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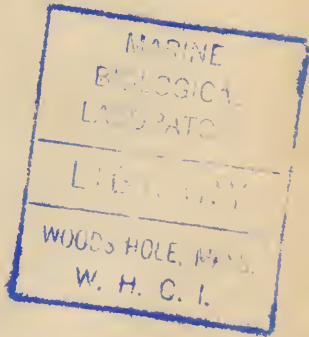
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BY

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AND

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## Subclass Physostomi.

## Order L. Eventognathi.

## Family 30. Catostomidæ.

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- a. Basal branchiials 2; pharyngeal teeth numerous, pectinate; maxillaries forming part of the margin of the upper jaw..... CATOSTOMIDÆ, 30.  
 aa. Basal branchiials 3; pharyngeal teeth few; margin of upper jaw formed by premaxillaries alone..... CYPRINIDÆ, 31.  
 \*\* Brain case not produced between orbits; basis cranii double, sometimes with muscular canal; 4 to 1 superior pharyngeal bones; lower pharyngeals not falciform; 3 basal branchiials; teeth in jaws often present. (*Characini*.)  
 CHARACINIDÆ, 32.

## FAMILY XXX.—CATOSTOMIDÆ.

(The Suckers.)

Body oblong or elongate, usually more or less compressed. Head more or less conoid. Opercles normally developed. Nostrils double. No barbels. Mouth large or small, usually protractile and with fleshy lips. Margin of upper jaw formed in the middle by the small premaxillaries, and on the side by the maxillaries. Jaws toothless. Lower pharyngeal bones falciform, armed with a row 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. Pseudobranchiæ present. Scales cycloid, large or small. Lateral line decurved, sometimes wanting. Head naked. Fins not scaly. Dorsal fin comparatively long (of 11–50 rays), without true spine. Anal fin short. Caudal fin more or less forked. Ventrals abdominal, with about 10 rays. Pectoral fins placed low, without spine. No adipose fin. Belly not serrated. Alimentary canal long. Stomach simple. No pyloric cœca. Air-bladder large, divided into two or three parts by transverse constrictions, not surrounded by a bony capsule. Genera 14 or fewer; species about 60; inhabiting the fresh waters of North America, two species in Eastern Asia. They are not much valued as food fishes, the flesh being flavorless and full of small bones.

(*Cyprinidae*, group *Catostomina* Günther, vii, 12–24.)

\* Dorsal fin elongate, its developed rays 25–50 in number; air-bladder in two parts.

† Fontanelle present; body ovate; scales large. (*Bubalichthys*.)

a. Dorsal rays 24–33.

b. Mouth large, terminal, protractile forwards; lips thin; pharyngeal bones and teeth weak..... ICHTHYUS, 59.

bb. Mouth smaller, inferior, protractile downwards.

c. Pharyngeal bones strong, the teeth comparatively coarse and large, increasing in size downwards..... BUBALICHTHYS, 60.

cc. Pharyngeal bones narrow, with the teeth thin and weak.. CARPIODES, 61.

†† Fontanelle obliterated by the union of the parietal bones; body elongate. (*Cycleptina*.)

d. Mouth small, inferior, with thick papillose lips; scales rather small.

CYCLEPTUS, 62.

\*\* Dorsal fin short, with 10-18 rays. (*Catostominae*.)

e. Air-bladder in two parts.

f. Lateral line complete and continuous; scales small, 55-115 in the lateral line.

g. Fontanelle none ..... PANTOSTEUS, 63.

gg. Fontanelle present.

h. Mouth inferior, small, with thick papillose lips.

CATOSTOMUS, 64.

hh. Mouth very large, terminal, oblique; lips thin and nearly smooth.

i. Pharyngeal bones moderate, with teeth of medium size.

CHASMISTES, 65.

ii. Pharyngeal bones slender, with very numerous, minute teeth.

LIPOMYZON, 66.

ff. Lateral line interrupted or wanting; scales large (40-50 in a longitudinal series).

g. Lateral line entirely wanting ..... ERIMYZON, 67.

gg. Lateral line more or less developed..... MINYTREMA, 68.

ee. Air-bladder in three parts; fontanelle present; scales large; lateral line complete.

j. Mouth normal, the lower lip entire or merely lobed.

k. Pharyngeal bones moderate, the teeth compressed, gradually larger downwards; mouth moderate or small, the lips usually plicate ..... MOXOSTOMA, 69.

kk. Pharyngeal bones very strong, with the lower teeth much enlarged, subcylindrical and truncate, the teeth of the upper part of the bone small and compressed; mouth large, somewhat oblique, with very thick lips.

PLACOPHARYNX, 70.

jj. Mouth singular, the upper lip not protractile, greatly enlarged, the lower lip developed as two separate lobes, pharyngeal bones and teeth ordinary.... QUASSILABIA, 71.

### 59.—ICTIOBUS Rafinesque.

#### *Buffalo-fishes.*

(Rafinesque, Ichth. Oh. 1820, 55: type *Ambiodon bubalus* Raf.)

Head very large and strong, wide and deep; its length  $3\frac{1}{2}$ - $3\frac{3}{4}$  in that of the body; its upper surface broad and depressed. Eye moderate, wholly anterior in position, the middle of the head being entirely behind it; suborbital bones proportionately narrow. Fontanelle large, well open. Opercular apparatus largely developed; the suboperculum broad; the operculum broad, strongly furrowed. Mouth very large for a sncker, terminal, protractile forwards; the middle of the premaxillaries nearly on the line of the middle of the eye; the posterior edge of the maxillary extending about to the line of the nostrils. Mandible very strong, oblique, placed at an angle of  $45^\circ$  or more when the mouth is closed, its posterior end extending to beyond opposite the front of the eye, its length a little less than one-third that of the head. Lips very little developed; the upper narrow and smooth, scarcely appreciable; the lower narrow, rather full on the sides, but reduced to a narrow rim in front,



entirely destitute both of papillæ and plicæ. Jaws without cartilaginous sheath. Muciferous system of head well developed. Isthmus narrow. Pharyngeal bones rather weak, the outer surface of the arch standing outwards and presenting a porous outer margin. The peduncle of the symphysis is much longer proportionally and more pointed than in *Carpiodes* and *Bubalichthys*. The teeth are very numerous, small, thin, and compressed as in *Carpiodes*, but the lower ones are gradually larger than the upper ones. Their inner edge is slanting outwards, and not uniformly arched as in *Bubalichthys*, or truncate as in *Cycleptus*, the innermost margin rising somewhat in the shape of a projecting cusp. Gill-rakers of anterior arch long and slender above, becoming shorter downwards. Body heavy, robust, not especially arched above nor greatly compressed, the form somewhat elliptical; the depth  $2\frac{1}{2}$ – $3\frac{1}{2}$  in the length of the body. Scales large, thick, nearly equal over the body, their posterior edges somewhat serrate; the lateral line well developed, but not as distinct as in *Carpiodes*, slightly decurved anteriorly; the number of scales in its course 36–42; 13–15 in a transverse series from dorsal to ventrals. Dorsal fin with an elongate basis, its number of rays 25–30; anterior rays somewhat elevated, their length about half that of the base of the fin. Caudal not much forked. Anal fin not much elevated, its rays about 9 in number. Pectorals and ventrals moderate, the latter with about 10 rays. Sexual peculiarities, if any, unknown. Coloration dark, not silvery. Air-bladder with two chambers. Size very large. A single species known. (*ιχθός*, fish; *βουός*, buffalo.)

**113. *I. bubalus*** (Raf.) Ag.—*Red-mouth Buffalo-fish*.

Body robust, moderately compressed, the outline somewhat elliptical, but the back rather more curved than the belly; depth  $2\frac{1}{2}$ – $3\frac{1}{2}$  in length. Head very large and thick,  $3\frac{1}{2}$  in length of body. Opercular apparatus very strong, the operculum itself forming nearly half the length of the head. Scales very large. Developed rays of the dorsal 27–29; anal rays 9; ventrals 10. Scales 7–37 to 41–6. Coloration dull brownish olive, not silvery. Fins dusky. Size very large; reaches a length of nearly 3 feet and a weight of 20–30 pounds. Mississippi Valley; generally abundant in the larger streams.

(*Ambodon bubalus* Raf. Journ. Phys. 1818, 421; Agassiz, Amer. Journ. Sci. Arts, 1854, 196; *Sclerognathus cyprinella* C. & V. Hist. Nat. Poiss. 1844, 477; \**Ichthyobus cyanellus* Nelson, Bull. Ill. Mus. Nat. Hist. i, 49; *Ichthyobus bubalus* Jordan, Bull. U. S. Nat. Mus. xii, 214; *Sclerognathus cyprinella* Günther, vii, 24.)

\* See Jordan, Bull. U. S. Nat. Mus. xii, 207. There has been perhaps a confusion among Mr. Nelson's types of this species. One sent by him to us is an *Ictiobus*.

**60.—BUBALICHTHYS** Agassiz.*Buffalo-fishes.*

(Agassiz, Amer. Journ. Sci. Arts, 1855, 192: type *Carpiodes urus* Ag.)

Head moderate or rather large deep and thick, its superior outline rapidly rising; its length about 4 in that of the body. Eye moderate, median or rather anterior in position. Suborbital bones comparatively narrow. Fontanelle always present and widely open. Mouth moderate or small, more or less inferior; the mandible short, little oblique, or typically quite horizontal; the mandible less than one-third the length of the head; the premaxillaries in the closed mouth below the level of the lower part of the orbit. Lips rather thin, thicker than in *Ictiobus*, the upper protractile, narrow, plicate, the plicæ sometimes broken up into granules; lower lip comparatively full (for a buffalo-fish), faintly plicate, the plicæ broken up into granules, the lower lip having the general  $\cap$ -shaped form seen in *Carpiodes*. Jaws without cartilaginous sheath. Muciferous system well developed. Opercular apparatus well developed, but less so than in *Ictiobus*; the operculum strongly rugose; isthmus moderate. Pharyngeal bones triangular, with large teeth, which increase in size from above downwards. Teeth compressed, their grinding edge blunt, slightly arched in the middle, and provided with a little cusp along the inner margin, which is hardly detached from the crown, and does not rise above the surface. Gill-rakers of anterior arch slender and stiff above, growing shorter downwards. Body ovate or oblong; the dorsal outline more or less arched; the sides of the body compressed; the ventral outline curved also, but to a less degree. Scales very large, about equal over the body, their posterior outlines somewhat serrate. Lateral line well developed, nearly straight, with 35–42 scales; 12–14 in a cross-series from ventrals to dorsal. Dorsal fin beginning near the middle of the body, somewhat in advance of the ventrals; its anterior rays elevated, their height about equal to half the base of the fin, the number of rays in the dorsal fin ranging from 25 to 30. Caudal fin well forked, the lobes about equal, not falcate. Anal fin comparatively long and rather low, of 8 or 9 developed rays. Ventrals moderate, 10-rayed. Pectorals rather short. Sexual peculiarities, if any, unknown. Coloration dull dark brown, nearly plain, not silvery. Fins olivaceous or more or less dusky. Air-bladder with two chambers. Size quite large. This genus is closely related to *Ictiobus*, differing only in

the somewhat stronger teeth. The two genera, with perhaps *Carpiodes* also, should probably be reunited. Three species are known, two in the United States and a third in Central America.\* (*βούβαλος*, buffalo; *ὀψίς*, fish.)

**114. *B. urus* Ag.—Big-mouthed Buffalo.**

Body much less elevated and less compressed than in *B. altus*, the back not at all carinated; axis of body above ventrals about at the lateral line, and but very little farther from the dorsal outline than from the ventral; depth 3–3½ in length. Head very stout, strongly transversely convex, thicker, larger, and less pointed than in the other, about 4 in length. Eye about equal to snout, 5½ in head, much smaller than in *B. altus*. Mouth large, considerably oblique, opening well forwards. Mandible longer than eye. Premaxillary somewhat below sub-orbital. Dorsal fin lower and less rapidly depressed than in the next, the longest ray scarcely half the length of the base of the fin. Anal fin rounded; its rays not rapidly shortened; the middle ones not much shorter than the longest. Colors very dark; fins all black. Scales 8–41–7; D. 30; A. 10. Mississippi Valley; in the larger streams.

(*Carpiodes urus* Agassiz, Amer. Journ. Sci. Arts, 1854, 355: *Bubalichthys urus, niger, et bouasus* Agassiz, Amer. Journ. Sci. Arts, 1855, 193–195; Jordan, l. c. 209.)

**115. *B. altus* Nelson.—Small-mouthed Buffalo.**

Body considerably elevated and compressed above; the dorsal region subcarinate; belly thicker; depth 2½–2¾ in length; axis of body above the ventrals, below the lateral line, and nearly twice as far from the back as from the belly. Head moderate, triangular in outline when viewed from the side, 4 in length. Eye equal to snout, 4–5 in length of head, much larger than in *B. urus*. Mouth quite small, notably smaller and more inferior than in *B. urus*. Mandible about equal to eye. Dorsal fin elevated in front and rapidly declined, the highest ray reaching much beyond the middle of the fin, the seventh ray about half the length of the third or longest. Anal rays rapidly shortened behind, the middle rays much shorter than the first long ones. Scales 8–39–6;

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\* *B. meridionalis* (Günther) Jordan. Mouth small, inferior, slightly corrugated. Depth 3¼–3½ in length. Head 4–4½, not much longer than high. Eye rather small, one-fifth of the length of the head and two-fifths that of the snout. Suborbitals narrow. Anterior dorsal rays not much produced, shorter than the head. Caudal forked. Origin of ventral vertically below the fourth dorsal ray. Pectoral fin not extending to ventrals. There are 5 longitudinal series of scales between the lateral line and the root of the ventral. Coloration uniform. Scales 7–38–7; D. 29; A. 10. Rio Usamacinta, Guatemala. (Günther.) (*Sclerognathus meridionalis* Günther, vii, 23.)



D. 29; A. 10; V. 10. Coloration paler; the lower fins slightly dusky. Mississippi Valley and southward; generally abundant.

(*Catostomus bubalus* Kirtland, Rep. Zoöl. Ohio, 1838, 168, not of Rafinesque: *Bubalichthys bubalus* Agassiz, Amer. Journ. Sci. Arts, 1855, 195: *Bubalichthys bubalus* Jordan, l. c. 206: *Scelcrognathus urus* Günther, vii, 22; *B. altus* Nelson MSS. in Jordan, Proc. Acad. Nat. Sci. Phila. 1877, 73; apparently the oldest tenable name, certainly belonging to the species.)

### 61.—CARPIOIDES Rafinesque.

#### *Carp Suckers.*

(*Scelcrognathus Valenciennes.*)

(Rafinesque, Ichth. Oh. 1820, 56: type *Catostomus cyprinus* Le Sueur.)

Head comparatively short and deep, sometimes conic, sometimes blunt; its length ranging from  $3\frac{1}{2}$  to 5 in that of the body; its upper surface always rounded. Eye moderate, median or anterior in position. Suborbital bones well developed, their depth about half that of the fleshy portion of the cheek below. Fontanelle always present, well developed. Mouth always small, horizontal and inferior; the mandible less than one-third the length of the head; the lips thin, the upper protractile, narrow, the lower quite narrow,  $\Lambda$ -shaped, or rather  $\cap$ -shaped, behind; both lips feebly plicate or nearly smooth, the plicæ often more or less broken up. Jaws without cartilaginous sheath. Muciferous system moderately developed. Opercular apparatus well developed; the subopercle broad; the operculum in the adult more or less rugose. Isthmus moderate. Pharyngeal bones remarkably thin and laterally compressed, with a shallow furrow along the anterior margin on the inside, and another more central one on the outline of the enlarged surfaces. Teeth very small, compressed, nearly equally thin along the whole inner edge of the bone, forming a fine, comb-like crest of minute serratures; their cutting edge rises above the inner margin into a prominent point. Gill-rakers of anterior arch slender and stiff above, becoming reduced downwards. Body ovate or oblong; the dorsal outline more or less arched; the ventral outline more nearly straight; the depth from half to one-third the length; the sides compressed, the back notably so, forming a sort of carina. Caudal peduncle short and deep. Scales large, about equal over the body, their posterior margins slightly serrate; lateral line well developed, nearly straight, with 34–41 scales; 12–15 scales in a cross-row from dorsal to ventrals. Dorsal fin beginning near the middle of the body, somewhat in advance of ventrals, falcate; its anterior rays elevated and often filamentous, their height ranging from  $\frac{1}{2}$  to  $1\frac{1}{3}$  the length of the base of the fin; the number of

developed rays ranging from 23 to 30. Caudal fin well forked, the lobes equal. Anal fin comparatively long and low, emarginate (in males), its number of developed rays usually 8. Ventrals shortish, with usually 10 rays. Pectorals short. Sexual peculiarities little marked; in some species, at least, the males in spring have the snout minutely tuberculate. Coloration always plain; pale olivaceous above, white below, but hardly silvery, the fins all partaking of the color of the region to which they belong. Air-bladder with two chambers. Size medium or rather large. This genus is very close to *Ictiobus* and *Bubalichthys*. Its species are numerous and very difficult to determine. All belong to the United States. (Latin *carpiodes*, carp-like.)

\* Dorsal fin with the anterior rays more or less shortened, their length one-half to two-thirds that of the base of the fin; muzzle more or less conic and projecting.

a. Head short, 4-5 in length.

**116. *C. carpio*** (Raf.) Jordan.—*Carp Sucker*.

Head comparatively short, its length contained 4-5 times in the length of the body. Body more fusiform than in the others, compressed, but not much arched, the depth  $2\frac{2}{3}$ -3 times in the length. Anterior rays of dorsal short, notably thickened and osseous at base, especially in the adult; the first ray nearer the end of the muzzle than the base of the caudal fin, the longest ray a little more than half the base of the fin; caudal moderately forked. Eye medium, anterior,  $4\frac{1}{2}$  in head. Muzzle short, but projecting much beyond mouth. D. 30; Lat. 1. 36. Size largest of the genus. Mississippi Valley; generally abundant.

(*Catostomus carpio* Rafinesque, Ichth. Oh. 1820, 56; Jordan, l. c. 200: *Carpiodes nummifer* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 484.)

aa. Head intermediate, its length contained about 4 times ( $3\frac{1}{4}$ - $4\frac{1}{8}$ ) in that of body; anterior rays of dorsal not thickened at base.

**117. *C. tumidus*** B. & G.—*Carp Sucker*.

Body elongate, not much elevated; the depth  $2\frac{3}{4}$  in length. Head  $3\frac{3}{4}$ -4; the muzzle prominent, but rather bluntish. Front scarcely concave above eyes, the profile forming a somewhat uniform curve. Eye small, nearly 6 in head. Anterior rays of dorsal moderately elevated, less than three-fourths the length of the fin; the first ray nearly midway between snout and base of caudal. Caudal lobes blunt; suborbitals narrow, small. Scales 6-37-5; D. 24-27; A. 8; V. 10. Ohio to the Rio Grande and Upper Missouri; common. Distinguished from

the preceding by the much smaller eye. This description is based on specimens from Wabash River.

(*Carpiodes cyprinus*\* Jordan, l. c. 193: *Carpiodes tumidus* Baird & Girard, Proc. Acad. Nat. Sci. Phila. 1854, 28: *Carpiodes damalis* Girard, Proc. Acad. Nat. Sci. Phila. 1856, 170: *Carpiodes grayi* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 482.)

**118. C. thompsoni** Agassiz.—*Lake Carp*.

Body stout, short, the back much arched, the depth  $2\frac{1}{2}$  in length. Head 4 to  $4\frac{1}{2}$  in length, the muzzle moderately pointed. Dorsal rays considerably elevated, two-thirds as long as base of fin. Eye small,  $5\frac{1}{2}$  in head. Tip of lower jaw much in advance of nostrils, maxillary reaching line of orbit. Anterior suborbital large, deep, roundish. Origin of dorsal about midway of body. Scales rather closely imbricated, 8-39 to 41-6; D. 27; A. 7; V. 10. Great Lake region; abundant. Perhaps identical with the preceding.

(Agassiz, Amer. Journ. Sci. Arts, 1855, 191; Jordan, l. c. 193.)

*aaa*. Head long, about  $3\frac{1}{2}$  in length.

**119. C. bison** Agassiz.

Head long, contained about  $3\frac{1}{2}$  times in length to base of caudal. Muzzle elongate-conic, so that the eye is nearly median, the middle of the length of the head falling in front of its posterior margin. Body not much arched, depth 3 in length. Anterior rays of dorsal pretty high, not much shorter than the base of the fin, not thickened at base. Lips well developed. Eye large,  $4\frac{1}{2}$  in head. Scales 7-40-5; D. 27; A. 7; V. 10. Mississippi Valley.

(Agassiz, Amer. Journ. Sci. Arts, 1854, 356; Cope, Proc. Amer. Phil. Soc. Phila. 1870, 483; Jordan, l. c. 197.)

\*\* Dorsal fin with the anterior rays very much elevated and attenuated, about equaling, or more usually exceeding, the length of the base of the fin.

**120. C. cyprinus**† (Le Sueur) Agassiz.—*Quillback*; *Spear-fish*; *Sail-fish*; *Skimback*.

Muzzle conic, projecting, obtusely pointed, tip of the mandible reaching to opposite nostrils; maxillary reaching to opposite front of orbit. Anterior suborbital as deep as long. Head  $3\frac{3}{4}$ -4 in length. Eye large,  $3\frac{1}{2}$ - $4\frac{1}{2}$  in length of head. Body much arched above, the depth  $2\frac{1}{4}$ - $2\frac{1}{2}$  in length. First ray of dorsal usually nearer muzzle than base of

\* The original *Catostomus cyprinus* was described from tributaries of Chesapeake Bay. It cannot be the present species, as the dorsal is described and figured as strongly falcate and the caudal deeply forked. We have seen no specimens from the original locality.

† Possibly two or three species are here included: *velifer*, with the anterior dorsal rays longer than the fin; *cyprinus*, with them somewhat shorter; and *cutisanserinus*, with a blunter snout and the dorsal rays very long.

caudal. Caudal deeply forked, its lobes slender, the upper the longer. Scales 7-37-5; D. 26 or 27. Chesapeake Bay to Mississippi Valley; generally abundant.

(? *Catostomus cyprinus* Le Sueur, Journ. Acad. Nat. Sci. Phila. 1817, 91; Günther, vii, 12: *Catostomus velifer* Rafinesque, Ichth. Oh. 1820, 56: *Carpiodes velifer* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 482: *Carpiodes velifer* Jordan, l. c. 196: *Carpiodes cutisanserinus* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 481: *Carpiodes cutisanserinus* Jordan, l. c. 196: *Carpiodes selene* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 41.)

### 121. *C. difformis* Cope.

Muzzle exceedingly blunt, so that the anterior edge of the mandible is in line with the anterior rim of the orbit, and the maxillary reaches to the anterior edge of the pupil. Anterior suborbital deeper than long. Head  $4\frac{1}{4}$  in length. Eye quite large,  $3\frac{1}{2}$ -4 in head. Body arched, the depth somewhat less than half the length. First ray of dorsal nearer muzzle than base of caudal. Scales 6-35-4; D. 24; A. 8; V. 9. Ohio Valley; not common. Perhaps a deformity of the preceding.

(Cope, Proc. Amer. Phil. Soc. Phila. 1870, 480; Jordan, l. c. 195.)

## 62.—CYCLEPTUS Rafinesque.

### *Black Horse.*

(Rafinesque, Journ. Phys. Chim. Hist. Nat. Paris, 1819, 421: type *Cycleptus nigrescens* Raf. = *Catostomus elongatus* Le Sueur.)

Head very small, short and slender, its length contained 6-7 times in that of the body; its upper surface rounded. Eye small, behind the middle of the head; not very high up, its length 6-8 in that of the head. Suborbital bones small and narrow. Fontanelle entirely obliterated by the union of the parietal bones. Mouth small, entirely inferior, overlapped by the projecting snout; the upper lip thick, pendent, covered with 3-5 rows of tubercles, the outer quite large, the inner small; lower lip moderate, formed somewhat as in *Catostomus*, but less full, incised behind. Jaws with rudimentary cartilaginous sheath. Muciferous system not greatly developed. Opercular apparatus not greatly developed; the operculum smooth and narrow. Isthmus moderate. Gill-rakers moderately long, soft. Pharyngeal bones strong; the teeth stout, increasing in size downwards, rather wide apart. Body elongate, moderately compressed, not much elevated; the caudal peduncle long; the greatest depth contained 4-6 times in length. Scales moderate, about equal over the body, not closely imbricated, with wide, exposed surfaces, the number in the lateral line from 55-60, and about 17 in a transverse series from dorsal to ventrals. Edges of scales crenate. Lateral line well developed, nearly straight. Fins rather large, dorsal fin be-



ginning in front of ventrals and ending just before anal, of about 30 rays, strongly falcate in front, the first and second developed rays in length more than half the length of the base of the fin, the rays rapidly shortened to about the eighth, the length of the remaining rays being nearly uniform and all short. Caudal fin large, widely forked, the lobes about equal. Anal fin quite small, low, of 7 or 8 developed rays, scaly at base. Ventrals moderate, with 10 rays. Pectorals elongate, somewhat falcate. Sexual peculiarities somewhat marked; the males in spring with black pigment; the head then covered with small tubercles. Air-bladder with two chambers, the anterior short, the posterior elongate. One species known. (*χόζλος*, round; *λεπτός*, slender. "The name means small round mouth."—*Rafinesque*.)

**122. *C. elongatus*** (Le Sueur) Ag.—*Black Horse*; *Gourd-seed Sucker*; *Missouri Sucker*; *Suckerel*.

Depth 4–5 in length; head 6–8½. Eye small, 6–7 in length of head. Longest dorsal rays a little longer than head. Pectorals rather longer than head. Dorsal rays 30; anal 7 or 8; scales 9–56–7. Coloration very dark, the males almost black. Size large. Length of adult 1½–2½ feet. Mississippi Valley; rather common. A singular and interesting fish.

(*Catostomus elongatus* Le Sueur, Journ. Acad. Nat. Sci. Phila. 1817, 103: *Scelcrognathus elongatus* Günther, vii, 23; Jordan, l. c. 189.)

### 63.—PANTOSTEUS Cope.

#### *Hard-headed Suckers.*

(Cope, Lieut. Wheeler's Expl. W. 100th Mer. v, 673, 1876: type *Minomus platyrhynchus* Cope.)

Head moderate or rather small, 4–5 times in length of body, flattish and rather broad above, anteriorly somewhat pointed. Eye rather small, usually behind the middle of the head. Suborbital bones narrow, as in *Catostomus*. Bones of head rather thick, the two parietal bones firmly united, entirely obliterating the fontanelle. Mouth rather large, entirely inferior; each jaw with a more or less developed cartilaginous sheath, separable in alcohol, essentially as in *Chondrostoma*, *Acrochilus*, and related genera. Upper lip broad, papillose, with a rather broad, free margin and 2 or more series of tubercles. Lower lip largely developed, with an extensive free margin deeply incised behind, but less so than in *Catostomus*. Pharyngeal bones and teeth essentially as in *Catostomus*. Isthmus quite broad. Body generally elongate, subterete, and little compressed. Scales quite small, 80–105 in the course of the lateral line and 30–35 in a cross-series between dorsal and ventrals, usually more or less reduced in size and crowded forward, as in *Catostomus*.



Lateral line well developed, straightish. Fins generally rather small. First ray of dorsal usually about midway of body, its rays few, 9-12 in number. Ventrals inserted rather under posterior part of dorsal, their rays 10 or 9. Anal short and high, with 7 developed rays. Caudal rather shallow-emarginate. Pectorals well developed. Air-bladder with two chambers. Size rather small. Species numerous in the Rocky Mountain region. ( $\pi\acute{\alpha}\nu$ , all;  $\upsilon\sigma\tau\acute{\epsilon}\upsilon\upsilon$ , bone.)

\* Scales moderate, 80-85 in the lateral line.

a. Scales subequal over the body, not reduced forwards.

**123. *P. plebeius*** (Baird & Girard) Jordan.

Body rather stont, subfusiform. Head slender, rather short,  $4\frac{2}{3}$  in length. Eye 5 in head. Ventrals reaching nearly to vent. Scales small, scarcely crowded anteriorly, 80 in the lateral line, 20-30 in a cross-series. Depth  $4\frac{1}{2}$  in length. Dorsal midway between snout and upper caudal rays. Caudal short, emarginate. Color dark brown, faintly mottled; sides with orange in the males. (*Girard.*) Lake Guzman, Mexico.

(*Catostomus plebeius* Baird & Girard, Proc. Acad. Nat. Sci. Phila. 1854, 28; *Catostomus plebejus* Günther, vii, 15; Jordan, l. c. 184.)

**124. *P. delphinus*** Cope.

"The dorsal outline is arched, the head flat above, not elevated behind and much depressed on the muzzle. The muzzle is wide and does not project beyond the upper lip, which is appressed to its lower face and bears four rows of warts; its smooth commissural part is narrow. On the lower lip the tubercles advance nearly to the commissure; this lip is deeply emarginate posteriorly. The eye enters the length of the head 5 times,  $2\frac{1}{2}$  times measuring the muzzle, and twice the interorbital region. Head  $4\frac{2}{3}$  times in length to end of caudal basal scales. Scales in 30 longitudinal series, between dorsal and ventral fins. Ventrals remarkably short, extending little more than half way to vent, originating under posterior third of dorsal. Pectorals well separated. Isthmus wide. Color above blackish, with a strong inferior marginal shade on the lower part of the sides, and the lighter tint above; a brown spot just above axilla is cut off from it by a band of the yellow color which covers the belly and head below." (*Cope.*) Probably from Green River.

(*Minomus delphinus* Cope, Hayden's Geol. Surv. Wyom. Terr. 1872, 436.)

**125. *P. bardus*** Cope.

This species is distinguished by its very short head and marked coloration, resembling in that respect the *C. guzmaniensis* of Girard; with

this species it has, however, nothing else in common. "Head wide, muzzle not projecting beyond upper lip; latter not pendant, with narrow, smooth commissure and 3 or 4 rows of tubercles. Lower lip deeply incised, tubercular to near inner edge. Eye 5.25 times in length of head, twice in interorbital width. Head 5 times to end of basal caudal scales. Form stout. Body cylindric anteriorly. Dorsal fin nearer end of muzzle than end of caudal scales. Scales of body subequal, in 30 longitudinal rows between dorsal and ventral fins, latter originating beneath hinder border of dorsal, not quite reaching vent. Pectorals well separated. Isthmus wide, narrower than in *M. delphinus*. Color blackish above; a broad olive band from upper part of opercular border along upper half of caudal peduncle, and a broad black band below, narrowing to a line along the middle of the peduncle; below yellowish, a band of the same cutting off a blackish area above the axilla, as in the last species." (Cope.) Probably from Green River. This species and the two preceding are not well separated.

(*Minomus bardus* Cope, Hayden's Geol. Surv. Wyom. Terr. 1872, 436.)

aa. Scales very much reduced and crowded anteriorly; upper lip full, pendent; cartilaginous sheaths on jaws well developed, the commissure transverse and abruptly angulate at the corners of the mouth.

**126. *P. platyrhynchus* Cope.**

Body extremely elongate, the depth  $5\frac{1}{2}$ –7 in length. Head  $4\frac{3}{4}$  in length, short and wide, with depressed and expanded muzzle, which considerably overhangs the mouth. Isthmus very wide. Dorsal rays 11; ventral rays 9; scales 15–86–12. Belly and lower fins yellowish, probably red in life. Utah Lake. Perhaps identical with the next.

(*Minomus platyrhynchus* Cope, Proc. Amer. Phil. Soc. Phila. 1874, 134; Jordan, l. c. 183.)

**127. *P. generosus* (Girard) Jordan.**

Body moderately elongate, the depth  $4\frac{1}{2}$ –5 in the length. Head rather short,  $4\frac{2}{3}$  in length, not specially broadened; muzzle not greatly overhanging the mouth. Lower lip full, with 4 or 5 rows of tubercles; upper with 2. Isthmus very broad. Head with conspicuous mucous tubes. Lower fins large. Dorsal rays 9 (rarely 10); ventral rays 10 (rarely 9); scales 11 to 14–83 to 87–13 to 15. Light brown above, with dusky spots and clouds; males with the chin and fins red, and a crimson lateral band. Rio Grande to Mojave Desert and Great Basin of Utah; very abundant.

(*Catostomus generosus* Girard, Proc. Acad. Nat. Sci. Phila. 1856, 174; *Minomus jarrovi* Cope, Proc. Amer. Phil. Soc. Phila. 1874, 35; Jordan, l. c. 183.)

\*\* Scales very small, 100–105 in the lateral line.

**128. *P. virescens*** Cope.

Body elongate, compressed, the caudal peduncle contracted. Head short, wide, 5 in length. Muzzle obtuse, little projecting. Upper lip wide; lower lip full, emarginate. Jaws with well-developed cartilaginous sheaths. Scales much reduced in size forwards. Dorsal rays 10; ventral 9; scales 18-103-16. Color olive; lower surface yellow. Headwaters of Arkansas River.

(Cope, Wheeler's Expl. W. 100th Mer. v, 675, 1876; Jordan, l. c. 182.)

**61.—CATOSTOMUS** Le Sueur.*Suckers.*

(*Hylomyzon* Agassiz; *Acomus* and *Minomus* Girard.)

(Le Sueur, Journ. Acad. Nat. Sci. Phila. i, 89, 1817: type *Cyprinus catostomus* Forster = *Catostomus longirostrum* Le Sueur.)

Head more or less elongate, its length ranging from  $3\frac{1}{2}$  to 5 times in that of the body. Eye usually rather small, high up, and median or more or less posterior in position. Suborbital bones narrow, longer than broad, much as in *Moxostoma*. Fontanelle always present, usually widely open, in two species reduced to a narrow slit, but never wholly obliterated. Mouth rather large, always inferior, and sometimes notably so; the upper lip thick, protractile, papillose; the lower lip greatly developed, with a broad free margin, deeply incised behind, so that it forms two lobes, which are often more or less separated. Mandible horizontal, short, not one-third the length of the head and not reaching to opposite the eye. Lower jaw usually without distinct cartilaginous sheath. Opercular apparatus moderately developed, not rugose. Pharyngeal bones moderately strong, the teeth shortish, vertically compressed, rapidly diminishing in size upwards, the upper surface of the teeth nearly even or somewhat cuspidate. Body oblong or elongate, more or less fusiform, subterete, more or less compressed. Scales comparatively small, typically much smaller and crowded anteriorly, the number in the lateral line ranging from about 50 to 115, the number in a transverse series between dorsal and ventrals from 15 to 40. Lateral line well developed, straightish, somewhat decurved anteriorly. Fins variously developed. Dorsal with its first ray nearly midway of the body, with from 9 to 14 developed rays. Anal fin short and high, with probably always 7 developed rays. Ventrals inserted under the middle or posterior part of the dorsal, typically with 10 rays; in one subgenus usually 9; the number often subject to variation of one. Caudal fin usually deeply forked, the lobes nearly equal. Sexual peculiarities not much

marked; the fins higher in the male and the anal somewhat swollen and tuberculate in the spring. Breeding males in some species with a rosy or orange lateral band. Air-bladder with two chambers. Vertebræ in *C. commersoni* and *C. nigricans* 45–47. Species very numerous, all belonging to the United States, except the Siberian *C. rostratus* Tilesius. (*záτω*, inferior; *στόμα*, mouth.)

\* Scales very small, much reduced and crowded anteriorly, 83–115 in the lateral line. (*Catostomus*.)

a. Fontanelle almost obliterated, reduced to a narrow slit; each jaw with a well-developed cartilaginous sheath (as in *Pantosteus*).

### 129. *C. discobolus* Cope.

Body subterete, compressed behind, the depth 5 in length. Interorbital space 2 in head. Head quite short, broad and rounded above,  $4\frac{3}{4}$  in length. Eye small, far back and high up, 6 in head. Mouth very large, inferior, beneath the projecting snout. Upper lip very full, pendent, with about 5 rows of tubercles. Lower lip very full, moderately incised, with about 10 rows, a notch separating the upper lip from the lower. Each jaw with a slightly curved cartilaginous sheath on its edge, the two parallel with each other and fitting closely together. Fins small. Dorsal 11; caudal little forked; scales 15–90–11, irregular. Colors dusky. Size small. Idaho to Wyoming and Arizona.

(Cope, Hayden's Geol. Surv. Wyom. Terr. 1870, 435; Jordan, l. c. 179.)

aa. Fontanelle well developed; jaws without evident cartilaginous sheath.

β. Upper lip very broad, with several (5 or 6) rows of large papillæ.

### 130. *C. latipinnis* Baird & Girard.

Body slender and elongate; the caudal peduncle especially long and very slender; the depth  $5\frac{1}{4}$  in the length. Head moderate,  $4\frac{3}{4}$  in length, rather slender, with prominent snout and rather contracted, inferior mouth. Outline of the mouth triangular, the apex forwards. The lips very thick, greatly developed; lower lip incised to the base; its posterior margin extending backwards to opposite the eye. Jaws with a slight cartilaginous pellicle. Eye small, high up. Preorbital bone broad, scarcely twice as long as deep. Scales long and low, posteriorly rounded, their horizontal diameter greater than the vertical, 17–98 to 105–17. Fins excessively developed, especially in the males, the free border of the dorsal deeply incised. Height of each of the three vertical fins in the males greater than the length of the head. Dorsal 13, inserted nearer snout than base of caudal. Caudal very strong, the rudimentary rays at its base unusually developed. Least depth of tail less



than one-third the head. Coloration silvery; the males probably rosy and tuberculate in spring. Gila region to Wyoming; not abundant.

(Baird & Girard, Proc. Acad. Nat. Sci. Phila. 1853, 383; Günther, vii, 14; Jordan, l. c. 178: ?? *Catostomus guzmaniensis*\* Girard, Proc. Acad. Nat. Sci. Phila. 1856, 173.)

**131. *C. retropinnis* Jordan.**

Body long and slender, subterete, compressed behind, the form essentially that of *C. longirostris*, the depth contained  $5\frac{1}{2}$  times in the length. Head large, 4 in length of body, the interorbital space broad and flat,  $2\frac{1}{2}$  in length of head. Eye small, high up and rather posterior. Preorbital bone very long and slender, its length about 3 times its depth. Mouth large, precisely as in *C. latipinnis*, the upper lip pendent, very large, with 5-8 series of tubercles. Dorsal fin not elongated or especially elevated, its rays 11, the beginning of the dorsal much nearer base of caudal than snout. Caudal fin long and strongly forked. Anal fin long and high, reaching base of caudal. Ventrals not reaching vent. Caudal peduncle stout and deep, its least depth more than one-third length of head; its length about two-thirds that of head. Scales quite small, about as in *longirostris*, the exposed portion not notably lengthened. Chest with well-developed scales. Scales 16-100-14. Coloration dusky brown, a dusky lateral band, pale below, the dark colors extending low. Snout quite dark. Size large. Montana to Nebraska.

(Jordan, l. c. 178.)

*bb.* Upper lip comparatively thin and narrow, with but few (3 or 4) rows of papillae.

**132. *C. longirostris* Le Sueur.—Long-nosed Sucker; Northern Sucker.**

Body elongate, subterete, the depth  $4\frac{1}{4}$ - $4\frac{3}{4}$  in length. Head quite long and slender,  $4\frac{1}{4}$ - $4\frac{2}{3}$  in length, depressed and flattened above, broad at base, but tapering into a long snout, which considerably overhangs the large mouth. Lips thick, coarsely tuberculate, the upper lip narrow, with 2 or 3 rows of tubercles. Eye rather small, behind the middle of the head. Scales very small, much crowded forwards, 95-114 in the course of the lateral line, and about 29 (26-31) in a cross-row from dorsal to ventrals. Dorsal rays 10 or 11. Males in spring with the head and anal fin profusely tuberculate, the tubercles on the head small; the sides at that season with a broad rosy band. Size large; the largest species in the genus. Great Lakes and Upper Mississippi Valley to

\* This is probably a distinct species. It is stouter than *C. latipinnis*, with shorter and deeper caudal peduncle and lower fins. A blackish lateral band. D. 12; Lat. 1. about 90. Upper lip with 4 rows of papillae. The original type from Lake Guzman, Chihuahua, is now lost.



Alaska; very abundant northward. The most widely distributed species.

(*Cyprinus catostomus* Forster, Phil. Trans. 1773, 155: *Catostomus longirostrum* and *hudsonius* Le Sueur, Journ. Acad. Nat. Sci. Phila. 1817, 102, 107: *Catostomus forsterianus* Richardson, Franklin's Journal, 1823, 720: *Catostomus aurora* Agassiz, Lake Superior, 360: *Catostomus hudsonius* Günther, vii, 13: *Catostomus griseus* Günther, vii, 14; Jordan, l. c. 175.)

**133. *C. tahoensis*** Gill & Jordan.—*Tahoe Sucker*.

Rather stouter, the depth  $4\frac{1}{2}$ –5 in length. Head very large and long-acuminate, the muzzle nearly one-half its length, overhanging the rather large mouth. Lips moderate, the upper pendent, with about 3 rows of small papillæ; the lower rather full, similarly papillose. Eye nearly median, rather small,  $8\frac{1}{2}$  in head. Scales small and crowded forwards, closely imbricated, 85–90 in the course of the lateral line, and about 28 in a cross-series from dorsal to ventrals. Dorsal short, but longer than high, its rays 10. Coloration very dark; fins dusky; scales everywhere finely punctate. Breeding males profusely tuberculate. Size large. Lake Tahoe; very abundant.

(Jordan, l. c. 173; Jordan & Henshaw, Rept. Chief Engin. app. *nn*, 1878, 188.)

\*\* Scales small, crowded, and smaller anteriorly than posteriorly, 58–75 in the course of the lateral line. (*Decactylus* Rafinesque.\*)

e. Upper lip thick and full, with several (5–8) rows of papillæ.

d. Fontanelle very small and narrow; both jaws with a weak cartilaginous sheath.

**134. *C. aræopus*** Jordan.

Body elongate, fusiform, subterete, the greatest depth  $4\frac{1}{2}$ – $4\frac{1}{2}$  in length. Head small, conical,  $4\frac{2}{3}$  in length. Mouth quite large, with full, thick lips, the upper very wide and pendent, with about 6 rows of very strong papillæ; lower lip two-lobed, similarly papillose. Interorbital space wide, convex. Eye elevated, posterior, quite small. Fins moderate; dorsal higher than long, with 10, rarely 11, rays; ventral rays 10. Scales small, crowded forwards, 10 or 9–70–8. Color dark; scales with dark punctulations. Nevada and Southern California.

(Jordan, l. c. 173; Jordan & Henshaw, Rept. Chief Engin. app. *nn*, 1878, 188.)

*dd*. Fontanelle well developed; lips without evident cartilaginous sheath.

e. Lateral line with 70–80 scales.

**135. *C. labiatus*** Ayres.

Head  $4\frac{1}{2}$  in length, rather bluntish. Mouth moderate, the labial papillæ largely developed; the upper lip full, with about 5 rows of large

\* Rafinesque, Ichth. Oh. 1820, 60: type *Catostomus bostoniensis* Le Sueur. (*δεκα*, ten; *δακτυλος*, toes; *i. e.*, 10 ventral rays.)

but rather sparse papillæ. Scales 12-74-10. Dorsal fin short, higher than long, of about 11 rays. Color dark above; sides clouded with black and yellow. Klamath Lake, Oregon. A little-known species.

(Ayres, Proc. Acad. Nat. Sci. Cal. 1855, 32; Jordan, l. c. 173.)

**136. *C. macrochilus*** Grd.—*Columbia River Sucker*.

Body heavy forwards. Head large and heavy, convex. Snout blunt, much overlapping the horizontal mouth. Mouth quite large, with very large lips, the upper full and pendent, with 6-8 rows of strong papillæ. Head large,  $4\frac{1}{4}$  in length, rather narrow, quadrangular, the snout projecting. Eye large. Dorsal fin much longer than high, its rays about 15. Pectorals long and narrow; caudal well forked. Head 4 in length. Scales 12-72-10. Coloration rather dark; a dusky lateral stripe; below abruptly pale. Columbia River.

(Girard, Proc. Acad. Nat. Sci. Phila. 1856, 175; Jordan, l. c. 171.)

**137. *C. occidentalis*** Ayres.—*Sacramento Sucker*.

Body rather slender, little elevated. Mouth comparatively small, smaller than in *C. commersoni*; the upper lip with 5 or 6 rows of smallish papillæ; lips rather thin. Head quite small, rounded above,  $4\frac{1}{2}$  in length, the profile steeper than in *C. commersoni*, the snout more pointed, the two sides of the head more convergent forwards. Eye small. Dorsal fin longer than high, its rays 12-14; caudal well forked, the upper lobe the longer. Scales 13-75-10. Dark above, gradually paler below. Streams of California; abundant in the Sacramento and San Joaquin.

(Ayres, Proc. Cal. Acad. Nat. Hist. 1854, 18; Jordan, l. c. 172.)

**138. *C. bernardini*** Girard.

Color blackish. Fins rather high. Lateral line with 80 scales (according to the figure). Eye large. Head 5 in length. Mouth small, with broad lips. Rio Huagu, Mexico, west of the Sierra Madre. (Girard.) This species is, perhaps, allied to *C. occidentalis*, but may be a *Pantosteus*.

(Girard, Proc. Acad. Nat. Sci. Phila. 1856, 175.)

cc. Lateral line with 60-65 scales.

**139. *C. ardens*** Jor. & Gilb.

Body rather elongate, little compressed, the back broad. Head broad, conical. Mouth entirely inferior, the mandible horizontal; upper lip very wide, full, pendent with about 8 rows of coarse, irregular papillæ; lower lip very broad, coarsely papillose, cut to the base by a sharp incision. Eye very small, 7 in head,  $3\frac{1}{2}$  in interorbital width. Dorsal fin long and low, its anterior rays three-fourths the base of the fin, half

longer than the last rays; pectorals and ventrals short; caudal short; anal long. Pharyngeal bones rather weak, with smallish teeth. Blackish above; males with the sides rosy; fins dark. Head  $3\frac{2}{3}$ ; depth  $4\frac{1}{2}$ . D. 13; A. 7; scales 9-65-9. L. 18 inches. Utah Lake.

(Jordan & Gilbert, Proc. U. S. Nat. Mus. iii, 464, 1830.)

**140. C. fecundus** Cope & Yarrow.—*Utah Lake Sucker.*

Body moderately stout, little compressed, the tail slender. Head subconic, the profile regularly decurved from the nape to the base of the premaxillary spines, which abruptly protrude, forming a distinct "nose" as in *Chasmistes liorus*; premaxillaries in front scarcely below the preorbital. Mandible large, oblique, placed at an angle of  $30^\circ$  when the mouth is closed, its length 3 in head. Upper lip full, pendent, with about 4 rows of coarse papillæ; lower lip moderate, divided by a broad notch, each lobe with about 6 rows of papillæ. Eye a little behind middle of head. First ray of dorsal twice height of the last, its length greater than that of the base of the fin; caudal forked, the lower lobe longest; pectorals long; anal high. Dusky above, pale below. Head 4; depth  $4\frac{1}{2}$ . D. 11; A. 7; V. 9; scales 8-60-8. L. 13 inches. Utah Lake; excessively abundant. This species has evident affinities with *Chasmistes*.

(Cope & Yarrow, Zool. Wheeler's Expl. W. 100th Mer. v, 678, 1876; Jordan & Gilbert, Proc. U. S. Nat. Mus. 1830, 463.)

cc. Upper lip comparatively thin, with but few (2 or 3) rows of papillæ.

f. Scales much reduced, and crowded anteriorly; dorsal rays 11-15.

**141. C. cypho** Lockington.

A conspicuous hump behind the occiput, supported by a greatly expanded, broadly triangular interneural bone. Upper lip with about 3 rows of papillæ, lower lip with about 8; the lower lip divided to the base by a broad emargination. D. 15; A. 8; V. 10; Lat. 1. 72. Colorado River at mouth of Gila. (*Lockington.*)

(Lockington, Proc. Acad. Nat. Sci. Phila. 1880.)

**142. C. commersoni** (Lacépède) Jordan.—*Common Sucker; White Sucker; Brook Sucker; Fine-scaled Sucker.*

Body moderately stout, varying with age, subterete, heavy at the shoulders, the depth  $4-4\frac{2}{3}$  in length. Head rather large and stout, conical, flattish above, its length  $4-4\frac{1}{2}$  in body ( $3\frac{1}{2}-4\frac{1}{2}$  in young). Snout moderately prominent, scarcely overpassing the mouth. Mouth rather large; the lips strongly papillose, the upper moderate, with 2 or 3 rows of papillæ. Scales crowded anteriorly, much larger on the sides than below; scales 10-64 to 70-9. Coloration olivaceous; males in

spring with a faint rosy lateral band; young brownish, more or less mottled, often with confluent blackish lateral blotches or a lateral band. Lateral line usually imperfect in the young. L. 18 inches. All streams from Labrador to Montana, and southward to Florida. The commonest of the suckers.

(*Cyprinus commersoni* Lacépède, Hist. Nat. Poiss. v, 502, 1803; *Cyprinus teres* Mitchell, Trans. Lit. & Phil. Soc. N. Y. 1814, 458; *Catostomus teres* Günther, vii, 15; *Catostomus teres* Jordan, l. c. 166; *Catostomus communis* and *bostoniensis* Le Sueur, Journ. Acad. Nat. Sci. Phila. 1817, 95, 106, etc.)

ff. Scales scarcely reduced or crowded anteriorly; dorsal rays 10 or 11.

**113. *C. insignis*** Baird & Girard.

Body rather elongate, subterete, heavy at the shoulders, tapering backward, the depth about 5 in length. Head moderate, about  $4\frac{1}{2}$  in length. Mouth comparatively small. Lips moderate, the upper narrow, with about 2 rows of large tubercles. Scales subequal, 58-63 in the lateral line, 19 in a cross-series. A series of dusky spots along each row of scales, the spots often obscure. Gila Basin.

(Baird & Girard, Proc. Acad. Nat. Sci. Phila. 1854, 28; Cope & Yarrow, Zoöl. Wheeler's Expl. W. 100th Mer. v, 676, 1876; Jordan, l. c. 165.)

**114. *C. clarki*** Baird & Girard.

Body moderately stout, depth  $4\frac{2}{3}$  in length. Head very small and short, about 5 in length. Eye moderate. Fins all notably small. Scales small, subequal, 9-70-9; larger mesially than posteriorly. Body with scattered nebulous spots. (*Girard.*) Arizona.

(Baird & Girard, Proc. Acad. Nat. Sci. Phila. 1854, 27.)

\*\*\* Scales moderate, not crowded anteriorly, 48-55 in the lateral line; head peculiarly formed. (*Hypentelium* Rafinesque.\*)

**115. *C. nigricans*** Le Sueur.—*Hog Sucker*; *Stone Roller*; *Toter*; *Crawl-a-bottom*; *Hammer head*; *Stone Lugger*; *Hog Molly*.

Head flattened above, transversely concave between the orbits, the frontal bone thick, broad, and short, the physiognomy being therefore peculiar. Ventral rays normally 9. Upper lip very thick, strongly papillose, with a broad, free margin, which has upwards of 8-10 series of papillæ upon it; lower lip greatly developed, strongly papillose, considerably incised behind, but less so than in *Catostomus* proper. Fontanelle shorter and smaller than in *C. commersoni*. Pectoral fins unusually large. D. 10 or 11; Lat. l. 48-55; 12-15 scales in a cross-

\* Rafinesque, Journ. Acad. Nat. Sci. Phila. 1818, 421: type *Eroglossum macropteron* Raf. = *Catostomus nigricans* Le Sueur. ( $\iota\pi\delta$ , below;  $\pi\acute{\epsilon}\nu\tau\eta$ , five; labium, lip, the five-lobed lower lip being supposed to distinguish it from *Eroglossum*.) (= *Hylomyzon* Ag.)



series. Depth  $4\frac{1}{2}$ –5 in length; head 4– $4\frac{1}{2}$ . Eye rather small,  $4\frac{1}{2}$  to 5 in head. Color olivaceous; sides with brassy lustre; belly white; back brown, with several dark cross-blotches, irregularly arranged, these becoming obsolete in old individuals; lower fins dull red, with some dusky shading; young considerably variegated, the sides spotted. Size large; maximum length about 2 feet. New York to Alabama and Kansas; abundant. Ascends streams to spawn early in spring.

(Le Sueur, Journ. Acad. Nat. Sci. Phila. 1818, 102; *Hylomyzon nigricans* Agassiz, Amer. Journ. Sci. Arts, 1855, 205; Günther, vii, 17; Jordan, l. c. 162.)

### 65.—CHASMISTES Jordan.

(Jordan, Bull. Hayden's Geol. Surv. Terr. iv, No. 2, 417, 1878: type *Chasmistes liorus* Jor.)

Head disproportionally large, forming more than one-fourth of length, broad and flattish above; sides of head vertical, slightly directed inwards, the breadth through the cheeks less than the breadth above the eyes. Eyes small, high up, rather posterior. Mouth extremely large, terminal, the lower jaw in the closed mouth being very oblique, placed at an angle of about 45 degrees. The lower jaw very long and strong, its length more than one-third the length of the head, nearly half the length of the head in the adult, its tip, when the mouth is closed, about on a level with the eye. Upper jaw very protractile. Upper lip very thin (for a sucker), and nearly smooth. Snout elevated above the rest of the head, the premaxillary spines usually forming a conspicuous nose. Lower lip moderate, consisting of a broad flap on each side of the mandible, in front reduced to a narrow rim, the surface of the lip nearly smooth, without papillæ. Nostrils large. Suborbital bones narrow, but rather broader than in *Catostomus*. Preorbital unusually large. Mucous channels moderately developed. Fontanelle very large. Isthmus rather narrow. Pharyngeal bones weaker than usual in *Catostomus*, the teeth generally smaller. Body rather slender, tapering pretty regularly from the shoulders to the tail, but little compressed. Caudal peduncle rather stout. Fins moderate; the dorsal rays about 12; the anal 7. Pectorals rather long, not quite reaching ventrals; ventrals reaching vent; anal fin high, reaching caudal; caudal fin rather long, its lobes equal. Scales moderate, large on the caudal peduncle, much smaller and crowded anteriorly, 60–65 in the lateral line, about 18 in a transverse series from dorsal to ventrals. Sexual peculiarities unknown. Coloration usual. Air-bladder in two parts. Size moderate or rather large. (χασμάω, to yawn.)



a. Pharyngeal bones of moderate strength; the upper teeth minute, the lower enlarged. (*Chasmistes*.)

**146. *C. liorus* Jordan.**—*June Sucker of Utah Lake.*

Depth about 5 in length; head  $3\frac{3}{8}$ . Interorbital space broad,  $2\frac{1}{4}$  in head. Eye 6-7 in head. Width of the open mouth  $3\frac{1}{2}$  in head. D. I, 11, the fin elevated in front, its anterior ray twice the height of the posterior and about equal to the base of the fin; A. I, 7; caudal deeply forked, the lower lobe long; lower fins small. Scales 9-63-8. Color dusky above, pale below; the scales of the back and sides profusely covered with dark punctulations. L. 18 inches. Utah Lake; abundant.

(Jordan, Bull. U. S. Nat. Mus. xii, 219, 1878.)

aa. "Pharyngeal bones very thin and flat, with very numerous minute teeth, as in *Carpiodes*." (*Lipomyzon* Cope.\*)

**147. *C. brevirostris* Cope.**

"Shorter than *C. luxatus*, especially the muzzle, and the latter is without the hump produced by the protuberant premaxillary spines. Parietal fontanelle small. The lower lip fold is only present on the sides of the mandible. Body nearly cylindrical. Scales 12-74-11. Radii: D. 11; A. 9. Color dusky above, silvery below; fins colorless." (Cope.) L. 16 inches. Klamath Lake, Oregon.

(Cope, American Naturalist, 1879, 785.)

**148. *C. luxatus* Cope.**

"Form elongate. Head long, flat above, and with a large fontanelle. Mouth terminal, the spines of the premaxillary projecting so as to form a hump on the top of the snout. Lower lip a very thin dermal fold, extending entirely around the chin. Scales 12-80-9. Radii: D. 11; A. 9. Color clouded above, with black punctulations, below paler, with red shades in some specimens; fins uncolored." (Cope.) L. 3 feet. Klamath Lake and River.

(Cope, American Naturalist, 1879, 784.)

**66.—ERIMYZON Jordan.**

*Chub Suckers.*

(*Moxostoma* Ag.; not of Raf.)

(Jordan, Bull. Buffalo Soc. Nat. Hist. 1876, 95: type *Cyprinus oblongus* Mitch. = *Cyprinus sneetta* Lac.)

Body oblong, rather shortened, heavy forwards, and considerably compressed. Head moderate, rather broad above. Mouth moderate,

\* Cope, Amer. Nat. Jan. 1881, 59: type *Chasmistes brevirostris* Cope. (λείπω, to be deficient; μύζω, to suck.)

somewhat inferior; the upper lip well developed, freely protractile; the lower moderate, infolded,  $\Lambda$ -shaped in outline, plicate, with 12–20 plicæ on each side. Lower jaw without cartilaginous sheath, rather stronger than usual, and oblique in position when the mouth is closed, thus similar to the mouth of *Ictiobus*. Eye moderate, rather high up, placed about midway of the head. Suborbital bones considerably developed, not very much narrower than the fleshy portion of the cheek below them; the posterior suborbital concavo-convex, about twice as long as deep, sometimes divided; the anterior somewhat deeper than long, sometimes divided into two, sometimes united with the preorbital bone, which is well developed, and much longer than broad. Opercular bones moderately developed, scarcely or not rugose. Fontanelle rather large. Gill-rakers rather long. Isthmus moderate. Pharyngeal bones weak; the teeth quite small, slender, and weak, rapidly diminishing in length upwards, each tooth narrowly compressed, with a cusp on the inner margin of the cutting surface, and some inequalities besides. Scales rather large, more or less crowded forwards, sometimes showing irregularities of arrangement; the longitudinal radiating furrows much stronger than usual; the scales rather longer than deep, but so imbricated in the adult that the exposed surfaces appear deeper than long. Lateral line entirely wanting. Scales in the longitudinal series from head to base of caudal 35–45 in number; scales in transverse row from base of ventral to dorsal 12–18. Dorsal fin rather short and high, with 10–14 developed rays, the number usually 11 or 12. Beginning of dorsal fin rather nearer snout than base of caudal. Pectoral fins moderate, not reaching ventrals; the latter not to vent. Ventrals under a point rather in advance of the middle of dorsal; their rays normally 9, but occasionally 8 or 10. Anal fin high and short, more or less emarginate or bilobed in adult males. Caudal fin moderately forked or merely lunate, its two lobes about equal. Air-bladder with two chambers. Two species known. ( $\acute{\epsilon}\rho\iota$ , an intensive particle;  $\mu\acute{o}\zeta\omega$ , to suck.)

**149. E. succetta** (Lac.) Jordan.—*Creek Fish*; *Chub Sucker*.

Body oblong, compressed, becoming gibbous with age, the ante-dorsal region more or less elevated in the adults, the depth  $3\frac{1}{4}$  in length, ranging from  $2\frac{3}{4}$  in adults to 4 in young. Head stout, short, about  $4\frac{1}{4}$  in length (4–4½), the interorbital space wide and depressed, the lower parts narrower. Eye not large,  $4\frac{3}{4}$  in head ( $4\frac{1}{2}$ –5½). Mouth protractile downwards and forwards, the mandible oblique. Scales usually closely imbricated

and more or less crowded forwards, but often showing various irregularities in arrangement, about 43 (39–45) in a longitudinal series and 15 (14–16) in a transverse series between the ventrals and the dorsal. Fin-rays somewhat variable, the dorsal with 11 (10–13) developed rays, the anal with 7, and the ventrals with 9 (rarely 8). Coloration varying with age; never distinct series of black spots along the rows of scales. Young with a broad black lateral band, bordered above by paler. In some specimens from clear water this band is of a jet-black color and very distinct; in others it is duller. Later this band becomes broken into a series of blotches, which often assume the form of broad transverse bars. In adult specimens these bars disappear, and the color is nearly uniform brown, dusky above, paler below, everywhere with a coppery or brassy, never silvery, lustre. The fins are dusky or smoky brown, rarely reddish-tinged. Sexual differences strong. The males in spring with usually three large tubercles on each side of the snout, and with the anal fin more or less swollen and emarginate. Adult specimens with the back gibbous and the body strongly compressed, in appearance quite unlike the young. Maximum length about 10 inches. New England to the Rocky Mountains, south to Texas; very abundant.

(*Cyprinus sucetta* Lac. Hist. Nat. Poiss. v, 606, 1803: *Cyprinus oblongus* Mitch. Trans. Lit. & Phil. Soc. i, 459, 1814: *Morostoma oblongum* Günther, vii, 21: *Catostomus gibbosus* Storer, Fish Mass. 291; Jordan, Man. Vert. 319; Jordan, Bull. U. S. Nat. Mus. xii, 144.)

#### 150. *E. goodei* Jordan.

Body oblong, the back more elevated, the body deeper and more compressed than in the preceding, the greatest depth in advance of the dorsal fin being contained about  $2\frac{3}{4}$  times in the length. Nape less gibbous than in *E. sucetta*. Head quite small and short, the large eye being almost exactly midway in its length. Its length  $4\frac{1}{2}$  in that of the body. Eye  $4\frac{1}{4}$  in head. Interorbital space rather narrow, transversely convex, less than half the length of the head. Mouth small, protractile forwards, the lower jaw oblique; lips as in the preceding. Scales large, much larger and much more uniform in their imbrication than in *E. sucetta*, 36 in a longitudinal series, and about 13 in a transverse series from the ventrals to the dorsal. Dorsal fin high, of 12 developed rays; anal moderate, with 7; ventrals large, with 10. Color dark olivaceous above; each scale along the sides reflecting pale from the strongly striated middle part, these giving in cer-

tain lights the appearance of pale stripes along the rows of scales; fins dusky, especially at their tips. Rivers of Florida.

(Jordan, Bull. U. S. Nat. Mus. xii, 148, 1878.)

67.—**MINYTREMA** Jordan.

*Spotted Suckers.*

(Jordan, Man. Vert. E. U. S. ed. 2, 318: type *Catostomus melanops* Raf.)

Head moderate, rather broad above. Mouth moderate, inferior, horizontal; the upper lip well developed, freely protractile; the lower rather small, infolded, A-shaped in outline, plicate, with 12–20 plicæ on each side. Lower jaw without cartilaginous sheath. Eye moderate, rather high, placed about midway of the head. Suborbital bones considerably developed, not very much narrower than the fleshy portion of the cheek below them; the posterior suborbital concavo-convex, about twice as long as deep, sometimes divided; the anterior somewhat deeper than long, often divided into two, sometimes united with the preorbital, which is well developed and much longer than broad. The number and form of these bones, except as to their depth, are not constant in the same species, and do not afford specific characters. Opercular bones well developed, not much rugose. Fontanelle evident, rather large. Gill-rakers rather long, in length about half the diameter of the eye. Isthmus moderate. Pharyngeal bones essentially as in *Moxostoma*. Body rather elongate, subterete, becoming deep and rather compressed with age. Scales rather large, nearly equal over the body, the radiating furrows not specially marked. Lateral line interrupted in the adult, but with perfect tubes, imperfect in partly grown specimens, entirely obsolete in the young. Scales in a longitudinal series 44–47 in number, 12–14 in a transverse series from dorsal to ventrals. Dorsal fin rather short and high, with about 12 developed rays, beginning rather nearer the snout than the base of the caudal. Pectoral fins moderate, not reaching ventrals, the latter not to vent. Ventrals rather in advance of the middle of the dorsal, their rays normally 9, rarely 8 or 10. Anal fin high and short, often more or less emarginate in males. Caudal fin moderately forked, the lobes about equal. Air-bladder with two chambers. Males in spring with the head covered with many small tubercles. One species certainly known.\* ( $\mu\nu\upsilon\varsigma$ , reduced;  $\tau\rho\tilde{\eta}\mu\alpha$ , aperture; in allusion to the imperfections of the lateral line.)

\* *M. austrinum* Bean. Body rather stout, the depth 4 in length. Head  $4\frac{1}{2}$  in length. Lips plicate, truncate behind. Light brown above, yellowish below; some scales brownish at base. Paired fins with dark blotches. D. 11; A. 6; scales 6–44–6. Michoacan, Mexico (west of Sierra Madre). This species is probably a *Minytrema*, but the air-bladder has been removed from the typical specimens.

(*Myxostoma austrina* Bean, Proc. U. S. Nat. Mus. 1879, 302.)



**151. *M. melanops*** (Raf.) Jordan.—*Spotted Mullet; Striped Sucker.*

Body oblong, little compressed, the young nearly terete, the adults deeper bodied; the dorsal region not elevated. Depth about 4 in length, varying from about 3 in adults to  $4\frac{1}{2}$  in the young. Head not very large,  $4\frac{1}{3}$  in length of body ( $4\frac{1}{4}$ – $4\frac{1}{2}$ ), not specially depressed. Mucous pores rather strong. Eye small, 5–6 in head. Mouth quite inferior, horizontal, rather small. Scales large, firm, regularly and smoothly imbricated, in 46 (44–47) longitudinal series and 13 (12–14) transverse series, the scales not crowded forwards. Fin-rays usually: D. 12; A. 7; V. 9. Coloration dusky above, with usually a black blotch behind the dorsal fin. Each scale along the sides with a small, more or less distinct blackish spot at its base, these spots forming interrupted longitudinal lines along the rows of scales. These lines are usually very distinct, especially in the adult, but young specimens often show them faintly. Sides and belly silvery, with a coppery lustre. Sexual peculiarities moderately marked; very old males with the head covered with small tubercles in spring. No great changes with age, either in form or coloration. Size large; maximum length about 18 inches. Great Lake region to South Carolina and Texas.

(*Catostomus melanops* Raf. Ichth. Oh. 1820, 57: *Catostomus fasciatus* Günther, vii, 19; Jordan, Man. Vert. 318; Jordan, Bull. U. S. Nat. Mus. xii, 138.)

**68.—MOXOSTOMA** Rafinesque.*Red Horse.*

(*Ptychostomus* Ag.; *Teretulus* Raf.)

(Rafinesque, Ichth. Oh. 1820, 54: type *Catostomus auisurus* Raf.)

Body more or less elongate, sometimes nearly terete, usually more or less compressed. Head variously long or short, its length ranging from  $3\frac{1}{2}$  to  $5\frac{1}{2}$  in that of the body. Eye usually rather large, varying from 3 to 6 times in the length of the side of the head, its position high up and median or rather posterior. Suborbital bones very narrow, always much longer than broad, their width less than one-fourth that of the fleshy part of the cheek. Fontanelle on top of head always well open, the parietal bones not coalescing. Mouth varying much in size, always inferior in position, the mandible being horizontal or nearly so. Lips usually well developed, the form of the lower varying in different sections of the genus, usually with a slight median fissure, but never deeply incised; the lips with transverse plicæ, the folds rarely so broken up as to form papillæ. Jaws without conspicuous cartilaginous



sheath. Muciferous system considerably developed, a chain of tubes along the supraorbital region, a branch of which extends around behind the eye and forwards along the suborbital bones and the lower edge of the preorbital. Opercular bones moderately developed, nearly smooth. Isthmus broad. Gill-rakers weak, moderately long. Pharyngeal bones rather weak, much as in *Erimyzon* and *Catostomus*, the teeth rather coarser, strongly compressed, the lower 5 or 6 much stronger than the others, which are rapidly diminished in size upwards, each with a prominent internal cusp. Scales large, more or less quadrate in form, nearly equal in size over the body, and not specially crowded anywhere, usually about 44 in the lateral line (41-56) and about 12 series between dorsal and ventrals. Lateral line well developed, straight or anteriorly curved. Fins well developed, the dorsal inserted about midway of the body, its first rays usually rather nearer snout than the caudal, the number of developed rays usually about 13, but varying in different species from 11 to 17. Anal fin short and high, usually emarginate in the male fish, probably always with 7 developed rays. Ventrals inserted nearly under the middle of the dorsal; their number of rays normally 9, occasionally varying to 10; the occurrence of 10 ventral rays is probably an accidental individual character, and not a permanent specific one. Caudal fin deeply forked, the lobes about equal, except in two species. Air-bladder with three chambers. Skeleton essentially as in *Catostomus*, the vertebræ in *M. carpio* 27-14. Sexual peculiarities little marked, the males in the spawning season with the lower fins reddened, and the anal rays swollen and somewhat tuberculate. Species very numerous in the United States east of the Rocky Mountains. They spawn in spring, running up from the rivers into the smaller streams for that purpose. They are difficult to distinguish, and have perhaps been unduly multiplied by authors. (μύζω, to suck; στόμα, mouth; hence, more properly *Myxostoma*.)

\* Lips full, strongly papillose.

152. *M. papillosum* (Cope) Jordan.

Body comparatively stout, the dorsal region somewhat elevated and rounded, the depth being about 4 in length, the head about the same. Eye rather large, high up and well back, the preorbital space being longer than the other species. Top of head flat. Dorsal rays 12-14. Scales rather large, 6-42-5. Lips well developed, deeply incised.

Color silvery; back with smoky shading; lower fins white. Size large; reaches a length of about 2 feet. North Carolina to Georgia.

(*Ptychostomus papillosus* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 470; Jordan, Man. Vert. 318; Jordan, Bull. U. S. Nat. Mus. xii, 134.)

\*\* Lips distinctly plivate.

† Lower lip infolded, A-shaped when viewed from below, with a distinct median crease, in which the two halves of the lip meet, forming an acute angle; mouth small.

a. Dorsal large, with 15-17 developed rays.

**153. *M. velatum* (Cope) Jordan.**

Body stout, deep, compressed, the back elevated, the depth 3-4 in length. Head short, heavy, flattish and broad above,  $3\frac{3}{4}$ - $4\frac{1}{4}$  in length. Depth of cheeks half the length of the head. Eye rather large, midway in head, 4-5 in its length. Muzzle rather prominent, bluntish, overhanging the very small mouth. Fins very large. Dorsal long and high, its height five-sixths the length of the head, its free border straight. Pectorals nearly reaching ventrals. Color silvery; smoky above; lower fins red. Size large. Upper Mississippi Valley to Georgia and southward.

(*Ptychostomus velatus* and *collapsus* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 471-472; Jordan, Man. Vert. 317; Jordan, Bull. U. S. Nat. Mus. xii, 132.)

aa. Dorsal moderate, with 12-14 developed rays.

b. Head comparatively large, about 4 in length; dorsal rays usually 12.

**154. *M. bucco* (Cope) Jordan.**

Head short and very wide through the opercles, flat above. Body stout, the back somewhat elevated, depth 4 in length. Muzzle subtruncate, slightly projecting. Scales 6-10-5. Olivaceous silvery below; dorsal fin dusky. Kansas. (Cope.)

(*Ptychostomus bucco* Cope, Hayden's Geol. Surv. Wyom. 1872, 437; *Myzostoma congestum* Jordan, Bull. U. S. Nat. Mus. xii, 133; probably not *Catostomus congestus* B. & G. Proc. Acad. Nat. Sci. Phila. 1854, 27, which Professor Cope thinks is a form of *M. macrolepidotum*, he having obtained it in Texas and Arizona.)

**155. *M. pidiense* (Cope) Jordan.**

Head rather long,  $4\frac{1}{2}$  in length, flattish above. Body elongate, more nearly cylindrical, little compressed. Muzzle truncate. Olivaceous, sometimes with rows of faint spots along the series of scales. Dorsal and caudal fins black-edged. Size quite small. Resembles *M. cervinum*, but the mouth entirely different. Great Pedee River. (Cope.)

(*Ptychostomus pidiensis*, Proc. Am. Phil. Soc. Phila. 1870, 471; Jordan, Man. Vert. 317; Jordan, Bull. U. S. Nat. Mus. xii, 133.)

bb. Head very small, about 5 in length.

**156. *M. coregonus*** (Cope) Jordan.—*Blue Mullet*.

Muzzle conic, much projecting beyond the very small mouth; body much compressed, broadly fusiform, the back elevated and arched. Dorsal rays 14. Color silvery, with plumbeous shades above; lower fins white. Size small. Catawba and Yadkin Rivers, North Carolina (Cope.)

(*Ptychostomus coregonus* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 472; Jordan, Man. Vert. 317; Jordan, Bull. U. S. Nat. Mus. xii, 134.)

† Lower lip thin, forming a narrow, crescent-shaped border around the mandible.

**157. *M. album*** (Cope) Jordan.—*White Mullet*.

Head small, 5 times in length. Muzzle prominent, but less so than in *M. coregonus*. Mouth moderate. Back a little elevated. Depth about  $3\frac{1}{2}$  in length. Dorsal rays 12–14, its free border often incised. Scales 6–15–5. Coloration very pale; lower fins white. Size large; reaches a weight of 4 pounds or more. Catawba and other rivers of North Carolina.

(*Ptychostomus albus* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 472; Jordan, Man. Vert. 316; Jordan, Bull. U. S. Nat. Mus. xii, 130.)

**158. *M. thalassinum*** (Cope) Jordan.

Head stout, as in *M. velatum*, rather long, 4 in length, flattish above, muzzle truncate, not very prominent. Mouth moderate. Back elevated. Dorsal fin long, of 14 or 15 rays. Sea-green above, white below; lower fins white. Yadkin River. (Cope.)

(*Ptychostomus thalassinus* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 472; Jordan, Man. Vert. 316; Jordan, Bull. U. S. Nat. Mus. xii, 131.)

†† Lower lip full, its posterior edge truncate.

d. Dorsal rays 15–18 in number.

**159. *M. carpio*** (Val.) Jordan.—*Carp Mullet*.

Dorsal fin largely developed, its rays 15–18 in number. Head rather large,  $3\frac{3}{4}$ – $4\frac{1}{4}$  in length, broad above. Mouth large, with full lips. Eye rather large. Body deep, strongly compressed, the back somewhat elevated, the depth about  $3\frac{1}{4}$  in length. Dorsal fin high and large, larger than in any other species of the genus, the first ray about as long as the base of the fin. Scales 5–13–4, quite large. Coloration very pale and silvery; the lower fins white. Ohio Valley, Great Lakes, and northward.

(*Catostomus carpio* Valenciennes, Hist. Nat. Poiss. xvii, 457, 1844: *Catostomus carpio* Günther, vii, 20; Jordan, Man. Vert. 312; Jordan, Bull. U. S. Nat. Mus. xii, 118.)

*dd.* Dorsal rays 12-14 in number.

*e.* Scales large, 41-50 in the course of the lateral line.

*f.* Caudal fin normal, the two lobes about equal and similarly colored.

**160. *M. macrolepidotum*** (Le Sueur) Jordan.—*Common Red Horse; Mullet; White Sncker; Large-scaled Sncker.*

Head comparatively elongate, bluntish, rather broad and flattened above, 4-5 in length. Body stoutish, varying to moderately elongate. Lips rather full, the bluntish muzzle projecting beyond the large mouth; greatest depth of cheeks more than half distance from snout to preopercle. Eye rather large. Dorsal fin medium, its developed rays 12-14, usually 13 in number, its free edge nearly straight, its longest ray shorter than head. Scales large, about 45 in the lateral line. Olivaceous; sides silvery; lower fins in the adult red or orange. Great Lakes to Virginia, southwestward to Arizona; one of the most abundant fishes, reaching a length of 2 feet or more. The Red Horse of the Ohio and Mississippi, with the head relatively longer and the mouth larger, is perhaps worthy of distinction as var. *duquesni* (Le Sueur) Jor. The eastern form (var. *macrolepidotum*) is scarcely distinguishable from the next species.

(*Catostomus macrolepidotus* and *duquesni* Le Sueur, Journ. Acad. Nat. Sci. Phila. i, 94, 105, 1817; *Catostomus crythrinus* Raf. Amer. Month. Mag. 1818, 354; *Catostomus duquesni* Günther, vii, 18; *Myxostoma macrolepidota* and vars. *duquesni* and *lachrymalis* Jordan, Man. Vert. 313; Jordan, Bull. U. S. Nat. Mus. xii, 120; *Ptychostomus duquesni*, *crythrinus*, *robustus*, *oncida*, *lachrymale*, etc. Cope, Proc. Amer. Phil. Soc. 1870. *Myxostoma enryops* Jordan, Ann. Lye. Nat. Hist. N. Y. 1876, 348, is probably a monstrosity of this species.)

**161. *M. aureolum*** (Le S.) Jordan.

Head comparatively short, low and small, conic, 5-5½ in length. Back elevated and compressed. Depth 3½ in length. Mouth small, overpassed by the snout, the lips thin and small, the greatest depth of cheek half the distance from snout to preopercle. Eye small. Coloration bright yellowish brown, somewhat silvery; lower fins bright red. Dorsal rays 13, the fin somewhat falcate, its free edge concave, its longest ray longer than head. Scales 5-45-4. Great Lakes, Ohio Valley, and northward.

(*Catostomus aureolum* Le Sueur, Journ. Acad. Nat. Sci. Phila. i, 95, 1817; *Catostomus macrolepidotus* Günther, vii, 18; Jordan, Man. Vert. 314; Jordan, Bull. U. S. Nat. Mus. xii, 124; ? *Cyprinus lescurei* Rich, Franklin's Journ. 1823, 772.)

**162. *M. crassilabre*** (Cope) Jordan.

Body flattish, the back elevated and compressed. Depth 3¾. Muzzle contracted, lower lip thick. Scales large, 5-44-5. Dorsal rays usually 12. Dorsal fin elevated in front, its first soft ray longer than the base of the fin. Color silvery, with smoky shading above, some of the scales



blackish at their bases; lower fins white; top of head, humeral bar, and dorsal fin dusky. Neuse River, North Carolina. (Cope.) Probably identical with the preceding.

(*Ptychostomus crassilabris* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 477; Jordan, Man. Vert. 314; Jordan, Bull. U. S. Nat. Mus. xii, 123.)

**163. *M. conus*** (Cope) Jordan.

Body flattish, the dorsal outline elevated, the form being like that of *M. coregonus*. Head small and conic. Mouth exceedingly small, the snout far overpassing it, the muzzle being much longer than in *M. crassilabre*. Dorsal rays 14. Eye large. Coloration smoky above, some scales dusky at their bases; sides pale; lower fins white. Yadkin River, North Carolina. (Cope.)

(*Ptychostomus conus* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 473; Jordan, Man. Vert. 314; Jordan, Bull. U. S. Nat. Mus. xii, 126.)

*ff.* Caudal fin with the upper lobe longer than the lower, the two similarly colored.

**164. *M. anisurum*** (Raf.) Jordan.

Caudal fin with the upper lobe falcate, much longer than the lower, at least in the adult, the lobes similarly colored. Dorsal fin short and high, falcate. Body compressed. Back somewhat elevated. Depth  $3\frac{1}{2}$  in length. Head conic, flattish,  $5\frac{1}{2}$  in length. Mouth very small, much as in *aurolum*, from which it can probably be distinguished only by the form of the caudal. D. 12-13, half higher than long. Scales 6-46-5. Ohio Valley and Great Lake region.

(*Catostomus anisurus* Raf. Ichth. Oh. 54; *Ptychostomus breviceps* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 473; Jordan, Man. Vert. 315; Jordan, Bull. U. S. Nat. Mus. xii, 126.)

*fff.* Caudal fin with the lower lobe distinctly longer than the upper and differently colored, the upper lobe in the adult being red, the inferior jet-black, its two lowermost developed rays and their membranes abruptly pale (? in both sexes).

**165. *M. pæcilurum*** Jordan.

Body elongate, moderately compressed, somewhat elevated forwards. Depth  $4\frac{1}{3}$  in length. Head about the same. Mouth medium, the lips full. Dorsal rays 13. Scales large, 5-44-4. Coloration usual, except of the caudal fin; other fins all red, with blackish shadings. Size small. Louisiana and Southern Mississippi.

(Jordan, Bull. U. S. Nat. Mus. x, 66; Jordan, Man. Vert. 315; Jordan, Bull. U. S. Nat. Mus. xii, 129.)

*ee.* Scales very small for the genus, about 56 in lateral line; body moderately elongate, the depth about 4 in length.

**166. *M. albidum*** (Grd.) Jordan.

Head shortish, conic, the snout not much projecting, about 4 in length; eye large. Dorsal fin small, with about 11 rays, the last rapidly

shortened. (Characters of mouth unknown, but probably similar to *macrolepidotus* and *pacilurus*; it is said to be "much larger than in *P. congestus*".) Rio Grande region. (*Girard*.)

(*Ptychostomus albidus* Grd. Proc. Acad. Nat. Sci. Phila. 1856, 172; Jordan, Man. Vert. 315; Jordan, Bull. U. S. Nat. Mus. xii, 128.)

*ddd.* Dorsal rays mostly less than 12; body very slender.

**167. *M. cervinum*** (Cope) Jordan.—*Jumping Mullet*; *Jump-rocks*.

Head very short, roundish above, rather pointed forwards, about 5 in length. Cheeks subvertical, their depth less than half the distance from snout to preopercle. Mouth rather large, with thick lips, which are strongly plicate, the folds somewhat broken up. Eye small. Fins very small; the dorsal rays 10–12; free edge of dorsal straight, its longest ray less than head. Scales rather large, 6–44 to 49–5. Color greenish brown; a pale blotch on each scale, these forming continuous streaks along the rows of scales; back with more or less distinct brownish cross-blotches; fins brownish, not much red, the dorsal blackish at tip. Size smallest in the genus. Length less than a foot. Rivers of the South Atlantic States from the James to the Chattahoochee.

(*Teretulus cervinus* Cope, Journ. Acad. Nat. Sci. Phila. 1868, 236; *Ptychostomus cervinus* Cope, Proc. Amer. Phil. Soc. Phila. 1870, 478; Jordan, Man. Vert. 315; Jordan, Bull. U. S. Nat. Mus. xii, 129.)

## 69.—PLACOPHARYNX Cope.

### *Big-jawed Suckers.*

(Cope, Proc. Amer. Phil. Soc. Phila. 1870, 437: type *Placopharynx carinatus* Cope.)

Suckers 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, 6–10 in number, nearly cylindrical in form, being but little compressed, and with a broad, rounded or flattened grinding surface. The forms and positions of these enlarged teeth vary greatly. In a specimen before us the first tooth is the highest and most compressed, its summit being rounded and then abruptly truncate. The second tooth is notably shorter and thicker, much larger, and rounded on top, the body of the tooth serving as a peduncle for the swollen grinding surface. The third tooth is still shorter and similar in form. The fourth tooth is similar to the first, being much higher than the second and third, and flat on top. The others seem to be irregularly alternated or arranged in pairs, a long one and a short one, the long teeth in all cases being the most truncated, as if their surfaces had been most worn off. The mouth is larger and more oblique than usual

in *Moxostoma*, and the lips are thicker. Size large. ( $\pi\lambda\lambda\tilde{\zeta}$ , a broad surface;  $\varphi\acute{\alpha}\rho\upsilon\gamma\tilde{\zeta}$ , pharynx.)

**168. P. carinatus** Cope.

Body oblong, moderately compressed, heavy at the shoulders. Head very large,  $3\frac{2}{3}$  in length of the body. Eye small, behind the middle of the head. Mouth extremely large, the lower jaw oblique when the mouth is closed, the mouth, therefore, protractile forwards as well as downwards. Lips very thick, coarsely plicate, the lower lip full and heavy, truncate behind. Head above evenly rounded or somewhat carinated. Scales 6–45–6. Dorsal rays 13; ventral 9. Color brassy green above; lower fins red. Great Lakes and Mississippi Valley; abundant in many streams.

(Cope, Proc. Amer. Phil. Soc. Phila. 1870, 467; Jordan, Man. Vert. 311; Jordan, Bull. U. S. Nat. Mus. xii, 103.)

**70.—QUASSILABIA** Jordan & Brayton.

*Hare-lip Suckers.*

(*Lagochila* Jordan & Brayton, preoccupied.)

(Jordan & Brayton, Man. Vert. E. U. S. ed. 2, 1878, 401: type *Lagochila lacera* Jordan & Brayton.)

Suckers like *Moxostoma* in every respect excepting the structure of the month. Head shortish, conical, with lengthened snout; its length  $4\frac{1}{2}$ –5 times in that of the body, the opercular region being reduced, so that the eye is well backwards. Suborbital bones narrow. Fontanelle large, widely open. Mouth large, singular in structure, inferior, the upper lip not protractile, greatly prolonged, closely plicate. Lower lip much reduced, divided into two distinct elongate lobes, which are weakly papillose. The split between these lobes extends backwards to the edge of the dentary bones, which are provided with a rather hard, horny plate, as in *Pantosteus*. The lower lip is entirely separated from the upper at the angles by a deep fissure. The skin of the cheeks forms a sort of cloak over this fissure, the crease separating this skin from the mouth extending up on the sides of the muzzle. The crease between the lips extends down on the under side of the head. System of muciferous tubes well developed. Pharyngeal bones not dissimilar from the usual type in *Moxostoma*, rather weak, with numerous small teeth. Body elongate, not much compressed, not elevated. Fins moderate, formed as in *Moxostoma*. Scales large, as in *Moxostoma*, the lateral line well developed and nearly straight, with about 45 scales in its course. Air-bladder in three parts. Sexual peculiarities unknown; probably little marked. (*Quassus*, broken or torn; *labia*, lip.)

**169. Q. *laccra*** Jor. & Brant.—*Harc-lip Sucker*; *Cut-lips*; *Split-mouth Sucker*; *May Sucker*; *Rabbit-mouth Sucker*.

Head short, conical, with lengthened snout, the region between the eyes flattened and with prominent mucous ridges. Cheeks and lower part of head rather swollen. Opercle much reduced, its greatest length scarcely greater than the diameter of the eye. Head about  $4\frac{2}{3}$  in length. Eye  $4\frac{1}{3}$  in length of head, about 2 in length of the snout, its situation thus quite posterior. Length of the top of the head  $2\frac{3}{5}$  in the distance from the snout to the base of the dorsal. Body rather slender, the form being between that of *Moxostoma cervinum* and *M. macrolepidotum*, the depth  $4\frac{2}{3}$  in the length. Dorsal fin rather low, its rays I, 12; A. I, 7; V. 9. Scales 5-45-5. Color olive or bluish brown above; sides and belly silvery; lower fins faintly orange. Ohio Valley and southward. A singular species, abundant in some sections (Scioto River, Clinch River, Chickamauga River), but overlooked by naturalists until lately.

(*Lagochila laccra* Jordan & Brant, Proc. Acad. Nat. Sci. Phila. 1877, 250; *Lagochila laccra* Jordan, Man. Vert. ed. 2, 311; Jordan, Man. Vert. ed. 2, 406; Jordan, Bull. U. S. Nat. Mus. xii, 106.)

## FAMILY XXXI.—CYPRINIDÆ.

(*The Carps.*)

Cyprinoid fishes with the margin of the upper jaw formed by the premaxillaries alone and the lower pharyngeal bones well developed, falciform, nearly parallel with the gill-arches, each provided with 1-3 series of teeth in small number, 4-7 in the main row, and a less number in the others if more are present. Head naked. Body scaly (except in *Meda*, *Plagopterus*, *Phoxinellus*, and *Aulopyge*). Barbels 2 or 4; absent in most of our genera, and not large in any. Belly usually rounded, rarely compressed, never serrated. Gill-openings moderate, the membranes broadly joined to the isthmus. Brachiostegals always 3. Gills 4, a slit behind the fourth. Pseudobranchiæ present (except in *Orthodon*, etc.). No adipose fin. Dorsal fin short in American species, elongate in many Old World forms. Ventral fins abdominal. Air-bladder usually large, commonly divided into an anterior and posterior lobe, rarely wanting, not enclosed in a bony capsule. Stomach without appendages, appearing as a simple enlargement of the intestines. Fishes of moderate or small size, inhabiting the fresh waters of the Old World and of North America. Genera about 200; species nearly 1,000; excessively abundant where found, both in individuals and species, and, from their great uniformity in size, form, and coloration, constituting one of the most difficult groups in natural history in



fork-tailed species, commonly referred to *Amiurus*, the two bones are more or less close together; in some species apparently joined in the young, but separated in the adult; in others apparently slightly separated at the surface and joined under the skin. In but two species, *furcatus* and *punctatus*, is there a continuous bridge formed at all ages. In view of the complete intergradation of this character, we have retained the name *Amiurus* for the species with truncate caudal and the interspinal and supraoccipital wholly separate, and *Ictalurus* for those with forked caudal and the two bones in question joined or approximated. The only other alternative, and a not unreasonable one, is to refer all these species to one genus, *Ictalurus*.

On page 108, instead of, *Ictalurus lacustris*, read:

**106. I. nigricans** (Le S.) Jor.

The "*Gadus lacustris*"\* (Walb. Artedi, Pisc. 1792, 144) can hardly be identified with any fish.

Page 110. To the description of *Arius felis*, the following may be added:

Bands of palatine teeth large, not prolonged backward over the pterygoid region; fontanelle prolonged backward in a narrow groove; occipital process long, narrow, keeled. Pectoral rays I, 9.

*Arius equestris* B. & G., is not distinct from *A. felis*, and should be erased.

Page 111. Instead of *Plectospondyli* read Order L. EVENTOGNATHI. The latter name is unobjectionable, and has priority of date.

Page 113. We do not believe that *Ictiobus*, *Bubalichthys*, and *Carpiodes* can be maintained as distinct genera, and think it preferable to unite the three under the earliest name, *Ictiobus*. In its dentition, *Ictiobus* is intermediate between *Carpiodes* and *Bubalichthys*, and in structure of mouth *Bubalichthys* stands between the others.

We have examined the original manuscript note-book of Rafinesque, containing the descriptions which were afterwards printed in the *Ichthyologia Ohiensis*. In this book is a drawing of his "*Ictiobus bubalus*,"

\* It is described as follows:

"*Gadus lacustris*, Americanis Mathemeg, Anglis Land Cod, Pennant, Arct. Zool. Introd. p. 191. Corpus tripedale, superne sub spadicem, inferne griseum; cirri tres in mandibula inferiore, quorum medius longitudine duos alios vincit."

The "Mathemeg or Land Cod" of Pennant is said by Richardson to be a cat-fish, and it may have been *I. nigricans*, but the description is wholly insufficient.

from which it is evident that the species intended was the *Catostomus bubalus* of Kirtland—the *Bubalichthys altus* of this work (p. 116). If this identification be accepted in our nomenclature, the specific name *bubalus* should take the place of *altus*, and *cyprinella* that of *bubalus*. If Rafinesque's species be considered unidentifiable, the same change should be made, as Kirtland's use of the name *bubalus* followed next. As Rafinesque's *I. bubalus* was the type of his *Ictiobus*, in strictness the name *Bubalichthys* should be superseded by *Ictiobus* as a subgeneric name, while the group heretofore called *Ictiobus* would be called *Selecrognathus* C. & V.

In this view, the species should stand as follows:

**113. I. cyprinella** (C. & V.) Ag. (*Selecrognathus*.)

**114. I. urus** (Ag.) J. & G. (*Ictiobus*.)

**115. I. bubalus** Raf. (*Ictiobus*.)

**116. I. carpio** (Raf.) Nels. (*Carpiodes*.)

**117. I. damalis**\* (Grd.) J. & G. (*Carpiodes*.)

**118. I. thompsoni** (Ag.) Nels. (*Carpiodes*.)

**119. I. bison** (Ag.) Nels. (*Carpiodes*.)

**120. I. cyprinus** (Le S.) J. & G. (*Carpiodes*.)

**121. I. difformis** (Cope) Nels. (*Carpiodes*.)

Of these species, 117, 118, 119, and 121 are of doubtful validity.

Page 126. The following species of *Catostomus* may be added:

**130 (c). C. nebulifer** Garman.

Brownish, clouded and blotched with darker; a blackish lateral shade; belly pale; lower half of preopercle abruptly silvery. Body stout, little compressed. Head nearly as broad as eye; eye small, about half snout; mouth small; lips with considerable free margin. Dorsal inserted midway between snout and caudal; caudal deeply notched; anterior rays of dorsal longest. Head 5; depth 5. D. 9; A. 8; scales 14–90–14. Nazas River, Coahuila. (*Garman*.) Very close to *C. guzmaniensis*, if not the same.

(*Catostomus nebuliferus* Garman, Bull. Mus. Comp. Zoöl. viii, 89, 1881.)

\* It is better not to adopt the name *tumidus* for any species of *Carpiodes*, as the original *Carpiodes tumidus* is not certainly identified. The description agrees well with young specimens of *I. bubalus*, a species lately obtained by us in Texas.