sundown. The meaning of this particular habit has not been explained.

Head 4 to $4\frac{2}{3}$; depth 5; eye 5 to 6 in head; snout 2; D. 12 to 14; A. 7; scales 12 to 14-65 to 75-10 or 11, about 40 before the dorsal. Body rather heavy forward, the caudal peduncle slender; snout blunt, overlapping the horizontal mouth which is quite large, with very large lips, the upper full and pendant, with 6 to 8 rows of moderate papillæ; dorsal fin much longer than high; pectoral long and narrow; caudal well forked. Colour, rather dark; a dusky lateral streak; abruptly pale below.



Common Sucker ; White Sucker

Catostomus commersonii (Lacépède)

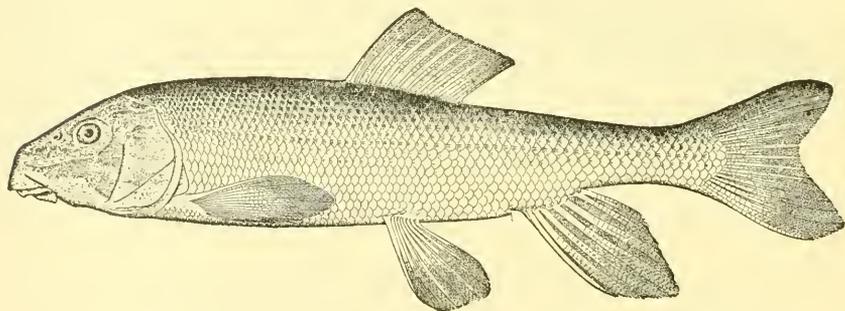
This is the most abundant sucker in the streams and lakes from Quebec and Massachusetts westward to Montana and Colorado and southward to Missouri and Georgia. Specimens from Montana to Colorado have the lips broader and with more numerous papillæ.

In the smaller streams this species reaches a length of but a few inches, while in the larger streams and lakes it attains a length of 18 inches or more and becomes a food-fish of considerable importance. Though quite bony, its flesh is firm and flaky and very sweet. In some parts of the country this species is caught in large numbers and salted for winter use. It is usually taken by means of seines, traps or gillnets.

Utah Lake Mullet

In the spring of the year, as the spawning season approaches, they run up the streams in great numbers and spawn upon the riffles. This is, in most parts of its range, in May or June, and the fish is called the "June Sucker."

Head 4 to $4\frac{2}{3}$; depth 4 to 5; eye 6 in head; snout $2\frac{1}{4}$; D. 12; A. 7; scales 10-64 to 70-9. Body rather stout, varying with age, subterete, heavy anteriorly; head moderate, conical, flattish above; snout rather prominent, scarcely overpassing the mouth, which is large, the lips papillose, the upper with 2 or 3 rows of papillæ (4 to 6 in western specimens); scales small, crowded anteriorly, larger on the sides and below. Colour, olivaceous; males in spring somewhat rosy; young brownish, more or less mottled and blotched with dark.



Utah Lake Mullet

Catostomus ardens Jordan & Gilbert

This species is very close to the common sucker, differing chiefly in the larger mouth and lips. Abundant in the Snake River basin above Shoshone Falls and in the lakes and streams of the Great Salt Lake basin. It swarms in myriads in Utah Lake, "the greatest sucker pond in the world." In Heart Lake of Yellowstone Park this fish is infested by a parasitic worm (*Ligula catostomi*) which is often larger than the fish's viscera.

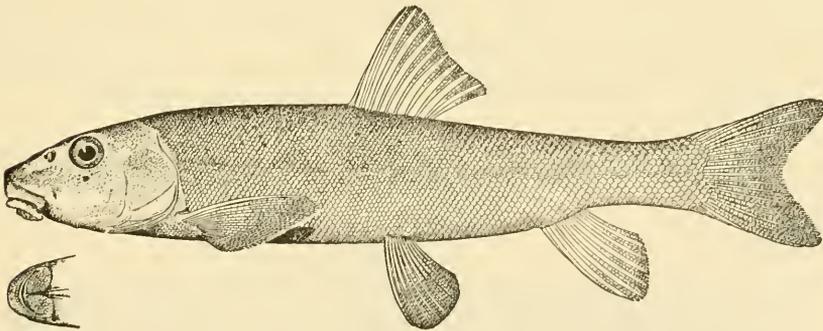
Like all other suckers, this species is a spring spawner, and at that time immense numbers are said to come into the shallow

water of Utah Lake, Jacksons Lake and other lakes which it inhabits.

This species reaches a length of 18 inches or more, and holds rank with the others of the genus as a food-fish.

Head $3\frac{2}{3}$; depth $4\frac{1}{2}$; eye small, 7 in head, $3\frac{1}{2}$ in interorbital width; snout $2\frac{1}{4}$ in head; D. 12 or 13; A. 7; scales 12-70 to 72-12. Body rather long, little compressed, the back broad; head broad, conical; mouth entirely inferior, the mandible nearly horizontal; upper lip wide, full, pendant, with 4 to 8 rows of coarse, irregular papillæ; lower lip very broad, coarsely papillose, cut to the base; dorsal fin long and low, its anterior rays $\frac{1}{2}$ longer than the last; pectorals, ventrals and caudal short; anal long. Colour, blackish above, paler below, the fins dark; breeding males with the sides rosy.

Besides the 7 species described above, 12 others of less importance are recognized as occurring in North America.



Moogadee

Catostomus pocatello Gilbert & Evermann

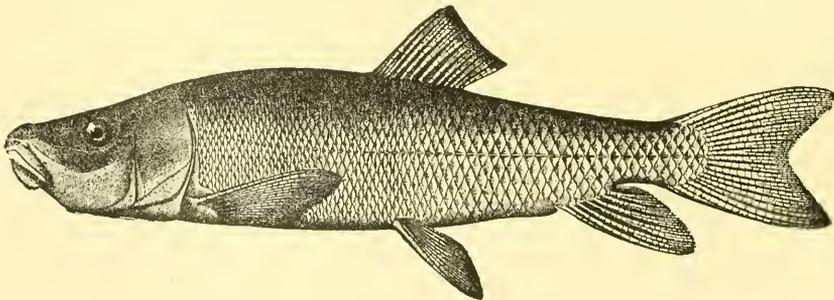
One of these, the Moogadee of the Fort Hall Indians of Idaho, is of some food value.

GENUS CHASMISTES JORDAN

Head large, broad and flattish above, the sides vertical; eye small, high up, and rather posterior; mouth very large, terminal, the lower jaw in the closed mouth being very oblique; lower jaw long and strong, more than half length of head, its tip, when the mouth is closed, about on a level with the eye; upper jaw very protractile; upper lip thin and nearly smooth; snout usually elevated above rest of head; the premaxillary spines generally forming a conspicuous nose; lower lip moderate, consisting of a broad flap on each side of the mandible, reduced to a narrow rim in front, the surface of the lip nearly smooth, without papillæ; nostrils large; fontanelle well developed; gillrakers simple, fringe-like; air-bladder in 2 parts. Species of rather large size, inhabiting the Great Salt Lake Basin and the Klamath Lakes of southern Oregon.

Six species are recognized, only 4 of which seem to be of any commercial importance.

- a. Scales moderate, 60 to 65 in the lateral line.
- b. Scales 9-63-8; dorsal usually 11; nose prominent; *liorus*, 54
- aa. Scales small, 75 to 85 in the lateral line.
- c. Snout prominent, premaxillary spines strongly protruding, forming a prominently projecting snout;.....*stomias*, 55
- cc. Snout not prominent, premaxillary spines not forming a prominent hump.
- d. Scales 12-75-11;.....*brevirostris*, 55
- dd. Scales 13-80-12;.....*copei*, 56



June Sucker of Utah Lake

Chasmistes liorus Jordan

Known only from Utah Lake, where it is exceedingly abundant,

contributing, with *Catostomus ardens*, to make that lake the "greatest sucker pond in the world."

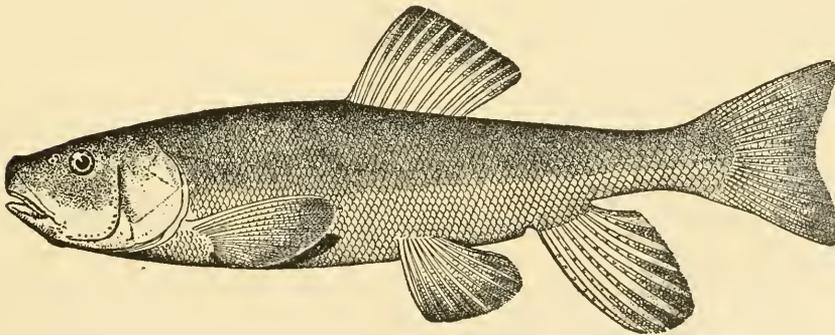
Head $3\frac{2}{5}$; depth 5; eye 6 to 7; scales 9-63-8; D. 11; A. 7; inter-orbital space broad, $2\frac{1}{4}$ in head; width of the open mouth $3\frac{1}{2}$ in head; dorsal elevated in front, its longest ray twice the length of the last and about equal to base of fin; caudal deeply forked, the lower lobe the longer; lower fins small. Colour, dusky above, pale below; back and sides profusely covered with dark punctulations. Length 18 inches or less.

Short-nosed Sucker

Chasmistes brevirostris Cope

This species is known only from the Klamath Lakes of Oregon. It attains a length of 12 to 18 inches and is a food-fish of some value to the Indians, who know it as the "Yen."

Snout $2\frac{1}{2}$ to $2\frac{2}{5}$ in head; mandible $1\frac{1}{4}$ in snout; interorbital width $2\frac{1}{8}$ in head; D. 11; A. 9; scales 13-73-12; premaxillary spines not produced to form a hump on the snout; lower lip fold present on the sides of the mandible; each lip with small, inconspicuous, sparse tubercles, in 3 or 4 series on the upper lip; ventrals extending $\frac{2}{3}$ distance to vent; scales with strong concentric striæ. Colour, dark above, silvery on lower part of side and on belly; fins all dusky.



Klamath Lake Sucker

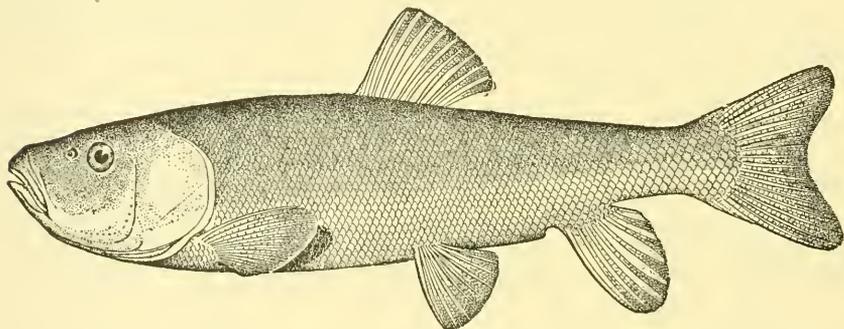
Chasmistes stomias Gilbert

This is another species of *Chasmistes* inhabiting Upper Klamath

Lake, which is a close rival of Utah Lake for the honour of being the "greatest sucker pond in the world."

It is the most abundant species of the genus in the Klamath Lakes. It reaches a length of 15 to 18 inches and is of great value to the Indians, by whom it is known as "Kahptu."

From all other species of the genus, except *C. brevirostris* and *C. copei*, it is distinguished by its small scales (14 or 15-76 to 82-11), and from *C. brevirostris* it differs in the deeper head, larger mandible, more oblique mouth, and by the prominent hump on the snout; mouth inclined at an angle of 40°. Colour, dark above, whitish or silvery below, the two colours separated along a definite line traversing the side midway between lateral line and insertion of ventrals.



Tswam

Chasmistes copei Evermann & Meek

This is still another species of *Chasmistes*, inhabiting the Klamath Lakes. It closely resembles *C. stomias*, but may be distinguished from that species by its larger head, larger, more oblique mouth, less prominent snout, and very small fins.

This sucker reaches a length of 16 or 18 inches and is used as food by the Klamath Indians. The Indian name is "Tswam."

Head $3\frac{2}{3}$; depth 4; eye $6\frac{1}{5}$; snout $2\frac{1}{2}$; D. 10; A. 7; scales 13-80-12. Head very large, cheek very deep; body stout, back scarcely elevated. Colour, upper parts dark olivaceous; under parts whitish; a dark spot in upper part of axil; dorsal and caudal dark; pectoral dark on inner surface; ventrals and anal plain.

GENUS *DELTISTES* SEALE

This genus is close to *Chasmistes*, from which it differs chiefly in the structure of the gillrakers, the very long, slender head, the small horizontal mouth, and the thicker lips. The gillrakers are broad and shaped like the Greek letter Δ (delta) and their edges are unarmed and entire; lower pharyngeals weak, with numerous small teeth.

The single known species is the Lost River sucker (*D. luxatus*), which is the most important food-fish of the Klamath Lakes region. It is apparently resident during most of the year in the deeper waters of Upper Klamath and Tule lakes, running up the rivers in March and April in incredible numbers, the height of the run varying from year to year according to the condition of the streams. The Lost River fish are the most highly prized, and are said to be much fatter and of finer flavour than those ascending the tributaries of Upper Klamath Lake.

This species reaches the largest size of any of the Klamath Lake suckers, examples over 3 feet in length and weighing several pounds having been examined. It is of vast importance to the Klamath Indians, who, during the spring run, catch it in immense numbers and cure it for winter use.

An attempt has been made to preserve the meat in cans, but apparently without success. Oil has been extracted from the heads and entrails, said to be worth 60c. to 85c. per gallon.

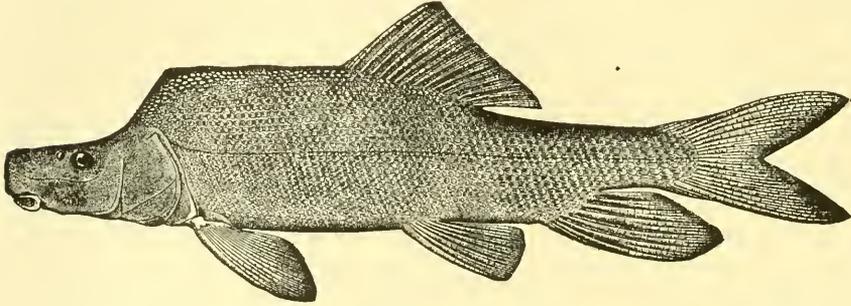
Head 4; depth $4\frac{4}{5}$; snout $2\frac{2}{5}$ in head; D. 12; A. 7; scales 12-76 to 81-9. Body elongate; head very long and slender, the snout and cheek especially long; mouth inclined upward at an angle of about 35° ; fontanelle large; premaxillary spines forming a decided hump on snout near its tip.

GENUS *XYRAUCHEN* EIGENMANN & KIRSCH

The characters of this genus agree in all respects with those of *Catostomus* except that behind the occiput is a sharp-edged hump produced by the singularly developed interneural bones, giving the adult fish a very grotesque appearance.

Razor-back Sucker ; Hump-back Sucker

Only two species are known, both from the Colorado River. Only one of these is of any food value. The other (*X. uncom-pahgre* Jordan & Evermann) is known only from the type, a specimen 7 inches long, and may be the young of *X. cypho*.



Razor-back Sucker ; Hump-back Sucker

Xyrauchen cypho (Lockington)

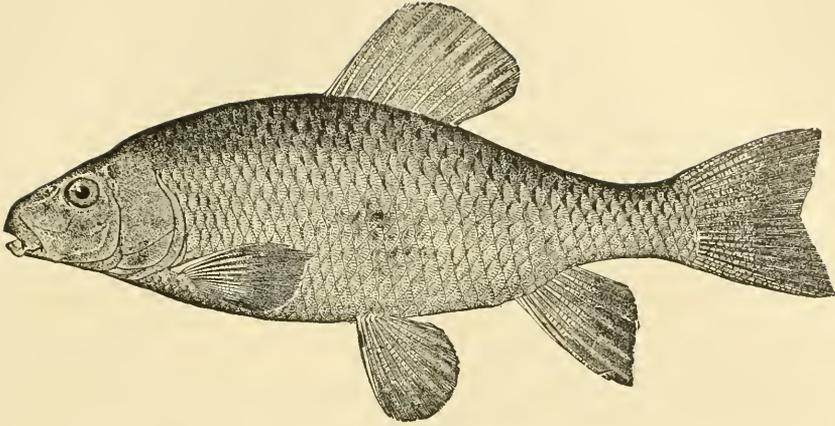
Known only from the Colorado Basin, where it is quite abundant and of considerable value. It reaches a weight of 8 to 10 pounds.

Head 4; depth 4; D. 13 or 14; A. 7; scales 13 to 15-72 to 77-13. Body stout, compressed, the head low, the profile ascending to the prominent hump; mouth wide, inferior; upper lip with 2 rows of papillæ, the lower deeply divided and with 8 rows; dorsal fin long and low, with concave edge; caudal broad and strong, with numerous rudimentary rays; scales loosely imbricated; anterior part of hump scaleless. Colour, plain olivaceous.

GENUS ERIMYZON JORDAN

The Chub Suckers

This genus may be known by the entire absence of a lateral line and the plain colouration in the adult. The young have a broad black lateral band and are easily mistaken for *Cyprinida*.

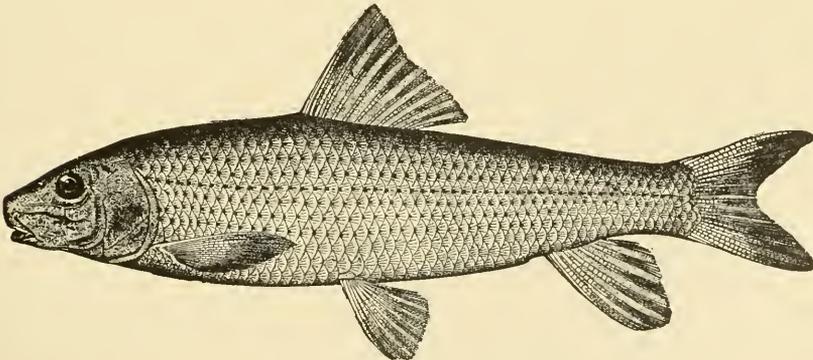


Chub Sucker

Only one species is known, *E. sucetta*, the chub sucker or creekfish, which reaches a length of about 10 inches and is widely distributed from the Great Lakes and New England south to Texas. Those in the northern part of the range have been regarded as a subspecies, *E. sucetta oblongus*.

GENUS MINYTREMA JORDAN

This genus may be known by the incomplete lateral line and the presence of a small blackish spot at base of each scale on side, these forming interrupted longitudinal lines along the rows of scales.



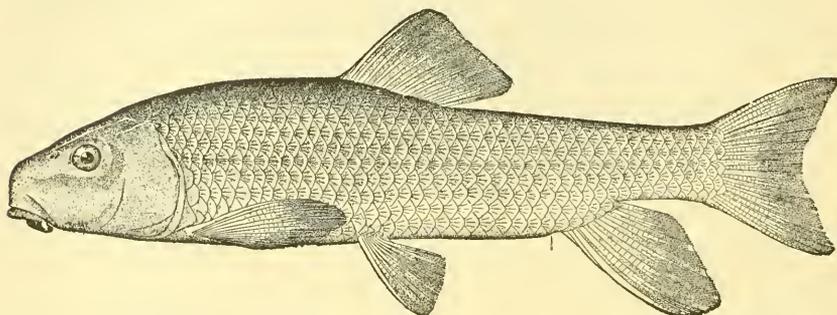
Spotted Sucker

The single species is *M. melanops*, known as the winter sucker or spotted sucker. It reaches a moderate size and is of

The Redhorses

some value as a food-fish. It occurs in the Great Lakes region and south to North Carolina and Texas, being most common westward.

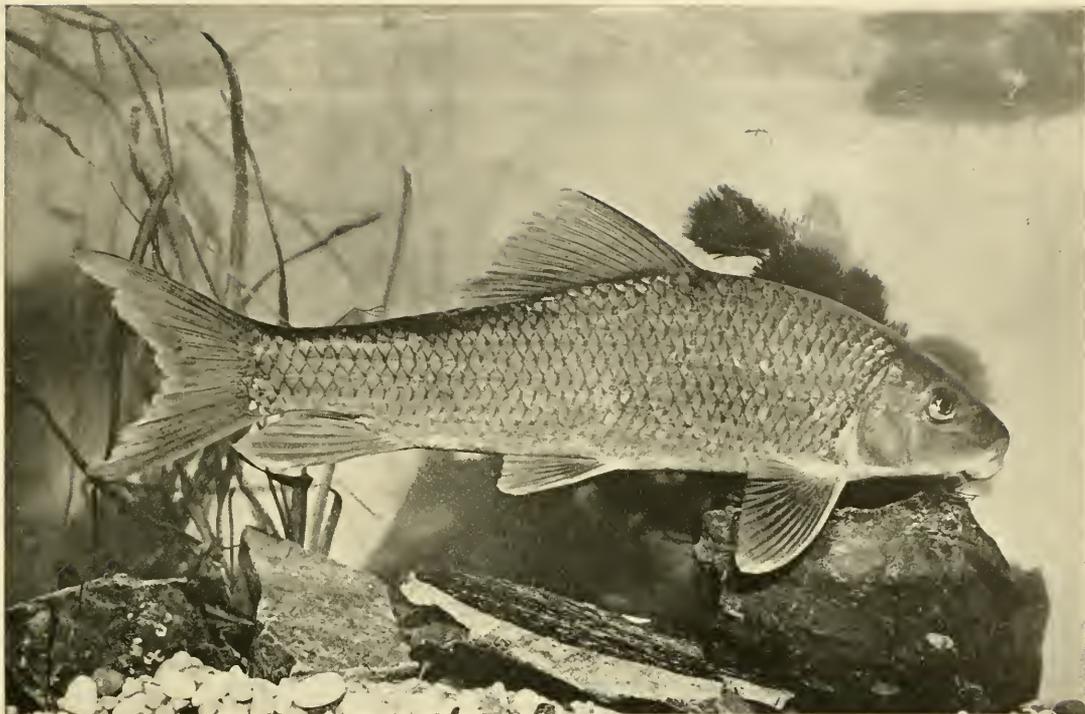
GENUS *MOXOSTOMA* RAFINESQUE



The Redhorses

Body more or less elongate, sometimes nearly terete, usually more or less compressed; head variously long or short; eye usually large; suborbital bones very narrow; fontanelle always open; mouth varying much in size, always inferior in position, the mandible horizontal, or nearly so; lips usually well developed, the form of the lower varying, usually with a slight median fissure, but never deeply cleft; lips with transverse plicæ, rarely broken up into papillæ; jaws without cartilaginous sheath; opercular bones moderately developed, nearly smooth; isthmus broad; gillrakers weak, moderately long; pharyngeal bones rather weak, as in *Catostomus*, the teeth rather coarser and strongly compressed, the lower 5 or 6 more strongly than the others, which rapidly diminish in size upward, each with a prominent internal cusp; scales large, more or less quadrate in form, nearly equal in size over the body, and not especially crowded anywhere; lateral line well developed, straight or anteriorly curved; fins well developed, the dorsal inserted about midway of the body, its first ray usually rather nearer snout than caudal; anal fin short and high, usually emarginate in the male; caudal fin deeply forked; air-bladder with three chambers.

Sexual characters little marked, the males during the spawning season with the lower fins reddened and the anal rays somewhat swollen and tuberculate.



COMMON REDHORSE SUCKER, *Moxostoma aureolum*



LAKE CARP SUCKER OR QUILLBACK, *Carpoides thompsoni*

This is a large genus, comprising not fewer than 20 species, all of which occur in the eastern United States in the Atlantic and Gulf drainages. There is no representative of the genus on the Pacific Coast. They inhabit both streams and lakes, but prefer the streams. Their spawning time is in the spring, when they run up the rivers and into the smaller streams, sometimes in very great numbers.

The species are difficult to distinguish and have been unduly multiplied by authors. They are less tenacious of life than the species of *Catostomus*, but equal them in food value.

Of the 20 species only about 5 attain a sufficient size to make them of much value for food. The remaining 15 species, which are mostly of small size, are the following:

Sucking mullet (*M. collapsum*), lowland streams of North Carolina; thick-cheeked sucker (*M. bucco*), Missouri River at St. Joseph; Pedee sucker (*M. pidiense*), Great Pedee River basin; blue mullet (*M. coregonus*), Catawba and Yadkin rivers; white mullet (*M. album*), Catawba and other rivers of North Carolina, green mullet (*M. thalassinum*), Yadkin River; Texas red-horse (*M. congestum*), rivers of Texas; Mexican mullet (*M. austrinum*) Rio Lerma, Mexico; Yadkin mullet (*M. robustum*) Yadkin River, a doubtful species, perhaps identical with *M. macrolepidotum*, which occurs from Delaware to the Carolinas; picconou (*M. lesueuri*), Albany River, Canada, and elsewhere in the far north, the most northern species, but not well known; Neuse River mullet (*M. conus*), Neuse and Yadkin rivers, perhaps not distinct from *M. breviceps*; Tangiopahoa mullet (*M. pæcilurum*), southern Mississippi to eastern Texas, jump-rocks (*M. rupiscartes*), rivers from North Carolina to Georgia; and jumping mullet (*M. cervinum*), rivers of the South Atlantic States from the James to the Neuse, abundant about rapids and rocky pools.

- a. Lips full, the folds broken up into evident papillæ;.....
papillosum, 62
- aa. Lips plicate, the folds not forming distinct papillæ.
- b. Dorsal fin large, of 15 to 18 rays; lower lip V-shaped,
 somewhat papillose;.....*anisurum*, 62
- bb. Dorsal fin smaller, of 10 to 14 rays.
- c. Caudal fin with the upper lobe not conspicuously longer
 than the lower.
- d. Dorsal fin with its free margin nearly straight; lower fins
 always red in life;.....*aureolum*, 63

White Mullet

- dd.* Dorsal fin with its free margin always more or less incised or concave; lower fins always pale in life.
- e.* Head moderate, $4\frac{2}{3}$ in body; back not elevated;..... *macrolepidotum*, 61
- ee.* Head very short and blunt, 5 in body; back elevated;... *crassilabre*, 63
- cc.* Caudal fin with the upper lobe more or less produced 61 and falcate..... *breviceps*, 64

White Mullet

Moxostoma papillosum (Cope)

Coastwise streams from the Dismal Swamp to the Ocmulgee River in Georgia; said to be common.

Head 4 to $4\frac{1}{2}$; depth 4 to $4\frac{1}{2}$; D, 12 to 14; scales 6-42-5. Body comparatively stout, the dorsal region somewhat elevated and rounded; eyes rather large, high up and well back, the preorbital space longer than in most species; top of head flat; lips moderate, deeply incised, the folds more broken up than in other species; caudal lobes equal. Colour, silvery; back with smoky shading; lower fins more or less reddish. Length 1 to 2 feet.

White-nosed Sucker

Moxostoma anisurum (Rafinesque)

This species reaches a length of $1\frac{1}{2}$ feet or more, and is not uncommon in the Great Lakes region and southward in the Ohio basin.

Head $3\frac{3}{4}$ to 4 in length; depth 3 to 4; eye 4 to 5 in head; depth of cheek 2 in head; D. 15 to 18. Body stout, deep and compressed, the back elevated; head short, heavy, flattish and broad above; eye rather large, midway in head; muzzle rather prominent, bluntish, overhanging the large mouth; upper lip thin; fins very large, the dorsal long and high, its height $1\frac{1}{6}$ in length of head, its free border straight, the first ray about as long as the fin; pectorals nearly reaching ventrals; upper lobe of caudal narrow, longer than lower. Colour, very pale and silvery; smoky above; lower fins white or pale red.

Common Redhorse

Moxostoma aureolum (Le Sueur)

The common redhorse is found from Lakes Ontario and Michigan to Nebraska and south to Arkansas and Georgia. West of the Alleghanies it is everywhere an abundant and well-known fish. It reaches a length of 2 feet or more and is the most important food-fish of the genus. In the upper Mississippi Valley states it has always been held in considerable esteem by the farmers, who were in the habit of snaring, seining, or catching them in traps in great numbers in the spring of the year and salting them for winter use.

Like most other well-known species of wide distribution, this sucker has received many common names, among which are the following: mullet, white sucker, large-scaled sucker, and redfin sucker.

Head rather elongate, bluntish, broad and flattened above; body stoutish, varying to moderately elongate; lips rather full, the bluntish muzzle projecting beyond the large mouth; greatest depth of cheek more than half distance from snout to preopercle; dorsal fin medium in size, its free edge nearly straight, its longest ray shorter than the head. Colour, olivaceous; sides silvery, paler beneath; lower fins red or orange.

Sucking Mullet

Moxostoma crassilabre (Cope)

Streams of eastern North Carolina, where it is very abundant. It reaches a length of nearly 2 feet, and, in the spring, is taken in large numbers in the shad seines.

Among the vernacular names applied to it are redhorse, horsefish, redfin, and mullet.

Head $4\frac{3}{4}$ to 5 in length; depth $3\frac{1}{2}$; eye $3\frac{2}{3}$ to 4; D. 12 or 13; scales 6-42 to 44-5. Body robust, the back elevated and com-

pressed; head short, broad, flattish above; mouth moderate, the lips full, the lower truncate behind; snout short, little projecting; dorsal fin elevated in front, its edge much incised, its first ray longer than the base of the fin and about as long as the head; caudal lobes equal. Colour, silvery, with smoky shading above, some of the scales blackish at their bases; caudal and anal with some red; top of head, humeral bar and a broad shade across dorsal fin, dusky.

Short-headed Redhorse

Moxostoma breviceps (Cope)

Great Lakes and Ohio Valley, abundant in Lake Erie. This species reaches a length of a foot or more.

Head 5 to $5\frac{1}{4}$; depth $3\frac{1}{2}$; eye small, 5 in head; D. 12 or 13-scales 6-45-5. Body deep, compressed; head small; snout short and sharply conic, overhanging the very small mouth; form suggesting that of the white-fish; caudal fin with the upper lobe fallate and much longer than the lower, at least in the adult; dorsal fin short, high, and falcate, the anterior rays $1\frac{1}{3}$ to $1\frac{1}{2}$ times base of fin, the free border much concave; anal long, falcate, reaching beyond base of caudal. Colour, silvery, the lower fins bright red.

GENUS PLACOPHARYNX COPE

Suckers much like *Moxostoma* in all respects, except that the pharyngeal bones are much more developed and the teeth reduced in number, those on the lower half of the bone very large, 6 to 10 in number, nearly cylindrical in form, being but little compressed and with a broad, rounded, or flattened grinding surface; mouth larger and more oblique than usual in *Moxostoma*, and the lips thicker. Only one species known.

Big-jawed Sucker

Placopharynx dugesnii (Le Sueur)

This interesting sucker reaches a length of 2 to $2\frac{1}{2}$ feet and is not uncommon from Michigan to Tennessee, Arkansas and

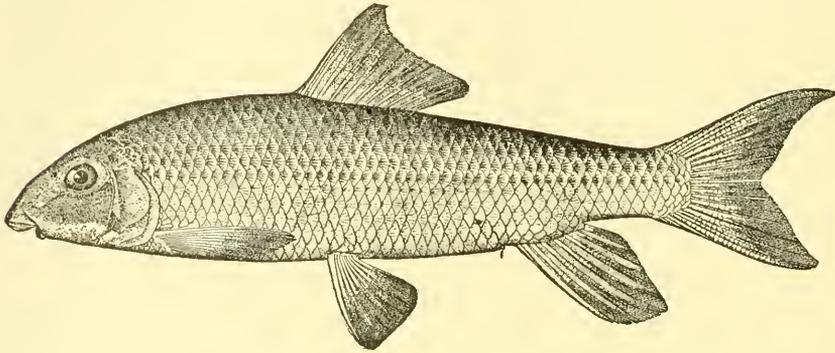
Georgia in the larger streams; it is probably most abundant in the French Broad River and in the Ozark region.

Nothing peculiar in its habits is known, and it ranks with the species of redhorse as a food-fish.

Head 4 in length; depth $3\frac{4}{5}$; D. 12 or 13; A. 9. Body oblong, moderately compressed, heavy at the shoulders; head large, broad, and flattish above, its upper surface somewhat uneven, eye small, behind the middle of the head; mouth large, the lower jaw oblique when the mouth is closed, the mouth, therefore, protractile forward as well as downward; lips very thick, coarsely plicate, the lower lip full and heavy, truncate behind; free edge of dorsal concave, the longest ray longer than base of fin, $1\frac{1}{5}$ in head; upper lobe of caudal narrower than the lower and somewhat longer. Colour, dark olive green, the sides brassy, not silvery; lower fins and caudal orange red.

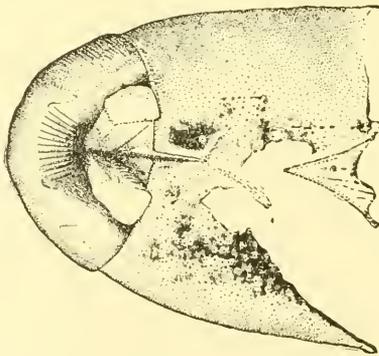
GENUS *LAGOCHILA* JORDAN & BRAYTON

This is the most peculiar genus of suckers and may be known readily by the nonprotractile upper lip and the split lower lip. The



Hare-lip Sucker

single species is the hare-lip sucker, cutlips, split-mouth sucker, rabbit-mouth sucker, pea-lip sucker, or May sucker, *L. lacera*.



Hare-lip sucker, showing lower lip.

It is found in clear streams in the Mississippi Valley, as the Tippecanoe, Wabash, Clinch, Cumberland, Chickamauga and White River of Arkansas. It is most common in the Ozark region.