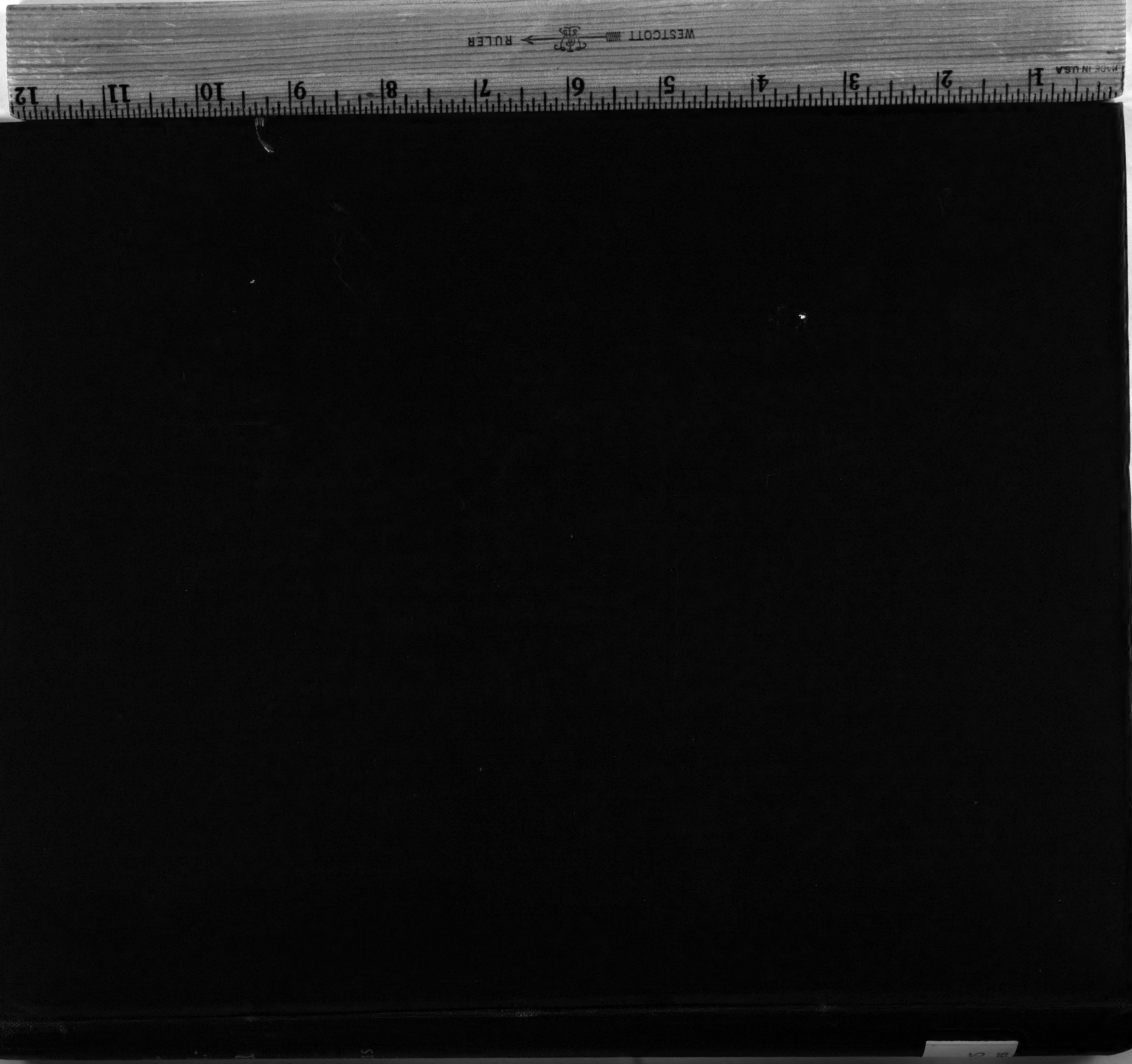
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BIOLOGIA CENTRALI-AMERICANA.

PISCES.

BY

C. TATE REGAN, M.A.

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INTRODUCTION.

THERE is a considerable literature dealing with the fresh-water fishes of Mexico and Central America, but our knowledge of them must still be regarded as very incomplete. The fact that not a single fresh-water fish has yet been described from the Republic of Honduras, or from Nicaragua north and east of the Great Lakes, may be instanced in support of this. The following account is based on the material in the British Museum; the diagnoses of the sub-orders and families in the systematic part are intended only to apply to their Mexican and Central-American representatives; in all cases synopses of the genera and species are presented in the form of keys, and sufficient references are given for the verification of determinations thus effected. Detailed descriptions and full synonymies are given only in the case of groups which appear to need revision and which are well represented in the British Museum.

True fresh-water fishes and also marine fishes which are known to ascend rivers beyond the influence of the tides are included: thus, in addition to the problems of the distribution of nearctic and neotropical types in this area, that of the differentiation of the marine faunas of the Atlantic and Pacific coasts is dealt with to a certain extent. The introductory remarks are arranged under the following headings:—

1. Principal Faunal Works on the Fresh-water Fishes of Mexico and Central America.
2. Principal Collections described in this Work.
3. Classification.
4. Geographical Distribution.
5. The Shore-Fishes of the Atlantic and Pacific Coasts of Mexico and Central America.

1. Principal Faunal Works on the Fresh-water Fishes of Mexico and Central America.

The fresh-water fishes of Mexico and Central America are included in Jordan and Evermann's great work on the fishes of North and Middle America (Bull. U.S. Nat. Mus. xlvii. 1896–1900), which is, however, so far as the Central-American fresh-water fish-fauna is concerned, rather a compilation than a critical revision; and necessarily so, seeing that the majority of the types are preserved in the British Museum and a large proportion of the remainder at Vienna. Dr. S. E. Meek has recently made extensive collections in Mexico, and has published an account of the fresh-water fishes of Mexico north of the Isthmus of Tehuantepec (Publ. Columbian Mus., Zool. v. 1904) based on his own material. Of other works dealing with Mexican fresh-water fishes we may mention Girard's valuable report on the fishes collected during the United States and Mexico boundary survey, published in 1859, Steindachner's report on a collection from the Lerma Basin and the Valley of Mexico (Denkschr. Ak. Wien, lxii. 1895), and a paper by Jordan and Snyder dealing with fishes from the same region (Bull. U.S. Fish. Comm. xix. 1900).

Dr. Günther's memoir on the Fishes of Central America (Trans. Zool. Soc. Lond. vi. 1868) is still the best account of the fresh-water fishes of this region, and it is remarkable how little our knowledge of them has been increased since its publication. It was preceded by Kner and Steindachner's account of a collection from Panama (Abhandl. Bayer. Ak. x. 1864), and the only important contributions since are by Gill and Bransford on the fishes of Lake Nicaragua (Proc. Ac. Philad. 1877), Steindachner on those of the Rio Mamoni, Panama (Denkschr. Ak. Wien, xli. 1879), and two recent papers by Meek, one on the fishes of Lakes Managua and Nicaragua, the other describing collections from Guatemala and Costa Rica (Publ. Columbian Mus., Zool. vii. 1907).

2. Principal Collections described in this Work.

The present account is based on the specimens preserved in the British Museum, including the actual types of a large proportion of the species and co-types or authenticated examples of many others.

First in importance are the large collections made in Central America by Messrs. F. D. Godman and O. Salvin and Capt. J. M. Dow during the years 1859–1865, which formed the basis of Dr. Günther's report.

Next to these must be placed a fine series of Mexican fishes received from the Field Museum of Natural History, Chicago, in 1905, including examples of many of the species recently described by Dr. Meek.

The remaining collections may be considered in chronological order; they include :—

(1) Fishes from Mexico and Central America collected by A. Sallé in 1850 and following years.
(2) Co-types of some of the species described by Baird and Girard, received from the Smithsonian Institution in 1861.
(3) A collection from Southern Mexico, purchased of A. Boucard in 1868.
(4) A small series from Guatemala, collected by Mr. F. C. Sarg, acquired in 1880.
(5) A collection made by Mr. C. Patrick Geddes in Mexico (Vera Cruz, Puebla, and Mexico) and presented by him in 1880.
(6) A series from Presidio, Sinaloa, collected by A. Forrer; purchased in 1883.
(7) A collection made by the Rev. J. Robertson in British Honduras; purchased in 1890 and 1891.
(8) Two collections made in Mexico by Dr. A. C. Buller—one from Vera Cruz and Oaxaca, the other from Guanajuato, Jalisco and Michoacan; acquired in 1890 and 1892 respectively.
(9) Series of fishes from the Rio Grande, Chihuahua, Salamanca, and Mexico City, collected by Mr. A. J. Woolman, and including a few co-types of species described by him; purchased in 1892.
(10) A collection from San Luis Potosi, including several co-types, received from Dr. D. S. Jordan in 1900.
(11) Fishes collected by Dr. H. Gadow in Vera Cruz and Oaxaca in 1902.
(12) Co-types of some of the species described by Gill and Bransford from Lake Nicaragua, sent by the Smithsonian Institution in 1905.
(13) A few co-types of species described by Vaillant and Bocourt, received from the Paris Museum in 1906.
(14) Recently acquired collections made in Costa Rica by H. Pittier, P. Biolley, H. Rogers and C. F. Underwood.

In addition to these, we may mention three collections of marine fishes, containing examples of species new to the British Museum of *Galeichthys*, *Mugil*, *Centropomus*, and other genera which enter fresh water. Two of these are from Panama, one acquired from A. Boucard in 1875 and the other from Dr. Jordan in 1903; the third is from Mazatlan, received from Dr. Jordan in 1895

3. Classification.

The class Pisces, as understood in this work, includes craniate vertebrates with gills, and typically with median and paired fins which are supported by endoskcletal elements. Three sub-classes are recognized, viz. Cyclostomata, Selachii, and Teleostomi, which are, however, separated from each other by characters at least as trenchant as those which serve for the distinction of the classes of higher vertebrates, and which have therefore, with some reason, been considered as separate elasses, in which case the term Pisces has been restricted to the Teleostomi. The Teleostomi approach the Batrachians in that they have typically a lung or its homologue, the air-bladder, and in the development of membrane bones. The Batrachia are well separated, however, by the absence of dermal fin-rays and of endoskeletal supports for the median fins, by the modification of the paired fins into pentadactyle limbs and of the hyomandibular into the stapes, and by the presence of true internal nares.

I especially lay stress on the last character, because the impression is prevalent that the Dipneusti have internal nares, and in this respect show affinity to the Batrachians. As a matter of fact, the Dipneusti, like other Teleostomes, have two external nasal openings on each side; these are situated on the under side of the snout, and when the mouth is closed the posterior and, to a certain extent, the anterior are covered by the lower lip. The posterior nostril is also covered by the lower lip when the mouth is closed in some Eels (e. g. *Ophichthys*).

True internal nares are quite different in structure and position to the posterior external nares of the Teleostomi, being paired perforations of the palate internal to the præmaxillaries and maxillaries. Their ontogenetic development in the Batrachians, the lowest group in which they occur, supports the view that they are a new formation.

The Cyclostomes and Selachians are represented by only a few species in the fresh waters of Mexico and Central America, the bulk of the fish-fauna belonging to the Teleostomi, or bony fishes.

These may be arranged in two series—Actinopterygian and Crossopterygian. In the fishes of the Actinopterygian series the branchiostegal rays and supports of the paired fins retain their primitive condition or evolve by a simple process of concentration or reduction, whilst the duct connecting the air-bladder with the digestive tract, when persistent, opens dorsally or dorso-laterally into the latter. The fishes of the Crossopterygian series comprise the orders Crossopterygii and Dipneusti; these have

the branchiostegal rays replaced by a pair of large gular plates (absent in some specialized Dipneusti), the paired fins more or less lobate, their basal supports becoming axial in the more specialized forms, and the duct of the air-bladder opening into the ventral part of the œsophagus. The Actinopterygian series includes two main groups which may be given ordinal rank; in the lower (Chondrostei) the clavicles (infra-clavicles) are distinct from the cleithra (clavicles), the pelvic fins have a well-developed series of radials, the median fins have the dermal rays more numerous than their endoskeletal supports, and the caudal fin is typically strongly heterocercal. The living members of this order are the Sturgeons (Acipenseridæ) and Paddle-fishes (Polyodontidæ); neither family is represented in Mexico or Central America.

In the more specialized group, the Teleostei, the clavicles do not exist as separate elements, the radials of the pelvic fins are absent or vestigial, the dermal rays of the median fins are equal in number to their endoskeletal supports, and the caudal fin is abbreviate heterocercal or homocercal.

The Teleostei are the dominant group to which the great majority of living fishes belong; their classification is by no means an easy matter. The genera *Lepidosteus* and *Amia* differ from other living Teleosts in the presence of a splenial and of a metapterygium, and in the absence of an endochondral supraoccipital ossification; they have been regarded as belonging to a separate order, Holostei.

Some of the supposed distinctive features of the Holostei have been found in undoubted Teleosts (Elopidæ, Albulidæ, Chirocentridæ), and a study of the fossils makes it still more difficult to recognize two orders, annectent forms (e. g. *Dapedius*, *Pholidophorus*) occurring.

Lepidosteus is represented in the fresh waters of Mexico and Central America; it is the type of the sub-order Ginglymodi, characterized by the opisthocœlous vertebræ.

The remaining Teleostei have a well-ossified endochondral supraoccipital, the lower jaw composed of three elements only (dentary, articulare, and angulare), and the pectoral radials all directly attached to the scapula and coracoid, the metapterygium being absent.

The most generalized of these form the sub-order Malacopterygii, soft-rayed fishes with abdominal ventral fins, with a pneumatic duct, and with a mesocoracoid element in the pectoral arch. This sub-order is represented in the fresh waters of Mexico and Central America by a few marine types.

The fishes of the next sub-order, Ostariophysi, differ from the Malacopterygii in the modification of the superior and lateral elements of the anterior vertebræ to form a chain of ossicles connecting the air-bladder with the auditory organ.

This group is almost entirely composed of fresh-water fishes, and five of the six families recognized by Boulenger are represented in Mexico and Central America.

The Ostariophysi agree with the Malacopterygii in having a mesocoracoid bone, but in the other groups to be considered this element has been lost.

Of four groups of more or less anguilliform fishes, Lyomeri, Heteromi, Symbranchii, and Apodes, which appear to be independent offshoots of the Malacopterygii, the last two are represented in the rivers of Mexico and Central America.

In the Symbranchii the body is eel-shaped, the dorsal and anal fins are continuous with the caudal, the ventral fins are absent, the gill-openings are confluent to form a single ventral slit, and the well-developed præmaxillaries exclude the maxillaries from the border of the mouth.

The Eels of the sub-order Apodes differ in having the small gill-openings usually separate and in having the mouth bordered above by the maxillaries, which are separated in the median line by the ethmo-vomer, to which the præmaxillaries (if present) are suturally united.

The sub-ordinal groups already mentioned appear to be natural and well-defined, but the next sub-order, Haplomi, which differs from the Malacopterygii only in the absence of a mesocoracoid, is less satisfactory, and includes four or five groups which may not be related.

The Cyprinodontidæ are abundant in the rivers of Mexico and Central America. Recent researches have shown that some members of this family are physoclistic *, and that in others the lower pharyngeal bones are suturally united. On this account I would place the physoclistic Scombresocidæ, which have the lower pharyngeals completely united, near the Cyprinodontidæ in the sub-order Haplomi. In my opinion they are much more closely related to the Cyprinodontidæ than to the Atherinidæ, with which they have recently been associated.

Most of the physoclistic Teleosts with abdominal ventral fins are placed by Boulenger in two sub-orders, Catosteomi and Percesoces, the former being distinguished from the latter by the supposed enlarged coracoid. In the 'Cambridge Natural History' Boulenger writes:—"The whole question of the arrangement of the

* Philippi, Sitzungsb. Gesellsch. naturf. Freund. 1906, p. 232.

physoclists with abdominal ventrals (Catosteomi and Percesoces) is, I feel, much in need of revision, and it may be found advisable to break up this group [Catosteomi] into a greater number of sub-orders."

I have paid a good deal of attention to these groups, and am of opinion that they are unnatural and indefinable.

After removal of the Selenichthyes, which I have recently been able to show are related to the Tæniosomi, and of the Hypostomides, the remainder of the Catosteomi, which corresponds to the Hemibranchii of Smith Woodward, is still a heterogeneous assemblage which I find incapable of definition, and includes three well-marked but probably related groups which should, in my opinion, be given sub-ordinal rank. These are: (1) THORACOSTEI *, which have on each side a large dermal plate, which in the adult is co-ossified with the coracoid and suturally united to the clavicle; (2) SOLENICHTHYES (nom. nov.), which have a considerable amount of dermal armour but no plates similar to the ectocoracoids of the Thoracostei—the tubiform snout, terminal toothless mouth, pectinate gills, and elongate anterior vertebræ with separate transverse processes further characterize this group; (3) LOPHOBRANCHII, differing from the Solenichthyes in the lobate gills and normal anterior vertebræ.

The resemblances between the Centriscidæ and the Solenostomidæ, respectively the most generalized of the Solenichthyes and the Lophobranchii, seem to indicate relationship, but are, no doubt, in great part due to similar modes of life.

A few fishes belonging to the sub-order Lophobranchii are found in the rivers of Mexico and Central America.

Adding the Osphromenidæ, which should, in my opinion, be placed with the Anabantidæ, and after removing the Scombresocidæ to the Haplomi, the Ammodytidæ and Champsodontidæ to the Percomorphi, and the Chiasmodontidæ (*incertæ sedis*), the families included by Boulenger in the Percesoces may be arranged thus:—

I. Pelvic bones remote from the clavicles; a separate spinous dorsal; no supra-branchial organ; no œsophageal sacs . . . . . *Atherinidæ, Mugilidæ, Polynemidæ,* and *Sphyrænidæ.*

II. A suprabranchial organ . . . . . *Ophiocephalidæ, Anabantidæ,* and *Osphromenidæ.*

III. Œsophagus with a pair of lateral muscular sacs, with internal papillæ which may be toothed . . . . . *Tetragonuridæ, Stromateidæ.*

IV. Pelvic bones remote from the clavicles; no fin-spines; no suprabranchial organ; no œsophageal sacs . . . . . *Icosteidæ.*

In the second and third of these divisions we see the transition from abdominal

* Swinnerton, Quart. Journ. Micr. Sci. xlv. 1902, p. 580, and xlix. 1905, pp. 369–380.

to truly thoracic ventral fins (with the pelvic bones directly attached to the clavicles) in the series *Ophiocephalus*, *Anabas*, *Osphromenus* and *Tetragonurus*, *Centrolophus*, *Stromateus* respectively, and in order to attain precise diagnoses it becomes necessary to regard each of these two groups as of primary, *i. e.* sub-ordinal, rank, and to neglect the character of the attachment of the pelvic bones in defining them.

The first and second of these sub-orders have the names Percesoces and Labyrinthici respectively. For the third I propose the name Zenopharyngii, whilst the fourth, comprising fishes with the skeleton in great part cartilaginous, may be termed Malacichthyes. Of these groups only the Percesoces is represented in the fresh waters of Mexico and Central America.

The sub-order Acanthopterygii, as understood by Boulenger, is defined by a single character, viz., the direct attachment of the pelvic bones to the pectoral arch. When the systematic portion of the present work was commenced, more than two years ago, the sub-order was accepted by me; but I now think that the fact has to be recognized that the pelvic bones have become directly attached to the clavicles in several groups and that a large group defined by this character alone is unnatural.

It has been mentioned above that each of two natural groups, Zenopharyngii and Labyrinthici, includes forms with the pelvic bones remote from the clavicles and others in which they have acquired a direct attachment to the clavicles. In a third group, the Berycoids, the two conditions are also found, *Polymixia* exemplifying the first and *Trachichthys* the second. It seems pretty certain that the Cyttidæ and the Percoid fishes have evolved independently from the Berycoids, and we cannot lay much stress on the fact that the pelvic bones are directly attached to the clavicles in the two first-named groups as indicating any special relationship between them.

Enough has been said to show that the Acanthopterygii should be split up into several sub-orders; two of these are represented in the fresh waters of Mexico and Central America, viz. Percomorphi and Heterosomata, the latter including the single family Pleuronectidæ.

4. Geographical Distribution.

In discussing the distribution of fresh-water fishes we need not take notice of marine fishes (*Centropomus*, *Pomadasis*, *Mugil*, &c.) which ascend rivers for considerable distances, either in search of food or for breeding-purposes, nor need we consider fishes which descend the rivers to breed in the sea (e. g. *Anguilla*). Fresh-water species of marine genera (e. g. *Chirostoma humboldtianum*) and fresh-water genera of marine families (e. g. *Xenatherina*) have little importance. True

fresh-water fishes belong to families which are wholly (*e. g.* Percidæ, Cichlidæ) or chiefly (*e. g.* Cyprinodontidæ, Siluridæ) confined to fresh water. In Mexico and Central America these are the following:—Cichlidæ, Percidæ, Centrarchidæ, Cyprinodontidæ, Loricariidæ, Siluridæ, Cyprinidæ, Gymnotidæ, Characinidæ, and Lepidosteidæ.

The CICHLIDÆ are Perciform fishes which bear a considerable resemblance in appearance and anatomy to the most generalized group of Perciformes, the widely-distributed marine family Serranidæ, but differ from them in certain features of specialization, such as the presence of but a single nostril on each side, the absence of teeth on the palate, the coalescence or sutural union of the lower pharyngeals, and the reduced number of branchiostegal rays.

No known fossils can be referred to the Cichlidæ, which inhabit America, from Texas to Montevideo, and Africa, including Madagascar. Seven species occur in Syria, and a single genus with three species inhabits Ceylon and Southern India.

The American Cichlidæ comprise over 150 species which may be arranged in 23 genera; from Africa more than 200 species referred to 35 genera have been described.

Not one of the genera is common to Africa and America, but the South-American *Acara* is scarcely generically distinct from the African *Paratilapia*, and there can be no doubt that these are the most generalized of living Cichlidæ and very near to the ancestral type of the family.

The Mexican and Central-American Cichlidæ are more specialized than the South-American ones, and have certainly been derived from them; not one of the genera with three anal spines is found north of the Isthmus of Panama, and all the South-American Cichlidæ have simple conical teeth.

Of the Southern types only *Cichlosoma* has reached Mexico and Central America, and has there given rise to a variety of more specialized forms.

We have no evidence in favour of dating the origin of the Cichlidæ before the Eocene. At the same time we have to explain their occurrence in South America, Africa, and India at the present day. Boulenger, in his address to the Zoological Section of the British Association in 1905, whilst adopting a non-committal attitude, put forward the hypothesis that the Cichlidæ were originally a Northern group, and that in the Eocene they ranged over North America and Northern and Eastern Asia, which were then one continent, and that they have attained their present distribution by a southward migration and by becoming extinct in their original habitat. This view

is supposed to be supported by the occurrence in the Eocene of Wyoming and Utah of a fish, *Priscacara*, which has been referred by some authors to the Cichlidæ. But *Priscacara* has neither the reduced number of branchiostegals nor the toothless palate which characterize all living Cichlidæ, and it appears to me that it has no bearing on the problem of how two very closely allied genera, *Acara* and *Paratilapia*, differing from it and agreeing with each other in some important features which are obviously due to their near relationship, have come to inhabit South America and Africa respectively.

Distribution of Cichlidæ.

The Indian *Etroplus* is an isolated type, more specialized than *Paretroplus* of Madagascar, which appears to be its nearest relative, and, as has already been stated, a study of the American Cichlidæ leaves no possible doubt that the Mexican and Central-American Cichlid fauna has originated with immigrants from South America; consequently the hypothesis of the northern origin of the family should, I think, be rejected. We are therefore led to believe that in early Eocene times Africa was connected by land with South America on the one side and with India, *viâ* Madagascar, on the other.

The Mexican and Central-American Cichlidæ number about 65 species; they are

not found on the Mexican Plateau, but in lowland rivers they extend northward to Sinaloa on the West and to the Rio Grande on the East.

The South-American *Acara* and *Geophagus* are each represented by a single species in Panama. Most of the Mexican and Central-American Cichlidæ belong to the genus *Cichlosoma*, but usually to different sections of the genus from the South-American species.

The section *Theraps* contains 21 species: 16 are from Guatemala and Mexico south of the Balsas, one of them ranging southwards to Panama; the most northern species occurs in the Panuco; whilst 3 are found in Lakes Managua and Nicaragua and 1 in Costa Rica.

Archocentrus comprises 6 species, 5 from Guatemala and Southern Mexico and 1 from Lake Nicaragua. *Astatheros* is made up of 4 species from Oaxaca, Guatemala, and British Honduras, 9 from the Great Lakes of Nicaragua, and 1 from Costa Rica and Panama. The 3 species of *Thorichthys* inhabit Guatemala and Southern Mexico.

Parapetenia is the most widely distributed group of the genus *Cichlosoma*. In addition to the sixteen species known from Mexico and Central America there is one in Cuba and another in Barbados (the latter locality perhaps doubtful), two in Western Ecuador, one in Colombia, and one in the Amazon. The South-American species of this section are probably derived from immigrants from Central America.

The Mexican and Central-American species of *Parapetenia* are distributed thus:—

C. beani. Lowland streams of Sinaloa and Jalisco.

C. istlanum. Rio Balsas.

C. steindachneri and *C. bartoni.* Rio Panuco.

C. mento, C. urophthalmus, C. centrale, C. tenue, C. trimaculatum, C. mojarra, C. salvini, C. multifasciatum, C. friedrichstahli, and *C. motaguense.* Southern Vera Cruz and Oaxaca to Guatemala.

C. managuense and *C. dovii.* Lakes Managua and Nicaragua.

Petenia is a monotypic genus, remarkable for the extremely protractile mouth, from Lake Peten. *Herichthys*, with four species from the Rio Grande to Lake Yzabal, differs from *Cichlosoma* in having incisor-like teeth. *Paraneetroplus*, with one species from Southern Vera Cruz and another from Costa Rica and Panama, and *Neetroplus* and *Herotilapia*, each with a single species from the Great Lakes of Nicaragua, are allied genera.

The points to be noted in the distribution of the Cichlidæ in Mexico and Central America are the following:—The chain of volcanoes which extends from Colima to Vera Cruz has checked the northward migration of the family, which is not represented on the Mexican plateau. The majority of the species are found in Southern

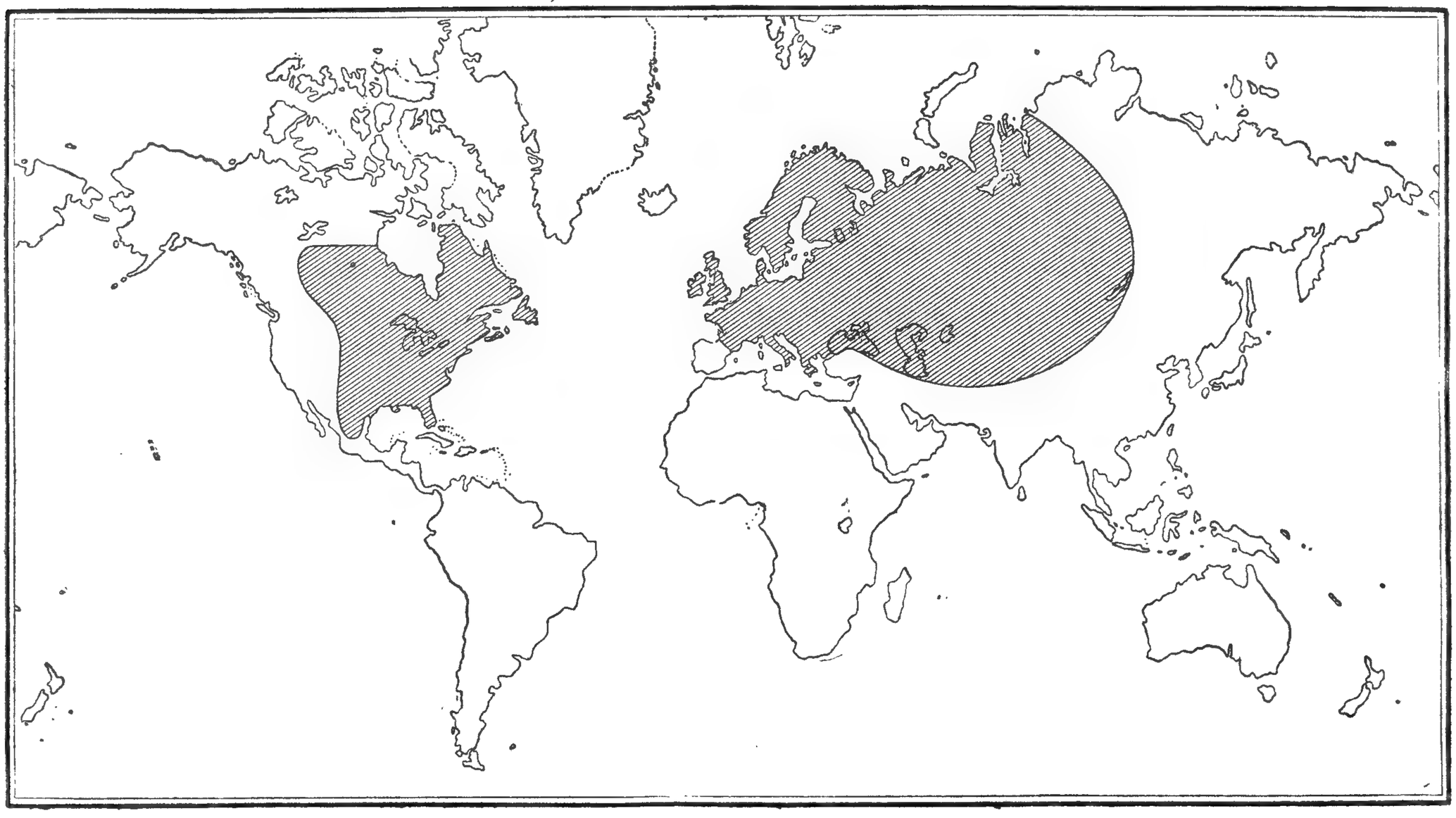
Mexico (*i. e.* Southern Vera Cruz, Oaxaca, Chiapas), British Honduras, and Guatemala. In this area 41 species occur, and to the north of it the Cichlid fauna is a very poor one, comprising one species from the Balsas, another from the lowland streams of Sinaloa and Jalisco, four from the Panuco (one of which also occurs in the Rio Soto Marina and the Rio Grande), and an additional species from the tributaries of the Rio Grande in Nuevo Leon.

The great lakes of Nicaragua, Lakes Managua and Nicaragua, have a peculiar Cichlid fauna, consisting of 18 species, all but one of which are endemic. These include some remarkable types, such as the genera *Herotilapia* and *Neetroplus*, and specialized forms of the genus *Cichlosoma*, such as *C. labiatum* and *C. lobochilus*, with thick lips and large blunt teeth, *C. managuense* and *C. dovii*, with very protractile mouth, and *C. balteatum* and *C. nicaraguense*, with the profile of the snout nearly vertical. It is certainly curious that each of the sections *Theraps*, *Archocentrus*, *Astatheros*, and *Parapetenia* is represented in the Great Lakes of Nicaragua by its most specialized types.

Nothing is known of the Cichlid fauna of Honduras, Salvador, and Nicaragua north and west of the Great Lakes, but it may be inferred that it is of the same general character as that of Guatemala and that many of the species will prove to be the same, seeing that *Cichlosoma maculicauda* of Guatemala is also found in the Rio Chagres. Except *C. maculicauda* and the two species belonging to the South-American genera *Acara* and *Geophagus*, only four Cichlids have been described from Costa Rica and Panama. These are: (1) *Cichlosoma citrinellum*, also found in Lake Nicaragua; (2) *Cichlosoma altifrons*, very close to *C. rostratum* of Lake Nicaragua; (3) *Cichlosoma alfari*, allied to *C. balteatum* of Lake Nicaragua; and (4) *Paraneetroplus sieboldii*, congeneric with *P. bulleri* from Southern Mexico, but also near to *Neetroplus nematopus* of the Great Lakes of Nicaragua.

The PERCIDÆ are fresh-water fishes of North America, east of the Rocky Mountains, and Western Eurasia. Of nearly 100 species about 80 belong to the North-American genera *Etheostoma*, *Percina*, *Boleosoma*, &c., comprising the dwarf Perches known as "darters." Only 6 species of these extend southward to the basin of the Rio Grande and the rivers of Chihuahua and Durango. Fossil Percidæ are found in the middle Eocene deposits of Wyoming.

The CENTRARCHIDÆ are fresh-water fishes of North America. Of about 30 species, which may be grouped into 8 or 9 genera, all but one, the Californian *Ambloplites interruptus*, are found east of the Rocky Mountains. Six species extend southward to the Rio Grande, and one a little further, into Tamaulipas.



DISTRIBUTION OF PERCIDÆ.

The Centrarchidæ have probably originated in Eastern North America from marine Perciform fishes with the habit of ascending rivers, as do the Bass (*Morone*) at the present day. The most generalized Centrarchids (*Chænobryttus* and *Micropterus*) are very similar to the Serranidæ. The Indo-Pacific *Kuhlia* and its fresh-water allies in Australia have been associated with the Centrarchidæ, but they present no very close affinity to the North-American fishes of the family. Fossil Centrarchidæ are found in the Eocene of North America.

CYPRINODONTIDÆ.—At the present day many species of this family enter brackish or salt water, but this habit is probably secondary, as in the case of the marine Cat-fishes of the genera *Arius*, *Plotosus*, &c. The reasons which may be assigned for regarding the Cyprinodontidæ as primarily a fresh-water family are as follows:—(1) Their absence from the Australian Region, except for a species of *Haplochilus* in Celebes and Lombok. (2) Several species have been found in European Oligocene and Miocene deposits, and Dr. Smith Woodward has been kind enough to tell me that "all fossil Cyprinodonts known are from fresh-water or estuarine deposits, chiefly lake deposits." (3) The nearest allies of the Cyprinodontidæ appear to be the more generalized Holarctic fresh-water types *Esox* and *Umbra*.

The Cyprinodontinæ are the oviparous Cyprinodonts, and are found at the present day in America from the Northern United States to Argentina, in Africa, and in Southern and Eastern Eurasia. Of nearly 120 species of this group, about 60 are North American, 20 South American, and 30 African.

Prolebias, with several species from fresh-water deposits of the Oligocene and Miocene of France, Germany, and Sicily, is probably not distinct from *Fundulus*, which is in some respects the most generalized of living genera. *Fundulus* includes a large number of species from the coasts and rivers of the United States; a few species occur in Mexico and Central America, Southern Europe, and Africa.

The North-American *Cyprinodon* is represented in the Mediterranean district by the living genus or sub-genus *Lebias* and the extinct *Rachylebias* of the Upper Miocene; several of the species enter brackish or salt water.

The Cyprinodonts of India, the Malay Peninsula and Archipelago, China, and Japan are few in number and belong to genera which differ from *Fundulus* but little. Some of the African species may be placed in *Fundulus* or in the allied Indian genus *Haplochilus*; the rest do not depart widely from this type. The South-American Cyprinodontinæ are the genera *Rivulus*, *Cynolebias*, and *Orestias*, which differ from *Fundulus* in having the margins of the eyes not free and in other characters of specialization. Four species of *Rivulus* are known from Southern Mexico and Central America. A consideration of the distribution of the Cyprinodontinæ leads us to suppose that they were originally a holarctic fresh-water group and that they have spread southwards; the African forms are probably derived from immigrants from Europe and India; the South-American genera have evolved from a North-American stock, which probably reached the southern continent by migration along the coast.

The viviparous Cyprinodontidæ are exclusively American and may be arranged in three groups—Characodontinæ, Pœciliinæ, and Anablepinæ. The Characodontinæ are characteristic of and almost peculiar to the system of the Rio Lerma (including the Valley of Mexico). *Zoogoneticus* comprises four species from the Lerma System, which may be defined as *Funduli* of the type of *F. punctatus*, but viviparous and with the anal fin of the male modified, the anterior 5 or 6 rays being short and stiff and separated by a notch from the rest of the fin. *Fundulus punctatus* is found in all the Pacific coast streams from Oaxaca to Ecuador, and probably enters the sea; it may be regarded as nearly representing the ancestral form from which *Zoogoneticus* has evolved.

Limnurgus (one species), *Characodon* (five species), and *Goodea* (seven species) differ from *Zoogoneticus* in their more specialized dentition. A species of *Characodon*

has extended northward to the rivers of Coahuila and Durango, and another has become marine and reached the coast of Lower California. Three species of *Goodea* have reached the upper tributaries of the neighbouring river-systems of the Balsas and the Panuco.

There can be no doubt that the Lerma System is the original home of the Characodontinæ.

The Pœciliinæ start with the genus *Gambusia*, which differs from *Fundulus* only in being viviparous and in having the anal fin of the male advanced and modified into an intromittent organ, the anterior rays being thickened and produced. *Gambusia* comprises about 14 species from the Southern United States, Mexico, Central America, Cuba, and Jamaica. The widely distributed *G. gracilis* (Atlantic streams from Illinois to Vera Cruz) enters brackish water; the others appear to be strictly fresh-water species. The Central-American *Belonesox* is a remarkable offshoot from the *Gambusia* type. *Pœcilia* and *Girardinus* comprise several species which differ from *Gambusia* in the structure of the mouth and the dentition, which is modified in adaptation to their phytophagous habits. These genera have a similar distribution to *Gambusia*, but in addition are well represented in the Lesser Antilles and in Brazil, a distribution no doubt to be accounted for by the fact that some of the species enter the sea. Allied to *Pœcilia* are *Mollienisia*, with one species from the Southern United States and Tamaulipas and another from Lake Peten, and *Xiphophorus*, with five species in Atlantic coast streams from Mexico to British Honduras.

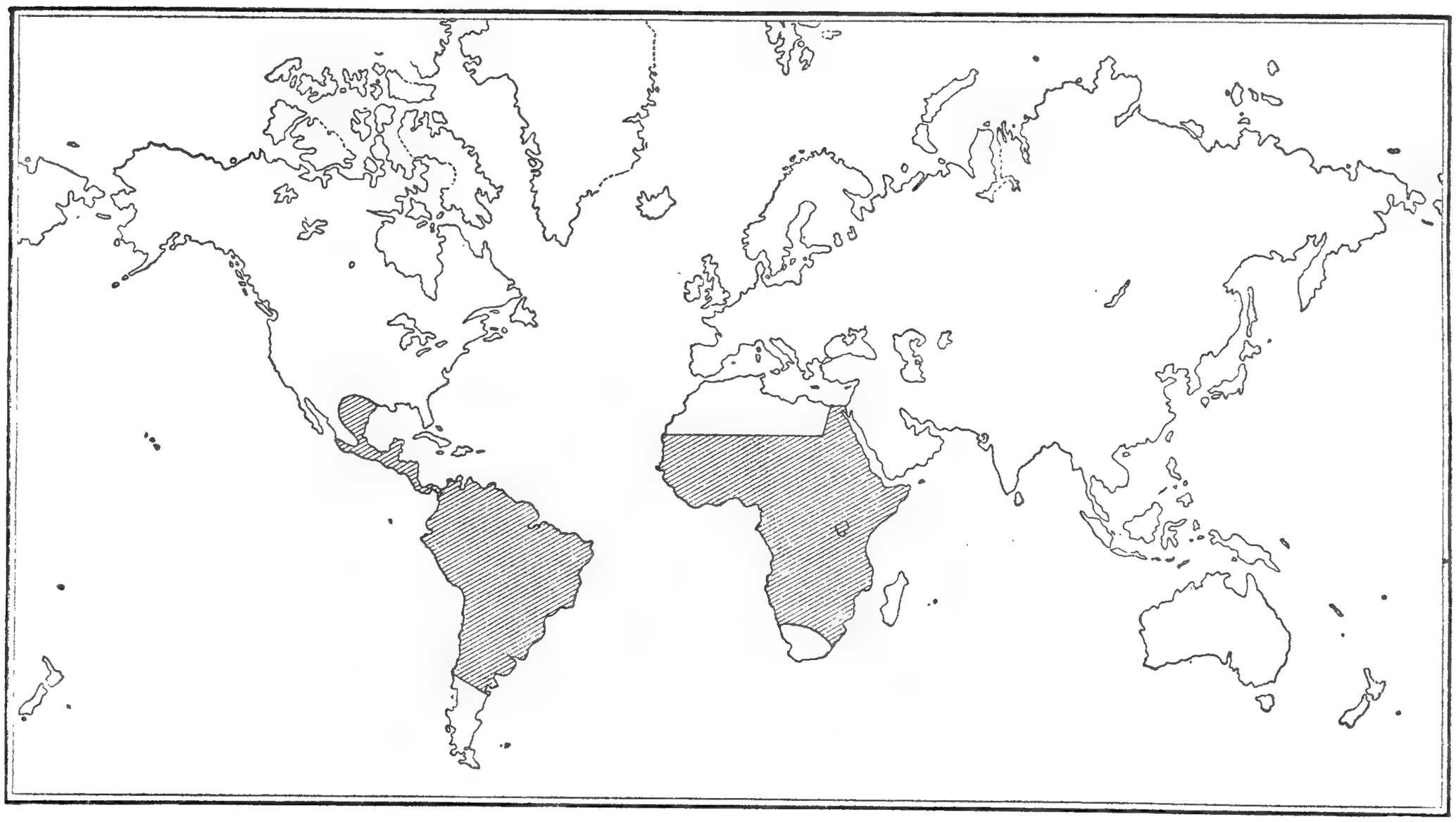
The remarkable *Anableps*, surface-swimming fishes with the projecting eyes divided horizontally into an upper part adapted for vision in the air and a lower for vision in the water, comprises three species—two from tropical South America, one from Southern Mexico and Central America. The males have the anal fin modified into a scaly conical intromittent organ with terminal orifice. The nearest ally of *Anableps* appears to be *Jenynsia* from Argentina.

The points to be noted in the distribution of the Cyprinodontidæ in Mexico and Central America are the remarkable development of the Characodontinæ in the River Lerma System, the presence of some endemic genera of the Pœciliinæ in the Atlantic coast rivers, the presence of only two genera (*Rivulus* and *Anableps*) which may be regarded as probable immigrants from the south, and the absence of peculiar types in the Great Lakes of Nicaragua, which contain only two species, both widely distributed.

The sub-order OSTARIOPHYSI, comprising the families Characinidæ, Gymnotidæ, Cyprinidæ, Siluridæ, Aspredinidæ, and Loricariidæ, is an offshoot of the Malaco-

pterygii, which were abundant in Cretaceous seas; no præ-tertiary Ostariophysi have been found, but Siluridæ occur in the earliest Eocene deposits. With the exception of the Silurid genera *Arius*, *Plotosus*, and a few allied to them, which have become estuarine or marine, all the members of the group are fresh-water fishes. The Gymnotidæ and Cyprinidæ are evidently modified Characinidæ, whilst the Loricariidæ and Aspredinidæ have been derived from the Siluridæ. The Characinidæ and Siluridæ, however, are by no means closely related, although evidently derived from the same stock, as is shown by the presence in both of the remarkable chain of "Weberian ossicles" connecting the air-bladder with the auditory organ. The origin and distribution of the Mexican and Central-American families of this group may now be discussed.

The family CHARACINIDÆ is very abundant in the fresh waters of South America, where more than 500 species are known to occur and where the genera are numerous and



DISTRIBUTION OF CHARACINIDÆ.

very diversified. The most generalized types also occur in this continent, which must be regarded as the original home of the group. In Africa there are about 100 species, but the family is not represented in Madagascar. None of the genera are common to

the two continents, but in at least one case (*Brycon* and *Alestes*) an American and an African genus are very closely allied.

The Mexican and Central-American Characinidæ are evidently an offshoot from the South-American stock; as in the Cichlidæ, the immigrants have found the volcanic chain of mountains which forms the southern boundary of the Mexican plateau an impassable barrier to their northward progress, but in the Eastern lowlands they have made their way as far north as the Rio Grande System.

The Mexican and Central-American Characinidæ may be arranged thus:—

1. Species belonging to South-American genera, the northern limit of which is the Isthmus of Panama: in several cases these species occur also in Colombia or Ecuador. To this division may be referred a species of *Hoplias*, two of *Piabucina*, one of *Luciocharax*, one of *Gastropelecus*, and one of *Curimatus*.

2. Species belonging to South-American genera which extend further north than the Isthmus of Panama. To this division belong two species of *Brycon*, one from Panama and Costa Rica, the other from Guatemala; a *Rœboides*, ranging from Oaxaca to Ecuador; a *Chirodon* from the Rio Papaloapam; and five species of *Tetragonopterus*, all closely allied to the widely distributed South-American *T. rutilus*. One species of *Tetragonopterus* is known only from Panama, a second ranges from Panama to Oaxaca and Vera Cruz, a third from Guatemala to Texas; the other two are found in Southern Mexico.

3. Two species belonging to the endemic genus *Bramocharax*, which appears to be related to *Brycon* and which is peculiar to the Great Lakes of Nicaragua.

The GYMNOTIDÆ are specialized eel-like Characinids, and have evidently evolved from the latter in South America. There are about 8 genera and 30 species, one of which (*Giton fasciatus*) extends from Guatemala to the La Plata, whilst a second (*Eigenmannia humboldtii*) is found in Panama and Colombia.

The CYPRINIDÆ are fresh-water fishes of North America, Eurasia, and Africa. They are absent from Madagascar and do not cross Wallace's Line; the family is well represented in Borneo and a few species are known from the Philippines and from Bali, but none from Celebes or Lombok. In America they extend southwards to the Rio Balsas in Southern Mexico and the Rio Usumacinta in Guatemala.

The family is closely related to and probably derived from the Characinidæ, from which they differ especially in the falciform lower pharyngeals.

The Cyprinidæ may be divided into four sub-families, viz. Cyprininæ, Catostominæ, Cobitidinæ, and Homalopterinæ, the first having a range nearly co-extensive with that of the family, the second being North American (with 2 or 3 species in Eastern Asia), the third occurring in Eurasia and Abyssinia, the fourth in Southern Asia.

The Cyprininæ, in addition to having the widest range, are by far the most diversified and the most numerous in genera and species, and may perhaps be regarded as the most generalized, especially as in some of the genera primitive characters are present (pharyngeal teeth in more than one series, lips normal, gill-membranes free from the isthmus, suborbitals broad) which are not to be found in the other sub-families.

In the Cyprininæ the maxillaries are entirely or in great part excluded by the præmaxillaries from the upper border of the mouth. The Catostominæ differ from them in that the margin of the upper jaw is formed in the middle by the small præmaxillaries and at the sides by the maxillaries; these bones are hidden in thick fleshy lips, and the reduction of the præmaxillaries is, in my opinion, probably due to this fact.

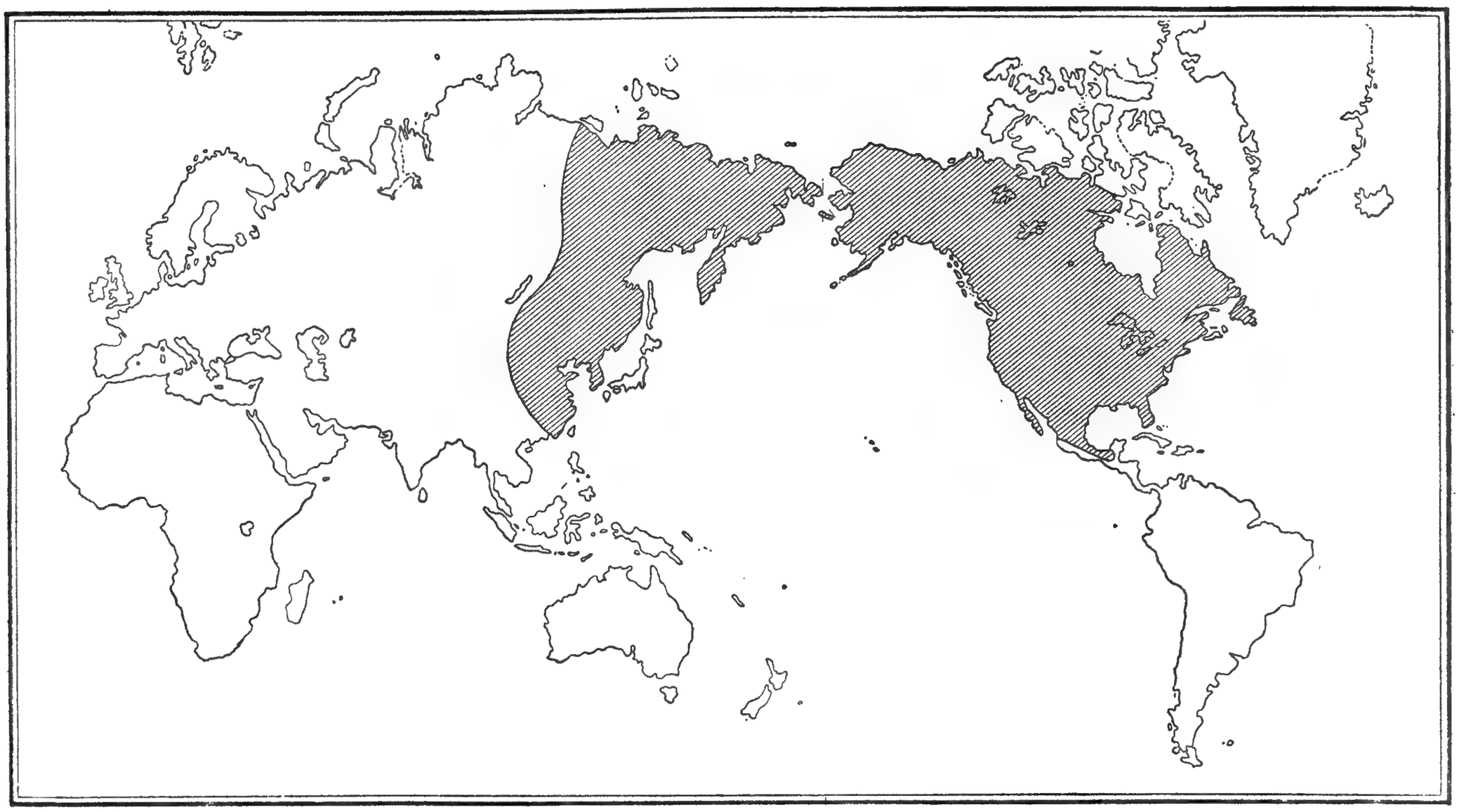
The Cyprinidæ may have originated in some part of the Indian region *, which is at the present day the richest in genera and species and where the most generalized forms occur. Boulenger, regarding the Catostominæ as the most generalized group, considers that the Cyprinidæ may have originated in North America as an offshoot of the South- and Central-American Characinidæ. He explains the fact that in America they have not extended further south than Guatemala as due to competition with herbivorous Characinids; but as the most northern representative of the latter group (*Curimatus magdalenæ*) does not extend further north than Panama, this explanation is scarcely satisfactory, especially as Cyprinidæ and herbivorous Characinidæ are by no means mutually exclusive in Africa.

The Catostominæ comprise about seventy species belonging to about ten genera from North and Central America and three species belonging to about two genera from Eastern Asia.

Ictiobus, with the dorsal fin elongate, includes about twelve species, in rivers east of the Rocky Mountains and the Sierra Madre, from the Great Lakes to the Rio Usumacinta in Guatemala. The Mexican species are four in number and are found in the southern tributaries of the Rio Grande and the rivers of Tamaulipas. *I. meridionalis* from the Usumacinta is the only member of the sub-family in the Neotropical Region. *Cycleptus*, with a single species ranging from the Mississippi to Tamaulipas, and a genus with two species in China are allied to *Ictiobus*.

* The present distribution of the Cyprinidæ leads to the supposition that they originated in Indo-China at or before the beginning of the Eocene.

The other Catostominæ have the dorsal fin short. Two of the genera are only found west of the Rocky Mountains, viz. *Chasmistes* (4 species) and *Xyrauchen* (2 species). One species of *Xyrauchen* is recorded from Northern Sonora. *Catostomus* comprises one species from Eastern Siberia and about twenty-five from North America, chiefly in the Rocky Mountain region. Two species occur in Mexico, one from Sonora and one from the Rio Grande. *Moxostoma* includes twenty species from the United States east of the Rocky Mountains, from the Great Lakes to the Rio Grande; in Mexico



DISTRIBUTION OF CATOSTOMINÆ.

one species is found in the Lerma System and another in the Rio Mascota, a small Pacific coast stream to the south of the Rio Grande de Santiago. Four monotypic genera allied to *Moxostoma* from the eastern part of the United States complete the count of the Catostominæ.

The Cyprininæ comprise more than 1000 species from all parts of the world except the extreme north and the Neotropical and Australian regions. Less than 200 species are known from Africa, and most of these belong to Indian genera; they are absent from Madagascar. The Indian Region is the richest in genera and species and the most generalized types occur there; fossil Cyprinidæ are found in Tertiary deposits of uncertain age in Sumatra. In the Palæarctic Region the Cyprininæ are an important

element of the fresh-water fish-fauna, but the generic types are comparatively few; some of the existing European genera are represented in Oligocene and Miocene deposits.

The Nearctic Cyprininæ number about 225 species, most of which belong to the Palæarctic genus *Leuciscus* or to closely allied generic types, there being, perhaps, less

Distribution of Cyprininæ.

diversity in this region than in any other. Consequently the generic distinctions are in great part based on very trivial characters, and slight differences in the form and number of the pharyngeal teeth are considered of importance.

In America the Cyprininæ range from British Columbia, Saskatchewan, and Quebec to the Rio Balsas in Southern Mexico. As in the Catostominæ, few genera are common to both sides of the Rocky Mountains, except in the case of types specially adapted to mountain-streams.

Of the 40 species included in the fauna of Mexico, 10 belong to six endemic genera, of which five, *Algansea* (4 species), *Falcula* (1 species), *Evarra* (2 species), *Xystrosus* (1 species), and *Yuriria* (1 species), are peculiar to the Lerma System and the other, *Stypodon*, contains a single species from Coahuila. *Notropis*, with about 100 species, all from rivers east of the Rocky Mountains and the Sierra Madre, is represented by 13 in Mexico; 10 of these are from north of the Lerma and 3 from the Lerma System;

one of the latter occurs also in the Balsas. In the last-named river is found a species (*N. boucardi*) which has so far only been obtained elsewhere in Nuevo Leon, possibly a case of discontinuous distribution.

The other Mexican Cyprinidæ are the representatives in Sonora (5 species) or in Mexico north of the Lerma System and east of the Sierra Madre (13 species) of Western and Eastern North-American types respectively.

The family SILURIDÆ, with about 1000 species, is practically cosmopolitan in tropical and temperate regions and is especially abundant in South America, Africa, India, and the Malay Peninsula and Archipelago. The true fresh-water types do not appear to cross Wallace's Line, the Siluridæ of the Australian Region belonging to the marine *Galeichthys*, *Plotosus*, &c., or to genera which may be regarded as evolved from these. A number of genera are common to the Indian and African Regions, but the Neotropical fresh-water types are all generically distinct from, although in some cases closely allied to, those of Africa. Genera related to the existing *Galeichthys* are found in the Eocene of Europe and North America.

As in the case of the Characinidæ, a larger number of genera and species and a greater diversity is found in the Neotropical Region than in any other. This parallelism extends to the fact that of three families peculiar to the Neotropical Region, one (Gymnotidæ) is derived from the Characinidæ, the other two (Loricariidæ and Aspredinidæ) from the Siluridæ.

In Mexico and Central America there are about sixty species, nearly half of which are marine Cat-fishes of the genera *Arius*, *Galeichthys*, and *Ælurichthys*. The fresh-water Silurids belong either to the widely distributed South-American genera *Rhamdia*, *Pimelodus*, and *Conorhynchichthys*, or to the North-American *Amiurus* and *Leptops*. Of these *Pimelodus* is represented only by two or three species in Panama, and *Conorhynchichthys* by one from the Usumacinta. *Rhamdia*, however, extends northward to Oaxaca and Southern Vera Cruz, and includes a considerable number of Central-American species.

Leptops comprises a single species from the United States east of the Rocky Mountains, which is also found in the southern tributaries of the Rio Grande. *Amiurus* includes a species in China and about twenty in America, eleven of which are found in Mexico and Central America. Three of these are widely distributed, ranging from the Great Lakes to Tamaulipas; a fourth is found in Texas and North-

eastern Mexico; and two more are known from the Rio Panuco, one of these extending into Southern Vera Cruz. The southernmost species is *Amiurus meridionalis* from the Rio Usumacinta. The four remaining species occur respectively in Arizona and Sonora, Chihuahua and Durango, the Rio Lerma, and the Rio Balsas.

The family LORICARIIDÆ, with over 200 species, ranges from Panama to Montevideo, and has evidently evolved in South America from the Siluridæ.

The Nearctic Region.

For fresh-water fishes the volcanic chain of mountains which stretches across Mexico from Colima nearly to Vera Cruz may be taken as the boundary between the Nearctic and Neotropical Regions. This range has proved an insuperable obstacle to the northward migration of the neotropical fishes, none of which have surmounted it to reach the Mexican plateau; in the narrow lowland strip near the west coast of Mexico one neotropical type (*Cichlosoma beani*) has extended northwards to the Rio Presidio in Sinaloa, whilst in the plains of Northern Vera Cruz and Tamaulipas on the east some neotropical fishes are found, viz. five Cichlids * and a Characinid (*Tetragonopterus mexicanus*), which last has spread from the Rio Grande on to the plateau north of the Lerma System. These only counterbalance the nearctic types which occur south of the Nearctic Region, viz. *Goodea whitii*, *Amiurus balsanus*, *Notropis boucardi*, and *N. aztecus* in the Rio Balsas, *Amiurus meridionalis* and *Ictiobus meridionalis* in the Rio Usumacinta, the latter also in the Rio Papaloapam, and *Lepidosteus tropicus*, ranging from Guatemala to Panama.

The Nearctic and Neotropical Regions are quite distinct, and show no affinity whatever. The former has much in common with the Palæarctic Region, whilst the latter shows relationship only to the Ethiopian. In addition to partly marine groups, such as the Salmonidæ and Gastrosteidæ, there are several families of true fresh-water fishes common to the Palæarctic and Nearctic Regions (*e. g.*, Esocidæ, Cyprinidæ, Percidæ, &c.). The latter is characterized by some endemic families (Hiodontidæ, Amblyopsidæ, Percopsidæ, and Aphredoderidæ), by the numerous dwarfed Percidæ (*Etheostoma*, &c.) and the great development of the Cyprinodontinæ (partly marine), and by three groups of fishes which are almost peculiar to this region, viz. Catostominæ, Siluridæ of the genera *Amiurus*, *Noturus*, &c., and Centrarchidæ. The first two are also found in

* *Cichlosoma labridens*, *C. bartoni*, *C. steindachneri*, *Herichthys cyanoguttatus*, and *H. pavonaceus*.

Eastern Asia, whilst to the last-named family has been referred a marine Indo-Pacific genus, with fresh-water representatives in Australia.

The Nearctic Region may be divided into three sub-regions, the first corresponding to the United States west of the Rocky Mountains and Northern Mexico to the west of the Sierra Madre. This, the Californian sub-region, is especially remarkable for the paucity of true fresh-water fishes. Esocidæ and Percidæ, in addition to the endemic nearctic families, are entirely absent, whilst the Siluridæ and Centrarchidæ are each represented by only a single species. The Cyprinidæ are fairly abundant, several peculiar generic types inhabiting this sub-region.

The fish-fauna of the rivers of Sonora and Sinaloa is very little known; the few fishes which have been recorded from the Rio Sonora show that its fauna is similar to that of the Rio Colorado, and the same may be said of that part of the Rio Yaqui which drains the western slope of the Sierra Madre. Only two strictly fresh-water fishes are known from streams of Sinaloa and Jalisco to the west of the Sierra Madre; one of these (*Cichlosoma beani*) is a neotropical type, the other (*Moxostoma mascotæ*) a nearctic one.

The second sub-region of the Nearctic Region includes Alaska, Canada, the United States east of the Rocky Mountains, and Mexico east of the Sierra Madre and north of the Lerma System. This sub-region may be characterized in nearly the same terms as those used to define the Nearctic Region as a whole: there is a northern zone in which the Salmonidæ are dominant; further south the Cyprinidæ become well established, and in the Mississippi System attain their maximum, together with the Cyprinodontinæ, Centrarchidæ, and Etheostomatinæ; in the Rio Grande a number of characteristic types disappear. These changes in the character of the fish-fauna render it necessary to divide this sub-region into several provinces, the southernmost of which (Rio Grande Province) comprises the Rio Grande System, with the rivers of the Mexican plateau north of the Lerma System and the streams of the Atlantic slope in Tamaulipas and Northern Vera Cruz.

A number of streams in Chihuahua and Durango flow in the direction of the Rio Grande, but never reach it, terminating in lakes which vary in magnitude according to the season. As has been pointed out by Dr. Meek, the nature of the fish-fauna justifies the supposition that these rivers were formerly tributaries of the Rio Grande. For a similar reason he considers that the portions of the Yaqui and Mezquital Rivers to the east of the Sierra Madre also at one time belonged to the Rio Grande System, and that

a cutting back of the western rivers has resulted in their capture, with the result that the eastern rivers with which they were formerly connected have diminished in size and fail to reach the main stream.

The Rio Grande Province differs from the Mississippi Province principally in the paucity of types. Not one of the endemic nearctic families is present; the Esocidæ are absent, and the Percidæ and Centrarchidæ are represented by a few species only. A considerable proportion of the true fresh-water fishes belong to the Cyprinidæ, whilst the presence of Cichlidæ and Characinidæ is a positive feature which distinguishes this area from other parts of the Nearctic Region.

The Rio Lerma System (excluding the Rio Grande de Santiago below the falls, and properly including, as Dr. Meek has shown, the Rio San Juan, a tributary of the Panuco, as well as the isolated lakes in the States of Michoacan and Mexico) has so peculiar a fish-fauna that it may be regarded as a separate sub-region of the Nearctic Region.

The viviparous Cyprinodontidæ of the sub-family Characondontinæ are characteristic of and nearly peculiar to this, the Lerma, Sub-region, in which the Atherinid genus *Chirostoma* is represented by a number of species which show a remarkable diversity. Both these groups are probably derived from marine ancestors which entered the river at a remote epoch; none of the marine types (Gobiidæ, Mugilidæ, &c.) which are found at the present day in neighbouring rivers, such as the Balsas and Panuco, have been able to make their way into the Lerma System, from which neotropical fishes are also absent.

The Cyprinidæ of this sub-region differ considerably from those of the Rio Grande, as five of the seven genera are endemic. With the exception of a Cat-fish (*Amiurus*) and a Lamprey (*Lampetra*), all the fishes of the Lerma Sub-region belong to the three groups already mentioned.

Below, in comparing some of the shore-fishes of the Pacific and Atlantic coasts of Central America, it is shown that in many cases D. S. Jordan's generalization—to the effect that a form occurring in a certain area has as its nearest relative a form inhabiting a neighbouring area separated by some sort of barrier from the first—holds good. In such cases isolation appears to have been a factor in determining specific differentiation.

Jordan's generalization also holds good for many groups of fresh-water fishes, but for many others it does not. As examples of the latter we may instance the Cichlid fauna of Lakes Managua and Nicaragua and the greater part of the fish-fauna of the Lerma System.

All the Cyprinodontidæ and Atherinidæ of the Lerma System appear to have evolved therein, in all probability each from a single prototype.

Of the fourteen species of *Chirostoma*, at least eleven, and probably all the fourteen, occur together in Lake Chapala; several of these species are very closely related and it is by no means easy to distinguish between them; some of the specific characters appear to be adaptive—*e. g.*, the lower jaw is short in *C. promelas* and strongly projecting in *C. ocotlane*, whilst *C. sphyræna* is remarkable for its strong dentition; such characters may have arisen during physiological isolation.

The Neotropical Region.

The families Lepidosirenidæ, Characinidæ, Cichlidæ, and Polycentridæ are either almost or entirely restricted to the Neotropical and Ethiopian Regions, as are the Siluridæ of the groups Pimelodinæ and Doradinæ.

The Neotropical Region is especially characterized by the great development of the Characinidæ and Siluridæ, and by the presence of endemic families derived from them. The Characinidæ are represented by an extraordinary variety of endemic types, and they have given rise to the Gymnotidæ; the neotropical Siluridæ include several sub-families peculiar to this region, and from them the endemic families Loricariidæ and Aspredinidæ have evolved.

The Neotropical Region may be held to include three principal divisions, which may be termed the Patagonian, Brazilian, and Central-American Sub-regions. The fish-fauna of Chili and Patagonia is chiefly remarkable for the scarcity of true neotropical types; in Southern Mexico and Central America several South-American groups are absent, but this sub-region is characterized also by the presence of a few nearctic fishes and by the development of a number of peculiar Cichlidæ and Cyprinodontidæ.

Our knowledge of the fresh-water fishes of the Central-American Sub-region is so incomplete that any division of this area into provinces can only be provisional. The Rio Balsas with its tributaries forms a province defined by the presence of some nearctic types (*Goodea*, *Amiurus*, *Notropis*) and by the scarcity or absence of typical Central-American groups (Cichlidæ represented by a single species; Pimelodinæ, *Belonesox* and *Xiphophorus* absent).

The Rio San Juan, with Lakes Managua and Nicaragua, may perhaps be regarded as a province (San Juan Province) characterized by the peculiar Cichlid fauna; the region to the north of these right up to and including the Papaloapam System forms another province, defined by the presence of three nearctic fishes (viz. one species each of *Amiurus*, *Ictiobus*, and *Lepidosteus*), by numerous Cichlidæ of the genus *Cichlosoma*,

and by some peculiar Cyprinodonts, such as *Belonesox* and *Xiphophorus*. This may be termed the Guatemalan Province. Costa Rica and Panama comprise a fourth province, in which many of the South-American types attain their northern limit (e. g., *Acara* and *Geophagus* of the Cichlidæ, *Curimatus*, *Gastropelecus* and some other Characinidæ, the Loricariidæ). In this, the Isthmian Province, the only nearctic form is *Lepidosteus tropicus*.

5. The Shore-Fishes of the Atlantic and Pacific Coasts of Mexico and Central America.

There is a great similarity between the fishes found on the Atlantic and Pacific coasts of Central America. It was formerly stated that a considerable proportion of the species were the same on both coasts, but in recent years the number of supposed identical species has been greatly reduced by more detailed comparison.

In the present work only those groups of shore-fishes which enter fresh water are considered; as a result of my studies on these I am inclined to think that if we eliminate pelagic or semi-pelagic fishes of wide distribution, very few species will be found to be identical on both coasts, and that these will probably be fishes which enter rivers for considerable distances. Such fishes may have become involved in those geological changes which have led to the occurrence of the same fresh-water species in rivers of the Atlantic and Pacific Slopes.

Many of the species which were formerly considered to be the same on both coasts are now found to be distinguished by slight but constant differences. In such cases, where an Atlantic species is more closely related to a Pacific one than to any on its own side, it is reasonable to suppose that both are derived from a parent species which inhabited the neighbouring parts of the two oceans at the time when there was a connection between them. Such a marine connection appears to have existed in the Eocene over what is now the Isthmus of Panama, and there are good reasons for believing that it ceased at the beginning of the Miocene.

A comparison of the shore-fishes of the two coasts should therefore give data as to the nature of the specific characters which may arise during isolation and as to the time required for specific differentiation in certain groups.

The following species are included in the systematic part of the present work and may be paired together, the members of each pair satisfying the definition that they are more closely related than either is to any other species, and that they represent each other on the Atlantic and Pacific coasts :—

Pacific.	Atlantic.
1. *Philypnus maculatus.*	*P. dormitator.*
2. *Eleotris picta.*	*E. pisonis.*
3. *Dormitator latifrons.*	*D. maculatus.*
4. *Gobioides peruanus.*	*G. broussonetii.*
5. *Gerres simillimus.*	*G. cinereus.*
6. *Gerres californiensis.*	*G. harengulus.*
7. *Gerres peruvianus.*	*G. olithostomus.*
8. *Gerres lineatus.*	*G. plumieri.*
9. *Centropomus medius.*	*C. pectinatus.*
10. *Centropomus viridis.*	*C. undecimalis.*
11. *Centropomus robalito.*	*C. ensiferus.*
12. *Centropomus unionensis.*	*C. altus.*
13. *Pomadasis bayanus.*	*P. crocro.*
14. *Mugil thoburni.*	*M. incilis.*
15. *Ælurichthys scutatus.*	*Æ. isthmensis.*
16. *Ælurichthys pinnimaculatus.*	*Æ. bagre.*
17. *Galeichthys guatemalensis.*	*G. assimilis.*
18. *Arius liropus.*	*A. melanopus.*

In several cases there is identity in the number of fin-rays, scales (when present), and gill-rakers between the members of a pair of species. This applies to the following:—*Dormitator maculatus* and *D. latifrons*, *Gerres lineatus* and *G. plumieri*, *Centropomus robalito* and *C. ensiferus*, *Centropomus unionensis* and *C. altus*, *Mugil thoburni* and *M. incilis*, *Ælurichthys scutatus* and *Æ. isthmensis*, *Galeichthys guatemalensis* and *G. assimilis*, *Arius melanopus* and *A. liropus*.

In other cases there is agreement in the number of fin-rays and of gill-rakers, but not of the scales (e. g., *Gerres simillimus* and *G. cinereus*, *Gerres peruvianus* and *G. olithostomus*, *Centropomus medius* and *C. pectinatus*, *Pomadasis bayanus* and *P. crocro*). In the last pair the slight difference in the size of the scales is uniform; a longitudinal or transverse count on any part of the body will probably give a larger number for the Pacific form. In *Centropomus medius* and *C. pectinatus* the scales differ in number only above the lateral line, especially anteriorly, where they are always smaller in the Atlantic species. *Gerres peruvianus* is identical in scaling with *G. olithostomus*, except in the thoracic region, where it has distinctly fewer and larger scales, whilst the only tangible difference in the scaling of *Gerres simillimus* and *G. cinereus* is the constant presence in the latter of 5 or $5\frac{1}{2}$ instead of 4 series of scales above the lateral line.

Gerres californiensis and *G. harengulus* are two species which agree in the number

of scales and fin-rays, but the latter appears to have constantly 8 gill-rakers on the lower part of the anterior arch, whilst the former has 7.

Centropomus viridis and *C. undecimalis* agree in the number of scales and gill-rakers, but the former appears to have a ray less in the second dorsal fin. A similar difference is found between *Philypnus maculatus* and *P. dormitator*, the former having a ray more in the anal fin.

The members of each pair of species in all cases differ from each other in at least one more or less tangible "substantive" character, such as the relative depth of the body, length of the head, size of the mouth, length of the fin-rays, or size of the teeth.

When there is agreement in all the characters which can be numerically expressed and the distinction appears to rest on a single feature, as in the case of *Dormitator latifrons*, separated from *D. maculatus* by the larger head, or *Gerres lineatus*, differing from *G. plumieri* in the less elevated dorsal fin, the two forms can scarcely be regarded as more than sub-specifically distinct.

In other cases the Atlantic and Pacific forms differ in two tangible characters, e. g. *Gerres olithostomus* and *G. peruvianus*, the latter of which is distinguished by the larger scales in the thoracic region and the somewhat smaller mouth. From such pairs of species we pass to others, the members of which may be separated by three, four, or more tangible characters.

From the data given above we may conclude that a greater or less amount of change may take place in a species when isolated for a considerable period, and that some of the changes which take place may be non-adaptive.

The fact that in so many cases species on opposite coasts may be paired is more in harmony with the view that there has been a gradual modification during isolation than with the supposition that a "mutant" has arisen which has replaced the parent form.

C. T. R.

February 1908.

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* Figured on Tab. XIII. fig. 2 as a form of *P. sphenops*.

ZOOLOGIA.

Class PISCES.

Sub-class I. TELEOSTOMI.

Order I. TELEOSTEI.

Sub-order I. ACANTHOPTERYGII.

It has been found convenient to commence an account of the Fresh-water Fishes of Mexico and Central America with the Acanthopterygii, which may be recognized by the thoracic or jugular position of the ventral fins, the pelvic bones being directly attached to the clavicles.

The Acanthopterygian fresh-water fishes of Mexico and Central America may be referred to their families by means of the following key:—

I. Head asymmetrical, with the two eyes on one side; fins without spines . 1. Pleuronectidæ.

II. Head symmetrical.

A. Gill-openings restricted, the gill-membranes attached to the isthmus.

Ventral fins widely separated, jugular; dorsal and anal fins short, without spinous rays . . . . . 2. Gobiesocidæ.

Ventral fins not widely separated, thoracic; two dorsals or the dorsal fin long . . . . . 3. Gobiidæ.

B. Gill-membranes free from the isthmus.

1. Anal fin with 3 spines, 2 of which are detached from the rest of the fin . . . . . 4. Carangidæ.

2. Anal fin not preceded by free spines.

a. A single nostril on each side. Dorsal with XIV–XIX 7–15 * rays. Anal with III–XII 6–12 rays . . . . . 5. Cichlidæ.

* The Roman numerals indicate the number of spines, the Arabic figures the number of articulated rays.

b. Two nostrils on each side.

α. Spinous part of the dorsal fin considerably shorter than the soft-rayed part; anal with 1 or 2 spines . . . . . 6. Sciænidæ.

β. Spinous part of the dorsal fin not shorter or not much shorter than the soft-rayed part.

* Ventral fins without scaly axillary processes.

Two dorsals, with VI–XVII, 8–17 rays; anal with I–II 6–12 rays . . . . 7. Percidæ.
A single dorsal, with X–XI 10–13 rays; anal with III 8–12 rays . . . . 8. Centrarchidæ.

** A scaly process at the base of the spine of each ventral fin.

A single dorsal with IX 10 rays; anal with II–III 7–9 rays . . . . . 9. Lognathidæ *.
A single dorsal with X–XIV 10–18 rays; anal with III 7–13 rays . . . . 10. Pomadasidæ.
Two dorsals, with VIII, I 9–11 rays; anal with III 6–7 rays . . . . . 11. Centropomidæ.

In all cases the account of the species is based on an examination of the examples in the British Museum Collection; but in the case of groups which have already been adequately described a synopsis only is given, with references to the works in which more details are to be found.

Fam. 1. PLEURONECTIDÆ.

The Flat-fishes are a large family, at once distinguished from all other fishes by the asymmetrical head, with the two eyes on one side. They are mostly marine, but many ascend rivers for considerable distances. In Mexico and Central America four species have been recorded as occurring in rivers above the regions affected by the tides, and must therefore be included in an account of the fresh-water fishes.

1. CITHARICHTHYS, Bleeker, 1862.

Citharichthys, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2678.

Eyes on the left side. Mouth moderately large; each jaw with a single series of small pointed teeth; palate toothless. Scales moderate or small, feebly ctenoid, deciduous; lateral line nearly straight. Dorsal commencing just in front of the eye and posteriorly free from the caudal; left ventral median, but not continuous with the anal; pectorals well-developed.

1. **Citharichthys gilberti**, Jenkins & Evermann, 1888.

Citharichthys gilberti, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2686.

Depth of body about 2 in the length, length of head $3\frac{1}{3}$ to $3\frac{2}{3}$. Snout as long as or a little longer than eye, the diameter of which is $4\frac{2}{3}$ to $5\frac{1}{2}$ in the length of head; interorbital region a narrow, shallow groove, bordered by the slightly elevated orbital margins; maxillary extending to below middle of eye; gill-rakers of moderate length, 12 to 14 on the lower part of the anterior arch. 38 to 45 scales in a longitudinal series. Dorsal 77–85. Anal 57–63. Left pectoral as long or nearly as long as the postorbital part of head; right pectoral shorter; caudal doubly truncate. Light brown, spotted or marbled with darker.

Hab. Pacific Coast from Guaymas, Mexico, to Ecuador, entering rivers.

My description is based on four specimens, 110 to 160 mm. in total length, from

* Usually known as Gerridæ, a family name preoccupied in Hemiptera.

Mazatlan, Chiapas, and the Rio Sapayo, Ecuador. The very closely allied *C. spilopterus*, Günth., 1862, from the Atlantic coast, differs in having the head somewhat shorter and the eyes a little smaller, whilst the scales are usually more numerous; it appears to be more strictly marine than its Pacific representative.

2. ACHIRUS, Lacep., 1803.

Achirus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2693.

Eyes on the right side, small, close together. Mouth small; jaws with small teeth on the left side, but not on the right; palate toothless. Scales small, adherent, strongly ctenoid; lateral line straight. Dorsal commencing on the snout, posteriorly free from the caudal; right ventral median and continuous with the anal; pectorals small or absent; caudal rounded.

The three species known to occur in the rivers of Mexico and Central America are closely allied, and differ little in the size of the scales (65 to 85 in a longitudinal series), the number of fin-rays (dorsal 50–60, anal 36–46), or the coloration (brownish, usually spotted or clouded with darker and with very narrow blackish transverse stripes). Their distinctive features are shown in the following key:—

I. Depth of body $1\frac{1}{2}$ to $1\frac{3}{5}$ in the length; right pectoral present . . . . . 1. *mazatlanus.*

II. Depth of body $1\frac{3}{4}$ to 2 in the length.

Right pectoral present . . . . . 2. *fonsecensis.*

No pectoral fins . . . . . 3. *fasciatus.*

1. **Achirus mazatlanus,** Steind., 1869.

Achirus mazatlanus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2698.

Hab. Pacific Coast of Mexico, entering rivers.

I have examined three specimens, 70 to 140 mm. in total length, from Presidio and Mazatlan.

2. **Achirus fonsecensis,** Günth., 1862.

Solea fonsecensis, Günth. Cat. Fish. iv. p. 475 (1862).

Achirus fonsecensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2699.

Hab. Pacific Coast of Mexico and Central America, entering rivers.

I have examined the type, a specimen of 110 mm., from the Gulf of Fonseca, and some small examples from the Rio Presidio.

3. **Achirus fasciatus,** Lacep., 1803.

Solea achirus, Günth. Cat. Fish. iv. p. 476 (1862).

Achirus fasciatus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2700.

Hab. Atlantic Coasts of the Southern United States and Mexico, entering rivers.

I have examined six examples, measuring up to 120 mm. in total length, from various localities.

Fam. 2. GOBIESOCIDÆ.

The Cling-fishes are small marine fishes, easily recognizable by the naked body, the short dorsal and anal fins without spinous rays, the widely separated ventral fins, which are jugular in position, and by the small gill-openings. They have an adhesive ventral disc, by means of which they adhere to stones or shells. They are usually found between tide-marks; but Pellegrin (Bull. Mus. Paris, vii. 1901, p. 206) has recorded that a species which he identifies with *Gobiesox adustus*, Jord. & Gilb., originally described from Mazatlan, is common in rapid streams near Tepic, Jalisco, and in the Rio Grande de Santiago.

Fam. 3. GOBIIDÆ.

A large family, chiefly marine, but with representatives in the fresh waters of all parts of the world. The Gobiidæ may easily be distinguished from other Acanthopterygians found in the rivers of Mexico and Central America by the following peculiarities:—The spinous portion of the dorsal fin is composed of a few slender non-articulated rays; the anal fin is preceded by a single slender spine; the pectoral is symmetrical and has a broad, subvertical base; the ventrals, inserted below the base of the pectorals, consist each of a short feeble spine and of five branched rays; the gill-openings are restricted, the gill-membranes being more or less broadly attached to the isthmus.

Synopsis of the Genera represented in the Fresh Waters of Mexico and Central America.

I. Ventral fins separate.

Jaws with bands of pointed teeth; vomer with teeth; lower jaw projecting; gill-openings extending forward to below the eye . . . . 1. PHILYPNUS.

Jaws with bands of pointed teeth; palate toothless; lower jaw projecting; gill-openings not extending forward to below the eye . . 2. ELEOTRIS.

Jaws with bands of movable, slender teeth with truncate apices; palate toothless; jaws equal anteriorly; gill-openings not extending forward to below the eye . . . . . 3. DORMITATOR.

II. Ventral fins united to form a disc.

A. Two dorsal fins.

1. Each jaw with a series of numerous slender teeth, those in the lower jaw horizontal and sometimes hidden by the gum; lower jaw with an inner series of a few erect conical teeth . . . . . 4. SICYDIUM.

2. Jaws with bands of pointed teeth.

Two or three fleshy flaps on the anterior edge of pectoral arch, projecting into the gill-cavity . . . . . 5. CHONOPHORUS.

No dermal flaps on the pectoral arch . . . . . 6. GOBIUS.

B. A single dorsal fin . . . . . 7. GOBIOIDES.

1. PHILYPNUS, Cuv. & Val., 1837.

Philypnus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2194.

Body elongate, compressed or subcylindrical; head elongate, more or less depressed. Mouth large, oblique; lower jaw projecting; jaws with pointed teeth in bands, the outermost series erect, fixed, somewhat recurved, the inner series depressible; vomer with a broad crescentic patch of small pointed teeth. Eyes moderate or rather small; interorbital region rather broad. Gill-openings wide, extending forward to below the eyes. Scales ctenoid, rather small, covering the body and the greater part of the head. Two dorsals, with VI, I 9 rays; anal with I 9–10 rays; caudal rounded; pectoral of moderate length, symmetrical, rounded; ventrals well separated, each with a short concealed spine and 5 branched rays.

This genus consists of two species only, which appear to be principally fluviatile, but enter the sea. In both the development of the soft vertical fins is subject to great sexual variation, the males having these fins larger, the second dorsal especially being much more elevated than in the females.

1. **Philypnus dormitator.**

Gobiomorus dormitor, Lacep. Hist. Nat. Poiss. ii. p. 599 (1798) [1]; Jord. & Eigenm. Proc. U.S. Nat. Mus. 1886, p. 482 [2]; Eigenm. & Eigenm. Proc. Cal. Ac. (2) i. 1888, p. 52 [3].

Platycephalus dormitator, Schneider, Bloch's Syst. Ichth. p. 60, t. 12 (1801) [4].

Eleotris dormitatrix, Cuv. Règne Anim. ed. 2, ii. p. 246 (1829) [5]; Günth. Cat. Fish. iii. p. 119 (1861) [6].

Philypnus dormitator, Cuv. & Val. Hist. Nat. Poiss. xii. p. 255 (1837) [7]; Poey, Mem. ii. p. 381 (1856) [8], and Enum. p. 128 (1875) [9]; Girard, U.S. & Mex. Bound. Survey, Ichth. p. 29, t. 12. fig. 13 (1859) [10]; Jord. & Gilb. Synopsis, p. 631 (1883) [11]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2194, fig. 781 [12].

Eleotris longiceps, Günth. Proc. Zool. Soc. 1864, p. 151 [13], and Trans. Zool. Soc. vi. 1869, p. 440 [14].

Philypnus dormitor (part.), Meek, Zool. Pub. Columbian Mus. v. 1904, p. 226 [15].

Depth of body 5 to 6 in the length, length of head 3 to $3\frac{1}{4}$. 57 to 68 scales in a longitudinal series, 26 to 31 from interorbital region to origin of anterior dorsal. Dorsal VI, I 9. Anal I 9. Caudal peduncle 2 to $2\frac{1}{2}$ as long as deep. Body marbled with brownish, sometimes with an irregular dark band from operculum to base of caudal, sometimes with light spots on the lower part of the sides; fins with series of dark spots.

Hab. Atlantic Coast Rivers from Texas to Surinam, and also in West-Indian Islands: Rio Grande [10]; Rio Soto la Marina [15]; Rio Panuco [15]; Rio Motagua (*Salvin*); Lake Yzabal (*Salvin*); Lake Nicaragua (*Salvin* [13 14]).—Cuba [8 9]; Jamaica [6]; Haiti [7]; Porto Rico [7]; Dominica; Martinique [4 7]; St. Vincent; Barbados [6]; Trinidad.

Here described from several specimens, 120 to 330 mm. in total length, including the type of *Eleotris longiceps*, from Southern Mexico, Lake Yzabal, the Rio Motagua, and Lake Nicaragua.

2. **Philypnus maculatus.** (Tab. I. fig. 2.)

Lembus maculatus, Günth. Cat. Fish. i. p. 505 (1859) [1], and Proc. Zool. Soc. 1860, p. 236 [2].

Philypnus lateralis, Gill, Proc. Ac. Philad. 1860, p. 123 [3]; Jord. & Gilb. Proc. U.S. Nat. Mus.

1881, p. 232 [4], and 1882, pp. 368 [5], 372 [6], 377 [7], and 380 [8]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2195 [9].

Eleotris lembus, Günth. Cat. Fish. iii. p. 121 (1861) [10].

Eleotris lateralis, Günth. t. c. p. 122 [11].

Gobiomorus lateralis, Eigenm. & Fordice, Proc. Ac. Philad. 1885, p. 69 [12]; Jord. & Eigenm. Proc. U.S. Nat. Mus. 1886, p. 482 [13]; Eigenm. & Eigenm. Proc. Cal. Ac. (2) i. 1888, p. 51 [14].

Gobiomorus maculatus, Eigenm. & Fordice, t. c. p. 70 [15].

Philypnus dormitor (part.), Meek, Zool. Pub. Columbian Mus. v. 1904, p. 226 [16].

Depth of body $3\frac{2}{3}$ to 5 in the length, length of the head $2\frac{3}{4}$ to 3. 55 to 60 scales in a longitudinal series, 20 to 24 from interorbital region to origin of anterior dorsal. Dorsal VI, I 9. Anal I 10. Caudal peduncle $1\frac{1}{2}$ to 2 as long as deep. Body usually spotted or marbled with dark brownish and with a more or less distinct dark longitudinal band from eye to base of caudal; an oblique dark stripe from eye across the præorbital; a vertical stripe from eye to corner of mouth; a dark spot on the upper part of the base of pectoral; soft vertical fins with or without series of small dark spots on the interradial membranes, sometimes with series of light spots.

Hab. Pacific Coast Rivers from California to Ecuador:

Cape St. Lucas [3 4 5].—Rio Presidio [9]; Colima [6]; Tehuantepec [16]; San José [8]; Panama [7].—Ecuador [1 2 10].

Here described from six specimens, 128 to 215 mm. in total length, from Presidio and Ecuador, including the types of the species.

This species has the head and body more compressed than its Atlantic congener, and has constantly a ray more in the anal fin.

2. ELEOTRIS, Gronow, 1763.

Guavina and *Eleotris*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, pp. 2198 & 2199.

Body elongate, subcylindrical, more or less compressed posteriorly; head broad, more or less depressed. Mouth large, oblique; lower jaw projecting; jaws with small pointed teeth in bands; palate toothless. Eyes rather small; interorbital region broad. Gill-openings moderately wide, extending forward to below the angle of præoperculum, the gill-membranes attached to the isthmus. Scales small or moderate, ctenoid or cycloid; no lateral line. Two dorsals, with VI–VII, I 7–13 rays; anal with I 7–13 rays; caudal rounded; pectoral symmetrical, rounded; ventrals well separated, each with a short feeble spine and 5 branched rays.

This widely distributed tropical genus comprises several species, some of which are strictly marine, whilst some enter rivers, and others appear to be permanently fluviatile. The three species which are known to occur in the rivers of Mexico and Central America may be distinguished thus:—

I. D. VII, I 10. A. I 10. 95 to 110 scales in a longitudinal series; no præopercular spine . . . . . 1. *guavina*.

II. D. VI, I 8. A. I 8. 55 to 70 scales in a longitudinal series; a small concealed antrorse spine at the angle of the præoperculum.

Depth of body 4 to $4\frac{2}{3}$ in the length . . . . . 2. *pisonis*.

Depth of body 5 to 6 in the length . . . . . 3. *picta*.

1. **Eleotris guavina** *.

Eleotris guavina, Cuv. & Val. Hist. Nat. Poiss. xii. p. 223 (1837) [1]; Günth. Cat. Fish. iii. p. 124 (1861) [2]; Poey, Repert. i. p. 337 (1867) [3], Syn. p. 395 (1868) [4], and Enum. p. 127 (1875) [5].

Guavina guavina, Eigenm. & Fordice, Proc. Ac. Philad. 1885, p. 73 [6]; Jord. & Eigenm. Proc. U.S. Nat. Mus. 1886, p. 483 [7]; Eigenm. & Eigenm. Proc. Cal. Ac. (2) i. 1888, p. 54 [8]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2198 [9].

Depth of body 4 to 5 in the length, length of head $3\frac{3}{5}$ to 4. No præopercular spine. Dorsal VII, I 10. Anal I 10. 95 to 110 scales in a longitudinal series. Uniformly brownish (in spirit).

Hab. Atlantic Coasts and Rivers from Mexico and Cuba to Southern Brazil:

Central America [8]; Turbo [8]; Demerara [2]; Brazil [8]; Cuba [3 4 5]; Martinique [1]; Barbados [8].

Here described from two specimens, 150 and 220 mm. in total length, from Demerara.

2. **Eleotris pisonis.**

Gobius pisonis, Gmelin, Linn. Syst. Nat. p. 1206 (1788) [1].

Gobius amorea, Walbaum, Artedi Pisc. iii. p. 205 (1792) [2].

Eleotris pisonis, Schneid. Bloch's Syst. Ichth. p. 68 (1801) [3]; Eigenm. & Fordice, Proc. Ac. Philad. 1885, p. 75 [4]; Jord. & Eigenm. Proc. U.S. Nat. Mus. 1886, p. 483 [5]; Eigenm. & Eigenm. Proc. Cal. Ac. (2) i. 1888, p. 55 [6]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2201 [7]; Meek, Zool. Pub. Columbian Mus. v. 1904, p. 228 [8].

Eleotris gyrinus, Cuv. & Val. Hist. Nat. Poiss. xii. p. 220, t. 356 (1837) [9]; Girard, U.S. & Mexico Bound. Survey, Ichth. p. 28, t. 12. figs. 11 & 12 (1859) [10]; Günth. Cat. Fish. iii. p. 122 (1861) [11]; Poey, Repert. i. p. 336 (1867) [12], Syn. p. 395 (1868) [13], and Enum. p. 127 (1875) [14]; Jord. & Gilb. Synopsis, p. 631 (1883) [15].

Culius perniger, Cope, Proc. Am. Phil. Soc. 1870, p. 473 [16].

Culius belizianus, Sauv. Bull. Soc. Philom. 1879, p. 55 [17]; Eigenm. & Fordice, l. c. [18]; Eigenm. & Eigenm. l. c. [19].

Eleotris perniger, Eigenm. & Eigenm. l. c. [20]; Jord. & Everm. t. c. p. 2201 [21].

Depth of body 4 to $4\frac{2}{3}$ in the length, length of head 3 to $3\frac{1}{2}$. A small concealed antrorse spine at the angle of the præoperculum. Dorsal VI, I 8. Anal I 8. 54 to 67 scales in a longitudinal series.

Hab. Atlantic Coasts and Rivers from Florida to Southern Brazil †:

Florida [6]; Rio Grande [10]; Vera Cruz [8]; Boca del Rio [8]; Belize [17].—Surinam [9]; Brazil [1 6]; Cuba [4 6 12 13 14]; Haiti; Dominica [6 9]; Martinique [6 9]; St. Vincent [6]; St. Christopher [6].

Here described from several specimens from Haiti, St. Vincent, Dominica, and Pernambuco, measuring up to 160 mm. in total length. This series of examples includes some with the cheeks wholly or partially naked, corresponding to *E. perniger*, and others which closely approach *E. abacurus*, Jord. & Gilb., in the small number of scales in a longitudinal series.

E. amblyopsis, Cope, is a closely allied species, but appears to have larger scales.

* *Eleotris brasiliensis*, Sauv., 1880, is probably not distinct from *E. guavina*.

† This or a very similar species has been recorded from West-African rivers.

3. **Eleotris picta.**

Eleotris picta, Kner & Steind. Abhandl. Bayern Ak. 1864, p. 18, t. 3. fig. 1 [1].
Culius æquidens, Jord. & Gilb. Proc. U.S. Nat. Mus. 1881, p. 461 [2], and 1882, pp. 372 [3] & 380 [4].
Eleotris æquidens, Eigenm. & Fordice, Proc. Ac. Philad. 1885, p. 76 [5]; Jord. & Eigenm. Proc. U.S. Nat. Mus. 1886, p. 483 [6]; Eigenm. & Eigenm. Proc. Cal. Ac. (2) i. 1888, p. 55 [7].
Eleotris pictus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2201 [8].

Depth of body 5 to 6 in the length, length of head 3 to $3\frac{1}{3}$. A small concealed antrorse spine at the angle of the præoperculum. Dorsal VI, I 8. Anal I 8. 60 to 70 scales in a longitudinal series. Back and sides obscurely spotted or clouded with blackish; lower parts with pale spots; fins with series of small dark spots on the rays and with irregular markings on the interradial membranes.

Hab. Pacific Coasts and Rivers from California to Ecuador:
Cape St. Lucas [4]. — Mazatlan [2]; Presidio (*Forrer*); Colima [3]; Rio Bayano, Panama [1].—Ecuador.

Here described from several specimens, measuring up to 380 mm. in total length, from the Rio Presidio and from Ecuador. This species is very close to the Atlantic *E. pisonis*, which has a deeper body and a shorter and broader head.

3. DORMITATOR, Gill, 1862.

Dormitator, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2195.

Body oblong, compressed; head broad, obtuse. Mouth moderate, more or less oblique; jaws equal anteriorly, with bands of small, movable, slender teeth with truncate apices; palate toothless. Eyes rather small; interorbital region broad. Gill-openings moderately wide, extending forward nearly to below the angle of præoperculum, the gill-membranes attached to the isthmus. Scales ctenoid, rather large, covering the body and the greater part of the head; no lateral line. Two dorsals, the first of 7 flexible spines, the second of a slender spine and 8 branched rays; anal similar to the second dorsal, with a slender spine and 9 or 10 branched rays; caudal rounded; pectoral of moderate length, symmetrical, rounded; ventrals below the base of the pectorals, close together but not united, each with a short concealed spine and 5 branched rays.

This genus is now usually considered to contain a single species, subject to considerable variation in form and colour. I find, however, that it is always possible to distinguish between specimens from the Atlantic and Pacific, and, although the differences are but slight, the two forms may provisionally be recognized as specifically distinct.

1. **Dormitator maculatus.**

Sciæna maculata, Bloch, Ausl. Fische, t. 299. fig. 2 (1790) [1]; Schneid. Bloch's Syst. Ichth. p. 80 (1801) [2].
Eleotris mugiloides, Cuv. & Val. Hist. Nat. Poiss. xii. p. 226 (1837) [3].
Eleotris grandisquama, Cuv. & Val. t. c. p. 229 [4]; Günth. Cat. Fish. iii. p. 113 (1861) [5].
Eleotris sima, Cuv. & Val. t. c. p. 232 [6]; Günth. l. c. [7].
Eleotris somnolentus, Girard, Proc. Ac. Philad. 1858, p. 169 [8], and U.S. & Mex. Bound. Survey, Fish. p. 28, t. 12. figs. 1–3 (1859) [9]; Günth. t. c. p. 557 [10].
Eleotris omocyaneus, Poey, Mem. ii. p. 269 (1860) [11].

Eleotris gundlachi, Poey, t. c. p. 272 [12].
Eleotris maculata (part.), Günth. t. c. p. 112 [13].
Dormitator lineatus, Gill, Proc. Ac. Philad. 1863, p. 271 [14].
Dormitator gundlachi, Poey, Synopsis, p. 396 (1868) [15], and Enum. p. 128 (1875) [16].
Dormitator omocyaneus, Poey, l. c. [17] and l. c. [18].
Dormitator maculatus (part.), Jord. & Gilb. Synopsis, p. 632 (1883) [19]; Jord. & Eigenm. Proc. U.S. Nat. Mus. 1886, p. 482 [20]; Eigenm. & Eigenm. Proc. Cal. Ac. (2) i. 1888, p. 52 [21]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2196 [22]; Meek, Zool. Pub. Columbian Mus. v. 1904, p. 227 [23].
Dormitator maculatus, Eigenm. & Fordice, Proc. Ac. Philad. 1885, p. 71 [24].

Depth of body $2\frac{2}{3}$ to $3\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$ (young) to 4 (adult). 33 to 38 scales in a longitudinal series. Dorsal VII, I 8. Anal I 9–10. Soft vertical fins, especially the second dorsal, more developed in males than in females. Body irregularly marbled or with alternate light and dark oblique cross-bars; sometimes a longitudinal band from operculum to base of caudal; sometimes dark longitudinal lines along the series of scales; a dark, nearly vertical stripe from eye to corner of mouth; usually 3 or 4 dark horizontal stripes across the cheek and operculum; a dark humeral spot; a dark bar at the base of the pectoral; vertical fins dusky, sometimes light-edged, the spinous dorsal, anal and caudal sometimes, the soft dorsal always with series of spots.

Hab. Atlantic Coasts and Rivers of the Atlantic Slope from Carolina to Para, and also in the West-Indian Islands:

Savannah [14].—Rio Grande [8 9]; Vera Cruz [6]; Cordova [10]; Boca del Rio [23]; Rio Papaloapam [23].—Cuba [11 12 15 17 18]; Haiti; St. Croix; Martinique [3]; Trinidad [13]; Demerara [13]; Surinam [3].

Here described from several specimens, 100 to 180 mm. in total length, from Southern Mexico, Haiti, and St. Croix.

2. **Dormitator latifrons.** (Tab. I. fig. 3.)

Eleotris latifrons, Richards. Voy. 'Sulphur,' Fishes, p. 57, t. 35. figs. 4–5 (1837) [1].
Eleotris maculata (part.), Günth. Cat. Fish. iii. p. 112 (1861) [2].
Dormitator microphthalmus, Gill, Proc. Ac. Philad. 1863, p. 170 [3].
Eleotris maculata (non Bloch), Günth. Trans. Zool. Soc. vi. 1869, p. 440 [4].
Dormitator maculatus (non Bloch), Jord. & Gilb. Proc. U.S. Nat. Mus. 1881, p. 232 [5], and 1882, pp. 368 [6], 372 [7], 377 [8], & 380 [9], and Bull. U.S. Fish. Comm. 1882, p. 108 [10].
Dormitator maculatus (part.), Jord. & Gilb. Synopsis, p. 632 (1883) [11]; Jord. & Eigenm. Proc. U.S. Nat. Mus. 1886, p. 482 [12]; Eigenm. & Eigenm. Proc. Cal. Ac. (2) i. 1888, p. 52 [13]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2196 [14]; Meek, Zool. Pub. Columbian Mus. v. 1904, p. 227 [15].
Dormitator latifrons, Eigenm. & Fordice, Proc. Ac. Philad. 1885, p. 72 [16].

Length of head 3 (young) to $3\frac{1}{3}$ (adult) in the length of the fish; mouth rather less oblique than in *D. maculatus*, usually entirely below the level of the eye; in other characters showing extreme similarity to the preceding species.

Hab. Pacific Coasts and Rivers of the Pacific Slope, from California to Ecuador:

Cape St. Lucas [5 8].—Presidio (*Forrer*); Mazatlan [9 10 14]; Huamuchal [4] (*Salvin*); Panama [3 7].—Guayaquil [2].

I have examined numerous examples of this form from Presidio, Huamuchal, and Guayaquil, measuring from 110 to 280 mm. in total length.

4. SICYDIUM, Cuv. & Val., 1837.

Sicydium and *Cotylopus*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, pp. 2205 & 2207.
Oreogobius, Bouleng. Ann. Mag. N. H. (7) iv. 1899, p. 126.

Body elongate, subcylindrical. Mouth wide, subterminal, the lower jaw the shorter; lips thick; both jaws with a series of numerous slender teeth, those in the lower jaw horizontal, sometimes completely hidden by the gum; an inner series of erect conical teeth in the lower jaw; palate toothless. Eyes small or of moderate size; interorbital region moderately broad. Gill-openings of moderate width, nearly vertical, not produced forward below. Scales small, ctenoid. Two dorsals, with VI (V–VII), I 10–12 rays; anal with I 9–11; caudal rounded; pectoral symmetrical, rounded; ventrals united to form a disc which is free from the body posteriorly, with a basal membrane which is folded to form a pit anteriorly.

In the males the dorsal fins are more elevated than in the females, whilst the rays of the anterior dorsal are produced into long filaments.

The genus comprises about thirty species from tropical rivers near the sea, three of which are found in Mexico and Central America.

1. **Sicydium salvini.**

Sicydium salvini, Grant, Proc. Zool. Soc. 1884, p. 159, t. 12. fig. 2 [1].
Sicyopterus salvini, Jord. & Eigenm. Proc. U.S. Nat. Mus. 1886, p. 485 [2].
Cotylopus salvini, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2208 [3].
Oreogobius rosenbergii, Bouleng. Ann. Mag. N. H. (7) iv. 1899, p. 126 [4].

Horizontal teeth of lower jaw conspicuous. Scales extending forward on the upper surface of head nearly to the interorbital region; abdomen completely covered with small scales; 68 to 76 scales in a longitudinal series. Dorsal VI, I 10. Anal I 10. Body with broad irregular dark cross-bars and with a more or less distinct dark longitudinal band from pectoral to base of caudal; each scale with a dark spot at the base; dorsal fins dusky, the second usually with numerous small dark spots, which may unite to form a network; anal dusky in the male, in the female pale with a dark intramarginal stripe.

Hab. Panama [1].—Western Ecuador [4].

Here described from five specimens, measuring up to 120 mm., including the types of the species and of *O. rosenbergii*.

2. **Sicydium gymnogaster.**

Sicydium gymnogaster, Grant, Proc. Zool. Soc. 1884, p. 158, t. 11. fig. 2 and t. 12. fig. 6 [1].
Sicyopterus gymnogaster, Jord. & Eigenm. Proc. U.S. Nat. Mus. 1886, p. 485 [2].
Cotylopus gymnogaster, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2207 [3].

Horizontal teeth of lower jaw usually more or less completely concealed beneath a fleshy pad. Scales not extending forward on to the head; abdomen with a median naked area; 60 to 74 scales in a longitudinal series *. Dorsal VI, I 10. Anal I 10. Coloration as in *S. salvini*, but the fins without spots.

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* In three specimens the scales extend forward above to the level of the gill-opening, and in these I count 66 to 74 in a longitudinal series. Usually the scales commence above the pectoral, and consequently this number is fewer.

Hab. Mexico, Michoacan (*Mus. Mexico*), Hacienda del Hobo, Southern Mexico (*Geddes*), Misantla *, Vera Cruz [1] (*Mus. Brit.*).

I have examined several examples, measuring up to 120 mm. in total length.

3. **Sicydium multipunctatum,** nom. nov. (Tab. I. fig. 1.)

Cotylopus punctatus †, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 362 [1].

Horizontal teeth of lower jaw concealed. Scales not extending forward on to the head; abdomen with a median naked area; 85 scales in a longitudinal series. Dorsal VI, I 10. Anal I 11. Head covered with small dark spots; a similar spot on each scale of the body; numerous small dark spots on the dorsal fins and on the base of the pectoral.

Hab. Mexico, Tequixistlan in Oaxaca (*Gadow* [1]).

This species is known only from the type, a specimen 132 mm. in total length.

5. CHONOPHORUS, Poey, 1861.

Awaous, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2234.

Body elongate, little compressed; head naked, elongate; mouth moderate or large, horizontal; jaws equal anteriorly or the lower the shorter, with narrow bands of small pointed teeth and an outer series of more or less distinctly enlarged teeth; palate toothless. Eyes moderate, placed high; interorbital region rather narrow. Gill-opening nearly vertical, placed in front of the base of the pectoral, scarcely produced forward below; 2 or 3 fleshy flaps on the anterior edge of the pectoral arch, projecting into the branchial chamber and covered by the operculum. Scales small or moderate, ctenoid. Two dorsals, with VI, I 9-12 rays; anal with I 9–13 rays; caudal rounded; pectoral symmetrical, rounded; ventrals completely united to form a rounded disc, which is free from the body and has a well-developed basal membrane.

This genus comprises about ten species from the Tropics, all of which enter or reside in rivers. The species are variable and difficult to define; the males differ from the females in having the snout more produced and the mouth larger.

1. **Chonophorus banana.**

? *Gobius taiasica,* Lichtenstein, Berl. Abhandl. 1822, p. 273 [1].

Gobius banana, Cuv. & Val. Hist. Nat. Poiss. xii. p. 103 (1837) [2]; Günth. Cat. Fish. iii. p. 59 (1861) [3]; Steind. Sitzungsb. Ak. Wien, lvi. 1867, p. 351 [4]; Cope, Trans. Am. Phil. Soc. xiv. 1871, p. 473 [5]; Jord. & Gilb. Proc. U.S. Nat. Mus. 1882, pp. 368 & 379 [6].

Gobius martinicus, Cuv. & Val. t. c. p. 105 [7]; Casteln. Anim. Am. Sud, Poiss. p. 26 (1855) [8].

Gobius mexicanus, Günth. t. c. p. 61 [9].

Chonophorus bucculentus, Poey, Mem. ii. p. 275 (1861) [10].

Rhinogobius contractus, Poey, t. c. p. 424 [11], and Enum. p. 125 (1875) [12].

Rhinogobius bucculentus, Poey, Syn. p. 394 (1868) [13], and Enum. p. 125 [14].

Gobius dolichocephalus, Cope, Trans. Am. Phil. Soc. 1869, p. 403 [15].

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* This locality was erroneously given as Mazatlan in the original description.

† The differences in the form of the upper teeth appear to be too much subject to intergradation to serve for generic distinctions. If *Cotylopus* be not recognized, the name *punctatus* must be changed, being preoccupied in *Sicydium* by *S. punctatum,* Perugia, 1896.

Chonophorus taiasica, Jord. & Eigenm. Proc. U.S. Nat. Mus. 1886, p. 500 [16]; Eigenm. & Eigenm. Proc. Cal. Ac. (2) i. 1881, p. 68 [17]; Meek, Zool. Pub. Columbian Mus. v. 1904, p. 233 [18].

Chonophorus mexicanus, Jord. & Eigenm. t. c. p. 501 [19]; Eigenm. & Eigenm. l. c. [20]; Meek, l. c. [21].

Awaous taiasica, Jord. Proc. Cal. Ac. (2) v. 1895, p. 494 [22]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2236 [23]; Jord. & Snyd. Bull. U.S. Fish. Comm. 1900, p. 147 [24]; Meek, Zool. Pub. Columbian Mus. iii. 1902, p. 121 [25].

Awaous mexicanus, Jord. & Everm. t. c. p. 2237 [26].

Depth of body 5 to 6 in the length, length of head 3 to $3\frac{3}{5}$. Dorsal VI, I 10. Anal I 10. 66 to 84 scales in a longitudinal series, 20 to 26 in a transverse series from origin of second dorsal to that of the anal fin. Olivaceous; back and sides with irregular dark spots; sides of head with spots or oblique lines; a dark bar on the upper part of base of pectoral; dorsal, caudal, and pectoral fins with series of dark spots; ventrals and anal immaculate.

Hab. Coasts and Rivers of Tropical America from Southern California to Panama and from Mexico to Brazil, and also in the West-Indian Islands:

Cape St. Lucas [6].—Presidio [22]; Puente de Ixtla; Balsas and Cuautla; Rio Balsas [18 25]; Valles, San Luis Potosi [18]; San Francisco, La Antigua and Perez, Vera Cruz [18 25]; Orizaba [15]; San José [6]; Rio Motagua (*Salvin*); Panama [17].—Cuba [10 11 12 13]; Haiti [2]; Martinique [7 17]; St. Vincent, St. Croix [17]; St. Lucia [17]; Barbados [17]; Trinidad (*Guppy*); Brazil [17].

Here described from several specimens, measuring up to 300 mm.

2. Chonophorus transandeanus.

Gobius transandeanus, Günth. Cat. Fish. iii. p. 62 (1861) [1].

? *Awaous nelsoni*, Everm. Proc. Biol. Soc. Washington, xii. 1898, p. 3 [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2235 [3].

Gobius guentheri, Regan, Ann. Mag. N. H. (7) xii. 1903, p. 629 [4].

Differs from *C. banana* especially in having only from 15 to 18 scales between the origins of the second dorsal and anal fins.

Hab. Western Mexico, Rosario, Sinaloa [2 3].—Western Ecuador [1 4].

G. guentheri was based on male examples, which differ considerably from the females. Probably *A. nelsoni* will prove to be identical with *G. transandeanus*, and the species will be found to occur in all the Pacific Coast streams from Sinaloa to Ecuador.

6. GOBIUS, Linn.

Gobius, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2210.

Body more or less elongate, compressed posteriorly; mouth moderate; jaws with several series of pointed teeth; palate toothless. Eyes placed high; interorbital region not very wide. Gill-opening nearly vertical, in front of the base of pectoral, not or scarcely produced forward below; no fleshy flaps on pectoral arch. Scales usually ctenoid. Two dorsals, the anterior of five to seven spines. Ventrals completely united to form a rounded disc, which is free from the body and has a basal membrane.

The limits of this large and cosmopolitan genus have never been precisely defined. Most of its representatives are marine, but some are fluviatile. Dr. Meek has recently described two species from fresh and brackish waters near Vera Cruz.

1. Gobius parvus.

Gobius parvus, Meek, Zool. Pub. Columbian Mus. v. 1904, p. 230, t. 17 [1].

Dorsal VI 11. Anal 12. 30 scales in a longitudinal series.

Hab. Mexico, Vera Cruz [1].

2. Gobius claytoni.

Gobius claytoni, Meek, t. c. p. 231, t. 17 [1].

Dorsal VI 12. Anal 13. 42 scales in a longitudinal series.

Hab. Mexico, Vera Cruz [1].

7. GOBIOIDES, Lacep., 1798.

Gobioides, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2263.

Body very elongate, compressed posteriorly; head comparatively short; mouth large, oblique; lower jaw more or less distinctly projecting; jaws with bands of small pointed teeth and an outer series of strongly enlarged teeth; palate toothless. Eyes small, placed high; interorbital region rather narrow. Gill-opening nearly vertical, in front of the base of pectoral, not produced forward below. Scales small, cycloid. A single dorsal fin, with V–VII 15–23 rays; anal with I 15–22; caudal pointed; pectoral symmetrical, rounded; ventrals completely united to form a rounded disc, which is free from the body and has a well-developed basal membrane.

Tropical seas, entering rivers.

1. Gobioides broussonetii.

Gobioides broussonetii, Lacep. Hist. Nat. Poiss. ii. p. 580 (1798) [1]; Jord. & Eigenm. Proc. U.S. Nat. Mus. 1886, p. 512 [2]; Bean & Bean, Proc. U.S. Nat. Mus. 1895, p. 631 [3]; Eigenm. & Eigenm. Proc. Cal. Ac. (2) i. 1888, p. 75 [4]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2263 [5].

Amblyopus brasiliensis, Schneid. Bloch's Syst. Ichth. p. 69 (1801) [6]; Cuv. & Val. Hist. Nat. Poiss. xii. p. 121 (1837) [7].

Gobius oblongus, Schneid. t. c. p. 548 [8].

Gobioides barreto, Poey, Mem. ii. p. 282 (1861) [9], Syn. p. 394 (1868) [10], and Enum. p. 125 (1876) [11].

Amblyopus broussonetii, Günth. Cat. Fish. iii. p. 136 (1861) [12].

Amblyopus mexicanus, O'Shaughnessy, Ann. Mag. N. H. (4) xv. 1875, p. 147 [13].

Depth of body 9 or 10 times in the length, length of head 6 to 7. Dorsal VI 16–17; sixth spine separated by considerable interspaces from the fifth and from the first branched ray; last ray adnate to the caudal. Anal I 15–16. Pectoral more than $\frac{1}{2}$ the length of head, shorter than the ventrals. Caudal $1\frac{1}{2}$ (young) to twice (adult) as long as the head. Body with dark cross-bars, or with a series of dark spots on each side.

Hab. Atlantic Coasts and Rivers from Florida to Brazil, and also in the West-Indian Islands:

Mexico [13]; Gulf of Mexico [3].—Surinam; Amazons [4]; Rio Janeiro [4]; Cuba [9 10 11]; Martinique.

Here described from six specimens (including the type of *A. mexicanus*) from Mexico and Surinam, from 230 to 500 mm. in total length.

Gobioides peruanus, Steind., 1880, from Peru and Ecuador, will probably be found in the Pacific Coast streams of Central America. The body is more slender and the head longer than in *G. broussonetii*, whilst the outer series of teeth is much stronger.

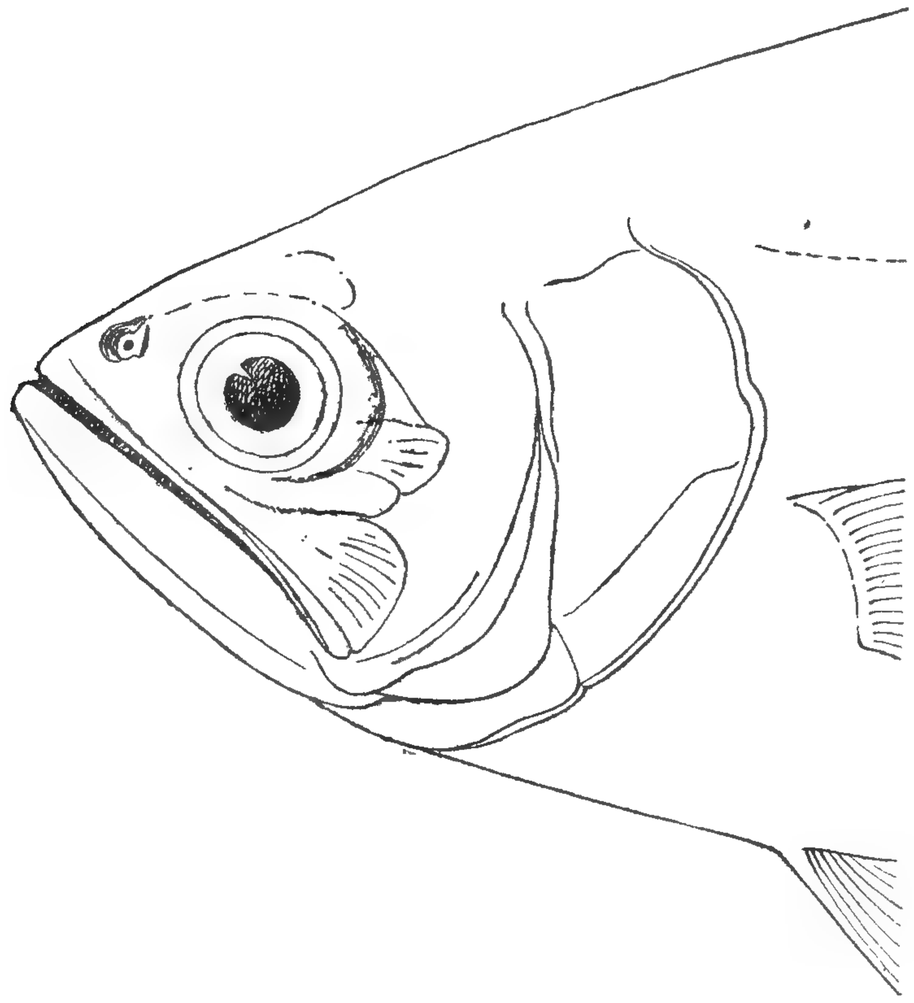
Fam. 4. CARANGIDÆ.

A large family of the tropical and temperate seas, represented in the fresh-water fauna of Central America by a single species.

SCOMBROIDES, Lacep., 1800.

Oligoplites, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 898.

Body ovate or fusiform, compressed; scales lanceolate or linear. Mouth rather large, oblique, little protractile; teeth somewhat small, pointed, in narrow bands in the jaws; vomerine and palatine teeth present. Spinous dorsal of a few short spines, connected by membrane at the base only; soft dorsal



Scombroides palometa.

long, more or less elevated anteriorly and with the posterior rays much branched and semi-detached as finlets. Anal similar to soft dorsal, preceded by two spines separate from the rest of the fin. Pectoral short, asymmetrical; ventrals with I 5 rays, close together, below the base of the pectorals, with the inner ray attached to the abdomen by membrane. Caudal peduncle slender; caudal fin widely forked.

Hab. Tropical Seas (one species only from fresh-water lakes of Tropical America).

The American species belong to the subgenus *Oligoplites*, Gill, with 4 or 5 dorsal spines and linear scales. They are six in number, viz.: *S. saurus*, Bl. Schn.; *S. refulgens*, Gilb. & Starks; *S. altus*, Gthr.; *S. mundus*, Jord. & Starks; *S. saliens*, Bl.; and *S. palometa*, C. & V.

The first-named appears to be identical on the Atlantic and Pacific Coasts; the next three are known from the Pacific Coast only. *S. saliens* is an Atlantic species and Pacific records of it should be referred to *S. mundus*.

1. Scombroides palometa.

Chorinemus palometa, Cuv. & Val. Hist. Nat. Poiss. viii. p. 392 (1831) [1].

Chorinemus saliens, var. *palometa*, Günth. Cat. Fish. ii. p. 475 (1860) [2].

Oligoplites saliens palometa, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 899 [3].

Depth of body $3\frac{2}{3}$ in the length, length of head $4\frac{3}{4}$. Snout as long as eye, the diameter of which is $4\frac{1}{2}$ in the length of head, interorbital width $3\frac{1}{3}$. Maxillary extending slightly beyond the vertical from the posterior margin of eye. 12 gill-rakers on the lower part of anterior arch. Dorsal IV, I 19. Anal II, I 20. Pectoral $\frac{2}{3}$ the length of head. Least depth of caudal peduncle $\frac{1}{4}$ the length of head. Silvery, back brownish; dorsal dusky, other fins yellowish.

Hab. GUATEMALA, Lake Yzabal (*Salvin*).—VENEZUELA, Lake Maracaibo [1 2].

Here described from a specimen of 280 mm. from Lake Maracaïbo. There is a small example (90 mm.) from Lake Yzabal in the British Museum. This species has not yet been recorded from other localities, but probably enters the sea.

Fam. 5. CICHLIDÆ.

This large family of fresh-water fishes is the dominant perciform group in Tropical America and Africa. In America the Cichlidæ extend from Texas to Argentina, and comprise about 150 species, which may be grouped into twenty-three genera. Africa appears to be somewhat richer in both genera and species, whilst a single genus with three representatives occurs in India and Ceylon.

The study of the relationships of the American genera is of considerable interest in connection with their geographical distribution, and leaves no room for doubt that the Mexican and Central-American Cichlid fauna originated with immigrants from the southern continent. The fact that the most generalized South-American genus *Acara* is scarcely generically distinct from the African *Paratilapia* is also important, and, seeing that there is no reason to believe that the Cichlids have ever been other than a fresh-water group, it lends support to the theory of a land-connection between South America and Africa in Eocene times.

I have recently monographed the American Cichlidæ, and, except where some amplification or alteration is necessary, a list of the species only, with keys for their identification, is here given.

Synopsis of the Cichlid Genera represented in Mexico and Central America.

I. Anal fin with 3 spines.

No lobe on the anterior branchial arch . . . . . 1. ACARA.

A compressed lobe on the upper part of the anterior branchial arch . 2. GEOPHAGUS.

II. Anal fin with more than 3 spines.

Teeth all conical or cylindrical; mouth small or moderate, moderately protractile, the præmaxillary spines (ascending processes) shorter than the head . . . . . 3. CICHLOSOMA.

Teeth all conical or cylindrical; mouth large, very protractile, the præmaxillary spines as long as the head . . . . . 4. PETENIA.

Several series of small conical teeth and an outer series of larger teeth, all or most of which are compressed, incisor-like . . . . . 5. HERICHTHYS.

Teeth all compressed, entire, with pointed or rounded apices . . . . 6. PARANEETROPLUS.

Teeth all compressed, entire, with truncate apices . . . . . 7. NEETROPLUS.

Teeth all compressed, mostly tricuspid, only the median ones of the outer series being entire, with truncate apices . . . . . 8. HEROTILAPIA.

1. ACARA, Heck., 1840.

Acara, Regan, Ann. Mag. Nat. Hist. (7) xv. 1905, p. 330.

This, the most generalized genus of American Cichlidæ, is very closely allied to the African *Paratilapia*, which it resembles not only in external features, but also in the anatomy. The only difference between them is that the maxillary is completely hidden by the præorbital in *Acara*, whilst it is more or less exposed distally in *Paratilapia*. Of the nineteen species of *Acara*, only one is found as far north as the Isthmus of Panama.

1. **Acara cœruleopunctata,** Kner & Steind., 1863.

Acara cœruleopunctata, Regan, Ann. Mag. Nat. Hist. (7) xv. 1905, p. 336.

D. XIV–XV 10–11. A. III 8–9. Sc. 26–28 $\frac{3}{8-9}$. Præoperculum scaleless; dorsal and anal fins scaleless; depth of body 2 to $2\frac{1}{3}$ in the length; 6 gill-rakers on the lower part of anterior arch; dorsal spines increasing in length to the last, which is nearly $\frac{1}{2}$ the length of head.

Hab. PANAMA, Rio Chagres.—N.W. ECUADOR.

2. GEOPHAGUS, Heck., 1840.

Geophagus, Regan, Ann. Mag. Nat. Hist. (7) xvii. 1906, p. 50.

Closely allied to *Acara*, differing only in the structure of the anterior branchial arch. Of the twelve species eleven are South American.

1. **Geophagus crassilabris,** Steind., 1877.

Geophagus crassilabris, Regan, Ann. Mag. Nat. Hist. (7) xvii. 1906, p. 58.

D. XVI 10–11. A. III 7–8. Sc. 30–31 $\frac{4\frac{1}{2}}{9-11}$. 14 or 15 gill-rakers on the lower part of anterior arch; pectoral $\frac{2}{3}$–$\frac{3}{4}$ the length of head, not extending to above the anal.

Hab. PANAMA.

3. CICHLOSOMA, Swains., 1839.

Cichlosoma, Regan, Ann. Mag. Nat. Hist. (7) xvi. 1905, p. 61.

This important genus includes the American Cichlids with more than three anal spines, with all the teeth conical or cylindrical, and with the mouth not abnormally protractile. There are 68 species—53 in Mexico and Central America, 1 in Cuba, 1 in Barbados, and 13 in South America.

I have arranged the Mexican and Central-American species in five sections, which appear to be natural groups, but which are not sufficiently sharply defined to rank as subgenera.

Section 1. THERAPS, Günth., 1862.

The teeth of the outer series in the upper jaw are in moderate number (10 to 15 on each side) and regularly increase in size anteriorly; in the lower jaw the teeth are either similar to those in the upper, or the anterior 3 to 6 on each side are enlarged, subequal and rather sharply differentiated from the smaller lateral teeth. The mouth is small or of moderate width, the maxillary never extending beyond the vertical from the anterior margin of eye; the cleft of the mouth is nearly horizontal and entirely below the level of the eye, the præorbital being deep; the jaws are equal anteriorly or the lower is somewhat the shorter; in the adult fish the præmaxillary spines do not extend to above the orbit. The upper profile of the snout is usually slightly convex, and except in two species (*C. microphthalmus* and *C. godmani*) the fold of the lower lip is not continuous. The dorsal fin has XV–XIX 10–15 rays and is more or less scaly at the base posteriorly; the anal has IV–VIII 7–12 rays; the pectoral is usually rather short and only in one species (*C. nicaraguense*) does it extend beyond the origin of the anal; the caudal is either rounded, truncate, or emarginate with rounded lobes.

This group consists of twenty species from Mexico and Central America, one extending into Colombia.

Heros deppii, Heckel, and *Cichlosoma zonatum,* Meek, are insufficiently described species, apparently belonging to this section.

Synopsis of the Species.

I. Pectoral not extending to above the anal, which has 4 to 7 spines.

A. Caudal rounded or truncate.

1. Depth of body $1\frac{2}{3}$ to $2\frac{5}{6}$ in the length.

a. Last dorsal spine $\frac{3}{8}$ to $\frac{3}{5}$ the length of head.

α. Lower jaw a little shorter than the upper; depth of body $2\frac{1}{4}$ to $2\frac{2}{3}$ in the length; caudal peduncle nearly as long as or longer than deep. D. XVII–XVIII 12–15. A. V–VI 8–10.

Length of head $3\frac{1}{4}$ to $3\frac{1}{2}$ in the length of the fish . . . . . 1. *eigenmanni.*

Length of head $3\frac{2}{3}$ to 4 in the length of the fish . . . . . 2. *nebuliferum.*

β. Jaws equal anteriorly.

* Caudal peduncle $\frac{1}{2}$ to $\frac{3}{4}$ as long as deep.

† D. XVI–XVII 12–14. A. VI–VII 9–10. A large dark blotch on the caudal peduncle. Depth of body $1\frac{2}{3}$ to 2 in the length . . . . . 3. *maculicauda.*

†† D. XVII–XVIII 11–13. A. VI–VII 8–9. Dark cross-bars and a dark band from operculum to base of caudal.

Depth of body $1\frac{2}{3}$ to 2 in the length, length of head $2\frac{5}{6}$ (young) to $3\frac{1}{4}$ (adult).
Last dorsal spine $\frac{1}{2}$, pectoral $\frac{7}{8}$ the length of head . . . . . 4. *fenestratum.*

Depth of body $2\frac{1}{4}$ in the length, length of head $3\frac{2}{5}$ (adult). Last dorsal spine $\frac{2}{5}$, pectoral $\frac{3}{4}$ the length of head . . . . . 5. *sexfasciatum.*

** Caudal peduncle from $\frac{3}{4}$ to as long as deep.

† 8 to 10 gill-rakers on the lower part of anterior arch; a broad dark band from pectoral to base of caudal.

D. XVII 13. A. VI 9. Last dorsal spine $\frac{1}{2}$ the length of head . . . . . 6. *bifasciatum.*

D. XVI–XVIII 12–14. A. VI–VII 9–10. Last dorsal spine $\frac{2}{5}$ the length of head . . . . . 7. *guttulatum.*

†† 7 or 8 gill-rakers on the lower part of anterior arch.

‡ Fold of the lower lip continuous, or at least with a continuous free edge. D. XVIII 11–13. A. (V) VI 9–11. Dark cross-bars and a dark band ending in a spot on the base of caudal more or less distinct . 8. *microphthalmus.*

‡‡ Fold of the lower lip not continuous, rarely subcontinuous in the young.

Diameter of eye 3 to 5 in the length of head, interorbital width $2\frac{3}{5}$ to 3 (in specimens of 85 to 260 mm.). D. XVII–XVIII 11. A V–VI 8–9. An interrupted dark longitudinal band or a series of spots above the lateral line, another from middle of side to caudal; lower parts of head and body sometimes blackish . . . . . 9. *melanurum.*

Diameter of eye 4 to $5\frac{1}{2}$ in the length of head, interorbital width 3 (in specimens of 80 to 175 mm.). D. XV–XVI 10–11. A. V–VI 8–9. Usually 5 or 6 dark cross-bars on the posterior part of the body; lower parts of head and body sometimes blackish . . . . . 10. *labridens.*

Diameter of eye 4 to $4\frac{3}{4}$ in the length of head, interorbital width $2\frac{1}{4}$ to $2\frac{2}{5}$ (in specimens of 130 to 240 mm.). D. XVI–XVIII 12–13. A. VI–VII 8–9. Dark cross-bars and a dark band from operculum to caudal . . . . . 11. *gadovii.*

Diameter of eye 4 to $4\frac{2}{3}$ in the length of head, interorbital width $2\frac{1}{3}$ to $2\frac{2}{3}$ (in specimens of 96 to 177 mm.). D. (XVI–XVII) XVIII 10–12 (13). A. (IV) V–VI 8–10 (11). A broad blackish angular band from operculum to the middle of side and thence upwards to the spinous dorsal; a dark blotch on the caudal peduncle . . . . . 12. *anguliferum.*

Diameter of eye $4\frac{1}{4}$ to $4\frac{1}{2}$ in the length of head, interorbital width $2\frac{2}{3}$ to 3 (in specimens of 133 to 155 mm.). D. XVIII 9–11. A. V–VI 8–10. A dark angular band as in *C. anguliferum*; a narrow longitudinal band from the angle of the broader one to the base of caudal, where it forms a vertically expanded spot . . . . . 13. *intermedium.*

D. XVI 12. A. V 8. 10 or 11 obscure dark cross-bars; a series of 4 to 6 blackish spots, usually ocellated and vertically expanded, below the dorsal fin on the posterior part of the body; an ocellus on the upper part of the base of caudal . . . . . 14. *pavonaceum.*

b. Last dorsal spine $\frac{1}{3}$ the length of head.

Depth of body $2\frac{1}{3}$ in the length. D. XVII 11. A. V 8 . . . . . 15. *sieboldii*.

Depth of body $2\frac{1}{2}$–$2\frac{3}{4}$ in the length. D. XVI–XVII 12–13. A. V 10 . . 16. *godmani*.

2. Depth of body 3 to $3\frac{1}{2}$ in the length; last dorsal spine $\frac{1}{3}$ to $\frac{2}{5}$ the length of head. D. XV–XVII 12–13. A. IV–V 9–10 . . . 17. *irregulare*.

B. Caudal emarginate, with rounded lobes; depth of body $2\frac{2}{3}$–$2\frac{4}{5}$ in the length; last dorsal spine $\frac{1}{2}$ the length of head. D. XVII 13. A. VI 9 . . . . . 18. *lentiginosum*.

II. Pectoral extending to above the origin of anal. D. XVIII 10–11. A. VII 8. Sc. $34\frac{5}{14}$ . . . . . 19. *balteatum*.

III. Pectoral extending to above the second or third anal spine. D. XVIII–XIX 10–11. A. VII–VIII 8–9. Sc. $35\frac{5\text{–}6}{14\text{–}15}$. . . . 20. *nicaraguense*.

1. **Cichlosoma eigenmanni,** Meek, 1902.

Cichlosoma eigenmanni, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 225.

Hab. SOUTHERN MEXICO, Rio Papaloapam (*Gadow*).

2. **Cichlosoma nebuliferum,** Günth., 1860.

Cichlosoma nebuliferum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 226.

Hab. SOUTHERN MEXICO, Isthmus of Tehuantepec (*Sallé*).

3. **Cichlosoma maculicauda,** Regan, 1905. (Tab. II. fig. 3.)

Cichlosoma maculicauda, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 227.

Hab. GUATEMALA, Rio Motagua and Lake Yzabal (*Salvin*); PANAMA, Rio Chagres (*Salvin*).

4. **Cichlosoma fenestratum,** Günth., 1860.

Cichlosoma fenestratum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 227.

Hab. SOUTHERN MEXICO, Chimalapa (*Buller*), Vera Cruz, Boca del Rio, and Rio Papaloapam (*Gadow*).

5. **Cichlosoma sexfasciatum,** Regan, 1905. (Tab. IV. figg. 2, 2 *a*.)

Cichlosoma sexfasciatum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 230.

Hab. MEXICO, Guapote.

This species is intermediate between *C. fenestratum* and *C. microphthalmus*. From the former it is distinguished by the shorter head, smaller eye, shorter pectoral fin, lower dorsal spines, &c.; from the latter by the shorter caudal peduncle and the broadly interrupted fold of the lower lip.

6. **Cichlosoma bifasciatum,** Steind., 1864.

Cichlosoma bifasciatum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 228.

Hab. MEXICO.

C. bifasciatum probably inhabits Southern Mexico, like the other species described by Dr. Steindachner in his memoir.

7. **Cichlosoma guttulatum,** Günth., 1864.

Cichlosoma guttulatum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 229 [1].

Hab. Southern Mexico, Rio de Sarabia (*Buller* [1]); Guatemala, Lakes Amatitlan and Nacasil (*Salvin*).

Cichlosoma zonatum, Meek (Proc. Biol. Soc. Washington, xviii. 1905, p. 245), from Tehuantepec, may be identical with *C. guttulatum*.

8. **Cichlosoma microphthalmus,** Günth., 1862. (Tab. VII. fig. 2.)

Cichlosoma microphthalmus, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 230.
Cichlosoma guentheri, Regan, t. c. p. 233.

Hab. Guatemala, Rio Motagua (*Salvin*).

After re-examination of the types I am unable to recognize *C. guentheri,* Pellegrin (*C. oblongus,* Günth., nec Casteln.), as distinct from *C. microphthalmus.*

9. **Cichlosoma melanurum,** Günth., 1862.

Cichlosoma melanurum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 231.

Hab. Guatemala, Lake Peten (*Salvin*).

10. **Cichlosoma labridens,** Pellegr., 1903.

Cichlosoma labridens, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 443.

Hab. Mexico, Rio Panuco and its tributaries.

11. **Cichlosoma gadovii,** Regan, 1905. (Tab. V. figg. 2, 2 *a*.)

Cichlosoma gadovii, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 232.

Hab. Southern Mexico, Motzorongo in Vera Cruz (*Gadow*), Oaxaca, Tehuantepec.

Dr. Meek's repetition * of the error of confusing *C. gadovii* with *C. melanurum* makes it necessary for me to call attention to the more important points in which these species differ. *C. melanurum* has been twice figured, by Günther (Trans. Zool. Soc. vi. 1869, t. 72. fig. 3) and by Steindachner, under the name *Heros melanopogon* (Denkschr. Ak. Wien, xxiii. 1864, t. 1. fig. 3). A comparison of these figures with the one now given of *C. gadovii* will show the notable difference in marking between the two species and also that the snout is more produced and has its upper profile less decurved in *C. melanurum.* The interorbital space is much wider in *C. gadovii* than in *C. melanurum,* its width being contained from $2\frac{1}{4}$ to $2\frac{2}{5}$ times in the length of the head in four specimens of the former, measuring from 130 to 240 mm. in total length, and $2\frac{3}{5}$ to

* Proc. Biol. Soc. Wash. xviii. 1905, p. 245.

times in the length of the head in four specimens of the latter species, 85 to 260 mm. in total length. *C. gadovii* is subject to the same range of variation in colour-markings as *C. fenestratum*; in some specimens the dark cross-bars are strongly marked and the longitudinal band is scarcely visible, in others the cross-bars are faint and the longitudinal band is very strong. It is curious that Dr. Meek, who has had the privilege of collecting these fishes, should attempt to distinguish in this respect between *C. parma* (=*fenestratum*), with the lateral band faint or absent, and *C. melanurum* (=*gadovii*), with a conspicuous dark lateral band.

12. **Cichlosoma anguliferum,** Günth., 1862.

Cichlosoma intermedium, var. *anguliferum*, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 233.

Hab. GUATEMALA, Rio de Santa Isabel (*Salvin*), Rio Santa near Cahabon (*Sarg*).

The slight difference in colour-markings between this species and the next appears to be correlated with other slight peculiarities, so that I am inclined to provisionally recognize them as distinct. In *C. anguliferum* the interorbital space is a little wider and the dorsal spines rather higher than in *C. intermedium*, the last spine measuring rather more than $\frac{2}{5}$ the length of the head in the former and distinctly less than $\frac{2}{5}$ of the head in the latter species.

13. **Cichlosoma intermedium,** Günth., 1862.

Cichlosoma intermedium (part.), Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 232.

Hab. GUATEMALA, Lake Peten (*Salvin*).

14. **Cichlosoma pavonaceum,** Garman, 1881.

Cichlosoma pavonaceum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 234.

Hab. NORTHERN MEXICO, Monclova in Coahuila.

15. **Cichlosoma sieboldii,** Kner & Steind., 1864.

Cichlosoma sieboldii, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 235.

Hab. PANAMA.—COLOMBIA.

Heros deppii, Heckel, 1840, from Mexico, may be allied to this species.

16. **Cichlosoma godmani,** Günth., 1862.

Cichlosoma godmanni, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 235.

Hab. GUATEMALA, Rio Cahabon (*Salvin*).

17. **Cichlosoma irregulare,** Günth., 1862.

Cichlosoma irregulare, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 236[1].

Hab. GUATEMALA, Lake Yzabal, Rio Gerónimo, Rio Usumacinta (*Salvin*), Lake San Cristobal (*Sarg*).

18. **Cichlosoma lentiginosum,** Steind., 1864.

Cichlosoma lentiginosum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 237.

Hab. "Mexico."

Probably an inhabitant of Southern Mexico.

19. **Cichlosoma balteatum,** Gill & Bransf., 1877. (Tab. II. fig. 1.)

Cichlosoma balteatum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 238.

Hab. Lake Nicaragua.

20. **Cichlosoma nicaraguense,** Günth., 1864.

Cichlosoma nicaraguense, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 238.

Hab. Lake Nicaragua.

Section 2. Archocentrus, Gill, 1877.

Very closely allied to *Theraps,* but with the anterior pair of teeth of the outer series in the upper jaw often somewhat enlarged, with a longer pectoral and more numerous anal spines. The group may be thus defined:—Body rather deep (depth $1\frac{3}{4}$ to $2\frac{1}{2}$ in the length, caudal peduncle $\frac{1}{2}$ to $\frac{2}{3}$ as long as deep); mouth rather small, moderately protractile (maxillary not extending beyond the vertical from anterior margin of eye, præmaxillary spines extending to just above the anterior margin of eye). D. XVII–XIX 7–10, the soft fin scaly at the base. A. VIII–XII 6–9. Pectoral extending beyond the origin of anal; caudal rounded or subtruncate.

Six species, from Southern Mexico, British Honduras, Guatemala, and Nicaragua.

Synopsis of the Species.

I. 6 to 8 gill-rakers on the lower part of anterior arch.

A. Maxillary extending to the vertical from anterior margin of eye.

D. XVII–XVIII 8–9. A. VIII–X 6–8. 2 or $2\frac{1}{2}$ scales between lateral line and base of anterior part of soft dorsal . . . . . 21. *nigrofasciatum.*

D. XVII–XIX 8–10. A VIII–X 7–8. $3\frac{1}{2}$ or 4 scales between lateral line and base of anterior part of soft dorsal . . . . . 22. *octofasciatum.*

B. Maxillary not extending to the vertical from anterior margin of eye.

a. Pectoral as long as or a little longer than the head. D. XVIII–XIX 9–10. A. VIII–X 7–8 . . . . . 23. *spilurum.*

b. Pectoral $\frac{4}{5}$ the length of head.

D. XVIII–XIX 9–10. A. IX 9 . . . . . 24. *immaculatum.*

D. XVIII–XIX 7–8. A. XI–XII 7–8 . . . . . 25. *spinosissimum.*

II. 15 gill-rakers on the lower part of the anterior arch. D. XVI 8–9.

A. X–XI 8–9 . . . . . 26. *centrarchus.*

21. **Cichlosoma nigrofasciatum,** Günth., 1869.

Cichlosoma nigrofasciatum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 75.

Hab. Guatemala, Lakes Amatitlan and Atitlan (*Salvin*).

22. **Cichlosoma octofasciatum,** Regan, 1903.

Cichlosoma octofasciatum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 331.

Hab. SOUTHERN MEXICO, Rio de Sarabia (*Buller*); BRITISH HONDURAS (*Robertson*).

The systematic position of this species is rather doubtful, as the dentition of some specimens is very like that of the more generalized members of the subgenus *Parapetenia.* Other characters seem to indicate relationship with *C. nigrofasciatum.*

23. **Cichlosoma spilurum,** Günth., 1862.

Cichlosoma spilurum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 75.

Hab. GUATEMALA, Rio Motagua and Lake Yzabal (*Salvin*).

24. **Cichlosoma immaculatum,** Pellegr., 1904.

Cichlosoma immaculatum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 77.

Hab. GUATEMALA, Rio Polochic.

25. **Cichlosoma spinosissimum,** Vaill. & Pellegr., 1902.

Cichlosoma spinosissimum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 76.

Hab. GUATEMALA, Rio Polochic.

26. **Cichlosoma centrarchus,** Gill & Bransf., 1877. (Tab. IV. figg. 1, 1 *a*.)

Cichlosoma centrarchus, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 77.

Hab. Lake NICARAGUA.

Section 3. ASTATHEROS, Pellegr., 1904.

Teeth of the outer series usually rather more numerous and less strongly enlarged anteriorly than in *Theraps*, but in the more specialized forms reduced in number and with the anterior pair in the upper jaw and the two anterior pairs in the lower strongly enlarged. The maxillary never extends beyond the vertical from the anterior edge of the eye; the præmaxillary spines measure from a little less than $\frac{2}{5}$ to slightly more than $\frac{1}{2}$ the length of head; the upper profile of the snout is straight and oblique. The body is rather deep (depth $1\frac{1}{2}$ to $2\frac{1}{3}$ in the length). The dorsal fin has XIV–XVII 10–15 rays and is more or less scaly at the base posteriorly; the anal has V–VIII 8–10 rays; the pectoral is usually elongate (in *C. heterodontum* and *C. altifrons* it extends to above the origin of the anal, in the other species it is longer); the caudal is subtruncate, rounded, or slightly emarginate with rounded lobes. The gill-rakers are usually more numerous than in most other species of the genus (usually 11 to 13 on the lower part of the anterior arch, but only 9 or 10 in *C. citrinellum*, 9 in *C. lobochilus*, 8 in *C. erythræum*).

Eleven species from Southern Mexico and Central America, one ranging into Colombia.

Synopsis of the Species.

I. Lips normal; anterior teeth not strongly enlarged.

A. Fourth to sixth dorsal spines longer than the rest.

D. XVI 10–11. A. VI 8–9. 11 or 12 gill-rakers on the lower part of anterior arch.

Pectoral extending to above the middle of anal . . . . . 27. *robertsoni.*

Pectoral extending to the posterior end of anal . . . . . 28. *longimanus.*

B. Dorsal spines subequal from the fifth or sixth or increasing in length throughout.

1. D. XIV–XV 12–15. A. V–VI 8–9. 11 gill-rakers on the lower part of anterior arch; snout not longer than postorbital part of head.

Pectoral as long as the head; depth of body $1\frac{1}{2}$ in its length; last dorsal spine $\frac{3}{5}$ the length of head; caudal rounded . . . . . 29. *macracanthus*.

Pectoral a little shorter than the head; depth of body 2 in its length; last dorsal spine $\frac{2}{5}$ the length of head (a little more in the young); caudal subtruncate . . . . . 30. *heterodontum*.

2. D. XVI 11. A. V 8–9. 12 gill-rakers on the lower part of anterior arch; snout longer than postorbital part of head; pectoral extending nearly to above origin of anal . . . . . 31. *altifrons*.

3. D. XVI–XVII 11–12. A. VII 8–9.

a. Pectoral extending to above the last anal spine; 12 or 13 gill-rakers on the lower part of anterior arch; snout longer than postorbital part of head . . . . . 32. *rostratum*.

b. Pectoral extending to above the third or fourth anal spine.

12 gill-rakers on the lower part of anterior arch; caudal slightly emarginate, with rounded lobes . . . . . 33. *margaritiferum*.

9 or 10 gill-rakers on the lower part of anterior arch; caudal rounded . . . . . 34. *citrinellum*.

II. Lips exceptionally thick; anterior pair of teeth in the upper jaw strongly enlarged; two anterior pairs of teeth in the lower jaw enlarged and subequal.

D. XVII 11–12. A. VII–VIII 8–9. Pectoral extending to above the third to fifth anal spines.

A. Lips subnormal, scarcely produced medianly . . . . . 35. *erythræum*.

B. Each lip produced medianly as a long fleshy flap.

Length of head nearly 3 in the length of the fish; 9 gill-rakers on the lower part of anterior arch . . . . . 36. *lobochilus*.

Length of head $2\frac{1}{2}$ to $2\frac{3}{5}$ in the length of the fish; 11 or 12 gill-rakers on the lower part of anterior arch . . . . . 37. *labiatum*.

27. **Cichlosoma robertsoni,** Regan, 1905. (Tab. III. fig. 1.)

Cichlosoma robertsoni, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 239.

Hab. British Honduras, Stann Creek (*Robertson*).

28. **Cichlosoma longimanus,** Günth., 1869.

Cichlosoma longimanus, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 240.

Hab. Lake Nicaragua (*Salvin*).

29. **Cichlosoma macracanthus,** Günth., 1864. (Tab. V. fig. 1.)

Cichlosoma macracanthus (part.), Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 241.

Hab. Guatemala, Huamuchal and Chiapam (*Salvin*).

30. **Cichlosoma heterodontum,** Vaill. & Pellegr., 1902.

Cichlosoma heterodontus, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 241.

Hab. SOUTHERN MEXICO, Tequixistlan in Oaxaca (*Gadow*), Tehuantepec.

Dr. Meek * considers me to be in error in placing his *C. evermanni* in the synonymy of *C. heterodontum*, and would distinguish between *C. evermanni*, with all the teeth conical and the fold of the lower lip continuous, but freer at the sides than in front, and *C. heterodontum*, with some of the teeth worn and ending in a flat circular surface and the fold of the lower lip interrupted. The examination of a series of specimens of the closely allied *C. macracanthus* has shown me that both conditions of the dentition and of the lower lip are to be found in that species. Three small specimens of *C. heterodontum* were collected by Dr. Gadow at Tequixistlan. The largest (125 mm.) has some of the teeth worn and the fold of the lower lip continuous. The others (53 and 76 mm.), formerly referred by me to *C. macracanthus*, have conical teeth, but the fold of the lower lip is interrupted.

31. **Cichlosoma altifrons,** Kner & Steind., 1863.

Cichlosoma altifrons, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 242.

Hab. PANAMA.—COLOMBIA.

32. **Cichlosoma rostratum,** Gill & Bransf., 1877. (Tab. VII. fig. 1.)

Cichlosoma rostratum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 243.

Hab. LAKE NICARAGUA.

33. **Cichlosoma margaritiferum,** Günth., 1862.

Cichlosoma margaritiferum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 316.

Hab. GUATEMALA (*Salvin*).

34. **Cichlosoma citrinellum,** Günth., 1864.

Cichlosoma citrinellum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 316.

Hab. LAKES MANAGUA (*Dow*) AND NICARAGUA (*Salvin*).

35. **Cichlosoma erythræum,** Günth., 1869.

Cichlosoma erythræum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 318.

Hab. LAKE MANAGUA (*Dow*).

36. **Cichlosoma lobochilus,** Günth., 1869.

Cichlosoma lobochilus, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 318.

Hab. LAKE MANAGUA (*Dow*).

* Proc. Biol. Soc. Washington, xviii. 1905, p. 244.

37. **Cichlosoma labiatum,** Günth., 1864.

Cichlosoma labiatum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 319.

Hab. Lakes Managua and Nicaragua (*Dow*).

Section 4. Thorichthys, Meek, 1904.

Very similar to *Astatheros* in form and dentition, but with the dorsal and anal fins entirely scaleless and the caudal truncate or slightly emarginate, usually with pointed lobes. Dorsal XV–XVII 8–12. Anal VI–IX 6–9. 9 to 12 gill-rakers on the lower part of the anterior arch. The coloration of the three species of this group may be described thus:—About six dark cross-bars, the third bearing a blackish blotch on or below the lateral line; suboperculum usually blackish; head and anterior part of body with blue spots; vertical fins dusky, usually with light spots.

Synopsis of the Species.

Pectoral extending to above origin of anal . . . . . 38. *callolepis.*
Pectoral extending to above middle anal spines . . . . . 39. *aureum.*
Pectoral extending to first branched ray of anal . . . . . 40. *affine.*

38. **Cichlosoma callolepis,** Regan, 1904. (Tab. II. fig. 2.)

Cichlosoma callolepis, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 321.

Hab. Mexico, San Domingo de Guzman (*Buller*).

39. **Cichlosoma aureum,** Günth., 1862.

Cichlosoma aureum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 320.

Hab. Southern Mexico, Rio Papaloapam (*Gadow*, *Meek*), San Domingo de Guzman and Rio de Sarabia (*Buller*); Guatemala, Lake Yzabal and Rio Motagua (*Salvin*).

40. **Cichlosoma affine,** Günth., 1862.

Cichlosoma affine, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 321.

Hab. Guatemala, Lake Peten (*Salvin*).

Section 5. Parapetenia, Regan, 1905.

The anterior pair of teeth in the upper jaw and the two on each side of the anterior pair in the lower are more or less strongly enlarged and canine-like. The mouth is usually larger, more oblique and more protractile than in other groups of *Cichlosoma*, the length of the lower jaw or of the præmaxillary spines, from the anterior edge of the upper jaw, measuring from $\frac{2}{5}$ to a little more than $\frac{3}{5}$ the length of the head. The upper profile of the snout is straight; the fold of the lower lip is continuous or subcontinuous. The dorsal fin has XV–XVIII 8–13 rays and posteriorly has a scaly sheath at the base and a short series of scales on each interradial membrane; the anal has IV–IX 7–10 rays; the pectoral is shorter than the head; the caudal is rounded.

In addition to the thirteen species from Mexico and Central America, there are two, the most generalized of the group, *C. tetracanthus* and *C. adspersum*, from Cuba and

Barbados respectively, two from Western Ecuador, *C. festæ* and *C. ornatum*, allied to *C. urophthalmus* or *C. istlanum*, and two, *C. kraussi* from Colombia and *C. spectabile* from the Amazon, more specialized than any in the great protractility of the mouth and apparently allied to *C. managuense*.

Synopsis of the Mexican and Central-American Species.

I. D. XV–XVI 10–13. A. V 7–10. Pectoral $\frac{3}{5}$–$\frac{3}{4}$ the length of the head. Præmaxillary spines $\frac{2}{5}$ to $\frac{1}{2}$ the length of head, extending to above anterior part of eye; maxillary not extending to below the eye; canines moderate.

A. Snout nearly as long as the postorbital part of head (in the adult); caudal peduncle as long as deep.

1. Length of head $2\frac{3}{4}$ (young) to 3 (adult) in the length of the fish; jaws equal anteriorly.

Interorbital width $3\frac{1}{4}$ to $3\frac{1}{2}$ in the length of head. A dark spot below the origin of the lateral line, another on the middle of the side, a third at the base of caudal . . . . . 41. *istlanum.*

Interorbital width 4 in the length of head. An interrupted dark longitudinal band from operculum to the base of caudal . . . . . 42. *steindachneri.*

2. Length of head $2\frac{1}{2}$ (young) to $2\frac{3}{4}$ (adult) in the length of the fish; lower jaw slightly projecting; coloration as in *C. steindachneri* . 43. *bartoni.*

B. Snout shorter than the postorbital part of head (in the adult).

Depth of body 2 to $2\frac{1}{3}$ in the length; caudal peduncle $\frac{2}{3}$ as long as deep; lower jaw slightly projecting . . . . . 44. *beani.*

Depth of body $2\frac{1}{2}$ to $2\frac{4}{5}$ in the length; caudal peduncle as long as deep; lower jaw projecting . . . . . 45. *mento.*

II. D. XV–XVII 10–12. A. VI 8–9. Pectoral $\frac{4}{5}$ to $\frac{5}{6}$ the length of head. Præmaxillary spines nearly $\frac{1}{2}$ the length of head, not extending to above middle of eye; maxillary extending to the vertical from anterior margin of eye; canines moderate . . . . . 46. *urophthalmus.*

III. D. XVI–XVIII 9–12. A. VI–IX 7–10. Præmaxillary spines $\frac{1}{2}$ or slightly more than $\frac{1}{2}$ the length of head, extending to above the middle of orbit; maxillary extending to below anterior margin or anterior $\frac{1}{4}$ of eye; canines strong.

A. Last dorsal spine $\frac{2}{5}$ to $\frac{1}{2}$ the length of head. D. XVI–XVII 9–12.

Snout shorter than postorbital part of head (in the adult). A. VI–VIII 8–9.

A dark spot above the origin of the lateral line, another on the middle of the side, a third at the base of the caudal . . . . . 47. *trimaculatum.*

Snout as long as postorbital part of head (in the adult). A. VIII–IX 7–9.

An interrupted longitudinal band from eye to base of caudal . . . . 48. *salvini.*

B. Last dorsal spine $\frac{2}{5}$ the length of head. D. XVIII 10. A. VII–VIII 8–9 . . . . . 49. *multifasciatum.*

C. Last dorsal spine $\frac{1}{3}$ the length of head. D. XVII–XVIII 9–11. A. VII–VIII 8-9.

Depth of præorbital $\frac{1}{2}$ to $\frac{3}{5}$ the diameter of eye (in specimens of 120 to 130 mm. in total length); caudal peduncle $\frac{3}{5}$ as long as deep . . . . . 50. *friedrichstahli.*

Depth of præorbital $\frac{2}{3}$ the diameter of eye (in a specimen of 115 mm.) or equal to it (in the adult fish); caudal peduncle $\frac{2}{3}$ to $\frac{4}{5}$ as long as deep . 51. *motaguense.*

IV. D. XVIII 10–12. A. VI–VII 8–10. Præmaxillary spines $\frac{3}{5}$ or slightly more than $\frac{3}{5}$ the length of head, extending to above posterior edge of orbit; maxillary extending to below anterior $\frac{1}{3}$ or middle of eye; canines strong; last dorsal spine $\frac{1}{3}$ the length of head.

D. XVIII 10. A. VII 8. Maxillary extending to below middle of eye; depth of præorbital $\frac{2}{5}$ to $\frac{1}{2}$ the diameter of eye (in specimens of 187 to 195 mm.) . . . . . 52. *managuense.*

D. XVIII 12. A. VI 9–10. Maxillary extending to below anterior $\frac{1}{3}$ of eye; depth of præorbital $\frac{2}{3}$ to $\frac{3}{4}$ the diameter of eye (in specimens of 140 to 144 mm.) . . . . . 53. *dovii.*

41. **Cichlosoma istlanum,** Jord. & Snyder, 1899.

Cichlosoma istlanum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 326.

Hab. Mexico, Rio Balsas and its tributaries.

42. **Cichlosoma steindachneri,** Jord. & Snyder, 1899.

Cichlosoma steindachneri, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 444.

Hab. Mexico, Rio Panuco and its tributaries.

43. **Cichlosoma bartoni,** Bean, 1892.

Cichlosoma bartoni, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 445

Hab. Mexico, Rio Panuco and its tributaries.

44. **Cichlosoma beani,** Jord., 1888. (Tab. VI. fig. 1.)

Cichlosoma beani, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 328.

Hab. Mexico, rivers of Sinaloa and Jalisco.

45. **Cichlosoma mento,** Vaill. & Pellegr., 1902.

Cichlosoma mento, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 329.

Hab. Southern Mexico, Rio Negro.

46. **Cichlosoma urophthalmus,** Günth., 1862.

Cichlosoma urophthalmus, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 332.

Hab. Mexico, Yucatan; British Honduras; Guatemala, Lake Peten (*Salvin*).

47. **Cichlosoma trimaculatum,** Günth., 1869.

Cichlosoma trimaculatum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 333.

Hab. Southern Mexico, Oaxaca and Tehuantepec; Guatemala, Huamuchal and Chiapam (*Salvin*).

From Dr. Meek's* description of adult specimens of his *C. mojarra*, founded on a small example with malformed spinous dorsal, it is evident that this species is identical with *C. trimaculatum*, and not with the closely allied *C. salvini*, as I at first supposed.

48. **Cichlosoma salvini,** Günth., 1864.

Cichlosoma salvini, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 334.

Hab. Southern Mexico; British Honduras (*Robertson*); Guatemala, Lake Peten and Rio de Santa Isabel (*Salvin*), Cahabon (*Sarg*).

49. **Cichlosoma multifasciatum,** Regan, 1905. (Tab. III. fig. 3.)

Cichlosoma multifasciatum, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 335.

Hab. British Honduras, Stann Creek (*Robertson*); Guatemala, Lake Peten (*Salvin*).

50. **Cichlosoma friedrichstahli,** Heck., 1840. (Tab. III. fig. 2.)

Cichlosoma friedrichstahli, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 336.

Hab. Guatemala, Lake Peten (*Salvin*).

51. **Cichlosoma motaguense,** Günth., 1869.

Cichlosoma motaguense, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 336.

Hab. Guatemala, Rio Motagua (*Salvin*).

52. **Cichlosoma managuense,** Günth., 1869.

Cichlosoma managuense, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 337.

Hab. Lakes Managua (*Dow*) and Nicaragua.

53. **Cichlosoma dovii,** Günth., 1864.

Cichlosoma dovii, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 338.

Hab. Lake Nicaragua (*Salvin*).

4. PETENIA, Günth., 1862.

Petenia, Regan, Ann. Mag. Nat. Hist. (7) xvi. 1905, p. 433.

The single species is allied to *Cichlosoma dovii* and *C. managuense*, but has the mouth larger and the maxillary more exposed, whilst the præmaxillary processes are as long as the head and extend nearly to the origin of the dorsal fin.

1. **Petenia splendida,** Günth., 1862.

Petenia splendida, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 433.

D. XV–XVI 12–13. A. V 8–10. Sc. 40–45 $\frac{6-7}{16-17}$.

Hab. Guatemala, Lake Peten (*Salvin*).

* Proc. Biol. Soc. Washington, xviii. 1905, p. 244.

5. HERICHTHYS, Baird & Girard, 1854.

Herichthys, Regan, Ann. Mag. Nat. Hist. (7) xvi. 1905, p. 434.

Differs from *Cichlosoma* only in the dentition, the enlarged outer series of teeth being compressed. The four species inhabit Mexico and Central America, one ranging into Texas, the northern limit of the family.

Synopsis of the Species.

I. D. XV–XVII 10–12. A. V (VI 7) 8–9. Caudal peduncle $\frac{3}{5}$ as long as deep . . . . . 1. *cyanoguttatus*.

II. D. XVI–XVII 13. A. V 10. Caudal peduncle as long, or nearly as long, as deep.

Last dorsal spine more than $\frac{1}{2}$ the length of head; diameter of eye $3\frac{3}{4}$ in the length of head (in a specimen of 182 mm.) . . . . . 2. *bocourti*.

Last dorsal spine less than $\frac{1}{2}$ the length of head; diameter of eye 4 in the length of head (in a specimen of 126 mm.) . . . . . 3. *underwoodi*.

III. D. XVI–XVIII 11–12. A. VI–VII 9–10. Caudal peduncle $\frac{1}{2}$ to $\frac{2}{3}$ as long as deep . . . . . 4. *geddesi*.

1. **Herichthys cyanoguttatus**, Baird & Girard, 1854.

Herichthys cyanoguttatus, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 434.

Hab. North-eastern Mexico, Nuevo Leon, Tamaulipas, and San Luis Potosi, extending into Texas.

2. **Herichthys bocourti**, Vaill. & Pellegrin, 1902.

Herichthys bocourti, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 435.

Hab. Guatemala, Lake [Yzabal] Isabel.

3. **Herichthys underwoodi**, sp. n. (Tab. III. fig. 5.)

Depth of body $2\frac{2}{5}$ in the length, length of head $3\frac{1}{3}$. Snout nearly as long as postorbital part of head. Diameter of eye 4 in the length of head, interorbital width $2\frac{3}{5}$. Depth of præorbital slightly more than the diameter of eye. Jaws equal anteriorly; maxillary extending to between nostril and eye; fold of the lower lip not continuous; cheek with 5 series of scales; 8 gill-rakers on the lower part of anterior arch. Scales 32 $\frac{5}{13}$, $3\frac{1}{2}$ between lateral line and anterior part of soft dorsal. Dorsal XVII 13, commencing above the extremity of operculum, the spines subequal from the fourth to the fourteenth, thence increasing in length to the last, which is less than $\frac{1}{2}$ the length of head; soft fin, when laid back, extending a little beyond the base of caudal. Anal V 10. Ventrals extending to the vent. Caudal rounded. Caudal peduncle as long as deep. Body with 6 dark cross-bars; vertical fins with small dark spots.

Hab. Costa Rica (*C. F. Underwood*).

A single specimen, 126 mm. in total length.

4. **Herichthys geddesi**, Regan, 1905. (Tab. III. fig. 4.)

Herichthys geddesi, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 436.

Hab. Southern Mexico (*Geddes*).

6. PARANEETROPLUS, Regan, 1905.

Paraneetroplus, Regan, Ann. Mag. Nat. Hist. (7) xvi. 1905, p. 436.

The single species is apparently allied to *Cichlosoma nebuliferum* and to *Neetroplus nematopus*. All the teeth are compressed, with pointed or rounded apices.

1. **Paraneetroplus bulleri**, Regan, 1905. (Tab. VI. fig. 2.)

Paraneetroplus bulleri, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 436.

D XVIII 12. A. VI 9. Sc. 34 $\frac{5\frac{1}{2}}{14}$. Mouth small, with the lower jaw shorter than the upper.

Hab. Mexico, Rio de Sarabia (*Buller*).

7. NEETROPLUS, Günth., 1869.

Neetroplus, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 437.

Very close to *Paraneetroplus*, but with truncate incisor-like teeth. A single species from Nicaragua.

1. **Neetroplus nematopus**, Günth., 1869.

Neetroplus nematopus, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 437.

D. XIX 10. A. VIII 7. Sc. 33 $\frac{6}{13}$. Mouth small, with the jaws nearly equal anteriorly.

Hab. Lakes Managua (*Dow*) and Nicaragua.

8. HEROTILAPIA, Pellegr., 1904.

Herotilapia, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 438.

The species is evidently closely allied to *Cichlosoma nigrofasciatum*, but the teeth are compressed and tricuspid, except the median ones of the outer series, which are truncate incisors.

1. **Herotilapia multispinosa**, Günth., 1869.

Herotilapia multispinosa, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 438.

D. XVIII 9. A. XI 8. Sc. 28 $\frac{4\frac{1}{2}}{12}$.

Hab. Lake Managua (*Dow*).

Fam. 6. SCIÆNIDÆ.

The Sciænidæ are a large family, principally tropical and subtropical shore-fishes; many of them enter rivers freely and a few are entirely fluviatile. Some of the features which distinguish them from other Perciform fishes are: (1) the dorsal fin, which is either deeply notched or completely divided into two, the anterior spinous

portion being usually considerably shorter than the posterior soft-rayed one; (2) the presence of only one or two anal spines; and (3) the toothless palate.

One permanently fluviatile species (*Haploidonotus grunniens*) is found in the rivers of Mexico and Central America, but whether any of the Sciænid shore-fishes of this region ascend rivers above the influence of the tides is uncertain *.

HAPLOIDONOTUS, Rafin., 1819.

Aplodinotus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 1484.

Body rather deep, compressed. Mouth subterminal; no barbels; præmaxillaries protractile; maxillary concealed by the præorbital; no supramaxillary; jaws with bands of small pointed teeth; palate toothless; lower pharyngeals large, completely united, with molariform teeth; præoperculum weakly denticulated. Scales of moderate size, ciliated; lateral line curved anteriorly, continued nearly to the end of the caudal fin. A single dorsal, scaly at the base, with X 29–32 rays; anal with II 7 rays; caudal doubly truncate; pectoral asymmetrical, pointed; ventrals each of a spine and 5 branched rays, inserted a little behind the base of the pectorals, without scaly axillary processes.

1. **Haploidonotus grunniens**, Rafin., 1819.

Corvina oscula, Günth. Cat. Fish. ii. p. 297 (1860).

Aplodinotus grunniens, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 1484.

Depth of body $2\frac{1}{2}$ to $2\frac{4}{5}$ in the length, length of head $3\frac{1}{2}$ to $3\frac{3}{4}$. Back elevated, the ventral profile being nearly straight. Snout short, obtuse; maxillary extending to below posterior part of eye, the diameter of which is about 5 in the length of head and $1\frac{1}{2}$ in the interorbital width. Scales 56–62 $\frac{8-10}{13-16}$. Dorsal X 29–32; spines moderately strong, the third highest, $\frac{1}{2}$ the length of head and nearly as long as the longest branched rays. Anal II 7; second spine strong, about as long as the longest dorsal spine, shorter than the anterior branched rays. Pectoral as long as the head. Silvery, back darker; vertical fins dusky.

Hab. Rivers and lakes of North America, from the Great Lakes to Chiapas (in Mexico recorded from Matamoros in Tamaulipas and the Rio Usumacinta).

This species, here described from Winnipeg examples of from 250 to 300 mm., attains a weight of 50 or 60 pounds.

Fam. 7. PERCIDÆ.

The Percidæ are a large family inhabiting the fresh waters of North America and Western Eurasia. The majority of the American species are the small fishes known as "darters," a few of which occur in Northern Mexico. These belong to two very closely allied genera, *Percina* and *Etheostoma*, which may be distinguished from other Perciform fishes by the following diagnosis:—

Body more or less elongate and compressed. Mouth small or moderate; præmaxillaries not protractile, except at the sides; maxillary exposed, but slipping under the præorbital for the whole length of its upper edge; villiform teeth in the jaws and usually on the palate. Scales small, denticulated. Two dorsals, with

* In the British Museum are examples of *Bairdiella icistia*, Jord. & Gilb., and *Cynoscion xanthulus*, Jord. & Gilb., collected by Herr Forrer in the Rio Presidio, but probably near the mouth of the river.

VI–XVII 8–17 rays. Anal short, with I–II 6–12 rays. Pectorals symmetrical, rounded. Ventrals below or behind the base of the pectorals, each with a moderate or feeble spine and 5 branched rays; no scaly axillary process.

The work of Boulenger and of Jordan and Evermann renders a full account unnecessary, but I have examined the examples in the British Museum collection.

Synopsis of the Species of Mexican Percidæ.

I. Dorsal XIII–XVII 12–17; lateral line complete . . . . . *Percina caprodes.*

II. Dorsal IX–XII 9–13; lateral line incomplete.

A. Lateral line forming a curve above the pectoral. Anal II 6–8 . *Etheostoma fusiforme.*

B. Lateral line nearly straight.

a. Anal II 6–8.

Caudal peduncle a little longer than deep . . . . . *E. pottsii.*

Caudal peduncle nearly twice as long as deep . . . . . *E. lepidum.*

b. Anal I 7–8 . . . . . *E. australe.*

III. Dorsal VI 10 . . . . . *E. laterale.*

1. PERCINA, Haldeman, 1842.

Percina, Bouleng. Cat. Fish. i. p. 56 (1895).

1. **Percina caprodes,** Rafin., 1818.

Percina caprodes, Bouleng. Cat. Fish. i. p. 57 (1895); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1026.

Depth of body 5 to $6\frac{1}{2}$ in the length, length of head 4 to $4\frac{3}{4}$. Snout projecting beyond the mouth, which is inferior. Dorsal XIII–XVII 12–17. Anal II 9–12. Scales 90–95 $\frac{8-10}{14-16}$. Lateral line complete. Olivaceous, with numerous dark vertical bars, usually alternately long and short.

Hab. North America, Great Lakes to the Rio Grande.

This is the largest of all the Darters, attaining a length of 200 mm.

2. ETHEOSTOMA, Rafin., 1819.

Etheostoma, Bouleng. Cat. Fish. i. p. 64 (1895).

1. **Etheostoma fusiforme,** Girard, 1854.

Etheostoma fusiforme, Bouleng. Cat. Fish. i. p. 75 (1895).

Boleichthys fusiformis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1101.

Depth of body 4 to 6 in the length, length of head $3\frac{1}{2}$ to 4. Dorsal IX–X 9–12. Anal II 6–8. Scales 43–60 $\frac{3-4}{12-13}$. Lateral line incomplete, forming a curve above the pectoral. Olivaceous, with darker spots and cross-bars.

Hab. North America, Massachusetts to the Rio Grande.

2. **Etheostoma pottsii,** Girard, 1859.

Etheostoma pottsii, Bouleng. Cat. Fish. i. p. 74 (1895); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1083.

Depth of body $3\frac{1}{2}$ to 4 in the length, length of head $3\frac{1}{3}$ to $3\frac{2}{3}$. Dorsal IX–XI 10–12. Anal II 7. Scales $44–50\frac{5}{9–11}$. Caudal peduncle a little longer than deep. Olive, barred and marbled with brownish.

Hab. Mexico, Chihuahua and Durango.

3. **Etheostoma lepidum,** Baird & Girard, 1853.

Etheostoma lepidum, Bouleng. Cat. Fish. i. p. 73 (1895); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1089.

Depth of body $4\frac{2}{3}$ in the length, length of head $4\frac{1}{4}$. Dorsal IX–X 10–13. Anal II 6–8. Scales $48–54\frac{5–7}{11}$. Caudal peduncle nearly twice as long as deep. Olive, with some more or less distinct dark vertical bars.

Hab. North America, Texas.—Mexico, Chihuahua.

4. **Etheostoma australe,** Jordan, 1888.

Etheostoma australe, Bouleng. Cat. Fish. i. p. 88 (1895); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1081.

Depth of body $4\frac{1}{4}–4\frac{2}{3}$ in the length, length of head $3\frac{1}{2}$ to $3\frac{3}{4}$. Dorsal X–XII 9–11. Anal I 7–8. Scales $58–66\frac{6–7}{10–12}$. Olive, with about 10 strongly-marked dark vertical bars.

Hab. Mexico, Rio Conchos in Chihuahua.

5. **Etheostoma laterale,** Girard, 1859.

Etheostoma laterale, Bouleng. Cat. Fish. i. p. 87 (1895).

Alvarius lateralis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1099.

Body slender, elongate. Dorsal VI 10. Anal 8. Scales very small. Brownish, spotted with black; a narrow blackish lateral stripe, which extends round the snout; first dorsal with a black spot on its upper posterior edge; caudal barred.

Hab. Rio Grande.

Fam. 8. CENTRARCHIDÆ.

This family comprises the Indo-Pacific genus *Kuhlia* and the allied *Edelia* and *Nanoperca* from the fresh waters of Australia, and about thirty species, which may be grouped into eight or nine genera, from the fresh waters of North America. Six species range into Northern Mexico, but only one of them extends further south than the southern tributaries of the Rio Grande.

These may be distinguished from other Perch-like fishes of Mexico by the following combination of characters:—

"A single dorsal fin, with X–XI 10–13 rays, the middle spines the longest; anal with III 8–12 rays; ventrals below or a little behind the base of pectorals, close together, each with I 5 rays, without scaly axillary process. Lateral line concurrent with the dorsal profile. Head without spines or serræ."

With the exception of *Micropterus salmonoides*, a characteristic feature is the prolongation of the operculum as a blackish membranous flap.

In view of the recent work on this group of Boulenger and Jordan and Evermann, a full account would be superfluous. I have, however, examined the specimens in the British Museum, and have prepared a synopsis of the Mexican species.

Synopsis of the Mexican Species of Centrarchidæ.

I. Supramaxillary bone well developed.

Dorsal X 12–13. Anal III 10–11. Scales 65–70 $\frac{7-8}{17-20}$. Depth of body 3 to $3\frac{1}{2}$ in the length . . . . . *Micropterus salmonoides.*

Dorsal X–XI 10–11. Anal III 8–9. Scales 45–55 $\frac{6-7}{15-18}$. Depth of body 2 to $2\frac{1}{2}$ in the length . . . . . *Apomotis cyanellus.*

II. Supramaxillary bone absent or rudimentary.

A. Pectoral much shorter than the head, not extending to above the anal. Dorsal X 10–12. Anal III 8–10.

Scales 36–45 $\frac{5-6}{14-16}$. Depth of body $1\frac{3}{4}$–$2\frac{1}{3}$ in the length.

Longest dorsal spine about $\frac{1}{3}$ the length of head . . . . . *Lepomis megalotis.*

Scales 35–38 $\frac{6-7}{13-15}$. Depth of body $2\frac{1}{2}$ in the length. Longest dorsal spine nearly $\frac{1}{2}$ the length of head . . . . . *L. haplognathus.*

B. Pectoral as long as or a little longer than the head, extending to above the anal spines. Dorsal X 11–12. Anal III 11–12.

Scales 43–52 $\frac{7-8}{15-18}$ . . . . . *Eupomotis pallidus.*

Scales 34–40 $\frac{4-5}{13-15}$ . . . . . *E. heros.*

1. MICROPTERUS, Lacep., 1802.

Micropterus, Bouleng. Cat. Fish. i. p. 14 (1895).

1. **Micropterus salmonoides**, Lacep., 1802.

Micropterus salmonoides, Bouleng. Cat. Fish. i. p. 16 (1895); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1012.

Hab. North America, east of the Rocky Mountains, from the Red River and the Great Lakes to Tamaulipas.

The "Large-mouthed Black Bass" is at once distinguished from other Mexican Centrarchidæ by the larger mouth, the more elongate body, and the absence of a membranous prolongation of the operculum.

2. APOMOTIS, Rafin., 1819.

Apomotis, Bouleng. Cat. Fish. i. p. 18 (1895).

1. **Apomotis cyanellus,** Rafinesque, 1819.

Apomotis cyanellus, Bouleng. Cat. Fish. i. p. 21 (1895); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 996.

Hab. North America, east of the Rocky Mountains, from the Great Lakes to the Rio Grande and its tributaries.

3. LEPOMIS, Rafin., 1819.

Lepomis, Bouleng. Cat. Fish. i. p. 23 (1895).

1. **Lepomis megalotis,** Rafinesque, 1820.

Lepomis megalotis, Bouleng. Cat. Fish. i. p. 26 (1895); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1002.

Lepidopomus occidentalis, Meek, Pbl. Columbian Mus. Zool. v. 1904, p. 192, t. 12.

Hab. North America, east of the Rocky Mountains, from the Great Lakes to the Rio Grande and its tributaries.

2. **Lepomis haplognathus,** Cope, 1885.

Eupomotis haplognathus, Bouleng. Cat. Fish. i. p. 372 (1895).

Lepomis haplognathus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1004.

Lepidopomus haplognathus, Meek, Pbl. Columbian Mus. Zool. v. 1904, p. 192.

Hab. Mexico, Monterey.

This species, described by Cope and re-described by Meek from specimens taken at Monterey, may be identical with *L. garmani,* Forbes, from Illinois, which is probably not distinct from *L. miniatus,* Jord., ranging from Texas to Florida.

4. EUPOMOTIS, Gill & Jord., 1877.

Eupomotis, Bouleng. Cat. Fish. i. p. 28 (1895).

1. **Eupomotis pallidus,** Mitchill, 1815.

Eupomotis pallidus, Bouleng. Cat. Fish. i. p. 23 (1895).

Lepomis pallidus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1005.

Hab. North America, east of the Rocky Mountains, from the Great Lakes to the Rio Grande and its tributaries.

2. **Eupomotis heros,** Baird & Girard, 1854.

Eupomotis heros, Bouleng. Cat. Fish. i. p. 32 (1895); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1007.

Hab. North America, Southern Indiana to Florida and the Rio Grande and its tributaries.

Fam. 9. LIOGNATHIDÆ.

The Liognathidæ comprise the four genera *Gerres*, *Pentaprion*, *Liognathus*, and *Gazza*. The three last-named appear to be exclusively marine and are confined to the tropical Indo-Pacific. *Gerres* is found in all tropical seas, and most of the species appear to freely enter fresh water.

1. GERRES, Cuv., 1829.

Gerres, Günth. Cat. Fish. iv. p. 252 (1862).

Eucinostomus, *Ulæma*, *Xystæma*, and *Gerres*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, pp. 1367, 1371, 1372, and 1373.

Body compressed; scales large or moderate, cycloid or finely ctenoid. Lateral line complete. Mouth moderate, very protractile; maxillary exposed; jaws equal anteriorly; bands of small villiform teeth in jaws; palate toothless. Præorbital and præoperculum entire or finely serrated. A single dorsal with IX 10 rays, with a scaly sheath at the base; second or third dorsal spine the longest; anal with II–III 7–9 rays; caudal forked; pectoral asymmetrical, pointed; ventrals a little behind the base of pectorals, with I 5 rays; a scaly process at base of spine of each ventral fin.

Hab. Tropical seas, entering rivers.

The American species of *Gerres* number seventeen, and although only a small proportion of these have been recorded from rivers or lakes in Mexico and Central America, we may feel quite sure that most of them are to be met with there. It is rather a difficult matter to know how to deal with such a group in a work on fresh-water fishes, but I have thought it more useful to prepare a synopsis of all the American species, based on an examination of the available material, rather than to give descriptions of the few definitely known to occur in the fresh waters of Mexico and Central America.

Synopsis of the Species.

I. Præoperculum entire.

A. Anal III 7.

1. Second anal spine $\frac{1}{3}$–$\frac{1}{2}$ the length of head; second dorsal spine a little longer than third; depth of body $2\frac{1}{3}$–$2\frac{1}{2}$ in the length.

5 or $5\frac{1}{2}$ scales between lateral line and middle of dorsal fin . . . . . 1. *cinereus*.

4 scales between lateral line and middle of dorsal fin . . . . . 2. *simillimus*.

2. Second anal spine from less than $\frac{1}{4}$ to slightly more than $\frac{1}{3}$ the length of head; second dorsal spine a little shorter than third.

a. Præmaxillary processes (measured from anterior edge of upper jaw to their posterior extremities) more than $\frac{1}{2}$ the length of head.

Snout a little shorter than eye; maxillary extending to below anterior margin of eye; depth of body $2\frac{1}{3}$–$2\frac{2}{3}$ in the length; 7 gill-rakers on the lower part of anterior arch . . . . . 3. *gula*.

Snout as long as eye; maxillary extending to below anterior $\frac{1}{4}$ of eye; depth of body $2\frac{3}{4}$–3 in the length; 8 gill-rakers on the lower part of anterior arch . 4. *harengulus.*

b. Præmaxillary processes $\frac{1}{2}$ the length of head; 7 gill-rakers on the lower part of anterior arch.

Depth of body $2\frac{1}{2}$–$2\frac{4}{5}$ in the length . . . . . 5. *californiensis.*

Depth of body 3–$3\frac{2}{5}$ in the length . . . . . 6. *pseudogula.*

B. Anal II 8 . . . . . 7. *lefroyi.*

II. Præoperculum finely serrated.

A. Præorbital entire; no conspicuous dark longitudinal lines along the series of scales.

1. Anal III 8.

a. Second dorsal spine from $\frac{4}{5}$ to as long as the head.

Maxillary extending nearly to below middle of eye (in specimens of 220 mm.);

4 scales between pectoral and ventral . . . . . 8. *peruvianus.*

Maxillary extending to below anterior $\frac{1}{3}$ of eye (in a specimen of 220 mm.);

3 scales between pectoral and ventral . . . . . 9. *olithostomus.*

b. Second dorsal spine $\frac{1}{2}$ the length of head . . . . . 10. *aureolus.*

2. Anal II 9 . . . . . 11. *rhombeus.*

B. Præorbital finely serrated; conspicuous dark longitudinal lines along the series of scales.

1. Pectoral extending to, or nearly to, origin of anal.

a. Second anal spine as long as longest dorsal spine.

α. Anal III 8.

4 scales between lateral line and middle of dorsal fin; 15 gill-rakers on the lower part of anterior arch . . . . . 12. *lineatus.*

3 scales between lateral line and middle of dorsal fin; 12 gill-rakers on the lower part of anterior arch . . . . . 13. *axillaris.*

β. Anal III 7 . . . . . 14. *patao.*

b. Second anal spine $\frac{4}{5}$–$\frac{7}{8}$ as long as longest dorsal spine. Anal III 8. 15. *plumieri.*

2. Pectoral not extending to origin of anal. Anal III 8.

Second anal spine $\frac{4}{5}$ as long as longest dorsal spine; pectoral $\frac{3}{4}$–$\frac{4}{5}$ the length of head . . . . . 16. *brevimanus.*

Second anal spine $\frac{5}{8}$ as long as longest dorsal spine; pectoral as long as head . 17. *mexicanus.*

1. **Gerres cinereus,** Walbaum, 1792.

Xystæma cinereum (part.), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 1372, and 1900, fig. 556.

Hab. Atlantic Coasts from Florida to Brazil; freshwater ponds of Barbados.

2. **Gerres simillimus,** sp. n. (Tab. VIII. fig. 2.)

Xystæma cinereum (part.), Jord. & Everm. l. c.

Depth of body $2\frac{1}{3}$–$2\frac{1}{2}$ in the length, length of head 3 to $3\frac{1}{4}$. Snout as long as or longer than eye, the diameter of which is more than $\frac{1}{4}$ the length of head; interorbital width $2\frac{3}{4}$ to 3 in the length of head. Maxillary extending to below anterior $\frac{1}{4}$ of eye. Præorbital and præoperculum entire. 8 gill-rakers on the lower part of the anterior arch. 40–43 scales in a longitudinal series, 4 between lateral line and

middle of dorsal fin. Dorsal IX 10; second spine longest, $\frac{2}{3}$ the length of head. Anal III 7; second spine not longer than third, about $\frac{2}{5}$ the length of head. Pectoral longer than the head. Caudal deeply forked. Silvery, back brownish; about 10 narrow bluish vertical bars on the upper part of the side: dorsal and caudal fins dusky.

Hab. Pacific Coast from Lower California to Panama:
Rio Presidio, Mexico.

This species differs slightly from its Atlantic representative (*G. cinereus*) in the fewer scales, larger head, longer maxillary, and longer second anal spine, whilst the bars on the sides are usually more numerous.

3. **Gerres gula,** Cuv. & Val., 1830.

Eucinostomus gula, Jord. & Everm. t. c. p. 1370.

Hab. Atlantic Coast from Carolina to Brazil.

The top of the head is covered with scales to the level of the nostrils except for a small rounded or oval naked area completely surrounded by scales, overlying the præmaxillary spines.

4. **Gerres harengulus,** Goode & Bean, 1879.

Eucinostomus harengulus, Jord. & Everm. t. c. p. 1368.

Hab. Atlantic Coast from Florida to Bahia.

5. **Gerres californiensis,** Gill, 1862.

Eucinostomus dowi, Jord. & Everm. t. c. p. 1367.

Eucinostomus californiensis, Jord. & Everm. t. c. p. 1369.

Hab. Pacific Coast from California to Panama:
Rio Mascota, Mexico (*Buller*).

6. **Gerres pseudogula,** Poey, 1875.

Eucinostomus pseudogula, Jord. & Everm. t. c. p. 1368.

Hab. Atlantic Coast from the Bermudas to Brazil.

7. **Gerres lefroyi,** Goode, 1874.

Ulæma lefroyi, Jord. & Everm. t. c. p. 1371.

Eucinostomus meeki, Eigenm. Bull. U.S. Fish. Comm. xxii. 1902, p. 229, fig. 10 (1904).

Hab. Atlantic Coast from the Bermudas to Cuba; rivers of Cuba.

8. **Gerres peruvianus,** Cuv. & Val., 1830.

Gerres peruvianus, Jord. & Everm. t. c. p. 1376.

Hab. Pacific Coast from Mexico to Peru; Rio Guayas, Ecuador.

9. **Gerres olithostomus,** Goode & Bean, 1882.

Gerres olithostomus, Jord. & Everm. l. c., and 1900, fig. 557.

Hab. Atlantic Coast from Florida to Brazil; Indian River, Florida.

10. **Gerres aureolus,** Jord. & Gilb., 1882.

Gerres aureolus, Jord. & Everm. t. c. p. 1375.

Hab. Pacific Coast of Panama.

11. **Gerres rhombeus,** Cuv. & Val., 1830.

Gerres rhombeus, Jord. & Everm. t. c. p. 1374.

Hab. Atlantic Coast from Cuba to Brazil; Rio Magdalena, Colombia.

12. **Gerres lineatus,** Humboldt.

Gerres lineatus (part.), Jord. & Everm. t. c. p. 1377.

Hab. Pacific Coast of Mexico: freshwater lake at Acapulco.

13. **Gerres axillaris,** Günth., 1864.

Gerres lineatus (part.), Jord. & Everm. l. c.

Hab. Brackish-water lakes at Chiapam, Guatemala (*Salvin*).

14. **Gerres patao,** Poey, 1868.

Gerres brasilianus (part.), Jord. & Everm. t. c. p. 1378.

Hab. Atlantic Coast from Cuba to Bahia.

15. **Gerres plumieri,** Cuv. & Val., 1830.

Gerres brasilianus (part.), Jord. & Everm. l. c.

Gerres embryx, Jord. & Everm. t. c. p. 1379.

Gerres plumieri, Jord. & Everm. l. c.

Hab. Atlantic Coast from Florida to Brazil:

Indian River, Florida; Lake Yzabal, Guatemala (*Salvin*); Rio Magdalena, Colombia.

As in other species of the genus, the dorsal and anal spines become relatively shorter during growth. Thus in specimens of 140 mm. the second dorsal spine is as long as or a little longer than the head, in one of 185 mm. it is $\frac{4}{5}$ the length of the head. *Gerres embryx*, Jord. & Starks, is based on examples of 300 mm. with the second dorsal spine $\frac{2}{3}$ the length of head. *Gerres brasilianus*, Cuv. & Val., was described as in every way similar to *G. plumieri*, except for the shorter dorsal spines.

16. **Gerres brevimanus,** Günth., 1864.

Gerres brevimanus, Jord. & Everm. t. c. p. 1377.

Hab. Brackish-water lakes at Chiapam, Guatemala (*Salvin*); Pacific Coast of Panama.

17. **Gerres mexicanus,** Steind., 1863.

Gerres mexicanus, Jord. & Everm. t. c. p. 1380.

Hab. Rio Teapa, Mexico.

Fam. 10. POMADASIDÆ.

A large and important group of marine fishes, chiefly from tropical seas. The species of the widely distributed genus *Pomadasis* are numerous, but only a few ascend rivers. About thirty-five members of this genus are found on the coast of Tropical America, and six of these are known to enter rivers freely and must be considered here.

1. POMADASIS, Lacep., 1803.

Pristipoma, Günth. Cat. Fish. i. p. 286 (1859).

Body compressed; scales small or of moderate size, ctenoid. Lateral line complete, usually curved. Mouth rather small or of moderate size, protractile; entire length of upper edge of maxillary slipping under the præorbital; jaws equal anteriorly or the lower somewhat the shorter; bands of small villiform teeth in the jaws; palate toothless. A median pit or groove behind the symphysis of the lower jaw. Præoperculum serrated; serræ on lower limb not directed forwards. A single dorsal, with X–XIV 10–18 rays, with a more or less distinct scaly sheath at the base; soft fin not densely covered with small scales. Anal with III 7–13 rays. Caudal truncate or forked. Pectoral asymmetrical, pointed; ventrals below or a little behind the base of the pectorals, with I 5 rays; a scaly process at the base of spine of each ventral fin.

Hab. Tropical and subtropical seas, a few species entering rivers.

Synopsis of the Species found in the Rivers of Mexico and Central America.

Scales above the lateral line in series parallel to the lateral line. Dorsal XI–XIII 11–17. Anal III 6–9 *.

I. A series of small scales on the membrane behind each branched ray of the dorsal fin.

Second anal spine not longer than third . . . . . 1. *leuciscus.*

Second anal spine longer than third . . . . . 2. *macracanthus.*

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* Other species which present these features and which may prove to be fluviatile are *P. nitidus*, *P. axillaris*, and *P. panamensis* from the Pacific Coast, and *P. corvinæformis* from the Atlantic. *P. panamensis* is related to *P. crocro*, the others to *P. leuciscus*. The genus *Conodon*, with a species on each coast, is very close to *Pomadasis* of the type of *P. branicki*. It is distinguished by the enlarged outer teeth and the strongly serrated præopercle, with antrorse serræ below the angle.

II. Dorsal fin scaleless, except at the base; second anal spine longer than third.

A. Maxillary not extending beyond the vertical from anterior margin of eye.

Second anal spine $\frac{2}{3}$ the length of head; depth of body 3 in the length . . . 3. *branicki.*

Second anal spine $\frac{5}{6}$ to $\frac{7}{8}$ the length of head; depth of body $3\frac{1}{2}$ in the length . 4. *boucardi.*

B. Maxillary extending to below anterior part of eye.

60–70 scales in a longitudinal series . . . . . 5. *bayanus.*

54–62 scales in a longitudinal series . . . . . 6. *crocro.*

1. Pomadasis leuciscus.

Pristipoma leuciscus, Günth. Proc. Zool. Soc. 1864, p. 147 [1], and Trans. Zool. Soc. vi. 1868, p. 416, t. 66. fig. 3 [2].

Pomadasis leuciscus, Jord. & Gilb. Proc. U.S. Nat. Mus. 1881, p. 387 [3]; Jord. & Fesler, Rep. U.S. Fish. Comm. 1893, p. 495 [4].

Brachydeuterus leuciscus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 1327 [5]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 109 [6].

Depth of body 3 in the length, length of head 3. Snout a little longer than eye, the diameter of which is 4–5 in the length of head; interorbital width $4\frac{1}{2}$–$4\frac{3}{4}$ in the length of head. Præorbital deep, its depth greater than the diameter of eye. Maxillary not quite reaching the vertical from the anterior margin of eye. 11 or 12 gill-rakers on the lower part of anterior arch. 50–56 scales in a longitudinal series, 5 between lateral line and middle of dorsal fin. Dorsal XII 14–15; third or fourth spine longest, $\frac{1}{2}$ or less than $\frac{1}{2}$ the length of head. Anal III 7–8; second spine not longer than third, $\frac{1}{4}$–$\frac{1}{3}$ the length of head. Pectoral $\frac{3}{4}$–$\frac{4}{5}$ the length of head. Caudal emarginate. Silvery, back darker; indistinct dark longitudinal lines on the side; edge of opercular membrane blackish; often a blackish blotch in the axil of pectoral; dorsal and caudal fins dusky.

Hab. Pacific Coast from California to Peru, entering rivers:

Lower California [5].—Mexico, Mazatlan [5]; Guatemala, San José and Chiapam (*Salvin* [1 2]); Panama [5 6] (*Dow* [2]).—Northern Peru [5].

Here described from four specimens, 260–300 mm. in total length, from Panama and Chiapam.

2. Pomadasis macracanthus.

Pristipoma macracanthum, Günth. Proc. Zool. Soc. 1864, p. 146 [1], and Trans. Zool. Soc. vi. 1868, p. 416, t. 64. fig. 1 [2].

Pomadasis macracanthus, Jord. & Fesler, Rep. U.S. Fish. Comm. 1893, p. 493 [3]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 1332 [4].

Depth of body $2\frac{1}{2}$–3 in the length, length of head $2\frac{4}{5}$–3. Snout $1\frac{1}{3}$–$1\frac{2}{3}$ as long as eye, the diameter of which is $4\frac{1}{2}$–$5\frac{1}{2}$ in the length of head; interorbital width $4\frac{1}{2}$–5 in the length of head. Maxillary not extending to below the eye. 15 or 16 gill-rakers on the lower part of anterior arch. 44–49 scales in a longitudinal series, 4 or 5 between lateral line and middle of dorsal fin. Dorsal XII 13; fourth or fifth spine longest, $\frac{2}{3}$–$\frac{1}{2}$ the length of head. Anal III 8; second spine longest, about $\frac{1}{2}$ the length of head. Pectoral as long, or nearly as long, as the head. Caudal slightly emarginate. Caudal peduncle about $1\frac{1}{3}$ as long as deep. Back dark; lower part of side silvery; sometimes 3 or 4 dark cross-bars on the side; fins dusky.

Hab. Pacific Coast of Tropical America, entering rivers:
Mexico, Rio Presidio (*Forrer*); Guatemala, Chiapam [1 2 4] (*Salvin*); Panama [4].

Here described from six specimens, 220–340 mm. in total length, including the types of the species.

3. **Pomadasis branicki.**

Pristipoma branicki, Steind. Denkschr. Ak. Wien, xii. p. 28 (1879) [1].
Pomadasis branicki, Jord. & Fesler, Rep. U.S. Fish. Comm. 1893, p. 493 [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 1334 [3].

Depth of body 3 in the length, length of head 3. Snout as long as eye, the diameter of which is $3\frac{1}{2}$ in the length of head; interorbital width 4 in the length of head. Maxillary not extending to below the eye. 12 gill-rakers on the lower part of anterior arch. 50 scales in a longitudinal series, $4\frac{1}{2}$ between lateral line and middle of dorsal fin. Dorsal XIII 12; fourth spine longest, $\frac{3}{5}$ the length of head. Anal III 7; second spine longest, $\frac{2}{3}$ the length of head. Pectoral a little shorter than head. Caudal truncate. Silvery, back darker; vertical fin dusky; soft part of dorsal with 3 series of spots.

Hab. Pacific Coasts of Tropical America, entering rivers:
Mexico, Mazatlan [3], Chiapas [3]; Panama [3].—Peru [1].

Here described from a specimen from Mazatlan, 165 mm. in total length.

4. **Pomadasis boucardi.**

? *Pristipoma ramosum,* Poey, Mem. Cuba, ii. p. 186 (1860) [1].
Pristipoma boucardi, Steind. Sitzb. Ak. Wien, lx. 1869, p. 120, t. 1 [2].
Pomadasis ramosus, Jord. & Fesler, Rep. U.S. Fish. Comm. 1893, p. 494 [3]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 1334 [4].
Pomadasis templei, Meek, Pbl. Columbian Mus. Zool. v. 1904, p. 201, t. 14 [5].

Depth of body $3\frac{1}{2}$ in the length, length of head $3\frac{1}{3}$. Snout as long as eye, the diameter of which is $3\frac{2}{3}$ in the length of head; interorbital width $4\frac{1}{2}$–5 in the length of head. Maxillary extending to or nearly to the vertical from the anterior margin of eye. 11 gill-rakers on the lower part of anterior arch. 52–55 scales in a longitudinal series, 6 between lateral line and middle of dorsal fin. Dorsal XIII 12; fourth or fifth spine longest, $\frac{1}{2}$–$\frac{3}{5}$ the length of head. Anal III 6; second spine longest, $\frac{5}{6}$–$\frac{7}{8}$ the length of head. Pectoral $\frac{3}{4}$ the length of head. Caudal very slightly emarginate. Caudal peduncle $1\frac{3}{4}$ as long as deep. Back dark; lower part of side silvery, with a more or less distinct longitudinal stripe; dorsal and caudal fins dusky.

Hab. Atlantic Coasts of Tropical America, entering rivers:
Gulf of Mexico [2]; Mexico, Valles [5], Perez [5], and the Rio Tonto (*Gadow*) in Vera Cruz.—Cuba [1]; Haiti [4].

Here described from two specimens, 170 and 175 mm. in total length, from the Rio Tonto, Southern Mexico.

5. **Pomadasis bayanus.**

Pristipoma humile (non Bowd.), Kner & Steind. Abh. Bayer. Ak. x. 1866, p. 3, t. 1. fig. 1 [1].
Pomadasis humilis, Jord. & Fesler, Rep. U.S. Fish. Comm. 1893, p. 492 [2].

Pomadasis bayanus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 1331[3]; Meek, Pbl. Columbian Mus. Zool. v. 1904, p. 201[4].

Pristipoma labraciforme, Bouleng. Boll. Mus. Torino, xiv. 1899, no. 335, p. 3[5].

Depth of body $3\frac{1}{4}$–4 in the length, length of head $2\frac{4}{5}$–$3\frac{1}{4}$. Snout $1\frac{1}{4}$–$1\frac{2}{3}$ as long as eye, the diameter of which is $4\frac{1}{4}$–$5\frac{1}{2}$ in the length of head; interorbital width $4\frac{1}{2}$–5 in the length of head. Maxillary extending a little beyond anterior margin of pupil. 12 or 13 gill-rakers on the lower part of anterior arch. 60–70 scales in a longitudinal series, 7 or 8 between middle of dorsal fin and lateral line. Dorsal XIII 12; fourth or fifth spine longest, a little more than $\frac{1}{2}$ the length of head. Anal III 7, second spine longest, $\frac{3}{5}$–$\frac{4}{5}$ the length of head. Pectoral $\frac{3}{5}$–$\frac{2}{3}$ the length of head. Caudal very slightly emarginate. Caudal peduncle $1\frac{1}{3}$–$1\frac{3}{4}$ as long as deep. Silvery, back darker; dorsal and caudal fins dusky.

Hab. Pacific Coast of Tropical America, entering rivers:

Lower California[4].—Mexico, Rio Mascota in Jalisco (*Buller*); Panama, Rio Bayano[1 3].—Ecuador, St. Helena Bay[5], Rio Durango (*Rosenberg*).

Here described from specimens measuring from 160 to 260 mm. in total length.

6. **Pomadasis crocro.**

Pristipoma crocro, Cuv. & Val. Hist. Nat. Poiss. v. p. 264 (1830)[1]; Günth. Cat. Fish. i. p. 296 (1859)[2], and Trans. Zool. Soc. vi. 1868, p. 386[3].

Pristipoma cultriferum, Poey, Mem. Cuba, ii. p. 185 (1860)[4].

Pomadasys approximans, Bean & Dresel, Proc. U.S. Nat. Mus. 1884, p. 160[5].

Pomadasis crocro, Jord. & Fesler, Rep. U.S. Fish. Comm. 1893, p. 493[6]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 1333[7].

Pomadasys starri, Meek, Pbl. Columbian Mus., Zool. v. 1904, p. 200, t. 13[8].

Depth of body $3\frac{1}{4}$–$3\frac{3}{4}$ in the length, length of head 3–$3\frac{1}{3}$. Snout $1\frac{1}{5}$–$1\frac{1}{2}$ as long as eye, the diameter of which is 4–5 in the length of head; interorbital width $4\frac{1}{2}$–5 in the length of head. Maxillary extending to below anterior $\frac{1}{3}$ of eye. 11 or 12 gill-rakers on the lower part of anterior arch. 54–62 scales in a longitudinal series, 6 or 7 between lateral line and middle of dorsal fin. Dorsal XIII 11–12; fifth spine longest, $\frac{1}{2}$ the length of head or less. Anal III 7; second spine longest, $\frac{1}{2}$–$\frac{2}{3}$ the length of head. Pectoral $\frac{2}{3}$ the length of head. Caudal very slightly emarginate. Caudal peduncle about $1\frac{1}{2}$ as long as deep. Back dark, sides silvery, sometimes with 2 or 3 dark longitudinal stripes; dorsal and caudal fins dusky.

Hab. Atlantic Coasts of Tropical America, entering rivers:

Mexico[2 3], Perez in Vera Cruz[8]; Guatemala, Rio Motagua (*Salvin*[3]).—Cuba[4]; Jamaica[5]; Martinique[1]; Brazil[6 7].

Here described from specimens measuring from 190 to 280 mm. in total length.

Fam. 11. CENTROPOMIDÆ.

The Centropomidæ, or Centropominæ (if they be regarded as a subfamily of the Serranidæ), are a natural and sharply-defined group, represented on the coasts and in the rivers of Tropical America by the genus *Centropomus* and including also the Old-World genera *Lates* and *Psammoperca*, found in the rivers of Tropical Africa and on the coasts and in the rivers of South-eastern Asia and Northern Australia.

1. CENTROPOMUS, Lacep., 1802.

Centropomus, Bouleng. Cat. Fish. i. p. 366 (1895); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1117.

Body compressed; scales small or of moderate size, finely ctenoid. Lateral line nearly straight, continued to the end of the caudal fin. Mouth rather large, protractile; maxillary exposed; lower jaw projecting; bands of villiform teeth with obtuse crowns in jaws and on vomer and palatines. Præorbital and supraclavicle serrated. Præoperculum with a ridge parallel to its free edge, bearing 1 or 2 spines at the angle; edge of præoperculum serrated, with enlarged serræ or spines at the angle; suboperculum produced into a long flap. Two dorsals, with VIII, I 9–11 rays; the first spine very small, the second short, the third or fourth the longest; anal short, with III 6–7 rays; caudal forked; pectoral asymmetrical, obtusely pointed; ventrals behind base of pectorals, with I 5 rays; a scaly process at the base of the spine of each ventral fin.

Hab. Coasts and rivers of Tropical America.

I am glad to have the opportunity of attempting a revision of this interesting and difficult genus, and, after examination of all the specimens in the British Museum collection, I have arrived at the conclusion that none of the species occur on both the Pacific and Atlantic Coasts.

Although marine, nearly all the species are known to ascend rivers for considerable distances, so that they must be included in the fresh-water fauna.

Synopsis of the Species.

I. Anal with 7 branched rays; opercular flap not extending to the vertical from origin of dorsal; second and third anal spines of equal length, or the second slightly the shorter.

66–72 scales in a longitudinal series, $8\frac{1}{2}$ between middle of second dorsal and lateral line . . . . . 1. *pectinatus.*

56–65 scales in a longitudinal series, $6\frac{1}{2}$ to $7\frac{1}{2}$ between middle of second dorsal and lateral line . . . . . 2. *medius.*

II. Anal with 6 (exceptionally 7) branched rays.

A. Opercular flap extending to the vertical from origin of dorsal; 75–88 scales in a longitudinal series; second anal spine a little longer than the third. 3. *parallelus.*

B. Opercular flap not extending to the vertical from origin of dorsal; 65–80 scales in a longitudinal series.

1. Third dorsal spine usually the longest, about $\frac{1}{2}$ the length of head; 65–75 scales in a longitudinal series, $7\frac{1}{2}$ to $8\frac{1}{2}$ between middle of second dorsal and lateral line.

Second anal spine usually slightly longer than the third, $\frac{1}{7}$–$\frac{1}{5}$ the length of the fish ($\frac{1}{6}$ in specimens of 295–330 mm.); vent at more than $\frac{2}{3}$ of the distance from base of ventral spine to origin of anal. . . . 4. *undecimalis.*

Second anal spine not longer than the third, nearly $\frac{1}{7}$ the length of the fish (in specimens of 320–345 mm.); vent at less than $\frac{2}{3}$ of the distance from base of ventral spine to origin of anal . . . . . 5. *viridis.*

2. Third or fourth dorsal spine the longest, $\frac{2}{5}$ the length of head; 73–80 scales in a longitudinal series, 9 or 10 between middle of second dorsal and lateral line; second anal spine not longer than the third . . . . 6. *nigrescens.*

C. Opercular flap extending to or beyond the vertical from origin of dorsal; 48–60 scales in a longitudinal series.

1. 17–19 gill-rakers, including 2 to 4 rudiments, on the lower part of anterior arch; 5 to $6\frac{1}{2}$ scales between middle of second dorsal and lateral line.

Third dorsal spine longer than fourth; second anal spine about $\frac{1}{5}$ the length of the fish (in specimens of 300 mm.) . . . . . 7. *robalito.*

Third and fourth dorsal spines subequal; second anal spine about $\frac{1}{4}$ the length of the fish (in specimens of nearly 300 mm.) . . . . . 8. *ensiferus.*

2. 13–15 gill-rakers, including 2 or 3 rudiments, on the lower part of anterior arch; 7 to $8\frac{1}{2}$ scales between middle of second dorsal and lateral line.

Third anal spine $\frac{2}{3}$–$\frac{4}{5}$ as long as second, which is $\frac{2}{7}$–$\frac{1}{3}$ the length of the fish (in specimens of 210–260 mm.) . . . . . 9. *armatus.*

Third anal spine $\frac{4}{5}$ as long as second, which is $\frac{1}{4}$ the length of the fish (in a specimen of 170 mm.) . . . . . 10. *altus.*

Third anal spine nearly as long as second, which is less than $\frac{1}{5}$ the length of the fish (in a specimen of 260 mm.) . . . . . 11. *unionensis.*

The length of the fish is measured from the tip of the snout to the base of the caudal fin, that of the head from the tip of the snout to the extremity of the opercular flap, which appears to be a true prolongation of the suboperculum and distinct from the branchiostegal membrane; the projecting lower jaw is not included in either case. The scales are counted in a longitudinal series above the lateral line from the supra-clavicle to the base of the caudal fin, not including the scales covering the basal part of the fin.

In using the descriptions the size of the specimens described must be taken into account. Young specimens have the head proportionately longer, eye larger, snout and maxillary shorter and vertical fins more developed than the adults.

In the case of *C. nigrescens* the second anal spine is described as $\frac{1}{7}$–$\frac{1}{5}$ the length of the fish in specimens of 150–300 mm. in total length; *i. e.*, $\frac{1}{5}$ in the smallest example and $\frac{1}{7}$ in the largest. *C. undecimalis* also is described as having the second anal spine $\frac{1}{7}$–$\frac{1}{5}$ the length of the fish, but this is in specimens of 230–600 mm. in total length, the spine being longer in this species than in *C. nigrescens*, when examples of the same size are compared.

1. Centropomus pectinatus.

Centropomus undecimalis (part.), Cuv. & Val. Hist. Nat. Poiss. ii. p. 102 (1828) [1]; Günth. Cat. Fish. i. p. 79 (1859) [2].

Centropomus pectinatus, Poey, Mem. Cuba, ii. p. 121 (1860) [3], and Repert. ii. p. 280 (1868) [4]; Vaill. & Boc. Miss. Sc. Mex., Poiss. p. 25 (1874) [5]; Bouleng. Cat. Fish. i. p. 368 (1895) [6]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1122 [7].

Centropomus pedimacula, Poey, Mem. Cuba, ii. p. 122 (1860) [8], and Repert. ii. p. 280 (1868) [9];

Vaill. & Boc. Miss. Sci. Mex., Poiss. p. 29 [10]; Steind. Denkschr. Ak. Wien, xxxix. 1878, p. 22 [11].

Centropomus cuvieri, Bocourt, Ann. Sc. Nat. (5) ix. 1868, p. 91 [12]; Vaill. & Boc. Miss. Sci. Mex., Poiss. p. 26, t. 1 ter. fig. 1 [13].

Centropomus pedimacula (part.), Jord. & Everm. t. c. p. 1119 [14].

Depth of body about $3\frac{2}{3}$ in the length, length of head $2\frac{5}{6}$. Snout $1\frac{1}{4}$–$1\frac{1}{3}$ as long as eye, the diameter of which is 4–$4\frac{1}{2}$ in the length of head; interorbital width $6\frac{1}{2}$ in the length of head. Maxillary extending to below anterior $\frac{1}{3}$ of eye, its greatest width $\frac{1}{2}$ the diameter of eye or less. Præorbital acutely serrated, præoperculum acutely serrated, with 2 or 3 enlarged serræ at the angle; præopercular ridge with 2 serræ at the angle. Opercular flap not reaching the vertical from origin of dorsal. 16 or 17 gill-rakers, including 1 or 2 rudiments, on the lower part of anterior arch. 66–72 scales in a longitudinal series, $8\frac{1}{2}$ between middle of second dorsal and lateral line. Dorsal VIII, I 10; third spine a little longer than the fourth, a little more than $\frac{1}{2}$ the length of head. Anal III 7; second and third spines of equal length or the second slightly the shorter, $\frac{1}{4}$ or $\frac{2}{7}$ the length of the fish. Pectoral a little more than $\frac{1}{2}$ the length of head. Ventrals extending beyond the vent, which is nearly equidistant from base of inner ventral ray and origin of anal. Caudal peduncle $1\frac{2}{3}$–$1\frac{4}{5}$ as long as deep. Silvery, back brownish; lateral line with or without brownish pigment; spinous dorsal and membrane between second and third anal spines dusky; ventrals dusky at the tips.

Hab. Atlantic Coasts of Tropical America, entering rivers:

Cuba [3 4]; San Domingo [6 12 13]; Jamaica [14]; Pernambuco [6].

Here described from two specimens, 160 and 230 mm. in total length, from San Domingo and Pernambuco.

In this species the number of scales in a longitudinal series has been stated by various authors at from 48 to 78. These discrepancies are no doubt due to different methods of counting. There are about 50 scales in the lateral line. I count 66 and 72 in a longitudinal series just above the lateral line, from supraclavicle to base of caudal fin, excluding the scales covering the base of the fin. In the same two specimens Boulenger has counted 70 and 78 scales.

2. Centropomus medius.

Centropomus medius, Günth. Proc. Zool. Soc. 1864, p. 144 [1], and Trans. Zool. Soc. vi. 1868, p. 406 [2]; Vaill. & Boc. Miss. Sc. Mex., Poiss. p. 30 (1874) [3].

Centropomus grandoculatus, Everm. & Jenkins, Proc. U.S. Nat. Mus. xi. 1888, p. 139 [4]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1120 [5].

Centropomus pedimacula (non Poey), Jord. Proc. U.S. Nat. Mus. viii. 1885, p. 376 [6]; Bouleng. Cat. Fish. i. p. 371 (1895) [7].

Centropomus pedimacula (part.), Jord. & Everm. t. c. p. 1119 [8]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 90 [9].

Depth of body $3\frac{1}{2}$–4 in the length, length of head $2\frac{3}{4}$–3. Snout $1\frac{1}{3}$–$1\frac{2}{3}$ as long as eye, the diameter of which is $4\frac{1}{2}$–6 in the length of head; interorbital width 6–7 in the length of head. Maxillary extending to below anterior $\frac{1}{4}$ or $\frac{1}{3}$ of eye, its greatest width $\frac{1}{2}$–$\frac{3}{5}$ the diameter of eye. Præorbital acutely serrated posteriorly; præoperculum acutely serrated, with 2 or 3 enlarged serræ at the angle; præopercular ridge with 1 or 2 weak spines at the angle. Opercular flap not reaching the vertical from origin of dorsal. 16 or 17 gill-rakers, including 1 or 2 rudiments, on the lower part of anterior arch. 56–65 scales in a longitudinal series, $6\frac{1}{2}$–$7\frac{1}{2}$ between middle of second dorsal and lateral line. Dorsal VIII, I 10; third

spine the longest, $\frac{1}{2}$–$\frac{3}{5}$ the length of head. Anal III 7; second and third spines of equal length or the second slightly the shorter, $\frac{1}{5}$–$\frac{1}{4}$ the length of the fish. Pectoral $\frac{1}{2}$ or a little more than $\frac{1}{2}$ the length of head. Ventrals extending to or beyond the vent, which is nearly equidistant from base of inner ventral ray and origin of anal. Caudal peduncle $1\frac{1}{2}$–$1\frac{2}{3}$ as long as deep. Silvery, back darker; lateral line black; spinous dorsal and membrane between second and third anal spines blackish; ventrals dusky at the tips.

Hab. Pacific Coasts of Tropical America, entering rivers:

Mexico, Guaymas [4], Mazatlan [8], San Juan Lagoon [5]; Guatemala, Chiapam [1 2 7] (*Salvin*); Panama [9].

Here described from seven specimens, 200–360 mm. in total length, from Chiapam and Panama.

C. medius is the Pacific Coast representative of *C. pectinatus*, from which it scarcely deserves to be specifically separated. The scales are less numerous and less crowded anteriorly above the lateral line, the paired ridges on the head are weaker and further apart, and the fin-spines usually more slender than in *C. pectinatus*. The black lateral line also appears to be a characteristic feature of the Pacific Coast form.

3. **Centropomus parallelus.**

Centropomus undecimalis (part.), Günth. Cat. Fish. i. p. 79 (1859) [1].

Centropomus parallelus, Poey, Mem. Cuba, ii. p. 120 (1860) [2], and Repert. ii. p. 280 (1868) [3]; Günth. Trans. Zool. Soc. vi. 1868, p. 407 [4]; Vaill. & Boc. Miss. Sc. Mex., Poiss. p. 22 (1874) [5]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1122 [6].

Centropomus appendiculatus (part.), Günth. Trans. Zool. Soc. vi. 1868, p. 406 [7].

Centropomus mexicanus, Bocourt, Ann. Sc. Nat. (5) ix. 1868, p. 90 [8]; Vaill. & Boc. o. c. p. 23, t. 1. fig. 2 [9]; Jord. & Everm. t. c. p. 1121 [10]; Meek, Pbl. Columbian Mus. Zool. v. 1904, p. 199 [11].

Centropomus parallelus (part.), Bouleng. Cat. Fish. i. p. 369 (1895) [12].

Centropomus gabbi, Fowler, Proc. Ac. Philad. 1906, p. 423, fig. 1 [13].

Centropomus heringi, Fowler, t. c. p. 425, fig. 2 [14].

Depth of body about $3\frac{1}{2}$ in the length, length of head $2\frac{3}{5}$–$2\frac{3}{4}$. Snout $1\frac{1}{4}$–$1\frac{1}{2}$ as long as eye, the diameter of which is $4\frac{2}{3}$–6 in the length of head; interorbital width $7\frac{1}{2}$ in the length of head. Maxillary extending to below middle of eye, its greatest width $\frac{1}{2}$–$\frac{3}{5}$ the diameter of eye. Præorbital acutely serrated; præoperculum acutely serrated, with 2 or 3 enlarged serræ at the angle; præopercular ridge with 2 spines at the angle. Opercular flap extending to the vertical from the origin of dorsal. 14 gill-rakers, including 2 or 3 rudiments, on the lower part of anterior arch. 75–88 scales in a longitudinal series, 8–11 between middle of second dorsal and lateral line. Dorsal VIII, I 10; third or fourth spine longest, $\frac{1}{2}$ the length of head. Anal III 6; second spine a little longer than third, about $\frac{1}{4}$ the length of the fish. Pectoral a little more than $\frac{1}{2}$ the length of head. Ventrals about reaching the vent, which is situated very slightly nearer to the origin of anal than to the base of the inner ventral rays. Caudal peduncle about $1\frac{1}{2}$ as long as deep. Silvery, back darker; lateral line usually more or less blackish; dorsal fins dusky.

Hab. Atlantic Coasts of Tropical America, entering rivers:

Mexico, Oaxaca [8 9], San Francisco [11], Boca del Rio [11], El Hule [11], Perez [11], and the Rio Tonto (*Gadow*) in Vera Cruz; Panama, Rio Chagres (*Salvin* [4]).—Surinam [14]; Brazil, Pernambuco [12], Bahia [4 12]; Cuba [2 3]; Haiti [4 12 13]; Jamaica [4 12].

Here described from five specimens, 200–300 mm. in total length, from Pernambuco, the Rio Chagres, and the Rio Tonto, Southern Mexico.

4. Centropomus undecimalis.

Sciæna undecimalis, Bloch, Ausl. Fische, vi. p. 60, t. 203 (1792) [1].

Platycephalus undecimalis, Schneid., Bloch's Syst. Ichthyol. i. p. 59 (1801) [2].

Centropomus undecimradiatus, Lacep. Hist. Nat. Poiss. iv. p. 268 (1802) [3].

Perca loubina, Lacep. t. c. p. 418 [4].

Sphyræna aureoviridis, Lacep. o. c. v. p. 327, t. 9. fig. 2 (1803) [5].

Centropomus undecimalis (part.), Cuv. & Val. Hist. Nat. Poiss. ii. p. 102, t. 14 (1828) [6]; Günth. Cat. Fish. i. p. 79 (1859) [7]; Boulenger, Cat. Fish. i. p. 367 (1895) [8]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 89 [9].

Centropomus undecimalis, Guichen. in Ramon de la Sagra's Hist. Cuba, Poiss. p. 9 (1853) [10]; Vaill. & Boc. Miss. Sc. Mex., Poiss. p. 17, t. 2. fig. 1 (1874) [11]; Steind. Denkschr. Ak. Wien, xxxix. 1878, p. 21 [12]; Jord. & Gilb. Syn. Fish. N. A. p. 528 (1882) [13]; Everm. & Kendall, Bull. U.S. Fish. Comm. 1892, t. 37 (1894) [14]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1118 [15].

Centropomus appendiculatus, Poey, Mem. Cuba, ii. p. 119 (1860) [16], and Repert. ii. p. 280 (1868) [17].

Centropomus appendiculatus (part.), Günth. Trans. Zool. Soc. vi. 1868, p. 406 [18].

Centropomus parallelus (part.), Bouleng. t. c. p. 369 [19].

? *Centropomus constantinus,* Jord. & Everm. t. c. p. 1125 [20].

Centropomus argenteus, Regan, Ann. Mag. Nat. Hist. (7) xiii. 1904, p. 260 [21].

Depth of body $3\frac{3}{4}$–$4\frac{1}{2}$ in the length, length of head $2\frac{2}{3}$–$2\frac{4}{5}$. Snout $1\frac{3}{5}$–2 as long as eye, the diameter of which is 6–$8\frac{1}{2}$ in the length of head; interorbital width 8–9 in the length of head. Maxillary extending to below middle or posterior edge of eye, its greatest width $\frac{1}{2}$–$\frac{4}{5}$ the diameter of eye. Præorbital weakly serrated; præoperculum acutely serrated, the serræ enlarged at the angle; 1 or 2 feeble spines at angle of præopercular ridge. Opercular flap not reaching the vertical from origin of dorsal. 8 or 9 well-developed gill-rakers and a few rudiments on the lower part of anterior arch. 67–75 scales in a longitudinal series, $7\frac{1}{2}$–$8\frac{1}{2}$ between middle of second dorsal and lateral line. Dorsal VIII, I 10; third spine usually the longest, about $\frac{1}{2}$ the length of head. Anal III 6; second and third spines subequal in length, the second sometimes slightly the longer, $\frac{1}{5}$–$\frac{1}{7}$ the length of the fish. Pectoral $\frac{1}{2}$ or a little more than $\frac{1}{2}$ the length of head. Ventrals not reaching vent, which is situated at more than $\frac{2}{3}$ of the distance from base of ventral spine to origin of anal. Caudal peduncle $1\frac{3}{4}$–2 as long as deep. Silvery or golden, back greenish; lateral line usually blackish; spinous dorsal dusky.

Hab. Atlantic Coasts of Tropical America, ascending rivers:

Mexico [7 8]; British Honduras, Belize [11]; Panama, Rio Chagres (*Salvin* [7 8 18]).—Cuba [10 15 16 17]; Haiti [6 11]; Jamaica [1 2 7 8]; Porto Rico [11]; Martinique [5]; Barbados [19 21]; British Guiana [19 21]; Cayenne [4]; Bahia [20]; Rio Janeiro.

Here described from six specimens, 230–600 mm. in total length, from Jamaica, Mexico, the Rio Chagres, and Rio Janeiro. The small examples from Barbados and Guiana, referred by Boulenger to *C. parallelus* and described by me under the name of *C. argenteus*, prove to be young individuals of this species.

5. Centropomus viridis.

Centropomus viridis, Lockington, Proc. Calif. Ac. Sci. viii. 1877, p. 110 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1118 [2].

Centropomus undecimalis (part.), Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 89 [3].

Depth of body $4\frac{1}{4}$–$4\frac{1}{3}$ in the length, length of head $2\frac{5}{6}$–3. Snout 2–$2\frac{1}{4}$ as long as eye, the diameter of which is 8 in the length of head, interorbital width 7–$7\frac{1}{2}$. Maxillary extending beyond middle of eye, its greatest width $\frac{4}{5}$ the diameter of eye. Præorbital weakly serrated; præoperculum acutely serrated, the serræ enlarged at the angle; 1 or 2 feeble spines at angle of præopercular ridge. Opercular flap not reaching the vertical from origin of dorsal. 8 or 9 well-developed gill-rakers and a few rudiments on the lower part of anterior arch. 65–70 scales in a longitudinal series, 8 or $8\frac{1}{2}$ between middle of second dorsal and lateral line. Dorsal VIII, I 9; third spine longest, $\frac{1}{2}$ the length of head. Anal III 6; second and third spines subequal in length, nearly $\frac{1}{7}$ the length of the fish. Pectoral $\frac{1}{2}$ the length of head. Ventrals not reaching vent, which is situated at about $\frac{5}{8}$ of the distance from base of ventral spine to origin of anal. Caudal peduncle 2 as long as deep. Silvery or golden, back greenish; lateral line blackish; spinous dorsal dusky.

Hab. Pacific Coasts of Tropical America:

Lower California, Asuncion I. [1].—Mazatlan [2]; Panama [2 3].

Here described from two specimens, 350 and 380 mm. in total length, from Panama and Mazatlan.

As in its Atlantic representative, *C. undecimalis*, the air-bladder has a pair of anterior appendages. From *C. undecimalis*, with which it has been confused, this species is seen to differ, when specimens of the same size are compared, in the somewhat smaller eye, broader interorbital region, broader maxillary, shorter anal spines, and more anteriorly placed vent. Moreover, the two specimens here described agree in having 9 branched rays in the dorsal fin, whilst all I have seen of *C. undecimalis* have 10.

The principal differences are shown by the following measurements (in millimetres) of the two specimens of *C. viridis* and the two of *C. undecimalis* which come nearest to them in size:—

	C. viridis.		*C. undecimalis.*	
Length, to base of caudal	320	345	295	330
Interorbital width	14	17	12	12
Length of second anal spine	45	49	51	54
Distance from base of ventral spine to vent	70	80	70	88
„ „ vent to origin of anal	40	45	30	32

6. Centropomus nigrescens.

Centropomus nigrescens, Günth. Proc. Zool. Soc. 1864, p. 144 [1], and Trans. Zool. Soc. vi. 1868, p. 407 [2]; Vaill. & Boc. Miss. Sci. Mex., Poiss. p. 20, t. 1 bis, fig. 1 (1874) [3]; Bouleng. Cat. Fish. i. p. 368 (1895) [4]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1119 [5]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 90 [6].

Centropomus undecimalis (part.), Bouleng. t. c. p. 367 [7].

Depth of body 4 in the length, length of head $2\frac{2}{3}$–$2\frac{4}{5}$. Snout $1\frac{1}{3}$–$1\frac{3}{4}$ as long as eye, the diameter of which is 5–7 in the length of head; interorbital width 7–$7\frac{1}{3}$ in the length of head. Maxillary extending to below

middle of eye or beyond, its greatest width $\frac{1}{2}$–$\frac{2}{3}$ the diameter of eye. Præorbital weakly serrated; præoperculum acutely serrated, the serræ enlarged at the angle; 1 or 2 feeble spines at angle of præopercular ridge. Opercular flap not reaching the vertical from origin of dorsal. 8 or 9 well-developed gill-rakers and a few rudiments on the lower part of anterior arch. 73–80 scales in a longitudinal series, 9 or 10 between middle of second dorsal and lateral line. Dorsal VIII, I 10; third or fourth spine longest, $\frac{2}{5}$ the length of head. Anal III 6; second and third spines subequal in length, $\frac{1}{5}$–$\frac{1}{7}$ the length of the fish. Pectoral $\frac{1}{2}$ or a little more than $\frac{1}{2}$ the length of head. Ventrals not reaching vent, which is situated at about $\frac{2}{3}$ of the distance from base of ventral spine to origin of anal. Caudal peduncle $1\frac{3}{4}$–2 as long as deep. Silvery, back brownish; lateral line blackish; spinous dorsal usually blackish; other fins usually more or less dusky.

Hab. Pacific Coasts of Tropical America, entering rivers:

Mexico, Mazatlan [4 5], Rio Presidio [4] (*Forrer*), Rio Mascota [7] (*Buller*); Guatemala, Chiapam [1 2] (*Salvin*); Panama [5 6].

Here described from three specimens, 150–300 mm. in total length, from the Rio Presidio, the Rio Mascota, and Chiapam.

This species is very closely allied to *C. viridis*, but the anterior processes of the air-bladder are wanting, whilst the third dorsal spine is shorter, the scales are somewhat smaller, and the vent is placed a little further back. There appear to be constantly 10 branched rays in the second dorsal fin.

7. Centropomus robalito.

Centropomus armatus (non Gill), Günth. Trans. Zool. Soc. vi. 1868, p. 408 [1].

Centropomus robalito, Jord. & Gilb. Proc. U.S. Nat. Mus. iv. 1882, p. 462 [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1123 [4]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 94, t. 13. fig. 25 [4].

Centropomus ensiferus (part.), Bouleng. Cat. Fish. i. p. 369 (1895) [5].

Depth of body $3\frac{1}{4}$–$3\frac{3}{4}$ in the length, length of head $2\frac{2}{5}$–$2\frac{3}{5}$. Snout $1\frac{1}{2}$–2 as long as eye, the diameter of which is 6–$7\frac{1}{2}$ in the length of head; interorbital width 8 in the length of head. Maxillary extending to below middle of eye, or nearly, its greatest width $\frac{3}{5}$–$\frac{4}{5}$ the diameter of eye. Præorbital acutely serrated posteriorly; præoperculum acutely serrated, with 1 or 2 enlarged serræ at the angle; præopercular ridge with 1 or 2 spines at the angle. Opercular flap extending a little beyond the vertical from origin of dorsal. 17–19 gill-rakers, including 2 or 3 rudiments, on the lower part of anterior arch. 48–54 scales in a longitudinal series, 5–$6\frac{1}{2}$ between middle of second dorsal and lateral line. Dorsal VIII, I 10; spines of moderate strength, the third the longest, about $\frac{1}{2}$ the length of head. Anal III 6; third spine $\frac{3}{4}$–$\frac{5}{6}$ as long as second, which is from $\frac{1}{5}$ to a little more than $\frac{1}{4}$ the length of the fish. Pectoral $\frac{3}{5}$ as long as head. Ventrals extending about to the vent, which is situated at $\frac{3}{5}$ of the distance from base of ventral spine to origin of anal. Caudal peduncle $1\frac{1}{5}$–$1\frac{1}{2}$ as long as deep. Silvery or golden, back brownish; lateral line not blackish; spinous dorsal and membrane between second and third anal spines usually blackish.

Hab. Pacific Coasts of Tropical America, entering rivers:

Mexico, Rio Presidio [5] (*Forrer*), Mazatlan [2 3], Acapulco [2 3]; Guatemala, Chiapam [1 5] (*Salvin*); Panama [3 4].

Here described from nine specimens, 180–300 mm. in total length, from Panama, Chiapam, Mazatlan, and the Rio Presidio.

8. **Centropomus ensiferus.**

Centropomus undecimalis (part.), Günth. Cat. Fish. i. p. 79 (1859) [1].

Centropomus ensiferus, Poey, Mem. Cuba, ii. p. 122, t. 12. fig. 1 (1860) [2]; Günth. Trans. Zool. Soc. vi. 1868, p. 408 [3]; Vaill. & Boc. Miss. Sci. Mex., Poiss. p. 33 (1874) [4]; Steind. Denkschr. Ak. Wien, xxxix. 1878, p. 21 [5]; Jord. Proc. U.S. Nat. Mus. ix. 1886, p. 39 [6]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1125 [7].

Centropomus affinis, Steind. Sitzb. Ak. Wien, xlix. i. 1864, p. 200, t. 1. fig. 1 [8]; Vaill. & Boc. Miss. Sci. Mex., Poiss. p. 31, t. 1. fig. 1 [9].

Centropomus scaber, Bocourt, Ann. Sc. Nat. (5) ix. 1868, p. 90 [10].

Centropomus ensiferus (part.), Bouleng. Cat. Fish. i. p. 370 (1895) [11].

Depth of body $3\frac{1}{3}$–4 in the length, length of head $2\frac{1}{2}$–$2\frac{3}{4}$. Snout $1\frac{1}{2}$–2 as long as eye, the diameter of which is 6–8 in the length of head; interorbital width about 8 in the length of head. Maxillary extending to below anterior $\frac{1}{3}$ or nearly to middle of eye, its greatest width $\frac{1}{2}$–$\frac{2}{3}$ the diameter of eye. Præorbital sharply serrated posteriorly; præoperculum acutely serrated, the serræ enlarged at the angle; præopercular ridge with 1 or 2 spines at the angle. Opercular flap extending to or a little beyond the vertical from origin of dorsal. 17–19 gill-rakers, including 3 or 4 rudiments, on the lower part of anterior arch. 52–58 scales in a longitudinal series, $5\frac{1}{2}$–$6\frac{1}{2}$ between middle of second dorsal and lateral line. Dorsal VIII, I 10; spines moderately strong, the third or fourth the longest, $\frac{2}{5}$–$\frac{1}{2}$ the length of head. Anal III 6; third spine $\frac{3}{4}$–$\frac{4}{5}$ as long as the second, which is $\frac{1}{4}$–$\frac{2}{7}$ the length of the fish. Pectoral $\frac{3}{5}$ the length of head. Ventrals extending nearly to the vent, which is situated at $\frac{3}{5}$ of the distance from base of ventral spine to origin of anal. Caudal peduncle $1\frac{1}{3}$–$1\frac{4}{5}$ as long as deep. Silvery, back brownish; lateral line not blackish; spinous dorsal and membrane between second and third anal spines usually blackish.

Hab. Atlantic Coasts of Tropical America, entering rivers:

British Honduras, Belize [1 3 10 11] (*Salvin*).—Cuba [2]; Jamaica [1]; Trinidad; British Guiana [1 8 11]; Rio Janeiro [8]; Cajutuba [8].

Here described from five specimens from Belize, Trinidad, and Jamaica, 200–280 mm. in total length.

9. **Centropomus armatus.**

Centropomus armatus, Gill, Proc. Ac. Philad. 1863, p. 163 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1123 [2]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 92, t. 13. fig. 26 [3].

Centropomus brevis, Günth. Proc. Zool. Soc. 1864, p. 145 [4].

Centropomus ensiferus (part.), Bouleng. Cat. Fish. i. p. 369 (1895) [5].

Centropomus atridorsalis, Regan, Ann. Mag. N. H. (7) xii. 1903, p. 627 [6].

Depth of body 3–4 in the length, length of head $2\frac{2}{5}$–$2\frac{2}{3}$. Snout $1\frac{1}{2}$–2 as long as eye, the diameter of which is 6–$7\frac{1}{2}$ in the length of head; interorbital width 7 in the length of head. Maxillary extending to below middle of eye or beyond, its greatest width $\frac{3}{5}$–$\frac{4}{5}$ the diameter of eye. Præorbital strongly serrated posteriorly; præoperculum acutely serrated, with 2 or 3 strongly enlarged serræ at the angle; præopercular ridge with 1 or 2 spines at the angle. Opercular flap extending a little beyond the vertical from origin of dorsal. 13–15 gill-rakers, including 2 or 3 rudiments, on the lower part of anterior arch. 50–56 scales in a longitudinal series, 7–$8\frac{1}{2}$ between middle of second dorsal and lateral line. Dorsal VIII, I 10; spines strong, the third often slightly longer than the fourth, $\frac{2}{5}$–$\frac{1}{2}$ the length of head. Anal III 6 (exceptionally 7); third spine $\frac{2}{3}$–$\frac{4}{5}$ as long as the second, which is $\frac{2}{7}$–$\frac{1}{3}$ the length of the fish. Pectoral $\frac{2}{3}$ the length of head. Ventrals extending to the vent, which is situated at about $\frac{2}{3}$ of the distance from base of ventral spine to origin of anal. Caudal peduncle $1\frac{1}{3}$–$1\frac{2}{3}$ as long as deep. Silvery,

back darker; lateral line usually more or less blackish; spinous dorsal and membrane between second and third anal spines blackish.

Hab. Pacific Coasts of Tropical America, entering rivers:
Panama [1 2 3 5]; Rio Vauqueria, Ecuador [6].

Here described from four specimens from Panama, 210–260 mm. in total length.

Centropomus brevis is founded on a young example of *C. armatus*; and *C. atri-dorsalis* was described from a small specimen of this species from the Rio Vauqueria, N.W. Ecuador, with the exceptional number of seven branched rays in the anal fin.

10. **Centropomus altus,** sp. n. (Tab. VIII. fig 1.).

Centropomus armatus (non Gill), Vaill. & Boc. Miss. Sci. Mex., Poiss. p. 34, t. 1 ter, fig. 3 (1874)[1].
Centropomus ensiferus (part.), Bouleng. Cat. Fish. i. p. 369 (1895)[2].

Depth of body 3 in the length, length of head $2\frac{1}{2}$. Snout $1\frac{1}{2}$ as long as eye, the diameter of which is 6 in the length of head and equal to the interorbital width. Maxillary extending to below middle of eye, its greatest width $\frac{2}{3}$ the diameter of eye. Præorbital acutely serrated posteriorly. Posterior edge of præopercle acutely serrated; two strong spines at the angle; lower edge with only 4 or 5 distinct serræ. Subopercular flap extending a little beyond the vertical from origin of dorsal. 14 gill-rakers, including 3 rudiments, on the lower part of anterior arch. 50–52 scales in a longitudinal series, 7 or 8 between middle of second dorsal and lateral line. Dorsal VIII, I 9–10; spines moderately strong, the third or fourth the longest, a little more than $\frac{2}{5}$ the length of head. Anal III 6; third spine $\frac{4}{5}$ the length of the second, which is $\frac{1}{4}$ the length of the fish. Pectoral $\frac{3}{5}$ the length of head. Ventrals extending a little beyond the vent, which is situated at $\frac{3}{5}$ the distance from base of ventral spine to origin of anal. Caudal peduncle $1\frac{1}{2}$ as long as deep. Silvery, back brownish; lateral line not blackish; vertical fins more or less dusky.

Hab. Atlantic Coast of Panama, Colon (*Boucard* [2]).

The description is based on a single specimen, 170 mm. in total length. Two others, of 85 and 95 mm., agree with it in all essential characters, but have, of course, a shorter snout, larger eye, more elevated spinous dorsal and longer anal spines. The number of scales and fin-rays in these is included in the description.

C. altus is the Atlantic representative of *C. unionensis*, from which it differs especially in the deeper body, the more strongly armed præoperculum, and the longer second anal spine, projecting further beyond the third.

11. **Centropomus unionensis.**

Centropomus unionensis, Bocourt, Ann. Sc. Nat. (5) ix. 1868, p. 90[1]; Vaill. & Boc. Miss. Sc. Mex., Poiss. p. 37, t. 1. fig. 3 (1874)[2]; Steind. Sitzb. Ak. Wien, lxxiv. i. 1876, p. 49[3]; Bouleng. Cat. Fish. i. p. 370 (1895)[4]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 1122[5]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 90, t. 13. fig. 27[6].

Depth of body $3\frac{1}{2}$ in the length, length of head $2\frac{3}{5}$. Snout $1\frac{3}{4}$ as long as eye, the diameter of which is 7 in the length of head; interorbital width 6 in the length of head. Maxillary extending to below the middle of eye, its greatest width $\frac{2}{3}$ the diameter of eye. Præorbital feebly serrated posteriorly. Posterior edge of præopercle feebly serrated; two moderately strong spines at the angle; lower edge with a few serræ. Opercular flap extending slightly beyond the vertical from the origin of dorsal. 14 gill-rakers, including 3 rudiments, on the lower part of the anterior arch. 52 scales in a longitudinal series, $7\frac{1}{2}$ between middle

of second dorsal and lateral line. Dorsal VIII, I 9; spines of moderate strength, the third and fourth the longest, a little more than $\frac{2}{5}$ the length of head. Anal III 6; second spine slightly longer than the third, less than $\frac{1}{5}$ the length of the fish. Pectoral nearly $\frac{3}{5}$ the length of head. Ventrals extending to the vent, which is situated at $\frac{3}{5}$ of the distance from base of ventral spine to origin of anal. Caudal peduncle $1\frac{1}{2}$ as long as deep. Silvery, back brownish; lateral line not blackish; spinous dorsal blackish, other fins pale.

Hab. Pacific Coasts of Central America:
Salvador, La Union [1 2]; Panama [5 6].

The above description is based on a single specimen, 260 mm. in total length, from Panama.

Sub-order II. LOPHOBRANCHII.

This sub-order comprises a number of marine fishes, mostly of small size and peculiar appearance. A few "Pipe-fishes" of the genera *Syngnathus* and *Doryichthys* are known to occur in the fresh waters of Mexico and Central America. They may be easily recognized by the long slender body enclosed in bony rings, the tubiform snout, and the small, terminal, toothless mouth.

Fam. SYNGNATHIDÆ.

Lophobranchii with small gill-openings, a single dorsal fin without spines, and no ventral fins.

1. SYNGNATHUS, Linn.

Syngnathus, Günth. Cat. Fish. viii. p. 155 (1870).
Siphostoma, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 761.
Pectoral fins present; caudal fin present; males with an egg-pouch under the tail.

Of the numerous American species of this widely distributed tropical genus only three appear to have been definitely recorded from fresh waters.

1. **Syngnathus spicifer,** Rüpp.

Syngnathus spicifer, Günth. Cat. Fish. viii. p. 172 (1870).
Body-rings 15–16 (abdominal) +38–42 (caudal). Dorsal rays 23–27. Origin of dorsal separated by 1 or 2 caudal rings from the ring containing the vent. Abdomen with dark vertical bars at the edges of the rings.

Hab. Tropical Indo-Pacific.

I have compared three specimens in the British Museum from Tehuantepec with others from Zanzibar and the Philippines and I cannot detect any differences.

2. **Syngnathus auliscus,** Swain.

Siphostomus auliscus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 767.

Body-rings 15+37–38. Dorsal rays 29–30. Origin of dorsal on the ring containing the vent or the one behind it.

Hab. Pacific Coast from California to Panama.

This species has been recorded by Gilbert and Starks (Mem. Calif. Ac. Sci. iv. 1904, p. 57) from the Rio Grande, at Miraflores, near Panama.

3. **Syngnathus starksi,** Jord. & Culv.

Siphostoma starksi, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 771.

Body-rings 14+37–38. Dorsal rays 38.

Hab. Mexico, Rio Presidio in Sinaloa.

2. DORYICHTHYS, Kaup.

Doryichthys, Günth. Cat. Fish. viii. p. 179 (1870).

Doryrhamphus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 773.

Pectoral fins present; caudal fin present; males with an egg-pouch under the abdomen.

Hab. Tropical seas.

Of three American species, two have been recorded from fresh waters.

1. **Doryichthys lineatus,** Kaup.

Doryichthys lineatus, Günth. Cat. Fish. viii. p. 183 (1870).

Doryrhamphus lineatus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 773.

Siphostoma brevicaudum, Meek, Pbl. Columbian Mus. Zool. v. 1904, p. 163, fig. 51.

Body-rings 19–22+23–27. Dorsal rays 42–44, the fin originating in advance of the vent. Snout $1\frac{1}{2}$ as long as the rest of head.

Hab. Tropical Atlantic.

Recorded by Meek from Boca del Rio in Vera Cruz, Mexico.

2. **Doryichthys brachyurus,** Bleek.

Doryichthys brachyurus, Günth. Cat. Fish. viii. p. 184 (1870).

Body-rings 21–23+19–24. Dorsal rays 36–42, the fin originating above the vent. Snout $1\frac{3}{5}$–$1\frac{4}{5}$ as long as rest of head.

Hab. Tropical Indo-Pacific.

Specimens from Tehuantepec in the British Museum, which I have compared with the type of the species from the East-Indian Archipelago.

Sub-order III. PERCESOCES.

The Fishes of this sub-order differ from the Acanthopterygii in the abdominal position of the ventral fins, the pelvic bones not being directly attached to the clavicles. In all the American species there are two well-separated dorsal fins, the first of which is formed of from 3 to 9 spines, the second of a spine and 7 to 15 articulated rays. The anal fin is wholly or partly opposed to the second dorsal and has from 1 to 3 spines. The ventral fins are inserted well behind the base of the pectorals; each consists of a spine and 5 branched rays. The caudal fin is forked.

Each of the four families is marine and widely distributed. The majority of the species are shore-fishes which frequent the mouths of rivers and sometimes ascend into fresh water. The Atherinidæ and Mugilidæ include a number of permanently fluviatile forms.

Synopsis of the American Families of the Sub-order Percesoces.

I. Lateral line usually absent, never complete; pectoral fins placed high.
  Anterior dorsal of 3 to 8 slender spines; a single anal spine; vertebræ 32 to 60 . . . . . 1. ATHERINIDÆ.
  Anterior dorsal of 3 to 5 pungent spines; 2 or 3 anal spines; vertebræ 24 to 26 . . . . . 2. MUGILIDÆ.

II. Lateral line present, complete; pectoral fins placed low.
  Pectoral fin normal . . . . . 3. SPHYRÆNIDÆ.
  Pectoral fin with a detached lower portion composed of free filamentous rays . . . . . 4. POLYNEMIDÆ.

Fam. 1. ATHERINIDÆ.

The Atherinidæ occur on the coasts of most tropical and temperate seas; a considerable number of them enter or permanently inhabit fresh waters. Those found in the rivers and lakes of Mexico and Central America have the following features in common:—Body elongate, more or less compressed. Lateral line usually absent, never complete. Two well-separated dorsal fins, the first formed of 3 to 6 slender spines, the second of a short spine and 7 to 13 articulated rays. Anal with one spine and 12 to 25 articulated rays. Pectorals placed high; ventrals abdominal, each with one spine and 5 branched rays. Caudal forked. Præmaxillaries protractile; jaws with two or more series of conical teeth; palate toothless, or a few teeth on the vomer. A silvery lateral longitudinal band or stripe always present.

Synopsis of the Genera found in the Fresh Waters of Mexico and Central America.

I. Body completely scaled; head scaly; maxillary not extending beyond the vertical from the anterior margin of eye.

Origin of spinous dorsal in advance of the anal . . . . . 1. CHIROSTOMA.

Origin of spinous dorsal posterior to that of the anal . . . . . 2. THYRINA.

II. Head and anterior part of body naked . . . . . 3. XENATHERINA.

1. CHIROSTOMA, Swains., 1839.

Lethostole, Chirostoma, Kirtlandia, and *Menidia,* Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, pp. 792, 794, & 796.

About fifteen species from the coasts of Tropical and Subtropical America, some of them entering rivers, and about as many fresh-water species from the Rio Lerma System and the Valley of Mexico.

Synopsis of the Mexican and Central-American Fresh-water Species.

I. Length of head $3\frac{1}{2}$ to $4\frac{1}{2}$ in the length of the fish. Jaws equal anteriorly or the lower projecting. Length of lower jaw less than $\frac{1}{2}$ the length of head.

A. Anal fin with I 12–15 rays; 45 to 57 scales in a longitudinal series; 17 or 18 gill-rakers on the lower part of the anterior arch . . . 1. *bartoni.*

B. Anal fin with I 14–17 rays.

45 to 48 scales in a longitudinal series; 20 or 21 gill-rakers on the lower part of the anterior arch . . . . . 2. *patzcuaro.*

36 to 42 scales in a longitudinal series; 11 or 12 gill-rakers on the lower part of the anterior arch . . . . . 3. *arge.*

C. Anal fin with I 16–21 rays.

38 to 42 scales in a longitudinal series; 16 gill-rakers on the lower part of the anterior arch; last dorsal spine above the origin of anal . . . . 4. *jordani.*

38 to 45 scales in a longitudinal series; 15 or 16 gill-rakers on the lower part of the anterior arch; last dorsal spine in advance of the origin of anal . . . . . 5. *breve.*

48 to 62 scales in a longitudinal series; 16 to 19 gill-rakers on the lower part of the anterior arch . . . . . 6. *humboldtianum.*

68 to 82 scales in a longitudinal series . . . . . 7. *estor.*

44 to 51 scales in a longitudinal series; 20 to 24 gill-rakers on the lower part of the anterior arch . . . . . 8. *chapalæ.*

56 to 62 scales in a longitudinal series; 21 to 23 gill-rakers on the lower part of the anterior arch . . . . . 9. *grandoculis.*

II. Length of head $3\frac{1}{2}$ in the length of the fish. Lower jaw shorter than the upper. Anal with I 19–20 rays. 53 to 56 scales in a longitudinal series . . . . . 10. *promelas.*

III. Length of head 3 to $3\frac{1}{2}$ in the length of the fish. Lower jaw projecting, $\frac{1}{2}$ or a little more than $\frac{1}{2}$ the length of head. Anal with I 18–24 rays. 20 to 23 gill-rakers on the lower part of the anterior arch.

A. Teeth small or moderate, close-set; maxillary exposed distally.

1. Lower jaw moderately projecting, $\frac{1}{2}$ the length of head; pectoral $\frac{3}{5}$ to $\frac{2}{3}$ the length of head, extending nearly to above the middle of ventrals.

50 to 60 scales in a longitudinal series . . . . . 11. *lucius.*
60 to 75 scales in a longitudinal series . . . . . 12. *diazi.*

2. Lower jaw strongly projecting, a little more than $\frac{1}{2}$ the length of head; pectoral $\frac{2}{3}$ to $\frac{3}{4}$ the length of head, extending a little beyond the middle of ventrals . . . . . 13. *ocotlane.*

B. Teeth strong, set rather far apart, in two series; edge of maxillary exposed for nearly its whole length . . . . . 14. *sphyræna.*

1. **Chirostoma bartoni.** (Tab. X. fig. 2.)

Chirostoma bartoni, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 793[1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 172[2].

Chirostoma attenuatum, Meek, l. c. fig. 55[3].

Chirostoma zirahuen, Meek, t. c. p. 174, fig. 57[4].

Depth of body 5 to 6 in the length, length of head $4\frac{1}{4}$ to $4\frac{1}{2}$. Snout as long as eye, the diameter of which is $3\frac{1}{2}$ in the length of head and a little less than the interorbital width. Teeth small; jaws equal anteriorly or the lower very slightly projecting; maxillary not or but very slightly exposed distally, not extending to below the eye. 17 or 18 gill-rakers on the lower part of anterior arch. Scales mostly with entire edges, 45 to 57 in a longitudinal series. Dorsal IV–V, I 8–10; spinous dorsal well in advance of anal, its origin usually nearer to tip of snout than to base of caudal. Anal I 12–15. Pectoral $\frac{2}{3}$ to $\frac{4}{5}$ the length of head, extending to above base or anterior part of ventrals. Caudal forked. Caudal peduncle 3 to 4 as long as deep.

Hab. Mexico, Rio Lerma System:

Guanajuato[1]; Lake Patzcuaro[3]; Lake Zirahuen[4]; Lerma[2].

Here described from several specimens, measuring up to 100 mm. in total length.

2. **Chirostoma patzcuaro.** (Tab. X. fig. 1.)

Chirostoma patzcuaro, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 174, fig. 56[1].

Depth of body $5\frac{1}{3}$ in the length, length of head $4\frac{1}{4}$. Snout as long as eye, the diameter of which is $3\frac{3}{5}$ in the length of head and nearly equal to the interorbital width. Teeth small; lower jaw very slightly projecting; maxillary very slightly exposed distally, not extending to below the eye. 20 gill-rakers on the lower part of the anterior arch. Scales mostly with entire edges, 45 in a longitudinal series. Dorsal V, I 10; spinous dorsal in advance of anal, its origin slightly nearer to tip of snout than to base of caudal. Anal I 15. Pectoral $\frac{3}{4}$ the length of head, extending a little beyond the base of ventrals. Caudal forked. Caudal peduncle $2\frac{1}{2}$ as long as deep.

Hab. Mexico, Rio Lerma System:

Lake Patzcuaro[1].

Here described from a single specimen from Lake Patzcuaro (*Meek*), measuring

90 mm. in total length. Dr. Meek's type has V, I 10 dorsal rays, I 17 anal rays, and 48 scales in a longitudinal series.

3. **Chirostoma arge.**

Esloparsum arge, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 133, fig. 12 (1901) [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 3158 [2].

Chirostoma arge, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 171, fig. 54 [3].

Depth of body $4\frac{1}{2}$ to 5 in the length, length of head $4\frac{1}{3}$ to $4\frac{2}{3}$. Snout as long as eye, the diameter of which is $3\frac{1}{2}$ in the length of head and nearly equal to the interorbital width. Teeth small; lower jaw very slightly projecting; maxillary very slightly exposed distally, extending to the vertical from the anterior margin of eye. 11 or 12 gill-rakers on the lower part of the anterior arch. Scales with entire edges, 36 to 42 in a longitudinal series. Dorsal III–IV, I 8–9; spinous dorsal in advance of anal, its origin nearly equidistant from tip of snout and base of caudal. Anal I 14–17. Pectoral about $\frac{3}{4}$ the length of head, extending to or a little beyond the base of ventrals. Caudal forked. Caudal peduncle 2 to $2\frac{1}{2}$ as long as deep.

Hab. Mexico, Rio Lerma System:
Aguas Calientes [1 3]; Lagos [3].

Here described from several specimens, measuring up to 70 mm. in total length, from Aguas Calientes (*Jordan*) and Lagos (*Meek*).

4. **Chirostoma jordani.**

Chirostoma jordani, Woolman, Bull. U.S. Fish. Comm. xiv. p. 62, t. 2 (1895) [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 793 [2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 169, fig. 52 [3].

Chirostoma mezquital, Meek, t. c. p. 170, fig. 53 [4].

Depth of body 4 to 5 in the length, length of head $4\frac{1}{3}$ to $4\frac{1}{2}$. Snout shorter than eye, the diameter of which is 3 to $3\frac{1}{2}$ in the length of head; interorbital width about 3 in the length of head. Teeth small; lower jaw very slightly projecting; maxillary not exposed, not quite reaching the vertical from the anterior margin of eye. 16 gill-rakers on the lower part of anterior arch. Scales with entire edges, 38 to 42 in a longitudinal series. Dorsal III–IV, I 8–10; origin of spinous dorsal nearly equidistant from tip of snout and base of caudal; last dorsal spine inserted above the origin of anal. Anal I 16–19. Pectoral a little shorter than the head, extending to above the middle of ventrals. Caudal peduncle twice as long as deep.

Hab. Mexico, Rio Mezquital and Rio Lerma Systems, Valley of Mexico:
Durango [4]; Aguas Calientes [3]; Lagos [3]; Salamanca [1]; Lake Chapala [2 3]; Acambaro [3]; Lake Cuitzeo [3]; Texcoco [3]; Chalco [3]; City of Mexico [1 3]; Yautepec [3].

Here described from specimens from Salamanca (*Woolman*) and Acambaro (*Meek*), measuring up to 65 mm. in total length.

5. **Chirostoma breve.** (Tab. X. fig. 3.)

Chirostoma breve, Steind. Denkschr. Ak. Wien, lxii. 1895, p. 526, t. 2. fig. 2 [1].

Chirostoma labarcæ, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 173 [2].

Depth of body 4 to $4\frac{1}{2}$ in the length, length of head 4 to $4\frac{1}{3}$. Snout as long as or a little longer than the eye,

the diameter of which is $3\frac{2}{3}$ to 4 in the length of head; interorbital width 3 to $3\frac{1}{3}$ in the length of head. Teeth small; lower jaw slightly projecting; maxillary slightly exposed distally, not quite reaching the vertical from the anterior margin of eye. 15 or 16 gill-rakers on the lower part of the anterior arch. Scales with crenate edges, (38) 40 to 45 in a longitudinal series. Dorsal III–V, I 9–11; origin of spinous dorsal usually nearer to base of caudal than to tip of snout; last dorsal spine inserted a little in advance of the origin of anal, which is below the membrane connecting the spine to the back. Anal I 17–20 (21). Pectoral $\frac{3}{4}$ to $\frac{4}{5}$ the length of head, extending a little beyond the base of ventrals. Caudal forked. Caudal peduncle 2 to $2\frac{1}{2}$ as long as deep.

Hab. MEXICO, Rio Lerma System and the Valley of Mexico:
Lake Chapala [2]; Lake Cuitzeo [1]; Xochimilco.

Here described from four specimens from Xochimilco (*Meek*), measuring up to 100 mm. in total length.

6. Chirostoma humboldtianum.

Atherina humboldtiana, Cuv. & Val. Hist. Nat. Poiss. x. p. 479, t. 306 (1835) [1].

Atherina vomerina, Cuv. & Val. t. c. p. 481 [2].

Atherinichthys humboldtii, Günth. Cat. Fish. iii. p. 404 (1861) [3].

Chirostoma humboldtianum, Steind. Denkschr. Ak. Wien, lxii. 1895, p. 522, t. 1. fig. 1 [4]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 793 [5]; Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 134 [6]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 175 [7].

Depth of body 4 to $5\frac{1}{2}$ in the length, length of head $3\frac{2}{5}$ to 4. Snout from as long to twice as long as the eye, the diameter of which is $3\frac{2}{3}$ to $5\frac{2}{3}$ in the length of head; interorbital width $3\frac{1}{4}$ to $3\frac{3}{4}$ in the length of head. Teeth rather small; jaws equal anteriorly or the lower a little projecting; lower jaw less than $\frac{1}{2}$ the length of head; maxillary exposed distally, extending nearly to the vertical from the anterior margin of eye. 16 to 19 gill-rakers on the lower part of the anterior arch. Scales with edges usually crenate; 48 to 62 in a longitudinal series. Dorsal IV–VI, I 10–13; spinous dorsal in advance of anal, its origin usually a little nearer to base of caudal than to tip of snout. Anal I 17–20. Pectoral $\frac{2}{3}$ to $\frac{4}{5}$ the length of head, extending to above anterior part or middle of ventrals. Caudal forked. Caudal peduncle 2 to $2\frac{2}{3}$ as long as deep.

Hab. MEXICO, Rio Lerma System and the Valley of Mexico:
Lake Juanacatlan [7] (*Buller*); Lake Ayotla (*Buller*); Lake Patzcuaro [7]; City of Mexico [7] (*Doorman*); Texcoco [4]; Lake Chalco [6 7] (*Jordan*); Xochimilco [7] (*Meek, Gadow*).

Here described from a large series of specimens, measuring up to 240 mm. in total length. Dr. P. Pappenheim has very kindly examined the type of the species on my behalf and has sent me a photograph of it, which leaves no doubt that the species above described is the true *C. humboldtianum*.

7. Chirostoma estor.

Chirostoma estor, Jord. Proc. U.S. Nat. Mus. 1879, p. 298 [1]; Steind. Denkschr. Ak. Wien, lxii. 1895, p. 523, t. 1. fig. 2 [2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 180 [3].

Lethostole estor, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 792 [4].

Depth of body about 5 in the length, length of head $3\frac{1}{2}$ to 4. Snout $1\frac{1}{3}$ to 2 as long as eye, the diameter of which is 4 to $5\frac{1}{2}$ in the length of head; interorbital width 4 in the length of head. Teeth small;

anterior teeth sometimes moderately strong; lower jaw projecting, less than half the length of head; maxillary exposed distally, extending nearly to the vertical from the anterior margin of eye. 20 or 21 gill-rakers on the lower part of the anterior arch. Scales with crenate edges, 68 to 82 in a longitudinal series. Dorsal IV–V, I 10–12; spinous dorsal in advance of anal, its origin usually a little nearer to base of caudal than to tip of snout. Anal I 17–20. Pectoral $\frac{3}{5}$ the length of head, extending to above the base of ventrals. Caudal forked. Caudal peduncle $2\frac{1}{2}$ to 3 as long as deep.

Hab. MEXICO, Rio Lerma System and the Valley of Mexico:

Lake Chapala [1]; Lake Patzcuaro [2]; Lake Zirahuen (*Meek*); Xochimilcho [3].

Here described from six specimens, measuring up to 220 mm. in total length, from Lakes Patzcuaro (*Mexico Mus.*) and Zirahuen (*Meek*).

8. **Chirostoma chapalæ.**

Chirostoma chapalæ, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 135, fig. 13 (1901) [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 3159 [2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 176, fig. 58 [3].

Depth of body $4\frac{1}{2}$ to $5\frac{1}{2}$ in the length, length of head $3\frac{4}{5}$ to $4\frac{1}{2}$. Snout as long as eye, the diameter of which is $3\frac{1}{3}$ to $3\frac{2}{3}$ in the length of head and nearly equal to the interorbital width. Teeth small; lower jaw very slightly projecting; maxillary very slightly exposed distally, not extending to below the eye. 20 to 24 gill-rakers on the lower part of anterior arch. Scales with crenate edges, 44 to 51 in a longitudinal series. Dorsal III–V, I 10–11; origin of spinous dorsal nearly equidistant from tip of snout and base of caudal; last dorsal spine inserted above the origin of anal. Anal I 18–21. Pectoral $\frac{4}{5}$ or $\frac{5}{6}$ the length of head, extending to above the middle of the ventrals. Caudal forked. Caudal peduncle 2 to $2\frac{1}{2}$ as long as deep.

Hab. MEXICO, Rio Lerma System:

Lake Chapala [1 3].

Here described from several specimens from Lake Chapala, measuring up to 125 mm. in total length.

9. **Chirostoma grandoculis.**

Chirostoma grandoculis, Steind. Denkschr. Ak. Wien, lxii. 1895, p. 525, t. 2. fig. 1 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 3159 [2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 176, fig. 58 [3].

Depth of body about 5 in the length, length of head 4 to $4\frac{1}{4}$. Snout as long as or shorter than eye, the diameter of which is $3\frac{1}{5}$ to $3\frac{1}{2}$ in the length of head and equal to the interorbital width. Teeth small; lower jaw very slightly projecting; maxillary very slightly exposed distally, not extending to below the eye. 21 to 23 gill-rakers on the lower part of the anterior arch. Scales with crenate edges, 56–62 in a longitudinal series. Dorsal V–VI, I 10–11; spinous dorsal usually entirely in advance of anal, its origin about equidistant from tip of snout and base of caudal. Anal I 17–20. Pectoral $\frac{3}{4}$ the length of head, extending to above the anterior part or middle of ventrals. Caudal forked. Caudal peduncle $2\frac{1}{2}$ to 3 as long as deep.

Hab. MEXICO, Rio Lerma System:

Lake Chapala [3]; Lake Patzcuaro [1 3].

Here described from four specimens, measuring up to 115 mm. in total length, from Lake Patzcuaro (*Meek*).

10. **Chirostoma promelas.**

Chirostoma promelas, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 136, fig. 14[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 3160[2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 177[3].

Allied to *C. lucius*, but with the lower jaw shorter than the upper. Dorsal IV, I 11. Anal I 19–20. Scales with crenate edges, 53 to 56 in a longitudinal series.

Hab. Mexico, Rio Lerma System:

Lake Chapala[1 3].

11. **Chirostoma lucius.**

Chirostoma lucius (part.), Bouleng. Ann. Mag. Nat. Hist. (7) v. 1900, p. 54[1].

Chirostoma crystallinum, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 139, figs. 16 & 17 (1900)[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 3162[3].

Chirostoma lucius, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 178, fig. 60[4].

Depth of body 4 in the length, length of head $3\frac{1}{3}$. Snout $1\frac{3}{4}$ as long as eye, the diameter of which is $5\frac{1}{2}$ in the length of the head; interorbital width 4 in the length of head. Teeth rather small; lower jaw projecting, $\frac{1}{2}$ the length of head; maxillary exposed distally, extending to the vertical from the anterior margin of eye; 20 gill-rakers on the lower part of the anterior arch. Scales with crenate edges, 52 in a longitudinal series. Dorsal VI, I 11; spinous dorsal in advance of the anal, its origin nearer to base of caudal than to tip of snout. Anal I 20. Pectoral $\frac{3}{5}$ the length of head, extending nearly to above the middle of ventrals. Caudal forked. Caudal peduncle twice as long as deep.

Hab. Mexico, Rio Lerma System:

Guadalajara[2]; Lake Chapala[1 2] (*Buller*).

Here described from the type of the species, measuring 200 mm. in total length. Jordan and Snyder give the following numbers for *C. crystallinum*:—Dorsal IV–V, I 11–13. Anal I 18–24. 56 to 60 scales in a longitudinal series.

12. **Chirostoma diazi.**

Chirostoma diazi, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 137, fig. 15 (1900)[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 3161[2].

Chirostoma sphyræna, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 177, fig. 59[3].

Closely allied to the preceding species, but with smaller scales (60 to 75 in a longitudinal series); dorsal scales very small and irregular, 21 to 27 in a series between the two dorsal fins. Dorsal IV–V, I 11–12. Anal I 20–22.

Hab. Mexico, Rio Lerma System:

Lake Chapala[1].

13. **Chirostoma ocotlane.** (Tab. IX. fig. 1.)

Chirostoma lucius (part.), Bouleng. Ann. Mag. Nat. Hist. (7) v. 1900, p. 54[1].

Chirostoma ocotlane, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 140, fig. 18 (1901)[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 3163[3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 180, fig. 62[4].

Depth of body 5 in the length, length of head $3\frac{1}{4}$ to $3\frac{1}{2}$. Snout $1\frac{1}{4}$ to $1\frac{2}{3}$ as long as eye, the diameter of which is 4 to 5 in the length of head; interorbital width $4\frac{2}{3}$ to 5 in the length of head. Teeth rather small; lower jaw strongly projecting, a little more than $\frac{1}{2}$ the length of head; maxillary exposed distally, extending to the vertical from the anterior margin of eye. 21 to 23 gill-rakers on the lower part of anterior arch. Scales with crenate edges, 53 to 62 in a longitudinal series. Dorsal V–VI, I 11–13; spinous dorsal in advance of anal, its origin nearer to base of caudal than to tip of snout. Anal I 20–22. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ the length of head, extending beyond the middle of the ventrals. Caudal forked. Caudal peduncle twice as long as deep.

Hab. MEXICO, Rio Lerma System:
Lake Chapala [1 2 4] (*Buller*, *Jordan*).

Here described from several specimens, measuring up to 215 mm. in total length.

14. **Chirostoma sphyræna.** (Tab. IX. fig. 2.)

Chirostoma sphyræna, Bouleng. Ann. Mag. Nat. Hist. (7) v. 1900, p. 55 [1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 178, fig. 59 [2].

Chirostoma lermæ, Jord. & Snyd. t. c. p. 142, fig. 19 [3]; Jord. & Everm. t. c. p. 3163 [4]; Meek, t. c. p. 179, fig. 61 [5].

Depth of body $5\frac{2}{3}$ in the length, length of head $3\frac{1}{5}$. Snout $2\frac{1}{3}$ as long as eye, the diameter of which is 6 in the length of head; interorbital width $4\frac{2}{3}$ in the length of head. Teeth strong, in two series; lower jaw projecting, $\frac{1}{2}$ the length of head; maxillary extending nearly to the vertical from the anterior margin of eye, its edge exposed for nearly its whole length. 22 gill-rakers on the lower part of the anterior arch. Scales with crenate edges, 65 in a longitudinal series. Dorsal V, I 11; spinous dorsal in advance of anal, its origin nearer to base of caudal than to tip of snout. Anal I 21. Pectoral nearly $\frac{2}{3}$ the length of head, extending to above the middle of ventrals. Caudal forked. Caudal peduncle twice as long as deep.

Hab. MEXICO, Rio Lerma System:
Lake Chapala [1 2 3 5] (*Buller*).

Here described from the type, a specimen measuring 230 mm. in total length. Jordan and Snyder give the following numbers for *C. lermæ*:—Dorsal IV–V, 10–12. Anal 19–22. 54–58 scales in a longitudinal series.

2. THYRINA, Jord. & Culv., 1895.

Thyrina, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 803.
Melaniris, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 183.

Two species described by Günther, *T. guatemalensis* and *T. pachylepis*, are intermediate between *Chirostoma* and *Atherinella*, Steind., resembling the latter in the posterior situation of the spinous dorsal fin and in the long falcate pectoral. The abdominal region is more or less compressed, but not more so than in many species of *Chirostoma*, and there is no trace of the ventral keel which characterizes *Atherinella*. *Melaniris* was based on specimens preserved in formalin, with the iris turned black.

1. Thyrina guatemalensis.

Atherinichthys guatemalensis, Günth. Proc. Zool. Soc. 1864, p. 151 [1], and Trans. Zool. Soc. vi. 1869, p. 443 [2].

Thyrina evermanni, Jord. & Culv. Proc. Calif. Ac. Sci. (2) v. 1895, p. 419 [3]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 804 [4]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 184 [5].

Thyrina crystallina, Jord. & Culv. t. c. p. 420 [6]; Jord. & Everm. l. c. [7]; Meek, l. c. [8].

Menidia guatemalensis, Jord. & Everm. t. c. p. 801 [9].

Melaniris balsanus, Meek, t. c. p. 183, fig. 64 [10].

Depth of body 4 to 5 in the length, length of head $4\frac{1}{4}$ to $4\frac{3}{4}$. Snout shorter than eye, the diameter of which is $2\frac{2}{3}$ to 3 in the length of head; interorbital width $2\frac{1}{2}$ in the length of head. Teeth in bands, the outermost series enlarged; jaws equal anteriorly; maxillary not exposed, extending nearly to below the eye. 16 or 17 gill-rakers on the lower part of the anterior arch. Scales with entire edges, 36 to 42 in a longitudinal series. Dorsal III–IV, I 7–9; origin of spinous dorsal above sixth ray of anal. Anal I 19–25, ending below or a little behind the end of the second dorsal. Pectoral falcate, longer than the head, extending beyond the middle of ventrals. Caudal forked, the lower lobe somewhat the longer. Caudal peduncle $1\frac{1}{2}$ to 2 as long as deep.

Hab. Pacific Coast Rivers and Lakes of Mexico and Central America, perhaps entering the sea:

Rio Presidio [3 6] and Rio Balsas [10] in Mexico; Huamuchal [1 2] in Guatemala.

Here described from the types of the species from Huamuchal (*Salvin*), and co-types of *T. evermanni* and *T. crystallina* from the Rio Presidio and of *M. balsanus* from the Rio Balsas, several specimens measuring up to 85 mm. in total length. Estuarine specimens have the pectoral fins longer and more acute than those from inland localities. *T. pachylepis*, from the Coast of Panama, is closely allied, but has laciniate scales. Gill and Bransford (Proc. Ac. Philad. 1877, p. 187) record *T. guatemalensis* from Lake Nicaragua, but this identification must be regarded as probably incorrect.

3. XENATHERINA, gen. nov.

The very aberrant little Atherine described by Meek under the name of *Menidia lisa* may be regarded as the type of a genus distinct from *Chirostoma*, characterized by the mouth extending to below the eye and by the peculiar disposition of the scales.

1. Xenatherina lisa.

Menidia lisa, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 182, fig. 63 [1].

Depth of body 5 in the length, length of head 4. Snout shorter than eye, the diameter of which is $2\frac{1}{4}$ to $2\frac{1}{2}$ in the length of head and greater than the interorbital width. Teeth small; mouth oblique; jaws equal anteriorly; maxillary extending to below anterior $\frac{1}{4}$ of eye. 13 gill-rakers on the lower part of the anterior arch. Posterior part of body covered with scales, which are continued forward as a scaly band along the middle of the side; anterior part of body naked, except for a dorsal strip and a ventral patch

of small scales. Dorsal III–V, I 8–9; origin of spinous dorsal above or a little behind that of the anal. Anal I 19–21. Pectoral asymmetrical, pointed, $\frac{4}{5}$ the length of head, extending to above the middle of ventrals. Caudal forked. Caudal peduncle twice as long as deep.

Hab. MEXICO, Rio Papaloapam:
Refugio [1], El Hule [1].

Here described from five specimens, measuring up to 55 mm. in total length, from Refugio (*Meek*).

Fam. 2. MUGILIDÆ.

The Mugilidæ are closely related to the Atherinidæ and have the same wide distribution. Most of the species of *Mugil* and allied genera with ciliiform teeth are marine, but freely enter fresh water. *Agonostomus* and *Joturus* comprise tropical fresh-water fishes, especially abundant in mountain-streams.

The Mexican and Central-American Mugilidæ have the following features in common:—Body elongate, more or less compressed, covered with rather large scales, which extend on to the upper surface of the head. Lateral line usually absent, never complete. Two well-separated dorsal fins, the first formed of 4 rather strong spines, the second of a spine and 7 to 10 articulated rays. Anal with 2 or 3 spines and 7 to 11 articulated rays. Pectorals placed high; ventrals abdominal, each with one spine and 5 branched rays. Caudal forked. Præmaxillaries protractile; jaws with teeth, which may be either well-developed or vestigial; palate with or without teeth. Coloration silvery, the back greenish or olivaceous; sometimes dark longitudinal stripes along the series of scales.

Synopsis of the Mexican and Central-American Genera.

I. Bands of small fixed teeth in the jaws and on the palate.

Teeth in the jaws pointed . . . . . 1. AGONOSTOMUS.
Teeth in the jaws incisor-like, with serrated edges . . . . . 2. JOTURUS.

II. Teeth in the jaws small, in one or more series; palate toothless.

A. Teeth ciliiform, in one or a few series; lips not very thick; rami of lower jaw meeting at an angle which is not very acute.

Three anal spines . . . . . 3. MUGIL.
Two anal spines . . . . . 4. QUERIMANA.

B. Teeth in several oblique series; lips thick; rami of lower jaw meeting at an acute angle . . . . . 5. CHÆNOMUGIL.

I have given full descriptions of the Mexican and Central-American species of the genera *Agonostomus* and *Joturus*, which appear to be true fresh-water fishes, and for purposes of comparison I have included in my account of the former genus two species, *A. percoides* and *A. microps*, which are at present known only from specimens in the

British Museum from the West Indies and Venezuela. Of the marine genera *Mugil*, *Querimana*, and *Chænomugil* only a synopsis is given, but they are included because the species of the first-named, at least, ascend rivers for considerable distances.

1. AGONOSTOMUS, Bennett, 1830.

Agonostomus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 818.
Neomugil, Vaill. Bull. Soc. Philom. iv. 1894, p. 72.

Mouth subterminal, with lateral cleft; bands of small pointed teeth in the jaws and on the vomer and palatines; two anal spines.

Hab. Tropical rivers near the sea, most of the species being American.

Synopsis of the American Species.

I. Maxillary not extending beyond the anterior $\frac{1}{3}$ of eye (in the adult).

A. Snout subconical, the upper lip only moderately thick, even in the adult . . . . . 1. *monticola*.

B. Snout truncated anteriorly, the upper lip thick.

Pectoral from less than $\frac{3}{4}$ (adult) to $\frac{4}{5}$ (young) the length of head; length of lower jaw $2\frac{1}{2}$ (adult) to $2\frac{3}{4}$ (young) in the length of head . . . . . 2. *nasutus*.

Pectoral $\frac{3}{5}$ (adult) or $\frac{2}{3}$ (young) the length of head; length of lower jaw $2\frac{1}{3}$ (adult) to $2\frac{1}{2}$ (young) in the length of head . . . . . 3. *salvini*.

II. Maxillary extending to below middle of eye (in the adult).

A. Snout subconical, the upper lip only moderately thick, even in the adult . . . . . 4. *percoides*.

B. Snout truncated anteriorly, the upper lip thick.

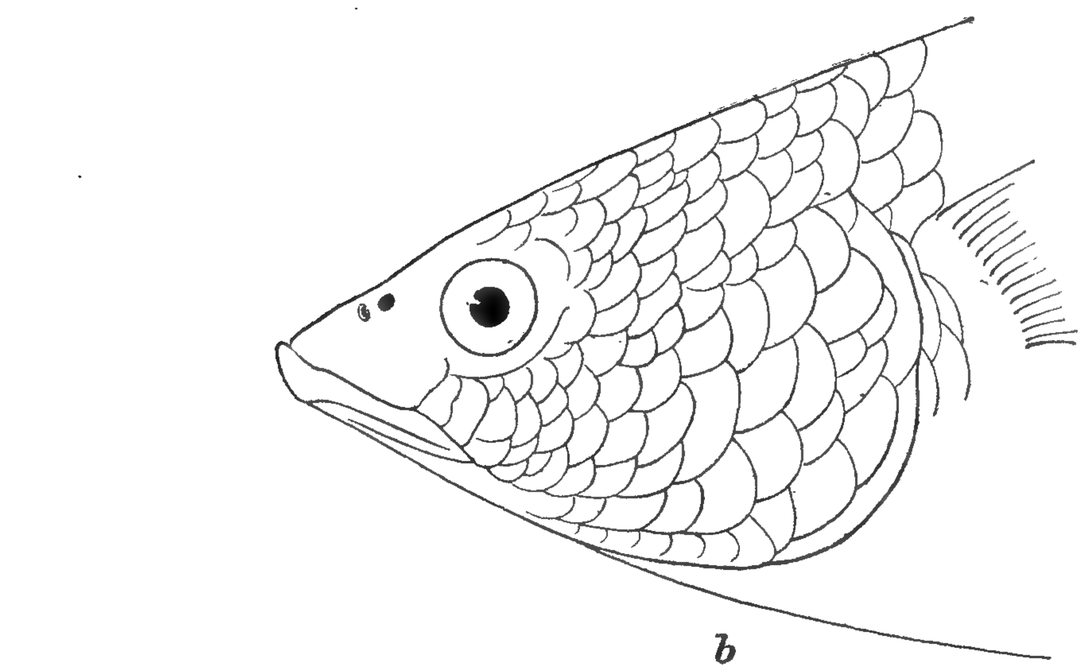
Pectoral extending to the vertical from the origin of spinous dorsal (adult) or beyond (young); first dorsal spine as long as the longest rays of the second dorsal . . . . . 5. *macracanthus*.

Pectoral nearly reaching the vertical from the origin of spinous dorsal in the young, but not in the adult; first dorsal spine shorter than the longest rays of the second dorsal . . . . . 6. *microps*.

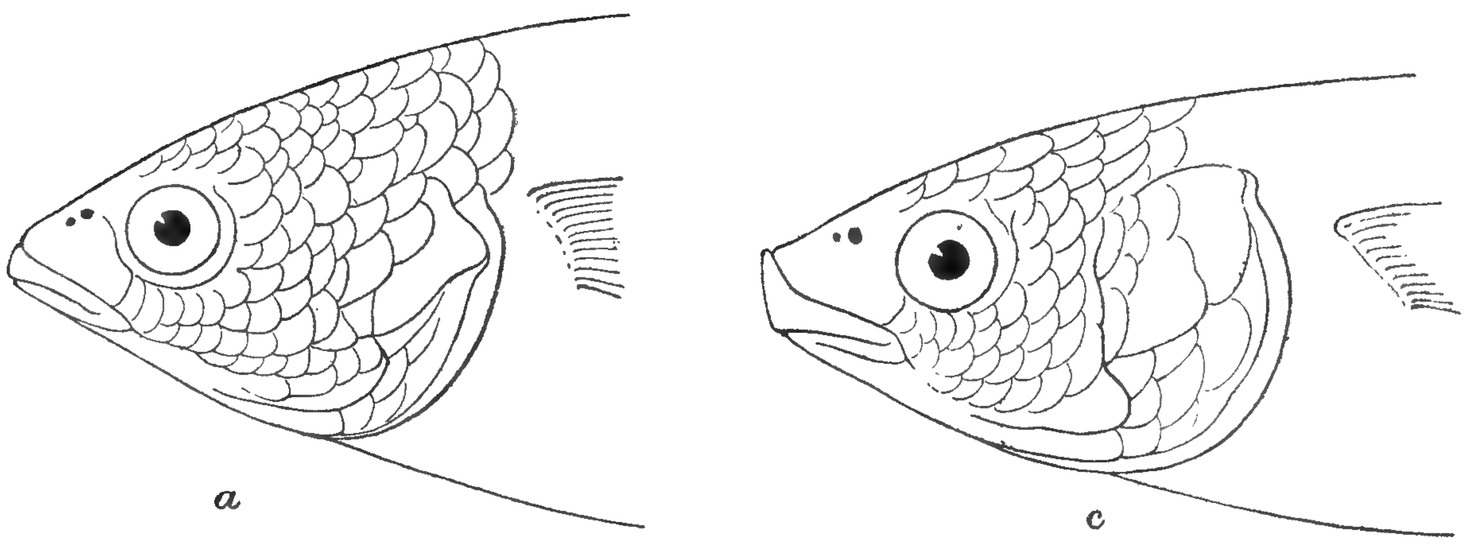
1. **Agonostomus monticola.**

Mugil monticola, Bancroft, Cuvier's Animal Kingdom (ed. Griffiths), p. 367, t. 36 (1836) [1].
Agonostoma monticola, Günth. Cat. Fish. iii. p. 464 (1861) [2].
Agonostomus monticola, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 819 [3], and 1900, fig. 347 [4].

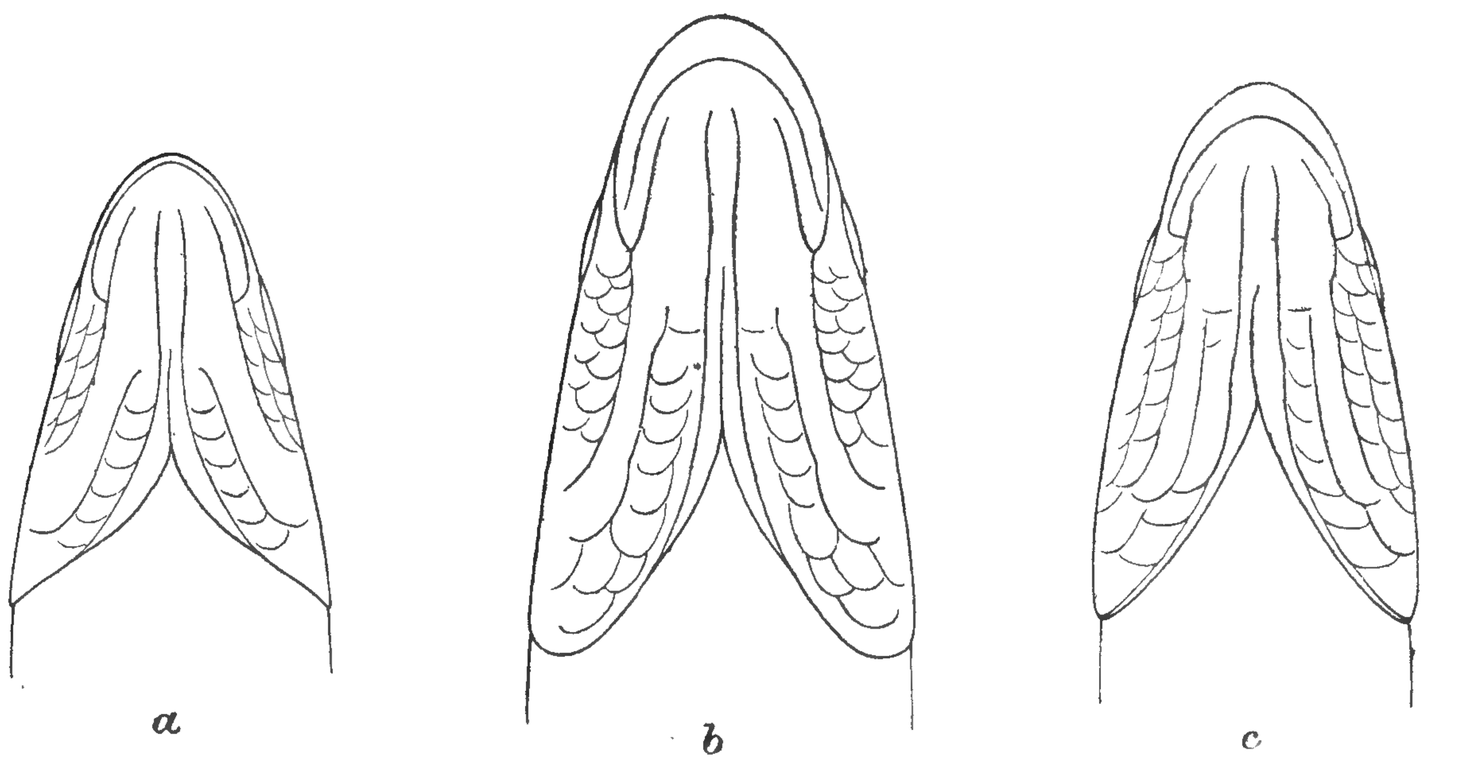
Depth of body $3\frac{1}{2}$ to $4\frac{1}{3}$ in the length, length of head $3\frac{2}{3}$ to $4\frac{1}{3}$. Snout from as long to $1\frac{3}{5}$ as long as eye, the diameter of which is $3\frac{1}{2}$ to $5\frac{1}{3}$ in the length of head; interorbital width $2\frac{3}{5}$ to 3 in the length of head. Snout subconical, the upper lip not very thick; mouth subterminal; maxillary extending to below anterior edge or anterior $\frac{1}{4}$ of eye; about 20 gill-rakers on the lower part of the anterior arch. 38 to 44 scales in a longitudinal series, 12 to 14 in a transverse series from spinous dorsal to vent, 20 to 22 round the caudal peduncle. Dorsal IV, I 8; origin of spinous dorsal usually nearer to tip of snout than



b



a *c*



a *b* *c*

Heads of *Agonostomus monticola* (*a*), *A. salvini* (*b*), and *A. nasutus* (*c*), from the side and from below.

to base of caudal; spines moderate, the first, in the adult, about $\frac{1}{2}$ the length of head or of the distance between the origins of the dorsal fins. Anal II 10. Pectoral about $\frac{2}{3}$ the length of head, in the adult not extending to below the spinous dorsal; ventrals originating below the middle of pectorals, in the adult extending about $\frac{1}{2}$ of the distance from their base to the origin of anal. Caudal forked. Caudal peduncle $1\frac{1}{2}$ to 2 as long as deep. Silvery, back darker; scales with dark edges, which often expand into irregular spots.

Hab. Mexico and Central America [2].—West Indies [1 2].

Specimens in the British Museum, measuring up to 250 mm. in total length, from the Rio Presidio in Sinaloa, the Rio Mascota in Jalisco (*Buller*), and Vera Cruz (*Meek*) appear to belong to the same species as others from Cuba, Jamaica, Barbados, and Trinidad.

2. **Agonostomus nasutus.** (Tab. X. fig. 4.)

Agonostoma nasutum, Günth. Cat. Fish. iii. p. 463 (1861)[1]; and Trans. Zool. Soc. vi. 1868, p. 444, t. 70. fig. 2[2].

Neomugil digueti, Vaill. Bull. Soc. Philom. iv. 1894, p. 73[3].

Agonostomus nasutus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 820[4].

Depth of body $3\frac{1}{3}$ to $4\frac{1}{3}$ in the length, length of head 4 to $4\frac{1}{3}$. Snout from as long to $1\frac{2}{3}$ as long as eye, the diameter of which is 4 to $5\frac{2}{3}$ in the length of head; interorbital width $2\frac{3}{5}$ to $2\frac{4}{5}$ in the length of head. Snout vertically truncated, the upper lip thick anteriorly, its depth $\frac{1}{2}$ the length of snout; mouth subterminal; maxillary extending to below anterior edge or anterior $\frac{1}{4}$ of eye; lower jaw broadly rounded, its length $2\frac{1}{2}$ (adult) or $2\frac{3}{4}$ (young) in the length of head; length of groove between lower lip and ramus of lower jaw (measured from its anterior extremity to the end of the maxillary) equal to the diameter of eye (adult) or less (young). 18 to 20 gill-rakers on the lower part of the anterior arch. 41 to 43 scales in a longitudinal series, 12 to 14 in a transverse series from spinous dorsal to in front of vent, 21 or 22 round the caudal peduncle. Dorsal IV, I 8 (exceptionally 7); origin of spinous dorsal a little nearer to tip of snout than to base of caudal; spines moderate, the first from less than $\frac{1}{2}$ (adult) to $\frac{3}{5}$ (young) the length of head, shorter than the longest rays of the second dorsal, which has the free edge concave. Anal II 10. Pectoral from less than $\frac{3}{4}$ (adult) to $\frac{4}{5}$ (young) the length of head, extending to below the spinous dorsal in the young, but not in the adult; ventrals originating below the middle of the pectoral, extending about $\frac{1}{2}$ of the distance from their base to the origin of anal. Caudal forked. Caudal peduncle $1\frac{2}{3}$ to 2 as long as deep. Silvery, back darker; scales with dark edges; a blackish spot on the base of pectoral; a more or less distinct silvery lateral band.

Hab. Lower California, Mexico, and Central America.

Specimens in the British Museum from Lower California (*Diguet*[3]); Mexico, Motzorongo (*Meek*); Guatemala, Rio San Gerónimo (*Owen*[1 2]), Rio Motagua (*Salvin*[2]); Costa Rica, Juan Viñas (*Underwood*).

Professor Vaillant has very kindly sent me two specimens of *Neomugil digueti*, one of which is now figured (Tab. X. fig. 4).

3. **Agonostomus salvini.** (Tab. XI. fig. 2.)

Agonostomus salvini, Regan, Ann. Mag. Nat. Hist. (7) xix. 1907, p. 66[1].

Depth of body $3\frac{1}{3}$ to $4\frac{1}{4}$ in the length, length of head 4. Snout $1\frac{1}{3}$ to 2 as long as eye, the diameter of which is $4\frac{3}{4}$ to $6\frac{1}{2}$ in the length of head; interorbital width $2\frac{2}{3}$ to 3 in the length of head. Snout vertically or obliquely truncated, the upper lip rather thick anteriorly, its depth $\frac{2}{5}$ the length of snout; mouth subterminal; maxillary extending to below anterior $\frac{1}{4}$ or anterior $\frac{1}{3}$ of eye; lower jaw evenly rounded, its length $2\frac{1}{3}$ (adult) or $2\frac{1}{2}$ (young) in the length of head; length of groove between lower lip and ramus of lower jaw (measured from its anterior extremity to the end of the maxillary) equal to the diameter of eye (young) or $1\frac{1}{2}$ the diameter of eye (adult). 18–20 gill-rakers on the lower part of the anterior arch. 38 to 40 scales in a longitudinal series, 12 or 13 in a transverse series from spinous dorsal to in front of vent, 21 or 22 round the caudal peduncle. Dorsal IV, I 8; origin of spinous dorsal equidistant from tip of snout and base of caudal or a little nearer the former; spines moderate, $\frac{2}{5}$ (adult) or $\frac{1}{2}$ (young) of the

length of head or of the distance between the origins of the dorsal fins and shorter than the longest rays of the second dorsal, which has the free edge a little concave. Anal II 10. Pectoral $\frac{2}{3}$ the length of head (young) or less (adult), not extending to below the spinous dorsal; ventrals originating below the middle of pectoral, extending nearly $\frac{1}{2}$ of the distance from their base to the origin of anal. Caudal moderately notched. Caudal peduncle 2 as long as deep. Silvery or golden, the back olivaceous.

Hab. GUATEMALA, Nacasil (*Salvin*).

Three specimens, 150 to 270 mm. in total length.

The species is closely allied to *A. nasutus*, which has the upper lip thicker, eye a little larger, lower jaw a little shorter, pectorals longer, &c.

4. **Agonostomus percoides.**

Agonostoma percoides (part.), Günth. Cat. Fish. iii. p. 464 (1861).

This species is represented in the British Museum by the type, from San Domingo, and by two examples from Trinidad. These are the only specimens known.

5. **Agonostomus macracanthus.** (Tab. XI. fig. 1.)

Agonostomus macracanthus, Regan, Ann. Mag. Nat. Hist. (7) xix. 1907, p. 65 [1].

Depth of body $3\frac{2}{3}$ to 4 in the length, length of head $3\frac{3}{5}$ to $3\frac{2}{3}$. Snout $1\frac{1}{3}$ to $1\frac{2}{3}$ as long as eye, the diameter of which is $4\frac{3}{4}$ to $5\frac{2}{3}$ in the length of head; interorbital width $2\frac{2}{3}$ in the length of head. Snout vertically truncated, the upper lip thick anteriorly; mouth subterminal; maxillary extending to below middle of eye, or nearly. 20 gill-rakers on the lower part of anterior arch. 41 to 43 scales in a longitudinal series, 14 in a transverse series from spinous dorsal to in front of vent, 20 or 21 round the caudal peduncle. Dorsal IV, I 8; origin of spinous dorsal a little nearer to tip of snout than to base of caudal; spines strong, the first $\frac{1}{2}$ to $\frac{3}{5}$ the length of head or $\frac{2}{3}$ to $\frac{3}{4}$ the distance between the origins of the dorsal fins and as long as the longest rays of the second dorsal, which has the free edge concave. Anal II 10. Pectoral $\frac{2}{3}$ the length of head, extending to the vertical from the origin of the spinous dorsal or a little beyond; ventrals originating below the middle of the pectorals, extending $\frac{3}{5}$ or $\frac{2}{3}$ of the distance from their base to the origin of anal. Caudal forked. Caudal peduncle $1\frac{2}{3}$ as long as deep. Silvery; back darker; scales with dark edges; a more or less distinct dark lateral band ending in a dark spot at the base of caudal and with a silvery band above it; dorsal and caudal fins a little dusky.

Hab. GUATEMALA, Rio Guacalate (*Salvin* [1]).

Two specimens, 145 and 210 mm. in total length.

These were referred by Günther to *A. microps*, a species which differs in many respects, notably in the shorter paired fins and lower spinous dorsal.

6. **Agonostomus microps.**

Agonostoma microps, Günth. Cat. Fish. iii. p. 462 (1861), and Trans. Zool. Soc. vi. 1869, t. 70. fig. 1.

Agonostoma percoides (part.), Günth. Cat. Fish. iii. p. 464.

This species has erroneously been referred to the Central-American fauna; it is represented in the British Museum by a number of specimens from St. Vincent, Dominica, and Venezuela, and is not known to occur elsewhere.

2. JOTURUS, Poey, 1861.

Joturus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 820.

Mouth rather small, inferior, with short lateral cleft; jaws with bands of small incisor-like teeth with serrated edges, the band in the lower jaw interrupted at the symphysis; very small teeth on vomer, palatines, and pterygoids. Three anal spines.

A single species.

1. **Joturus pichardi.**

Joturus pichardi, Poey, Mem. ii. p. 263 (1861)[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 821, and 1900, fig. 348[2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 188[3].

Agonostoma globiceps, Günth. Ann. Mag. Nat. Hist. (4) xiv. 1874, p. 370[4].

Joturus stipes, Jord. & Gilb. Proc. U.S. Nat. Mus. 1882, p. 373[5].

Depth of body $3\frac{1}{2}$ in the length, length of head $4\frac{3}{5}$. Profile decurved from origin of dorsal to mouth, the snout obtuse, longer than the eye, the diameter of which is $5\frac{1}{2}$ in the length of head. Interorbital region very convex, its width $\frac{1}{2}$ the length of head. Præorbital serrated posteriorly. 43 scales in a longitudinal series. Dorsal IV, I 9; origin of spinous dorsal much nearer tip of snout than base of caudal; first spine rather more than $\frac{3}{5}$ the length of head. Anal II 11, the first articulated ray simple. Pectoral a little shorter than the head, extending to below the spinous dorsal. Caudal forked. Olivaceous, without markings.

Hab. SOUTHERN MEXICO TO PANAMA.—CUBA:

Mexico, Misantla in Vera Cruz[4]; Costa Rica[2]; Panama[5]; Cuba[1].

Here described from the type of *A. globiceps*, a specimen 240 mm. in length. The species is said to attain a length of 600 mm., and to live only in mountain-torrents and at the foot of waterfalls.

3. MUGIL, Linn.

Mugil, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 809.

Mouth rather small, transverse, subterminal; rami of lower jaw forming an angle; lower jaw with a more or less distinct symphysial prominence; teeth very small, ciliiform, in one or a few series. Three anal spines.

A large number of species of "Grey Mullet" are known from the coasts of tropical and temperate countries, entering fresh waters.

Synopsis of the Mexican and Central-American Species.

Adipose eyelid well developed. Dorsal IV, I 7–9. Anal III 7–9.

I. Second dorsal naked, except for a series of small scales behind each ray; anal rays usually III 8.

38 to 43 scales in a longitudinal series	1. *cephalus.*
32 to 36 scales in a longitudinal series	2. *brasiliensis.*

II. Second dorsal covered with small scales.

A. Anal rays usually III 9.

1. 42 to 46 scales in a longitudinal series.

Second dorsal spine longer than first . . . . . 3. *incilis.*
Second dorsal spine not longer than first . . . . . 4. *thoburni.*

2. 36 to 39 scales in a longitudinal series.

Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ the length of head, extending nearly to the vertical from the origin of the spinous dorsal in the young, but not in the adult . . . . . 5. *curema.*
Pectoral from $\frac{4}{5}$ to as long as the head, extending to below the spinous dorsal, even in the adult . . . . . 6. *hospes.*

B. Anal rays usually III 8; 32 to 36 scales in a longitudinal series . . 7. *trichodon.*

1. **Mugil cephalus,** Linn.

Mugil cephalus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 811, and 1900, fig. 343.

Hab. Japan; Sandwich Islands; Pacific Coast of America from California to Chile; Atlantic Coast of America from Cape Cod to Brazil; Atlantic Coast of Europe and Africa from the Loire to the Congo.

2. **Mugil brasiliensis,** Agass., 1829.

Mugil brasiliensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 810.

Hab. Atlantic Coast from Cuba to Patagonia.

3. **Mugil incilis,** Hancock, 1830.

Mugil incilis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 812.

Hab. Atlantic Coast from Panama to Brazil.

4. **Mugil thoburni,** Jord. & Starks, 1896.

Mugil thoburni, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 812.

Hab. Pacific Coast from Guatemala to Ecuador and the Galapagos Islands.

5. **Mugil curema,** Cuv. & Val., 1836.

Mugil curema, Mugil gaimardianus, and *Mugil setosus,* Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, pp. 813, 814, and 815.

Mugil curema, Jord. & Everm. t. c. 1900, fig. 344.

Hab. Pacific and Atlantic Coasts from the United States to Chile and Brazil; Cape Verde Islands.

The examination of a large series of examples (including one received from Dr. Jordan as *Mugil setosus*) has shown me that the length of the pectoral fin compared to that of the head varies but little according to the size of the individual, but if its length be compared with its distance from the spinous dorsal it appears to be longer in young

specimens than in adults. Thus in small examples the pectoral fin nearly or quite reaches the vertical from the origin of the spinous dorsal, but in large ones it extends only $\frac{2}{3}$ of the distance from its base to the spinous dorsal.

In young examples also the adipose eyelid is thinner and more transparent, the teeth are more evident, and the mandibulary angle is more acute than in the adults. Poey's description of *Mugil gaimardianus* (Ann. Lyc. N. York, xi. 1876, p. 64, t. 8. figs. 1–3) was based on an example 225 mm. in length which was compared with one of *M. curema* of 325 mm. The supposed specific differences are mostly very trivial and due to individual variation (e. g., *M. gaimardianus* was said to have the body less deep, the depth $5\frac{1}{5}$ in the length as compared with 5 in *M. curema*); other differences, *i. e.* the shorter snout, stronger teeth, and shorter distance between tip of pectoral and spinous dorsal in *M. gaimardianus*, are due to the different size of the specimens compared. The characters assigned to *M. setosus* (Gilbert, Proc. U.S. Nat. Mus. 1891, p. 549) are those of young specimens of *M. curema*.

6. **Mugil hospes,** Jord. & Culver, 1895.

Mugil hospes, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 814, and 1900, fig. 345.

Hab. Pacific Coast from Sinaloa to Panama.

7. **Mugil trichodon,** Poey, 1876.

Mugil trichodon, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 816.

Hab. Atlantic Coast from Florida to Brazil.

4. QUERIMANA, Jord. & Gilb., 1882.

Querimana, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 817.

This genus differs from *Mugil* principally in having 2 anal spines instead of 3. It comprises "Grey Mullets" of small size, which have not been recorded as entering fresh waters.

1. **Querimana harengus,** Günth., 1861.

Querimana harengus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 817.

Dorsal IV, I 8. Anal II 9–10. 38 scales in a longitudinal series.

Hab. Pacific Coast from Mazatlan to Peru.

2. **Querimana gyrans,** Jord. & Gilb., 1884.

Querimana gyrans, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 818.

Dorsal IV, I 7–8. Anal II 7–8. 28 or 29 scales in a longitudinal series.

Hab. Southern Atlantic Coasts of the United States.

5. CHÆNOMUGIL, Gill, 1863.

Chænomugil, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 816.

Mouth rather small, subterminal or inferior; rami of lower jaw forming an angle; teeth small, movable, in several oblique series; palate toothless.

This genus comprises two species, one American, the other from the Sandwich Islands.

1. **Chænomugil proboscideus,** Günth., 1861.

Chænomugil proboscideus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 816.

Lips very thick; mandibular angle very acute; no adipose eyelid. Dorsal IV, I 8. Anal III 10. 38 to 41 scales in a longitudinal series.

Hab. Pacific Coast from Mazatlan to Panama.

"Common in rock pools" (*Jordan & Evermann*); not recorded from fresh waters.

Fam. 3. SPHYRÆNIDÆ *.

The single genus *Sphyræna* comprises about twenty species, pike-like carnivorous marine fishes, with large mouth and strong dentition, often growing to a considerable size.

There appear to be no records of any of the American species occurring in the fresh waters of Mexico and Central America, but one of them, *S. guachancho,* Cuv. & Val., has been recorded from the Congo †.

Fam. 4. POLYNEMIDÆ ‡.

This family comprises three genera with about thirty species, tropical shore fishes which often enter rivers. They are easily recognizable on account of the peculiar structure of the pectoral fin, which has a detached lower portion composed of free filamentous rays. *Pentanemus quinquarius,* Linn., from the Tropical Atlantic, with the præoperculum entire and the anal fin much longer than the second dorsal, is known to ascend West African rivers and has been recorded from Cuba; it is perhaps to be met with in the rivers of the Atlantic slope of Tropical America.

The fishes of the genus *Polynemus,* Linn., have the præoperculum serrate and the anal fin about as long as the second dorsal. Two species are found on the Pacific Coast, ranging from California to Ecuador, viz., *P. approximans,* Lay & Bennett, with 5 or 6 pectoral filaments, and *P. opercularis,* Gill, with 8 or 9 pectoral filaments.

* Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 822.

† Bouleng. Les Poissons du Bassin du Congo, p. 364 (1901).

‡ Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 828.

There are examples of the former species, collected by Herr Forrer at Presidio, in the British Museum collection. Atlantic coast species are *P. virginicus*, Linn., and *P. octonemus*, Girard, the former usually with 7 pectoral filaments, the latter usually with 8.

Sub-order IV. HAPLOMI.

The Haplomi are represented in the fresh waters of Mexico and Central America by two families, Scombresocidæ and Cyprinodontidæ, which may be distinguished from other soft-rayed fishes with abdominal ventral fins by the following combination of characters:—"Jaws toothed; præmaxillaries wholly or in great part excluding the maxillaries from the upper border of the mouth. Gill-membranes free from the isthmus. Body scaly; lateral line either absent or placed very low. Fins without spinous rays; a single dorsal; no adipose fin; ventral fins, if present, 5- to 7-rayed, abdominal in position."

The two families may be distinguished thus:—

Lateral line present, running along the edge of the lower surface of the body	1. SCOMBRESOCIDÆ.
No lateral line	2. CYPRINODONTIDÆ.

Fam. 1. SCOMBRESOCIDÆ.

The Scombresocidæ are marine Fishes of the tropical and temperate seas. Some of the species of *Belone* and *Hemirhamphus* enter rivers, and a few permanently fluviatile forms are now usually referred to distinct genera.

1. BELONE, Cuv., 1817.

Belone, Günth. Cat. Fish. vi. p. 234 (1866).

Tylosurus (Cocco), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 708.

Body slender, elongate. Mouth with wide lateral cleft, both jaws being much prolonged; jaws with small pointed teeth in bands and with a series of enlarged, wide-set, conical teeth; palate toothless. Scales small. Dorsal and anal fins opposite each other and posterior in position; caudal lunate or forked; pectorals asymmetrical, placed high; ventrals 6-rayed, inserted posteriorly.

Many species from tropical and temperate seas; of eighteen American forms, two have been recorded from fresh-water localities in Mexico and Central America.

1. **Belone marina,** Walbaum, 1792.

Tylosurus marinus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 714; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 160.

Snout twice as long as rest of head. Diameter of eye $2\frac{1}{2}$ in length of postorbital part of head. Dorsal 15. Anal 17. Caudal peduncle somewhat depressed, the lateral line forming a slight keel. Silvery, back greenish; a bluish-silvery lateral stripe.
Total length 1000 mm.

Hab. Atlantic Coast from Cape Cod to Southern Mexico, entering rivers.

2. **Belone scapularis,** Jord. & Gilb., 1881.

Tylosurus scapularis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 711; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 51.

Snout twice as long as rest of head. Diameter of eye $3\frac{1}{2}$ to 4 in length of postorbital part of head. Dorsal 14. Anal 15. Caudal peduncle not depressed. Silvery, back greenish; a bluish-silvery lateral stripe; a dark blotch above the pectoral.
Total length 450 mm.

Hab. Pacific Coast of Panama, entering rivers.

Fam. 2. CYPRINODONTIDÆ.

Head and body covered with cycloid scales *; no lateral line. Head depressed or moderately compressed, usually flat above; body more or less elongate, compressed posteriorly. Mouth protractile, bordered above by the præmaxillaries only; jaws with teeth; palate toothless †. A single dorsal fin; pectoral fins placed low or moderately high; ventrals abdominal, of 5 to 7 rays; caudal usually rounded or truncate.

This family comprises over two hundred species which may be referred to about twenty-five genera, from the fresh waters of America, Africa, and Southern and Eastern Eurasia. Most of the species are American, several of them entering the sea. Some species attain a length of 200 mm., but the majority do not grow to more than half that length.

Synopsis of the Mexican and Central-American Genera.

I. Oviparous. Males with the anal fin unmodified. Rami of the lower jaw firmly united. (Cyprinodontinæ.)
  A. Teeth conical.
    1. Eyes with free margins.
      Teeth in bands, with an outer series of more or less strongly enlarged teeth . . . . . 1. Fundulus.
      Teeth in a single series . . . . . 2. Lucania.
    2. Margins of eyes not free; teeth in bands, with an outer series of enlarged teeth . . . . . 3. Rivulus.
  B. Teeth tricuspid, in a single series . . . . . 4. Cyprinodon.

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* The edges of the scales bear a series of prickles in the males of some species of *Cyprinodon*.

† Vomerine teeth are present in some Asiatic and African species.

II. Viviparous. Males with the anterior 5 or 6 anal rays short, stiff, and subequal, separated by a shallow notch from the rest of the fin. (CHARACODONTINÆ.)

A. Rami of the lower jaw firmly united; teeth fixed.

Teeth of the outer series conical . . . . . 5. ZOOGONETICUS.

Teeth of the outer series usually spear-shaped, sometimes with the apices truncate or even notched . . . . . 6. LIMNURGUS.

Teeth of the outer series all distinctly bicuspid . . . . . 7. CHARACODON.

B. Rami of the lower jaw weakly connected; teeth of the outer series movable, bicuspid . . . . . 8. GOODEA.

III. Viviparous. Males with the anal fin advanced and modified into an intromittent organ, some of the anterior rays being enlarged and produced. Eyes normal. (PŒCILIINÆ.)

A. Mouth large, with wide lateral cleft; teeth in bands, slender, pointed, depressible . . . . . 9. BELONESOX.

B. Mouth rather small, with short lateral cleft; rami of lower jaw firmly united; teeth in bands, with an outer series of enlarged, fixed teeth.

Teeth of the outer series conical . . . . . 10. GAMBUSIA.

Teeth of the outer series chisel-shaped . . . . . 11. GLARIDICHTHYS.

C. Mouth small, transverse; rami of lower jaw weakly connected; teeth unicuspid.

1. Teeth in a single series . . . . . 12. GIRARDINUS.

2. Teeth in bands, with an outer series of larger teeth.

Dorsal fin with 8–11 rays, higher but not much longer in the males than in the females; caudal rounded or subtruncate in both sexes . . . 13. PŒCILIA.

Dorsal fin with 12 to 16 rays, higher and considerably longer in the males than in the females; caudal rounded or subtruncate, sometimes with the lower angle a little produced in the males . . . . . 14. MOLLIENISIA.

Dorsal fin with 11 to 15 rays, higher but not much longer in the males than in the females; lower rays of the caudal, in the males, produced to form a long pointed appendage . . . . . 15. XIPHOPHORUS.

IV. Viviparous. Males with the anal fin modified into a conical scaly intromittent organ with terminal orifice. Eye transversely divided into two parts. (ANABLEPSINÆ.) . . . . . 16. ANABLEPS.

1. FUNDULUS, Lacep., 1803.

Haplochilus (part.) and *Fundulus*, Günth. Cat. Fish. vi. pp. 310 & 318 (1866).
Fundulus and *Adinia* (part.), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, pp. 633 & 660.

Oviparous. Mouth rather small, with short lateral cleft; rami of the lower jaw firmly united; teeth pointed, in bands, with an outer series of more or less strongly enlarged, curved, conical teeth. Eyes with free margins.

This genus comprises a large number of species, mostly North American, some of which are marine. A few forms occur in the rivers of Mexico and Central America, and the genus is also represented in Africa and Southern Europe. In my synopsis of the species I include some which have been described from the coast of Lower

California and which probably enter the rivers of Sinaloa, and others which are not yet known to extend further south than the Rio Grande.

Synopsis of the Mexican and Central-American Species.

I. Origin of anal fin below or behind that of the dorsal. (FUNDULUS.)

A. 30 to 40 scales in a longitudinal series.

1. Dorsal 12–14. Anal 13–17. Oviduct not produced into a tube attached to the anal fin.

a. 32 to 35 scales in a longitudinal series.

Interorbital width more than $\frac{1}{2}$ the length of head; snout not longer than eye. 1. *pachycephalus.*

Interorbital width $\frac{1}{2}$ the length of head or a little less; snout not shorter than eye . . . . . 2. *punctatus.*

b. 36 to 39 scales in a longitudinal series . . . . . 3. *labialis.*

2. Dorsal 10–13. Anal 10–12. Females with the oviduct produced into a tube or sheath attached to the anterior anal rays. (? *F. vinctus.*)

a. 31 to 34 scales in a longitudinal series.

Interorbital width $\frac{1}{2}$ the length of head, which is $3\frac{3}{4}$ in the length of the fish (in specimens of 65 mm.) . . . . . 4. *vinctus.*

Interorbital width $\frac{2}{5}$ the length of head, which is $3\frac{2}{5}$ in the length of the fish (in specimens of 70 mm.) . . . . . 5. *pallidus.*

Interorbital width $\frac{1}{3}$ the length of head, which is 3 in the length of the fish (in specimens of 100 mm.) . . . . . 6. *similis.*

b. 35 to 39 scales in a longitudinal series.

Anal fin deep, when laid back extending to or nearly to the base of caudal . 7. *heteroclitus.*

Anal fin of moderate depth, when laid back not nearly reaching the caudal . 8. *grandis.*

B. 44 to 60 scales in a longitudinal series.

Dorsal 13. Anal 11. 44 scales in a longitudinal series . . . . . 9. *adinia.*

Dorsal 15. Anal 13. 47 scales in a longitudinal series . . . . . 10. *extensus.*

Dorsal 14–15. Anal 13–14. 60 scales in a longitudinal series . . . . . 11. *zebrinus.*

II. Origin of anal fin far in advance of that of the dorsal. (ZYGONECTES.). 12. *dovii.*

1. Fundulus pachycephalus.

Fundulus pachycephalus, Günth. Cat. Fish. vi. p. 321 (1866)[1], and Trans. Zool. Soc. vi. 1868, p. 483, t. 84. fig. 6[2].

Adinia pachycephala, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 660[3].

Depth of body 3 to $3\frac{2}{3}$ in the length, length of head $3\frac{1}{4}$ to $3\frac{1}{2}$. Snout nearly as long as or shorter than eye, the diameter of which is $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of head; interorbital width more than $\frac{1}{2}$ the length of head. Lower jaw slightly projecting. 32 to 35 scales in a longitudinal series. Dorsal 12 to 14; origin nearer to base of caudal than to head. Anal 13–15; origin below or a little behind that of the dorsal; no tube attached to the anterior rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ the length of head. Caudal subtruncate. Brownish, each scale with an indistinct darker spot; an indistinct dark lateral band on the posterior part of the body; vertical fins dusky, the dorsal with a few spots, the anal with a pale margin.

Hab. GUATEMALA, Lake Atitlan[1,2] (*Salvin*).

Here described from the types, four females measuring up to 72 mm. in total length.

2. **Fundulus punctatus.**

Fundulus punctatus, Günth. Cat. Fish. vi. p. 320 (1866)[1], and Trans. Zool. Soc. vi. 1868, p. 482, t. 84. fig. 5[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 637[3].

Fundulus guatemalensis, Günth. t. c. p. 321[4], and l. c. t. 94. figs. 3 & 4[5].

Adinia guatemalensis, Jord. & Everm. t. c. p. 660[6].

Fundulus oaxacæ, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 104, fig. 28[7].

Depth of body $3\frac{1}{2}$ to 4 in the length, length of head $3\frac{1}{2}$ to 4. Snout as long as or a little longer than eye, the diameter of which is 4 to $4\frac{1}{2}$ in the length of head; interorbital width about $\frac{1}{2}$ the length of head. Jaws equal anteriorly, or the lower jaw slightly projecting. 32 to 35 scales in a longitudinal series. Dorsal 12–14; origin nearer to base of caudal than to head. Anal 13–16; origin below or a little behind that of the dorsal; fin deeper in females than in males, but not reaching the base of caudal when laid back; no tube attached to the anterior anal rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ the length of head. Caudal subtruncate. Brownish or olivaceous, each scale usually with a darker spot; spots especially well defined in males on the posterior part of the body; females usually with a dark longitudinal band or a series of short vertical bars on the posterior part of the body; vertical fins usually dusky, the dorsal often with a series of spots near the base, the anal often with a pale margin.

Hab. Mexico, San Domingo de Guzman (*Buller*), Totolopam (*Gadow*), Tequesixtlan (*Gadow*), and Oaxaca[7] (*Meek*); Guatemala, Chiapam[1 2], Rio Guacalate[4 5], Lakes Dueñas[4 5], Nacasil, and Amatitlan[4 5] (*Salvin*); Honduras. — Western Ecuador[4 5].

Here described from a large series of specimens measuring up to 100 mm. in total length, including the types of the species and of *F. guatemalensis.*

3. **Fundulus labialis.**

Fundulus labialis, Günth. Cat. Fish. vi. p. 319 (1866)[1], and Trans. Zool. Soc. vi. 1868, p. 481, t. 84. figs. 1 & 2[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 644[3].

Depth of body $3\frac{1}{2}$ to $4\frac{1}{2}$ in the length, length of head 4 to $4\frac{1}{3}$. Snout as long as or a little longer than eye, the diameter of which is 4 to $4\frac{1}{4}$ in the length of head; interorbital width $\frac{1}{2}$ the length of head or a little less. Jaws equal anteriorly; upper lip rather broad. 36 to 39 scales in a longitudinal series. Dorsal 13–14; origin nearer to base of caudal than to head. Anal 15–17; origin below that of the dorsal; fin much deeper in females than in males, when laid back extending to the base of caudal; no tube attached to the anterior anal rays. Pectoral nearly $\frac{3}{4}$ the length of head. Caudal subtruncate. Olivaceous; edges of scales usually darker; vertical fins dusky, the dorsal and anal with broad yellow margins, which are especially well defined in the males.

Hab. Guatemala, Rio San Gerónimo[1 2], Rio Chisoy, and Lake Yzabal[1 2] (*Salvin*).

Here described from several specimens, including the types of the species, measuring up to 120 mm. in total length.

4. **Fundulus vinctus.**

Fundulus vinctus, Jord. & Gilb. Proc. U.S. Nat. Mus. 1882, p. 355[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 637[2].

Hab. Lower California, Cape St. Lucas or lagoons near La Paz[1 2].

5. **Fundulus pallidus.**

Fundulus pallidus, Everm. Bull. U.S. Fish. Comm. xi. 1891, p. 84, t. 35. fig. 2 (1892) [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 638 [2].

Fundulus similis (non Baird & Girard), Meek, Publ. Columbian Mus., Zool. v. 1904, p. 105 [3].

Depth of body $3\frac{2}{3}$ to $4\frac{1}{3}$ in the length, length of head 3 to $3\frac{2}{5}$. Snout as long as or shorter than eye, the diameter of which is 3 to $3\frac{1}{2}$ in the length of head; interorbital width $2\frac{1}{2}$ in the length of head. Jaws equal anteriorly. 31 to 34 scales in a longitudinal series. Dorsal 10–12; origin equidistant from head and base of caudal. Anal 11–12; origin below or a little behind that of the dorsal; females with a short tube attached to the basal part of the anterior anal rays. Pectoral $\frac{2}{3}$ the length of head. Caudal subtruncate. Sides with a series of blackish vertical bars, which are broader and less sharply defined in the males than in the females; an oblong black median spot on the back in front of the dorsal fin.

Hab. North America, Galveston in Texas.—Mexico, Linares [3] and Victoria [3] (*Meek*) in Tamaulipas.

Here described from four specimens measuring up to 70 mm. in total length.

6. **Fundulus similis.**

Hydrargyra similis, Girard, U.S. & Mex. Bound. Survey, Fish. p. 68, t. 35. figs. 1–8 (1859) [1].

Fundulus similis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 638 [2].

Hab. Rio Grande to Florida, entering the sea [2].

7. **Fundulus heteroclitus.**

Cobitis heteroclitus, Linn. Syst. Nat. p. 500 (1766) [1].

Fundulus heteroclitus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 640 [2].

Hab. Rio Grande to Maine, entering the sea [2].

8. **Fundulus grandis.**

Fundulus grandis, Girard, U.S. & Mex. Bound. Survey, Fish. p. 69, t. 36 (1859) [1].

Fundulus heteroclitus grandis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 641 [2].

Hab. Rio Grande to Florida, entering the sea [2].

Dr. Meek (Publ. Columbian Mus., Zool. v. 1904, p. 107) describes this species as having 40 to 46 scales in a longitudinal series. Specimens which I have examined, and which certainly belong to *F. grandis* as described and figured by Girard, have 36 to 38 scales in a longitudinal series. In females of this species the length of the tube attached to the anal fin is about $\frac{1}{2}$ the depth of the fin, in *F. heteroclitus* about $\frac{2}{3}$.

9. **Fundulus adinia.**

Fundulus adinia, Jord. & Gilb. Synopsis, p. 335 (1883) [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 645 [2].

Hab. Rio Grande at Brownsville [1 2].

10. **Fundulus extensus.**

Fundulus extensus, Jord. & Gilb. Proc. U.S. Nat. Mus. 1882, p. 355 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 646 [2].

Hab. Lower California, Cape St. Lucas or lagoons near La Paz [2].

11. **Fundulus zebrinus.**

Fundulus zebrinus, Jord. & Gilb. Synopsis, p. 891 (1883) [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 646 [2].

Hab. Rio Grande to Kansas [2].

12. **Fundulus dovii.**

Haplochilus dovii, Günth. Cat. Fish. vi. p. 316 (1866) [1], and Trans. Zool. Soc. vi. 1868, p. 481, t. 82. fig. 5 [2].

Fundulus dovii, Jord. & Everm. Bull. U.S. Nat. Nus. xlvii. 1896, p. 650 [3].

Depth of body $4\frac{1}{2}$–5 in the length, length of head $3\frac{2}{5}$. Snout as long as the postorbital parts of head. Diameter of eye $4\frac{1}{2}$ in the length of head and $1\frac{3}{4}$ in the interorbital width. Lower jaw a little shorter than the upper; teeth of the outer series in the lower jaw implanted horizontally. 30 scales in a longitudinal series. Dorsal 8. Anal 13–14, originating at a point equidistant from base of pectoral and base of caudal or a little nearer the latter, terminating below the origin of dorsal. Pectoral $\frac{3}{5}$ the length of head, extending to the base of ventrals, which reach the vent. Caudal rounded. Olivaceous, with indistinct darker vertical bars; vertical fins with series of spots.

Hab. Costa Rica [1] [2], Punta Arenas (*Dow*).

Two specimens, types of the species, 150 mm. in total length.

This is the southern representative of the subgenus *Zygonectes*, Agass., and is close to the North-American *Fundulus* (*Zygonectes*) *notatus*, Rafin.

2. LUCANIA, Girard, 1859.

Lucania, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 663.

Oviparous. Mouth rather small, with short lateral cleft; rami of the lower jaw firmly united; teeth conical, in a single series.

Four species from the Atlantic Coasts and rivers of the United States, one extending southwards to Tamaulipas.

1. **Lucania venusta.**

Limia venusta, Girard, U.S. & Mex. Bound. Surv., Fish. p. 71, t. 39. figs. 20–23 (1859) [1].

Lucania venusta, Girard, Proc. Ac. Philad. 1859, p. 118 [2]; Günth. Cat. Fish. vi. p. 310 (1866) [3]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 665 [4]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 109 [5].

Lucania affinis, Girard, l. c. [6].

Depth of body 3 to $3\frac{1}{2}$ in the length, length of head $3\frac{1}{3}$ to $3\frac{2}{3}$. Snout shorter than eye, the diameter of which is 3 in the length of head; interorbital width $2\frac{1}{2}$ in the length of head. Lower jaw slightly projecting.

25 or 26 scales in a longitudinal series. Dorsal 11–13; origin equidistant from tip of snout and base of caudal. Anal 9–11; origin below middle of dorsal. Pectoral $\frac{3}{4}$ the length of head. Caudal rounded. Olivaceous; edges of scales darker; a silvery lateral stripe; fins plain (♀) or a dark spot at anterior edge of dorsal (♂).

Hab. Coasts and rivers from Florida to Tamaulipas:

Pensacola in Florida [4]; Indianola in Texas [1]; Matamoros in Tamaulipas [6].

Here described from specimens from Florida, measuring up to 60 mm. in total length.

3. RIVULUS, Poey, 1860.

Rivulus, Günth. Cat. Fish. vi. p. 327 (1866); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 662.

Cynodonichthys, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 101.

Oviparous. Mouth rather small, with short lateral cleft; rami of the lower jaw firmly united; teeth pointed, in bands, with an outer series of enlarged, curved, conical teeth. Margins of eyes not free.

This genus comprises four species from Mexico and Central America, two from Cuba, and about eight from South America*. The head is rather broad and the body is somewhat elongate, subcylindrical anteriorly and compressed posteriorly. The snout is short, and the lower jaw projects a little beyond the upper; the lateral gape of the mouth is short, horizontal, and about on a level with the middle of the eye; a vertical cleft in front of the eye marks the posterior edge of the broad lower lip. The teeth of the outer series are rather few and strong, and do not extend on to the sides of the jaws; one or two of the lateral teeth of this series may be longer than the others. The rather short dorsal fin is placed further back than the longer anal. The pectorals are obtuse and are placed very low; the ventrals are small; the caudal is rounded or subtruncate.

Synopsis of the Mexican and Central-American Species.

I. Origin of dorsal over posterior part of anal, which ends below the middle of the dorsal.
- Dorsal 9. Anal 12. 42 scales in a longitudinal series . . . . . 1. *flabellicauda.*
- Dorsal 8. Anal 11. 38 scales in a longitudinal series . . . . . 2. *tenuis.*
- Dorsal 8. Anal 11. 35 scales in a longitudinal series . . . . . 3. *godmani.*

II. Origin of dorsal over middle of anal, which ends a little in advance of the end of the dorsal. Dorsal 9. Anal 11. 32 scales in a longitudinal series. 4. *isthmensis.*

1. **Rivulus flabellicauda.** (Tab. X. fig. 6.)

Rivulus flabellicauda, Regan, Ann. Mag. Nat. Hist. (7) xix. 1907, p. 64 [1].

Depth of body $4\frac{2}{3}$ in the length, length of head $3\frac{4}{5}$. Snout shorter than eye, the diameter of which is 4 in the length of head; interorbital width $2\frac{1}{3}$ in the length of head†. 42 scales in a longitudinal series.

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* *Haplochilus harti*, Bouleng., from Trinidad, and *H. peruanus*, Regan, from Peru, belong to this genus.

† In this species and in *R. opercularis* the interorbital width is less than the interocular width.

Dorsal 9; origin above posterior part of anal, which ends below the middle of the dorsal. Anal 12; origin equidistant from operculum and base of caudal. Pectoral $\frac{2}{3}$ the length of head. Caudal subtruncate. Brownish; edges of scales darker; vertical fins with some small darker spots; an ocellus on the upper half of the base of the caudal fin.

Hab. Costa Rica, Juan Viñas (*Underwood* [1]), San José (*Biolley*).

Two specimens, the type, 70 mm. in total length, and a much smaller example not included in the description.

2. **Rivulus tenuis.**

Cynodonichthys tenuis, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 101, fig. 27 [1].

Allied to *R. godmani*, but with smaller scales and a smaller eye (diameter $3\frac{2}{3}$ in the length of head in a specimen of 40 mm.).

Hab. Mexico, El Hule in Oaxaca [1].

3. **Rivulus godmani.** (Tab. X. fig. 5.)

Rivulus godmani, Regan, Ann. Mag. Nat. Hist. (7) xix. 1907, p. 65.

Depth of body $4\frac{1}{2}$ to 5 in the length, length of head $3\frac{3}{4}$. Snout shorter than eye, the diameter of which is 3 in the length of head and a little less than the interorbital width. 35 scales in a longitudinal series. Dorsal 8; origin above posterior part of anal, which ends below the middle of the dorsal. Anal 11; origin equidistant from operculum and base of caudal. Pectoral $\frac{2}{3}$ the length of head. Caudal subtruncate or rounded. Olivaceous, with a more or less distinct darker spot on each scale; operculum blackish; vertical fins dusky, the caudal with a narrow light edge, and below with a blackish intramarginal stripe; caudal ocellus sometimes present.

Hab. Guatemala (*Godman*).

Two specimens, 40 mm. in total length.

4. **Rivulus isthmensis.**

Rivulus isthmensis, Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 140 [1].

Hab. Costa Rica, Rio San José [1].

4. CYPRINODON, Lacep., 1803.

Cyprinodon, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 670.

Oviparous. Mouth small, with short lateral cleft; rami of the lower jaw firmly united; teeth incisor-like, tricuspid, in a single series.

About eight species comprise this genus, which ranges from the United States to Brazil. In these the gill-openings are restricted from above, commencing only a little above the level of the pectoral fins. The Old-World genus or subgenus *Lebias* differs only in the greater freedom of the operculum.

A few forms enter the sea and others are sometimes found in salt springs; they are very variable and difficult to distinguish; specimens without ventral fins are not uncommon.

Only two well-established species, *C. macularius* and *C. bovinus*, have been recorded from Mexico, but two others known to occur in the Rio Grande system are probably to be met with in its southern tributaries and are therefore included here. In all these the origin of the dorsal fin is about in the middle of the length of the fish (without the caudal fin), and the anal commences below the posterior part of the dorsal.

Synopsis of the Mexican and Central-American Species *.

I. Longest dorsal rays, in the male, only a little more than $\frac{1}{2}$ the length of head, less than the length of base of the fin . . . . . 1. *elegans*.

II. Longest dorsal rays, in the male, from $\frac{2}{3}$ to as long as the head, not shorter than the base of the fin.

A. Longest anal rays considerably shorter than those of the dorsal.

Diameter of eye $3\frac{1}{2}$ to 4 in the length of head (in specimens measuring up to 60 mm.); pectoral $\frac{3}{4}$ the length of head . . . . . 2. *bovinus*.

Diameter of eye 3 to $3\frac{1}{2}$ in the length of head (in specimens measuring up to 70 mm.); pectoral as long or nearly as long as the head . . . . . 3. *variegatus*.

B. Longest anal rays scarcely shorter than those of the dorsal . . . . . 4. *macularius*.

1. Cyprinodon elegans.

Cyprinodon elegans, Baird & Girard, Proc. Ac. Philad. 1853, p. 389 [1]; Girard, U.S. Mex. Bound. Surv., Fish. p. 66, t. 37. figs. 1–7 (1859) [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 675 [3].

Depth of body $2\frac{2}{3}$ in the length, length of head $3\frac{1}{3}$. Snout as long as eye, the diameter of which is $3\frac{1}{2}$ in the length of head; interorbital width $2\frac{3}{4}$ in the length of head. 26 scales in a longitudinal series. Dorsal 11; longest rays less than the length of base of the fin, scarcely more than $\frac{1}{2}$ the length of head, shorter than the longest anal rays. Anal 11. Pectoral $\frac{3}{4}$ the length of head. Caudal subtruncate. Least depth of caudal peduncle $1\frac{2}{5}$ in its length, $\frac{2}{3}$ the length of head. Dark brownish above, yellowish beneath; upper parts with irregular dark spots; a dark band along the middle of the side; fins pale; basal half of dorsal with small dark spots; caudal with a narrow blackish posterior edge.

Hab. Camanche Springs, Rio Grande [1 2].

Here described from a single specimen, a male, measuring 50 mm. in total length, received from the Smithsonian Institution.

2. Cyprinodon bovinus.

Cyprinodon bovinus, Baird & Girard, Proc. Ac. Philad. 1853, p. 389 [1]; Girard, U.S. & Mex. Bound. Surv., Fish. p. 67, t. 37. figs. 12–18 (1859) [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 673 [3].

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* *C. carpio*, Günth., from Florida, apparently does not extend further south. It is recognizable by the large eye (diameter $\frac{1}{3}$ the length of head in specimens of 80 mm.) and by the humeral scale, which is not enlarged.

C. martæ, Steind., from the coast of Colombia, may occur in Central America; it appears to have a more slender body than the species described here.

Cyprinodon eximius, Girard, Proc. Ac. Philad. 1859, p. 158 [4]; Jord. & Everm. l. c. [5]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 125 [6].

Cyprinodon latifasciatus, Garm. Bull. Mus. Comp. Zool. vii. 1881, p. 92 [7], and Mem. Mus. Comp. Zool. xix. 1895, p. 22 [8]; Jord. & Everm. t. c. p. 676 [9]; Meek, l. c. [10].

Cyprinodon elegans, Meek, t. c. p. 125 [11].

Depth of body 2 to $2\frac{2}{3}$ in the length, length of head 3 to $3\frac{1}{2}$. Snout about as long as eye, the diameter of which is $3\frac{1}{2}$ to 4 in the length of head; interorbital width $2\frac{1}{4}$ to $2\frac{1}{2}$ in the length of head. 26 or 27 scales in a longitudinal series. Dorsal 9–11; longest rays equal to the base of the fin or $\frac{2}{3}$ the length of head (♂) or less than the base of the fin and $\frac{1}{2}$ the length of head (♀). Anal 9–11; longest rays shorter than those of the dorsal. Pectoral $\frac{3}{4}$ the length of head. Caudal truncate or subtruncate. Least depth of caudal peduncle $\frac{2}{3}$ the length of head. Coloration very variable, the males sometimes spotted or barred, sometimes uniformly blackish; females spotted, the spots sometimes forming cross-bars, sometimes a longitudinal lateral band; vertical fins pale or dusky; caudal, in the males, usually spotted and with a blackish posterior edge; females with a dark spot on the posterior part of the dorsal.

Hab. Rio Grande System and southwards to Durango:

Leon Spring in Texas [1 2]; Colonia Juarez, Guzman, Santa Maria and Miñaca in Chihuahua [11]; Rio Carmen and Rio Sauz in Chihuahua [6]; Rio Conchos in Chihuahua [5 6]; Rio Chihuahua [4]; Parras in Coahuila [7]; Labor and Durango in Durango [10].

Here described from specimens measuring up to 60 mm. in total length from the Rio Conchos (*Woolman*), determined as *C. eximius* and *C. elegans* by Dr. Jordan, the Rio Sauz (*Meek*), and Labor (*Meek*).

3. **Cyprinodon variegatus.**

Cyprinodon variegatus, Lacep. Hist. Nat. Poiss. v. p. 486 (1803) [1]; Günth. Cat. Fish. vi. p. 305 (1866) [2]; Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 20 [3]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 672 [4].

Esox ovinus, Mitchell, Trans. Phil. Soc. N. York, i. 1815, p. 441, t. 4. fig. 7 [5].

Lebias rhomboidalis, Val. in Humboldt's Obs. Zool. ii. p. 100 (1817) [6].

Lebias ellipsoidea, Le Sueur, Journ. Ac. Philad. ii. 1821, p. 5, t. 2. figs. 1–3 [7].

Cyprinodon gibbosus, Baird & Girard, Proc. Ac. Philad. 1853, p. 390 [8]; Girard, U.S. Mex. Bound. Surv., Fish. p. 67, t. 37. figs. 1–7 [9].

Trifarcias riverandi, Poey, Mem. ii. p. 306 (1861) [10].

Depth of body 2 to $2\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$. Snout a little shorter than eye, the diameter of which is 3–$3\frac{1}{2}$ in the length of head; interorbital width $2\frac{1}{2}$ to $2\frac{3}{4}$ in the length of head. 26 or 27 scales in a longitudinal series. Dorsal 10–11; longest rays equal to the base of the fin and nearly as long as the head (♂) or about $\frac{2}{3}$ the length of head (♀). Anal 10–11; longest rays considerably shorter than those of the dorsal. Pectoral nearly as long as the head. Caudal truncate. Least depth of caudal peduncle $\frac{2}{3}$ the length of head. Body with more or less distinct dark vertical bars; caudal fin, in males, with a dark posterior edge; females with a dark spot on the posterior part of the dorsal.

Hab. Cape Cod to the Rio Grande and Cuba, entering the sea:

New York [5]; Carolina [1]; Florida [7]; Louisiana [6]; Indianola in Texas [8 9]; Cuba [10].

Here described from specimens from Florida, measuring up to 70 mm. in total length.

4. Cyprinodon macularius.

Cyprinodon macularius, Baird & Girard, Proc. Ac. Philad. 1853, p. 389[1]; Girard, U.S. & Mex. Bound. Surv., Fish. p. 68, t. 37. figs. 8–11 (1859)[2]; Garm. Mem. Mus. Comp. Zool. xix. 1895, p. 24[3]; Gilb. N. Amer. Fauna, no. 7, p. 232 (1893)[4]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 674[5]; Gilb. & Scofield, Proc. U.S. Nat. Mus. 1898, p. 498[6]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 126[7].

Cyprinodon californiensis, Girard, Proc. Ac. Philad. 1859, p. 157[8].

Cyprinodon nevadensis, Eigenm. Proc. Calif. Ac. Sci. (2) i. 1889, p. 270[9].

Depth of body $2\frac{1}{4}$ to $2\frac{1}{2}$ in the length, length of head 3. Snout a little shorter than eye, the diameter of which is 3 to $3\frac{1}{2}$ in the length of head; interorbital width $2\frac{1}{2}$ in the length of head. 25 or 26 scales in a longitudinal series. Dorsal 10–11; longest rays equal to the base of the fin (♂) or a little less (♀), $\frac{2}{3}$ (♂) or $\frac{1}{2}$ (♀) the length of head, scarcely longer than the longest anal rays. Anal 10–11. Pectoral $\frac{4}{5}$ the length of head. Caudal subtruncate. Least depth of caudal peduncle $\frac{2}{3}$ the length of head. Body with irregular dark cross-bars and an interrupted lateral band, these markings scarcely distinct in males; the caudal fin and sometimes the dorsal and anal with a narrow dark edge (in the males), the dorsal with a small dark spot on the posterior rays (in the females).

Hab. Colorado and Nevada to Sonora and Lower California:

Colorado; Nevada[4 9]; California[4 8 9]; Arizona[1 2]; Sonora[5 6].

Here described from five specimens from Colorado (*Eigenmann*) and Lower California, measuring up to 60 mm. in total length.

5. ZOOGONETICUS, Meek, 1902.

Zoogoneticus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 109.

Viviparous. Anal fin of the male with the anterior five or six rays short, stiff, and subequal, separated by a more or less distinct notch from the rest of the fin. Mouth rather small, with short lateral cleft; rami of the lower jaw firmly united; minute teeth in bands, with an outer series of enlarged, fixed, conical teeth.

This genus comprises four species, from the Rio Lerma System and the Valley of Mexico. It is very closely related to *Funduli* of the type of *F. punctatus*, *F. pachycephalus*, &c.

Synopsis of the Species.

I.	28 to 30 scales in a longitudinal series.	
	Dorsal 13–16; origin about equidistant from tip of snout and posterior end of caudal fin. Anal 13–15	1. *cuitzeoensis.*
	Dorsal 17; origin nearer to end of caudal than to tip of snout. Anal 13 .	2. *dugesii.*
II.	32 to 34 scales in a longitudinal series	3. *diazi.*
III.	36 to 39 scales in a longitudinal series	4. *robustus.*

1. Zoogoneticus cuitzeoensis.

Platypœcilus quitzeoensis, B. A. Bean, Proc. U.S. Nat. Mus. 1898, p. 540, fig. 1 [1].

Zoogoneticus cuitzeoensis, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 111, fig. 29 [2].

Depth of body $2\frac{1}{2}$ to $3\frac{1}{2}$ in the length, length of head $3\frac{1}{4}$–$3\frac{3}{4}$. Snout as long as or shorter than the eye, the diameter of which is 3 to $3\frac{1}{2}$ in the length of head; interorbital width $2\frac{2}{3}$ to 3 in the length of head. Lower jaw projecting. 28 to 30 scales in a longitudinal series. Dorsal 13–16; origin equidistant from eye or operculum and base of caudal. Anal 13–15; origin a little behind that of the dorsal. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ the length of head. Caudal rounded. Males nearly uniformly coloured, with the vertical fins dusky, the dorsal and anal with pale edges. Females with a series of dark spots or bars on the lower half of the posterior part of the body; a pair of dark spots at the base of the caudal; fins pale, immaculate.

Hab. Mexico, Rio Lerma System:

Lake Chapala [2]; Lake Cuitzeo [1].

Here described from specimens from Lake Chapala (*Meek*), measuring up to 65 mm. in total length.

2. Zoogoneticus dugesii.

Fundulus dugesii, Bean, Proc. U.S. Nat. Mus. 1887, p. 373, t. 20. fig. 5 [1].

Adinia dugesii, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 661 [2].

Zoogoneticus dugesii, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 111, fig. 30 [3].

Hab. Mexico, Rio Lerma System:

Lagos [3]; Guanajuato [1]; Lake Patzcuaro [3].

This species should be easily distinguished by the coloration, the body being crossed by well-defined vertical bars, and by the short and deep caudal peduncle.

3. Zoogoneticus diazi.

Zoogoneticus diazi, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 114, fig. 32 [1].

Zoogoneticus miniatus, Meek, t. c. p. 115, fig. 33 [2].

Depth of body 3–$3\frac{1}{2}$ in the length, length of head $3\frac{1}{3}$ to $3\frac{2}{3}$. Snout nearly as long as or shorter than eye, the diameter of which is $2\frac{3}{4}$ to $3\frac{2}{3}$ in the length of head; interorbital width $2\frac{2}{3}$ to 3 in the length of head. Lower jaw a little projecting. 32 to 34 scales in a longitudinal series. Dorsal 16–18; origin equidistant from head and base of caudal (♀) or a little nearer the former (♂). Anal 12–15; origin below or a little behind that of the dorsal. Pectoral $\frac{3}{5}$ the length of head. Caudal subtruncate. A lateral series of irregular dark spots or vertical bars; fins immaculate.

Hab. Mexico, Rio Lerma System and Valley of Mexico:

Lake Patzcuaro [1]; Lake Zirahuen [1]; Lake Chalco [2].

Here described from specimens from Lake Patzcuaro (*Meek*) measuring up to 80 mm. in total length.

4. Zoogoneticus robustus.

Fundulus robustus, Bean, Proc. U.S. Nat. Mus. 1892, p. 285, t. 44. fig. 2 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 644 [2].

Zoogoneticus robustus, Meek, Publ. Columbian Mus., Zool. iii. 1902, p. 92 [3], and v. 1904, p. 113, fig. 31 [4].

Zoogoneticus maculatus, Regan, Ann. Mag. N. H. (7) xiii. 1904, p. 256 [5].

Depth of body 3 to $3\frac{3}{4}$ in the length, length of head 3 to $3\frac{1}{3}$. Snout as long as or longer than eye, the diameter of which is 4 to 5 in the length of head; interorbital width $2\frac{1}{3}$ to $2\frac{2}{3}$ in the length of head. Lower jaw projecting. 36 to 39 scales in a longitudinal series. Dorsal 13–14; origin nearly equidistant from præoperculum and base of caudal. Anal 14–16; origin a little behind that of the dorsal. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ the length of head. Caudal subtruncate. Body usually with irregular dark spots; fins immaculate.

Hab. Mexico, Rio Lerma System:

Guanajuato [1]; Rio Grande de Santiago [5] (*Buller*); Lake Chapala [3 4]; Lake Cuitzeo [3 4]; Lake Patzcuaro [3 4]; Zirahuen [3 4].

Here described from several specimens from the Rio Grande de Santiago, Lake Chapala, and Lake Patzcuaro, measuring up to 145 mm. in total length.

6. LIMNURGUS, Günth., 1866.

Limnurgus, Günth. Cat. Fish. vi. p. 309 (1866).

Girardinichthys, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 666.

Viviparous. Anal fin of the male with the anterior five or six rays short, stiff, and subequal, separated by a more or less distinct notch from the rest of the fin. Mouth small, with short lateral cleft; rami of the lower jaw firmly united; minute teeth in bands, with an outer series of enlarged fixed teeth which are usually spear-shaped, but may have their apices truncate or even notched.

A single species from the Valley of Mexico.

1. **Limnurgus innominatus.** (Tab. XII. fig. 1.)

Lucania sp., Girard, Proc. Ac. Philad. 1859, p. 118 [1].

Girardinichthys innominatus, Bleek. Cyprin. p. 484 (1860) [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 666 [3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 116 [4].

Limnurgus variegatus, Günth. Cat. Fish. vi. p. 309 (1866) [5].

Characodon geddesi, Regan, Ann. Mag. N. H. (7) xiii. 1904, p. 257 [6].

Depth of body $2\frac{1}{3}$ to $3\frac{1}{3}$ in the length, length of head $3\frac{3}{4}$ to 4. Snout as long as eye, the diameter of which is 4 to $4\frac{1}{4}$ in the length of head; interorbital width $2\frac{1}{5}$ to $2\frac{2}{5}$ in the length of head. 39 to 43 scales in a longitudinal series. Dorsal 18–23; origin equidistant from eye (♂) or operculum (♀) and base of caudal. Anal 20–26; origin a little behind that of the dorsal. Pectoral $\frac{2}{3}$ the length of head. Caudal subtruncate. Body with irregular dark spots or narrow vertical bars.

Hab. Mexico, Valley of Mexico:

City of Mexico [1]; Lake Chalco [4] (*Meek*); Lake Tezcoco [6] (*Geddes*); Xochimilco [4].

Here described from several specimens, measuring up to 75 mm. in total length.

7. CHARACODON, Günth., 1866.

Characodon, Günth. Cat. Fish. vi. p. 308 (1866); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 667.

Characodon and *Chapalichthys,* Meek, Publ. Columbian Mus., Zool. v. 1904, pp. 118 & 123.

Viviparous. Anal fin of the male with the anterior five or six rays short, stiff, and subequal, separated by a more or less distinct notch from the rest of the fin. Mouth rather small, with short lateral cleft; rami of lower jaw firmly united; minute teeth in bands, with an outer series of enlarged, fixed, bicuspid teeth.

Hab. Mexico and Lower California.

Synopsis of the Species.

I. Dorsal and anal fins each with more than 25 rays . . . . . 1. *multiradiatus.*

II. Dorsal and anal fins each with less than 20 rays.

A. 32 to 36 scales in a longitudinal series.

Origin of anal below middle of dorsal; origin of dorsal equidistant from tip of snout and base of caudal or a little nearer the latter . . . . . 2. *encaustus.*

Origin of anal below anterior part of dorsal; origin of dorsal about equidistant from tip of snout and posterior end of caudal fin . . . . . 3. *variatus.*

Origin of anal a little in advance of that of the dorsal, which is equidistant from posterior part of head and posterior end of caudal fin . . . . . 4. *lateralis.*

B. 50 to 55 scales in a longitudinal series . . . . . 5. *furcidens.*

1. **Characodon multiradiatus.** (Tab. XII. figg. 3, 4.)

Characodon multiradiatus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 119[1].

Depth of body $2\frac{2}{3}$ to $3\frac{1}{3}$ in the length, length of head $3\frac{3}{4}$ to 4. Snout a little shorter than eye, the diameter of which is 3 to $3\frac{1}{3}$ in the length of head; interorbital width 2 to $2\frac{1}{3}$ in the length of head. About 40 scales in a longitudinal series *. Dorsal 28–33; origin nearer to tip of snout than to base of caudal (♂) or nearer to the caudal (♀). Anal 29–32; origin below the anterior part of the dorsal. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ the length of head. Caudal subtruncate. Olivaceous, with irregular dark cross-bars; vertical fins, in the males, with blackish edges.

Hab. Mexico, Rio Lerma System, Lerma[1].

Here described from four specimens, measuring up to 45 mm. in total length, from Lerma (*Meek*).

2. **Characodon encaustus.**

Characodon encaustus, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 126, fig. 7 (1900)[1].

Chapalichthys encaustus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 123, fig. 36[2].

Depth of body 3 to $3\frac{2}{3}$ in the length, length of head $3\frac{1}{2}$ to 4. Snout as long as or shorter than eye, the diameter of which is 3 to $3\frac{1}{2}$ in the length of head; interorbital width $2\frac{1}{2}$ to 3 in the length of head.

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* When the scales are regularly arranged I count not more than 40 in a longitudinal series. Sometimes they are irregular, two scales from series above and below meeting to exclude a scale from contact with what should be the next one in its longitudinal series; in one specimen this occurs to such an extent that more than 45 may be counted from above the pectoral to the caudal.

33 to 36 scales in a longitudinal series. Dorsal 15–18; origin equidistant from tip of snout and base of caudal or a little nearer the latter. Anal 15–17; origin below the middle of dorsal. Pectoral nearly $\frac{3}{4}$ the length of head, extending beyond the base of ventral. Caudal truncate. Olivaceous; a series of 7 to 10 dark brown spots or short vertical bars along the middle of the side.

Hab. MEXICO, Lake Chapala [1] [2].

Here described from several specimens, measuring up to 75 mm. in total length.

3. Characodon variatus.

Characodon variatus, Bean, Proc. U.S. Nat. Mus. 1887, p. 370, t. 20. fig. 1 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 669 [2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 120 [3].

Characodon ferrugineus, Bean, t. c. p. 372, t. 20. figs. 3 & 4 [4].

Characodon eiseni, Rutter, Proc. Calif. Ac. Sci. (2) vi. 1896, p. 266 [5]; Jord. & Everm. t. c. 1898, p. 2831 [6]; Meek, t. c. p. 119 [7].

Depth of body about 3 in the length, length of head $3\frac{1}{4}$ to $3\frac{1}{2}$. Snout as long as eye, the diameter of which is $3\frac{1}{2}$ to 4 in the length of head; interorbital width $2\frac{1}{2}$ in the length of head. 32 to 35 scales in a longitudinal series. Dorsal 12–14; origin equidistant from tip of snout and end of caudal fin. Anal 14–17; origin behind that of the dorsal. Pectoral $\frac{3}{5}$ to $\frac{3}{4}$ the length of head. Caudal subtruncate. Males with a blackish longitudinal band; dorsal and caudal fins blackish, with a narrow light edge. Females with the lateral band broken up into a series of spots or bars; body with numerous irregular spots; fins pale.

Hab. MEXICO, Rio Lerma System:

Aguas Calientes [3]; Tepic [5]; Lagos [3]; Guanajuato [1] [4]; Ocotlan [3]; Celaya [3]; Salamanca [3]; Huingo [3].

Here described from a number of specimens, measuring up to 75 mm. in total length, from Aguas Calientes (*Jordan, Meek*) and Salamanca (*Woolman*).

4. Characodon lateralis.

Characodon lateralis, Günth. Cat. Fish. vi. p. 308 (1866) [1], and Trans. Zool. Soc. vi. 1868, p. 480, t. 82. fig. 2 [2]; Garm. Mem. Mus. Comp. Zool. xix. 1895, p. 36 [3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 121 [4].

Characodon garmani *, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2831 [5]; Meek, l. c. [6].

Depth of body $2\frac{1}{2}$ to 3 in the length, length of head 3 to $3\frac{1}{3}$. Snout as long as or shorter than eye, the diameter of which is $3\frac{1}{2}$ to $4\frac{1}{4}$ in the length of head; interorbital width 2 to $2\frac{1}{4}$ in the length of head. 32 to 35 scales in a longitudinal series. Dorsal 11–14; origin equidistant from præoperculum or operculum and end of caudal. Anal 13–16; origin a little in advance of that of the dorsal. Pectoral $\frac{3}{5}$ the length of head. Caudal rounded or subtruncate. Males dark brownish, with a more or less distinct blackish lateral band; vertical fins each with a blackish intramarginal band. Females olivaceous, with the dark lateral band more or less broken up into spots or bars.

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* Jordan & Evermann (Bull. U.S. Nat. Mus. xlvii. 1898, p. 2831) proposed the name *Characodon garmani* for the specimens from Parras, Coahuila, described by Garman (Mem. Mus. Comp. Zool. xix. 1895, p. 36) under the name *Characodon lateralis*. Garman's description appears about equally applicable to *C. lateralis* and *C. variatus*, species which he does not recognize as distinct from each other. Specimens collected by Dr. Meek at Durango and sent as *C. garmani* are identical with *C. lateralis*.

Hab. Mexico, Coahuila, Durango, and Jalisco :

Parras in Coahuila [3]; Durango and Labor in Durango [6]; Jalisco [4].

Here described from several specimens, measuring up to 65 mm. in total length, the types of the species (described as from Central America, without particulars as to the exact locality) and a series from Durango (*Meek*).

5. **Characodon furcidens.** (Tab. XII. fig. 2.)

Characodon furcidens, Jord. & Gilb. Proc. U.S. Nat. Mus. 1882, p. 354 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1892, p. 670 [2].

Depth of body $3\frac{1}{2}$ in the length, length of head 4. Snout as long as eye, the diameter of which is $3\frac{1}{2}$ in the length of head; interorbital width 2 in the length of head. 53 scales in a longitudinal series. Dorsal 16; origin equidistant from base of pectoral and base of caudal. Anal 12; origin posterior to that of the dorsal. Pectoral $\frac{2}{3}$ the length of head. Caudal truncate. Brownish above, yellowish below; upper part of the body with traces of darker spots.

Hab. Lower California and Jalisco :

Cape San Lucas or lagoons near La Paz [1]; Rio de Mascota in Jalisco (*Buller*); Colima [2].

Here described from a specimen of 80 mm. from the Rio de Mascota (*Buller*).

8. GOODEA, Jord., 1879.

Goodea, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 685.

Xenendum, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 127 (1900).

Goodea and *Skiffia,* Meek, Publ. Columbian Mus., Zool. v. 1904, pp. 136 and 141.

Viviparous. Anal fin of the male with the anterior five or six rays short, stiff, and subequal, separated by a more or less distinct notch from the rest of the fin. Mouth small, transverse; rami of lower jaw weakly connected; minute teeth in bands, with an outer series of larger, movable, bicuspid teeth.

Hab. Mexico.

Synopsis of the Species.

I. Origin of anal well in advance of that of the dorsal; 38 to 45 scales in a longitudinal series . . . . . 1. *toweri.*

II. Origin of anal below or slightly in advance of that of the dorsal.

39 to 44 scales in a longitudinal series . . . . . 2. *atripinnis.*

34 to 38 scales in a longitudinal series . . . . . 3. *calientis.*

III. Origin of anal a little behind that of the dorsal; 32 scales in a longitudinal series . . . . . 4. *bilineata.*

IV. Origin of anal considerably behind that of the dorsal.

A. 48 to 55 scales in a longitudinal series . . . . . 5. *whitii.*

B. 32 to 38 scales in a longitudinal series.

Dorsal with 12–15 rays . . . . . 6. *lermæ.*

Dorsal with 16–18 rays . . . . . 7. *multipunctata.*

1. Goodea toweri.

Goodea toweri, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 138, fig. 41 [1].

Depth of body 2 to $2\frac{1}{3}$ in the length, length of head $3\frac{3}{4}$. Snout shorter than eye, the diameter of which is $2\frac{3}{4}$ in the length of head; interorbital width equal to the distance from posterior margin of pupil to free edge of operculum. 38 to 42 (45) scales in a longitudinal series. Dorsal 11–12; origin equidistant from præoperculum or operculum and posterior end of caudal. Anal 12–13; origin in advance of that of the dorsal. Pectoral $\frac{3}{4}$ the length of head. Caudal truncate. Brownish above, lighter below; fins plain.

Hab. Mexico, Upper tributaries of the Rio Panuco:

Rio Verde in San Luis Potosi [1].

Here described from two specimens of 70 mm. from the Rio Verde (*Meek*).

2. Goodea atripinnis.

Goodea atripinnis, Jord. Proc. U.S. Nat. Mus. 1879, p. 299 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 685 [2], and 1900, fig. 301.

Characodon luitpoldi, Steind. Denkschr. Ak. Wien, lxii. 1895, p. 528, t. 2. fig. 3 [3].

Goodea luitpoldi, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 139, fig. 42 [4].

Xenendum xaliscone, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 128, fig. 9 (1900) [5].

Depth of body 3 to $3\frac{2}{3}$ in the length, length of head 4 to 5. Snout as long as eye, the diameter of which is $3\frac{1}{2}$ to 4 in the length of head; interorbital width equal to the distance from middle of eye to free edge of operculum. 39 to 44 scales in a longitudinal series. Dorsal 13–15; origin equidistant from eye and posterior end of caudal fin. Anal 15–16; origin below or a little in advance of that of the dorsal. Pectoral a little shorter than the head. Caudal rounded or subtruncate. Caudal peduncle $1\frac{1}{3}$–$1\frac{2}{3}$ as long as deep. Brownish; vertical fins dusky.

Hab. Mexico, Rio Lerma System:

Leon in Guanajuato [1]; Lake Chapala [4 5]; Lake Patzcuaro [3].

Here described from five specimens, measuring up to 180 mm. in total length, from Lakes Chapala (*Buller*) and Patzcuaro (*Meek*).

3. Goodea calientis.

Xenendum caliente, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 127, fig. 8 [1].

Goodea atripinnis, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 140, fig. 43 [2].

Depth of body $2\frac{2}{3}$ to $3\frac{1}{3}$ in the length, length of head 4. Snout about as long as eye, the diameter of which is $3\frac{1}{2}$ to $4\frac{1}{2}$ in the length of head; interorbital width equal to the distance from posterior margin of pupil to free edge of operculum. 34 to 38 scales in a longitudinal series. Dorsal 13–15; origin equidistant from operculum and posterior end of caudal fin. Anal 15–16; origin below or a little in advance of that of the dorsal. Pectoral a little shorter than the head. Caudal rounded or subtruncate. Caudal peduncle as long as or a little longer than deep. Brownish; young with irregular darker spots; fins plain.

Hab. Mexico, Rio Lerma and upper tributaries of the Rio Panuco:

Aguas Calientes [1 2]; Lagos [2]; Celaya [2]; Acambaro [2]; San Juan del Rio [2]; Huingo [2]; Lake Patzcuaro [2].

Here described from a number of specimens from Aguas Calientes (*Jordan*, *Meek*), San Juan del Rio (*Meek*), Huingo (*Meek*), and Patzcuaro (*Mexico Mus.*).

4. Goodea bilineata.

Characodon bilineatus, Bean, Proc. U.S. Nat. Mus. 1887, p. 371, t. 20. fig. 2 [1].
Skiffia bilineata, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 144, fig. 45 [2].

Hab. Mexico, Rio Lerma System :
Leon in Guanajuato [1]; Huingo [2].

This species agrees with *G. multipunctata* in the number of scales and fin-rays, but has the dorsal fin placed further back, whilst the markings are quite different.

5. Goodea whitii.

Goodea whitei, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 137, fig. 40 [1].

Depth of body 3 to 4 in the length, length of head 4. Snout as long as or shorter than eye, the diameter of which is 3 to $3\frac{1}{2}$ in the length of head; interorbital width equal to the distance from posterior margin of pupil to free edge of operculum. 48 to 55 scales in a longitudinal series. Dorsal 14–17; origin equidistant from tip of snout and posterior end of caudal fin. Anal 12–14; origin posterior to that of the dorsal. Pectoral about $\frac{3}{4}$ the length of head. Caudal truncate, the upper angle sometimes a little produced. Brownish above, yellowish below; each scale of the upper part of the body with a dark spot; usually a blackish lateral stripe; vertical fins dusky, more or less distinctly spotted, sometimes with a pale edge and dark intramarginal stripe.

Hab. Mexico, upper tributaries of the Rio Balsas :
Yautepec [1]; Cuautla [1].

Here described from several specimens, measuring up to 90 mm. in total length, from Yautepec and Cuautla (*Meek*).

6. Goodea lermæ.

Skiffia lermæ, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 142, t. 8 [1].
Skiffia variegata, Meek, t. c. p. 143, fig. 44 [2].

Depth of body $2\frac{2}{3}$ to $3\frac{1}{3}$ in the length, length of head 4. Snout shorter than eye, the diameter of which is 3 in the length of head; interorbital width equal to or a little more than the postorbital part of head. 34 to 38 scales in a longitudinal series. Dorsal 12–15; origin equidistant from snout and base of caudal (♂) or nearer the latter (♀). Anal 13–15; origin posterior to that of the dorsal. Pectoral $\frac{2}{3}$–$\frac{4}{5}$ the length of head. Caudal truncate. Males dark brownish; females olivaceous, with irregular darker spots; sometimes an indistinct dark lateral stripe and a spot or bar at the base of caudal; fins plain.

Hab. Mexico, Rio Lerma System and Valley of Mexico :
Celaya [1]; Lake Patzcuaro [1]; Lake Zirahuen [2]; Lake Chalco [2].

Here described from a number of specimens, measuring up to 65 mm. in total length, from Lakes Patzcuaro and Zirahuen (*Meek*). I am unable to detect any differences between the examples from these two lakes, sent as *S. lermæ* and *S. variegata* respectively.

7. Goodea multipunctata. (Tab. XII. figg. 5, 6.)

Xenendum multipunctatum, Pellegr. Bull. Mus. Paris, 1901, p. 205 [1].
Skiffia multipunctata, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 141 [2].

Depth of body $2\frac{2}{3}$ to $2\frac{4}{5}$ in the length, length of head 4. Snout shorter than eye, the diameter of which is 3

in the length of head; interorbital width equal to or a little longer than the postorbital part of head. 32 to 35 scales in a longitudinal series. Dorsal 16–18; origin equidistant from snout and base of caudal (♂) or nearer the latter (♀). Anal 14–16; origin posterior to that of the dorsal. Pectoral $\frac{3}{4}$–$\frac{4}{5}$ the length of head. Caudal truncate or subtruncate. Olivaceous; a dark spot on each scale of the upper and posterior parts of the body; a dark vertical bar at the base of the caudal fin; dorsal and caudal fins with dark spots.

Hab. MEXICO, Rio Lerma System:
Jalisco [1]; Lake Chapala [2].

Here described from four specimens, measuring up to 50 mm. in total length, from Ocotlan (*Meek*).

9. BELONESOX, Kner, 1860.

Belonesox, Günth. Cat. Fish. vi. p. 333 (1866); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 684.

Viviparous. Anal fin, in the male, advanced and modified into an intromittent organ. Mouth large, with extended lateral cleft; teeth in bands, slender, pointed, depressible.

This genus comprises a single species, quite unlike any other member of the family.

1. **Belonesox belizanus.**

Belonesox belizanus, Kner, Sitzungsb. Ak. Wien, xl. 1860, p. 419, fig.[1]; Günth. Cat. Fish. vi. p. 333 (1866)[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 684[3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 135[4].

Depth of body 4 to 6 in the length, length of head nearly 3. Snout $2\frac{1}{2}$ to $3\frac{1}{4}$ as long as eye, the diameter of which is 5 to 6 in the length of head. Lower jaw more than $\frac{1}{2}$ the length of head. 55 to 65 scales in a longitudinal series. Dorsal 9–10. Anal 10–12, in advance of the dorsal. Caudal rounded. A small dark spot on each scale of the upper part of the body; a blackish spot at the base of the caudal.

Hab. MEXICO, Boca del Rio [4], Otopa [4], El Hule [4], Obispo [4], and Perez [4] in Vera Cruz; BRITISH HONDURAS, Belize [1]; GUATEMALA, Lake Peten [2].

Here described from eight specimens, measuring up to 200 mm. in total length, from Perez (*Meek*), Lake Peten (*Salvin*), and Belize. The largest males measure 90 mm.

10. GAMBUSIA, Poey, 1855.

Pseudoxiphophorus and *Gambusia*, Günth. Cat. Fish. vi. pp. 332 and 333 (1866); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 678.

Viviparous. Anal fin, in the male, advanced and modified into an intromittent organ. Mouth small or moderate; rami of lower jaw firmly united; small teeth in bands, with an outer series of more or less enlarged, conical, fixed teeth.

This genus comprises ten species from the Southern United States, Mexico, and Central America, and three or four from Cuba and Jamaica.

Synopsis of the Mexican and Central-American Species.

I. Dorsal fin with 7 to 12 rays, its origin posterior to that of the anal. (GAMBUSIA.)

A. Anal fin similar to the dorsal, rounded or obtuse, the middle rays the longest. (? *G. tridentiger*.)

1. End of anal below anterior part or middle of dorsal (♀); no dark cross-bars on the body.

Diameter of eye 3 to $3\frac{1}{2}$ in the length of head (in specimens measuring up to 70 mm.) . . . . . 1. *gracilis*.

Diameter of eye $2\frac{1}{3}$ to $2\frac{3}{4}$ in the length of head (in specimens measuring up to 50 mm.) . . . . . 2. *bonita*.

2. End of anal nearly below origin of dorsal.

4 or 5 narrow blackish cross-bars on each side . . . . . 3. *fasciata*.

7 or 8 brownish vertical bars on the posterior part of the body . . . . . 4. *tridentiger*.

B. Anal fin dissimilar to the dorsal, pointed, the anterior rays the longest.

1. Pectoral nearly as long as the head, extending to the origin of anal . 5. *nicaraguensis*.

2. Pectoral shorter than the head, not reaching the anal.

a. Dorsal with 8 or 9 rays.

Length of head 4 to $4\frac{1}{2}$ in the length of the fish (in specimens of 25 to 50 mm.); 29 to 31 scales in a longitudinal series . . . . . 6. *infans*.

Length of head $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of the fish (in specimens measuring up to 45 mm.); 28 scales in a longitudinal series . . . . . 7. *episcopi*.

b. Dorsal with 10 to 12 rays . . . . . 8. *annectens*.

II. Dorsal fin with 11 to 17 rays, its origin in advance of that of the anal. (PSEUDOXIPHOPHORUS.)

A. Origin of anal below or a little in advance of middle of dorsal; no dark spot above the pectoral.

Dorsal with 12 to 14 rays, its origin equidistant from tip of snout and base or anterior part of caudal . . . . . 9. *terrabensis*.

B. Origin of anal below anterior part of dorsal; a dark spot above the pectoral.

Dorsal with 11 to 13 rays, its origin equidistant from tip of snout and middle or posterior part of caudal . . . . . 10. *jonesii*.

Dorsal with 13 to 17 rays, its origin about equidistant from tip of snout and base of caudal . . . . . 11. *bimaculata*.

1. Gambusia gracilis *.

Xiphophorus gracilis, Heck. Sitzungsb. Ak. Wien, i. 1848, p. 300, t. 9. figs. 3–4 [1].

Gambusia affinis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 680 [2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 130 [3].

Gambusia nobilis, Jord. & Everm. t. c. p. 682 [4].

Gambusia gracilis, Jord. & Everm. t. c. p. 683 [5].

Depth of body 3 to 4 in the length, length of head $3\frac{1}{2}$ to 4. Snout as long or nearly as long as eye, the diameter of which is 3–$3\frac{1}{2}$ in the length of head. Interorbital width about equal to the distance from

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* For the extensive synonymy of this species, see Jord. & Everm. pp. 681–683, and Garm. Mem. Mus. Comp. Zool. xix. 1895, pp. 82–85 (*G. holbrookii*, *patruelis*, and *gracilis*).

middle of eye to free edge of operculum. 29 to 31 scales in a longitudinal series. Dorsal 8–9; origin usually nearer to posterior end of caudal fin than to tip of snout; free edge of the fin convex. Anal 9–10, similar to the dorsal, ending below or a little in advance of the middle of the dorsal. Pectoral $\frac{3}{4}$–$\frac{5}{6}$ the length of head. Caudal rounded or subtruncate. Least depth of caudal peduncle about $\frac{2}{3}$ the length of head. Olivaceous; edges of scales darker; often a dark longitudinal band from upper part of eye to base of caudal.

Hab. Streams of the Atlantic Slope from Illinois to Vera Cruz:

In Mexico recorded from Rio Chihuahua and Rio Conchos in Chihuahua [3]; Monclova in Coahuila [3]; Monterey and Rio San Diego in Nuevo Leon [3]; Matamoros, Rio Soto la Marina, and Rio Panuco in Tamaulipas [3]; Orizaba [1] and Vera Cruz.

Here described from specimens measuring up to 70 mm. in total length.

2. Gambusia bonita.

Gambusia bonita, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 132, fig. 39 [1].

Depth of body $3\frac{1}{3}$ to $3\frac{2}{3}$ in the length, length of head $3\frac{1}{2}$ to $3\frac{3}{4}$. Snout shorter than eye, the diameter of which is $2\frac{1}{3}$ to $2\frac{3}{4}$ in the length of head. Interorbital width equal to the distance from posterior margin of pupil to free edge of operculum. 29 to 31 scales in a longitudinal series. Dorsal 8–10; origin a little nearer to posterior end of caudal fin than to tip of snout; middle rays longest. Anal 10–11, similar to the dorsal, ending below the anterior rays of dorsal. Pectoral $\frac{4}{5}$ the length of head. Caudal rounded or subtruncate. Least depth of caudal peduncle $\frac{2}{3}$ the length of head. Olivaceous; scales of upper part of body with dark edges.

Hab. Mexico, Rio Papaloapam:

Refugio [1], Motzorongo [1].

Here described from five specimens, measuring up to 50 mm. in total length, from Refugio, received from Dr. Meek.

3. Gambusia fasciata.

Gambusia fasciata, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 129, fig. 37 [1].

Depth of body $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length, length of head 4 to $4\frac{1}{3}$. Snout a little shorter than eye, the diameter of which is 3 to $3\frac{1}{3}$ in the length of head. Interorbital width equal to the distance from middle of eye to free edge of operculum. 32 scales in a longitudinal series. Dorsal 8; origin considerably nearer to end of caudal than to tip of snout; middle rays longest. Anal 9–10, similar to the dorsal, ending below the origin of dorsal. Pectoral $\frac{4}{5}$ the length of head. Caudal subtruncate. Least depth of caudal peduncle $\frac{2}{3}$ the length of head. 4 or 5 narrow vertical or slightly oblique blackish bars on each side; a small blackish spot on the anterior dorsal rays, another on the anal.

Hab. Mexico, Oaxaca, Tequesixtlan (*Gadow*), San Gerónimo [1], Tehuantepec [1].

Here described from six specimens, measuring up to 55 mm. in total length.

4. Gambusia tridentiger.

Gambusia tridentiger, Garm. Mem. Mus. Comp. Zool. xix. 1895, p. 89 [1].

Inner teeth tricuspid. 28 to 30 scales in a longitudinal series. Dorsal 7–8; origin about equidistant from occiput and end of caudal, nearly above the last ray of anal. Anal 10. 7 or 8 brownish vertical bars, separated by pale interspaces of equal width, on the posterior part of the body.

Hab. Isthmus of Panama [1].

5. Gambusia nicaraguensis.

Gambusia nicaraguensis, Günth. Cat. Fish. vi. p. 336 (1866) [1], and Trans. Zool. Soc. vi. 1868, p. 483, t. 82. fig. 3 [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 682 [3].

Paragambusia nicaraguensis, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 133 [4].

Depth of body $2\frac{2}{3}$ to $3\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$ to $3\frac{3}{4}$. Snout shorter than eye, the diameter of which is $2\frac{1}{2}$ to 3 in the length of head. Interorbital width about equal to the distance from middle of eye to free edge of operculum. 28 to 30 scales in a longitudinal series. Dorsal 7–8; origin nearer to posterior end of caudal fin than to tip of snout; free edge of the fin straight. Anal 10–11, pointed, with concave free edge, ending below the origin of dorsal. Pectoral nearly as long as the head. Caudal rounded. Least depth of caudal peduncle $\frac{2}{3}$ to $\frac{3}{4}$ the length of head. Olivaceous: a small dark spot at the base of each scale on the upper part of the body; dorsal and caudal with series of small dark spots.

Hab. Southern Mexico and Central America:

Mexico, Boca del Rio [4], Otopa [4], El Hule [4], Obispo [4], and Perez [4] in Vera Cruz; Nicaragua [1 2] (*Dow*).

Here described from several specimens measuring up to 55 mm. in total length, the types of the species from Lake Nicaragua and examples from El Hule, received from Dr. Meek.

6. Gambusia infans.

Gambusia infans, Woolman, Bull. U.S. Fish. Comm. 1894, p. 62, t. 2. fig. 3 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 680 [2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 131, fig. 38 [3].

Gambusia gracilis, Meek, t. c. p. 130 [4].

Depth of body $3\frac{1}{4}$ to $3\frac{3}{4}$ in the length, length of head 4 to $4\frac{1}{2}$. Snout nearly as long as or shorter than eye, the diameter of which is 3 to $3\frac{1}{2}$ in the length of head. Interorbital width about equal to the distance from middle of eye to free edge of operculum. 29 to 31 scales in a longitudinal series. Dorsal 8–9; origin usually nearer to posterior end of caudal than to tip of snout; free edge of fin slightly convex. Anal 9–10, pointed, ending below anterior rays of dorsal. Pectoral $\frac{4}{5}$ the length of head. Caudal rounded or subtruncate. Least depth of caudal peduncle $\frac{2}{3}$ to $\frac{3}{4}$ the length of head. Olivaceous; scales with narrow dark edges; often a dark stripe from operculum to caudal.

Hab. Mexico, Rio Lerma and Rio Balsas:

Salamanca [1]; Celaya [3]; Ocotlan [3]; La Barca [3]; Huingo [3]; Yautepec [4]; Cuautla [4]; Puente de Ixtla [4]; Jojutla [4]; Chietla [4]; Balsas [4].

Here described from several specimens, measuring up to 50 mm. in total length, from Salamanca (*Woolman*), Celaya and Puente de Ixtla (*Meek*). A male of 25 mm. is marked with dark vertical bars.

7. Gambusia episcopi.

Gambusia episcopi, Steind. Sitzungsb. Ak. Wien, lxxvii. 1878, p. 387, t. 2. figs. 3 & 4 [1].

Hab. Panama [1].

8. **Gambusia annectens.** (Tab. XIV. figg. 5, 6.)

Gambusia annectens, Regan, Ann. Mag. N. H. (7) xix. 1907, p. 259.

Depth of body 3 to $3\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$ to $3\frac{3}{4}$. Snout as long as or shorter than eye, the diameter of which is 3 to $3\frac{2}{3}$ in the length of head; interorbital width equal to the distance from middle or posterior part of eye to free edge of operculum. 28 to 31 scales in a longitudinal series. Dorsal 10–12; origin equidistant from tip of snout and middle or posterior part of caudal; free edge of the fin convex. Anal 9–10, pointed, originating a little in advance of the dorsal. Pectoral about $\frac{3}{4}$ the length of head. Caudal rounded or subtruncate. Least depth of caudal peduncle about $\frac{2}{3}$ the length of head. Scales with dark edges, forming series of spots on the lower part of the side; often a series of short dark vertical bars along the middle of the side; a series of dark spots on the lower part of the dorsal fin.

Hab. Costa Rica, Carrillo and Juan Viñas (*Underwood*), Irazu (*Rogers*).

Numerous specimens, measuring up to 70 mm. in total length.

This species is very close to *G. episcopi*, Steind., from Panama, which has only 8 or 9 dorsal rays and also differs in having a blackish spot on the anal fin. It is also close to *G. terrabensis*, Regan, and *G. jonesii*, Günther, and with them forms a series from *G. episcopi* to *G.* (*Pseudoxiphophorus*) *bimaculata*, Heck., so that the genus *Pseudoxiphophorus* can no longer be maintained.

9. **Gambusia terrabensis.** (Tab. XII. fig. 7.)

Gambusia terrabensis, Regan, Ann. Mag. N. H. (7) xix. 1907, p. 260.

Depth of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$ to $3\frac{4}{5}$. Snout shorter than eye, the diameter of which is 3 to $3\frac{1}{3}$ in the length of head; interorbital width equal to the distance from posterior margin of pupil to free edge of operculum. 29 to 31 scales in a longitudinal series. Dorsal 12–14; origin equidistant from tip of snout and base of caudal or a little nearer the latter. Anal 9–10; origin below or a little in advance of the middle of dorsal. Pectoral nearly $\frac{3}{4}$ the length of head. Caudal subtruncate. Least depth of caudal peduncle nearly $\frac{2}{3}$ the length of head. Scales of the upper part of the body with dark edges; an interrupted dark lateral stripe; dorsal fin with a basal series of vertically expanded blackish spots and with a second series of smaller spots; anal dark at the base and also distally; posterior part of caudal dusky.

Hab. Costa Rica, Rio Grande de Terraba, Pacific Slope (*Pittier*).

Six specimens, measuring up to 48 mm. in total length.

10. **Gambusia jonesii.** (Tab. XII. fig. 8.)

Mollienisia jonesii, Günth. Ann. Mag. N. H. (4) xiv. 1874, p. 371 [1]; Garm. Mem. Mus. Comp. Zool. xix. 1895, p. 52 [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 698 [3].

Pseudoxiphophorus bimaculatus (non Heck.), Jord. & Everm. t. c. p. 678 [4].

Pseudoxiphophorus pauciradiatus, Regan, Ann. Mag. N. H. (7) xiii. 1904, p. 256 [5], and (7) xvi. 1905, p. 362 [6].

Very closely allied to *G. bimaculata*. Dorsal 11–13; origin of dorsal equidistant from tip of snout and middle or posterior part of caudal. Longest anal ray $\frac{3}{5}$ to $\frac{2}{3}$ the length of head. Scales with dark edges, especially superiorly; a dark spot on the operculum, another above the root of the pectoral, and a third on the upper part of the base of the caudal; dorsal with about 3 series of small dark spots; anal and caudal with an oblong dark spot on each interradial membrane.

Hab. Mexico, Mountain Lakes and Streams of Central Vera Cruz:
Lake Alcohuaca, near Huamantla, 8000 feet [1] (*Jones*); Orizaba [4 5 6] (*Woolman*, *Gadow*).

Of the numerous examples, measuring up to 85 mm. in total length, which I have examined, the majority have 12 dorsal rays, in striking contrast to *G. bimaculata*, in which the usual number is 14 or 15.

11. **Gambusia bimaculata.** (Tab XIV. fig. 4.)

Xiphophorus bimaculatus, Heck. Sitzungsb. Ak. Wien, i. 1848, p. 296, t. 9. figs. 1–2 [1].
Pœcilioides bimaculatus, Steind. Sitzungsb. Ak. Wien, xlviii. 1863, p. 176, t. 4. fig. 2 [2].
Pseudoxiphophorus reticulatus, Trosch. in Müller's Reise Mexico, iii. Append. p. 104 (1865) [3]; Günth. Cat. Fish. vi. p. 333 (1866) [4]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 678 [5].
Pseudoxiphophorus bimaculatus, Trosch. l. c. [6]; Günth. t. c. p. 332 [7]; Garm. Mem. Mus. Comp. Zool. xix. 1895, p. 81 [8]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 127 [9].
Pseudoxiphophorus bimaculatus, var. *tæniatus*, Regan, Ann. Mag. N. H. (7) xvi. 1905, p. 362 [10].

Depth of body 3 to 4 in the length, length of head $3\frac{1}{2}$ to 4. Snout as long as or a little shorter than eye, the diameter of which is 3 to $3\frac{2}{3}$ in the length of head. Interorbital width equal to the distance from middle or posterior part of eye to free edge of operculum. 28–31 scales in a longitudinal series. Dorsal 13–17; origin about equidistant from tip of snout and base of caudal. Anal 9–11, below the anterior dorsal rays, pointed, the longest ray from $\frac{2}{3}$ to as long as the head. Pectoral $\frac{2}{3}$ to $\frac{4}{5}$ the length of head. Caudal rounded. Least depth of caudal peduncle $\frac{3}{5}$ to $\frac{3}{4}$ the length of head. Olivaceous or brownish; some or all of the scales with dark outlines; a dark spot above the pectoral, another on the upper part of the base of caudal; dorsal with series of small dark spots; anal and caudal dusky.

Hab. Southern Mexico, Tepeaca, San Domingo de Guzman [10] (*Buller*), Jalapa [9], Xico [9], Orizaba [1 5], Cordova (*Boucard*), Motzorongo [9], El Hule [9], Obispo [9], Perez [9], Sanborn [9], Rio Tonto (*Gadow*); British Honduras, Stann Creek (*Robertson*); Guatemala (*Godman*).

A very variable species in form, coloration, and number of fin-rays. Specimens from San Domingo de Guzman (var. *tæniatus*) have 16 or 17 dorsal rays and the dark edges of the mid-lateral series of scales so broad as to form a dark longitudinal band; one of these is figured (Tab. XIV. fig. 4). Examples from other localities appear also to have peculiarities which may prove to be distinctive. The numerous specimens examined measure up to 90 mm. in total length.

11. GLARIDICHTHYS, Garman, 1896.

Glaridichthys, Garman, Am. Nat. xxx. 1896, p. 232.

Viviparous. Anal fin, in the male, advanced and modified into a long intromittent organ. Mouth small or moderate; rami of lower jaw firmly united; small teeth in bands, with an outer series of enlarged, chisel-shaped, fixed teeth. Dorsal fin short, with 8 to 11 rays.

This genus comprises three species, respectively from Northern Mexico, Cuba, and Brazil.

1. Glaridichthys latidens.

Glaridodon latidens, Garm. Mem. Mus. Comp. Zool. xix. 1895, p. 42[1].

Glaridichthys latidens, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 134[2].

Depth of body nearly equal to length of head, which is more than $\frac{1}{4}$ of the length of the fish. Snout shorter than eye, the diameter of which is 3 in the length of head. 28 to 30 scales in a longitudinal series. Dorsal 8; origin a little nearer to posterior end of caudal than to tip of snout and above the middle of the anal. Anal 10. Caudal rounded or subtruncate. Olivaceous; sides with narrow brownish vertical bars, which are more distinct posteriorly.

Hab. Mexico, Chihuahua[1].

12. GIRARDINUS, Poey, 1855.

Girardinus, Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 45.

Viviparous. Anal fin, in the male, advanced and modified into a long intromittent organ. Mouth small, transverse; rami of lower jaw weakly connected; teeth unicuspid, movable, in a single series.

Hab. Carolina to Guatemala; West Indies.

The three Mexican and Central-American forms are very closely allied and should perhaps be regarded as races or subspecies of *Girardinus pleurospilus*. The following description applies to all:—

Depth of body $3\frac{1}{4}$ to $3\frac{3}{4}$ in the length, length of head $3\frac{3}{4}$ to $4\frac{1}{2}$. Snout nearly as long as or shorter than eye, the diameter of which is 3 to $3\frac{1}{3}$ in the length of head. Interorbital width equal to the distance from middle or posterior part of eye to free edge of operculum. 27 to 30 scales in a longitudinal series. Dorsal 7–9; origin equidistant from tip of snout and end of caudal or a little nearer the latter (♀). Anal 8–10; origin in advance of that of the dorsal. Dorsal and anal fins each with an acute anterior angle and nearly straight free edge. Pectoral as long as or a little shorter than the head. Caudal rounded or subtruncate. Least depth of caudal peduncle $\frac{3}{5}$ to $\frac{3}{4}$ the length of head.

1. Girardinus presidionis.

Pœcilia presidionis, Jord. & Culver, Prof. Calif. Ac. Sci. (2) v. 1895, p. 413, t. 29[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 697[2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 152[3].

A series of narrow dark vertical bars, variable in number, along the side of the body; one or two of the bars sometimes represented by oval spots.

Hab. Mexico, Rio Presidio in Sinaloa[1 2 3].

Ten examples, measuring up to 70 mm. in total length. In these I am unable to detect any trace of an inner series of teeth, even with the aid of a binocular microscope.

2. Girardinus lutzi.

Heterandria lutzi, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 148, fig. 47[1].

Heterandria pleurospilus, Meek, l. c.[2].

A series of dark spots along the middle of the side, usually more than eight in number, and each usually smaller than the eye. A few spots sometimes expanded vertically; posterior spots sometimes broken up, forming two or even three irregular series.

Hab. Southern Mexico, Otopa [1], Motzorongo [1], Venta Salada [1], El Hule [1], Perez [1], and Cuicatlan [1] in Vera Cruz, Oaxaca [1], Tequesixtlan (*Gadow*), San Gerónimo [2] and Tehuantepec in Oaxaca.

Numerous examples, measuring up to 80 mm. in total length.

3. **Girardinus pleurospilus.**

Girardinus pleurospilus, Günth. Cat. Fish. vi. p. 355 (1866) [1], and Trans. Zool. Soc. vi. 1868, p. 486, t. 87. fig. 1 [2].

Heterandria pleurospilus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 688 [3].

A series of from four to eight rounded dark spots, each about as large as the eye, along the middle of the side.

Hab. Guatemala, Lake of Dueñas [1 2], Lake Nacasil (*Salvin*).

Numerous examples, measuring up to 60 mm. in total length.

13. PŒCILIA, Schneider, 1801.

Pœcilia, Günth. Cat. Fish. vi. p. 339 (1866); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 690.

Viviparous. Anal fin, in the male, advanced and modified into an intromittent organ of moderate length. Mouth small, transverse; rami of lower jaw weakly connected; minute teeth in bands, with an outer series of more or less enlarged, curved, unicuspid, movable teeth. Dorsal fin with 8 to 11 rays, higher but not much longer in the males than in the females. Caudal rounded or subtruncate in both sexes.

Hab. Mexico and Central America to Brazil; West Indies.

P. elongata is known to enter the sea, and probably *P. sphenops*, which is abundant in brackish water, does so also.

Dr. Garman, in his monograph of the Cyprinodonts (Mem. Mus. Comp. Zool. xix. 1895), proposed a considerable reduction in the number of Mexican and Central-American species of this genus. He placed *P. couchiana*, Girard, *P. mexicana*, Steind., *P. thermalis*, Steind., *P. petenensis*, Günth., *P. dovii*, Günth., *P. spilurus*, Günth., and *P. butleri*, Jord., in the synonymy of *P. sphenops*, Cuv. & Val., and *P. elongata*, Günth., *P. boucardi*, Steind., and *P. chisoyensis*, Günth., in the synonymy of *P. gillii*, Kner & Steind.

After examination of a large number of specimens I have reached the conclusion that *P. couchiana*, *P. petenensis*, *P. spilurus*, and *P. elongata* are very distinct and easily definable species. The others enumerated appear to be merely forms of one widely distributed and variable form, *P. sphenops*.

Synopsis of the Species *.

I. Origin of anal in advance of that of the dorsal.

Dorsal 8. Anal 7. 26 scales in a longitudinal series . . . . . 1. *spilurus.*
Dorsal 7–9. Anal 9–11. 27 to 30 scales in a longitudinal series . . . . . 2. *occidentalis.*
Dorsal 9–10. Anal 8–9. 30 to 33 scales in a longitudinal series . . . . . 3. *elongata.*

II. Origin of anal below or behind that of the dorsal.

A. Origin of anal below or a little behind that of the dorsal; origin of dorsal equidistant from tip of snout and middle or posterior part of caudal; 26 to 30 scales in a longitudinal series.

Free edge of dorsal fin convex . . . . . 4. *sphenops.*
Free edge of dorsal fin straight . . . . . 5. *salvatoris.*

B. Origin of anal below fourth or fifth dorsal ray; origin of dorsal equidistant from tip of snout and base of caudal; 28 to 30 scales in a longitudinal series . . . . . 6. *petenensis.*

C. Origin of anal below the middle of dorsal; origin of dorsal equidistant from tip of snout and anterior part of caudal; 23 to 27 scales in a longitudinal series.

Depth of body about $2\frac{3}{4}$ in the length, length of head about 4 (in specimens of 50 mm.) . . . . . 7. *couchiana.*
Depth of body 2 to $2\frac{2}{3}$ in the length, length of head $3\frac{1}{3}$ to $3\frac{2}{3}$ (in specimens of 60 mm.) . . . . . 8. *maculata.*

1. Pœcilia spilurus.

Pœcilia spilurus, Gunth. Cat. Fish. vi. p. 345 (1866)[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 697[2].

Depth of body $3\frac{1}{4}$ in the length, length of head 4. Snout a little shorter than eye, the diameter of which is $3\frac{1}{3}$ in the length of head. Interorbital width equal to the distance from posterior margin of pupil to free edge of operculum. 26 scales in a longitudinal series. Dorsal 8; origin about equidistant from tip of snout and posterior end of caudal. Anal 7; origin in advance of that of the dorsal (♀). Least depth of caudal peduncle the length of head. A blackish spot on each side of the upper part of the tail, at the base of the caudal fin.

Hab. Central America (*Sallé* [1]).

Here described from the type, the only specimen known, 60 mm. in total length.

2. Pœcilia occidentalis.

Heterandria occidentalis, Baird & Girard, Proc. Ac. Philad. 1853, p. 390[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 689[2].

Girardinus occidentalis, Girard, U.S. Mex. Bound. Surv., Fishes, p. 73, t. 39. figg. 16–19[3], and Proc. Ac. Philad. 1859, p. 119[4].

Girardinus sonorensis, Girard, Proc. Ac. Philad. 1858, p. 120[5].

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* This synopsis is based on female specimens only. The males of some of the species have not yet been described.

Pœcilia occidentalis, Garm. Mem. Mus. Comp. Zool. xix. 1895, p. 71[6]; Rutter, Proc. Calif. Ac. Sci. (2) vi. 1896, pp. 261[7] and 267[8]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 150[9].

Hab. Pacific Coast Rivers from Arizona to Jalisco:

Rio Santa Cruz in Arizona[1 3 4]; Rio Sonora[7] and Rio Yaqui[4 7] in Sonora; Tepic in Jalisco[8].

3. **Pœcilia elongata.**

Pœcilia elongata, Günth. Cat. Fish. vi. p. 342[1] (1866), and Trans. Zool. Soc. vi. 1869, p. 484, t. 85. fig. 2[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 607[3]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 54[4].

Depth of body $3\frac{1}{2}$ to 4 in the length, length of head about 4. Snout as long as or a little shorter than eye, the diameter of which is $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of head. Interorbital width nearly equal to the distance from the posterior edge of pupil to the free edge of operculum. 30 to 33 scales in a longitudinal series. Dorsal 9–10; anterior angle acute, free edge straight, oblique; origin nearly equidistant from tip of snout and posterior edge of caudal (♀). Anal 8–9; origin a little in advance of that of the dorsal. Pectoral as long as the head. Caudal rounded. Least depth of caudal peduncle $\frac{2}{3}$ to $\frac{3}{4}$ the length of head (♀). Olivaceous, with indistinct narrow cross-bars.

Hab. Panama[1 2 4].

Here described from several specimens, including the types, all females, measuring up to 130 mm. in total length.

Pœcilia cuneata, Garman (Mem. Mus. Comp. Zool. xix. 1895, p. 62), from Turbo, is described as having 28 to 29 scales in a longitudinal series, but is otherwise very similar to *P. elongata,* with which it may prove to be identical.

4. **Pœcilia sphenops.** (Tab. XIII. figg. 1–7.)

Pœcilia sphenops, Cuv. & Val. Hist. Nat. Poiss. xviii. p. 130, t. 526 (1846)[1]; Günth. Cat. Fish. vi. p. 643 (1866)[2]; Garman, Mem. Mus. Comp. Zool. 1895, p. 59[3]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 694[4]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 153, fig. 49[5].

Pœcilia mexicana, Steind. Sitzungsb. Ak. Wien, xlviii. 1863, p. 178, t. 4. fig. 1[6]; Günth. t. c. p. 340[7]; Jord. & Everm. t. c. p. 692[8].

Pœcilia thermalis, Steind. t. c. p. 181, t. 4. fig. 3[9].

Xiphophorus gillii, Kner & Steind. Abhandl. Bayer. Ak. x. 1864, p. 28, t. 4. fig. 1[10].

? *Gambusia modesta,* Trosch. in Müller's Reise Mexico, iii. Append. p. 105 (1865)[11].

? *Gambusia plumbea,* Trosch. t. c. p. 106[12].

Pœcilia chisoyensis, Günth. t. c. p. 342[13]; Jord. & Everm. t. c. p. 693[14].

Pœcilia dovii, Günth. t. c. p. 344[15]; Jord. & Everm. t. c. p. 695[16].

Pœcilia gillii, Günth. Trans. Zool. Soc. vi. 1869, p. 485[17].

? *Platypœcilus mentalis,* Gill, Proc. Ac. Philad. 1876, p. 335[18].

Pœcilia vandepolli, Van Lidth de Jeude, Notes Leyden Mus. ix. 1887, p. 438[19]; Jord. & Everm. t. c. p. 696[20].

Pœcilia vandepolli arubensis, Van Lidth de Jeude, l. c.[21]; Jord. & Everm. l. c.[22].

Pœcilia boucardii, Steind. Sitzungsb. Ak. Wien, lxxvii. 1878, p. 386, t. 3. figs. 2 & 3[23]; Jord. & Everm. t. c. p. 695[24]; Gilb. & Starks, Mem. Calif. Ac. Sci. (2) iv. 1904, p. 51[25].

Pœcilia butleri, Jord. Proc. U.S. Nat. Mus. 1888, p. 330[26]; Jord. & Everm. t. c. p. 691[27]; Meek, t. c. p. 151[28].

Pœcilia limantouri, Jord. & Snyd. Bull. U.S. Fish. Comm. 1900, p. 129, fig. 10[29]; Jord. & Everm. t. c. p. 3153 (1900)[30].

Platypœcilus nelsoni, Meek, t. c. p. 147, fig. 46[31].

Pœcilia latipunctata, Meek, t. c. p. 151, fig. 48[32].

Depth of body $2\frac{2}{3}$ to $3\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$ (young) to $4\frac{1}{2}$. Snout as long as or shorter than eye, the diameter of which is 3 (young) to $3\frac{3}{5}$ in the length of head. Interorbital width equal to the distance from middle or posterior part of eye to free edge of operculum. 26 to 29 scales in a longitudinal series. Dorsal 8–11; origin equidistant from tip of snout and middle or posterior part of caudal (♀); free edge of the fin more or less convex, the rays usually increasing in length to the middle ones and rapidly decreasing posteriorly. Anal 8–10, acutely pointed; origin below or a little behind that of the dorsal (♀). Pectoral as long as or a little shorter than head. Caudal rounded or subtruncate. Least depth of caudal peduncle from $\frac{2}{3}$ (♀) to as long as the head (♂). Olivaceous, edges of scales sometimes darker; sides often with narrow dark vertical bars, especially in males; series of dark spots, one on each scale of the side of the body, often present, especially in females; dorsal and caudal sometimes blackish, with or without pale margins, sometimes pale, usually with several series of small dark spots, which may be absent in females.

Hab. Mexico and Central America, extending to Colombia and the Leeward Islands:

Mexico, Rio San Juan in Nuevo Leon[5], Rio Conchos[5], Rio Soto Marina[5] and Rio Forlon[5 29 32] in Tamaulipas, Rio Presidio[26 30] in Sinaloa (*Forrer*), Los Menores in Jalisco (*Buller*), Rio Verde[5] in San Luis Potosi, Vera Cruz[1 2 5], Boca del Rio[5] and Rio Papaloapam[5] in Vera Cruz, Orizaba[6], Puebla (*Boucard*), Rio Balsas in Guerrero[5 31], Tehuantepec[5], Tequesixtlan (*Gadow*), and San Gerónimo[5] in Oaxaca, La Esperanza in Chiapas[9]; Guatemala, Rio Chisoy[13], Chiapam, Huamuchal, and Lakes Dueñas, Nacasil, and Amatitlan (*Salvin*); Nicaragua, Lake Nicaragua[15] (*Dow*); Costa Rica, San José (*Biolley*); Panama[18], Panama[25], Colon[23], and Rio Chagres[10].—Colombia; Curaçoa[19]; Aruba[21].

I have examined a large series of specimens, representing the whole range of the species, measuring up to 100 mm. in total length, including the types of *P. chisoyensis* and *P. dovii* and examples of *P. butleri*, *P. limantouri*, and *P. latipunctata* received from their describers. Of the last-named I have compared one specimen, from Forlon, received from Dr. Meek, with several from the same locality determined by him as *Pœcilia sphenops*. The lateral series of spots supposed to be characteristic of *P. latipunctata* is merely a phase of the peculiar and usually irregular blackish markings which are found on individual specimens of so many Cyprinodont species.

The specimens figured on Tab. XIII. are:—

1. One of the types of *P. latipunctata,* from Forlon.
2. A female from San José, Costa Rica.
3. A spotted variety from Tequesixtlan.
4. A female from Puente de Ixtla.
5. A male from Vera Cruz (typical *P. sphenops*).
6. A male from Puebla.
7. A female from Lake Amatitlan (typical *P. mexicana*).

5. **Pœcilia salvatoris.** (Tab. XIV. figg. 2, 3.)

Pœcilia thermalis (non Steind.), Günth. Cat. Fish. vi. p. 341 (1866)[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 693[2].

Pœcilia salvatoris, Regan, Ann. Mag. Nat. Hist. (7) xix. 1907, p. 65[3].

Depth of body $3\frac{1}{4}$ to $3\frac{3}{4}$ in the length, length of head about $3\frac{3}{4}$. Snout shorter than eye, the diameter of which is $3\frac{1}{4}$ in the length of head. Interorbital width equal to the distance from anterior part or middle of eye to free edge of operculum. 27 to 30 scales in a longitudinal series. Dorsal 10–11; origin equidistant from tip of snout and middle or posterior part of caudal (♀); anterior angle rectangular, free edge of the fin straight, the rays gradually decreasing in length from the first branched ray backwards (♀). Anal 8–9; origin below or a little behind that of the dorsal. Pectoral a little shorter than the head. Caudal subtruncate. Least depth of caudal peduncle from $\frac{3}{5}$ (♀) to $\frac{4}{5}$ (♂) the length of head. Olivaceous; males with more or less distinct cross-bars; dorsal fin, in the males, with 2 series of vertically expanded blackish spots, which may or may not be present in the females; caudal, in the males, with oblong spots.

Hab. Salvador (*Dow* [1 3]).

Here described from several specimens, measuring up to 55 mm. in total length.

6. **Pœcilia petenensis.**

Pœcilia petenensis, Günth. Cat. Fish. vi. p. 342 (1866)[1], and Trans. Zool. Soc. vi. 1868, p. 484, t. 85. figs. 3 & 4[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 694[3].

Depth of body $3\frac{1}{3}$ (♂) to $4\frac{1}{2}$ (♀) in the length, length of head $4\frac{2}{5}$ to $4\frac{4}{5}$. Snout as long as eye, the diameter of which is $3\frac{1}{3}$ to $3\frac{1}{2}$ in the length of head. Interorbital width equal to the distance from the middle or posterior part of eye to the free edge of operculum. 28 to 30 scales in a longitudinal series. Dorsal 10–11; anterior angle rectangular, free edge straight (♀); origin equidistant from tip of snout and base of caudal (♀). Anal 8–9, acutely pointed; origin below the fourth or fifth dorsal ray (♀). Pectoral as long as the head. Caudal rounded. Least depth of caudal peduncle nearly equal to the length of head (♂) or about $\frac{3}{4}$ the length of head (♀). Greenish; scales on the upper part of the body with dark edges; dorsal and caudal blackish (♂) or with small dark spots (♀).

Hab. Guatemala, Lake Peten (*Salvin* [1 2]).

Here described from the types, five specimens measuring up to 150 mm. in total length.

7. **Pœcilia couchiana.** (Tab. XIV. fig. 1.)

Limia couchiana, Girard, Proc. Ac. Philad. 1859, p. 116[1].

Pœcilia couchii, Günth. Cat. Fish. vi. p. 347 (1866)[2].

Pœcilia couchiana, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 695[3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 152[4].

Depth of body about $2\frac{3}{4}$ in the length, length of head about 4. Snout a little shorter than eye, the diameter of which is 3 in the length of head. Interorbital width equal to the distance from anterior part of eye to free edge of operculum. 24 to 27 scales in a longitudinal series. Dorsal 9–11; origin equidistant from tip of snout and anterior part of caudal (♀); free edge of fin nearly straight, the branched rays subequal (♀). Anal 7–8, pointed, opposite to the posterior half of the dorsal (♀). Pectoral nearly as long as the head. Caudal rounded or subtruncate. Least depth of caudal peduncle $\frac{3}{4}$ to $\frac{4}{5}$ the length of head. Upper half of body dark brownish or blackish, the colour especially dark at the edges of the scales; lower part of body usually yellowish and sharply separated from the darker upper part, at the lower edge of which there may be a blackish longitudinal band.

Hab. MEXICO, Rio San Juan at Monterey, Nuevo Leon [1 4].

Here described from several specimens, measuring up to 50 mm. in total length.

8. **Pœcilia maculata.**

Platypœcilus maculatus, Günth. Cat. Fish. vi. p. 350 (1866) [1]; Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 48 [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 686 [3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 145, t. 9 [4].

Platypœcilus variatus, Meek, t. c. p. 146, t. 10 [5].

Depth of body 2 to $2\frac{2}{3}$ in the length, length of head $3\frac{1}{3}$ to $3\frac{2}{3}$. Snout shorter than eye, the diameter of which is 3 in the length of head. Interorbital width equal to the distance from middle of eye to free edge of operculum. 23 to 26 scales in a longitudinal series. Dorsal 9–11; origin equidistant from snout and anterior part of caudal; free edge of the fin somewhat convex. Anal 8–9, pointed, opposite the posterior half of the dorsal (♀). Pectoral a little shorter than the head. Caudal rounded. Least depth of caudal peduncle from $\frac{3}{4}$ to as long as the head. Olivaceous, sometimes with black blotches; often a dark spot or crescent or a pair of spots at the base of the caudal.

Hab. Atlantic Coast Streams of Mexico:

Rio Soto la Marina (Garza Valdez, Santa Engracia, Victoria) [5]; Rio Panuco (Forlon, Rascon, Valles) [5]; Rio Papaloapam (El Hule, Obispo, Perez) [4].

Here described from eight specimens, measuring up to 60 mm. in total length, including the types of the species.

14. MOLLIENISIA, Le Sueur, 1821.

Mollienisia, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 698.

Scarcely generically distinct from *Pœcilia*. Dorsal fin longer, of 12 to 16 rays, in adult males not only higher but considerably longer than in females.

Hab. Carolina to Guatemala.

1. **Mollienisia latipinna.**

Mollienisia latipinna, Le Sueur, Journ. Ac. Philad. ii. 1821, p. 3, t. 3 [1]; Günth. Cat. Fish. vi. p. 348 (1866) [2]; Garm. Mem. Mus. Comp. Zool. xix. 1895, p. 50, t. 12 [3]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 699 [4]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 155 [5].

Pœcilia multilineata, Le Sueur, t. c. p. 4, t. 1 [6].

Pœcilia lineolata, Girard, U.S. Mex. Bound. Surv., Fishes, p. 70, t. 35. figs. 9–11 (1859) [7].

Limia pœcilioides, Girard, t. c. p. 70, t. 38. figs. 8–11 [8].

Limia formosa, Girard, Proc. Ac. Philad. 1859, p. 115 [9].

Limia matamorensis, Girard, t. c. p. 116 [10].

Mollienisia formosa, Günth. t. c. p. 349 [11]; Jord. & Everm. l. c. [12]; Meek, l. c. [13].

Depth of body $2\frac{1}{2}$ to 3 in the length, length of head $3\frac{1}{2}$ to 4. 26 to 28 scales in a longitudinal series. Dorsal 13–16, in adult males very elevated and occupying the greater part of the length of the back. Anal 9–10. Caudal rounded in both sexes. Each scale on the side of the body with a dark spot, which may form continuous longitudinal stripes; dorsal, in the female, with series of small dark spots, in the male with an oblong or oval spot on each interradial membrane, forming a series along the middle of

the fin, below which are longitudinal stripes and above which are numerous smaller spots; caudal with series of small spots.

Hab. South Carolina to Tamaulipas:

Pensacola in Florida; New Orleans [1 6]; Indianola [8] and Brownsville [7] in Texas; Matamoros [10], Palo Alto [9], La Vega [5], and Tampico [5] in Tamaulipas.

Here described from several specimens, measuring up to 75 mm. in total length, from New Orleans, Pensacola, and Tampico. Garman's plate illustrates strikingly the differences between the sexes and the changes during growth in this species, which attains a length of 100 mm.

2. Mollienisia petenensis.

Mollienisia petenensis, Günth. Cat. Fish. vi. p. 348 (1866) [1], and Trans. Zool. Soc. vi. 1868, p. 485, t. 86. figs. 1–3 [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 700 [3].

Depth of body $2\frac{3}{4}$ to 3 in the length, length of head 4. 28 to 30 scales in a longitudinal series. Dorsal 15–16. Anal 9. Caudal rounded or subtruncate, in the males with the lower angle pointed and slightly produced. Males with a small dark spot on each scale of the upper and posterior parts of the body and with the lower edge of the caudal blackish; dorsal fin coloured as in *M. latipinna*.

Hab. GUATEMALA, Lake Peten (*Salvin*) [1 2].

Here described from the types, six specimens, measuring up to 130 mm. in total length. This species is very close to the preceding, but it attains a larger size and is distinguished by the form of the caudal in the males, which suggests relationship with *Xiphophorus*.

15. XIPHOPHORUS, Heck., 1848.

Xiphophorus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 701.

Scarcely generically distinct from *Pœcilia* and *Mollienisia*. Dorsal with 11 to 15 rays, higher but not much longer in the males than in the females. Males with the lower rays of the caudal fin produced to form a long pointed appendage.

Hab. Tamaulipas to British Honduras.

The five closely allied species of this genus agree in the following features:—Snout as long as or a little shorter than eye, the diameter of which is 3 to $3\frac{1}{3}$ in the length of head, interorbital width $1\frac{3}{5}$ to $1\frac{4}{5}$. Origin of dorsal about equidistant from tip of snout and base of caudal, well in advance of that of the anal (♀). Pectoral nearly as long as the head. Caudal appendage of the males pale, with black edges.

Synopsis of the Species.

I. Anal with 6 to 8 rays . . . . . 1. *montezumæ*.

II. Anal with 8 to 10 rays.

A. Depth of body 3–4 in the length.

1. Least depth of caudal peduncle not greater than the distance from anterior margin of eye to free edge of operculum . . . . . 2. *helleri*.

2. Least depth of caudal peduncle greater than the distance from anterior margin of eye to free edge of operculum.
   A blackish lateral stripe . . . . . 3. *strigatus*.
   No well-marked lateral stripe . . . . . 4. *guentheri*.

B. Depth of body $2\frac{1}{2}$–$2\frac{2}{3}$ in the length . . . . . 5. *brevis*.

1. **Xiphophorus montezumæ.**

Xiphophorus montezumæ, Jord. & Snyder, Bull. U.S. Fish. Comm. 1900, p. 131, fig. 11 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 3156 [2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 158, fig. 50 [3].

Depth of body about 3 in the length, length of head about 4. 27 to 29 scales in a longitudinal series. Dorsal 11–13. Anal 6–8. Yellowish; scales of upper part of body with dark edges; a more or less distinct dark stripe from eye to base of caudal.

Hab. Mexico, Rio Panuco System, Rascon [1 2 3].

Here described from a number of specimens from Rascon, measuring up to 60 mm. in total length.

2. **Xiphophorus helleri.**

Xiphophorus helleri, Heck. Sitzungsb. Ak. Wien, i. 1848, p. 291, t. 8 [1].

Xiphophorus jalapæ, Meek, Publ. Columbian Mus., Zool. iii. 1902, p. 107 [2], and v. 1904, p. 136, t. 11 [3].

Depth of body 3 (♀) to 4 (♂) in the length, length of head about 4. 27 to 29 scales in a longitudinal series. Dorsal 11–13. Anal 8–10. Dorsal rays, in the males, subequal from about the third to the ninth or tenth, thence increasing in length to the last. Least depth of caudal peduncle nearly equal to the distance from anterior margin of eye to free edge of operculum. Olivaceous; a well-defined blackish lateral stripe from eye to base of caudal; males with a second stripe from axil of pectoral to the lower edge of the caudal peduncle.

Hab. Mexico, Mountain Streams of Central Vera Cruz:
Jalapa [2 3], Orizaba [1].

Here described from several specimens from Jalapa, measuring up to 70 mm. in total length. Heckel's figures are not good, but the lower stripe distinctive of the males of this form is clearly shown.

3. **Xiphophorus strigatus.** (Tab. XIV. fig. 7.)

Xiphophorus helleri (part.), Günth. Cat. Fish. vi. p. 349 (1866) [1], and Trans. Zool. Soc. vi. 1868, p. 485, t. 87. fig. 6 [2]; Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 68, t. 4. fig. 14, and t. 8. fig. 4 [3]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 701 [4].

Xiphophorus helleri (non Heck.), Meek, Publ. Columbian Mus., Zool. v. 1904, p. 157 [5].

Xiphophorus strigatus, Regan, Ann. Mag. Nat. Hist. (7) xix. 1907, p. 65 [6].

Depth of body about $3\frac{1}{2}$ in the length, length of head $4\frac{1}{5}$ to $4\frac{3}{5}$. 28 to 30 scales in a longitudinal series. Dorsal 12–14. Anal 9–10. Dorsal rays, in the males, subequal from the second or third to the ninth or tenth, thence increasing in length to the last. Least depth of caudal peduncle greater than the distance from anterior margin of eye to free edge of operculum. Olivaceous; a blackish lateral stripe from eye to base of caudal; no additional stripe in the males.

Hab. SOUTHERN MEXICO, Cordova [1 2 5 6] (*Boucard*), Otopa [5], Motzorongo [5], Refugio [5], El Hule [5], Obispo [5], Sanborn [5], Oaxaca (*Gadow* [6]).

Several specimens, measuring up to 100 mm. in total length.

4. **Xiphophorus guentheri.**

Xiphophorus helleri (part.), Günth. Cat. Fish. vi. p. 349 (1866) [1], and Trans. Zool. Soc. vi. 1868, p. 485, t. 87. figs. 2–5 [2].

Xiphophorus guentheri, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 702 [3].

Depth of body 3–3½ in the length, length of head 4½. 28 or 29 scales in a longitudinal series. Dorsal 13–14. Anal 9–10. Dorsal rays, in the males, increasing in length throughout. Least depth of caudal peduncle nearly equal to the length of head. Olivaceous, with brownish longitudinal stripes or series of spots along the rows of scales.

Hab. GUATEMALA, Rio Chisoy [1 2] (*Godman and Salvin*).

Here described from eight specimens, measuring up to 100 mm. in total length. Jordan and Evermann gave a name to this form because they considered the dark irregular blotches on some of the specimens figured by Günther were a specific character. This is not the case, for in this, as in many other species of the family, the dark spotting or marbling is found only on some individuals.

5. **Xiphophorus brevis.** (Tab. XIV. figg. 8, 9.)

Xiphophorus brevis, Regan, Ann. Mag. Nat. Hist. (7) xix. 1907, p. 65 [1].

Depth of body 2½–2⅔ in the length, length of head 3⅗–3¾. 27 scales in a longitudinal series. Dorsal 13–15. Anal 9–10. Least depth of caudal peduncle nearly equal to the length of head, equal to the distance from end of dorsal to base of caudal. Olivaceous; 3 or 4 indistinct darker longitudinal stripes at the edges of the series of scales on the sides of the body.

Hab. BRITISH HONDURAS, Stann Creek (*Robertson*) [1].

Here described from two specimens, male and female, 70 and 75 mm. in total length.

16. ANABLEPS, Bloch, 1795.

Anableps, Günth. Cat. Fish. vi. p. 337 (1866).

Viviparous. Anal fin, in the male, modified into an intromittent organ, covered with scales and with a terminal orifice. Mouth small or moderate; teeth pointed, in bands. Eyes placed high, each divided into an upper and a lower portion, the former above the level of the rest of the head. Dorsal fin short, with 8–12 rays, posterior in position; anal with 10–12 rays, in advance of the dorsal.

This remarkable genus comprises three species, two of which are restricted to the rivers of tropical South America.

1. **Anableps dovii.**

Anableps dowei, Gill, Proc. Ac. Philad. 1864, p. 4 [1].

Anableps dovii, Günth. Cat. Fish. vi. p. 338 (1866) [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 685 [3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 136 [4].

Anableps dowii, Garm. Mem. Mus. Comp. Zool. xix. 1895, p. 79 [5].

Depth of body about 6 in the length, length of head about 4. 60 to 68 scales in a longitudinal series. Dorsal 8–10. Anal 10–11. Caudal rounded. Brownish; a yellow longitudinal band, bordered by a dark brownish band above and below, from axil of pectoral to base of caudal.

Hab. Southern Mexico and Central America:

MEXICO, Tequesixtlan (*Gadow*) and Tehuantepec (*Buller*) in Oaxaca, Chiapas[5]; GUATEMALA, Chiapam (*Salvin*); SALVADOR.

Several specimens, up to 250 mm. in total length.

Sub-order V. APODES.

Body elongate, eel-shaped; fins without spinous rays; no ventral fins; gill-openings small, separate (except in the marine eels of the family Synaphobranchidæ).

The Apodes are chiefly marine fishes, but the members of the genus *Anguilla* are fresh-water eels which go down to the sea for purposes of reproduction.

Fam. 1. ANGUILLIDÆ.

1. ANGUILLA, Shaw, 1804.

Anguilla, Günth. Cat. Fish. viii. p. 23 (1870); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 347.

Head subconical; eye above the angle of the mouth; teeth in bands in the jaws and on the vomer. Body covered with oblong imbedded scales which are arranged obliquely at right angles to each other; dorsal and anal fins well-developed, confluent round the end of the tail; pectoral fins present.

The number of valid species of this widely distributed genus is probably not more than five or six. The American form appears to be nearly identical with the European eel, *Anguilla vulgaris*, but it is generally regarded as distinct by American ichthyologists.

1. **Anguilla chrysypa,** Rafin., 1820.

Anguilla chrysypa, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 348; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 91.

Hab. Atlantic Coast Rivers, from Maine to Mexico; West Indies.

Fam. 2. MURÆNIDÆ.

1. PISODONTOPHIS, Kaup, 1856.

Pisoodonophis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 377.

Head subconical; eye above the mouth; teeth granular, in bands in the jaws and on the vomer. Body naked; tail projecting beyond the dorsal and anal fins; pectoral fin present.

1. **Pisodontophis daspilotus,** Gilb., 1898.

Pisoodonophis daspilotus, Gilb. & Starks, Mem. Calif. Ac. Sci. v. 1904, p. 36.

Hab. PANAMA.

This marine species is recorded by Gilbert and Starks from a fresh-water pond at Miraflores, Panama.

Sub-order VI. SYMBRANCHII.

Body elongate, eel-shaped; fins without spinous rays; no ventral fins; gill-openings confluent to form a ventral slit.

Fam. 1. SYMBRANCHIDÆ.

1. SYMBRANCHUS, Bl., 1795.

Symbranchus, Günth. Cat. Fish. viii. p. 15 (1870); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 342.

This genus comprises four species from India, China, Australia, and Tropical America.

1. **Symbranchus marmoratus,** Bl., 1795.

Symbranchus marmoratus, Günth. Cat. Fish. viii. p. 15 (1870); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 342.

Hab. Southern Mexico to Brazil.

Sub-order VII. OSTARIOPHYSI.

The members of this sub-order have the anterior vertebræ modified and bearing a chain of small bones connecting the air-bladder with the auditory organ, but they differ so greatly in outward appearance that it is nearly impossible to give a definition based on external characters.

The principal characters of the Mexican and Central-American fishes of this sub-order are shown in the following synopsis:—

Synopsis of the Mexican and Central-American Families.

I. Ventral fins present, abdominal in position.

A. Body protected by series of bony plates; mouth inferior, with expanded, sucker-like lips . . . . . 1. LORICARIIDÆ.

B. Body naked; mouth terminal or subterminal; 4 to 8 barbels; an adipose fin . . . . . 2. SILURIDÆ.

C. Body scaly.

Mouth toothless; gill-membranes joined to the isthmus; no adipose fin . .	3. Cyprinidæ.
Jaws with teeth; mouth bordered laterally by the maxillaries; gill-membranes free from the isthmus; 3 to 5 branchiostegals; an adipose fin often present; lateral line usually present and running along the middle of the side; pectoral fins placed low	4. Characinidæ.
II. No ventral fins; no dorsal; a long anal; body more or less eel-shaped .	5. Gymnotidæ.

Fam. 1. LORICARIIDÆ.

The Loricariidæ are fresh-water fishes of South America, ranging from Panama to Monte Video. There are about 200 species, of which seven are known from Panama. These may be recognized by the series of bony plates which protect the body, the restricted gill-openings, and the inferior mouth with expanded sucker-like lips. The dorsal fin is anterior in position, the anal fin is short, and the uppermost and lowest rays of the caudal and the first ray of each of the other fins are simple and often spinous.

Synopsis of the Genera represented in Central America.

I. Caudal peduncle compressed or cylindrical.

A. Snout granular to its margin.

Operculum and interoperculum little, and not independently, movable . . .	1. Plecostomus.
Interoperculum freely movable, spinate	2. Ancistrus.

B. Snout with a naked margin.

Snout without tentacles	3. Chætostomus.
Snout with tentacles	4. Xenocara.

II. Caudal peduncle strongly depressed.

Teeth not setiform; snout not much produced; an orbital notch . . .	5. Loricaria.
Teeth numerous, setiform; snout produced; no orbital notch	6. Oxyloricaria.

1. PLECOSTOMUS, Gronow.

Plecostomus, Regan, Trans. Zool. Soc. xvii. 1904, p. 202.

Body more or less elongate, protected on each side by 5 longitudinal series of bony scutes; upper surface of snout covered with granular plates to its margin; operculum and interoperculum little, and not independently, movable. Teeth slender, bifid, in a single series. Adipose fin usually present and supported by a movable spine.

About thirty-five species from Tropical America.

1. **Plecostomus guacari,** Lacep.

Loricaria plecostomus, Linn. Syst. Nat. i. p. 508 (1766).

Plecostomus guacari, Regan, Trans. Zool. Soc. xvii. 1904, p. 205.

Dorsal I 7. Anal I 4. 25 or 26 scutes in a longitudinal series, the anterior and superior scutes keeled.

Supraoccipital with a median ridge and bordered posteriorly by a single scute. Dark spots on head, body, and fins.

Hab. Panama to Paraguay.

This species, which attains a length of 350 mm., is known to range from Venezuela to Paraguay. It has also been recorded by Kner and Steindachner (Abhandl. Bayer. Akad. x. 1865, p. 60) from Panama. The Panama specimens are said to differ from the typical *P. guacari* in having more numerous teeth (40 on each side), a lower occipital keel, &c., but the probable explanation is that Kner and Steindachner had examples of the true *P. guacari* and compared them with specimens of *P. verres*, Cuv. & Val., a species which has not usually been distinguished from *P. guacari*, but which differs from it in the fewer teeth, higher occipital keel, &c.

2. ANCISTRUS, Kner.

Ancistrus, Gill, Ann. Lyc. N. York, vi. 1858, p. 407; Regan, Trans. Zool. Soc. xvii. 1904, p. 221.

Similar to *Plecostomus*, but operculum and interoperculum independently movable, the latter usually with a group of spines or bristles which can be everted.

Thirty-one species from Tropical America.

1. **Ancistrus aspidolepis**, Günth.

Ancistrus aspidolepis, Regan, Trans. Zool. Soc. xvii. 1904, p. 230.

Dorsal I 7. Anal I 4. Scutes all strongly keeled, 25 in a longitudinal series. Interoperculum armed with a few short spines. Small dark spots or vermiculations on head, body, and fins.

Hab. Panama, Veragua.

Total length 280 mm.

3. CHÆTOSTOMUS, Tschudi.

Chætostomus, Regan, Trans. Zool. Soc. xvii. 1904, p. 241.

Similar to *Ancistrus*, but the snout with a naked margin.

Fifteen species, chiefly from the Andes of Peru, Ecuador, and Colombia, but extending into Venezuela and Panama.

1. **Chætostomus fischeri**, Steind.

Chætostomus fischeri, Steind. Denkschr. Ak. Wien, xli. 1879, p. 164, t. 4. fig. 9.

Dorsal I 8. Anal I 5. 23 to 24 scutes in a longitudinal series, none of them keeled. Interoperculum armed with 1 or 2 short spines. Head and anterior part of body with little yellowish spots; fins spotted or clouded with blackish.

Hab. Panama, Rio Mamoni.

Total length 275 mm.

4. XENOCARA, Regan.

Xenocara, Regan, Trans. Zool. Soc. xvii. 1904, p. 251.

Similar to *Ancistrus*, but the snout with a naked margin, which is usually broader in males than in females and bears fleshy tentacle-like processes, which are more developed in the males.

Twelve species from Tropical America.

1. **Xenocara chagresi,** Eigenm.

Xenocara chagresi, Regan, Trans. Zool. Soc. xvii. 1904, p. 256, t. 14. fig. 7.

Dorsal I 7. Anal I 3–4. 24 scutes in a longitudinal series, none of them keeled. Interoperculum armed with about 10 spines. Olivaceous; a dark spot at the base of the first interradial membrane of the dorsal.

Hab. PANAMA, Rio Chagres.

Total length 175 mm.

5. LORICARIA, Linn.

Loricaria, Regan, Trans. Zool. Soc. xvii. 1904, p. 270.

Body elongate, protected by bony scutes; caudal peduncle depressed, with paired dorsal and ventral series of scutes and posteriorly with a single lateral series of scutes on each side. Snout pointed or rounded. Teeth bifid, in a single series. An orbital notch. No adipose fin.

Forty-two species from Panama and South America.

1. **Loricaria uracantha,** Kner & Steind.

Loricaria uracantha, Kner & Steind. Abhandl. Bayer. Ak. x. 1865, p. 56, t. 6. fig. 3; Regan, Trans. Zool. Soc. xvii. 1904, p. 278.

Loricaria lima, Kner & Steind. t. c. p. 58.

? *Loricaria bransfordi,* Gill, Proc. Ac. Philad. 1876, p. 338.

Lips papillose, with short marginal fringes. Snout pointed. Males with bristles on the sides of the head, the occipital region and nuchal scutes, and the pectoral fins. 28 scutes in a longitudinal series. Abdomen covered with 3 or 4 series of plates between the lateral series. Upper caudal ray strong, stout, spinous.

Hab. PANAMA.

Total length 180 mm.

2. **Loricaria variegata,** Steind.

Loricaria variegata, Steind. Denkschr. Ak. Wien, xli. 1879, p. 165, t. 3; Regan, Trans. Zool. Soc. xvii. 1904, p. 293.

Lips with filiform papillæ and long marginal fringes. Snout obtuse. 30 to 32 scutes in a longitudinal series. Abdomen naked except for the lateral series of plates and a median strip of smaller plates. Uppermost caudal ray elongate. Head, body, and dorsal, caudal, and pectoral fins with numerous dark oblong spots.

Hab. PANAMA, Rio Mamoni.

6. OXYLORICARIA, Bleek.

Oxyloricaria, Regan, Trans. Zool. Soc. xvii. 1904, p. 297.

Differs from *Loricaria* in the numerous, setiform teeth and the absence of an orbital notch.

Seven species from Panama and South America.

1. **Oxyloricaria panamensis,** Eigenm.

Loricaria aurea, Steind. Denkschr. Ak. Wien, lxxii. 1902, p. 138, t. 5. fig. 1.

Oxyloricaria panamensis, Regan, Trans. Zool. Soc. xvii. 1904, p. 301.

Body slender, elongate; snout produced as a rostrum.

Hab. PANAMA.—COLOMBIA, Rio Magdalena.

Fam. 2. SILURIDÆ.

This is one of the largest families of fishes, comprising over 1000 species, and is nearly cosmopolitan. The Mexican and Central-American Siluridæ may be recognized by the naked body, the presence of two to four pairs of barbels, the short anteriorly placed dorsal fin, the first ray of which is a more or less strong spine, the presence of an adipose fin, and the spiny outer ray of the pectoral fins.

In Mexico and Central America there are about sixty species, comprising (1) marine Cat-fishes of the genera *Arius, Galeichthys,* and *Ælurichthys,* most of the species of which seem to enter fresh-waters; (2) fishes of the South-American fresh-water genera *Rhamdia, Pimelodus,* and *Conorhynchus*; and (3) the North-American fresh-water types, *Amiurus* and *Leptops.*

Synopsis of the Mexican and Central-American Genera.

I. Nostrils close together; teeth on the palate; no nasal barbels; ventral fins with 6 rays.

A. Teeth on the palate villiform.

Four barbels . . . . . 1. ÆLURICHTHYS.

Six barbels . . . . . 2. GALEICHTHYS.

B. Teeth on the palate granular or obtusely conical; six barbels . . . 3. ARIUS.

II. Nostrils well separated; palate toothless.

A. No nasal barbels; barbels 6; ventral fins with 6 rays.

1. Adipose fin long; jaws with well-developed teeth.

Dorsal fin-spine slender, flexible; occipital process not nearly reaching the dorsal fin . . . . . 4. RHAMDIA.

Dorsal fin-spine pungent; occipital process extending to shield at base of spine of dorsal fin . . . . . 5. PIMELODUS.

2. Adipose fin rather short, shorter than the anal; teeth in the jaws feeble or absent. . . . . 6. CONORHYNCHUS.

B. Posterior nostril with a barbel; barbels 8; ventral fins with 8 or 9 rays.

Præmaxillary band of teeth of equal breadth throughout, or sometimes very slightly produced backwards at the sides; lower jaw not projecting . . 7. Amiurus.

Præmaxillary band of teeth with a well-developed posterior extension on each side; lower jaw somewhat projecting . . . . . 8. Leptops.

1. ÆLURICHTHYS, Baird & Girard, 1854.

Ælurichthys, Günth. Cat. Fish. v. p. 177 (1864).

Felichthys (Swainson), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 116.

Body elongate. Mouth terminal or subterminal; jaws with villiform teeth in bands; vomerine and palatine teeth; nostrils close together, the posterior with a flap; a pair of maxillary and a pair of mental barbels. Parieto-occipital with a process which extends posteriorly to the small basal shield of the dorsal spine. Dorsal fin with a strong spine and 7 branched rays; adipose fin short; anal moderate or rather long; ventral fins 6-rayed; caudal deeply forked.

Eight species from the Coasts and Rivers of America.

It seems most useful to deal here with the whole genus and not to omit the two species (*A. bahiensis* and *A. bagre*) which are not known to range so far north as Central America, but which may do so.

Synopsis of the Species.

I. Occipital process of nearly equal breadth throughout, with convex lateral edges*; spine of dorsal fin not bearing a filament; about 14 gill-rakers on the lower part of the anterior arch.

A. Vomerine patches of teeth separate, nearly equal in length and breadth to the palatine patches; occipital process not broader than long; anal of 26 or 27 rays . . . . . 1. *panamensis*.

B. Vomerine patches of teeth united, considerably broader than the palatine patches; occipital process broader than long.

Breadth of occipital process $\frac{2}{5}$ or nearly $\frac{2}{5}$ the length of head; anal of 28 rays, produced anteriorly, the longest ray, when laid back, reaching beyond the end of the base of the fin . . . . . 2. *scutatus*.

Breadth of occipital process $\frac{1}{3}$ the length of head; anal of 29 or 30 rays, the longest, when laid back, not reaching the end of the base of the fin . . 3. *isthmensis*.

II. Occipital process narrowed posteriorly, with concave or straight lateral edges; spine of dorsal fin bearing a long filamentous ray; not more than 10 gill-rakers on the lower part of the anterior arch.

A. Distance from tip of snout to origin of dorsal nearly $\frac{1}{3}$ the length of the fish (to base of caudal).

1. Pectoral spine $\frac{3}{5}$ to $\frac{3}{4}$ as long as the head.

Anal of 22 to 24 rays, the longest nearly as long as or shorter than the base of the fin; dorsal filament not reaching the adipose fin . . . . . 4. *marinus*.

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* In the species of this section the occipital process has the appearance of a separate nuchal shield.

2. Pectoral spine nearly as long as the head.

Anal of 19 to 21 rays, the longest as long as or a little longer than the base of the fin; dorsal filament extending to the adipose fin . . . . . 5. *bahiensis.*

Anal of 24 to 26 rays, the longest a little shorter than the base of the fin; dorsal filament extending to the caudal . . . . . 6. *filamentosus.*

B. Distance from tip of snout to origin of dorsal $\frac{1}{4}$ to $\frac{2}{7}$ the length of the fish; longest anal ray much shorter than the base of the fin.

Anal of 27 to 31 rays; vomerine patches of teeth united, about as large as the palatine patches, with which they are continuous . . . . . 7. *pinnimaculatus.*

Anal of 31 to 35 rays; vomerine patches of teeth separated, much shorter than than the palatine patches, with which they are subcontinuous . . . . 8. *bagre.*

1. Ælurichthys panamensis.

Ælurichthys panamensis, Gill, Proc. Ac. Philad. 1863, p. 172.

Ælurichthys nuchalis, Günth. Cat. Fish. v. p. 179 (1864), and Trans. Zool. Soc. vi. 1868, p. 476, t. 81. fig. 2.

Ælurichthys panamensis (part.), Steind. Sitzungsb. Ak. Wien, lxxii. 1876, p. 564, t. 2. figs. 3 & 4.

Felichthys panamensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 117.

Felichthys panamensis (part.), Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 20.

Depth of body a little less than the length of head, which is 4 in the length of the fish. Breadth of head $1\frac{1}{3}$ in its length; snout a little longer than eye, the diameter of which is 4 in the length of head. Lower jaw a little shorter than the upper; vomerine patches of teeth separate, equal in length and breadth to the palatine patches; maxillary barbel extending to the ventral fin. 14 gill-rakers on the lower part of the anterior arch. Head covered with skin; profile nearly straight from snout to dorsal fin; occipital process uncovered by skin, pitted, of nearly equal breadth throughout, the lateral edges somewhat convex, the posterior edge a little emarginate; two halves of the process meeting in the middle line at an angle which is rather more than a right angle; breadth of process equal to (or a little less than) its length and $\frac{1}{3}$ the length of head. Dorsal I 7, the spine not bearing a long filament. Anal 26 (27), somewhat produced anteriorly, the longest rays, when laid back, just reaching the end of the base of the fin. Pectoral spine bearing a long filament; ventrals not reaching the anal. Caudal deeply forked. Caudal peduncle twice as long as deep. Silvery, back bluish.

Hab. Pacific Coast of Panama (*Dow*).

One specimen, type of *A. nuchalis*, 220 mm in length.

2. Ælurichthys scutatus, sp. n. (Tab. XV. fig. 2 and Tab. XIX. fig 2.)

Ælurichthys panamensis (part.), Steind. Sitzungsb. Ak. Wien, lxxii. 1876, p. 564, t. 2. figs. 3 & 4.

Felichthys panamensis (part.), Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 20.

Depth of body a little less than the length of head, which is 4 to $4\frac{1}{4}$ in the length of the fish. Breadth of head $1\frac{1}{4}$ in its length; snout longer than eye, the diameter of which is $4\frac{1}{2}$ to 5 in the length of the head. Lower jaw a little shorter than the upper; vomerine patches of teeth united, considerably broader than the palatine patches; maxillary barbel extending nearly to the ventral fin or a little beyond. 14 gill-rakers on the lower part of the anterior arch. Head and occipital process covered with smooth skin (in large specimens occipital region and process naked, rugose); profile from end of fontanel to origin of dorsal convex; occipital process shaped nearly as in the preceding species, but considerably broader than long (the breadth $\frac{2}{5}$ or nearly $\frac{2}{5}$ the length of head) and with the two halves forming a more

acute angle. Dorsal I 7, the spine not bearing a long filament. Anal 28, considerably produced anteriorly, the longest rays, when laid back, extending beyond the end of the base of the fin. Pectoral spine bearing a long filament; ventrals reaching the anal. Caudal deeply forked. Caudal peduncle $1\frac{3}{4}$ as long as deep. Silvery, back bluish; vertical fins more or less dusky.

Hab. Pacific Coast of Panama (*Jordan*).—N.W. Ecuador (*Rosenbery*).

Two specimens, 220 and 280 mm. in length.

Probably both this and the preceding species extend northwards to Lower California, but it is impossible to say to which the northern records should apply.

3. **Ælurichthys isthmensis,** sp. n. (Tab. XV. fig. 1 and Tab. XIX. fig. 1.)

Depth of body nearly equal to the length of head, which is 4 to $4\frac{1}{4}$ in the length of the fish. Breadth of head $1\frac{1}{3}$ in its length; snout longer than eye, the diameter of which is $4\frac{1}{2}$ to $4\frac{2}{3}$ in the length of head. Lower jaw scarcely shorter than the upper; vomerine patches of teeth united, considerably broader than the palatine patches; maxillary barbel extending nearly to the ventral fin. 14 gill-rakers on the lower part of the anterior arch. Head covered with skin; upper profile of head straight or slightly convex; occipital process shaped nearly as in the preceding species, uncovered by skin, pitted, broader than long, its breadth $\frac{1}{3}$ the length of head. Dorsal I 7, the spine not bearing a long filament. Anal 29–30, slightly produced anteriorly, the longest rays, when laid back, not nearly reaching the end of the base of the fin. Pectoral spine bearing a long filament; ventrals not reaching the anal. Caudal deeply forked. Caudal peduncle $1\frac{3}{5}$ as long as deep. Silvery, back bluish.

Hab. Atlantic Coast of Panama, Colon (*Boucard*).

Two specimens, 190 and 210 mm. in total length.

4. **Ælurichthys marinus.**

Ælurichthys marinus (Mitchill, 1815), Girard, Rep. U.S. Mex. Bound., Fishes, p. 31, t. 14 (1859); Günth. Cat. Fish. v. p. 178 (1864).

Felichthys marinus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 118.

Distance from tip of snout to origin of dorsal about $\frac{1}{3}$ the length of the fish. Occipital process narrowed posteriorly, with straight or concave lateral edges. Maxillary barbel extending to pectoral (adult) or ventral (young); vomerine and palatine teeth forming a continuous or subcontinuous band; about 8 gill-rakers on the lower part of the anterior arch. Dorsal I 7; filamentous ray usually not reaching the adipose fin. Anal 22–24; longest ray nearly as long as or shorter than the base of the fin. Pectoral spine $\frac{3}{5}$ to $\frac{3}{4}$ the length of head. Silvery, back bluish.

Hab. North America, Atlantic Coasts and Rivers from Cape Cod to Texas; probably occurring in Northern Mexico.

Here described from three specimens, 180 to 400 mm. in total length.

5. **Ælurichthys bahiensis.**

Galeichthys bahiensis, Casteln. Anim. Amér. Sud, Poiss. p. 37, t. 18. fig. 1 (1855).

Ælurichthys longispinis (part.), Günth. Cat. Fish. v. p. 178 (1864).

Felichthys bahiensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 118.

Distance from tip of snout to origin of dorsal about $\frac{1}{3}$ the length of the fish. Occipital process narrowed posteriorly, with straight or concave lateral edges. Maxillary barbel nearly reaching ventral fin; vomerine and palatine teeth forming a continuous or subcontinuous band; 6 gill-rakers on the lower

part of the anterior arch. Dorsal I 7; filamentous ray extending to the adipose fin. Anal 19–21; longest ray as long as or a little longer than the base of the fin. Pectoral spine nearly as long as the head. Silvery, back bluish.

Hab. SOUTH AMERICA, Brazil.

Here described from two specimens, 300 and 400 mm. in total length.

6. Ælurichthys filamentosus.

Silurus bagre (non Linn.), Bloch, Ausl. Fische, t. 365 (1793)[1].

Felichthys filamentosus, Swainson, Nat. Hist. Fish. ii. p. 305 (1839)[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 118[3].

Ælurichthys longispinis (part.), Günth. Cat. Fish. v. p. 178 (1864)[4].

Distance from tip of snout to origin of dorsal $\frac{1}{3}$ the length of the fish. Occipital process narrowed posteriorly, with slightly concave lateral edges. Maxillary barbel extending to ventral fin; vomerine and palatine teeth forming a narrow band which is interrupted in the middle; 7 gill-rakers on the lower part of the anterior arch. Dorsal I 7; filamentous ray extending to the caudal fin. Anal 24–26; longest ray a little shorter than the base of the fin. Pectoral spine nearly as long as the head. Silvery, back bluish.

Hab. Atlantic Coasts and Rivers of Central America:
Gulf of Mexico[4]; Lake Nicaragua[3].

Here described from a specimen 220 mm. in total length.

7. Ælurichthys pinnimaculatus.

? *Galeichthys eydouxii*, Cuv. & Val. Hist. Nat. Poiss. xv. p. 43 (1840)[1].

Ælurichthys pinnimaculatus, Steind. Sitzungsb. Ak. Wien, lxxii. 1876, p. 565, t. 8[2].

Felichthys pinnimaculatus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 117[3].

Distance from tip of snout to origin of dorsal fin $\frac{1}{4}$ to $\frac{2}{7}$ the length of the fish. Occipital process narrowed posteriorly, with straight or concave lateral edges. Maxillary barbel extending to, or nearly to, the anal fin; teeth on the palate forming a continuous or subcontinuous band, the vomerine and palatine patches subequal; 2 gill-rakers and a few rudiments on the lower part of the anterior arch. Dorsal I 7; filamentous ray extending to adipose fin or even to the caudal. Anal 27–31; longest ray about $\frac{1}{2}$ the length of base of the fin (more in the adult, less in the young). Pectoral spine $\frac{2}{3}$ to $\frac{3}{4}$ the length of head. Silvery, back bluish; a blackish spot on the anterior part of the anal and sometimes one on the caudal and on each of the paired fins.

Hab. Pacific Coast from Mexico to Ecuador:
Altata[2] and Mazatlan in Sinaloa (*Jordan*[3]); Costa Rica[2]; Panama (*Jordan*[2 3]); Guayaquil[1].

Here described from three specimens, 250 to 500 mm. in total length.

8. Ælurichthys bagre.

Silurus bagre, Linn. Syst. Nat. p. 505 (1766).

Ælurichthys gronovii (Cuv. & Val.), Günth. Cat. Fish. v. p. 178 (1864).

Felichthys bagre, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 117.

Distance from tip of snout to origin of dorsal fin $3\frac{1}{2}$ to 4 in the length of the fish. Occipital process narrowed posteriorly, with straight or concave lateral edges. Maxillary barbel extending beyond the origin of anal fin; vomerine patches of teeth separate, much smaller than the palatine patches, with which they are subcontinuous; 4 gill-rakers and a few rudiments on the lower part of the anterior arch. Dorsal I 7; filamentous ray extending to the adipose fin. Anal 30–35; longest ray less than $\frac{1}{2}$ the length of base of the fin. Pectoral spine $\frac{3}{4}$ the length of head. Silvery, back bluish.

Hab. Atlantic Coast of South America; West Indies.

Here described from three specimens, the largest 350 mm. in total length.

2. GALEICHTHYS, Cuv. & Val., 1840.

Galeichthys and *Arius* (part.), Cuv. & Val. Hist. Nat. Poiss. xv. pp. 28 & 52 (1840); Günth. Cat. Fish. v. pp. 138 & 174 (1864).

Sciædichthys (Bleek.), *Selenaspis* (Bleek.), *Netuma* (Bleek.), and *Galeichthys*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, pp. 2757, 2760, 2764, & 2770.

Body elongate. Mouth terminal or subterminal; jaws with villiform teeth in bands; villiform teeth on the palate; nostrils close together, the posterior with a flap; a pair of maxillary and two pairs of mental barbels. Parieto-occipital produced into a process which extends to the basal shield of the dorsal spine. Dorsal fin with a strong spine and 7 branched rays; adipose fin short or of moderate length; anal of moderate length; ventral fins 6-rayed; caudal deeply forked.

A large number of species from the coasts of tropical and sub-tropical countries, most of them entering rivers freely.

Synopsis of the Mexican and Central-American Species.

I. Teeth present on vomer, palatines, and pterygoids, sometimes in separate patches, but in the adult usually forming a continuous band, the large subtriangular palato-pterygoid patches connected anteriorly by a transverse vomerine strip.

A. A transverse membranous fold on the snout, connecting the posterior nostrils; dorsal shield large, saddle-shaped . . . . . 1. *dovii*.

B. No membranous fold connecting the posterior nostrils.

1. Dorsal shield subpentagonal, large, its length in the middle line $\frac{1}{6}$ or $\frac{1}{7}$ of the distance from snout to origin of dorsal fin . . . . 2. *troscheli*.

2. Dorsal shield subcrescentic, considerably smaller than in *G. troscheli*.

a. Fontanel produced posteriorly into a feeble groove which does not extend to the parieto-occipital; adipose fin a little longer than the dorsal fin.

Width of mouth $\frac{1}{2}$ the width of head . . . . . 3. *planiceps*.

Width of mouth $\frac{2}{3}$ the width of head . . . . . 4. *kessleri*.

b. Fontanel produced posteriorly into a well-developed groove which extends to the parieto-occipital; adipose fin shorter than the dorsal fin . . . . . 5. *platypogon*.

II. Teeth present on palatines and usually on the vomer, but not on the pterygoids, the vomerine patches separate or subcontinuous, and continuous or subcontinuous with or separate from the palatine patches, which may be rounded, oval, club-shaped, or oblong.

A. Fontanel not produced backwards into a groove; occipital process not longer than broad; inner edge of pectoral spine moderately or strongly serrated; anal of 16 to 20 rays.

1. Vomerine patches of teeth continuous with the larger club-shaped palatine patches; maxillary barbel extending to operculum or nearly to base of pectoral.

Width of mouth slightly more than $\frac{1}{2}$ the width of head . . . . . 6. *assimilis.*

Width of mouth nearly $\frac{2}{3}$ the width of head . . . . . 7. *guatemalensis.*

2. Vomerine patches of teeth oblong or oval, continuous or subcontinuous with the palatine patches, which are only a little larger than the vomerine ones and of similar form; maxillary barbel extending beyond the base of pectoral . . . . . 8. *cærulescens.*

B. Fontanel produced backwards into a feeble groove which does not reach the parieto-occipital; occipital process twice as long as broad; inner edge of pectoral spine weakly serrated; anal of 21 or 22 rays . 9. *lentiginosus.*

C. Fontanel produced backwards into a groove which nearly or quite reaches the parieto-occipital; inner edge of pectoral spine weakly or moderately serrated; anal fin of 14 to 20 rays.

1. Occipital process subtriangular, much broader than long; 9 to 12 gill-rakers on the lower part of the anterior arch; adipose fin shorter than the dorsal.

Occipital process rounded posteriorly; præmaxillary band of teeth $4\frac{1}{2}$ times as long as broad . . . . . 10. *guentheri.*

Occipital process with straight sides and truncate apex; præmaxillary band of teeth 5 to 6 times as long as broad . . . . . 11. *seemani.*

2. Occipital process as long as broad; 6 gill-rakers on the lower part of the anterior arch; adipose fin a little longer than the dorsal . . 12. *longicephalus.*

3. Occipital process 3 times as long as broad; 10 gill-rakers on the lower part of the anterior arch; adipose fin as long as the dorsal . 13. *peruvianus.*

1. Galeichthys dovii.

Leptarius dowi, Gill, Proc. Ac. Philad. 1863, p. 170[1].

Arius alatus, Steind. Sitzungsb. Ak. Wien, lxxii. 1876, p. 569, t. 6[2].

Selenaspis dowi, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2761[3].

Hab. Pacific Coast from Panama to Ecuador:
Panama[1 2 3]; Ecuador[3].

This is the Pacific representative of *G. herzbergii,* Bl., from Guiana and Brazil.

2. Galeichthys troscheli.

Sciades troscheli, Gill, Proc. Ac. Philad. 1863, p. 171[1].

Arius troscheli, Günth. Cat. Fish. v. p. 150 (1864)[2].

Arius brandtii, Steind. Sitzungsb. Ak. Wien, lxxii. 1876, p. 571, t. 3[3].

Sciædichthys troscheli, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2757[4].

Depth of body 5 in the length, length of head $3\frac{3}{4}$. Breadth of head $1\frac{1}{6}$ to $1\frac{1}{5}$ in its length, diameter of eye 7 to $8\frac{1}{2}$. Fontanel not produced backwards into a distinct groove; occipital process with a weak keel, broader than long, the sides straight, the posterior edge emarginate; dorsal shield sub-pentagonal, emarginate posteriorly, about as broad as long, its length in the median line $\frac{1}{6}$ to $\frac{1}{7}$ of the distance from tip of snout to origin of dorsal fin. Width of mouth $\frac{3}{5}$ to $\frac{2}{3}$ the width of head; præmaxillary band of

teeth about 6 times as long as broad; teeth on the palate villiform, in the adult forming a continuous band, the rather narrow vomerine strip connecting the large subtriangular palato-pterygoid patches. Maxillary barbel about reaching the base of pectoral. 10 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine about $\frac{2}{3}$ the length of head; adipose fin about as long as the dorsal. Anal 17–18. Pectoral spine about $\frac{2}{3}$ the length of head, with tuberculated or weakly serrated edges.

Hab. Pacific Coast of Mexico and Central America, from Mazatlan to Panama: Mazatlan [4] and Altata [3] in Sinaloa; Panama [1 3 4].

Here described from two specimens from Mazatlan and Panama (*Jordan*), 260 and 420 mm. in total length.

3. Galeichthys planiceps.

Arius planiceps, Steind. Sitzungsb. Ak. Wien, lxxii. 1876, p. 576, t. 4 [1].

Netuma planiceps, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2766 [2]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 27 [3].

Netuma oscula (Jord. & Gilb.), Jord. & Everm. t. c. p. 2768 [4]; Gilb. & Starks, t. c. p. 28 [5].

Depth of body about 5 in the length, length of head $3\frac{3}{5}$ to $4\frac{1}{5}$. Breadth of head $1\frac{1}{5}$ to $1\frac{1}{4}$ in the length, diameter of eye $6\frac{1}{2}$ to 8. Fontanel produced backwards into a feeble groove, which does not extend to the parieto-occipital; occipital process with a keel, longer than broad, truncated posteriorly, and with the sides straight; dorsal shield small, subcrescentic. Width of mouth $\frac{1}{2}$ the width of head; præmaxillary band of teeth $3\frac{3}{4}$ to $4\frac{1}{2}$ times as long as broad; teeth on the palate villiform, the vomerine patches continuous or subcontinuous with each other and with the large subtriangular palato-pterygoid patches. Maxillary barbel nearly reaching the base of pectoral. 9 or 10 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine $\frac{2}{3}$ to $\frac{4}{5}$ the length of head; adipose fin a little longer than the dorsal. Anal 18–19. Pectoral spine $\frac{3}{5}$ to $\frac{4}{5}$ the length of head, with tuberculated or weakly serrated edges.

Hab. Pacific Coast of Mexico and Central America: Altata in Sinaloa [1]; Panama [1 2 3 4 5].

Here described from four specimens from Panama (*Jordan*), 220 to 280 mm. in total length.

4. Galeichthys kessleri.

Arius kessleri, Steind. Sitzungsb. Ak. Wien, lxxii. 1876, p. 574, t. 5 [1].

Netuma kessleri, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2765 [2]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 26 [3].

Netuma elattura (Jord. & Gilb.), Jord. & Everm. t. c. p. 2769 [4].

Depth of body $5\frac{1}{3}$ in the length, length of head $3\frac{2}{5}$. Breadth of head $1\frac{1}{4}$ in its length, diameter of eye $7\frac{1}{2}$. Fontanel produced backwards into a feeble groove, which does not reach the parieto-occipital; occipital process with a keel, rather broader than long, subtriangular, posteriorly rounded, and with the sides slightly concave; dorsal shield small, subcrescentic. Width of mouth nearly $\frac{2}{3}$ the width of head; præmaxillary band of teeth 6 times as long as broad; vomerine, palatine, and pterygoid patches of teeth present, separate or subcontinuous. Maxillary barbel reaching basal part of pectoral. 8 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine $\frac{3}{5}$ the length of head; adipose fin a little longer than the dorsal. Anal 19. Pectoral spine $\frac{2}{3}$ the length of head, weakly serrated.

Hab. Pacific Coast of Mexico and Central America :
Altata in Sinaloa [1]; Panama [1 2 3 4].

Here described from a single specimen from Panama (*Dow*), 280 mm. in total length.

Netuma insculpta, Jord. & Gilb. (Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2765), from Panama, is evidently very closely allied to *G. kessleri* and may be identical with it.

5. **Galeichthys platypogon.** (Tab. XVII. fig. 1 and Tab. XIX. fig. 5.)

Arius platypogon, Günth. Cat. Fish. v. p. 147 (1864) [1]; Steind. Sitzungsb. Ak. Wien, lxxii. 1876, p. 567 [2].

Netuma platypogon, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2767 [3]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 28 [4].

Depth of body 5 to 6 in the length, length of head $3\frac{3}{4}$ to $4\frac{1}{4}$. Breadth of head about $1\frac{1}{4}$ in its length, diameter of eye 5 to 6. Fontanel produced backwards into a groove which reaches the parieto-occipital; occipital process with a keel, usually longer than broad, subtriangular, with straight sides and truncated apex; dorsal shield small, subcrescentic. Width of mouth $\frac{3}{5}$ the width of head; præmaxillary band of teeth 4 to 5 times as long as broad; vomerine, palatine, and pterygoid patches of teeth sometimes separate, sometimes forming a continuous band, the rather narrow vomerine strip connecting the large subtriangular palato-pterygoid patches. Maxillary barbel extending to base or middle of pectoral. About 10 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine about $\frac{3}{4}$ the length of head; adipose fin shorter than the dorsal. Anal 18. Pectoral spine $\frac{3}{4}$ to $\frac{4}{5}$ the length of head, weakly serrated.

Hab. Pacific Coast from Lower California to Peru :
Lower California [2]; Mazatlan in Mexico [3]; San José in Guatemala [1]; Panama [4]; Peru [2].

Here described from the types of the species from San José (*Godman & Salvin*), and a specimen from Mazatlan (*Jordan*), five examples measuring from 150 to 240 mm. in total length.

6. **Galeichthys assimilis.** (Tab. XVI. fig. 2 and Tab. XIX. fig. 4.)

Arius assimilis, Günth. Cat. Fish. v. p. 146 (1864) [1].

Depth of body 5 in the length, length of head $3\frac{2}{3}$. Breadth of head $1\frac{1}{3}$ in its length, diameter of eye 7. Fontanel not produced backwards into a groove; occipital process with a feeble keel, broader than long, subtriangular, with truncated apex and straight sides; dorsal shield subcrescentic, larger than in related species, its length in the middle line equal to the breadth of the posterior extremity of the occipital process. Width of mouth slightly more than $\frac{1}{2}$ the width of head; præmaxillary band of teeth 5 times as long as broad; vomerine patches of teeth separate, continuous with the larger club-shaped palatine patches. Maxillary barbel nearly reaching the base of pectoral. 11 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine $\frac{3}{5}$ the length of head; adipose fin nearly as long as the dorsal. Anal 19. Pectoral spine $\frac{5}{7}$ the length of head, with the inner edge rather strongly serrated.

Hab. GUATEMALA, Lake Yzabal [1] (*Godman & Salvin*).

Here described from the type, a specimen measuring 300 mm. in total length.

7. Galeichthys guatemalensis.

Arius guatemalensis, Günth. Cat. Fish. v. p. 145 (1864) [1].
Galeichthys guatemalensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2779 [2].
Galeichthys azureus (Jord. & Williams), Jord. & Everm. t. c. p. 2775, fig. 55 [3].

Depth of body 6 in the length, length of head $3\frac{1}{2}$. Breadth of head $1\frac{1}{3}$ in its length, diameter of eye $6\frac{1}{2}$. Fontanel not produced backward into a groove; occipital process weakly keeled, considerably broader than long, with apex truncated and sides somewhat concave. Width of mouth nearly $\frac{2}{3}$ the width of head; præmaxillary band of teeth $5\frac{1}{2}$ times as long as broad; vomerine patches of teeth separate, continuous with the larger club-shaped palatine patches. Maxillary barbel extending to operculum. 11 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine $\frac{1}{2}$ the length of head; adipose fin shorter than the dorsal. Anal 19. Pectoral spine nearly $\frac{2}{3}$ the length of head, with strongly serrated inner edge.

Hab. Pacific coast of Mexico and Central America:
Mazatlan [3]; Guatemala [1].

Here described from the type, a specimen measuring 260 mm. in total length. Günther's specimen (*b*), from Chiapam, belongs to *G. cærulescens*.

8. Galeichthys cærulescens. (Tab. XVII. fig. 2 and Tab. XIX. fig. 6.)

Arius cærulescens, Günth. Cat. Fish. v. p. 149 (1864) [1].
Galeichthys cærulescens, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2776 [2].

Depth of body 5 to 6 in the length, length of head $3\frac{1}{2}$ to 4. Breadth of head $1\frac{1}{4}$ to $1\frac{1}{3}$ in its length, diameter of eye 6 to 8. Fontanel not produced backwards into a groove; occipital process not or but feebly keeled, subtriangular, as broad as or a little broader than long, with apex truncated or subtruncated and sides nearly straight; dorsal shield small, subcrescentic. Width of mouth $\frac{3}{5}$ to $\frac{2}{3}$ the width of head; præmaxillary band of teeth 6 times as long as broad; vomerine patches of teeth oblong or oval, separate, continuous or subcontinuous with the palatine patches, which are only a little larger than the vomerine ones and of similar form. Maxillary barbel extending to basal part or middle of pectoral. 12 or 13 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine $\frac{1}{2}$ (adult) or $\frac{2}{3}$ (young) the length of head; adipose fin as long as or a little shorter than the dorsal. Anal 16–18. Pectoral spine $\frac{3}{5}$ to $\frac{2}{3}$ the length of head, with the inner edge moderately or rather strongly serrated.

Hab. Pacific Coast of Mexico and Guatemala:
Rio Presidio in Mexico (*Forrer*); Huamachal [1] and Chiapam in Guatemala (*Salvin*).

Here described from six specimens, including the type of the species, measuring from 160 to 280 mm. in total length.

9. Galeichthys lentiginosus.

Galeichthys lentiginosus (Eigenm. & Eigenm.), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2771 [1]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 20 [2].
Galeichthys xenauchen (Gilb.), Jord. & Everm. t. c. p. 2777 [3]; Gilb. & Starks, t. c. p. 24, t. 4. fig. 7 [4].

Depth of body 5 to 6 in the length, length of head 4. Breadth of head $1\frac{1}{4}$ in the length, diameter of eye 8 to 9. Fontanel produced backwards into a feeble groove which does not reach the parieto-occipital; occipital process with a feeble keel, twice as long as broad, scarcely narrowed posteriorly, with straight

sides; dorsal shield small, subcrescentic. Width of mouth $\frac{1}{2}$ the width of head; præmaxillary band of teeth 5 times as long as broad; vomerine patches of teeth rounded or quadrangular, separate or subcontinuous, continuous with the larger rounded or elliptical palatine patches. Maxillary barbel extending to basal part of pectoral. 4 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine nearly $\frac{2}{3}$ the length of head, adipose fin longer than the dorsal. Anal 21–22. Pectoral spine $\frac{3}{5}$ to $\frac{2}{3}$ the length of head, weakly serrated.

Hab. Panama [1 2 3 4] (*Jordan*).

Here described from two specimens, 270 and 280 mm. in total length.

10. **Galeichthys guentheri,** sp. n. (Tab. XVI. fig. 1 and Tab. XIX. fig. 3.)

Arius milberti (non Cuv. & Val.), Günth. Cat. Fish. v. p. 155 (1864) [1].

Depth of body $5\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$ to $3\frac{3}{4}$. Breadth of head $1\frac{1}{3}$ in its length, diameter of eye 6 to $6\frac{1}{2}$. Fontanel produced into a groove which nearly or quite reaches the parieto-occipital; occipital process keeled, much broader than long, subtriangular, with rounded apex; dorsal shield small, subcrescentic. Width of mouth $\frac{1}{2}$ to $\frac{3}{5}$ the width of head; præmaxillary band of teeth $4\frac{1}{2}$ times as long as broad; vomerine patches of teeth very small, well separated, separate from or continuous with the oval palatine patches. Maxillary barbel extending to operculum. 9 or 10 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine $\frac{3}{5}$ the length of head; adipose fin shorter than the dorsal. Anal 17–18. Pectoral spine $\frac{3}{5}$ to $\frac{2}{3}$ the length of head, weakly serrated.

Hab. Gulf of Mexico (*Haslar Coll.*) [1].

Two specimens, 240 and 260 mm. in total length.

Galeichthys felis, Linn. (*Arius milberti*, Cuv. & Val., *Arius equestris*, Girard), which is known to range from Cape Cod to Texas, is closely allied to *G. guentheri*, but differs in several respects, notably in having the occipital process as long as broad and in the longer barbels. I have examined a specimen from New Orleans.

11. **Galeichthys seemani.**

Arius seemani; Günth. Cat. Fish. v. p. 147 (1864) [1].

Galeichthys seemanni, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2772 [2].

Galeichthys jordani (Eigenm. & Eigenm.), Jord. & Everm. t. c. p. 2774 [3]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 22 [4].

Galeichthys gilberti (Jord. & Williams), Jord. & Everm. t. c. p. 2773, fig. 54 [5].

Galeichthys eigenmanni, Gilb. & Starks, t. c. p. 21, t. 4. fig. 8 [6].

Depth of body 5–$5\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$ to 4. Breadth of head $1\frac{1}{4}$ to $1\frac{1}{2}$ in its length, diameter of eye $5\frac{1}{2}$ to $7\frac{1}{2}$. Fontanel produced into a groove which nearly or quite reaches the parieto-occipital; occipital process keeled, much broader than long, subtriangular, the apex truncated, the sides straight; dorsal shield small, subcrescentic. Width of mouth $\frac{1}{2}$ to $\frac{3}{5}$ the width of head; præmaxillary band of teeth 5 to 6 times as long as broad; vomerine patches of teeth quadrangular, rounded or ovate, separate or subcontinuous, subcontinuous or continuous with the larger oval or club-shaped palatine patches. Maxillary barbel extending to opercle or base of pectoral. 10 to 12 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine $\frac{3}{5}$ to $\frac{2}{3}$ the length of head; adipose fin shorter than the dorsal. Anal 16–20. Pectoral spine weakly or moderately serrated, $\frac{3}{5}$ to $\frac{2}{3}$ the length of head.

Hab. Pacific Coast from Mexico to Ecuador:

Mazatlan (*Jordan*) [5]; Panama (*Jordan*) [2 3 4 6]; Ecuador (*Festa*).

Here described from eight specimens, 220 to 330 mm. in total length, including the type of the species and co-types of *G. gilberti* and *G. eigenmanni*.

12. Galeichthys longicephalus.

Galeichthys dasycephalus (non Günth.), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2780 [1]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 25 [2].

Galeichthys longicephalus (Eigenm. & Eigenm.), Jord. & Everm. t. c. p. 2781 [3]; Gilb. & Starks, l. c. [4].

Depth of body $5\frac{1}{2}$ in the length, length of head 4. Breadth of head $1\frac{1}{3}$ in its length, diameter of eye $6\frac{1}{2}$. Fontanel produced into a groove which reaches the parieto-occipital; occipital process strongly keeled, as long as broad, with truncated apex and slightly concave sides. Width of mouth $\frac{1}{2}$ the width of head; præmaxillary band of teeth 4 times as long as broad; vomerine patches of teeth small, well separated, continuous with the rather small oblong or oval palatine patches. Maxillary barbel extending to the basal part of the pectoral. 6 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine $\frac{1}{2}$ the length of head; adipose fin a little longer than the dorsal. Anal 19. Pectoral spine $\frac{2}{3}$ the length of head, with the inner edge weakly serrated.

Hab. Panama (*Jordan* [1 2 3 4]).

Here described from a specimen of 250 mm.

13. Galeichthys peruvianus.

Galeichthys peruvianus, Lütk. Vid. Medd. 1874, p. 205 [1]; Steind. Sitzungsb. Ak. Wien, lxxii. 1876, p. 584 [2]; Eigenm. & Eigenm. Occ. Papers Calif. Ac. Sci. i. 1890, p. 51 [3]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 122 [4].

Apparently allied to the preceding species, which it resembles in the arrangement of the teeth on the palate, but well distinguished by the longer occipital process, the narrower præmaxillary band of teeth (8 times as long as broad), and the shorter anal fin, with 14 to 16 rays.

Hab. Pacific Coast from Mexico to Peru:

Altata in Sinaloa [2]; Panama [2]; Callao [1 2 3].

3. ARIUS, Cuv. & Val., 1840.

Arius (part.), Cuv. & Val. Hist. Nat. Poiss. xv. p. 52 (1840); Günth. Cat. Fish. v. p. 174 (1864).

Tachysurus *, Eigenm. & Eigenm. Occ. Papers Calif. Ac. Sci. i. 1890, p. 42; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2782.

Cathorops (Jord. & Gilb.), Jord. & Everm. t. c. 1896, p. 133.

Like *Galeichthys*, from which it differs only in having the teeth on the palate granular or obtusely conical instead of villiform, this genus comprises a considerable number of species from the coasts of tropical and subtropical countries, most of which enter fresh water.

* Lacepède (Hist. Nat. Poiss. v. p. 151, 1803) founded the genus *Tachysurus* on a Chinese painting of a fresh-water fish which may have belonged to *Galeichthys* or *Arius* or may not have been at all closely related to them. The generic diagnosis consists of (1) characters which are common to *Arius*, *Pimelodus*, and other genera, and of (2) others which might certainly be held to define the genus *Tachysurus* if they could be relied

Synopsis of the Mexican and Central-American Species.

I. Middle of eye above the level of the angle of the mouth; 9 to 12 gill-rakers on the lower part of the anterior arch.

A. Anal fin of 19 to 24 rays.

1. Occipital process not much broader than long.

a. Teeth on the palate in two rather small, well-separated patches.

Diameter of eye 6 in the length of head (in specimens of 180 to 200 mm.); maxillary barbel extending to basal part of pectoral; dorsal spine $\frac{3}{5}$ the length of head; pectoral spine $\frac{3}{5}$ the length of head, its inner edge very strongly serrated . . . . . 1. *melanopus*.

Diameter of eye 4 to 5 in the length of head (in specimens of about 180 to 220 mm.); maxillary barbel extending about to base of pectoral; dorsal spine $\frac{3}{4}$ to $\frac{7}{8}$ the length of head; pectoral spine $\frac{2}{3}$ the length of head . . 2. *liropus*.

b. Teeth on the palate in two rather large narrowly separated patches; diameter of eye 6 to $7\frac{1}{2}$ in the length of head (in specimens of 196 to 260 mm.); maxillary barbel extending to basal part or middle of pectoral; dorsal and pectoral spines $\frac{2}{3}$ to $\frac{3}{4}$ the length of head, the latter with the inner edge moderately serrated . . . . . 3. *fuerthii*.

2. Occipital process much broader than long . . . . . 4. *evermanni*.

B. Anal fin of 27 rays . . . . . 5. *multiradiatus*.

II. Middle of eye about on a level with the angle of the mouth; 30 gill-rakers on the lower part of the anterior arch; anal fin of 22 or 23 rays . . . . . 6. *hypophthalmus*.

1. **Arius melanopus.** (Tab. XVIII. fig. 1 and Tab. XIX. fig. 7.)

Arius melanopus, Günth. Cat. Fish. v. p. 172 (1864) [1].

Tachysurus melanopus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2784 [2].

Galeichthys aqua-dulce, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 9, t. 4 [3].

Depth of body 5 to $5\frac{1}{2}$ in the length, length of head $3\frac{3}{4}$ to $4\frac{1}{3}$. Breadth of head $1\frac{1}{3}$ in its length, diameter of

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on, viz., a single nasal opening on each side and a rayed adipose dorsal. Cuvier and Valenciennes (xv. p. 163, 1840) placed Lacepède's fish in the genus *Pimelodus* and made the following remarks:—"M. de Lacépède a cru devoir faire un genre à part de ce poisson, à cause de quelques traits que l'on voit sur l'adipeuse, et qu'il a regardés, dit-il, comme des rayons; . . . . il le nomme *tachisure* à cause de l'agilité de sa queue, longue et déliée, et comme on peut en juger par la copie, assez mauvaise d'ailleurs, qu'il donne de sa figure chinoise, les proportions de cette partie ne diffèrent pas beaucoup de ce qu'elle est dans les espèces du groupe actuel. Il nous pârait donc que le genre *Tachisure* ne peut être conservé."

I have thought it necessary to give in detail the reasons why I use *Arius* instead of *Tachysurus*, as the latter is now generally used by American ichthyologists, although I am at a loss to imagine how they have determined that a fish known only from a Chinese painting had granular or obtusely conical teeth on the palate.

eye 6. Fontanel produced into a feeble groove which nearly reaches the parieto-occipital; occipital process keeled, subtriangular, about as broad as long, with sides slightly concave and apex more or less emarginate; dorsal shield small, subcrescentic. Width of mouth $\frac{1}{2}$ the width of head; præmaxillary band of teeth $3\frac{1}{2}$ to 4 times as long as broad; teeth on the palate obtusely conical, in 2 rather small well-separated subovate patches; maxillary barbel extending to basal part of pectoral. 11 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine $\frac{3}{5}$ the length of head; adipose fin shorter than the dorsal. Anal 19–21. Pectoral spine $\frac{3}{5}$ the length of head, with the inner edge very strongly serrated. Inner surface of the paired fins blackish.

Hab. MEXICO, Rio Papaloapam [3]; GUATEMALA, Rio Motagua [1] (*Salvin*).

Here described from the types of the species, three specimens measuring from 180 to 200 mm. in total length.

This is the only member of the genus known from the Atlantic slope of Mexico and Central America.

2. **Arius liropus.**

Tachysurus liropus (Bristol), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2784 [1].

Hab. MEXICO, San Juan Lagoon in Sonora [1].

3. **Arius fuerthii.** (Tab. XVIII. fig. 2 and Tab. XIX. fig. 8.)

Arius fürthii, Steind. Sitzungsb. Ak. Wien, lxxii. 1876, p. 579 [1].

Tachysurus furthii, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2787 [2]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 32 [3].

Tachysurus steindachneri, Gilb. & Starks, t. c. p. 29, t. 5. fig. 9 [4].

Depth of body 5 in the length, length of head $3\frac{3}{4}$ to 4. Breadth of head $1\frac{1}{3}$ in its length, diameter of eye 6 to $7\frac{1}{2}$. Fontanel produced into a groove which does not reach the parieto-occipital; occipital process with or without a weak keel, usually broader than long, with straight or concave sides and truncate or emarginate apex; dorsal shield small, subcrescentic. Width of mouth $\frac{1}{2}$ the width of head; præmaxillary band of teeth 4 times as long as broad; teeth on the palate obtusely conical, in 2 rather large subovate patches which are not very widely separated anteriorly; maxillary barbel extending to the basal part or middle of pectoral. 10 or 11 gill-rakers on the lower part of the anterior arch. Dorsal I 7; spine $\frac{2}{3}$ to $\frac{3}{4}$ the length of head; adipose fin shorter than the dorsal. Anal 20–24. Pectoral spine $\frac{2}{3}$ to $\frac{3}{4}$ the length of head, with the inner edge moderately serrated.

Hab. PANAMA [1 2 3 4] (*Boucard, Jordan*).

Here described from five specimens, 190 to 260 mm. in total length.

4. **Arius evermanni.**

Tachysurus evermanni, Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 32, t. 5. fig. 10 [1].

Hab. PANAMA [1].

Very closely allied to *A. fuerthii*, but apparently distinguished by the shorter and broader occipital process.

The species is based on a single specimen of 250 mm.

5. Arius multiradiatus.

Arius multiradiatus, Günth. Cat. Fish. v. p. 173 (1864) [1].

Tachysurus multiradiatus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 132 [2].

Tachysurus emmelane (Gilb.), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2786 [3]; Gilb. & Starks, Mem. Calif. Ac. Sci. iv. 1904, p. 31, t. 6 [4].

Depth of body 5 in the length, length of head $3\frac{1}{2}$. Breadth of head $1\frac{2}{5}$ in its length, diameter of eye 7. Fontanel produced into a groove which nearly reaches the parieto-occipital; occipital process without distinct keel, broader than long, with concave sides and slightly emarginate apex; dorsal shield small, subcrescentic. Width of mouth $\frac{1}{2}$ the width of head; præmaxillary band of teeth 4 times as long as broad; teeth on the palate obtusely conical, in two small, well-separated, subovate patches; maxillary barbel extending to basal part of pectoral. 11 gill-rakers on the lower part of anterior arch. Dorsal I 7; spine $\frac{2}{3}$ the length of head; adipose fin shorter than the dorsal. Anal 27. Pectoral spine $\frac{3}{5}$ the length of head, with the inner edge rather strongly serrated.

Hab. Panama [1 3 4] (*Boucard*).

Here described from a specimen measuring 230 mm. in total length.

6. Arius hypophthalmus.

Arius hypophthalmus, Steind. Sitzungsb. Ak. Wien, lxxii. 1876, p. 581, t. 10 [1].

Tachisurus gulosus, Eigenm. & Eigenm. Occ. Papers Calif. Ac. Sci. i. 1890, p. 93 [2].

Cathorops hypophthalmus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 133 [3].

Cathorops gulosus, Jord. & Everm. l. c. [4].

Hab. Panama [1 2 3 4].

4. RHAMDIA, Bleek., 1858.

Rhamdia, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 149.

Body elongate. Snout not greatly produced; mouth terminal or subterminal; jaws with villiform teeth in bands; palate toothless; nostrils remote from each other; no nasal barbels; barbels 6; occipital process not extending to the dorsal fin. Dorsal fin with a slender flexible spine and 5 to 8 branched rays; adipose fin long; anal short or of moderate length; ventral fins 6-rayed.

Numerous species, from Mexico to the La Plata.

Synopsis of the Mexican and Central-American Species *.

I. Caudal fin deeply notched, the middle rays not more than $\frac{1}{2}$ the length of the longest.

A. Width of mouth $\frac{2}{5}$ to $\frac{1}{2}$ the width of head; pectoral spine $\frac{1}{2}$ to $\frac{3}{5}$ the length of head.

Occipital process as broad as long, extending $\frac{1}{3}$ of the distance from its base to the origin of dorsal; body rather deep (depth $4\frac{1}{3}$ to 5 in the length) . . 1. *parryi*.

Occipital process much longer than broad, extending $\frac{3}{8}$ of the distance from its base to the origin of dorsal; body rather slender (depth about 6 in the length); first branched ray of dorsal the longest . . . . . 2. *motaguensis*.

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* The original description of *P. brachypterus*, Cope (Trans. Am. Phil. Soc. 1866, p. 404), from Orizaba, is insufficient, but Fowler's re-description of the type (in Meek, Publ. Columbian Mus., Zool. v. 1904, p. 21) shows that this species is probably not distinct from *P. guatemalensis*.

B. Width of mouth $\frac{3}{5}$ to $\frac{3}{4}$ the width of head.

1. Occipital process extending $\frac{1}{2}$ of the distance from its base to the origin of dorsal.

a. Breadth of head $1\frac{1}{2}$ in its length, interorbital width 4 . . . . . 3. *nicaraguensis.*

b. Breadth of head $1\frac{1}{5}$ to $1\frac{2}{5}$ in its length, interorbital width $2\frac{3}{5}$ to $3\frac{1}{4}$.

α. Pectoral spine $\frac{1}{3}$ the length of head; least depth of caudal peduncle 3 in the length of head . . . . . 4. *boucardi.*

β. Pectoral spine $\frac{2}{5}$ to $\frac{1}{2}$ the length of head; least depth of caudal peduncle $1\frac{3}{4}$ to $2\frac{1}{2}$ in the length of head.

* Length of snout $2\frac{3}{5}$ to $2\frac{3}{4}$ in the length of head, which is $4\frac{1}{2}$ to $4\frac{3}{4}$ in the length of the fish (in specimens measuring up to 280 mm.) . . . . . 5. *wagneri.*

** Length of snout $2\frac{3}{4}$ to 3 in the length of head (in specimens measuring up to 280 mm.).

Breadth of head $1\frac{1}{5}$ in its length, which is $4\frac{3}{5}$ in the length of the fish; least depth of caudal peduncle $1\frac{3}{4}$ in the length of head . . . . . 6. *petenensis.*

Breadth of head $1\frac{1}{3}$ to $1\frac{2}{5}$ in its length, which is $3\frac{4}{5}$ to $4\frac{2}{5}$ in the length of the fish; least depth of caudal peduncle 2 to $2\frac{1}{2}$ in the length of head . . . 7. *guatemalensis.*

2. Occipital process extending $\frac{2}{5}$ of the distance from its base to the origin of dorsal; interorbital width $2\frac{2}{3}$ to $3\frac{1}{3}$ in the length of head.

Maxillary barbel extending to origin of adipose fin; pectoral spine $\frac{2}{5}$ to $\frac{1}{2}$ the length of head . . . . . 8. *godmani.*

Maxillary barbel extending to middle of dorsal fin; pectoral spine $\frac{1}{3}$ the length of head . . . . . 9. *microptera.*

3. Occipital process extending $\frac{1}{3}$ of the distance from its base to the origin of dorsal; interorbital width 4 in the length of head . . . 10. *managuensis.*

II. Caudal fin with a moderately deep notch, but the middle rays more than $\frac{1}{2}$ as long as the longest.

A. Occipital process extending $\frac{2}{7}$ of the distance from its base to the origin of dorsal; pectoral spine $\frac{2}{5}$ to $\frac{1}{2}$ the length of head.

Pectoral spine with a finely serrated inner edge and a series of antrorse denticulations on the outer edge; maxillary barbel reaching origin of adipose fin (in a specimen of 105 mm.); anal of 10 rays . . . . . 11. *heteracantha.*

Pectoral spine with serrated inner and entire outer edge; maxillary barbel reaching middle of base of dorsal fin (in a specimen of 115 mm.); anal of 13 rays . . . . . 12. *hypselura.*

B. Occipital process slender, extending $\frac{1}{4}$ of the distance from its base to the origin of dorsal; pectoral spine nearly $\frac{2}{5}$ the length of head; maxillary barbel extending to basal part of pectoral (in specimens measuring up to 190 mm.) . . . . . 13. *brachycephala.*

C. Occipital process short, triangular, extending $\frac{1}{5}$ or $\frac{1}{6}$ of the distance from its base to the origin of dorsal; pectoral spine from less than $\frac{1}{3}$ to nearly $\frac{2}{5}$ the length of head.

1. Humeral process not reaching middle of pectoral spine; length of adipose fin $3\frac{2}{3}$ to $4\frac{1}{4}$ in the length of the fish; anal of 11 or 12 rays. 14. *underwoodi.*

2. Humeral process extending beyond middle of pectoral spine.

Adipose fin $\frac{2}{7}$ the length of the fish; anal of 12 rays . . . . . 15. *salvini.*

Adipose fin $\frac{1}{3}$ the length of the fish; anal of 15 rays . . . . . 16. *polycaulus.*

III. Caudal fin slightly notched, nearly truncate.

Maxillary barbel extending to middle of pectoral fin; adipose fin $\frac{2}{9}$ the length of the fish . . . . . 17. *rogersi.*

Maxillary barbel extending to ventral fin; adipose fin $\frac{2}{7}$ the length of the fish . . . . . 18. *laticauda.*

1. **Rhamdia parryi.**

Rhamdia parryi, Eigenm. Proc. Calif. Acad. Sci. (2) i. 1888, p. 130[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 153[2].

Depth of body $4\frac{1}{3}$ to 5 in the length, length of head $4\frac{1}{3}$ to $4\frac{1}{2}$. Breadth of head $1\frac{1}{4}$ in its length. Diameter of eye 5 in the length of head, 2 in the length of snout, $1\frac{1}{2}$ in the interorbital width. Lower jaw shorter than the upper; width of mouth $2\frac{2}{3}$ to 3 in the length of head (about $\frac{2}{5}$ to $\frac{1}{2}$ the width of head). Maxillary barbel extending to or beyond the dorsal fin. Head covered with smooth skin; occipital process as broad as long, extending $\frac{1}{3}$ of the distance from its base to the origin of dorsal. Dorsal I 6; spine slender. Length of adipose fin 3 to $3\frac{1}{2}$ in the length of the fish. Anal 12–14. Pectoral spine slightly more than $\frac{1}{2}$ the length of head. Lower caudal lobe rounded. Brownish; a blackish lateral stripe.

Hab. Mexico, Rio Zanalenco in Chiapas[1].

Apparently allied to *R. motaguensis.*

2. **Rhamdia motaguensis.** (Tab. XX. fig. 1.)

Pimelodus motaguensis, Günth. Cat. Fish. v. p. 127 (1864)[1].

Rhamdia motaguensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 151[2].

Depth of body $5\frac{2}{3}$ to $6\frac{1}{3}$ in the length, length of head $5\frac{1}{4}$ to $5\frac{1}{3}$. Breadth of head $1\frac{1}{4}$ to $1\frac{1}{3}$ in its length, length of snout $2\frac{1}{2}$ to $2\frac{3}{4}$, diameter of eye 5 to 6, interorbital width 3 to $3\frac{1}{3}$. Lower jaw shorter than the upper; width of snout $\frac{1}{2}$ the width of head. Maxillary barbel extending to middle of dorsal (adult) or nearly to adipose fin (young). Head covered with smooth skin; occipital process extending $\frac{3}{8}$ of the distance from its base to the origin of dorsal. 8 or 9 gill-rakers on the lower part of the anterior arch. Dorsal I 6; spine slender; first branched ray the longest. Length of adipose fin $3\frac{1}{3}$ in the length of the fish. Anal 13. Humeral process not extending to middle of pectoral spine, which is about $\frac{3}{4}$ the length of the fin and $\frac{1}{2}$ to $\frac{3}{5}$ the length of head. Ventrals inserted behind the last dorsal ray, extending $\frac{3}{5}$ to $\frac{2}{3}$ of the distance from their base to the origin of anal. Caudal deeply notched. Least depth of caudal peduncle $1\frac{2}{3}$ in the length of head and $1\frac{4}{5}$ to 2 in the distance from anal to base of caudal. Brownish; dorsal dusky, with a pale band near the base.

Hab. British Honduras, Stann Creek (*Robertson*); Guatemala, Rio Motagua[1] (*Salvin*).

Here described from two specimens, the type, 210 mm. in total length, and one of 130 mm., from Stann Creek.

3. **Rhamdia nicaraguensis.** (Tab. XX. fig. 2.)

Pimelodus nicaraguensis, Günth. Cat. Fish. v. p. 125 (1864)[1].

Rhamdia nicaraguensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 152[2].

Depth of body 7 in the length, length of head $4\frac{1}{2}$. Breadth of head $1\frac{1}{2}$ in its length, length of snout $2\frac{2}{5}$, diameter of eye $5\frac{2}{3}$, interorbital width 4. Jaws nearly equal anteriorly; width of mouth $\frac{2}{3}$ the width of head. Maxillary barbel extending to origin of adipose fin *. Head covered with smooth skin; occipital process extending $\frac{1}{2}$ of the distance from its base to the origin of dorsal. 11 gill-rakers on the lower part of the anterior arch. Dorsal I 6; spine slender, fin rounded. Length of adipose fin $2\frac{2}{5}$ in the length of the fish. Anal 13. Humeral process extending slightly beyond the middle of the pectoral spine, which is about $\frac{2}{3}$ the length of the fin and nearly $\frac{1}{2}$ the length of head. Ventrals inserted behind the last dorsal ray, extending $\frac{2}{3}$ of the distance from their base to the origin of anal. Caudal deeply notched. Least depth of caudal peduncle $2\frac{2}{3}$ in the length of head and $2\frac{1}{4}$ in the distance from the anal to the base of caudal. Brownish.

Hab. Lake Nicaragua [1] (*Dow*).

Here described from the type, measuring 190 mm. in total length.

4. **Rhamdia boucardi.** (Tab. XX. fig. 3.)

? *Rhamdia depressa*, Barbour & Cole, Bull. Mus. Comp. Zool. l. 1906, p. 155, t. 1 [1] †.

Pimelodus boucardi, Regan, Ann. Mag. Nat. Hist. (7) xix. 1907, p. 258 [2].

Depth of body $6\frac{1}{2}$ in the length, length of head 4. Breadth of head $1\frac{1}{3}$ in its length, length of snout $2\frac{3}{4}$. diameter of eye 6, interorbital width 3. Lower jaw nearly as long as the upper; width of mouth $\frac{2}{3}$ the width of head. Maxillary barbel extending to origin of adipose fin. Head covered with smooth skin; occipital process rather strong, extending $\frac{1}{2}$ the distance from its base to the origin of dorsal. 12 or 13 gill-rakers on the lower part of the anterior arch. Dorsal I 6, the spine slender, the fin rounded. Adipose fin $\frac{1}{3}$ the length of the fish. Anal 14; when laid back nearly reaching the vertical from the end of adipose fin. Pectoral spine with serrated inner edge, about $\frac{3}{5}$ the length of the fin and $\frac{1}{3}$ the length of head; humeral process long, nearly reaching the middle of the fin. Ventrals originating nearly below the last dorsal ray, extending more than $\frac{2}{3}$ of the distance from their base to the origin of anal. Caudal deeply notched, the lobes rounded, the lower the larger. Least depth of caudal peduncle 3 in the length of head, and $2\frac{1}{3}$ in the distance from anal to base of caudal. Blackish.

Hab. Mexico, Yucatan [1] (*Boucard*).

Here described from the type, a specimen measuring 190 mm. in total length.

5. **Rhamdia wagneri.**

Pimelodus cinerascens (non Günth.), Kner & Steind. Abhandl. Bayern. Akad. x. 1865, p. 49 [1].

Pimelodus wagneri, Günth. Trans. Zool. Soc. vi. 1868, p. 474 [2].

Rhamdia bransfordi, Gill, Proc. Ac. Philad. 1876, p. 337 [3].

Rhamdia wagneri, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 151 [4].

Depth of body about 6 in the length, length of head $4\frac{1}{2}$ to $4\frac{3}{4}$. Breadth of head $1\frac{1}{4}$ to $1\frac{1}{3}$ in its length, length of snout $2\frac{3}{5}$ to $2\frac{3}{4}$, diameter of eye 6 to 7, interorbital width $2\frac{3}{5}$ to 3. Lower jaw nearly as long as the upper; width of mouth about $\frac{2}{3}$ the width of head. Maxillary barbel extending about to the origin of adipose fin. Head covered with smooth skin; occipital process extending $\frac{1}{2}$ of the distance from its base to the origin of dorsal. 7 to 9 gill-rakers on the lower part of anterior arch. Dorsal I 6; spine slender, fin rounded. Length of adipose fin $2\frac{3}{5}$ to 3 in the length of the fish. Anal 10–12, when laid back nearly reaching the vertical from end of adipose fin. Humeral process extending about to the middle of

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* As described by Günther. Both barbels are now broken off in the type, the longest reaching the middle of the dorsal.

† *Rhamdia depressa* is probably the same as *R. boucardi*, but the description is insufficient and the figure bad.

pectoral spine, which has the inner edge serrated and measures $\frac{2}{3}$ to $\frac{3}{4}$ of the length of the fin or about $\frac{1}{2}$ the length of head. Ventrals inserted behind the last ray of dorsal, extending $\frac{3}{5}$ to $\frac{3}{4}$ of the distance from their base to the origin of anal. Caudal deeply notched, the lower lobe rounded. Least depth of caudal peduncle about $\frac{1}{2}$ the length of head or of the distance from anal to base of caudal. Brownish; usually a blackish lateral stripe; fins dusky, the dorsal with a pale band near the base.

Hab. COSTA RICA, Shirures (*H. Pittier*); PANAMA [1] [3].—WESTERN ECUADOR (*Rosenberg*).

Here described from four specimens, measuring 200 to 280 mm. in total length. Probably records of this species from Southern Mexico refer to *R. guatemalensis*.

6. **Rhamdia petenensis.** (Tab. XXII. fig. 1.)

Pimelodus petenensis, Günth. Cat. Fish. v. p. 126 (1864) [1].

Rhamdia petenensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 153 [2].

Depth of body $5\frac{1}{2}$ in the length, length of head $4\frac{3}{5}$. Breadth of head $1\frac{1}{5}$ in the length, length of snout $2\frac{4}{5}$, diameter of eye $5\frac{1}{2}$, interorbital width 3. Jaws nearly equal anteriorly; width of mouth $\frac{2}{3}$ the width of head. Maxillary barbel extending to origin of adipose fin. Head covered with smooth skin; occipital process extending about $\frac{1}{2}$ of the distance from its base to the origin of dorsal. 8 gill-rakers on the lower part of anterior arch. Dorsal I 6; spine slender, fin rounded. Length of adipose fin $2\frac{4}{5}$ in the length of the fish. Anal 12. Humeral process extending to middle of pectoral spine, which is $\frac{2}{3}$ to $\frac{3}{4}$ the length of the fin and nearly $\frac{1}{2}$ the length of head. Ventrals inserted behind the last dorsal ray, extending $\frac{3}{5}$ of the distance from their base to the origin of anal. Caudal deeply notched. Least depth of caudal peduncle $1\frac{3}{4}$ in the length of head and $1\frac{1}{2}$ in the distance from anal to base of caudal. Brownish; an indistinct dark lateral stripe; dorsal dusky, with a pale band near the base.

Hab. GUATEMALA, Lake Peten [1] (*Salvin*).

Here described from the type, a specimen measuring 200 mm. in total length.

7. **Rhamdia guatemalensis.**

Pimelodus guatemalensis, Günth. Cat. Fish. v. p. 122 (1864) [1].

Rhamdia guatemalensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 152 [2].

Rhamdia oaxacæ, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 20, t. 5 [3].

Depth of body $5\frac{1}{3}$ to $6\frac{1}{2}$ in the length, length of head $3\frac{4}{5}$ to $4\frac{2}{5}$. Breadth of head $1\frac{1}{3}$ to $1\frac{2}{5}$ in its length, length of snout $2\frac{3}{4}$ to 3, diameter of eye 5 to $7\frac{1}{2}$, interorbital width $2\frac{3}{5}$ to $3\frac{1}{5}$. Lower jaw nearly as long as the upper; width of mouth $\frac{2}{3}$ to $\frac{5}{7}$ the width of head. Maxillary barbel extending to origin or middle of adipose fin. Head covered with smooth skin; occipital process extending nearly $\frac{1}{2}$ the distance from its base to the origin of dorsal. 5 to 7 gill-rakers on the lower part of anterior arch. Dorsal I 6; spine slender, fin rounded. Length of adipose fin $2\frac{2}{5}$ to 3 in the length of the fish. Anal 11–13, when laid back reaching the vertical from the end of adipose fin. Humeral process extending about to middle of pectoral spine, which has the inner edge serrated and measures from less than $\frac{2}{3}$ to more than $\frac{3}{4}$ the length of the fin, or $\frac{2}{5}$ to $\frac{1}{2}$ the length of head. Ventrals inserted behind the vertical from last ray of dorsal, extending $\frac{3}{5}$ to $\frac{3}{4}$ of the distance from their base to the origin of anal. Caudal deeply notched, the lower lobe rounded. Least depth of caudal peduncle 2 to $2\frac{1}{2}$ in the length of head or $1\frac{1}{2}$ to 2 in the distance from anal to base of caudal. Brownish; usually a blackish lateral stripe; fins usually more or less dusky, the dorsal with an indistinct pale band near the base.

Hab. SOUTHERN MEXICO, Rio Blanco [3], Rio Papaloapam [3], Tequesixtlan in Oaxaca (*Gadow*); BRITISH HONDURAS, Stann Creek (*Robertson*); GUATEMALA, Huamuchal [1] (*Salvin*).

Here described from a large series of specimens, including the types of the species, measuring from 95 to 280 mm. in total length.

Pimelodus baronis-mülleri, Trosch., 1865 (*Rhamdia baronis-mulleri*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 151), is probably identical with *P. guatemalensis*.

8. **Rhamdia godmani.** (Tab. XXI. fig. 1.)

Pimelodus godmani, Günth. Cat. Fish. v. p. 124 (1864) [1].

Rhamdia godmani, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 152 [2].

? *Rhamdia sacrificii*, Barbour & Cole, Bull. Mus. Comp. Zool. l. 1906, p. 156, t. 2 [3].

Depth of body about 6 in the length, length of head 4 to $4\frac{1}{2}$. Breadth of head $1\frac{1}{4}$–$1\frac{1}{2}$ in its length, length of snout $2\frac{2}{5}$ to $2\frac{4}{5}$, diameter of eye $5\frac{1}{2}$ to 7, interorbital width $2\frac{2}{3}$ to $3\frac{1}{3}$. Lower jaw a little shorter than the upper; width of mouth about $\frac{2}{3}$ the width of head. Maxillary barbel extending about to origin of adipose fin. Head covered with smooth skin; occipital process extending about $\frac{2}{5}$ of the distance from its base to the origin of dorsal. 7 to 9 gill-rakers on the lower part of the anterior arch. Dorsal I 6 (exceptionally I 5); spine slender, fin rounded. Length of adipose fin $2\frac{1}{2}$ to 3 in the length of the fish. Anal 11–13. Humeral process not extending beyond the middle of pectoral spine, which is $\frac{3}{5}$ to $\frac{3}{4}$ the length of the fin and $\frac{2}{5}$ to $\frac{1}{2}$ the length of head. Ventrals inserted behind the last dorsal ray, extending $\frac{3}{5}$ to $\frac{3}{4}$ of the distance from their base to the origin of anal. Caudal deeply notched. Least depth of caudal peduncle 2 to $2\frac{1}{2}$ in the length of head or $1\frac{2}{5}$ to 2 in the distance from anal to base of caudal. Brownish; dorsal dusky, with a pale band.

Hab. MEXICO [1] (*Sallé*), Yucatan [3]; GUATEMALA, Baja Vera Paz [1] (*Godman & Salvin*), Rio Motagua [1] (*Salvin*).

Here described from eight specimens, including the types of the species, measuring from 150 to 270 mm. in total length.

9. **Rhamdia microptera.** (Tab. XXIII. fig. 3.)

Pimelodus micropterus, Günth. Cat. Fish. v. p. 124 (1864) [1].

Rhamdia microptera, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 153 [2].

Depth of body $6\frac{1}{2}$ in the length, length of head $4\frac{1}{2}$. Breadth of head $1\frac{1}{3}$ in the length, length of snout $2\frac{4}{5}$, diameter of eye 6, interorbital width 3. Jaws nearly equal anteriorly; width of mouth rather more than $\frac{2}{3}$ the width of head. Maxillary barbel extending to middle of dorsal fin. Head covered with smooth skin; occipital process extending $\frac{2}{5}$ of the distance from its base to the origin of dorsal. 7 gill-rakers on the lower part of the anterior arch. Dorsal I 6; spine slender, fin rounded. Length of adipose fin $2\frac{3}{4}$ in the length of the fish. Anal 13. Humeral process extending nearly to tip of pectoral spine, which is $\frac{3}{5}$ the length of the fin and $\frac{1}{3}$ the length of head. Ventrals inserted behind the last dorsal ray, extending $\frac{1}{2}$ of the distance from their base to the origin of anal. Caudal deeply notched. Least depth of caudal peduncle $2\frac{1}{5}$ in the length of head and $1\frac{4}{5}$ in the distance from anal to base of caudal. Dark greyish; fins dusky.

Hab. GUATEMALA, Rio San Gerónimo [1] (*Godman & Salvin*).

Here described from the type, a specimen measuring 170 mm. in total length.

10. **Rhamdia managuensis.** (Tab. XXI. fig. 2.)

Pimelodus managuensis, Günth. Trans. Zool. Soc. vi. 1868, t. 474 [1].

Rhamdia managuensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 153 [2].

Depth of body 6 in the length, length of head 5. Breadth of head $1\frac{2}{5}$ in its length, length of snout $2\frac{3}{5}$, diameter of eye $5\frac{1}{3}$, interorbital width 4. Lower jaw nearly as long as the upper; width of mouth $\frac{2}{3}$ the width of head. Maxillary barbel extending nearly to the posterior end of pectoral fin. Head covered with smooth skin; occipital process extending $\frac{1}{3}$ of the distance from its base to the origin of dorsal. 9 to 11 gill-rakers on the lower part of anterior arch. Dorsal I 6; spine slender, fin rounded. Length of adipose fin $2\frac{3}{5}$ in the length of the fish. Anal 14, when laid back not nearly reaching the vertical from the end of adipose fin. Humeral process extending a little beyond the middle of pectoral spine, which has the inner edge serrated and measures $\frac{2}{3}$ the length of the fin or $\frac{2}{5}$ the length of head. Ventrals inserted behind the last ray of dorsal, extending $\frac{2}{3}$ of the distance from their base to the origin of anal. Caudal deeply notched, the lower lobe rounded. Least depth of caudal peduncle $2\frac{1}{2}$ in the length of head and $2\frac{3}{4}$ in the distance from anal to base of caudal. Brownish.

Hab. NICARAGUA, Lake Managua [1] (*Dow*).

Here described from the type, a specimen measuring 210 mm. in total length.

11. **Rhamdia heteracantha,** sp. n.

Depth of body $5\frac{2}{3}$ in the length, length of head $4\frac{1}{5}$. Breadth of head $1\frac{1}{3}$ in its length, length of snout $2\frac{3}{5}$, diameter of eye $5\frac{2}{3}$, interorbital width 3. Lower jaw scarcely shorter than the upper; width of mouth $\frac{3}{5}$ the width of head. Maxillary barbel extending to origin of adipose fin. Head covered with smooth skin; occipital process triangular, extending about $\frac{2}{7}$ of the distance from its base to the origin of dorsal. 7 gill-rakers on the lower part of the anterior arch. Dorsal I 6; spine slender, fin rounded. Length of adipose fin nearly 3 in the length of the fish. Anal 10. Humeral process extending nearly to middle of pectoral spine, which has the inner edge finely serrated and a series of antrorse denticulations on the outer edge and measures $\frac{2}{3}$ the length of the fin and $\frac{2}{5}$ to $\frac{1}{2}$ the length of head. Ventrals inserted behind the last ray of dorsal, extending $\frac{3}{4}$ of the distance from their base to the origin of anal. Caudal moderately notched. Least depth of caudal peduncle $2\frac{1}{5}$ in the length of head and $1\frac{3}{4}$ in the distance from anal to base of caudal. Brownish.

Hab. COSTA RICA, Juan Viñas (*Underwood*).

A single specimen, measuring 105 mm. in total length.

12. **Rhamdia hypselura.** (Tab. XXI. fig. 3.)

Pimelodus hypselurus, Günth. Cat. Fish. v. p. 126 (1864) [1].

Rhamdia hypselurus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 152 [2].

Depth of body about $5\frac{1}{2}$ in the length, length of head $4\frac{3}{5}$. Breadth of head $1\frac{1}{4}$ in its length, length of snout $2\frac{3}{5}$, diameter of eye $5\frac{1}{3}$, interorbital width 3. Lower jaw shorter than the upper; width of mouth slightly more than $\frac{3}{5}$ the width of head. Maxillary barbel extending to middle of dorsal fin. Head covered with smooth skin; occipital process extending $\frac{2}{7}$ of the distance from its base to the origin of dorsal. 9 gill-rakers on the lower part of the anterior arch. Dorsal I 6; spine slender, fin rounded. Length of adipose fin $3\frac{1}{2}$ in the length of the fish. Anal 13. Humeral process extending to middle of pectoral spine, which is $\frac{2}{3}$ the length of the fin and $\frac{1}{2}$ the length of head. Ventrals inserted behind the last dorsal ray, extending $\frac{2}{3}$ of the distance from their base to the origin of anal. Caudal moderately notched. Least depth of caudal peduncle $1\frac{2}{3}$ in the length of head and $1\frac{1}{2}$ in the distance from anal to base of caudal. Dark greyish.

Hab. MEXICO [1] (*Parudazki*).

Here described from the type, a specimen measuring 115 mm. in total length.

13. **Rhamdia brachycephala.** (Tab. XXII. fig. 2.)

Pimelodus brachycephalus, Regan, Ann. Mag. N. H. (7) xix. 1907, p. 258[1].

Depth of body $5\frac{1}{2}$ to $6\frac{1}{2}$ in the length, length of head $5\frac{1}{2}$ to $5\frac{4}{5}$. Breadth of head $1\frac{1}{5}$ in its length, length of snout $2\frac{2}{3}$ to 3, diameter of eye 5 to 6, interorbital width 3 to $3\frac{1}{2}$. Lower jaw a little shorter than the upper; width of mouth $\frac{1}{2}$ to $\frac{3}{5}$ the width of head. Maxillary barbel extending to the basal part of pectoral. Head covered with smooth skin; occipital process slender, extending about $\frac{1}{4}$ of the distance from its base to the origin of dorsal. 6 to 8 gill-rakers on the lower part of the anterior arch. Dorsal I 6, the spines slender, the fin rounded. Length of adipose fin $3\frac{1}{4}$ to $3\frac{3}{4}$ in the length of the fish. Anal 12–13, when laid back sometimes reaching the vertical from end of adipose fin. Pectoral spine with serrated inner edge, about $\frac{3}{5}$ the length of the fin and $\frac{2}{5}$ the length of head; humeral process extending to or beyond the middle of the spine. Ventrals originating behind the dorsal, extending $\frac{1}{2}$ to $\frac{3}{5}$ the distance from their base to the origin of anal. Caudal moderately notched, the lower lobe rounded and rather shorter than the upper. Least depth of caudal peduncle $\frac{2}{3}$ or more than $\frac{2}{3}$ the length of head, $1\frac{2}{5}$ to $1\frac{4}{5}$ in the distance from anal to base of caudal. Brownish.

Hab. Guatemala, Rio Nacasil [1] (*Salvin*).

Here described from the types, six specimens, measuring up to 190 mm. in total length.

14. **Rhamdia underwoodi**, sp. n. (Tab. XXIII. fig. 4.)

Depth of body $5\frac{1}{2}$ to 6 in the length, length of head $4\frac{2}{3}$ to 5. Breadth of head $1\frac{1}{5}$ to $1\frac{1}{4}$ in its length, length of snout $2\frac{2}{3}$ to $2\frac{4}{5}$, diameter of eye 6 to 7, interorbital width 3. Lower jaw scarcely shorter than the upper; width of mouth $\frac{1}{2}$ to $\frac{3}{5}$ the width of head. Maxillary barbel extending to posterior end of pectoral fin. Head covered with smooth skin; occipital process extending $\frac{1}{5}$ or $\frac{1}{6}$ of the distance from its base to the origin of dorsal. 7 or 8 gill-rakers on the lower part of the anterior arch. Dorsal I 6 (exceptionally I 7); spine slender, fin rounded. Length of adipose fin $3\frac{2}{3}$ to $4\frac{1}{4}$ in the length of the fish. Anal 11–12. Humeral process short, not extending to middle of pectoral spine, which has the inner edge serrated and measures about $\frac{3}{5}$ the length of the fin and $\frac{1}{3}$ to $\frac{2}{5}$ the length of the head. Ventrals inserted behind the last ray of the dorsal, extending $\frac{1}{2}$ to $\frac{2}{3}$ of the distance from their base to the origin of anal. Caudal moderately notched. Least depth of caudal peduncle $1\frac{3}{4}$ to 2 in the length of head and $1\frac{1}{2}$ to $1\frac{3}{4}$ in the distance from anal to base of caudal. Blackish grey.

Hab. Costa Rica, Juan Viñas (*Underwood*).

Four specimens, the largest 100 mm. in total length.

15. **Rhamdia salvini.** (Tab. XXIII. fig. 2.)

Pimelodus salvini, Günth. Cat. Fish. v. p. 130 (1864)[1].

Rhamdia salvini, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 152[2].

Depth of body $6\frac{1}{3}$ in the length, length of head $5\frac{2}{3}$. Breadth of head $1\frac{1}{4}$ in its length, length of snout $2\frac{1}{2}$, diameter of eye 6, interorbital width $3\frac{1}{4}$. Jaws nearly equal anteriorly; width of mouth $\frac{3}{5}$ the width of head. Maxillary barbel extending a little beyond middle of pectoral. Head covered with smooth skin; occipital process short, triangular, extending $\frac{1}{6}$ of the distance from its base to the origin of dorsal. 7 gill-rakers on the lower part of anterior arch. Dorsal I 6; spine slender, fin rounded. Length of adipose fin $3\frac{1}{2}$ in the length of the fish. Anal 12. Humeral process extending beyond the middle of the pectoral spine, which is about $\frac{1}{2}$ the length of the fin and $\frac{1}{3}$ the length of head. Ventrals inserted behind the last dorsal ray, extending $\frac{3}{5}$ of the distance from their base to the origin of anal. Caudal moderately notched. Least depth of caudal peduncle $1\frac{2}{3}$ in the length of head and 2 in the distance from anal to base of caudal. Brownish.

Hab. GUATEMALA, Rio San Gerónimo [1] (*Salvin*).

Here described from the type, a specimen measuring 135 mm. in total length.

16. **Rhamdia polycaulus.** (Tab. XXII. fig. 3.)

Pimelodus polycaulus, Günth. Cat. Fish. v. p. 131 (1864) [1].
Rhamdia polycaulus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 153 [2].

Depth of body $5\frac{2}{3}$ in the length, length of head $5\frac{1}{2}$. Breadth of head $1\frac{1}{4}$ in its length, length of snout $2\frac{4}{5}$, diameter of eye 5, interorbital width $3\frac{1}{5}$. Lower jaw shorter than the upper; width of mouth $\frac{3}{5}$ the width of head. Maxillary barbel extending to posterior end of pectoral. Head covered with smooth skin; occipital process short, triangular, extending $\frac{1}{5}$ of the distance from its base to the origin of dorsal. 6 gill-rakers on the lower part of anterior arch. Dorsal I 6; spine slender, fin rounded, last ray cleft to the base. Length of adipose fin $2\frac{5}{6}$ in the length of the fish. Anal 15. Humeral process extending nearly to end of pectoral spine, which is less than $\frac{1}{2}$ the length of the fin and $\frac{1}{3}$ the length of head. Ventrals inserted behind the last dorsal ray, extending $\frac{2}{3}$ of the distance from their base to the origin of anal. Caudal moderately notched. Least depth of caudal peduncle $1\frac{4}{5}$ in the length of head or in the distance from anal to base of caudal. Brownish.

Hab. GUATEMALA, Rio San Gerónimo [1] (*Salvin*).

Here described from the type, a specimen measuring 115 mm. in total length.

17. **Rhamdia rogersi.** (Tab. XXIII. fig. 1.)

Pimelodus rogersi, Regan, Ann. Mag. N. H. (7) xix. 1907, p. 259 [1].

Depth of body 6 in the length, length of head 5. Breadth of head $1\frac{1}{5}$ in its length, length of snout 3, diameter of eye 6, interorbital width 3. Lower jaw shorter than the upper; width of mouth $\frac{3}{5}$ the width of head. Maxillary barbel extending to middle of pectoral fin. Head covered with smooth skin; occipital process short, slender, extending about $\frac{1}{5}$ of the distance from its base to the origin of dorsal. 7 gill-rakers on the lower part of anterior arch. Dorsal I 6; spine slender, fin rounded. Length of adipose fin about $4\frac{1}{2}$ in the length of the fish. Anal 12–14, when laid back nearly reaching the vertical from the end of adipose fin. Humeral process extending about to the middle of pectoral spine, which has the inner edge serrated and measures nearly $\frac{2}{3}$ the length of the fin or nearly $\frac{2}{5}$ the length of head. Ventrals originating behind the last ray of dorsal, extending $\frac{1}{2}$ the distance from their base to the origin of anal. Caudal slightly notched. Least depth of caudal peduncle about $1\frac{2}{3}$ in the length of head or $1\frac{1}{2}$ to 2 in the distance from anal to base of caudal. Brownish.

Hab. COSTA RICA, Irazu [1] (*Rogers*).

Here described from the types, four specimens measuring up to 130 mm. in total length.

18. **Rhamdia laticauda.**

Pimelodus laticaudus (Heck. MS.), Kner, Sitzungsb. Ak. Wien, xxvi. 1857, p. 420 [1]; Günth. Cat. Fish. v. p. 127 (1864) [2].
Rhamdia laticauda, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 152 [3].

Evidently allied to the preceding, differing at least in the longer barbels and the longer adipose fin.

Hab. MEXICO [1].

Total length about 220 mm.

5. PIMELODUS, Lacep., 1803.

Pimelodella and *Pimelodus*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, pp. 153 & 154.

Occipital process extending to shield at base of dorsal spine; dorsal spine pungent; in other respects similar to *Rhamdia*.

Numerous species, ranging from Panama to La Plata.

Synopsis of the Mexican and Central-American Species.

I. Head covered with smooth skin; maxillary barbel about reaching origin of adipose fin.
Occipital process twice as long as broad; adipose fin about $\frac{2}{7}$ the length of the fish . . . . . 1. *chagresi.*
Occipital process 3 times as long as broad; adipose fin $\frac{1}{3}$ the length of the fish . . 2. *modestus.*

II. Head naked, rugose; maxillary barbel extending to caudal fin . . . . . 3. *maculatus.*

1. **Pimelodus chagresi.**

Pimelodus chagresi, Steind. Sitzungsb. Ak. Wien, lxii. 1876, p. 584[1].

Hab. PANAMA, Rio Chagres.

2. **Pimelodus modestus.**

Pimelodus modestus, Günth. Proc. Zool. Soc. 1860, p. 239[1], and Cat. Fish. v. p. 117 (1864)[2].

Hab. ? PANAMA.—WESTERN ECUADOR[1 2].

P. modestus has been recorded from the Rio Chagres by Kner and Steindachner (Abhandl. Bayer. Ak. x. 1865, p. 49), but it is not improbable that this record refers to the preceding species, which appears to differ from it only in the characters given in the key.

3. **Pimelodus maculatus.**

Pimelodus clarias, Steind. Denkschr. Ak. Wien, xli. 1879, p. 162[1].
Pimelodus maculatus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 155[2].

Hab. PANAMA, Rio Mamoni[1].

Steindachner's description of specimens from the Rio Mamoni, Panama, is not sufficiently detailed to show whether they should be referred to one of the South-American species which have been placed together under the names *P. clarias*, L., or *P. maculatus*, Lacep. The specimens in the British Museum which come nearest to them geographically are from Colombia, but these are certainly distinct from the Mamoni River form.

6. CONORHYNCHUS, Bleek., 1863 *.

Conorhynchus, Günth. Cat. Fish. v. p. 135 (1864).

Teeth feeble or absent; adipose fin rather short; in other respects similar to *Pimelodus.*

Three species, ranging from Mexico to Brazil.

1. **Conorhynchus nelsoni.**

Conorhynchus nelsoni, Everm. & Goldsborough, Bull. U.S. Fish. Comm. xxi. p. 140, fig. 1 (1902).

Snout long, conical; posterior part of head naked, rugose; barbels short. Dorsal I 6. Anal 17. Caudal forked.

Hab. MEXICO, Rio Usumacinta in Chiapas.

7. AMIURUS, Rafin., 1820.

Ictalurus, Amiurus, Villarius, and *Istlarius,* Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896–1900, pp. 133, 135, 2799, & 3138.

Body elongate; mouth terminal or subterminal; jaws with villiform teeth in bands, the premaxillary band of teeth of nearly equal breadth throughout, sometimes with a slight posterior extension on each side; palate toothless; nostrils remote from each other, the posterior with a barbel; barbels eight. Dorsal fin with a spine and 6 branched rays; adipose fin short; anal of moderate length or rather elongate; ventrals 8- or 9-rayed.

About 20 species from North and Central America and one from China.

Synopsis of the Mexican and Central-American Species.

I. Caudal fin forked or deeply emarginate.

A. Occipital process notched at the apex for the reception of the anterior point of the second interneural. (ICTALURUS.)

Anal with 28 to 32 rays; pectoral spine about $\frac{1}{2}$ the length of head, its inner edge with 9–12 serræ; maxillary barbel extending to base of pectoral; silvery, back darker . . . . . 1. *meridionalis.*

Anal with 25 to 30 rays; pectoral spine nearly $\frac{2}{3}$ the length of head, its inner edge with 10 or 11 serræ; maxillary barbel extending nearly to middle of pectoral; silvery, back darker, sides usually with small, round, dark spots. 2. *punctatus.*

B. Occipital process pointed or truncated posteriorly, not or scarcely reaching the second interneural. (HAUSTOR.)

1. Pectoral spine with inner edge distinctly serrated.

Anal with 32 to 37 rays; pectoral spine about $\frac{1}{2}$ the length of head, its inner edge with 5 or 6 strong serræ; maxillary barbel extending to basal part or middle (young) of pectoral . . . . . 3. *furcatus.*

Anal with 24 to 29 rays; pectoral spine about $\frac{3}{5}$ the length of head, its inner edge with 7 to 9 serræ; maxillary barbel extending to middle of pectoral . 4. *lupus.*

Anal with 19 to 22 rays; pectoral spine $\frac{2}{5}$ the length of head, its inner edge with 10 to 12 rather short projections, some of which are bifid; maxillary barbel extending nearly to middle of pectoral . . . . . 5. *pricei.*

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* Preoccupied in Coleoptera (Motschulsky, 1860).

Anal with 21 rays; pectoral spine $\frac{2}{5}$ the length of head, its inner edge with 5 strong serræ; maxillary barbel extending to basal part of pectoral . . 6. *meeki.*

2. Pectoral spine with inner edge entire or very indistinctly serrated.

Anal with 26 rays; pectoral spine a little less than $\frac{1}{2}$ the length of head; maxillary barbel extending to middle of pectoral fin . . . . . 7. *australis.*

Anal with 20 or 21 rays; pectoral spine a little less than $\frac{1}{2}$ the length of head; maxillary barbel extending to basal part of pectoral; middle caudal rays $\frac{2}{3}$ as long as the longest rays . . . . . 8. *mexicanus.*

Anal with 20 to 24 rays; pectoral spine about $\frac{1}{2}$ the length of head; maxillary barbel extending to basal part of pectoral; middle caudal rays not more than $\frac{1}{2}$ as long as the longest . . . . . 9. *dugesi.*

Anal with 24 to 26 rays; pectoral spine $\frac{1}{3}$ the length of head; maxillary barbel extending to basal part of pectoral fin . . . . . 10. *balsanus.*

II. Caudal fin subtruncate. (AMIURUS.)

Anal with 24 to 27 rays . . . . . 11. *natalis.*

1. Amiurus meridionalis.

Amiurus meridionalis, Günth. Cat. Fish. v. p. 102 (1864)[1], and Trans. Zool. Soc. vi. 1868, p. 473, t. 81. fig. 1[2].

Ictalurus meridionalis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 135[3].

Ichthyælurus meridionalis, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 11[4].

Hab. MEXICO, Rio Otopa in Vera Cruz[4]; GUATEMALA, Rio Usumacinta[1 2] and Rio Chisoy (*Salvin*).

The largest of four specimens in the British Museum measures 340 mm. in total length.

2. Amiurus punctatus.

Ictalurus punctatus (Rafinesque), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 135[1].

Ichthyælurus punctatus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 135[2].

Hab. Great Lakes to Tamaulipas[1 2].

I have examined specimens from Arkansas and the Ohio River; the species is said to attain to a weight of twenty-five pounds.

3. Amiurus furcatus.

Ictalurus furcatus (Le Sueur), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 134[1].

Ichthyælurus furcatus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 10[2].

Hab. Iowa and Ohio to Tamaulipas[1 2].

This species is said to attain a weight of forty pounds. I have examined a few small specimens, including one of the types of *A. affinis*, Baird & Girard, and

specimens collected at Juarez, Rio Grande, by Mr. A. J. Woolman, who determined them as *A. punctatus*. In these the occipital process is not notched posteriorly and scarcely reaches the second interneural, but whether this is the case in the adult fish I cannot say.

4. **Amiurus lupus.**

Amiurus lupus (Girard), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 137[1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 14[2].

Hab. North America, Texas[1].—Mexico, Nuevo Leon[2] and Tamaulipas[2].

I have examined four specimens from the Rio Soto Marina (*Meek*), the largest measuring 150 mm.; the species attains to a length of 450 mm.

5. **Amiurus pricei.**

Villarius pricei, Rutter, Proc. Calif. Ac. Sci. (2) vi. 1896, p. 257[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2799[2].

Hab. Upper tributaries of the Rio Yaqui in Sonora and Southern Arizona[1 2].

I have examined one of the types, a specimen measuring 240 mm. in total length.

6. **Amiurus meeki,** sp. n. (Tab. XXIII. fig. 5.)

Amiurus pricei (non Rutter), Meek, Publ. Columbian Mus., Zool. v. 1904, p. 16[1].

Depth of body 5 in the length, length of head 4. Snout $1\frac{2}{3}$ as long as eye, the diameter of which is 5 in the length of head; interorbital width $3\frac{1}{3}$ in the length of head. Mouth subterminal; maxillary barbel extending to basal part of pectoral. 11 gill-rakers on the lower part of the anterior arch. Occipital process obtusely pointed, not quite reaching the second internasal. Dorsal I 6; spine short, $\frac{2}{5}$ the length of head. Anal 21, the free edge convex, the middle rays the longest. Pectoral spine $\frac{2}{5}$ the length of head, its inner edge with 5 strong serræ; humeral process extending beyond the middle of pectoral spine. Caudal deeply emarginate, the middle rays $\frac{2}{3}$ as long as the longest, the lobes rounded. A few indistinct small round dark spots on the sides; caudal with a dark edge.

Hab. Mexico, Miñaca in Chihuahua (*Meek*[1]). (Also recorded by Meek from Lerdo and Durango in Durango.)

A single specimen, 105 mm. in total length.

7. **Amiurus australis.**

Amiurus australis, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 13[1].

Hab. Mexico, Rio Forlon in Tamaulipas[1], Rio Blanco in Vera Cruz[1].

8. **Amiurus mexicanus.**

Amiurus mexicanus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 15[1].

Hab. Mexico, Rio Verde in San Luis Potosi[1].

9. **Amiurus dugesi.**

Amiurus dugesi, Bean, Proc. U.S. Nat. Mus. 1879, p. 304 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 138 [2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 15 [3].

Hab. MEXICO, Rio Lerma System [1 2 3].

I have examined a number of specimens in the British Museum from Lake Chapala (*Jordan, Meek*) measuring up to 200 mm. in total length. A specimen from Salamanca (*Woolman*) appears to belong to the same species, but has the dorsal and pectoral spines shorter, less than $\frac{1}{2}$ the length of head.

10. **Amiurus balsanus.**

Istlarius balsanus, Jord. & Snyder, Bull. U.S. Fish. Comm. xix. 1899, p. 118 (1900) [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 3138 [2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 17, fig. 2 [3].

Hab. MEXICO, Rio Balsas [1 2 3].

The præmaxillary band of teeth has a slight posterior projection on each side, but this is scarcely sufficient justification for placing this species in a different genus from *A. dugesii*, to which it is closely allied. I have examined three specimens (*Jordan, Meek*), the largest 180 mm. in total length. The species attains a length of 900 mm.

11. **Amiurus natalis.**

Amiurus natalis (Le Sueur), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 139 [1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 16 [2].

Hab. NORTH AMERICA, Great Lakes to the Rio Grande [1 2].

8. LEPTOPS, Rafinesque, 1820.

Leptops, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 142.

Præmaxillary band of teeth with a well-developed pointed posterior extension on each side; dorsal fin with a spine and 7 branched rays; in other respects similar to *Amiurus*.

A single species from North America and Northern Mexico.

1. **Leptops olivaris.**

Leptops olivaris (Rafinesque), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 143 [1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 18 [2].

Body slender; head depressed; lower jaw a little projecting. Dorsal I 7. Anal 13–16. Caudal truncate. Pectoral spine with the inner edge serrated and with the outer edge roughened or serrated. Yellowish, marbled with brownish.

Hab. NORTH AMERICA, Mississippi System and Southern United States [1 2].—MEXICO, Chihuahua [1 2].

This species is an important food-fish, and is said to attain a weight of fifty to seventy-five pounds.

Fam. 3. CYPRINIDÆ.

Fresh-water fishes of North America, Eurasia, and Africa. The species are very numerous, about 1400 being known. The American Cyprinidæ extend southwards to the Rio Balsas in Southern Mexico and the Rio Usumacinta in Guatemala. The Mexican and Central-American representatives are scaly fishes, with the mouth toothless, with the gill-membranes joined to the isthmus and with 3 branchiostegals. There are no spinous fin-rays, the single dorsal fin is not followed by an adipose fin and the ventral fins are abdominal, 7- to 12-rayed. The upper pharyngeals are toothless and the lower pharyngeals are falciform, each with 1 to 3 series of teeth.

Synopsis of the Genera represented in Mexico and Central America *.

I. Mouth bordered above by the præmaxillaries and the maxillaries; lips fleshy, papillose or plicated; pharyngeal teeth in a single series, 6 or more in number on each side. [Catostominæ.]

A. Dorsal fin long, of 20 to 35 rays . . . . . 1. Ictiobus.

B. Dorsal fin short, of 8 to 16 rays.

1. Body normally shaped; no nuchal hump.

Scales moderate, 40 to 50 in a longitudinal series; jaws without cartilaginous sheaths . . . . . 2. Moxostoma.

Scales small, 60 to 100 in a longitudinal series; jaws with more or less distinct cartilaginous sheaths . . . . . 3. Catostomus.

2. Nuchal region with an elevated sharp-edged hump, the interneural spines being enlarged and expanded; scales small . . 4. Xyrauchen.

II. Mouth bordered above by the præmaxillaries; lips not papillose nor plicated; pharyngeal teeth in 1 to 3 series, 3 to 6 in number in the main row on each side. [Cyprininæ.]

A. No barbels.

1. Abdomen behind the ventral fins compressed to form a keel; anal fin more or less elongate . . . . . 5. Abramis.

2. Abdomen not compressed to an edge.

a. Anterior 2 or 3 rays of dorsal fin simple, graduated and closely connected, the first not enlarged nor separated by a membrane from the second.

α. Air-bladder completely surrounded by convolutions of the very long intestine . . . . . 6. Campostoma.

β. Air-bladder not surrounded by the intestine.

* Pharyngeal teeth subconical or more or less compressed and hooked, 4 to 6 in the main row on each side.

† Gill-rakers comparatively few and short.

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* A revision of the American Cyprinidæ would probably show that several of the genera here recognized are untenable. For the present I have thought it best to agree as far as possible with the current American nomenclature for the fishes of this family.

§ Intestine elongate, with several convolutions; pharyngeal teeth compressed, scarcely hooked, with broad grinding-surface, in a single series, 4—4.

Scales large, less than 60 in a longitudinal series . . . . . 7. HYBOGNATHUS.
Scales small, 60 or more in a longitudinal series . . . . . 8. ALGANSEA.

§§ Intestine comparatively short; pharyngeal teeth subconical, scarcely hooked, wide apart, in 2 series, 5, 2—2, 4 . . . . . 9. PTYCHOCHEILUS.

§§§ Intestine comparatively short; pharyngeal teeth compressed and hooked, without or with narrow grinding-surface, not set wide apart.

‡ Pharyngeal teeth in 2 series, 4–6, 1–2—2–1, 4–6 . 10. LEUCISCUS.

‡‡ Pharyngeal teeth usually in a single series, 4—4; sometimes a second series of 1 or 2 small teeth.

Lips normal; scales rather large, 45 to 50 in a longitudinal series; ventral fins 10-rayed . . . . . 11. FALCULA.
Lips normal; scales rather large, 30 to 60 in a longitudinal series; ventral fins 8-rayed . . . . . 12. NOTROPIS.
Lips normal; scales small, 85 to 95 in a longitudinal series . . . . . 13. EVARRA.
Lower lip forming a fleshy lobe on each side . . . . . 14. PHENACOBIUS.

†† Gill-rakers very long, slender, and numerous . . . 15. XYSTROSUS.

** Pharyngeal teeth cylindrical, with obtusely convex apices, in a single series, 3 in number on each side . . . . 16. STYPODON.

b. First dorsal ray more or less enlarged and spinous or surrounded by thick skin, separated by a membrane from the second ray.

Jaws without hard sheaths . . . . . 17. PIMEPHALES.
Jaws with hard sheaths, forming cutting-plates . . . . . 18. COCHLOGNATHUS.

B. A small barbel at or near the end of each maxillary.

1. Mouth terminal, oblique.

Scales rather large, 45 to 50 in a longitudinal series . . . . . 19. YURIRIA.
Scales smaller, 55 to 75 in a longitudinal series . . . . . 20. COUESIUS.

2. Mouth subterminal or inferior.

a. Præmaxillaries protractile.

Scales large, less than 60 in a longitudinal series . . . . . 21. HYBOPSIS.
Scales smaller, 60 to 90 in a longitudinal series . . . . . 22. AGOSIA.

b. Præmaxillaries not protractile . . . . . 23. RHINICHTHYS.

1. ICTIOBUS, Rafin., 1820.

Ictiobus and *Carpiodes* (Rafin.), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, pp. 163, 165.

This genus is at once distinguished from other Mexican Catostominæ by the elongate dorsal fin. It comprises about ten species, ranging from the region of the Great Lakes to Guatemala.

Synopsis of the Mexican and Central-American Species.

I. Depth of body $2\frac{3}{4}$ to $3\frac{2}{5}$ in the length; pectoral fin not extending to the ventral.
A. Dorsal fin of 28 to 31 rays . . . . . 1. *meridionalis.*

B. Dorsal fin of 23 to 26 rays.
1. Origin of ventrals below about the seventh dorsal ray.
Depth of body $2\frac{3}{4}$ to $3\frac{1}{3}$ in the length; caudal peduncle as long as deep . . . 2. *microstomus.*
Depth of body $3\frac{1}{4}$ to $3\frac{2}{3}$ in the length; caudal peduncle longer than deep . . 3. *elongatus.*
2. Origin of ventrals below about the third dorsal ray . . . . . 4. *labiosus.*

II. Depth of body about $2\frac{3}{5}$ in the length; pectoral extending to or a little beyond the base of ventral . . . . . 5. *tumidus.*

1. **Ictiobus meridionalis.** (Tab. XXIV. fig. 1.)

Sclerognathus meridionalis, Günth. Cat. Fish. vii. p. 23 (1868) [1].
Ictiobus meridionalis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 164 [2].
Carpiodes meridionalis, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 26 [3].

Depth of body $2\frac{3}{4}$ to $3\frac{1}{3}$ in the length, length of head 4 to $4\frac{1}{2}$. Diameter of eye $1\frac{1}{2}$ in the length of snout and $5\frac{1}{2}$ in the length of head; interorbital width 2 to $2\frac{1}{4}$ in the length of head. Snout obtuse, more or less projecting beyond the mouth, which has plicated lips. 36 to 40 scales in a longitudinal series, 7 or 8 in a transverse series from origin of dorsal fin to lateral line, 5 or 6 between lateral line and base of ventral. Dorsal 28–31, the 3 anterior rays simple, the fin elevated anteriorly, the longest ray shorter than the head. Anal 10, the 3 anterior rays simple, the fin, when laid back, extending to the caudal. Pectoral extending $\frac{2}{3}$ to $\frac{5}{6}$ of the distance from its base to the origin of the ventral, which is below the fourth to sixth rays of the dorsal. Caudal emarginate. Caudal peduncle nearly as long as deep. Silvery, back brownish.

Hab. Mexico, Perez in Vera Cruz [3] (*Meek*); Guatemala, Rio Usumacinta (*Salvin*) [1].

Here described from the types, four specimens, 200 to 250 mm. in total length, with which I have compared two small specimens from Perez. This species is said to attain a length of over 600 mm.

2. **Ictiobus microstomus.**

Carpiodes microstomus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 27, fig. 4 [1].

Hab. Mexico, Rio Conchos in Chihuahua [1].

Four small specimens from the Rio Conchos (*Meek*) differ from *I. meridionalis* especially in the shorter dorsal fin.

3. **Ictiobus elongatus.**

Carpiodes elongatus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 28, fig. 5 [1].

Hab. Mexico, Rio San Juan, Rio Conchos, and Rio Soto Marina in Tamaulipas [1].

4. Ictiobus labiosus.

Carpiodes labiosus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 29, fig. 6 [1].

Hab. Mexico, Valles in San Luis Potosi [1].

5. Ictiobus tumidus.

Ictiobus tumidus, Girard, U.S. & Mex. Bound. Surv., Fish. p. 34, t. 19. figs. 1–4 (1859) [1].
Carpiodes velifer (part.), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 167 [2].
Carpiodes tumidus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 27 [3].

Hab. Texas and North-eastern Mexico:

Texas [2], Rio Grande at Fort Brown [1]; Rio Soto Marina and Rio Forlon in Tamaulipas [3].

Differs from *I. meridionalis* especially in having the body deeper, the pectoral fin longer, and the dorsal rather more elevated anteriorly and perhaps with fewer rays.

Girard described and figured his fish as having 29 rays, and Meek gives the number as 24. The former seems often to have given 1 or 2 in excess of the actual number, whilst the latter would sometimes count the 3 anterior simple rays as one.

2. MOXOSTOMA, Rafin., 1820.

Moxostoma, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 187.

The distinctive characters of this genus are the short dorsal fin, large scales, complete lateral line, small inferior protractile mouth, jaws without cartilaginous sheaths and compressed pharyngeal teeth.

There are about 24 species from the United States east of the Rocky Mountains and from Mexico.

Synopsis of the Mexican Species.

I. Posterior edge of lower lip straight, transverse; dorsal fin of 2 simple and 10 or 11 branched rays.

A. Pectoral as long as the head, nearly or quite reaching the ventral . . . 1. *congestum.*

B. Pectoral shorter than the head, not reaching the ventral.

Width of mouth $\frac{1}{3}$ the width of head; interorbital width $2\frac{1}{4}$ to $2\frac{1}{3}$ in the length of head, which is $4\frac{1}{2}$ to $4\frac{3}{4}$ in the length of the fish (in specimens of 130 to 150 mm.); pharyngeal teeth 10—10 . . . . . 2. *austrinum.*

Width of mouth $\frac{2}{5}$ to $\frac{1}{2}$ the width of head; interorbital width $2\frac{1}{2}$ to $2\frac{3}{4}$ in the length of head, which is 4 to $4\frac{1}{3}$ in the length of the fish (in specimens of 105 to 150 mm.); pharyngeal teeth 6—6 . . . . . 3. *mascotæ.*

II. Posterior edge of lower lip notched; dorsal fin of 2 simple and 12 branched rays . . . . . 4. *parvidens.*

1. Moxostoma congestum.

Ptychostomus congestus, Girard, Rep. U.S. & Mex. Bound. Surv., Fish. p. 36, t. 21. figs. 5–8 (1859) [1].

Ptychostomus albidus, Girard, t. c. p. 36, t. 19. figs. 5–8 [2].

Moxostoma congestum, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 192, and 1900, fig. 91 [3].

Myzostoma congestum, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 34 [4].

Depth of body 4 in the length, length of head 4 to $4\frac{1}{3}$. Diameter of eye 4 to $4\frac{1}{2}$ in the length of head, length of snout $2\frac{3}{4}$, interorbital width 2 to $2\frac{1}{3}$. Snout truncated anteriorly. Lips plicated; lower lip with a straight transverse posterior edge; width of mouth $\frac{1}{3}$ to $\frac{2}{5}$ the width of head. 44 to 46 scales in a longitudinal series, 6 or 7 in a transverse series from origin of dorsal fin to lateral line, 5 or 6 from lateral line to base of ventral fin. Dorsal 12, the 2 anterior rays simple; origin nearer to tip of snout than to base of caudal; free edge straight or slightly concave; longest ray longer than the base of the fin. Anal 8, the 2 anterior rays simple, the fin, when laid back, extending to the basal part of the caudal. Pectoral as long as the head, nearly or quite reaching the ventral, which is inserted below the anterior part of the dorsal. Caudal emarginate. Caudal peduncle $1\frac{1}{2}$ as long as deep. Brownish above, yellowish below; dorsal dusky, other fins pale.

Hab. Rio Grande System; Rivers of Texas and Tamaulipas:

R. Lampasas [3] and R. Salado [1] in Texas; R. Conchos in Chihuahua [4]; R. San Juan in Nuevo Leon [2 4]; R. Conchos and R. Soto Marina in Tamaulipas [4].

Here described from two specimens, 120 and 160 mm. in total length, from the Rio Soto Marina (*Meek*). The species attains a length of 350 mm.

2. Moxostoma austrinum.

Myxostoma austrina, Bean, Proc. U.S. Nat. Mus. 1879, p. 302 [1].

Moxostoma austrinum, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 192 [2].

Myzostoma austrinum, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 35 [3].

About 10 pharyngeal teeth on each side. Depth of body $4\frac{1}{3}$ in the length, length of head $4\frac{1}{2}$ to $4\frac{3}{4}$. Diameter of eye $5\frac{1}{4}$ to $5\frac{1}{2}$ in the length of head, length of snout $2\frac{4}{5}$, interorbital width $2\frac{1}{4}$ to $2\frac{1}{3}$. Snout truncated anteriorly. Lips plicated; lower lip with a straight transverse posterior edge; width of mouth $\frac{1}{3}$ the width of head. 47 to 50 scales in a longitudinal series, 7 in a transverse series from origin of dorsal fin to lateral line, 6 from lateral line to base of ventral fin. Dorsal 12, the 2 anterior rays simple; origin nearer to tip of snout than to base of caudal; free edge straight or slightly concave; longest ray a little longer than the base of the fin. Anal 8, with the 2 anterior rays simple, the fin, when laid back, extending nearly to the base of caudal. Pectoral a little shorter than the head, extending rather more than $\frac{2}{3}$ of the distance from its base to the origin of the ventral, which is below the middle of the dorsal. Caudal emarginate. Caudal peduncle $1\frac{3}{4}$ as long as deep. Brownish above, yellowish below; dorsal dusky, lower fins pale yellowish.

Hab. Mexico, Rio Mezquital and Rio Lerma Systems:

Durango [3]; Aguas Calientes and Ataquiza in Jalisco [3]; Salamanca in Guanajuato [2]; Lake Chapala [3]; Morelia in Michoacan [1].

Here described from two specimens from Aguas Calientes (*Jordan*), 130 and 150 mm. in total length. The species grows to the same size as the preceding one.

3. **Moxostoma mascotæ,** sp. n. (Tab. XXIV. fig. 2.)

Pharyngeal teeth comparatively few and strong, about 6 on each side. Depth of body 4 to $4\frac{1}{2}$ in the length, length of head 4 to $4\frac{1}{3}$. Diameter of eye 5 to 6 in the length of head, length of snout $2\frac{1}{2}$ to $2\frac{3}{4}$, interorbital width $2\frac{1}{2}$ to $2\frac{3}{4}$. Snout truncated anteriorly. Lips plicated; lower lip with a straight transverse posterior edge; width of mouth $\frac{2}{5}$ to $\frac{1}{2}$ the width of head. 43 to 48 scales in a longitudinal series, 6 or 7 in a transverse series from origin of dorsal fin to lateral line, 5 or 6 from lateral line to base of ventral. Dorsal 12–13, the 2 anterior rays simple; origin equidistant from tip of snout and base of caudal or a little nearer the former; free edge of the fin straight or slightly concave; longest ray as long as or a little longer than the base of the fin. Anal 8, the 2 anterior rays simple, the fin, when laid back, extending nearly to the caudal. Pectoral shorter than the head, extending $\frac{3}{5}$ to $\frac{3}{4}$ of the distance from its base to the origin of the ventral, which is a little in advance of the middle of the dorsal. Caudal emarginate. Caudal peduncle $1\frac{1}{2}$ to $1\frac{3}{4}$ as long as deep. Brownish above, yellowish below; fins pale yellowish.

Hab. Mexico, Rio Mascota in Jalisco (*Buller*).

Here described from seven specimens, 105 to 150 mm. in total length, taken near the source of the river, at a height of 4000 feet.

4. **Moxostoma parvidens,** sp. n. (Tab. XXIV. fig. 3.)

Pharyngeal teeth small, 14 on each side. Depth of body $3\frac{2}{3}$ to 4 in the length, length of head 4 to $4\frac{1}{4}$. Diameter of eye $3\frac{1}{2}$ to $3\frac{2}{3}$ in the length of head, length of snout 3 to $3\frac{1}{4}$, interorbital width $2\frac{1}{2}$. Snout truncated anteriorly. Lips plicated; lower lip with the posterior edge notched, **V**-shaped, the two halves of the **V** meeting at an obtuse angle; width of mouth nearly $\frac{1}{3}$ the width of head. 41 to 43 scales in a longitudinal series, 6 in a transverse series from origin of dorsal fin to lateral line, 5 from lateral line to base of ventral. Dorsal 14, the 2 anterior rays simple; origin nearer to tip of snout than to the base of caudal; free edge of the fin nearly straight; longest ray as long as or shorter than the base of the fin. Anal 8, the 2 anterior rays simple, the fin, when laid back, extending to the base of caudal. Pectoral a little shorter than the head, extending $\frac{3}{4}$ of the distance from its base to the origin of ventral, which is below the middle of the dorsal. Caudal emarginate. Caudal peduncle as long as deep. Silvery, back brownish; dorsal dusky; other fins pale.

Hab. Mexico, Rio Grande at Juarez (*Woolman*).

Two specimens, 90 and 120 mm. in total length.

3. CATOSTOMUS, Le Sueur, 1817.

Pantosteus (Cope, 1876) and *Catostomus*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, pp. 169 and 173.

The distinctive characters of this genus are the short dorsal fin, small scales, complete lateral line, moderate inferior protractile mouth, jaws with cartilaginous sheaths and compressed pharyngeal teeth.

There are about 25 species from North America and one from Eastern Siberia.

1. **Catostomus plebeius.**

Minomus plebeius, Girard, Rep. U.S. & Mex. Bound. Surv., Fish. p. 38, t. 22. figs. 1–4 (1859)[1].

? *Acomus guzmaniensis*, Girard, t. c. p. 39, t. 23. figs. 1–10[2].

Catostomus nebuliferus, Garm. Bull. Mus. Comp. Zool. viii. 1881, p. 89[3].

Pantosteus plebeius, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 170[4]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 30[5].

Catostomus conchos, Meek, t. c. p. 33, t. 7[6].

Depth of body 4 to 5 in the length, length of head $4\frac{1}{3}$ to $4\frac{2}{3}$. Diameter of eye 5 to 6 in the length of head, length of snout $2\frac{1}{2}$, interorbital width $2\frac{1}{5}$ to $2\frac{1}{3}$. Snout obtuse. Lips papillose; lower lip deeply incised; width of mouth $\frac{2}{5}$ the width of head. 80 to 95 scales in a longitudinal series. Dorsal 10–11, the 2 anterior rays simple; origin nearly equidistant from tip of snout and base of caudal; free edge straight; longest ray longer than the base of the fin. Anal 8, the 2 anterior rays simple, the fin, when laid back, extending to the base of caudal. Pectoral shorter than the head, extending $\frac{1}{2}$ to $\frac{3}{4}$ of the distance from its base to the origin of ventral, which is nearly below the middle of the dorsal. Caudal emarginate. Brownish, mottled with darker.

Hab. MEXICO, Chihuahua and Durango:

Rio Casas Grandes[1 2 5], Rio Santa Maria[5], Rio Carmen[5], Rio Sauz[5] and Rio Conchos[5 6] in Chihuahua; Rio Nazas[3] and Rio Mezquital[5] in Durango.

Here described from seven specimens, the largest 150 mm. in total length, from the R. Casas Grandes and the R. Nazas (*Meek*). The species attains a length of 450 mm.

From Girard's figure I should have thought that *C. guzmaniensis* was a distinct species, differing in having a longer dorsal fin with 13 rays and in coloration, the back and sides being dark, with an orange lateral band. I place it in the synonymy on the authority of Dr. Meek, who states that this is the coloration of adult males.

2. **Catostomus bernardini.**

Catostomus bernardini, Girard, Rep. U.S. & Mex. Bound. Surv., Fish. p. 40, t. 23. figs. 1–5 (1859)[1]; Jord & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 178[2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 32[3].

Catostomus sonorensis, Meek, l. c.[4].

Differs from the preceding especially in the larger scales, 65 to 75 in a longitudinal series.

Hab. MEXICO, Sonora[1 2 3 4].

4. XYRAUCHEN, Eigenm. & Kirsch, 1888.

Xyrauchen, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 184.

This genus differs from *Catostomus* in having a sharp-edged hump behind the occiput, produced by the remarkable development of the expanded plate-like anterior interneural bones. It comprises two species from the Colorado River System, one of which has been recorded from Horseshoe Bend, on the border of Sonora.

1. **Xyrauchen cypho,** Lockington, 1880.

Xyrauchen cypho, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 184[1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 33[2].

Hab. COLORADO RIVER[1 2].

5. ABRAMIS, Cuv., 1817.

Abramis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 249.

Body ovate, compressed; abdomen behind the ventral fins compressed to form a keel. Mouth small, protractile; no barbels. Pharyngeal teeth compressed, hooked, in a single series, 5—5. Scales rather large; lateral line complete, decurved. Dorsal fin short, posterior to the ventrals; anal more or less elongate.

Eight species in Europe and Western Asia and one in North America.

1. **Abramis chrysoleucus**, Mitchell, 1814.

Abramis chrysoleucus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 250[1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 57[2].

Hab. Dakota and Nova Scotia to the Rio Grande[1 2].

6. CAMPOSTOMA, Agass., 1855.

Campostoma, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 204.

This genus differs from *Hybognathus* in having the air-bladder completely surrounded by the convolutions of the very long intestine.

Two species from the United States and Mexico.

1. **Campostoma ornatum.**

Campostoma ornatum, Girard, U.S. & Mex. Bound. Surv., Fish. p. 40, t. 25. figs. 1–4 (1859)[1]; Günth. Cat. Fish. vii. p. 183 (1868)[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 205[3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 41[4].

Camposta pricei, Jord. & Everm. l. c.[5].

Depth of body 4 to 5 in the length, length of head $3\frac{1}{2}$ to 4. Diameter of eye $4\frac{3}{4}$ to $5\frac{1}{2}$ in the length of head, length of snout 3 to $3\frac{1}{4}$, interorbital width 4 to $4\frac{1}{3}$. 70 to 75 scales in a longitudinal series. Dorsal 9–10, with 7 or 8 branched rays; origin equidistant from tip of snout and base of caudal or a little nearer the latter; free edge straight or slightly convex; longest ray considerably longer than the base of the fin. Anal 8, with 6 branched rays. Pectoral $\frac{3}{5}$ to $\frac{4}{5}$ the length of head or of the distance from its base to the origin of ventrals, which is nearly below that of the dorsal. Caudal emarginate. Caudal peduncle nearly twice as long as deep. Sides with dark mottlings; young with a dark lateral band ending in a caudal spot; a black band on the basal part of the dorsal fin; ventrals and anal sometimes similarly banded.

Hab. Southern Arizona and Northern Mexico:

Rucker Cañon, a tributary of the Rio Yaqui in Southern Arizona[5]; Rio Casas Grandes[4] and Rio Conchos[1 3 4] in Chihuahua; Rio Nazas in Durango[4].

Here described from several specimens, 75 to 110 mm. in total length, from Chihuahua (*Woolman*) and San Andres (*Meek*).

2. **Campostoma anomalum.**

Campostoma anomalum (Rafin., 1820), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 205 [1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 42 [2].

Campostoma formulosum, Girard, U.S. & Mex. Bound. Surv., Fish. p. 41, t. 25. figs. 5–8 (1859) [3]; Jord. & Everm. t. c. p. 206 [4]; Meek, l. c.[5].

Campostoma nasutum, Girard, t. c. p. 42, t. 25. figs. 9–12 [6].

Closely allied to the preceding, but with much larger scales, 46 to 53 in a longitudinal series.

Hab. Mississippi System and southwards to the Rio Grande; in Mexico recorded from the Rio San Juan in Nuevo Leon [3 5].

I have compared a specimen from Ohio with Girard's figures.

7. HYBOGNATHUS, Agass., 1855.

Hybognathus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, pp. 211 and 242.

Body elongate, more or less compressed. Mouth protractile, small, horizontal, terminal or subterminal; no barbels. Pharyngeal teeth compressed, scarcely or slightly hooked, with broad grinding-surface, in a single series, 4—4. Scales large. Lateral line complete. Dorsal fin short, about in the middle of the length of the fish; anal short. Intestine elongate, with several convolutions.

About eight species, small herbivorous fishes, chiefly of the Mississippi and Rio Grande Systems.

1. **Hybognathus episcopus.**

Dionda episcopa, Girard, Proc. Ac. Philad. 1856, p. 177 [1].

Dionda melanops, Girard, t. c. p. 178 [2], and U.S. & Mex. Bound. Surv., Fish. p. 44, t. 26. figs. 17–20 (1859) [3].

Dionda couchi, Girard, l. c.[4], and t. c. p. 44, t. 26. figs. 1–4 [5].

Hybognathus punctifer, Garm. Bull. Mus. Comp. Zool. viii. 1881, p. 89 [6].

Hybognathus civilis, Cope, Trans. Am. Phil. Soc. 1884, p. 167 [7].

Hybognathus episcopus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 214 [8]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 49 [9].

Hybognathus melanops, Jord. & Everm. t. c. p. 216 [10].

Notropis rasconis, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 121, fig. (1900) [11].

Hybognathus rasconis, Meek, t. c. p. 50, fig. 10 [12].

Depth of body 3 to 4 in the length, length of head 4 to $4\frac{1}{2}$. Snout as long as eye, the diameter of which is 3 to $3\frac{1}{2}$ in the length of head; interorbital width $2\frac{1}{2}$ to $2\frac{2}{3}$ in the length of head. Mouth small, subterminal. Dorsal 8–9, with 6 or 7 branched rays; origin nearly equidistant from tip of snout and base of caudal. Anal 8. Pectorals shorter than the head, not reaching the ventrals, which are inserted below or a little in advance of the origin of dorsal. 35 to 44 scales in a longitudinal series, 6 or 7 in a transverse series from origin of dorsal to lateral line, 4 or 5 between lateral line and base of ventral. Lateral line complete. Caudal peduncle nearly twice as long as deep. A more or less distinct dark lateral stripe ending in a caudal spot.

Hab. Southern Texas and Northern Mexico:

Camanche Spring, Rio Grande [1], Brownsville, Texas [10]; Rio Conchos in Chihuahua [9 10] (*Meek*); Buena Vista [2 3], Parras [6], and Saltillo [6] in Coahuila; Rio

San Juan in Nuevo Leon [4 5 7 9] (*Meek*); Durango in Durango [9]; Rio Verde in San Luis Potosi [11 12] (*Meek*).

Here described from several specimens, measuring up to 70 mm. in total length.

8. ALGANSEA, Girard, 1856.

Algansea, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 211.

This genus differs from *Hybognathus* in the larger and more oblique mouth and in the smaller scales. It comprises four species from the Rio Lerma System (including the Valley of Mexico and the upper tributaries of the Panuco).

Synopsis of the Species.

I. 10 to 12 gill-rakers on the lower part of the anterior arch; 67 to 76 scales in a longitudinal series.

12 to 14 scales between lateral line and base of ventral fin . . . . . 1. *tincella*.
8 to 11 scales between lateral line and base of ventral fin . . . . . 2. *affinis*.

II. 13 or 14 gill-rakers on the lower part of the anterior arch; 60 to 66 scales in a longitudinal series, 7 or 8 between lateral line and base of ventral fin. 3. *stigmatura*.

III. 15 to 17 gill-rakers on the lower part of the anterior arch; 76 to 86 scales in a longitudinal series. . . . . 4. *dugesi*.

1. **Algansea tincella.**

Leuciscus tincella, Cuv. & Val. Hist. Nat. Poiss. xvii. p. 323 (1844)[1]; Günth. Cat. Fish. vii. p. 244 (1868)[2].

Algansea tincella, Girard, U.S. & Mex. Bound. Surv., Fish. p. 46, t. 27. figs. 1–4 (1859)[3]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 45[4].

Algansea tincella (part.), Meek, Publ. Columbian Mus., Zool. v. 1904, p. 44[5].

Depth of body $3\frac{1}{2}$ to $4\frac{1}{4}$ in the length, length of head $3\frac{1}{2}$ to 4. Snout considerably longer than eye, the diameter of which is $5\frac{1}{2}$ to 7 in the length of head; interorbital width $2\frac{2}{3}$ to 3 in the length of head. 10 to 12 gill-rakers on the lower part of the anterior arch. 70 to 76 scales in a longitudinal series, 14 to 16 in a transverse series from dorsal fin to lateral line, 12 to 14 between lateral line and base of ventral fin. Dorsal 9, with 7 branched rays; origin a little nearer to base of caudal than to tip of snout; free edge straight or slightly convex; longest ray $\frac{1}{2}$ to $\frac{3}{4}$ the length of head. Anal 8, with 6 branched rays, when laid back not reaching the caudal fin. Pectoral $\frac{3}{5}$ to $\frac{4}{5}$ the length of head, not extending to the ventrals, which are inserted nearly below the origin of dorsal. Silvery; back brownish; fins pale.

Hab. Valley of Mexico [1 3 5].

Here described from four specimens, 100 to 150 mm. in total length, from Mexico (*Mexico Mus.*) and Chalco (*Meek*).

2. **Algansea affinis,** sp. n. (Tab. XXV. fig. 1.)

Algansea tincella (part.), Meek, Publ. Columbian Mus., Zool. v. 1904, p. 44[1].

Depth of body nearly equal to the length of head, which is 4 to $4\frac{1}{2}$ in the length of the fish. Snout longer

than eye, the diameter of which is $4\frac{1}{2}$ to 5 in the length of head; interorbital width $2\frac{2}{3}$ to 3 in the length of head. 10 gill-rakers on the lower part of the anterior arch. 65 to 76 scales in a longitudinal series, 13 to 16 in a transverse series from dorsal fin to lateral line, 8 to 11 between lateral line and base of ventral fin. Dorsal 9, with 7 branched rays; origin equidistant from tip of snout and base of caudal or slightly nearer the latter; free edge straight; longest ray $\frac{2}{3}$ the length of head. Anal 8, with 6 branched rays. Pectoral $\frac{2}{3}$ the length of head, not reaching the ventrals, which are inserted below the origin of the dorsal. Traces of a dark lateral band ending in a caudal spot.

Hab. Mexico, Rio Lerma and upper tributaries of the Rio Panuco [1].

Here described from several specimens, 90 to 120 mm. in total length, from Aguas Calientes (*Jordan*), Salamanca (*Woolman*), and San Juan del Rio (*Meek*).

This species has a shorter head and larger eye than *A. tincella*, but is especially distinguished by the fewer scales between the lateral line and the ventral fin.

3. **Algansea stigmatura,** sp. n. (Tab. XXV. fig. 2.)

Depth of body 4 to $4\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$ to 4. Snout as long as eye, the diameter of which is 4 in the length of head; interorbital width $2\frac{3}{4}$ to 3 in the length of head. 13 or 14 gill-rakers on the lower part of the anterior arch. 60 to 66 scales in a longitudinal series, 13 to 15 in a transverse series from origin of dorsal to lateral line, 7 or 8 between lateral line and base of ventral fin. Dorsal 9, with 7 branched rays; origin equidistant from tip of snout and base of caudal; free edge straight; longest ray $\frac{3}{4}$ the length of head. Anal 8. Pectoral $\frac{2}{3}$ the length of head, not reaching the ventrals, which are inserted nearly below the origin of dorsal. Silvery; a dark caudal spot.

Hab. Mexico, Rio Grande de Santiago.

Four specimens, 55 to 75 mm. in total length, collected by Dr. A. C. Buller.

4. **Algansea dugesi.**

Algansea dugesi, Bean, Proc. U.S. Nat. Mus. 1892, p. 283, t. 44. fig. 1 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 212 [2], and 1900, fig. 98 [3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 45, fig. 8 [4].

Algansea lacustris, Steind. Denkschr. Ak. Wien, lxii. 1895, p. 526, t. 3. fig. 1 [5]; Meek, t. c. p. 47 [6].

Algansea tarascorum, Steind. t. c. p. 527, t. 3. fig. 2 [7].

? *Algansea rubescens,* Meek, t. c. p. 46, fig. 9 [8].

Depth of body nearly equal to the length of head, which is $3\frac{2}{3}$ to 4 in the length of the fish. Snout longer than eye, the diameter of which is $4\frac{1}{2}$ to 6 in the length of head; interorbital width 3 in the length of head. 15 to 17 gill-rakers on the lower part of the anterior arch. 76 to 86 scales in a longitudinal series, 18 to 21 between dorsal fin and lateral line, 12 to 15 between lateral line and root of ventral. Dorsal 9, with 7 branched rays; origin equidistant from tip of snout and base of caudal or a little nearer the latter; free edge straight; longest ray $\frac{1}{2}$ to $\frac{2}{3}$ the length of head. Anal 8, with 6 branched rays. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ the length of head, not reaching the ventrals, which are inserted nearly below the origin of dorsal. Silvery, back darker; young with a dark spot at the base of caudal.

Hab. Mexico, Rio Lerma System:

Lake Yuriria in Guanajuato [1]; Lake Chapala in Jalisco [8]; Lake Patzcuaro in Michoacan [4 5 6 7].

Here described from three specimens, 100 to 200 mm. in total length, from

L. Patzcuaro (*Mexico Mus., Meek*). These evidently correspond to Steindachner's *A. lacustris* and *A. tarascorum*. Meek gives 85 to 100 scales in a longitudinal series for *A. lacustris*, but my lower counts agree with those of Steindachner. I have examined the type of *A. dugesi* in the U.S. National Museum at Washington. I count 84 scales in a longitudinal series, 18 between dorsal fin and lateral line, 14 from lateral line to root of ventral fin.

A. rubescens is said to differ from *A. dugesi* in the more numerous gill-rakers, 22 or 23 on the first arch; in the specimens described above I count 19 to 22 (4–5+15–17).

9. PTYCHOCHEILUS, Agass., 1855.

Ptychocheilus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 224.

This genus differs from *Leuciscus* in the large subterminal horizontal mouth extending to below the eye and in the subconical pharyngeal teeth set wide apart on the long, slender, lower pharyngeal bones. It comprises three species, large fishes from the Pacific Coast streams of the United States and Northern Mexico.

1. **Ptychocheilus lucius,** Girard, 1856.

Ptychocheilus lucius, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 224; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 52.

Hab. Colorado River and Northern Sonora.

This species is said to reach a length of five feet and a weight of eighty pounds.

10. LEUCISCUS, Cuv., 1817.

Gila (Baird & Girard) and *Leuciscus,* Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, pp. 226 and 228.

Body ovate or elongate, more or less compressed. Mouth protractile, terminal or subterminal, small or moderate, usually more or less oblique; no barbels. Pharyngeal teeth compressed, hooked, in two series, 1–2, 4–6—6–4, 1–2. Dorsal fin short; anal short or of moderate length.

A large number of species from Europe, Asia, and North America.

Synopsis of the Mexican Species.

85 to 90 scales in a longitudinal series	1. *elegans.*
60 to 75 scales in a longitudinal series	2. *nigrescens.*

1. **Leuciscus elegans.**

Gila elegans, Baird & Girard, Proc. Ac. Philad. 1853, p. 369[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 226[2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 53[3].

? *Gila minacæ,* Meek, t. c. p. 54, fig. 11[4].

Hab. Colorado and Gila Rivers[1 2 3], headwaters of the Rio Yaqui, at Miñaca in Chihuahua[4].

The species attains a length of 300 mm. or more. Some of the distinctive characters assigned to *G. minacæ* by Dr. Meek are evidently due to the small size of the specimen described.

2. **Leuciscus nigrescens.**

Gila pulchella (non *Leuciscus pulchellus*, Storer), Baird & Girard, Proc. Ac. Philad. 1854, p. 29[1].

Tigoma pulchella, Girard, Proc. Ac. Philad. 1856, p. 206[2], and U.S. & Mex. Bound. Surv., Fish. p. 62, t. 34. figs. 5–8 (1859)[3].

Tigoma nigrescens, Girard, t. c. p. 207[4], and t. c. p. 64, t. 32. figs. 1–4[5].

Tigoma pulchra, Girard, l. c.[6], and t. c. p. 65[7].

Tigoma conspersa, Garm. Bull. Mus. Comp. Zool. viii. 1881, p. 91[8].

Cheonda modesta, Garm. t. c. p. 92[9].

Cheonda nigrescens, Garm. l. c.[10].

Leuciscus nigrescens, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 233[11]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 55[12].

Depth of body $3\frac{1}{3}$ to $4\frac{1}{3}$ in the length, length of head $3\frac{1}{3}$ to 4. Snout longer than eye, the diameter of which is $4\frac{1}{2}$ (young) to $5\frac{1}{2}$ in the length of head; interorbital width 3 in the length of head. Mouth terminal, oblique. Dorsal 10, with 8 branched rays; origin above the insertion of the innermost ray of the ventral. Anal 9. 60 to 75 scales in a longitudinal series, 15 to 18 in a transverse series from origin of dorsal to lateral line, 8 to 10 between lateral line and base of ventral. Lateral line complete. Silvery, back darker; a dark lateral stripe ending in a caudal spot present in the young.

Hab. Mexico, Chihuahua, Coahuila, and Durango:

Rio Grande[11]; Rio Casas Grandes (*Meek*)[1 2 3 4 5 12], Rio Santa Maria[12], Rio Carmen[12] and Rio Conchos (*Woolman*)[6 7 12] in Chihuahua; Parras[10] and Saltillo[9] in Coahuila; Rio Nazas[8 12] and Durango (*Meek*)[12] in Durango.

Here described from several specimens measuring up to 150 mm. in total length.

11. FALCULA, Jord. & Snyd., 1900.

Falcula, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 124 (1900).

Although the single species of this genus does not appear to be specially closely related to the small fishes which are comprised in *Notropis*, it is difficult to find characters by which to separate it from them generically. Until a study of the anatomy makes its relationships clear, the external character of the larger number of rays (10 instead of 8) in the ventral fins may be used.

1. **Falcula chapalæ.**

Falcula chapalæ, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 125, fig. (1900)[1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 58, fig. 12[2].

Depth of body nearly equal to the length of head, which is 4 in the length of the fish. Snout longer than

eye, the diameter of which is 5 to 6 in the length of head; interorbital width $3\frac{1}{3}$ to $3\frac{2}{3}$ in the length of head. Mouth terminal, oblique. Dorsal 10, with 7 branched rays; origin equidistant from tip of snout and base of caudal or a little nearer the former; longest ray $\frac{2}{3}$ to $\frac{3}{4}$ the length of head. Anal 10. Ventrals inserted below or in advance of the origin of dorsal. 45 to 50 scales in a longitudinal series, 8 in a transverse series from origin of dorsal to lateral line, 4 or 5 between lateral line and base of ventral. Silvery, back darker; fins pale.

Hab. Mexico, Rio Lerma System:

Lake Chapala [1 2] (*Buller*); Ojo de Agua, Michoacan (*Mexico Mus.*).

Here described from four specimens, 130 to 190 mm. in total length.

12. NOTROPIS, Rafin., 1818.

Notropis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 254.

This genus differs from *Leuciscus* in the smaller number of pharyngeal teeth, in one or two series, 4, 0–2—0–2, 4.

The scales are large (30 to 60 in a longitudinal series), and the ventral fins are 8-rayed.

A large number of species of small fishes from the United States east of the Rocky Mountains and from Mexico.

Synopsis of the Mexican Species.

I. Mouth subterminal, the lower jaw included.

35 to 39 scales in a longitudinal series . . . . . 1. *boucardi.*
42 scales in a longitudinal series . . . . . 2. *orca.*
48 to 54 scales in a longitudinal series . . . . . 3. *nazas.*
54 to 60 scales in a longitudinal series . . . . . 4. *sallæi.*

II. Mouth terminal, oblique, with the jaws equal anteriorly.

A. 32 to 40 scales in a longitudinal series.

1. Lateral line complete or absent on a few scales posteriorly.

a. Caudal peduncle $2\frac{1}{2}$ as long as deep . . . . . 5. *chihuahua.*

b. Caudal peduncle not more than twice as long as deep.

α. Diameter of eye $2\frac{1}{2}$ (young) to $3\frac{1}{2}$ (adult) in the length of head; 32 to 36 scales in a longitudinal series . . . . . 6. *macrostomus.*

β. Diameter of eye $3\frac{1}{2}$ to 5 in the length of head; 34 to 40 scales in a longitudinal series.

Males with several dark cross-bars; anal fin of 8 or 9 rays . . . . . 7. *ornatus.*
Males with a dark vertical bar behind the head; anal fin of 9 or 10 rays; length of head $3\frac{2}{3}$ to 4 in the length of the fish . . . . . 8. *lutrensis.*
Males with a dark vertical bar behind the head; anal fin of 10 to 12 rays; length of head 4 to $4\frac{1}{2}$ in the length of the fish . . . . . 9. *garmani.*

2. Lateral line incomplete, not continued beyond the ventral fins.

38 scales in a longitudinal series . . . . . 10. *santamariæ.*
32 to 35 scales in a longitudinal series . . . . . 11. *calientis.*

B. 40 to 50 scales in a longitudinal series.

Diameter of eye 3 to 3½ in the length of head (in specimens measuring up to 55 mm.); caudal deeply notched, the middle rays ½ as long as the longest . . . . . 12. *formosus.*

Diameter of eye 4 to 5 in the length of head (in specimens measuring up to 80 mm.); caudal moderately notched, the middle rays ¾ as long as the longest . . . . . 13. *aztecus.*

1. **Notropis boucardi.** (Tab. XXV. figg. 4, 5.)

Moniana nitida (non *Alburnus nitidus,* Kirtland), Girard, Proc. Ac. Philad. 1856, p. 21 [1].

Leuciscus boucardi, Günth. Cat. Fish. vii. p. 485 (1868) [2].

Graodus nigrotæniatus, Günth. l. c. [3].

Rutilus boucardi, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 247 [4].

Notropis nigrotæniatus, Jord. & Everm. t. c. p. 264 [5].

Notropis braytoni, Jord. & Everm. l. c. [6]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 65 [7].

Notropis boucardi, Meek, t. c. p. 67 [8].

Depth of body 3½ to 4½ in the length, length of head 3⅔ to 4½. Diameter of eye 3½ to 4½ in the length of head. Mouth little oblique; lower jaw included within the upper; snout obtuse. Dorsal 9, with 7 branched rays. Anal 8–10, with 6 to 10 branched rays. Ventrals inserted nearly below the origin of dorsal, which is about equidistant from tip of snout and base of caudal. 35 to 39 scales in a longitudinal series, 6 or 7 in a transverse series from origin of dorsal fin to lateral line, 3 or 4 between lateral line and base of ventral fin. Lateral line complete. Caudal peduncle about twice as long as deep. Usually a dark lateral stripe ending in a caudal spot.

Hab. MEXICO, rivers of Nuevo Leon and Tamaulipas and northern tributaries of the Rio Balsas:

Cadereita [7] and Rio San Juan [7] (*Meek*) in Nuevo Leon; Rio Conchos [7] and Rio Soto Marina [7] (*Meek*) in Tamaulipas; Yautepec [8], Cuautla [8], Cuernavaca [2] (*Boucard*), Atlixco [3 8], Puente de Ixtla [8] (*Meek*), Matamoros [8], Jojutla [8] and Chietla [8].

Here described from a series of specimens measuring up to 100 mm. in total length. The examples figured are the types of *Leuciscus boucardi* (fig. 4) and *Graodus nigrotæniatus* (fig. 5).

2. **Notropis orca.**

Notropis orca, Woolman, Bull. U.S. Fish. Comm. xiv. 1894, p. 56 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 289 [2].

Hab. Rio Grande at El Paso, Texas.

3. **Notropis nazas.**

Nototropis nazas, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 70, fig. 19 [1].

Depth of body 4 to 4½ in the length, length of head 4. Diameter of eye 3⅓ to 3⅔ in the length of head. Mouth little oblique; lower jaw included within the upper; snout rather pointed. Dorsal 9, with 7 branched rays. Anal 9. Ventrals inserted in advance of the origin of dorsal, which is a little nearer to the base of caudal than to the tip of snout. 48 to 54 scales in a longitudinal series, 9 or 10 in a

transverse series from origin of dorsal to lateral line, 5 between lateral line and root of ventral fin. Lateral line complete. Caudal peduncle 3 times as long as deep. A narrow dark lateral stripe ending in a small caudal spot.

Hab. Mexico, Rio Nazas in Durango [1] (*Meek*).

Here described from seven specimens, measuring up to 70 mm. in total length.

4. **Notropis sallæi.** (Tab. XXV. fig. 3.)

Ceratichthys sallæi, Günth. Cat. Fish. vii. p. 484 (1868) [1].

Zophendum australe, Jord. Proc. U.S. Nat. Mus. 1870, p. 300 [2].

Algansea sallæi, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 212 [3].

Aztecula mexicana, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 61, fig. 15 [4].

Depth of body $3\frac{1}{2}$ in the length, length of head 4. Diameter of eye 5 in the length of head. Mouth terminal; snout rather obtuse. Dorsal 9, with 7 branched rays; origin nearer to base of caudal than to tip of snout; longest ray $\frac{1}{2}$ or a little more than $\frac{1}{2}$ the length of head; free edge straight or convex. Anal 8–9, with 6 or 7 branched rays. Pectoral $\frac{2}{3}$ the length of head, not reaching the ventrals, which are inserted slightly in advance of the origin of dorsal. 56 to 60 scales in a longitudinal series, 8 or 9 in a transverse series from dorsal fin to lateral line, 6 or 7 between lateral line and base of ventral fin. Lateral line complete. Caudal peduncle about twice as long as deep. Brownish, with silvery stripes along the series of scales.

Hab. Mexico, Rio Lerma and upper tributaries of the Rio Balsas and the Rio Panuco: Lake Tupataro in Guanajuato [2]; Rio San Juan in Hidalgo [4]; Cuernavaca in Morelos [1].

Here described from the types, three specimens of 70 to 85 mm., from Cuernavaca (*Boucard*), with which I have compared several smaller specimens from San Juan del Rio (*Meek*), received as *A. mexicana*.

5. **Notropis chihuahua.**

Notropis chihuahua, Woolman, Am. Nat. 1892, p. 260 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 265 [2].

Nototropis robustus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 66, fig. 17 [3].

Nototropis chihuahua, Meek, t. c. p. 67, fig. 18 [4].

Depth of body nearly equal to the length of head, which is 4 in the length of the fish. Diameter of eye $3\frac{1}{3}$ to $3\frac{2}{3}$ in the length of head. Mouth terminal, slightly oblique; jaws equal anteriorly; snout obtuse. Dorsal 9–10, with 7 branched rays. Anal 8–9, with 6 or 7 branched rays. Ventrals inserted below or a little in advance of the origin of dorsal, which is nearly equidistant from tip of snout and base of caudal. 33 to 38 scales in a longitudinal series, 6 to 8 in a transverse series from origin of dorsal to lateral line, 4 or 5 between lateral line and base of ventral fin. Lateral line complete. Caudal peduncle about $2\frac{1}{2}$ as long as deep. A dark lateral stripe usually ending in a caudal spot; small dark spots on the upper half of the body in the adult.

Hab. Mexico, Rio Conchos in Chihuahua [1 2 3 4].

Here described from several specimens, measuring up to 70 mm. in total length.

Notropis santarosaliæ, Meek (Publ. Columbian Mus., Zool. v. 1904, p. 75, fig. 22), is based on a specimen of about 45 mm., which may be a young example of *N. chihuahua*.

6. **Notropis macrostomus.**

Cyprinella macrostoma, Girard, Proc. Ac. Philad. 1856, p. 198[1], and U.S. & Mex. Bound. Surv., Fish. p. 54, t. 31. figs. 5–8 (1859)[2].

Notropis macrostomus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 274[3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 72[4].

Notropis forlonensis, Meek, t. c. p. 70, fig. 20[5].

Depth of body nearly equal to the length of head, which is $3\frac{3}{5}$ to $3\frac{4}{5}$ in the length of the fish. Diameter of eye $2\frac{1}{2}$ to $2\frac{3}{4}$ (young) in the length of head. Mouth terminal, oblique; snout pointed. Dorsal 8–9, with 6 or 7 branched rays; origin equidistant from tip of snout and base of caudal. Anal 8–9. Ventrals inserted below or a little in advance of the origin of dorsal. 32 to 36 scales in a longitudinal series, 6 in a transverse series from origin of dorsal to lateral line, 3 between lateral line and base of ventral. Lateral line complete. Caudal peduncle nearly twice as long as deep. A dark lateral stripe.

Hab. Texas, Devil's River[1].—Mexico, Rio San Juan in Nuevo Leon[2 4]; Rio Forlon in Tamaulipas[5] (*Meek*).

Here described from three specimens, measuring up to 45 mm. in total length, received as *N. forlonensis*; these are only to be distinguished from small examples of *N. lutrensis* by the larger eye, and appear to be the young of the species described and figured by Girard.

7. **Notropis ornatus.**

Codoma ornata, Girard, U.S. & Mex. Bound. Surv., Fish. p. 53, t. 29. figs. 22–25 (1859)[1].

Notropis ornatus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 270[2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 68[3].

Depth of body 3 (adult) to $3\frac{1}{2}$ (young) in the length, length of head $3\frac{2}{3}$ to 4. Diameter of eye $3\frac{1}{2}$ to $4\frac{1}{2}$ in the length of head. Mouth terminal, oblique; jaws equal anteriorly; snout obtuse. Dorsal 9, with 7 branched rays. Anal 8–9, with 6 or 7 branched rays. Ventrals inserted a little in advance of the origin of dorsal, which is equidistant from tip of snout and base of caudal or a little nearer the latter. 36 to 40 scales in a longitudinal series, 6 to 8 in a transverse series from origin of dorsal to lateral line, $3\frac{1}{2}$ to $4\frac{1}{2}$ between lateral line and base of ventral fin. Lateral line complete. Caudal peduncle twice as long as deep. Males with blackish cross-bars and with the fins dark with pale edges; females and young with a lateral stripe and with the fins pale.

Hab. Mexico, rivers of Chihuahua and Durango:

Chihuahua[1 2 3] (*Meek*); San Andres[3], Jimenez[3], and Miñaca[3] in Chihuahua; Santiago Papasquiaro[3] (*Meek*) and Durango in Durango[3].

Here described from specimens measuring up to 70 mm. in total length.

8. **Notropis lutrensis.**

Leuciscus lutrensis, Baird & Girard, Proc. Ac. Philad. 1853, p. 391[1].

Moniana couchi, Girard, U.S. & Mex. Bound. Surv., Fish. p. 57, t. 30. figs. 21–24 (1859)[2].

Moniana rutila, Girard, l. c. t. 30. figs. 1–4[3].

Notropis lutrensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 271[4]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 72[5].

Depth of body $2\frac{2}{3}$ to $3\frac{1}{2}$ in the length, length of head $3\frac{2}{3}$ to 4. Diameter of eye 4 to 5 in the length of head. Mouth terminal, oblique; jaws equal anteriorly; snout rather obtuse. Dorsal 9, with 7 branched rays.

Anal 9–10. Ventrals inserted a little before the origin of dorsal, which is equidistant from the tip of snout and base of caudal or a little nearer the latter. 34 to 38 scales in a longitudinal series, 6 to 8 in a transverse series from origin of dorsal to lateral line, 3 or 4 between lateral line and root of ventral. Lateral line usually complete. Caudal peduncle $1\frac{2}{3}$ to 2 as long as deep. A dark vertical bar behind the head; a lateral stripe on the posterior part of the body.

Hab. South Dakota to Northern Mexico:

In Mexico recorded from the Rio Santa Maria [5], Rio Carmen [5] (*Meek*), Rio Sauz [5] (*Meek*), and Rio Conchos [4 5] (*Meek*) in Chihuahua; Rio San Juan in Nuevo Leon [2 3 5]; Rio Conchos in Tamaulipas [5].

Here described from several specimens, measuring up to 70 mm. in total length.

9. **Notropis garmani.**

Cyprinella rubripinna (non *Argyreus rubripinnis*, Heck.), Garm. Bull. Mus. Comp. Zool. viii. 1881, p. 91 [1].

Notropis garmani, Jord. Cat. Fish. N. Am. p. 813 (1885) [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 281 [3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 73 [4].

Very similar to *N. lutrensis*, but with the head smaller (4 to $4\frac{1}{2}$ in the length of the fish) and the anal fin usually longer (of 10 to 12 rays).

Hab. Mexico, Rio Nazas:

Lerdo (*Meek*) and Santiago Papasquiaro in Durango [4]; Parras in Coahuila [4].

I have examined four specimens, measuring up to 70 mm. in total length.

10. **Notropis santamariæ.**

Notropis santamariæ, Everm. & Goldsborough, Bull. U.S. Fish. Comm. xxi. 1902, p. 147, fig. [1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 74, fig. 21 [2].

Very close to *N. lutrensis* and perhaps not really distinct, but the lateral line incomplete, terminating below the origin of the dorsal fin, and only 2 scales between the lateral line and the base of the ventral fin.

Hab. Mexico, Lago de Santa Maria in Chihuahua.

11. **Notropis calientis.**

Notropis calientis, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 122, fig. (1900) [1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 65, fig. 16 [2].

Depth of body $3\frac{1}{4}$ to $3\frac{2}{3}$ in the length of the fish, length of head $3\frac{3}{4}$ to 4. Diameter of eye 4 in the length of head. Mouth terminal, oblique; jaws equal anteriorly; snout obtuse. Dorsal 9, with 7 branched rays. Anal 7–8, with 5 or 6 branched rays. Ventrals inserted below or a little in advance of the origin of dorsal, which is nearly equidistant from tip of snout and base of caudal. 32 to 35 scales in a longitudinal series, 6 or 7 in a transverse series from origin of dorsal to lateral line, 3 or 4 between lateral line and base of ventral fin. Lateral line incomplete, not extending further back than the vertical from the origin of the dorsal fin. Caudal peduncle twice as long as deep. A dark lateral stripe.

Hab. Mexico, Rio Lerma System:

Aguas Calientes [1 2], Ocotlan [2], Acambaro [2].

Here described from eight specimens, measuring up to 50 mm. in total length, from Aguas Calientes (*Meek*).

12. **Notropis formosus.**

Moniana formosa, Girard, U.S. & Mex. Bound. Surv., Fish. p. 58, t. 30. figs. 5–9 (1859)[1].

Notropis formosus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 271[2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 74[3].

Depth of body 3 to 4 in the length, length of head $3\frac{2}{3}$ to 4. Diameter of eye 3 to $3\frac{1}{2}$ in the length of head. Mouth terminal, oblique; jaws equal anteriorly; snout rather pointed. Dorsal 9, with 7 branched rays, its origin equidistant from tip of snout and base of caudal or a little nearer the latter. Anal 8–9. Ventrals inserted in advance of the origin of dorsal. 40 to 50 scales in a longitudinal series, 8 to 10 in a transverse series from origin of dorsal to lateral line, 4 to 6 between lateral line and base of ventral. Lateral line usually complete. Caudal peduncle about twice as long as deep. A lateral stripe on the posterior part of the body.

Hab. Mexico, Rio Casas Grandes in Chihuahua:
Rio Mimbres[1]; Colonia Juarez[3] (*Meek*).

Here described from several specimens, measuring up to 55 mm. in total length.

13. **Notropis aztecus.**

Codoma vittata (non *Leuciscus vittatus*, De Kay), Girard, U.S. & Mex. Bound. Surv., Fish. p. 53, t. 29. figs. 18–21 (1859)[1].

Notropis aztecus, Woolm. Bull. U.S. Fish. Comm. xiv. 1894, p. 63, t. 2[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 258[3].

Aztecula lermæ, Everm. & Goldsborough, Bull. U.S. Fish. Comm. xxi. 1902, p. 147, fig. 3[4]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 60, fig. 14[5].

Aztecula vittata, Meek, t. c. p. 59, fig. 13[6].

Depth of body $3\frac{1}{2}$ to 4 in the length, length of head 4 to $4\frac{1}{4}$. Diameter of eye 4 to 5 in the length of head. Mouth terminal, oblique; jaws equal anteriorly; snout obtuse, decurved. Dorsal 9, with 7 branched rays; origin a little nearer to base of caudal than to tip of snout; longest ray $\frac{1}{2}$ or a little more than $\frac{1}{2}$ the length of head; free edge straight or convex. Anal 8. Pectoral shorter than the head, not reaching the ventrals, which are inserted a little in advance of the origin of dorsal. 43 to 50 scales in a longitudinal series, 7 or 8 in a transverse series from dorsal fin to lateral line, 4 or 5 between lateral line and base of ventral fin. Lateral line complete. Caudal peduncle nearly twice as long as deep. Young with a dark lateral band ending in a caudal spot.

Hab. Mexico, Rio Lerma System, Valley of Mexico, and upper tributaries of the Rio Balsas:
Lerma[4 5] (*Meek*), Texcoco[6] (*Meek*), Chalco[6], and Xochimilco (*Gadow*) in Mexico[1 2 3]; Puebla in Puebla[6].

Here described from six specimens, measuring from 45 to 80 mm. in total length.

13. EVARRA, Woolman, 1894.

Evarra, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 304.

Allied to *Notropis* and evidently derived from a type similar to *N. aztecus*, but distinguished by the smaller scales, the more elongate and less compressed body, and the broader isthmus, the gill-openings not extending forward below to the level of the posterior edge of the præoperculum.

Two species from the Valley of Mexico.

1. **Evarra eigenmanni.**

Evarra eigenmanni, Woolman, Bull. U.S. Fish. Comm. 1894, p. 64[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 304[2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 77, fig. 23[3].

Depth of body $5\frac{1}{3}$ in the length, length of head $4\frac{1}{4}$. Diameter of eye $4\frac{2}{3}$ in the length of head. Snout obtuse; mouth small. Dorsal 9, with 7 branched rays; origin nearer to base of caudal than to tip of snout. Anal 8. Ventrals inserted in advance of the origin of dorsal. 85 scales in a longitudinal series, 15 in a transverse series from origin of dorsal to lateral line, 9 between lateral line and base of ventral. Lateral line complete. Silvery, back darker; an indistinct lateral stripe ending in a small caudal spot.

Hab. Valley of Mexico:

City of Mexico[1 2] (*Woolman*); Tlahuac[3].

Here described from the type, 60 mm. in total length.

2. **Evarra tlahuacensis.**

Evarra tlahuacensis, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 78, fig. 24[1].

Differs from the preceding in the smaller scales (95 in a longitudinal series) and the longer anal fin (of 14 rays).

Hab. Valley of Mexico, Tlahuac[1].

14. PHENACOBIUS, Cope, 1867.

Phenacobius, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 302.

Body elongate, little compressed. Mouth protractile, inferior; lower lip produced into a fleshy lobe on each side; no barbels. Pharyngeal teeth compressed, hooked, in a single series, 4—4. Scales small or moderate (40 to 60 in a longitudinal series); lateral line complete. Dorsal and anal fins short.

This genus comprises five species, small fishes of the Eastern United States and the Mississippi System, one extending south to the Rio Grande.

1. **Phenacobius scopifer,** Cope, 1870.

Phenacobius scopifer, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 303[1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 76[2].

Hab. Illinois to the Rio Grande[1 2].

15. XYSTROSUS, Jord. & Snyd., 1900.

Xystrosus, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 123 (1900).

This genus appears to be nearest to *Falcula,* but is at once distinguished by the numerous very long and slender gill-rakers.

A single species from Lake Chapala.

1. **Xystrosus popoche.**

Xystrosus popoche, Jord. & Snyd. Bull. U.S. Fish. Comm. xix. 1899, p. 123, fig. (1900)[1]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 43, fig. 7[2].

Depth of body 4 to $4\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$. Mouth rather large, terminal, oblique; gill-rakers

very long, slender, and numerous. 60 to 70 scales in a longitudinal series. Dorsal 9–10, with 7 branched rays; origin equidistant from tip of snout and base of caudal and above the insertion of the ventrals. Anal 8–10, with 6 or 7 branched rays. Silvery, back darker; fins plain.

Hab. MEXICO, Lake Chapala in Jalisco [1 2] (*Buller*, *Meek*).

I have examined three specimens, 200 to 230 mm. in total length.

16. STYPODON, Garm., 1881.

Stypodon, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 220.

Body oblong, compressed. Mouth small, protractile; no barbels. Pharyngeal teeth cylindrical, with convex apices, in a single series, 3—3. Scales large (35 in a longitudinal series); lateral line complete, decurved. Dorsal and anal fins short.

A single species from Coahuila.

1. Stypodon signifer.

Stypodon signifer, Garm. Bull. Mus. Comp. Zool. viii. 1881, p. 90 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 220 [2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 51 [3].

Hab. MEXICO, Lake Parras in Coahuila [1].

17. PIMEPHALES, Rafin., 1820.

Pimephales, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 216.

Body more or less elongate, moderately compressed. Mouth small, inferior, protractile; no barbels. Pharyngeal teeth with oblique grinding-surface, usually not hooked, in a single series, 4—4. Scales moderate. Dorsal and anal fins short, the former with the first ray more or less spinous (in adult males covered by a thick skin) and separated from the second by a membrane. Intestine elongate.

Three or four species from the United States and Northern Mexico.

1. Pimephales confertus.

Hyborhynchus confertus, Girard, Proc. Ac. Philad. 1856, p. 179 [1].

Pimephales promelas confertus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 217 [2].

Pimelocephales confertus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 50 [3].

Depth of body $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length, length of head $3\frac{2}{3}$ to 4. Snout obtuse; diameter of eye $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of head. Dorsal 10, with 8 branched rays. Anal 8. 50 to 55 scales in a longitudinal series, 8 between lateral line and base of ventral. A dark lateral stripe; males dark with pale vertical bars.

Hab. South-western Texas and Northern Mexico:

Rio Pecos [1] and Brownsville [3] in Texas; Rio Casas Grandes [3], Rio Santa Maria [3], Rio Conchos [3] (*Meek*) and Miñaca [3] in Chihuahua.

Here described from six specimens, measuring up to 60 mm. in total length.

18. COCHLOGNATHUS, Baird & Girard, 1854.

Cochlognathus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 251.

Differs from *Pimephales* especially in the structure of the jaws, each of which is provided with a hard cutting-

plate. The pharyngeal teeth are more strongly hooked than in *Pimephales*, and the intestine is shorter.

Two species from Texas and the Rio Grande.

1. Cochlognathus ornatus.

Cochlognathus ornatus, Baird & Girard, Proc. Ac. Philad. 1854, p. 158[1]; Girard, Bull. U.S. & Mex. Bound. Surv., Fish. p. 46, t. 25. figs. 12–17 (1859)[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 252[3].

Hab. Rio Grande at Brownsville[1 2 3].

19. YURIRIA, Jord. & Everm., 1896.

Yuriria, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 315.

Body elongate, compressed. Mouth protractile, terminal, oblique; a small barbel at the end of each maxillary. Pharyngeal teeth compressed, hooked, in a single series, 4—4. Gill-openings separated by a narrow isthmus. Scales large. Dorsal and anal fins short, the former about in the middle of the length of the fish; ventral fins 10-rayed.

A single species from the Rio Lerma System.

1. Yuriria alta.

Hudsonius altus, Jord. Proc. U.S. Nat. Mus. 1879, p. 301[1].

Hybopsis altus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 321[2], and 1900, fig. 138[3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 81[4].

Depth of body about 4 in the length, length of head $3\frac{2}{3}$ to 4. Snout longer than eye, the diameter of which is $4\frac{1}{3}$ to 5 in the length of head; interorbital width 3 in the length of head. Dorsal 9, with 7 branched rays; origin nearly equidistant from tip of snout and base of caudal; longest ray $\frac{2}{3}$ to $\frac{4}{5}$ the length of head; free edge straight or slightly concave. Anal 9. Pectorals nearly or quite reaching the ventrals, which are inserted below the origin of dorsal. 45 to 50 scales in a longitudinal series, 8 to 10 in a transverse series from origin of dorsal to lateral line, 4 or 5 between lateral line and base of ventral. Lateral line complete, slightly decurved. Caudal peduncle $1\frac{2}{3}$ to 2 as long as deep. Silvery, back darker; fins pale.

Hab. Mexico, Rio Lerma System:

Aguas Calientes[4] (*Jordan, Meek*), Lagos[4], Celaya[4] (*Meek*), Acambaro[4], Lago de Tupataro[1], Salamanca[2] (*Woolman*); Rio Cuitzeo[4]; Ojo de Agua, Michoacan (*Mexico Mus.*).

Here described from several specimens, measuring up to 130 mm. in total length.

20. COUESIUS, Jord., 1878.

Couesius, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 323.

Very similar to the preceding genus, but the body less compressed, the barbel not quite terminal, the pharyngeal teeth in two series, 2, 4—4, 2, and the scales smaller.

Five species from North America, including one from Northern Mexico.

1. Couesius adustus.

Couesius adustus, Woolman, Bull. U.S. Fish. Comm. xiv. 1894, p. 57[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 325[2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 82[3].

Hab. Mexico, Rio Conchos in Chihuahua [1 2].

21. HYBOPSIS, Agass., 1854.

Hybopsis (part.), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 314.

Differs from *Yuriria* in having the body less compressed, the snout obtuse, the mouth horizontal and subterminal or inferior, the isthmus wider, and the ventral fins 7- or 8-rayed.

About fifteen species from the United States, from the Great Lakes to the Rio Grande and its southern tributaries.

1. Hybopsis æstivalis.

Gobio æstivalis, Girard, Proc. Ac. Philad. 1856, p. 189[1], and U.S. & Mex. Bound. Surv., Fish. p. 49, t. 57. figs. 17–29 (1859)[2].

Hybopsis æstivalis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 316[3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 81[4].

Depth of body 4 to 5 in the length, length of head 4. Snout as long as postorbital part of head; diameter of eye 4 in the length of head. Dorsal 9, with 7 branched rays; origin nearer to tip of snout than to base of caudal; longest ray shorter than the head; free edge concave. Anal 8–9. Pectorals sometimes nearly reaching the ventrals, which are inserted below the origin or anterior part of dorsal. 33 to 36 scales in a longitudinal series, 5 or 6 in a transverse series from origin of dorsal to lateral line, $3\frac{1}{2}$ or 4 between lateral line and base of ventral. Caudal peduncle twice as long as deep. Upper part of body with small dark spots; a dusky stripe on each caudal lobe.

Hab. Mexico, Rio San Juan in Nuevo Leon [1 2 4]; Rio Conchos in Tamaulipas [4] (*Meek*).

Here described from six specimens, measuring up to 65 mm. in total length.

2. Hybopsis sterletus.

Ceratichthys sterletus, Cope, in Wheeler's Surv., Zool. v. p. 652, t. 27. fig. 3 (1876).

Depth of body $5\frac{1}{2}$ in the length, length of head 4. Snout nearly as long as postorbital part of head; diameter of eye $4\frac{1}{3}$ in the length of head. Dorsal 9, with 7 branched rays; origin nearer to tip of snout than to base of caudal; longest ray nearly as long as the head; free edge concave. Anal 9. Pectorals extending to the ventrals, which are inserted below the origin of dorsal and reach the anal. 38 scales in a longitudinal series, $5\frac{1}{2}$ in a transverse series from origin of dorsal to lateral line, 4 between lateral line and base of ventral. Caudal peduncle twice as long as deep. Coloration uniform; fins pale.

Hab. Rio Grande:

San Ildefonso [1]; Juarez (*Woolman*).

Here described from a single specimen of 40 mm.

22. AGOSIA, Girard, 1856.

Agosia, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 308.

Differs from *Hybopsis* in the smaller scales, 60 to 90 in a longitudinal series, and in the more posterior position of the dorsal fin, which is often partly above the anal.

About ten species, small fishes of the mountain streams of Western North America, two of which have been recorded from Northern Mexico.

1. Agosia oscula.

Argyreus osculus, Girard, Proc. Ac. Philad. 1856, p. 186 [1], and U.S. Mex. Bound. Surv., Fish. p. 47, t. 27. figs. 9–12 (1859) [2].

Argyreus notabilis, Girard, l. c. [3], and t. c. p. 47, t. 27. figs. 5–8 [4].

Agosia oscula, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 309 [5]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 80 [6].

Hab. Gila River in Arizona:

Recorded in Mexico from the Rio Santa Cruz [3 4] in Northern Sonora, a tributary of the Gila.

2. Agosia chrysogaster.

Agosia chrysogaster, Girard, Proc. Ac. Philad. 1856, p. 187 [1], and U.S. & Mex. Bound. Surv., Fish. p. 49, t. 28. figs. 5–8 (1859) [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 313 [3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 80 [4].

Hab. Gila River in Arizona; Sonora and Western Chihuahua:

Rio Santa Cruz [1 2], Hermosillo [4] and Rucker Cañon [4] in Sonora; Sierra Madre in Chihuahua [4].

23. RHINICHTHYS, Agass., 1850.

Rhinichthys, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 305.

Body elongate, little compressed. Mouth non-protractile, subterminal or inferior; a small barbel at the end of each maxillary. Pharyngeal teeth compressed, hooked, in two series, 2, 4—4, 2 or 1. Gill-openings separated by a broad isthmus. Scales small. Dorsal and anal fins short, the former about in the middle of the length of the fish; ventral fins 7- or 8-rayed.

Three or four species from mountain-streams of North America, including one from Chihuahua.

1. Rhinichthys simus.

Rhinichthys simus, Garm. Science Observer, 1881, p. 61 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 307 [2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 79 [3].

Depth of body 4 to $4\frac{3}{4}$ in the length, length of head about 4. Snout obtuse; mouth inferior; diameter of eye 5 to 6 in the length of head. Dorsal 8–9, with 6 or 7 branched rays; origin above innermost ray of ventrals and nearly equidistant from tip of snout and base of caudal. Anal 8. 50 to 62 scales in a longitudinal series, 12 to 14 in a transverse series from origin of dorsal to lateral line, 8 to 10 between

lateral line and base of ventral. Caudal peduncle nearly twice as long as deep. Brownish; young with a dark lateral band.

Hab. Tributaries of the Rio Grande in Northern Mexico:

Santa Rosalia in Chihuahua [3]; Coahuila [1]; Montemorelos in Nuevo Leon [3] (*Meek*).

Here described from two specimens, 60 and 85 mm. in total length.

Fam. 4. CHARACINIDÆ.

The Characinidæ comprise about 500 species from the fresh-waters of Mexico and South America and 100 from Africa. The family is in many ways the most generalized of the Ostariophysi, but is closely related to the Cyprinidæ. In the Mexican and Central-American species the body is scaly, the maxillary enters the gape of the mouth, the branchiostegals number 3 to 5 and the gill-membranes are free from the isthmus. An adipose dorsal fin is often present and the jaws are usually toothed.

Synopsis of the Mexican and Central-American Genera.

I. Teeth well developed in both jaws.

A. No adipose fin; anal fin short, of 10–12 rays; body rather elongate; mouth large; teeth conical . . . . . 1. Hoplias.

B. An adipose fin.

1. Anal fin short, of 10–12 rays; body rather elongate.

Mouth moderate; teeth in jaws compressed, cuspidate; palate toothless; dorsal fin in the middle of the length of the fish . . . . . 2. Piabucina.

Mouth large, the snout produced, the jaws with small conical teeth in a single series; palate toothed; dorsal fin posterior in position . . . 3. Luciocharax.

2. Anal fin rather long, of 20 to 40 rays; teeth compressed, cuspidate.

a. Teeth of the outer series in both jaws subequal, without canines.

α. Body oblong or ovate; abdomen in front of the ventral fins rounded.

A pair of conical teeth behind the middle of the series in the lower jaw; præmaxillary teeth in 3 or 4 series . . . . . 4. Brycon.

No pair of conical teeth in the lower jaw; præmaxillary teeth in 2 series . 5. Tetragonopterus.

No pair of conical teeth in the lower jaw; præmaxillary teeth in a single series . . . . . 6. Chirodon.

β. Body deep; abdomen in front of ventral fins compressed to a sharp edge . . . . . 7. Gastropelecus.

b. Some of the anterior teeth enlarged, canine-like; snout somewhat produced . . . . . 8. Bramocharax.

3. Anal fin very long, of 45 to 55 rays; teeth conical . . . . . 9. Rœboides.

II. Jaws toothless; anal fin short . . . . . 10. Curimatus.

1. HOPLIAS.

Macrodon (non Schinz), Müll. & Trosch. Hor. Ichthyol. iii. p. 6 (1845); Günth. Cat. Fish. v. p. 281 (1864); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 330.
Hoplias, Gill, Proc. U.S. Nat. Mus. xxvi. 1903, p. 1016.

This genus comprises two species only, viz. *H. microlepis* from Panama and Western Ecuador, and the widely-distributed South-American *H. trahira*, Spix, which ranges from the Magdalena to the La Plata and which differs from its congener in having a broader head and somewhat larger scales.

1. **Hoplias microlepis.** (Tab. XXVI. fig. 1.)

Macrodon microlepis, Günth. Cat. Fish. v. p. 282 (1864) [1].

Depth of body $3\frac{3}{4}$ to 5 in the length, length of head $3\frac{1}{3}$ to $3\frac{1}{2}$. Snout longer than eye, the diameter of which is 6 to 8 in the length of head; interorbital width $3\frac{1}{2}$ to $3\frac{4}{5}$ in the length of head. Mouth wide, the maxillary extending beyond the vertical from the posterior edge of eye; teeth acutely conical, in a single series in the jaws, with some strong canines; teeth on the palatines in bands and on the vomer in two separate patches. 42 to 45 scales in a longitudinal series, 6 between middle of dorsal and lateral line, 5 or 6 between lateral line and root of ventral fin, 11 across the back of the tail from one lateral line to the other. Dorsal 13–14, nearly in the middle of the length of the fish; edge straight or slightly convex. Anal 10–11, rounded. Pectorals and ventrals of moderate length, rounded. Caudal rounded. Olivaceous, marbled with brownish, the marking sometimes forming a longitudinal band and vertical bars; fins with dark undulating stripes or series of spots.

Hab. Panama, Rio Chagres [1] (*Dow, Salvin*).—Western Ecuador (*Festa*).

Here described from several specimens, including the types of the species, measuring up to 300 mm. in total length.

2. PIABUCINA.

Piabucina, Cuv. & Val. Hist. Nat. Poiss. xxii. p. 161 (1849); Günth. Cat. Fish. v. p. 311 (1864); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 332.

This genus resembles *Hoplias* in general form, in the structure and position of the fins, except that the caudal is emarginate instead of rounded, and in the absence of a fontanel in the cranial roof.

About six species are known, from Panama, Ecuador, Colombia, Venezuela, and Guiana.

1. **Piabucina panamensis.**

Piabucina panamensis, Gill, Proc. Ac. Philad. 1876, p. 336 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 333 [2].

Depth of body 4 in the length. Dorsal 10. Anal 12. 30 scales in a longitudinal series. A dark longitudinal band on the middle of the side; a dark spot on the base of the dorsal fin.

Hab. Panama, Rio Tripoli [1].

This species may be identical with *P. erythrinoides*, C. & V., from Venezuela.

2. **Piabucina festæ.**

Piabucina festæ, Bouleng. Boll. Mus. Torin. xiv. 1899, No. 346, p. 1 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 3145 [2].

Depth of body 4 in the length. Dorsal 9. Anal 11. 28 scales in a longitudinal series. Deep olive-brown above, whitish below; fins greyish.

Hab. Panama, Rio Sabina.

Length of the type, 160 mm.

3. LUCIOCHARAX.

Luciocharax, Steind. Denkschr. Ak. Wien, xxxix. 1878, p. 67; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 339.

A single species from Panama and Colombia.

1. **Luciocharax insculptus.**

Luciocharax insculptus, Steind. Denkschr. Ak. Wien, xxxix. 1878, p. 67, t. 13. fig. 2 [1], and xli. 1879, p. 169 [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 339 [3].

Depth of body 6 in the length, length of head 3. Dorsal 10. Anal 12. 44 scales in a longitudinal series. Silvery, back greyish; a dark spot at the base of caudal.

Hab. Panama, Rio Mamoni [2].—Colombia, Rio Magdalena [1].

Total length 300 mm.

4. BRYCON.

Brycon, Müll. & Trosch. Hor. Ichthyol. i. p. 15 (1845); Günth. Cat. Fish. v. p. 333 (1864); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 337.

Chalcinopsis, Kner, Sitzungsb. Bayer. Ak. 1863, p. 226; Günth. t. c. p. 336.

Numerous species from Central and South America.

1. **Brycon guatemalensis,** sp. n.

Chalcinopsis dentex (part.), Günth. Cat. Fish. v. p. 337 (1864) [1], and Trans. Zool. Soc. vi. 1868, p. 478, t. 82. fig. 1 [2].

Depth of body $2\frac{3}{4}$ to $3\frac{2}{3}$ in the length, length of head $4\frac{1}{4}$ to $4\frac{3}{4}$. Snout longer than eye, the diameter of which is $4\frac{1}{3}$ to $5\frac{1}{2}$ in the length of head; interorbital width 2 to $2\frac{3}{5}$ in the length of head. Maxillary extending nearly to below middle of eye; lower jaw a little shorter than the upper; præmaxillary teeth in 4 series. 13 to 15 gill-rakers on the lower part of the anterior arch. 52 to 56 scales in a longitudinal series, 10 between dorsal fin and lateral line, 5 or 6 between lateral line and root of ventral. Dorsal 11; origin behind the ventrals; free edge straight or convex; longest ray as long as or shorter than the head. Anal 34–36, of 4 simple and 30 to 32 branched rays; origin below the middle of dorsal; anterior part of fin deep and convex, middle part emarginate. Pectoral as long as or shorter than head, sometimes reaching the ventrals, which do not extend to the anal. Caudal forked. Silvery; some of the scales with blackish edges, forming vertical streaks; posterior edge of gill-opening blackish; a more or less distinct blackish spot on the caudal peduncle; anal usually dark-edged.

Hab. GUATEMALA, Rio Chisoy, Rio Usumacinta [1 2], Rio Motagua [1 2] and Lake Yzabal [1 2] (*Godman & Salvin*).

Six specimens, measuring up to 400 mm. in total length.

The types of *Brycon dentex*, from Western Ecuador, have 18 gill-rakers on the lower part of the anterior arch, 47 to 50 scales in a longitudinal series, the lower jaw shorter, the eye larger and the interorbital region narrower than in *B. guatemalensis*, and the body uniformly silvery.

Gill (Proc. Ac. Philad. 1877, p. 188) has recorded *B. dentex* from Lake Nicaragua, but judging from Meek's description (Publ. Columbian Mus., Zool. vii. 1907, p. 109) the Nicaraguan species is not *Brycon dentex* and may prove to be distinct from *B. guatemalensis*.

2. **Brycon striatulus.**

Chalcinopsis striatulus, Kner, Sitzgsb. Bayer. Ak. 1863, p. 226 [1]; Günth. Cat. Fish. v. p. 337 (1864) [2].
Chalcinopsis chagrensis, Kner, l. c. p. 338 [3].

Depth of body $2\frac{3}{4}$ to $3\frac{1}{2}$ in the length, length of head $4\frac{1}{4}$ to $4\frac{1}{2}$. Snout a little longer than eye, the diameter of which is 4 to $4\frac{2}{3}$ in the length of head; interorbital width $2\frac{1}{3}$ to $2\frac{3}{4}$ in the length of head. Maxillary extending nearly to below middle of eye; lower jaw a little shorter than the upper; præmaxillary teeth in 4 series. 13 or 14 gill-rakers on the lower part of the anterior arch. 70 to 77 scales in a longitudinal series (exclusive of 4 or 5 on the basal part of the caudal), 12 to 15 between dorsal fin and lateral line, 8 or 9 between lateral line and root of ventral fin. Dorsal 11–12; origin behind the ventrals; free edge nearly straight; longest ray shorter than the head. Anal 33–39, of 3 or 4 simple and 30 to 35 branched rays; anterior part deep and convex, free edge emarginate. Pectoral nearly as long as or shorter than head, sometimes reaching the ventrals, which may extend to the anal. Caudal forked. Coloration as in the preceding species.

Hab. COSTA RICA, Juan Viñas and El Pozo del Rio Grande (*Underwood*); PANAMA, Rio Chagres [1 3].

Here described from several specimens, measuring up to 230 mm. in total length.

5. TETRAGONOPTERUS.

Tetragonopterus, Cuv. Règne Anim. ii. p. 166 (1817); Günth. Cat. Fish. v. p. 317 (1864); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 333.

This genus comprises a large number of species from South America and a few from Mexico and Central America.

Synopsis of the Mexican and Central-American Species.

I. Interorbital width $2\frac{2}{5}$ to 3 in the length of head; 10 to 15 gill-rakers on the lower part of the anterior arch.

Anal 25–33 (3–4/22–29); maxillary extending to below anterior edge or anterior part of eye; diameter of eye 3 to $3\frac{1}{2}$ in the length of head (in specimens of 65 to 120 mm.) . . . . . 1. *æneus*.

Anal 23–29 (3–4/20–25); maxillary extending to below anterior $\frac{1}{3}$ of eye; diameter of eye $2\frac{1}{2}$ to 3 in the length of head (in specimens of 65 to 130 mm.) . . . . . 2. *macrophthalmus*.

Anal 20–27 (3–4/17–24); maxillary extending to below anterior part or middle of eye; diameter of eye $2\frac{3}{4}$ to $3\frac{1}{2}$ in the length of head (in specimens of 60 to 120 mm.). . . . . 3. *mexicanus*.

II. Interorbital width $3\frac{1}{3}$ to $3\frac{1}{2}$ in the length of head; 14–17 gill-rakers on the lower part of the anterior arch . . . . . 4. *angustifrons*.

1. Tetragonopterus æneus.

Tetragonopterus æneus, Günth. Proc. Zool. Soc. 1860, p. 319 [1], and Cat. Fish. v. p. 326 (1864) [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 334 [3].

Tetragonopterus fasciatus (part.), Günth. Cat. Fish. v. p. 322 (1864) [4].

Tetragonopterus microphthalmus (part.), Günth. t. c. p. 324 [5].

Tetragonopterus panamensis, Günth. l. c. [6]; Steind. Denkschr. Ak. Wien, xli. 1879, p. 166, t. 1. figs. 1 & 2 [7].

Tetragonopterus humilis, Günth. t. c. p. 327 [8].

Tetragonopterus finitimus, Bocourt, Ann. Sci. Nat. (5) ix. 1868, p. 62 [9]; Vaill. & Pellegr. Bull. Mus. Paris, 1903, p. 325 [10].

Tetragonopterus belizianus, Bocourt, l. c. [11]; Vaill. & Pellegr. l. c. [12].

Tetragonopterus ærstedii (Kröyer, MS.), Lütken, Vid. Medd. 1874, p. 229 [13].

Tetragonopterus rutilus (part.), Jord. & Everm. l. c. [14].

Tetragonopterus æneus (part.), Meek, Publ. Columbian Mus., Zool. v. 1904, p. 86 [15].

? *Astyanax nasutus*, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 108 [16].

Astyanax rutilus ærstedii, Eigenmann & Ogle, Proc. U.S. Nat. Mus. xxxiii. 1907, p. 22 [17].

Astyanax rutilus nicaraguensis, Eigenmann & Ogle, t. c. p. 23 [18].

Astyanax rutilus æneus, Eigenmann & Ogle, t. c. p. 24 [19].

Astyanax fischeri, Eigenmann & Ogle, t. c. p. 26 [20].

Depth of body $2\frac{1}{4}$ to $3\frac{1}{3}$ in the length, length of head $3\frac{2}{3}$ to $4\frac{1}{2}$. Snout obtuse, not longer than eye, the diameter of which is 3 to $3\frac{1}{2}$ in the length of head; interorbital width $2\frac{1}{2}$ to 3 in the length of head. Maxillary extending to the vertical from anterior edge of eye or sometimes a little beyond; maxillary teeth 0 to 6. 11 to 15 gill-rakers on the lower part of the anterior arch. 32 to 40 scales in a longitudinal series, 6 to 8 in a transverse series from dorsal fin to lateral line, 5 to 7 between lateral line and root of ventral fin. Dorsal 10–12; origin behind the ventrals; longest ray from $\frac{2}{3}$ to as long as the head; free edge of the fin nearly straight. Anal 25–33, with 3 or 4 simple and 22 to 29 branched rays; free edge usually slightly emarginate. Pectoral from $\frac{3}{4}$ to as long as the head, usually reaching the ventrals, which often extend to the origin of anal. Caudal forked. Caudal peduncle about as long as deep. Olivaceous above, silvery below; a bluish-silvery lateral band; often a dark humeral spot; usually a blackish oblong spot on the caudal peduncle, produced on the middle caudal rays.

Hab. Mexico [19], Rio Papaloapam [15] (*Buller*, *Gadow*, *Meek*), Oaxaca [1] (*Sallé*); British Honduras [11 12] (*Paris Mus.*, *Robertson*); Guatemala [19], Rio Motagua [4], Lake Yzabal [6], Huamuchal [4], Rio Guacalate [4], and Lake Amatitlan [5 8] (*Godman & Salvin*), Chinautla [9 10]; Nicaragua [17], Lake Nicaragua [18], Lake Managua [16] and Rio San Juan [13] (*Copenhagen Mus.*); Costa Rica (*Underwood*); Panama [6 20] (*Godman & Salvin*), Rio Mamoni [7], Rio Chagres.

Here described from a large series of specimens, measuring up to 120 mm. in total length, including the types of the species and of *T. microphthalmus*, *T. panamensis*, and *T. humilis*, and co-types of *T. ærstedii* and *T. belizianus*.

T. æneus is very closely allied to *T. rutilus*, Jenyns, which ranges from Venezuela to Montevideo, and it is practically impossible to distinguish between young examples of the two species. When adult specimens are compared, however, the distance between the eye and the upper edge of the lower limb of the præopercle, just behind the articulation of the lower jaw, is seen to be considerably less in *T. rutilus* than in *T. æneus*, being equal to $\frac{1}{2}$ the vertical diameter of the eye in the former and $\frac{3}{4}$ of the same in the latter species.

Steindachner had formerly given the name *T. fischeri* to the specimens which he described and figured as *T. panamensis*. *Astyanax emperador*, Eigenm. & Ogle (Proc. U.S. Nat. Mus. xxiii. 1907, p. 26), from Panama, is said to differ from *A. fischeri* in the smaller scales (39 to 45 instead of 34 to 37) in a longitudinal series.

2. **Tetragonopterus macrophthalmus,** sp. n. (Tab. XXVI. fig. 4.)

Tetragonopterus æneus (part.), Meek, Publ. Columbian Mus., Zool. v. 1904, p. 86[1].

Astyanax rutilus, variety ?, Eigenmann & Ogle, Proc. U.S. Nat. Mus. xxxiii. 1907, p. 23[2].

Depth of body $2\frac{1}{3}$ to $3\frac{1}{4}$ in the length, length of head $3\frac{4}{5}$ to $4\frac{2}{5}$. Snout obtuse, decurved, $\frac{1}{2}$ to $\frac{3}{4}$ as long as eye, the diameter of which is $2\frac{1}{2}$ to 3 in the length of head; interorbital width $2\frac{2}{3}$ to 3 in the length of head. Maxillary extending nearly to the vertical from anterior edge of pupil; 0 to 4 maxillary teeth. 10 to 12 gill-rakers on the lower part of the anterior arch. 34 to 40 scales in a longitudinal series, 6 to 8 in a transverse series from dorsal fin to lateral line, 5 or 6 between lateral line and base of ventral. Dorsal 10–12; origin behind the base of ventrals; longest ray as long as the head; free edge of the fin nearly straight. Anal 23–29, of 3 or 4 simple and 20 to 25 branched rays; free edge usually emarginate. Pectoral about as long as the head, usually reaching the ventrals, which nearly or quite reach the origin of anal. Caudal forked. Caudal peduncle longer than deep. Coloration as in the preceding species.

Hab. Mexico (*Sallé*), Motzorongo[2] in Vera Cruz[1 2] (*Meek*, *Gadow*).

Several specimens, measuring up to 130 mm. in total length.

Meek's description is evidently based on examples of this species, but he also had the true *T. æneus* in his collections.

3. **Tetragonopterus mexicanus.** (Tab. XXVI. figg. 2, 3.)

Tetragonopterus mexicanus, Filippi, Rev. Mag. Zool. 1853, p. 166[1]; Steind. Sitzungsb. Ak. Wien, lx. 1869, p. 299, t. 4[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 335[3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 85[4].

Tetragonopterus argentatus, Baird & Girard, Proc. Ac. Philad. 1854, p. 27[5]; Jord. & Everm. t. c. p. 336[6].

Tetragonopterus fasciatus (part.), Günth. Cat. Fish. v. p. 322 (1864)[7].

Tetragonopterus brevimanus, Günth. t. c. p. 325[8].

Tetragonopterus petenensis (part.), Günth. t. c. p. 326[9].

Tetragonopterus cobanensis, Bocourt, Ann. Sci. Nat. (5) ix. 1868, p. 62[10]; Vaill. & Pellegr. Bull. Mus. Paris, 1903, p. 323[11].

Tetragonopterus oaxacanensis, Bocourt, l. c.[12]; Vaill. & Pellegr. t. c. p. 324[13].

Tetragonopterus nitidus, Bocourt, l. c.[14]; Vaill. & Pellegr. l. c.[15].

Tetragonopterus fulgens, Bocourt, l. c.[16]; Vaill. & Pellegr. l. c.[17].

Tetragonopterus streetsii, Cope, Proc. Ac. Philad. 1871, p. 217[18].

Astyanax mexicanus, Eigenmann & Ogle, Bull. U.S. Nat. Mus. xxxiii. 1907, p. 25[19].

Depth of body $2\frac{2}{5}$ to $3\frac{1}{3}$ in the length, length of head $3\frac{3}{5}$ to $4\frac{2}{5}$. Snout obtuse, nearly as long as or shorter than eye, the diameter of which is $2\frac{3}{4}$ (young) to $3\frac{1}{2}$ in the length of head; interorbital width $2\frac{2}{5}$ to $2\frac{4}{5}$ in the length of head. Maxillary extending about to the vertical from anterior edge of pupil, or sometimes nearly to below middle of eye; maxillary teeth 0 to 5. 10 to 14 gill-rakers on the lower part of anterior arch. 33 to 39 scales in a longitudinal series, 6 to 8 in a transverse series from dorsal fin to lateral line, $4\frac{1}{2}$ to 7 between lateral line and root of ventral fin. Dorsal 10–12; origin above or a little behind the base of last ray of ventral; longest ray $\frac{2}{3}$ to $\frac{5}{6}$ the length of head; free edge of the fin straight or slightly convex. Anal 20–27, with 3 or 4 simple and 17 to 24 branched rays, free edge usually slightly emarginate. Pectoral $\frac{3}{5}$ to $\frac{5}{6}$ the length of head, sometimes reaching the ventrals, which may or may not extend to the origin of anal. Caudal forked. Caudal peduncle longer than deep. Olivaceous above, silvery below; a bluish-silvery lateral band; often a dark humeral blotch; an oblong blackish spot on the caudal peduncle, extending to the end of the middle caudal rays.

Hab. Texas[19], Rio Grande[5], Rio Nueces[5] (*Smithsonian Inst.*), and Rio Leona[5].—Mexico, Rio Conchos in Chihuahua[6] (*Woolman*), Rio Nazas in Durango[4], Rio San Juan in Nuevo Leon[4], Rio Conchos, Rio Soto Marina, and Rio Forlon in Tamaulipas[4] (*Meek*), Rio Verde in San Luis Potosi[4] (*Jordan, Meek*), Rio Papaloapam and its tributaries[4 18]; Rio Balsas and its tributaries[1 2 4 14 15 16 17] (*Boucard, Meek*); Guatemala, Rio Chisoy[7], Rio San Gerónimo[8], Lake Peten[9] and Lake Yzabal[8] (*Salvin*), Coban in Vera Paz[10 11] (*Paris Mus.*).

Here described from a large series of specimens measuring up to 120 mm. in total length, including the types of *T. brevimanus* (fig. 3) and *T. petenensis* (fig. 2), co-types of *T. argentatus* and of *T. cobanensis*, and examples collected at Cuernavaca by M. Boucard, corresponding to the *T. nitidus* and *T. fulgens* of Bocourt, which were described from specimens obtained at this place by the same collector.

4. **Tetragonopterus angustifrons**, sp. n. (Tab. XXVI. fig. 5.)

Depth of body about 3 in the length, length of head $3\frac{2}{3}$ to 4. Snout subconical, $\frac{2}{3}$ as long as eye, the diameter of which is 3 in the length of head; interorbital width $3\frac{1}{3}$ to $3\frac{1}{2}$ in the length of head. Maxillary extending about to the vertical from anterior edge of pupil; 3 to 5 maxillary teeth. 14 to 17 gill-rakers on the lower part of the anterior arch. 34 to 38 scales in a longitudinal series, 7 or 8 in a transverse series from dorsal fin to lateral line, 6 or 7 between lateral line and base of ventrals. Dorsal 11; origin behind the base of ventrals; longest ray $\frac{3}{4}$ to $\frac{4}{5}$ the length of head; free edge of fin slightly convex. Anal 26–29, of 3 or 4 simple and 23 to 26 branched rays; free edge slightly emarginate. Pectoral $\frac{3}{4}$ the length of head, about reaching the ventrals, which extend nearly to the anal. Caudal forked. Caudal peduncle longer than deep. Coloration as in the preceding species.

Hab. Mexico (*Sallé*).

Three specimens, the largest 80 mm. in total length.

6. CHIRODON.

Chirodon, Girard, Proc. Ac. Philad. vii. 1854, p. 199; Günth. Cat. Fish. v. p. 332 (1864).

About twelve species from South America and one from Mexico.

1. **Chirodon compressus.**

Hemigrammus compressus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 87, fig. 25.

Depth of body $2\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$. Snout shorter than eye, the diameter of which is $2\frac{3}{4}$ in the length of head and greater than the interorbital width. Maxillary extending a little beyond the vertical from the anterior edge of eye; 5 maxillary teeth. About 12 gill-rakers on the lower part of the anterior arch. About 45 scales in a longitudinal series; lateral line on only 5 or 6 scales. Dorsal 10–11; origin behind the ventrals. Anal 25–27, origin below middle or posterior part of dorsal; anterior part of fin deep, pointed; free edge emarginate. Pectoral reaching the ventrals, which extend beyond the origin of anal. Caudal forked. Olivaceous; a dark spot on the basal part of the dorsal fin.

Hab. MEXICO, Rio Papaloapam [1] (*Meek*).

Here described from two specimens, 45 mm. in total length.

7. GASTROPELECUS.

Gastropelecus, Pall. Spic. Zool. fasc. 8, p. 50 (1769); Günth. Cat. Fish. v. p. 342 (1864); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 337.

About six species from tropical South America and one from Panama.

1. **Gastropelecus maculatus.**

Gastropelecus maculatus, Steind. Denkschr. Ak. Wien, xli. 1879, p. 168, t. 1. fig. 4 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 338 [2].

Dorsal 11. Anal 36 or 37. 31 or 32 scales in a longitudinal series.

Hab. PANAMA, Rio Mamoni [1].

Length about 80 mm.

8. BRAMOCHARAX.

Bramocharax, Gill, Proc. Ac. Philad. 1877, p. 189; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 338.

Two species from Nicaragua.

1. **Bramocharax bransfordi.**

Bramocharax bransfordi, Gill, Proc. Ac. Philad. 1877, p. 190 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 339 [2]; Eigenmann & Ogle, Proc. U.S. Nat. Mus. xxxiii. 1907, p. 32, fig. 6.

Dorsal 11. Anal 28. Depth of body $2\frac{3}{4}$ in the length.

Hab. LAKE NICARAGUA [1].

Eigenmann and Ogle's figure of this species shows that the teeth are not conical, but notched, as in *Brycon*, &c. The produced pointed snout and the canine-like anterior teeth distinguish *Bramocharax* from *Chirodon*.

2. **Bramocharax elongatus.**

Bramocharax elongatus, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 110[1].

Dorsal 10. Anal 25 to 28. 41 scales in a longitudinal series. Depth of body $3\frac{2}{5}$ to 4 in the length. Maxillary extending to below middle of eye.

Hab. NICARAGUA, Lake Managua[1].

Total length 150 mm.

9. RŒBOIDES.

Rœboides, Günth. Cat. Fish. v. p. 347 (1864); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 338.

About ten species from Central and South America.

1. **Rœboides guatemalensis.**

Anacyrtus (*Rœboides*) *guatemalensis*, Günth. Cat. Fish. v. p. 347 (1864)[1], and Trans. Zool. Soc. vi. 1868, p. 479, t. 82. fig. 4[2].

Rœboides guatemalensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 339[3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 88[4], and vii. 1907, p. 111[5].

Depth of body $2\frac{1}{2}$ to $2\frac{4}{5}$ in the length, length of head about 4. Snout as long as eye, the diameter of which is $3\frac{1}{2}$ to $3\frac{2}{3}$ in the length of head and equal to the interorbital width. Maxillary extending to below middle of eye; lower jaw included. Upper profile of head concave. 10 gill-rakers on the lower part of the anterior arch. 76 to 82 scales in a longitudinal series, 17 to 19 between dorsal fin and lateral line, 20 to 22 from lateral line to origin of anal. Dorsal 11–12, rather elevated; origin above anterior part of anal. Anal 47–53, with 3 or 4 simple and 44 to 49 branched rays, deepest anteriorly; free edge straight. Pectoral extending to, ventrals beyond the origin of anal. Caudal forked. Olivaceous; a silvery lateral stripe, sometimes bearing a dusky spot, about equidistant from head and dorsal fin and another on the caudal peduncle.

Hab. MEXICO, San Gerónimo in Oaxaca[4]; GUATEMALA, Huamuchal[1 2] (*Salvin*); NICARAGUA, Lake Nicaragua[5]; COSTA RICA, Juan Viñas and El Pozo del Rio Grande (*Underwood*); PANAMA, Rio Chagres[1 2] (*Salvin*).—WESTERN ECUADOR (*Rosenberg*).

10. CURIMATUS.

Curimatus, Cuv. & Val. Hist. Nat. Poiss. xxii. p. 5 (1849); Günth. Cat. Fish. v. p. 288 (1864); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 332.

Several species from Tropical South America, one extending into Panama.

1. **Curimatus magdalenæ.**

Curimatus magdalenæ, Steind. Denkschr. Ak. Wien, xxxix. 1878, p. 50[1], and xli. 1879, p. 167[2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 332[3].

Dorsal 11–12. Anal 9–10. 36 to 38 scales in a longitudinal series. Depth of body $2\frac{2}{3}$ in the length.

Hab. PANAMA, Rio Mamoni[2].—COLOMBIA, Rio Magdalena[1].

Fam. 5. GYMNOTIDÆ.

This family, which has recently been monographed by Eigenmann *, comprises about 30 species from South America, one of which extends into Panama and another as far north as Guatemala.

The Gymnotidæ are highly specialized Characinids, and may be recognized by the long, more or less eel-shaped body, naked or covered with small scales, the restricted gill-openings, the anterior position of the vent, the absent dorsal and ventral fins, the very long anal, and the small or absent caudal.

Synopsis of the Central-American Genera.

Each jaw with a series of conical teeth	1. GITON.
Each jaw with a patch or band of very small villiform teeth	2. EIGENMANNIA.

1. GITON, Kaup, 1856.

Carapus (non Rafin.), Cuv. Règne Anim. p. 237 (1817); Müll. & Trosch. Hor. Ichthyol. iii. p. 13 (1845); Günth. Cat. Fish. viii. p. 9 (1870).
Giton, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 340.

This genus includes only one species.

1. Giton fasciatus, Pall., 1769.

Carapus fasciatus, Günth. Cat. Fish. viii. p. 9 (1870) [1].
Giton fasciatus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 340 [2].
Gymnotus carapo, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 135 [3].

Hab. Guatemala to La Plata [1 2]; in Central America known only from the Rio Motagua (*Salvin*) and Lake Amatitlan [3].

A very variable species, sometimes uniformly coloured, more often with oblique dark cross-bands which may break up into spots.

Total length 400 mm.

2. EIGENMANNIA, Jord. & Everm., 1896.

Eigenmannia, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 341.

Four species from Tropical America.

1. Eigenmannia humboldti, Steind., 1878.

Sternopygus humboldti, Steind. Denkschr. Ak. Wien, xxxix. 1878, p. 71, t. 14. fig. 3 [1], and xli. 1879, p. 169 [2].
Eigenmannia humboldti, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 341 [3].

Hab. PANAMA, Rio Mamoni [2].—COLOMBIA, Rio Magdalena [1].

Total length 450 mm.

* Proc. Washington Ac. vii. 1905.

Sub-order VIII. MALACOPTERYGII.

This sub-order is represented in the fresh waters of Mexico and Central America by a few fishes, mostly marine types. These are soft-rayed fishes with elongate or ovate scaly body and naked head; dorsal, anal, and caudal fins are present, the pectorals are placed low and the ventrals are abdominal. The naked head, the maxillary forming part of the border of the mouth, the normal position of the lateral line (when present), and the larger number of rays in the ventral fins distinguish them externally from the Haplomi of this region. From the Characinidæ they may usually be distinguished by the larger number of branchiostegal rays.

Synopsis of the Families represented in the fresh waters of Mexico and Central America.

I. An adipose dorsal fin . . . . . 1. SALMONIDÆ.

II. No adipose fin.

A. No gular plate; teeth small or absent.

No lateral line . . . . . 2. CLUPEIDÆ.

Lateral line well developed . . . . . 3. CHANIDÆ.

B. A gular plate between the rami of the lower jaw; bands of villiform teeth in the jaws and on the palate and tongue . . . . . 4. ELOPIDÆ.

Fam. 1. SALMONIDÆ.

The Salmonidæ are principally a circumpolar family of marine origin which are establishing themselves in fresh water in the Palæarctic and Nearctic Regions. One fresh-water genus occurs in Australia and New Zealand. There are about twenty genera, but the number of species which should be recognized is very uncertain.

1. SALMO, Linn.

Oncorhynchus (Suckley, 1861) and *Salmo,* Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, pp. 474 and 483.

Body elongate, more or less compressed, covered with small cycloid scales. Lateral line present. Head naked; mouth large; conical teeth in the jaws and on the palate. Dorsal fin short, in the middle of the length of the fish; an adipose fin; anal short or of moderate length; caudal forked or truncate.

The species are very variable and difficult to define; they inhabit the rivers and lakes of North America, Europe, and Asia; many of the forms are migratory, living part of their life in the sea and ascending rivers to spawn.

1. **Salmo clarkii,** Richards.

Salmo mykiss, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 487.
Salmo clarkii, Jord. & Everm. t. c. 1900, p. 2819.
Salmo irideus, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 96.

Hab. Streams of the Rocky Mountains and Sierra Nevada, from Kamchatka and Alaska to California and Durango.

This species embraces a number of local forms, including *S. spilurus*, Cope (Jord. & Everm. t. c. p. 495, fig. 210), which inhabits the upper Rio Grande and extends southwards into Chihuahua and Durango.

A second form, *S. pleuriticus*, Cope (Jord. & Everm. t. c. p. 496, fig. 211), is found in the Colorado River, and is probably the trout reported by Meek as abundant in the Rio Yaqui in Sonora.

Fam. 2. CLUPEIDÆ.

A large and widely distributed marine family; several species are anadromous, and some are permanently fluviatile.

The Clupeidæ may be distinguished from other soft-rayed fishes of the fresh waters of Mexico and Central America by the compressed body, covered with thin cycloid scales, the naked head, the feeble dentition, and the absence of a lateral line.

Synopsis of the Genera represented in the fresh waters of Mexico and Central America.

I. Abdomen compressed to a serrated edge; mouth small or moderate; last dorsal ray elongate.

Maxillary bearing one supramaxillary . . . . . 1. Dorosoma.
Maxillary bearing two supramaxillaries . . . . . 2. Signalosa.

II. Abdomen not serrated; mouth large, the maxillary extending back far behind the eye; last dorsal ray not elongate.

Teeth in the jaws evident, some more or less enlarged . . . . . 3. Lycengraulis.
Teeth in the jaws very small or absent . . . . . 4. Anchovia.

1. DOROSOMA, Rafin., 1829.

Chatoessus (Cuv.), Günth. Cat. Fish. vii. p. 406 (1868).
Dorosoma, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 415.

Five species from the Atlantic coasts and rivers of America.

Synopsis of the Mexican and Central-American Species.

74 to 78 scales in a longitudinal series; anal of 26 to 30 rays . . . . . 1. *chavesi.*
69 to 73 scales in a longitudinal series; anal of 36 to 38 rays . . . . . 2. *anale.*
56 to 60 scales in a longitudinal series; anal of 30 to 34 rays . . . . . 3. *exile.*
40 to 45 scales in a longitudinal series; anal of 21 to 24 rays . . . . . 4. *petenense.*

1. Dorosoma chavesi.

Dorosoma chavesi, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 112 [1].

Hab. Nicaragua, Lakes Managua and Nicaragua [1].

Total length 210 mm.

2. Dorosoma anale.

Dorosoma anale, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 93, fig. 26 [1].

Hab. MEXICO, Otopa and Rio Papaloapam in Vera Cruz [1].

Total length 300 mm.

3. Dorosoma exile.

Dorosoma cepedianum exile (Jord. & Gilb., 1882), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 416 [1].

Dorosoma exile, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 94 [2].

Hab. Coasts and rivers of Texas [1] and Tamaulipas [2].

Total length 300 mm.

4. Dorosoma petenense.

Chatoessus petenensis, Günth. Cat. Fish. vii. p. 408 (1868) [1].

Dorosoma petenense, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 417 [2].

Depth of body $2\frac{3}{4}$ to 3 in the length, length of head $3\frac{1}{2}$. Jaws equal anteriorly; maxillary extending to below anterior $\frac{1}{4}$ or $\frac{1}{3}$ of eye. 40 to 43 scales in a longitudinal series. Dorsal 14–15; origin above or slightly in advance of the ventrals. Anal 21–24. Pectoral nearly reaching the ventral. Silvery, a dark humeral spot.

Hab. GUATEMALA, Lake Peten [1] (*Salvin*).

Here described from the types, four specimens, 70 to 90 mm. in total length.

2. SIGNALOSA, Everm. & Kendall, 1898.

Signalosa, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1900, p. 2809.

A single species.

1. Signalosa mexicana.

Chatoessus mexicanus, Günth. Cat. Fish. vii. p. 409 (1868) [1].

Dorosoma mexicanum, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 416 [2].

Signalosa atchafalayæ, Everm. & Kendall, Bull. U.S. Fish. Comm. 1897, p. 127 (1898) [3]; Jord. & Everm. t. c. 1900, p. 2809, fig. 184 [4].

Signalosa mexicana, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 94 [5].

Depth of body $2\frac{2}{3}$ to 3 in the length, length of head 3 to $3\frac{1}{2}$. Jaws equal anteriorly; maxillary extending to below anterior $\frac{1}{4}$ or $\frac{1}{3}$ of eye. 40 to 42 scales in a longitudinal series. Dorsal 13–14; origin immediately behind the base of the ventrals. Anal 24–25. Pectoral extending to or a little beyond the base of ventral. Silvery, a dark humeral spot.

Hab. Atlantic Coast streams of the Southern United States and Mexico:

UNITED STATES, Mississippi [4] and Louisiana [3 4]; MEXICO [1] (*Sallé*), Valles in San Luis Potosi [5]; Rio Papaloapam in Vera Cruz [5] (*Meek*).

Here described from three specimens, 90 to 100 mm. in total length, including the types of the species. *S. atchafalayæ* is described and figured as having the origin of the dorsal above the ventrals, but it seems to be the same as *S. mexicana*.

3. LYCENGRAULIS, Günth., 1868.

Lycengraulis, Günth. Cat. Fish. vii. p. 399 (1868); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 451.

Two species from the coasts of Panama and South America.

1. **Lycengraulis poeyi.**

Engraulis poeyi, Kner & Steind. Abhandl. Bayern. Ak. x. 1864, p. 23, t. 3. fig. 3 [1].
Stolephorus poeyi, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 445 [2].
Lycengraulis poeyi, Gilb. & Starks, Mem. Calif. Ac. iv. 1904, p. 49 [3].
Hab. Panama [3], Rio Bayano [1].

Total length 208 mm.

4. ANCHOVIA, Jord. & Everm., 1896.

Anchovia, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 449.

A single species.

1. **Anchovia macrolepidota.**

Engraulis macrolepidotus, Kner & Steind. Abhandl. Bayern. Ak. x. 1864, p. 21, t. 3. fig. 2 [1].
Anchovia macrolepidota, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 449 [2].
Hab. Pacific Coast of Mexico and Central America, entering rivers:
Mexico, Guaymas [2]; Panama, Rio Bayano [1].

Total length 200 mm.

Fam. 3. CHANIDÆ.

This family includes a single genus with 3 or 4 species, marine fishes of the Indo-Pacific.

1. CHANOS, Lacep., 1803.

Chanos, Günth. Cat. Fish. vii. p. 473 (1868); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 414.

Body elongate or ovate, compressed, covered with small cycloid scales. Lateral line complete, straight. Head naked; mouth small, terminal, toothless; gill-membranes broadly united; an adipose eyelid. Dorsal fin short, in the middle of the length of the fish, above the ventrals; anal fin short; caudal deeply forked.

1. **Chanos salmoneus,** Bl. Schn., 1801.

Chanos salmoneus, Günth. Cat. Fish. vii. p. 473 (1868).
Chanos chanos (Forsk.), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 414, and 1900, fig. 182.
Hab. Indian and Pacific Oceans, entering rivers.

Specimens of this large silvery fish in the British Museum are from brackish lakes at Chiapam in Guatemala.

Fam. 4. ELOPIDÆ.

Two genera with five species, inhabiting tropical and subtropical seas.

1. MEGALOPS, Lacep., 1803 *.

Megalops, Günth. Cat. Fish. vii. p. 471 (1868).
Tarpon, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 409.

Body elongate, compressed, covered with large silvery cycloid scales. Lateral line present. Head naked; mouth large, terminal, the lower jaw prominent; bands of villiform teeth in the jaws and on the palate and tongue. A gular plate between the rami of the lower jaw. Dorsal fin short, in the middle of the length of the fish, last ray produced; anal of moderate length; caudal forked.

Two species, one from the Indian Ocean, the other from the Atlantic coasts of America.

1. **Megalops atlanticus**, Cuv. & Val., 1846.

Megalops thrissoides (non Bl. Schn.), Günth. Cat. Fish. vii. p. 472 (1868).
Tarpon atlanticus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 409, and 1900, fig. 117.

Hab. Atlantic coasts of America from Long Island to Brazil, entering rivers.

The Tarpon attains a length of 1800 mm. It has been recorded by Gill and Bransford (Proc. Ac. Philad. 1877, p. 187) from Lake Nicaragua.

Sub-order IX. GINGLYMODI.

This sub-order includes only the genus *Lepidosteus*, unique among fishes in having opisthocœlous vertebræ, and distinguished from other fresh-water fishes of Mexico and Central America by the rugose skull, the hard, rhombic ganoid scales, and the abbreviate heterocercal caudal fin.

Fam. 1. LEPIDOSTEIDÆ.

1. LEPIDOSTEUS, Lacep., 1803.

Lepidosteus, Günth. Cat. Fish. viii. p. 328 (1870); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 109.

Body elongate, subcylindrical, covered with bony rhombic scales arranged in oblique series running downwards and backwards. Jaws elongate, the upper projecting beyond the lower; teeth conical, in the jaws and on the palate. Dorsal fin short, posterior, nearly opposite the anal; pectorals placed low; ventrals abdominal; caudal rounded.

Six or seven species of this genus may be regarded as valid. They inhabit North and Central America.

* This name has been used for a genus of Staphylinidæ in the Biol. Centr.-Am. (Coleopt. i. pt. 2), but it has priority in Pisces.

Synopsis of the Mexican and Central-American Species.*

I. Snout more than twice as long as the rest of the head; no series of enlarged teeth on the palatines in the adult . . . . . 1. *osseus.*

II. Snout not more than once and a half as long as the rest of the head; a series of enlarged teeth on the palatines in the adult, as well as in the young.

58 to 60 scales in a longitudinal series; length of head 3 to $3\frac{1}{3}$ in the length of the fish (in specimens of 300 to 500 mm.) . . . . . 2. *tristoechus.*

51 to 54 scales in a longitudinal series; length of head $3\frac{2}{5}$ to $3\frac{3}{5}$ in the length of the fish (in specimens of 450 to 500 mm.) . . . . . 3. *tropicus.*

1. Lepidosteus osseus.

Esox osseus, Linn. Syst. Nat. p. 313 (1758) [1].

Lepidosteus osseus, Günth. Cat. Fish. viii. p. 330 (1870) [2]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 109 [3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 5 [4].

Snout about $2\frac{1}{2}$ times as long as the rest of the head. Dorsal 7–8. Anal 8–9. 58 to 62 scales in a longitudinal series.

Hab. United States from the Great Lakes to the Rio Grande [2 3]; North-eastern Mexico [4].

In Mexico recorded by Meek from San Juan in Nuevo Leon, Forlon in Tamaulipas, and Valles in San Luis Potosi.

Total length 1500 mm.

2. Lepidosteus tristoechus.

Esox tristoechus, Schneid. Bloch's Syst. Ichth. p. 395 (1801) [1].

Lepidosteus viridis (non Gmelin), Günth. Cat. Fish. viii. p. 329 (1870) [2].

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* The three species here recognised comprise the subgenera *Lepidosteus* (*L. osseus*) and *Atractosteus* (*L. tristoechus* and *L. tropicus*). There is a third subgenus, *Cylindrosteus*, with the dentition of *Lepidosteus*, but with the snout shorter and broader than in *L. osseus*, only a little longer than the rest of the head. This subgenus is usually considered to include a single species, *L. platystomus*, Rafin., which is said to range from the Great Lakes to Texas. Examination of the specimens in the British Museum leaves no doubt that 3 or 4 distinct species belong to this section; some of these may extend into North-eastern Mexico.

L. productus, Cope, seems to be different from *L. platystomus* or any of the species which I have seen. Specimens of *L. platystomus* from Illinois and Louisiana have 60 to 62 scales in a longitudinal series and the width of the snout, at the level of the angles of the mouth, not more than $\frac{1}{3}$ the length of the upper jaw. A fish from St. Louis, received from the Museum of Comparative Zoology, closely resembles *L. platystomus*, and may not be specifically distinct, but has larger scales (55 or 56 in a longitudinal series) and corresponds in every way to *L. agassizii*, Dum., also described from a St. Louis specimen from the Museum of Comparative Zoology. The type of *L. grayi*, Agass. (600 mm. long), and a much larger specimen, also from Louisiana, differ from *L. platystomus* in having a much broader snout (width at the angles of the mouth $2\frac{1}{3}$ in the length of the upper jaw). *L. zadocki*, Dum., is evidently the same as *L. grayi*.

Lepidosteus tristoechus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 111[3]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 6[4].

Length of head 3 to $3\frac{1}{3}$ in the length of the fish. Snout $1\frac{1}{4}$ to $1\frac{2}{5}$ as long as the rest of the head. Dorsal 7–8. Anal 7–8. 58 to 60 scales in a longitudinal series.

Hab. Southern United States[2 3 4]; North-eastern Mexico[2 3 4]; Cuba[1 2 3].

In Mexico recorded from Tampico in Tamaulipas.

Here described from three specimens, 300 to 500 mm. in total length, from Mexico and Cuba. The species is said to attain a length of 3600 mm.

3. Lepidosteus tropicus.

Atractosteus tropicus, Gill, Proc. Ac. Philad. 1863, p. 172[1]; Duméril, Hist. Nat. Poiss. ii. p. 367 (1870)[2].

Atractosteus bocourti, Duméril, t. c. t. 22. fig. 1[3].

Lepidosteus tropicus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 111[4]; Everm. & Goldsborough, Bull. U.S. Fish. Comm. xxi. 1902, p. 139[5]; Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 104[6].

Length of head $3\frac{2}{5}$ to $3\frac{3}{5}$ in the length of the fish. Snout $1\frac{1}{5}$ to $1\frac{2}{5}$ as long as the rest of the head. Dorsal 6–7. Anal 6–7. 51 to 54 scales in a longitudinal series.

Hab. Mexico, Montecristo and Teapa in Tabasco[5]; Guatemala, Huamuchal (*Salvin*) and Rio Nagualate[2 3]; Nicaragua, Lakes Managua and Nicaragua[6]; Panama[1].

Here described from two specimens, 450 and 500 mm. in total length.

Sub-class II. SELACHII.

Order I. EUSELACHII.

Sub-order I. PLEUROTREMATA.

Sharks, with the gill-openings lateral, 5 to 7 in number on each side, the last in front of or above the pectoral fin.

Fam. 1. CARCHARIIDÆ.

1. CARCHARIAS, Rafin., 1810.

Carcharias, Günth. Cat. Fish. viii. p. 357 (1870).

Carcharinus (Blainv., 1816), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 33.

Numerous species from tropical and sub-tropical seas.

1. **Carcharias nicaraguensis.**

Eulamia nicaraguensis, Gill & Bransf. Proc. Ac. Philad. 1877, p. 190.
Carcharinus nicaraguensis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 39.

Hab. NICARAGUA, Lake Nicaragua and Rio San Juan.

This shark attains a length of 2100 mm. It has so far only been recorded from fresh water, and does not appear to be identical with any of the marine species of the coasts of America.

Sub-order II. HYPOTREMATA.

Rays, with the gill-openings ventral, five in number on each side, below the pectoral fins.

Fam. 1. PRISTIDÆ.

1. PRISTIS, Latham, 1794.

Pristis, Günth. Cat. Fish. viii. p. 436 (1870) ; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 60.

This genus comprises four or five species, "Saw-fishes," inhabiting warm seas on sandy shores and often ascending rivers. Only two species appear to occur on the coasts of Mexico and Central America *.

1. **Pristis pectinatus,** Latham, 1794.

Pristis pectinatus, Günth. Cat. Fish. viii. p. 437 (1870) ; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 60.

24 to 32 pairs of rostral teeth, the posterior further apart than the anterior.

Hab. Tropical seas.

2. **Pristis perrotteti,** Müll. & Henle, 1838.

Pristis perrotteti, Günth. Cat. Fish. viii. p. 436; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 60.
Pristis zephyreus (Jord. & Starks), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2749.

18 to 22 pairs of rostral teeth.

Hab. Tropical seas.

This is probably the Saw-fish which has been recorded from Lake Nicaragua by Gill and Bransford (Proc. Ac. Philad. 1877, p. 190) as *Pristis antiquorum*, Latham.

* Saw-fishes were seen by Mr. G. C. Champion in a fresh-water lagoon at Paso Antonio, near the Pacific coast of Guatemala.

Sub-class III. CYCLOSTOMATA.

Order I. HYPEROARTII.

Fam. 1. PETROMYZONIDÆ.

Lampreys, with naked eel-shaped body, suctorial mouth, and seven gill-openings on each side.

1. LAMPETRA, Gray, 1851.

Lampetra, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 12.

Five or six species, small Lampreys inhabiting brooks in Europe and North America.

1. **Lampetra spadicea.**

Lampetra spadicea, Bean, Proc. U.S. Nat. Mus. 1887, p. 374[1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 13, and 1900, fig. 6[2]; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 2, fig. 1[3].

Hab. Mexico, Rio Lerma System:
Guanajuato[1 2]; Lake Chapala[3].

SUPPLEMENT.

THE following additions and corrections are chiefly necessitated by the acquisition of fresh material during the progress of this work, and by the recent publication of some papers by Dr. S. E. Meek on Central-American fishes. I am indebted to Dr. Meek for kindly sending me proof-sheets of his latest memoir (Publ. Columbian Mus., Zool. vii. 1907, pp. 133–157); in this he quotes, presumably from proofs, a paper on the fishes of the Rio Motagua (Miller, Bull. Amer. Mus. Nat. Hist. 1907, pp. 95–124) which I have not seen.

ACHIRUS (p. 3).

2 (A). **Achirus fischeri,** Steind., 1879.

Achirus fischeri, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 2699.

Depth of body nearly 2 in the length; right pectoral fin represented by a single ray; 60 to 62 scales in a longitudinal series.

Hab. PANAMA, Rio Mamoni.

SICYDIUM (p. 10).

1 (A). **Sicydium altum.**

Sicydium altum, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 149[1].

Horizontal teeth of lower jaw mostly concealed. Scales extending forward on the upper surface of the head nearly to the interorbital region; abdomen scaly, except for a small area just behind the ventral fins; 92 scales in a longitudinal series. Dorsal VI, I 10. Anal I 10. Dark olivaceous, without spots or bars; fins without spots or vermiculations, the anal with a dark edge.

Hab. COSTA RICA, Turrialba[1] and El Guayabo[1].

Total length 105 mm.

1 (B). **Sicydium pittieri.**

Sicydium pittieri, Regan, Ann. Mag. Nat. Hist. (7) xix. 1907, p. 260[1].

Horizontal teeth of lower jaw concealed or not. Scales extending forward on the upper surface of the head nearly to the interorbital region; abdomen with a median naked area or strip; 75 to 80 scales in a longitudinal series. Dorsal VI, I 10. Anal I 10. A dark spot on each scale; dorsal fins with dark vermiculations; anal with a dark edge.

Hab. COSTA RICA, Rio Grande de Terraba[1] (*Pittier*).

Here described from the types, two specimens (males), 120 and 135 mm. in total length.

CICHLOSOMA (p. 17).

1 (A). **Cichlosoma zonatum.**

Cichlasoma zonatum, Meek, Proc. Biol. Soc. Washington, xviii. 1905, p. 245 [1].

This species was originally described as having the jaws equal anteriorly, and I suggested (*anteà*, p. 20) that it might be the same as *C. guttulatum*. Dr. Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 141) has now stated that *C. zonatum* differs from *C. guttulatum* in the *smaller and more inferior mouth*; it is evidently allied to *C. eigenmanni*, differing in the deeper body (depth $2\frac{1}{10}$ in the length), the lower spinous dorsal (last spine $\frac{2}{5}$ the length of head), and the fewer soft rays (10 or 11) in the dorsal fin.

Hab. Mexico, Niltepec in Oaxaca [1].

Cichlosoma maculicauda (p. 19).

Recorded from Belize by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 151).

3 (A). **Cichlosoma nigritum.**

Cichlasoma nigritum, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 128.

Apparently very similar to *C. maculicauda*, but the coloration plain dark olivaceous, without a dark spot on the caudal peduncle.

Hab. Lake Nicaragua.

Cichlosoma microphthalmus (p. 20).

To the synonymy add:—

Cichlasoma milleri, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 142.

Meek's type is also from the Rio Motagua.

Cichlosoma pavonaceum (p. 21).

This species appears to resemble *Herichthys cyanoguttatus* in so many respects that it seems probable that it may prove to belong to the genus *Herichthys*.

Cichlosoma sieboldii (p. 21).

Specimens of *C. sieboldii* from Costa Rica (*Pittier*) show that it is a *Paraneetroplus* and is the same as the species described on p. 30 from a single badly preserved example under the name *Herichthys underwoodi*.

22 (A). **Cichlosoma alfari.**

Cichlasoma alfari, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 148.

Differs from *C. balteatum* especially in the lower spinous dorsal, the last spine scarcely more than $\frac{1}{3}$ the length of head.

Hab. Costa Rica, Turrialba.

Cichlosoma citrinellum (p. 25).

A specimen has been received from Juan Viñas, Costa Rica (*Underwood*). This species is recorded from Lago de Guila and Lago de Asososca in Nicaragua by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 152).

34 (A). **Cichlosoma granadense.**

Cichlasoma granadense, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 121.

Apparently intermediate between *C. citrinellum* and *C. erythræum*, with the lips and dentition of the former and the low spinous dorsal fin of the latter.

Hab. LAKES MANAGUA AND NICARAGUA.

35 (A). **Cichlosoma dorsatum.**

Cichlasoma dorsatum, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 123.

Differs from *C. erythræum* in the longer pectoral fin, which is a little longer than the head and extends to the soft-rayed portion of the anal fin.

Hab. NICARAGUA, Lake Managua.

Cichlosoma affine (p. 26).

This species is recorded by Barbour and Cole (Bull. Mus. Comp. Zool. l. 1906, p. 158) from near Progreso in Yucatan.

46 (A). **Cichlosoma centrale.**

Cichlasoma centrale, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 94.

Apparently very similar to *C. urophthalmus*, but distinguished by the lower spinous dorsal (longest spine less than $\frac{2}{5}$ the length of head).

Hab. GUATEMALA, Caballo Blanco, Pacific slope.

46 (B). **Cichlosoma tenue.**

Cichlasoma tenue, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 94.

Differs from *C. centrale* in the slender body (depth $2\frac{3}{4}$ in the length) and the more produced vertical and ventral fins.

Hab. MEXICO, Achotal in Vera Cruz.

Cichlosoma trimaculatum (p. 28).

Recorded from Achotal in Vera Cruz by Meek (Proc. Biol. Soc. Washington, xviii. 1905, p. 245).

47 (A). **Cichlosoma mojarra.**

Cichlasoma mojarra, Meek, Publ. Columbian Mus., Zool. v. 1904, p. 217, fig. 71 [1]; Proc. Biol. Soc. Washington, xviii. 1905, p. 244 [2].

Hab. MEXICO, San Gerónimo in Oaxaca [1 2].

Dr. Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 140) compares this species with *C. trimaculatum*, from which it is said to differ in several features, none of which are very marked.

Cichlosoma motaguense (p. 29).

Recorded from Belize by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 151).

Cichlosoma managuense (p. 29).

Recorded from Lago de Guila in Nicaragua by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 152).

HERICHTHYS (p. 30).

Examination of a large series of examples of *Herichthys cyanoguttatus* received recently shows that the pointed inner teeth are more or less compressed. The genera *Herichthys* and *Paraneetroplus* may nevertheless be maintained, the former including species with slender teeth, those of the outer series in the lower jaw gradually decreasing in size and becoming acutely pointed laterally. This genus includes *H. cyanoguttatus*, *H. bocourti*, and *H. geddesi*, whilst Garman's *Heros pavonaceus* probably belongs here also.

PARANEETROPLUS (p. 31).

This genus differs from *Herichthys* in having broader and more strongly compressed teeth. The outer series in the lower jaw is transverse, formed of subequal teeth with rounded or obtusely pointed apices; it ceases abruptly and does not extend back on the sides. *Heros sieboldii*, Kner & Stdr. (of which *Herichthys underwoodi*, Regan, is a synonym), from Costa Rica and Panama, belongs to this genus.

NEETROPLUS (p. 31).

Neetroplus nematopus (p. 31).

Recorded from Lago de Guila in Nicaragua by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 153).

SCIÆNIDÆ (pp. 31, 32).

Micropogon undulatus, C. & V. (Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 1461), is a marine species ranging from Cape Cod to Montevideo. It has been recorded from Lake Yzabal by Vaillant and Bocourt (Miss. Sci. Mex., Poiss. 1874).

GERRES (p. 37).

The characters of *G. peruvianus* and *G. olithostomus* have unfortunately been transposed in the synopsis of the species (p. 38). It is *G. peruvianus* which has the mouth smaller and the scales of the thoracic region larger.

Gerres californiensis (p. 39).

Recorded from Caballo Blanco in Guatemala by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 143).

Gerres peruvianus (p. 39).

Recorded from Caballo Blanco in Guatemala by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 143).

POMADASIS (p. 41).

Pomadasis boucardi (p. 43).

To the synonymy add :—

? *Pomadasis grandis*, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 116.

This supposed species is based on a single specimen of 345 mm. from Lake Nicaragua, which appears to differ from *P. boucardi*, as described, only in characters due to its larger size, such as the smaller eye and shorter fin-spines.

Fam. 10 (A). **LUTIANIDÆ.** (To precede the Centropomidæ, p. 44.)

Lutianus argentiventris, Peters, 1869 (*Neomænis argentiventris*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1898, p. 1260), is a marine species from the Pacific coast of tropical America. It has been recorded from fresh-water at Caballo Blanco in Guatemala by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 140).

CENTROPOMUS (p. 45).

Centropomus nigrescens (p. 50).

Recorded from Caballo Blanco in Guatemala by Meek (Publ. Columbian Mus., Zool vii. 1907, p. 140).

THYRINA (p. 63).

2. **Thyrina sardina.**

Melaniris sardina, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 114.

Hab. Lakes Managua and Nicaragua.

Dr. Meek's description shows that this species is very closely allied to *T. guatemalensis* of the rivers of the Pacific slope, and they may yet prove to be inseparable.

FUNDULUS (p. 76).

Fundulus grandis (p. 79).

This species is recorded by Barbour and Cole (Bull. Mus. Comp. Zool. l. 1906, p. 156) from near Progreso, Yucatan.

CYPRINODON (p. 82).

Cyprinodon bovinus (p. 83).

This species is recorded (as *Cyprinodon eximius*) by Barbour and Cole (Bull. Mus. Comp. Zool. l. 1906, p. 157) from near Progreso, Yucatan.

4 (A). JORDANELLA, Goode & Bean, 1879.

(To precede the genus *Zoogoneticus*, p. 85.)

Jordanella, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 677.

Differs from *Cyprinodon* in the longer dorsal fin with 15 to 18 rays, the first of which is a stout spine.

A single species.

1. **Jordanella floridæ.**

Jordanella floridæ, Goode & Bean, Proc. U.S. Nat. Mus. ii. 1879, p. 117 [1]; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 677 [2], and 1900, fig. 298 [3]; Barbour & Cole, Bull. Mus. Comp. Zool. l. 1906, p. 157 [4].

Hab. NORTH AMERICA, Florida [1 2].—MEXICO, near Progreso, Yucatan [4].

GAMBUSIA (p. 93).

Gambusia fasciata (p. 95).

Recorded from Caballo Blanco, Pacific slope of Guatemala, by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 137).

GIRARDINUS (p. 99).

Girardinus lutzi (p. 99).

Recorded from the Rio Motagua in Guatemala by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 137).

PŒCILIA (p. 100).

4 (A). **Pœcilia caucana.**

Girardinus caucanus, Steind. Denkschr. Ak. Wien, xlii. 1880, p. 87, t. 6. figs. 4 & 5 [1].

Pœcilia tenuis, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 147 [2].

Pœcilia sphenops, Regan (part.), anteà, p. 102, t. 13. fig. 2 [3].

Hab. COSTA RICA, San José [2 3] (*Biolley*) and Rio Maria Aguilar [2].—COLOMBIA, Rio Cauca [1].

The specimens from Costa Rica referred to *P. sphenops*, one of which is figured (Tab. XIII. fig. 2), appear to differ from *P. sphenops* in the greater length of the anterior dorsal rays and in the presence of a dark spot at the base of the dorsal fin. This species seems to be the one described by Steindachner as *Girardinus caucanus*.

4 (B). **Pœcilia tropica.**

Platypœcilus tropicus, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 146 [1].

This species is described as having a larger eye than *P. sphenops* (diameter $2\frac{1}{2}$ to $2\frac{3}{4}$ in the length of head in specimens of 59 to 63 mm.); other differences are not apparent.

Hab. Costa Rica, Turrialba [1].

MOLLIENISIA (p. 105).

Mollienisia latipinna (p. 105).

This species is recorded by Barbour and Cole (Bull. Mus. Comp. Zool. l. 1906, p. 157) from near Progreso, Yucatan.

ÆLURICHTHYS (p. 115).

Ælurichthys marinus (p. 117).

This species and not *Galeichthys milberti*, C. & V. (p. 124), is the *Silurus felis* of Linnæus, and the name should be changed to *Ælurichthys felis*. I am indebted to Dr. Günther for kindly calling my attention to this (see Proc. Linn. Soc. 1898–99, p. 30).

RHAMDIA (p. 128).

Rhamdia parryi (p. 130).

Recorded by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 134) from Caballo Blanco in Guatemala.

5 (A). **Rhamdia barbata.**

Rhamdia barbata, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 106 [1].

Allied to *R. wagneri*, but apparently distinguished by the longer barbels (extending beyond the middle of the adipose fin) and the longer adipose fin (length $2\frac{1}{3}$ to $2\frac{3}{5}$ in the length of the fish).

Hab. Nicaragua, Lake Managua.

Rhamdia godmani (p. 133).

Recorded by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 150) from Belize.

Rhamdia brachycephala (p. 135).

Recorded by Meek (Publ. Columbian Mus., Zool. vii. 1907, p. 144) from Turrialba in Costa Rica.

13 (A). **Rhamdia cabreræ.**

Rhamdia cabreræ, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 93 [1].

Apparently allied to *R. brachycephala*, which it resembles in the short barbels, small occipital process, &c.

It seems to be distinguished by the longer head ($4\frac{3}{5}$ in the length of the fish) and the shorter humeral process (not extending beyond the anterior $\frac{1}{3}$ of the pectoral spine).

Hab. GUATEMALA, Lake Amatitlan [1].

Rhamdia rogersi (p. 136).

To the synonymy add:—

Rhamdia regani, Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 144 [2].

COSTA RICA, Turrialba [2] and Rio Tiribi, San José [2].

CONORHYNCHUS (p. 138).

I learn from an editorial footnote that the name *Conorhynchus* is preoccupied. I propose to substitute for it the name *Conorhynchichthys*.

1 (A). CYCLEPTUS, Rafin., 1819. (To precede *Moxostoma*, p. 145.)

Cycleptus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 168.

Scarcely distinct from *Ictiobus*, but with a much shorter head (length 6 to $8\frac{1}{2}$ in the length of the fish) and smaller scales (55 to 60 in a longitudinal series) than any species of that genus.

A single species.

1. **Cycleptus elongatus.**

Catostomus elongatus, Le Sueur, Journ. Ac. Philad. i. 1817, p. 103 [1].

Sclerognathus elongatus, Günth. Cat. Fish. vii. p. 23 (1868) [2].

Cycleptus elongatus, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 168 [3]; Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 154 [4].

Hab. UNITED STATES, Mississippi System [1 2 3].—MEXICO, Rodriguez in Nuevo Leon [4].

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[Names in small capitals refer to Families, &c.; those in roman type to the chief reference to each species included in the work; those in italics to species incidentally mentioned, synonyms, &c.]

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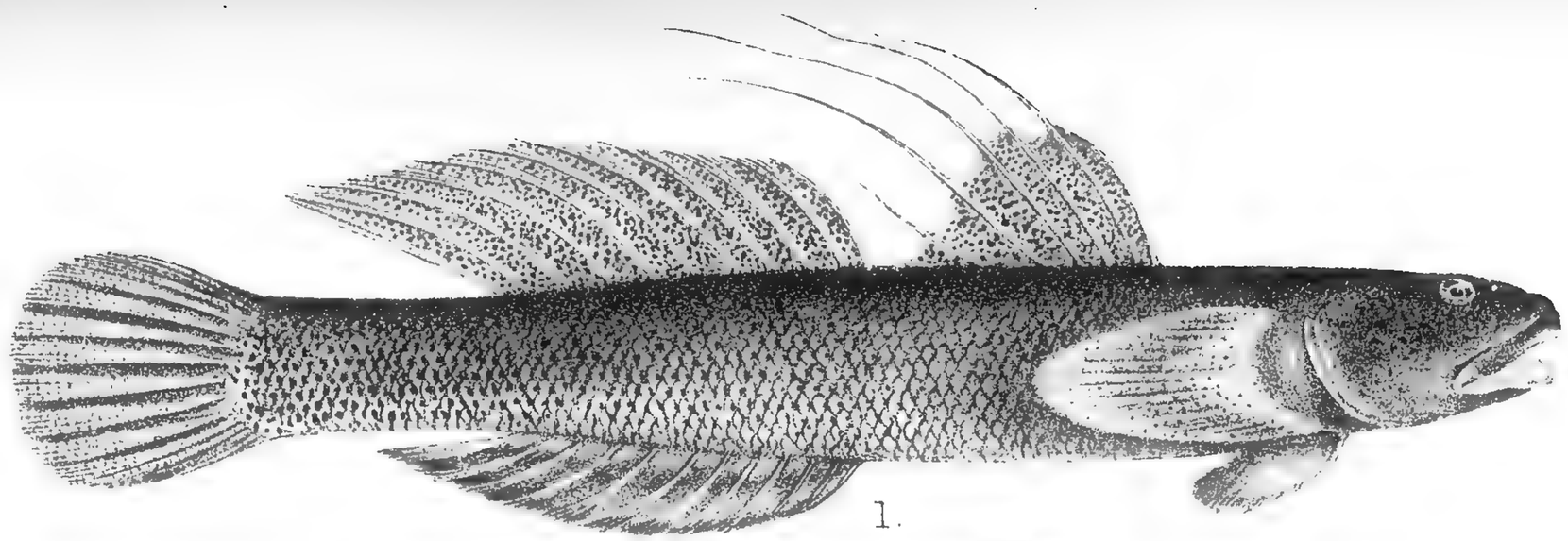

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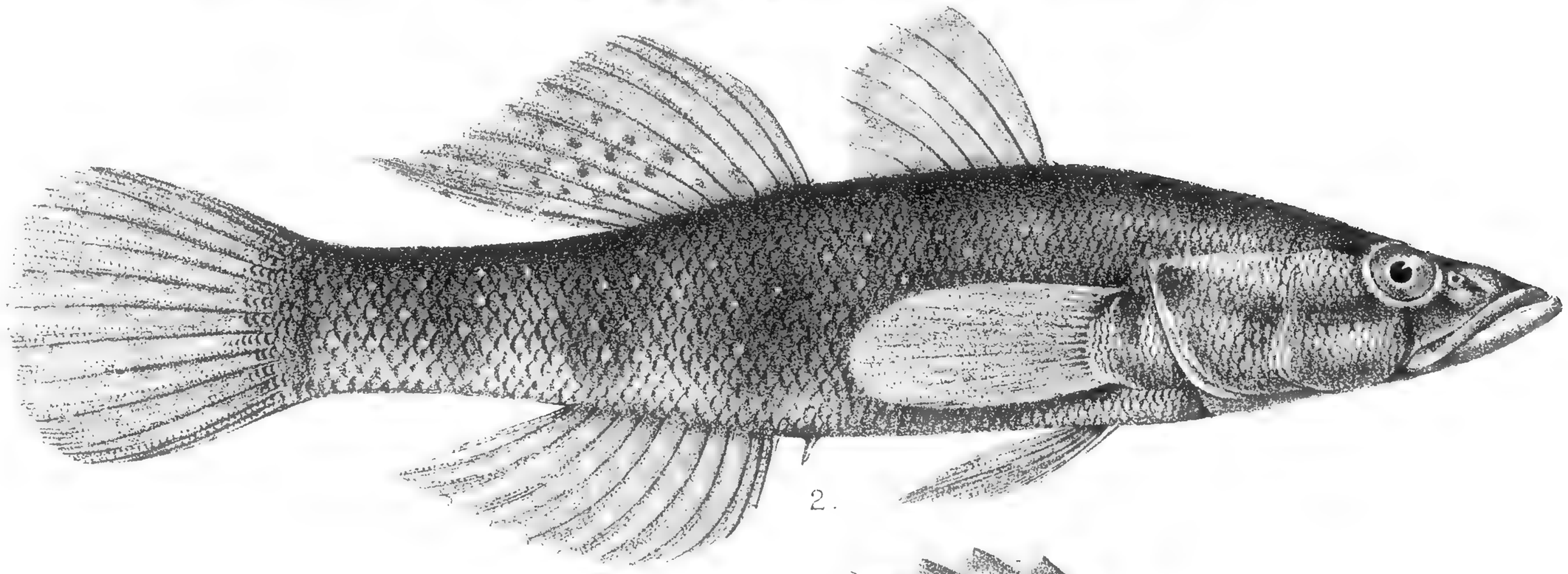

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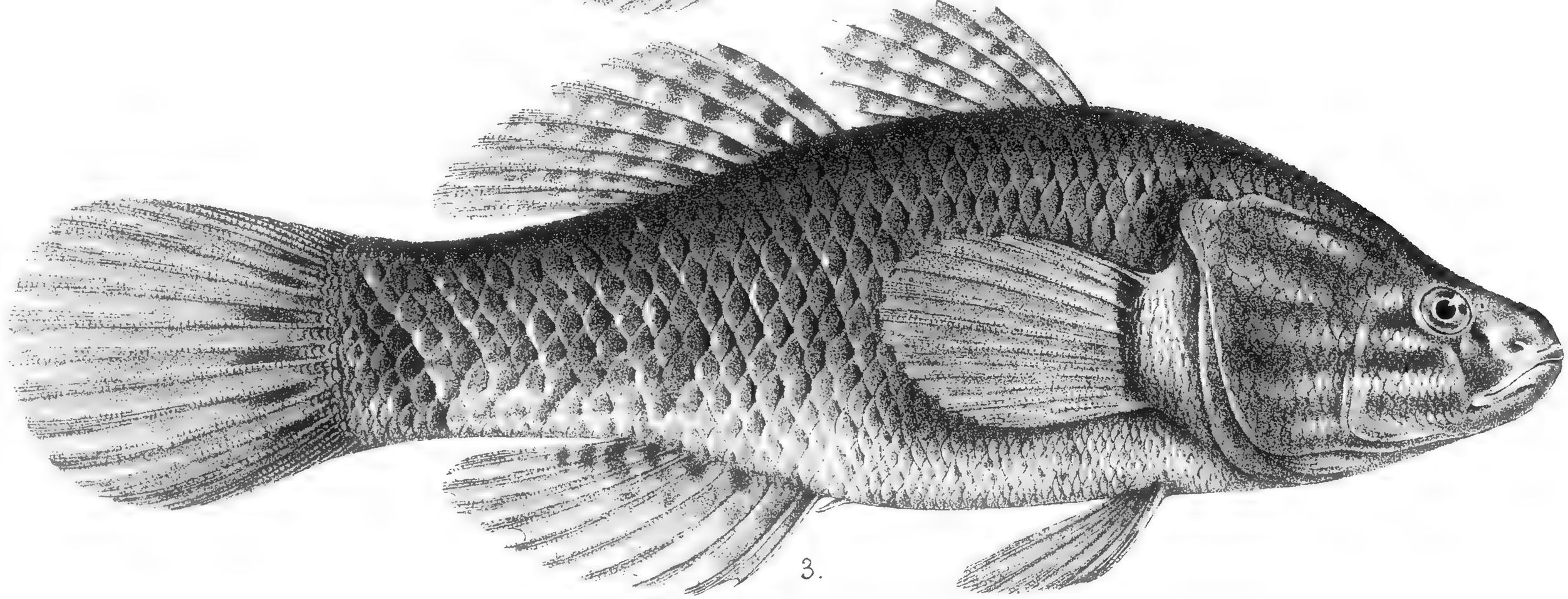

3.

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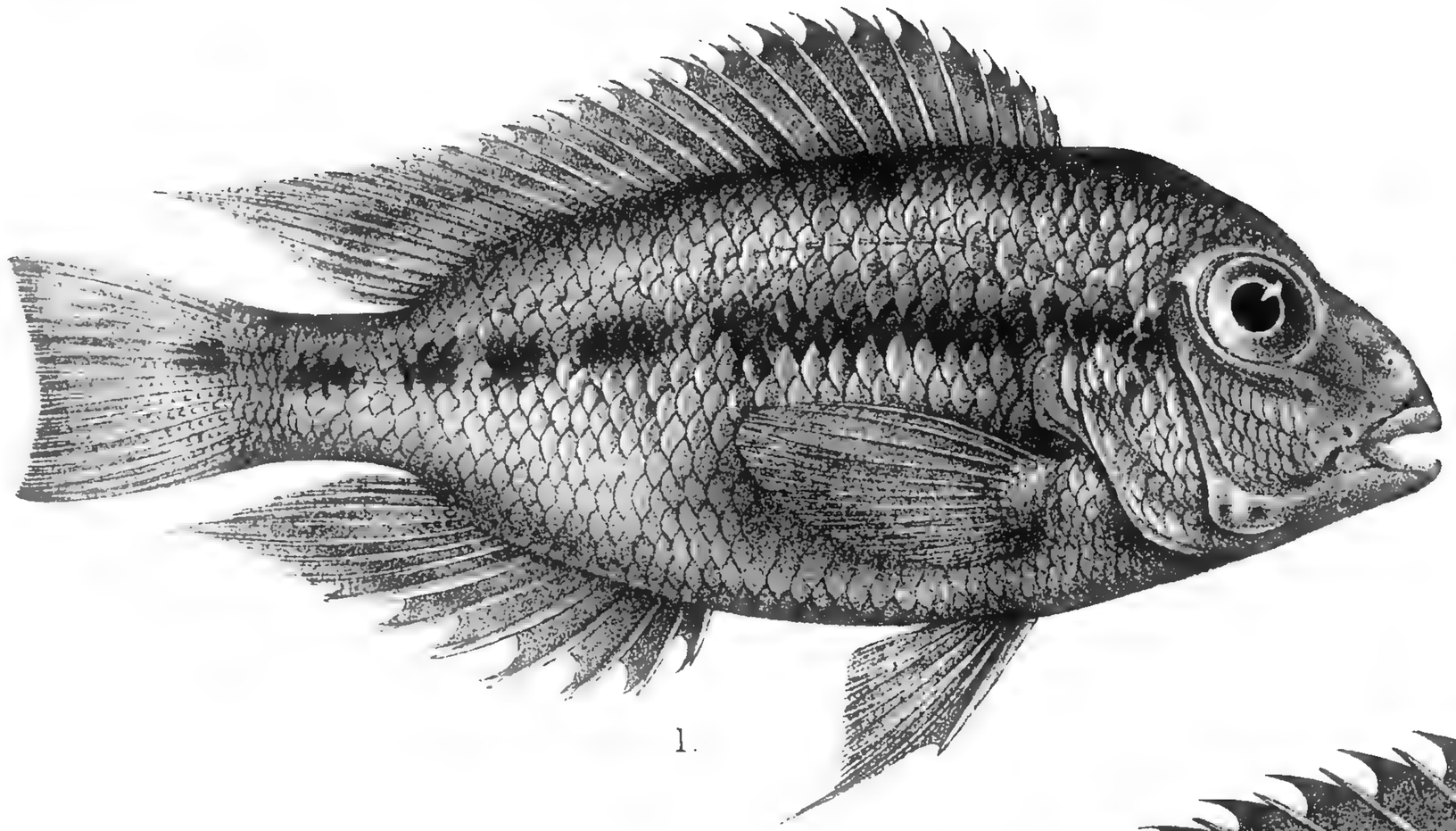

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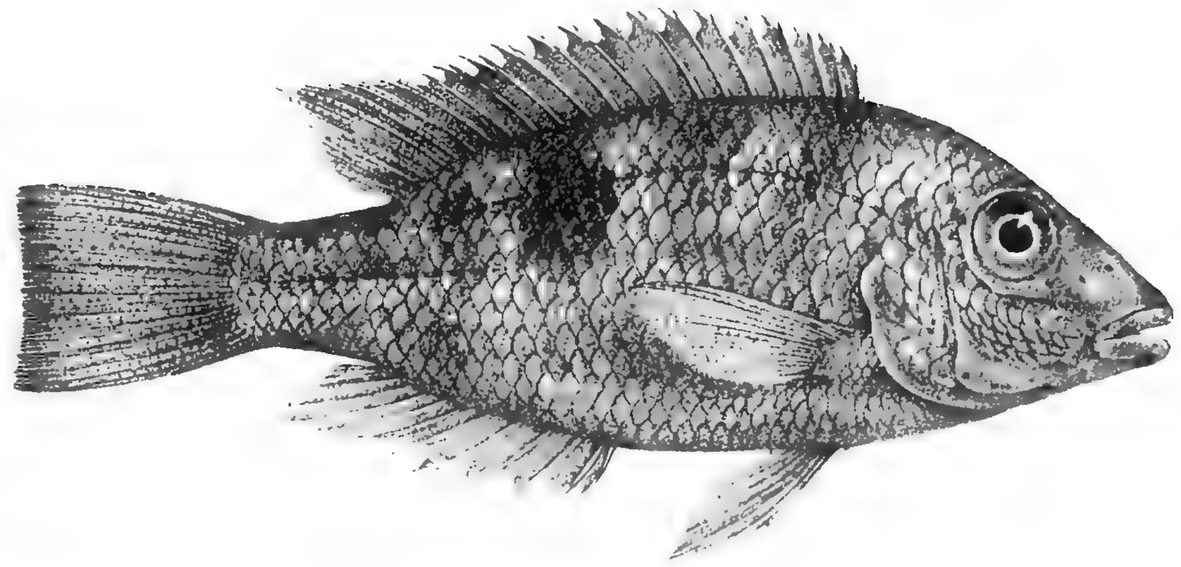
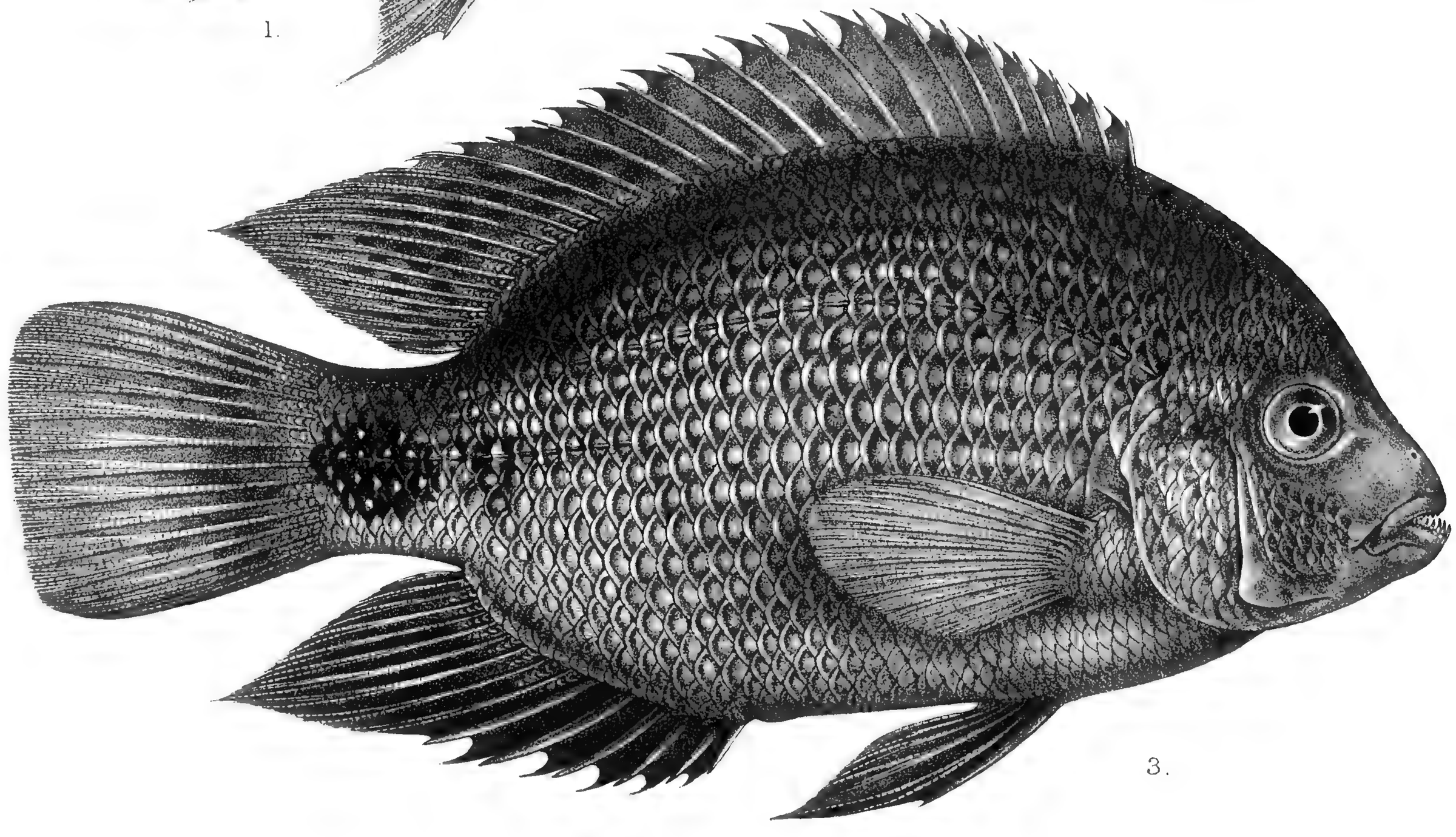


2.



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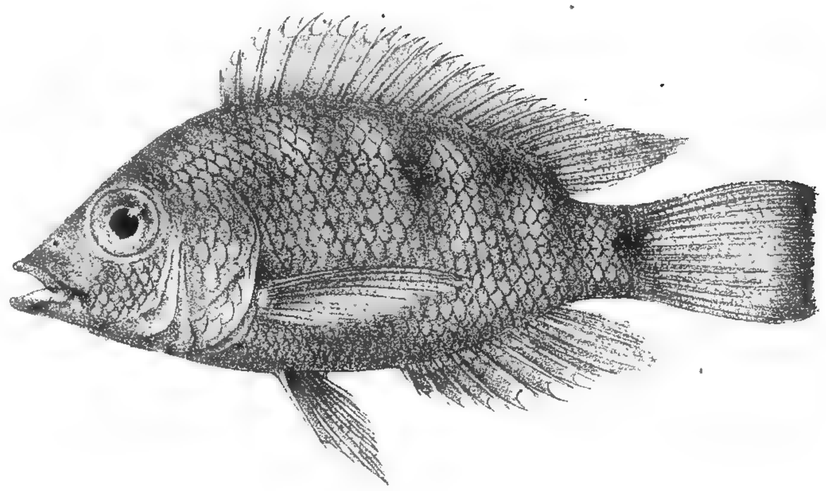
1. CICHLOSOMA BALTEATUM. 2. C. CALLOLEPIS. 3. C. MACULICAUDA.

J. Green del. lith et imp.



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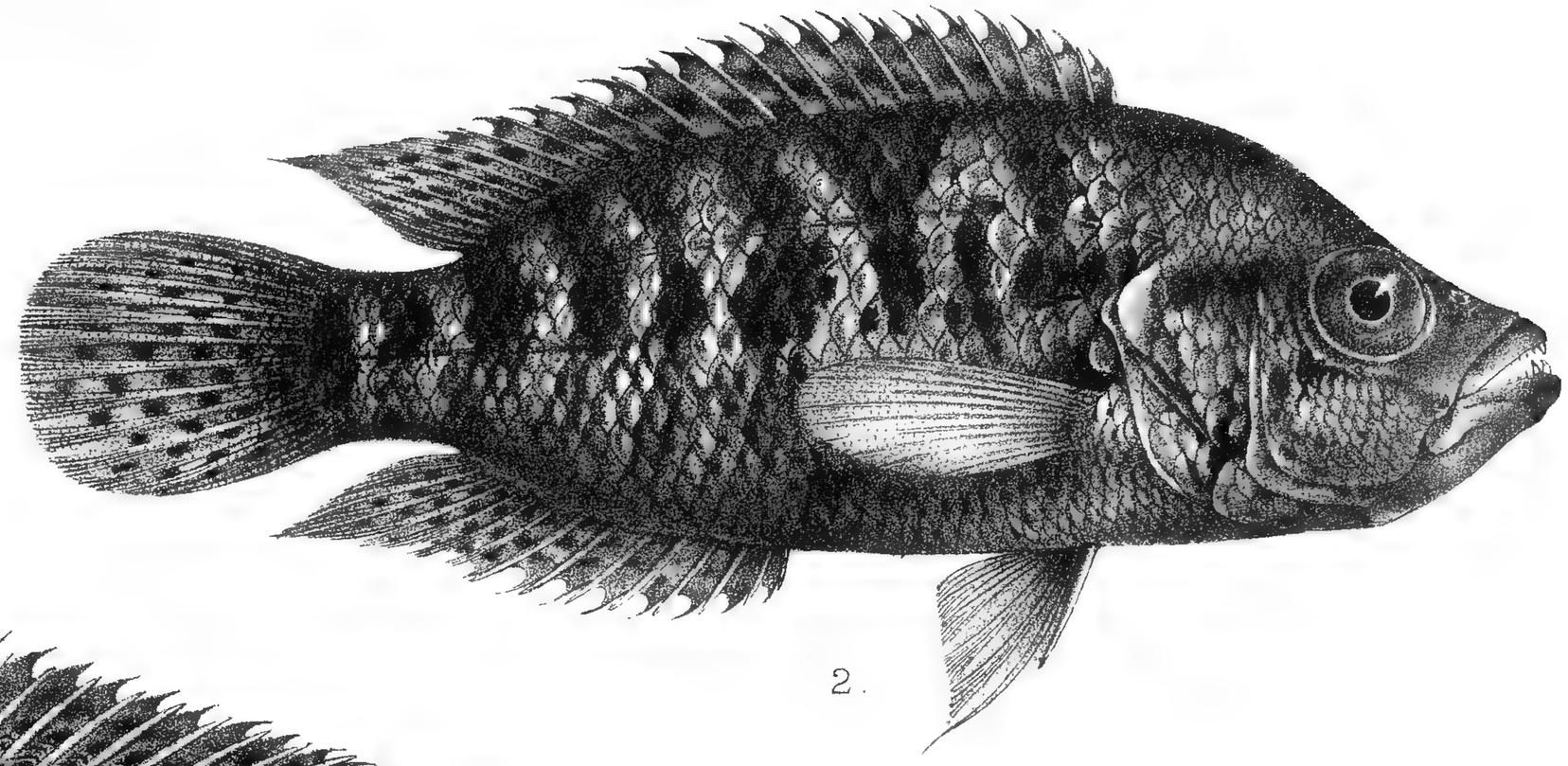

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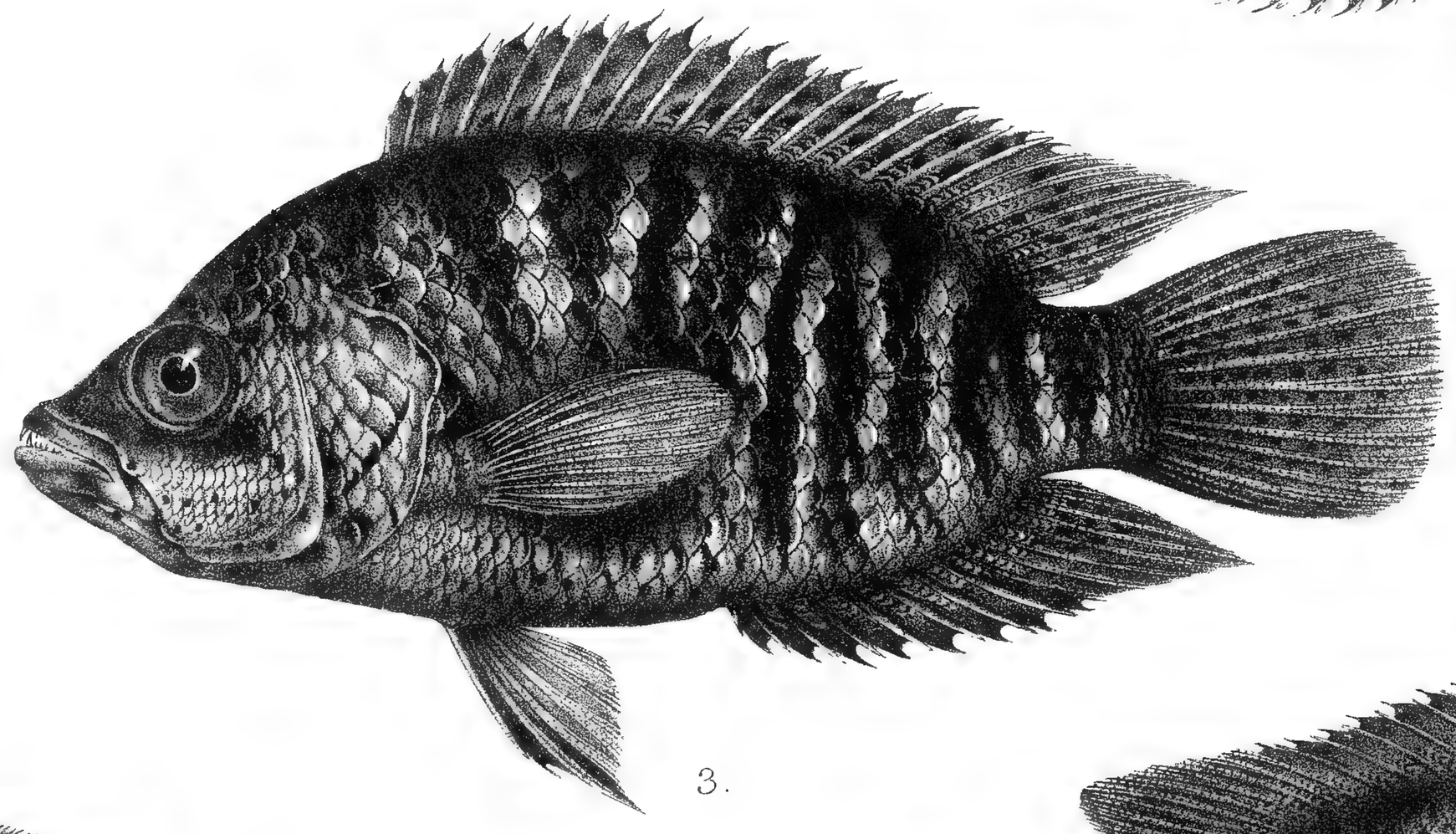

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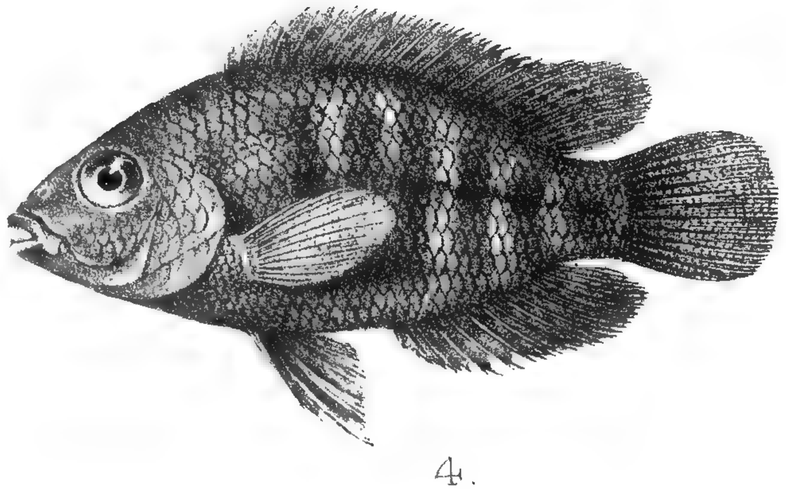

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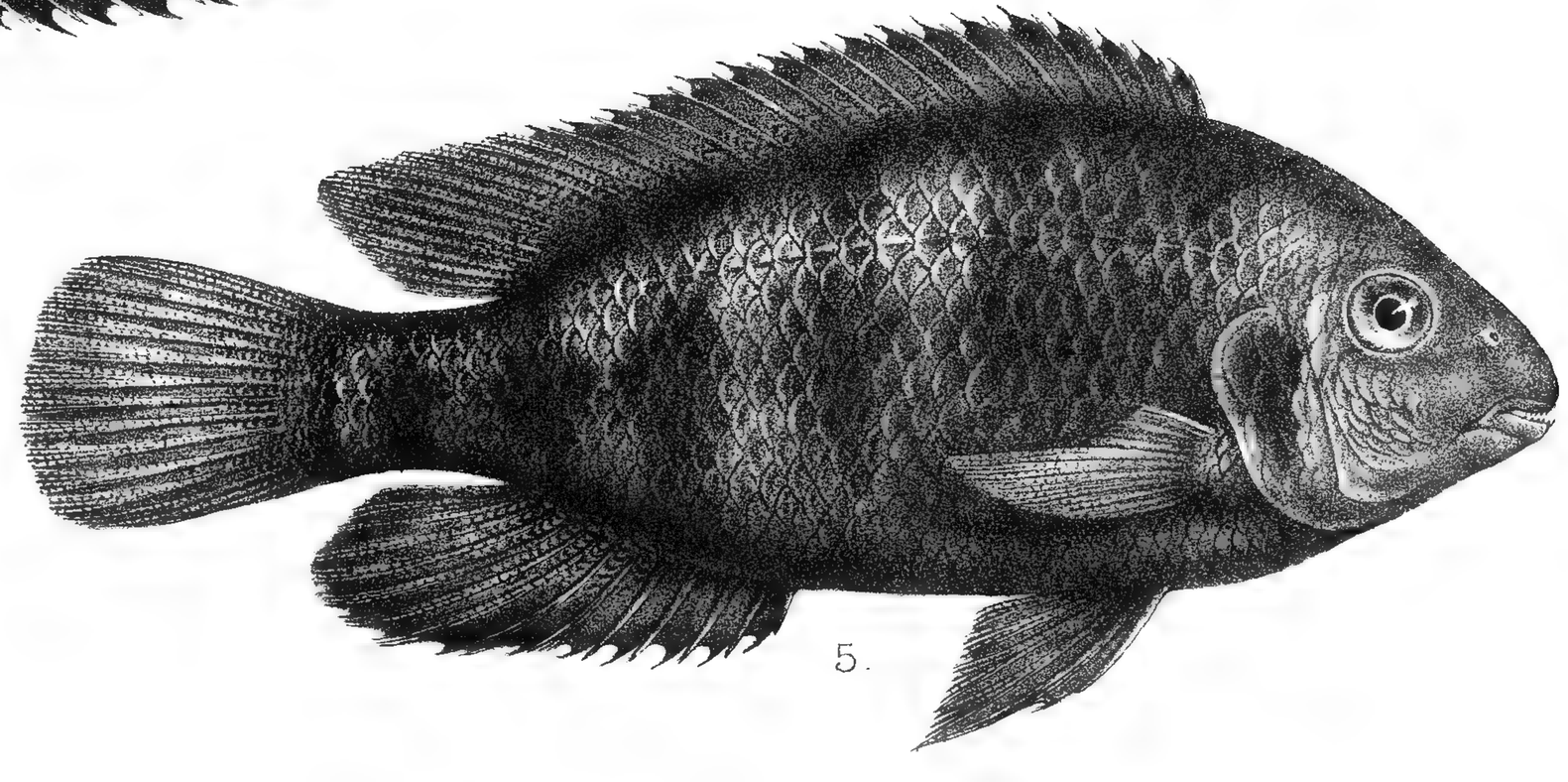

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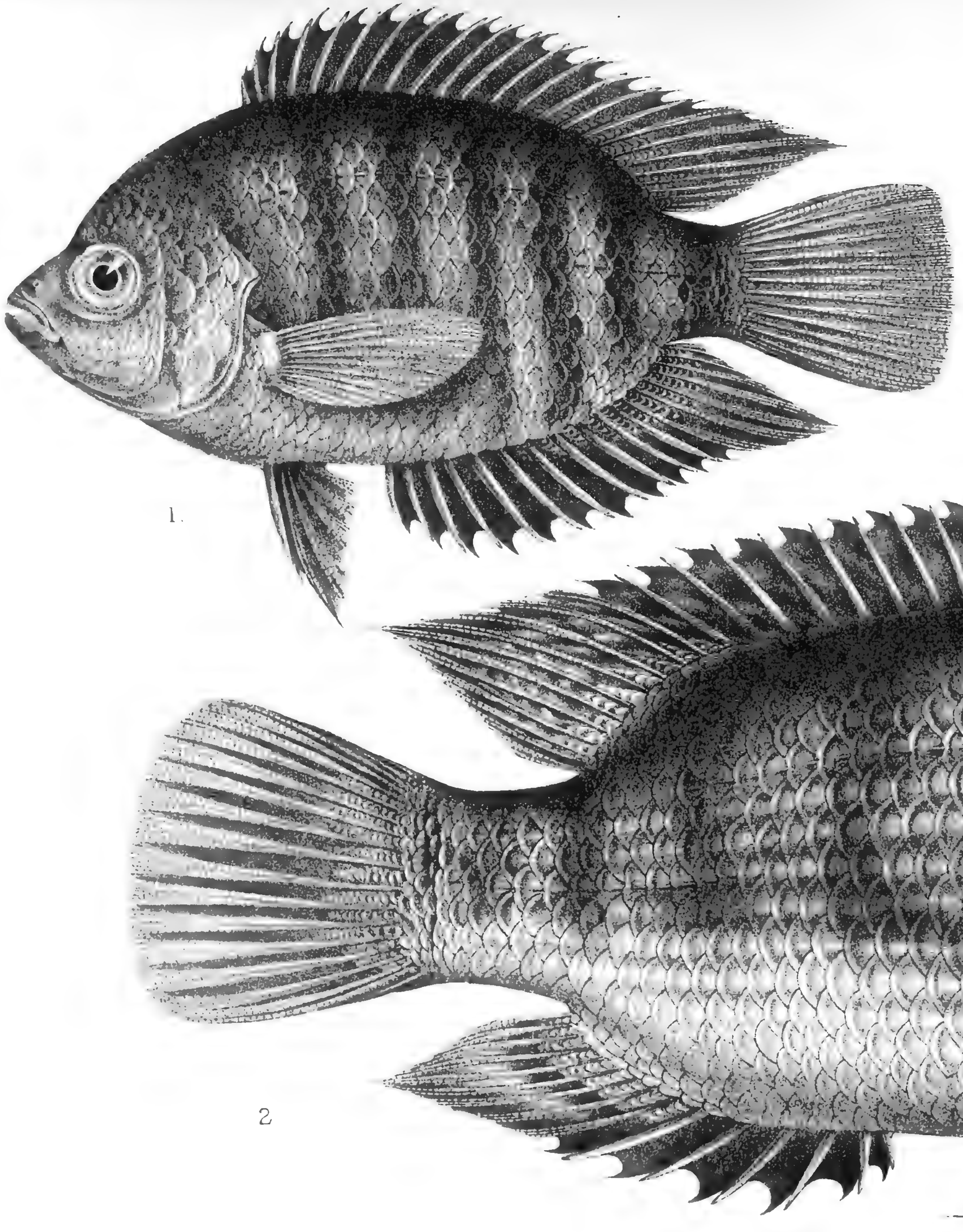
1. CICHLOSOMA ROBERTSONI. 2. C. FRIEDRICHSTAHLI. 3. C. MULTIFASCIATUM.
4. HERICHTHYS GEDDESI. 5. H. UNDERWOODI.

J. Green del. lith. et imp.



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2a.

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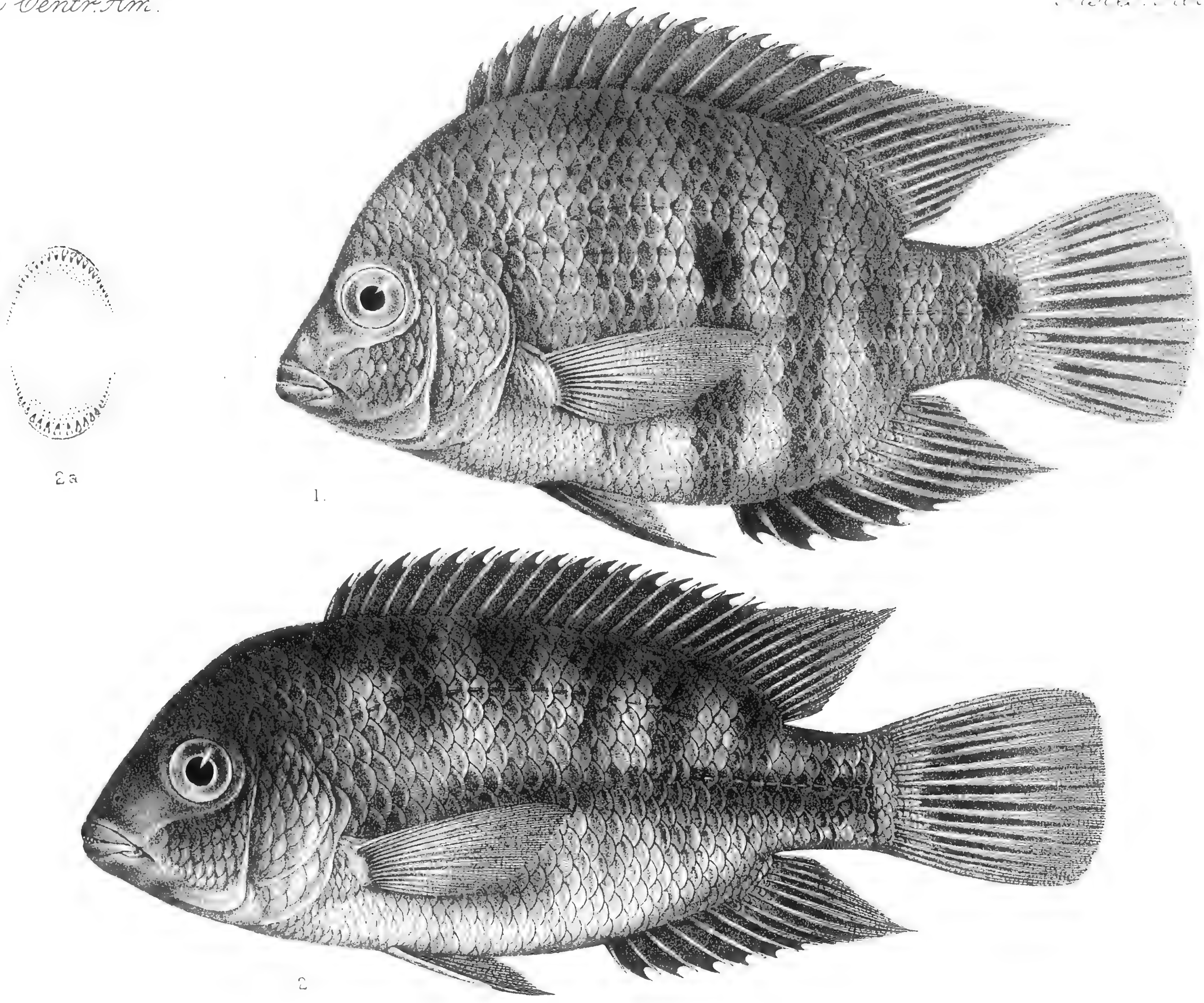
1. CICHLOSOMA CENTRARCHUS. 2. C. SEXFASCIATUM.

J. Green del. lith. et imp.



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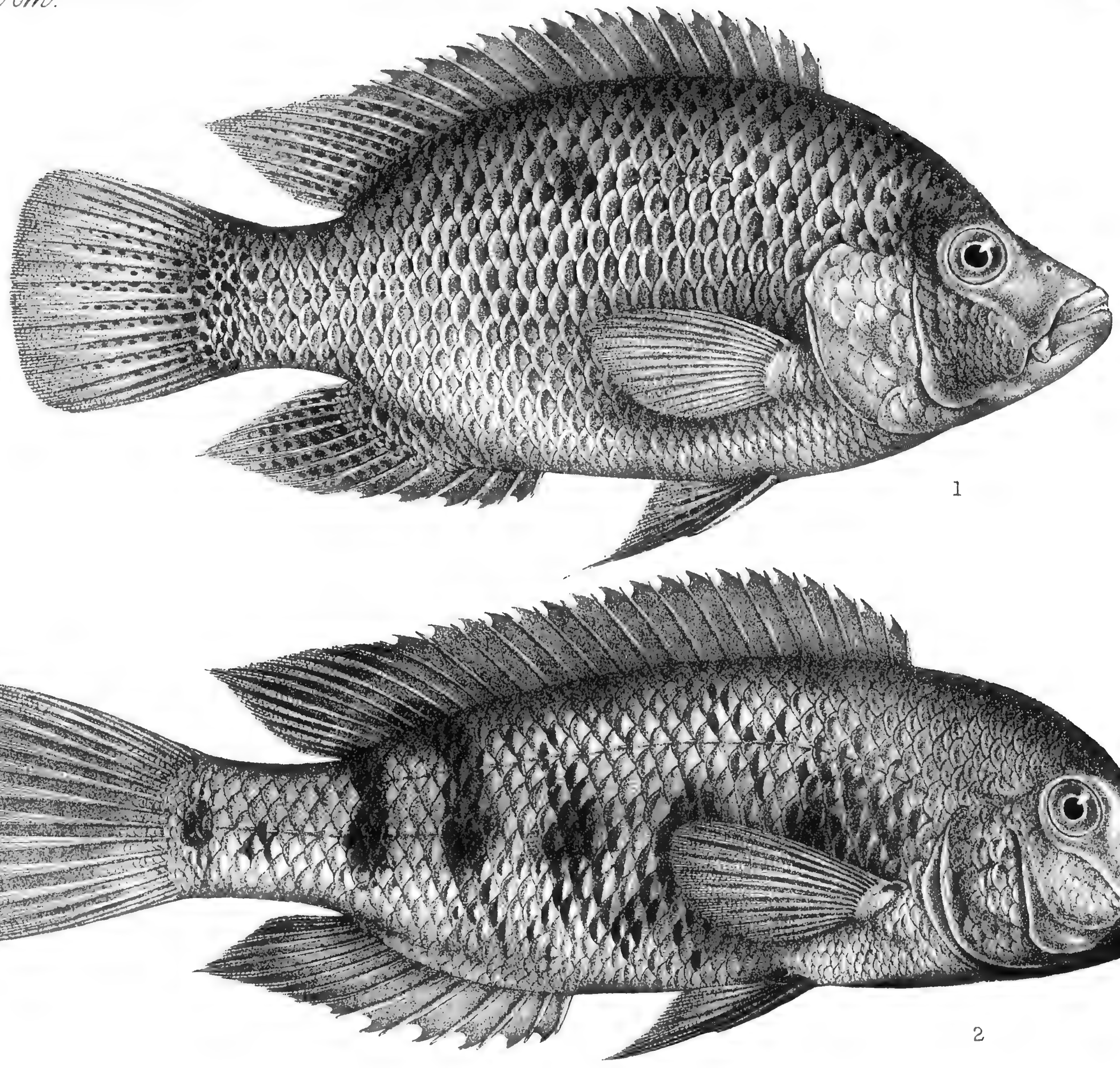
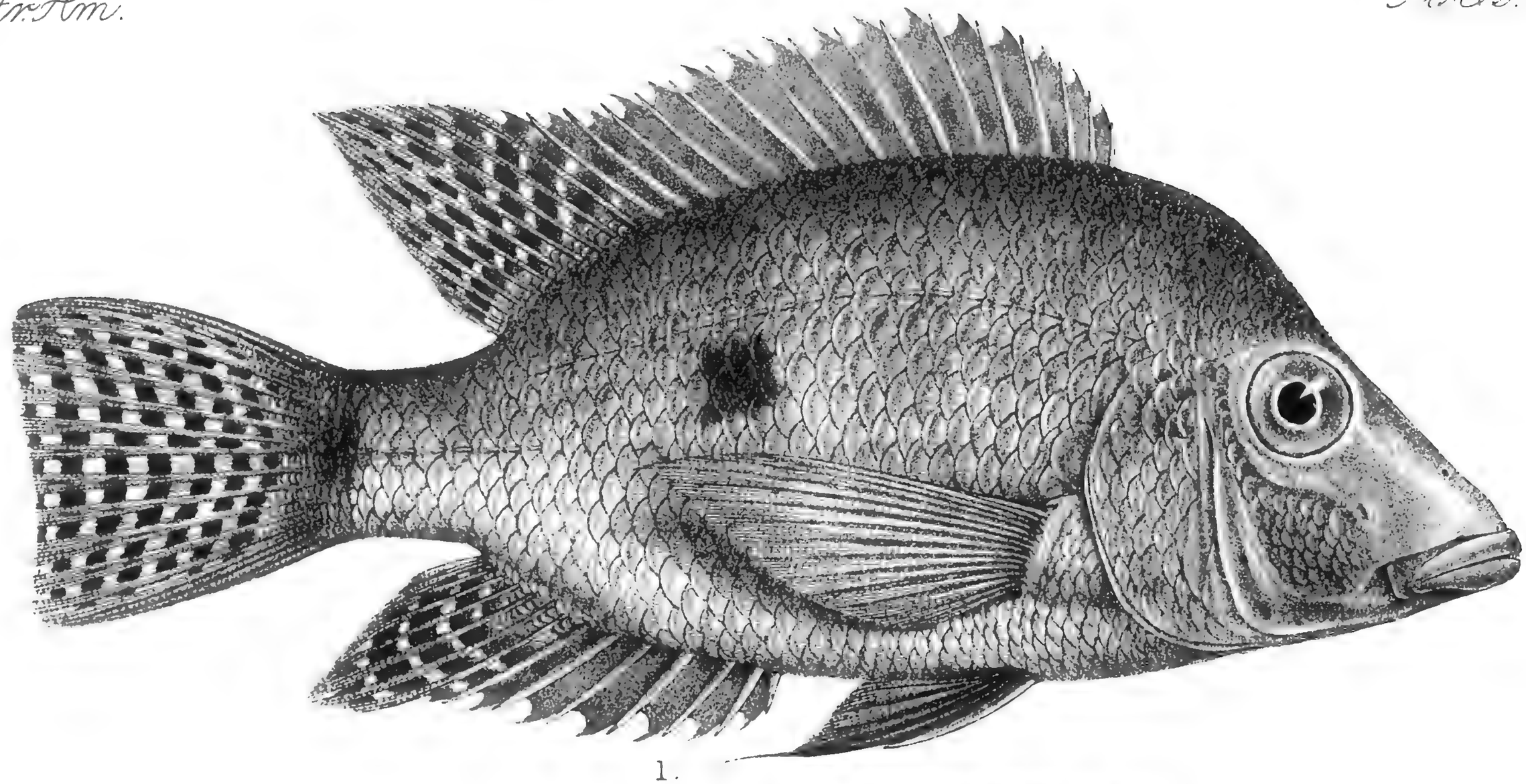
J Green del. lith et imp



1. CICHLOSOMA BEANI. 2. PARANEETROPLUS BULLERI.

J. Green del lith et imp.



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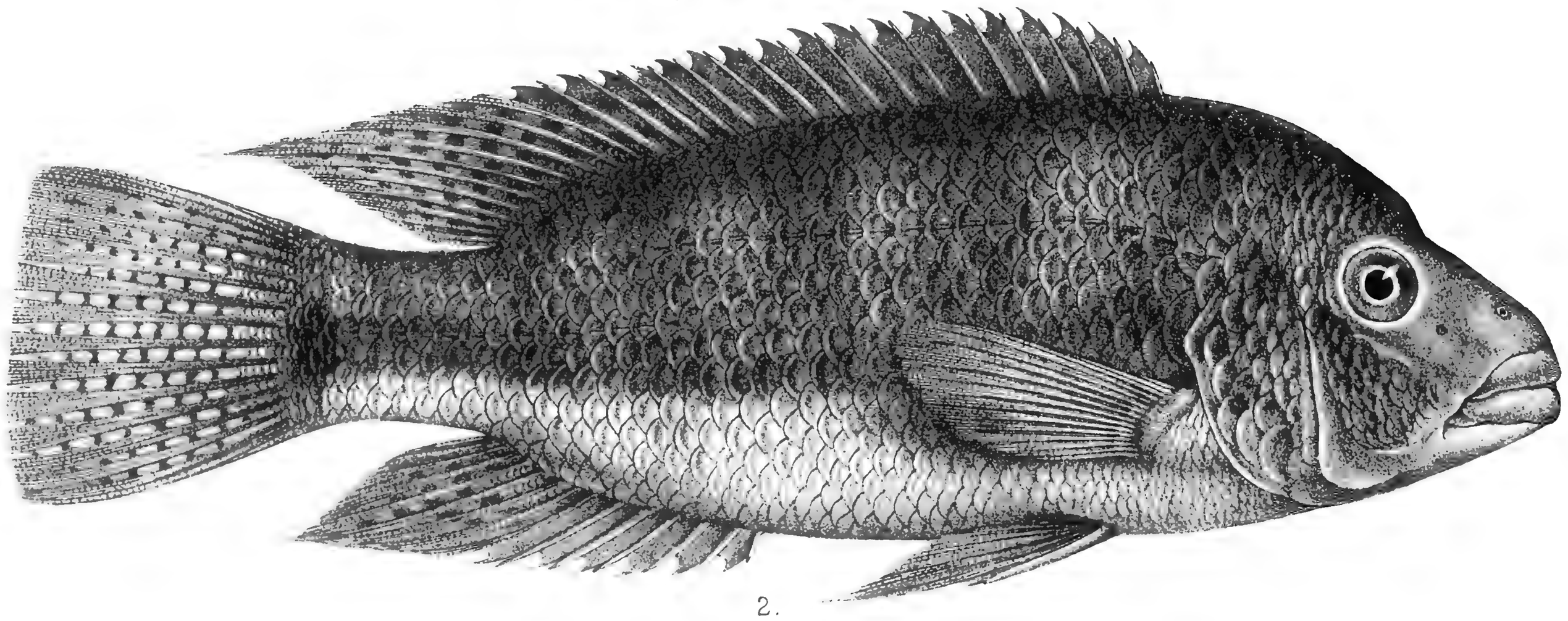

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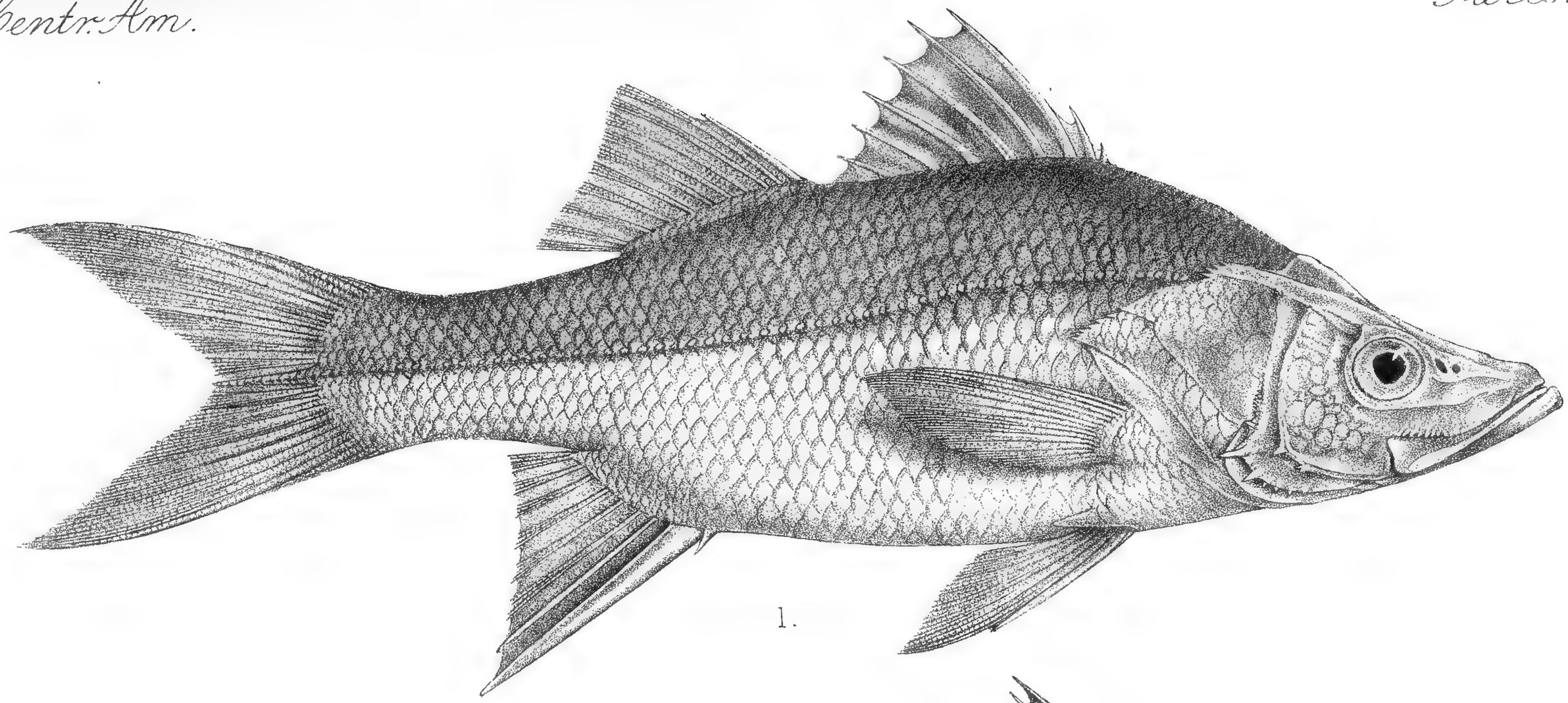
1. CICHLOSOMA ROSTRATUM. 2. C. MICROPHTHALMUS.

J.Greer. del. lith et imp.



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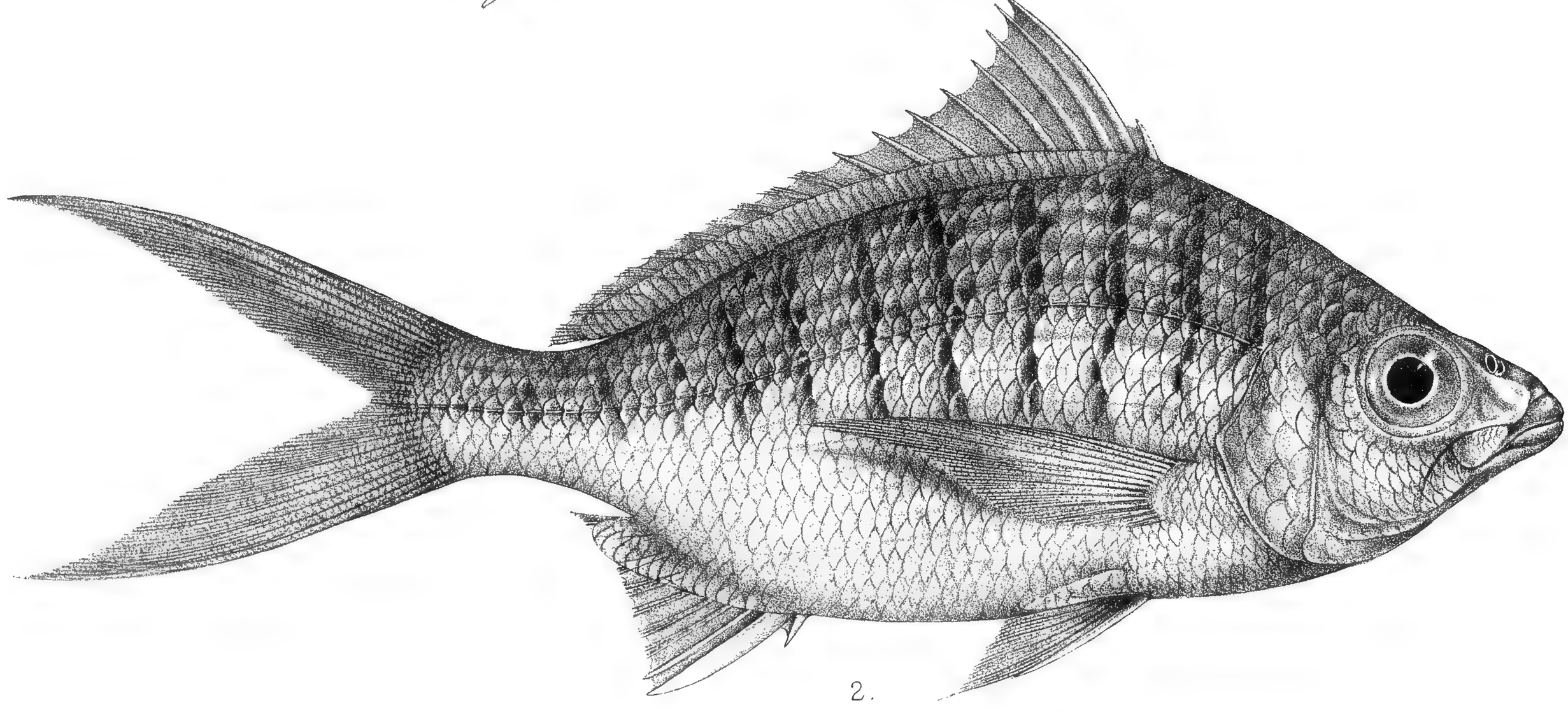

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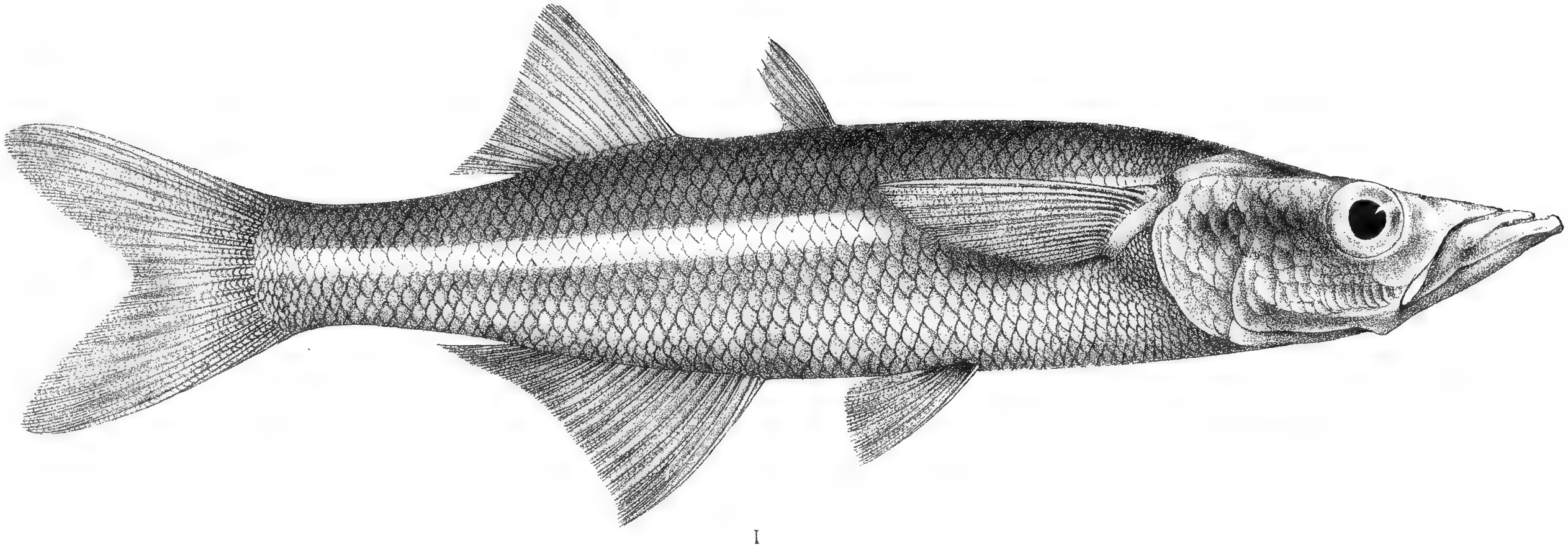
1. CENTROPOMUS ALTUS. 2. GERRES SIMILLIMUS.

J. Green del. lith et imp



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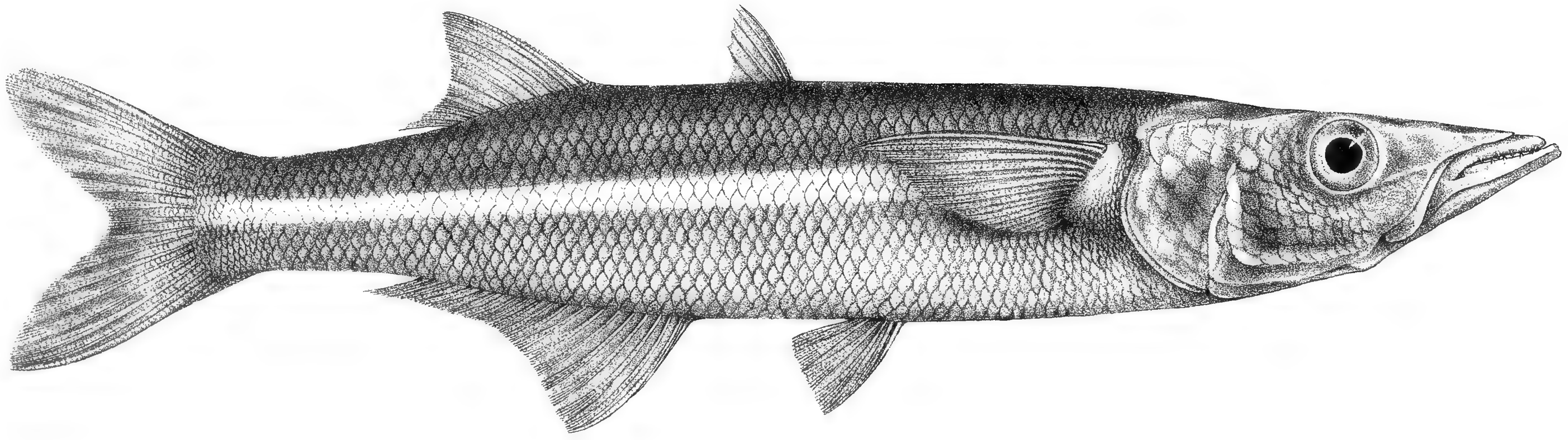

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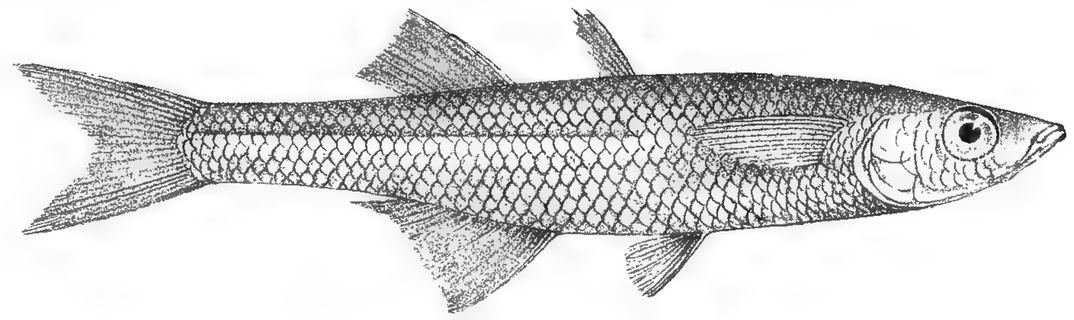
1. CHIROSTOMA OCOTLANE. 2. C. SPHYRÆNA.

J. Green. del. Lith. et imp.



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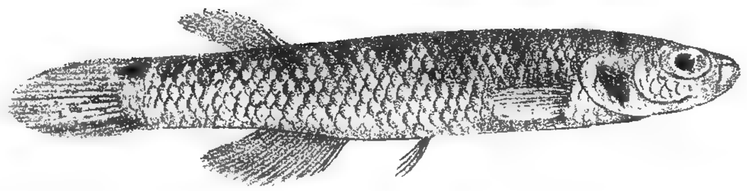

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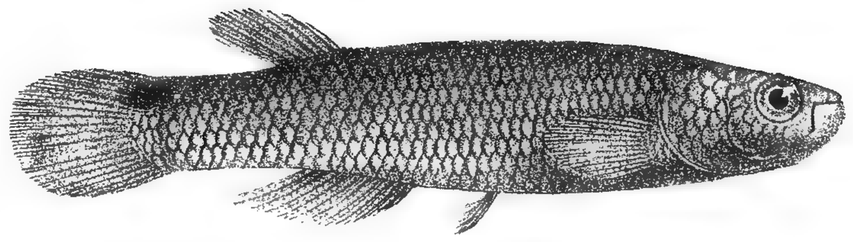

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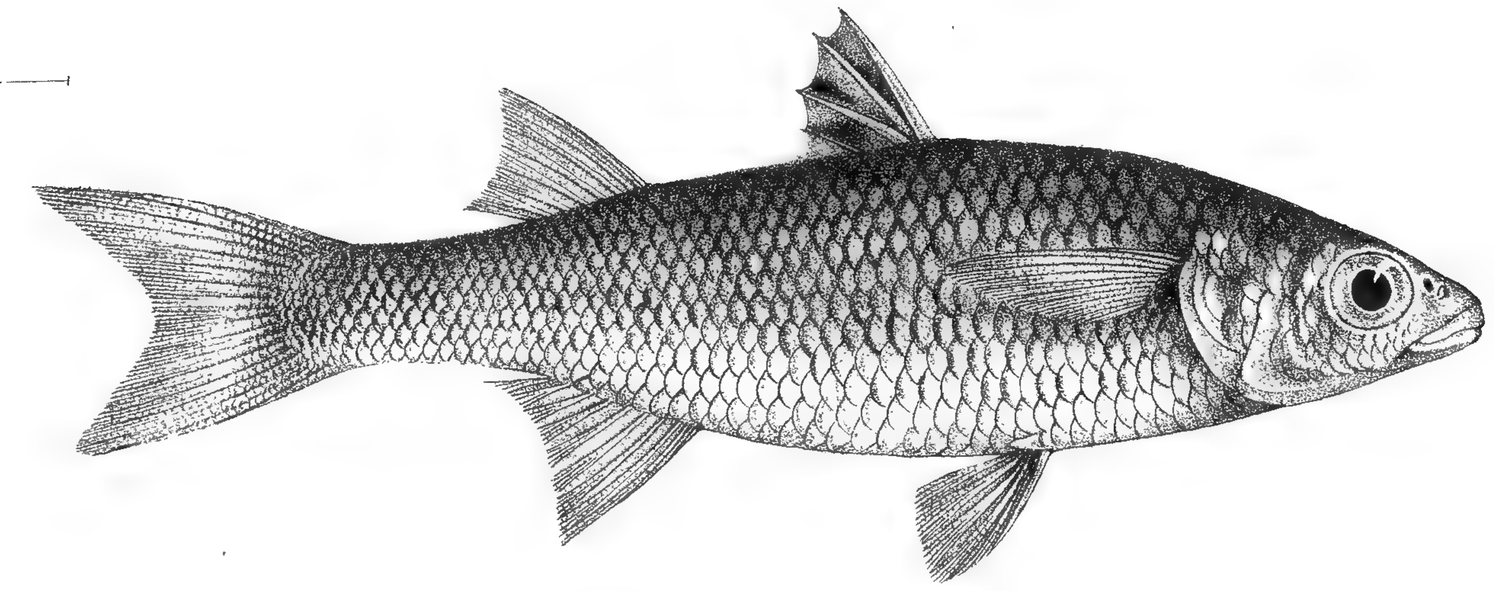

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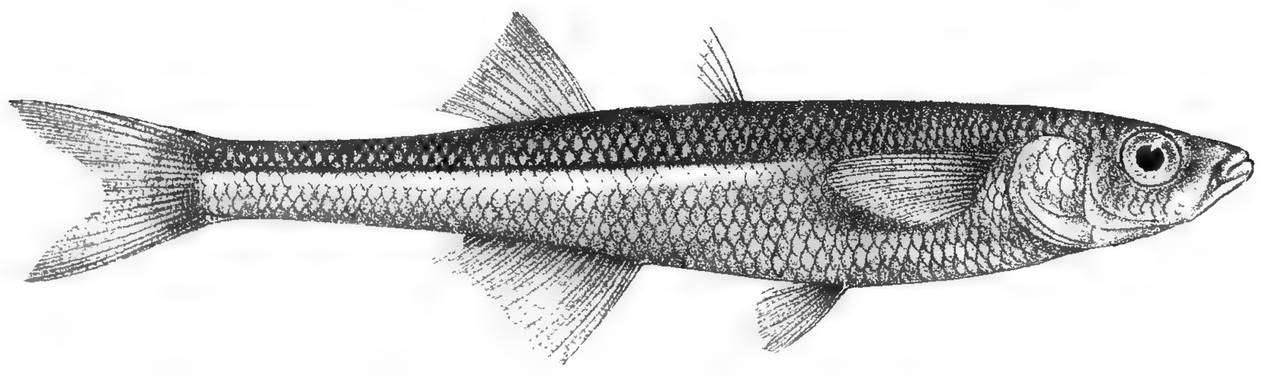

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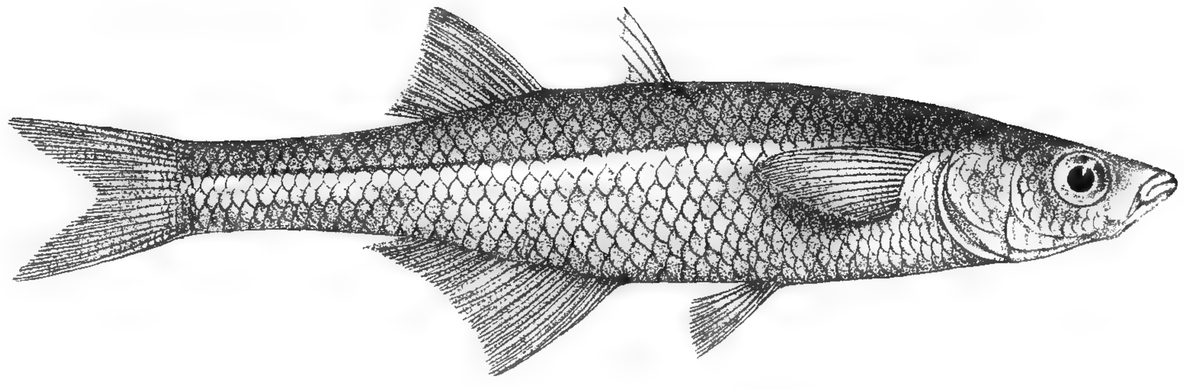
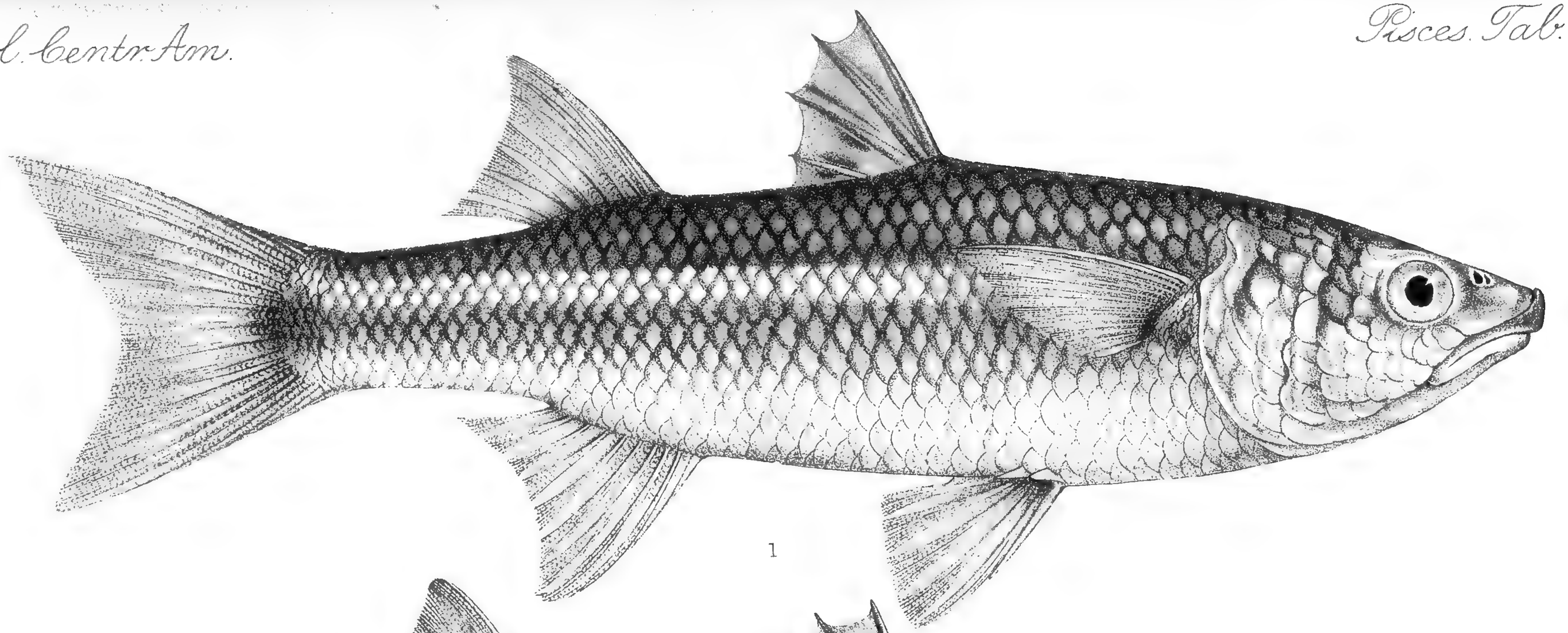


3.

1. CHIROSTOMA PATZCUARO. 2. C. BARTONI. 3. C. BREVE. 4. AGONOSTOMUS NASUTUS.
5. RIVULUS GODMANI. 6. R. FLABELLICAUDA.

J. Green del. lith. et imp.



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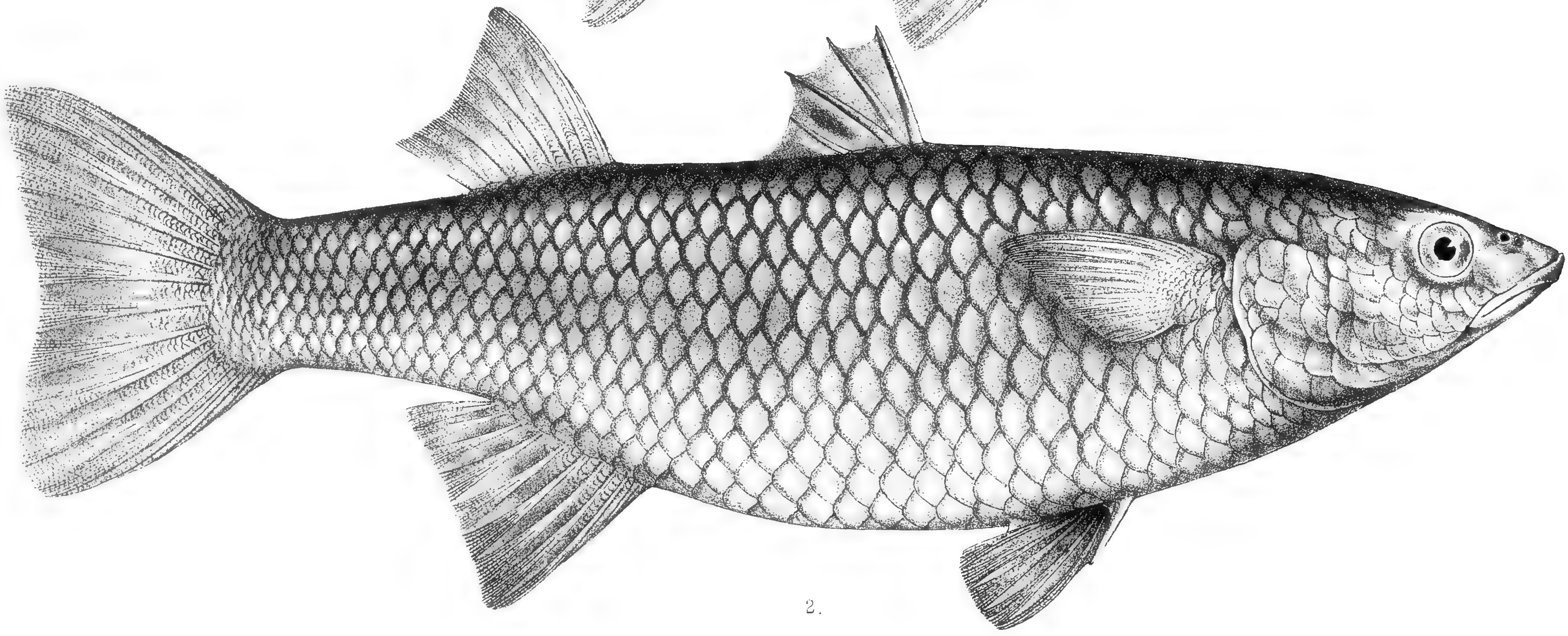

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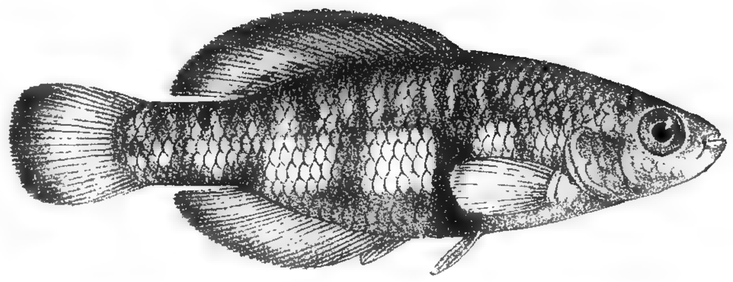
1. AGONOSTOMUS MACRACANTHUS. 2. A. SALVINI.

J. Green del. lith et imp.



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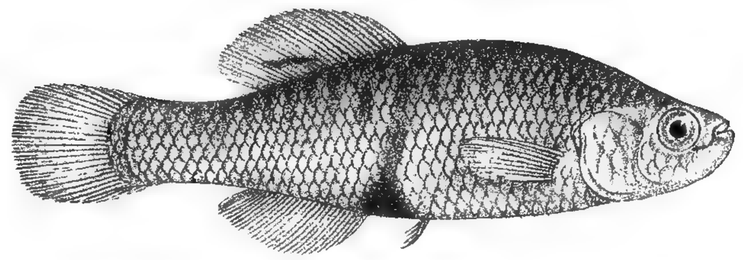

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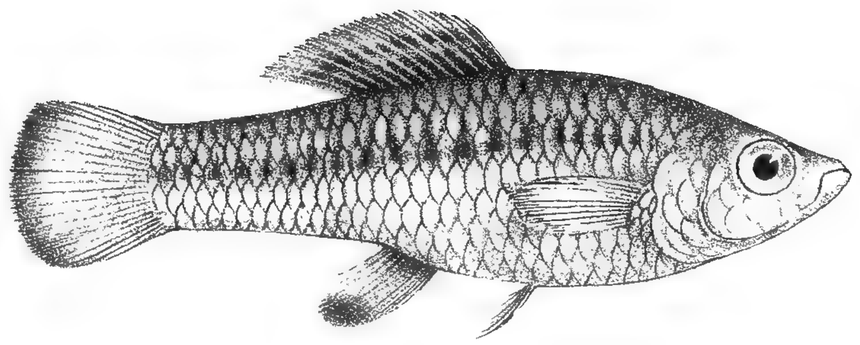

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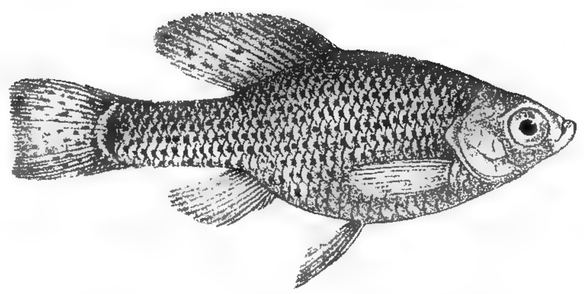

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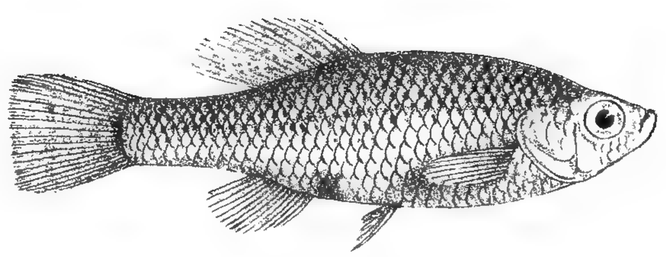

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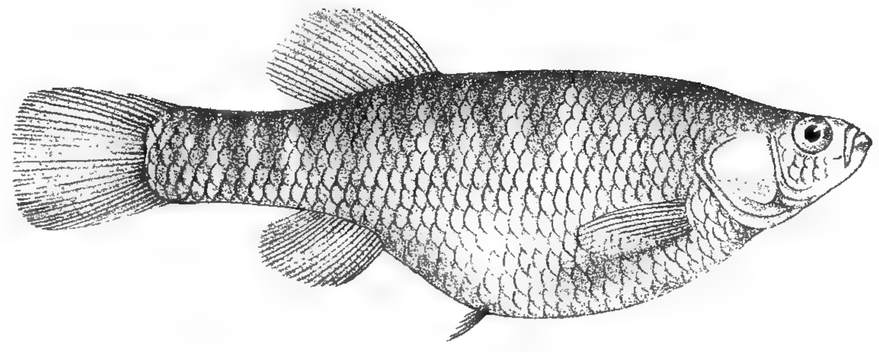

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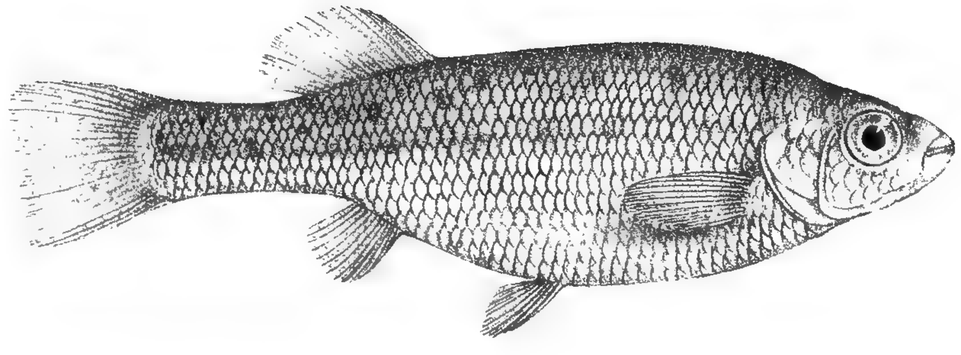

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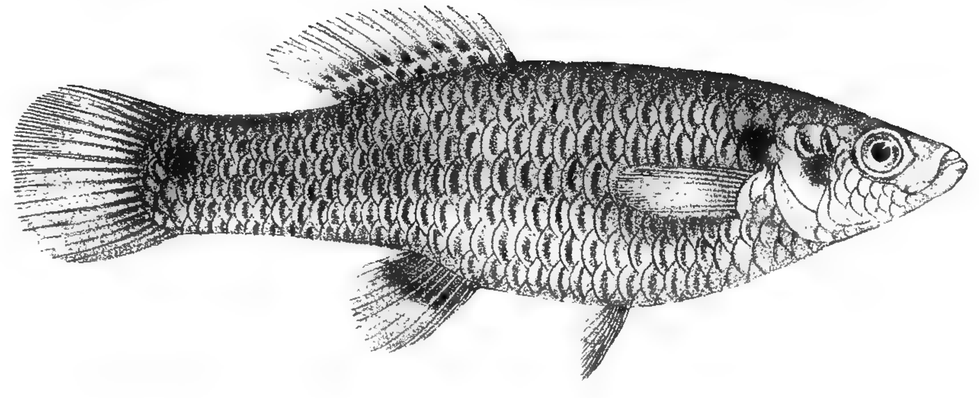

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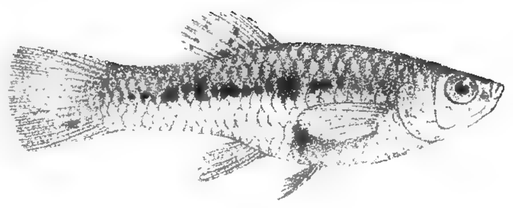
1. LIMNURGUS INNOMINATUS. 2. CHARACODON FURCIDENS. 3, 4. C. MULTIRADIATUS. 5, 6. GOODEA MULTIPUNCTATA.
7. GAMBUSIA TERRABENSIS. 8. G. JONESII.

J. Green del. lith. et imp.



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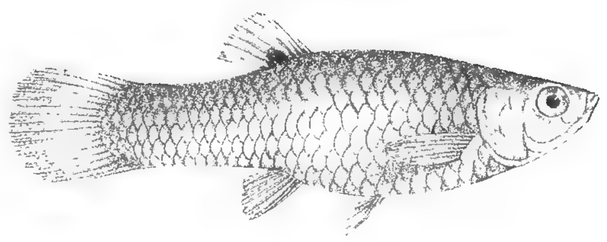

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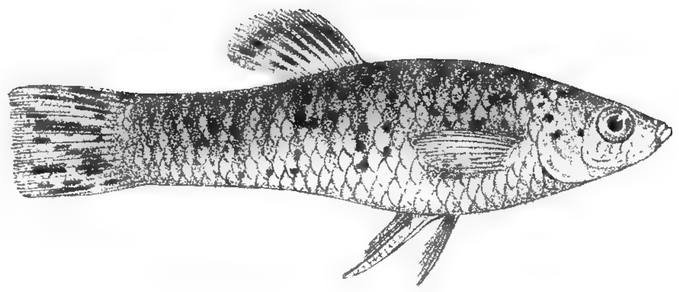

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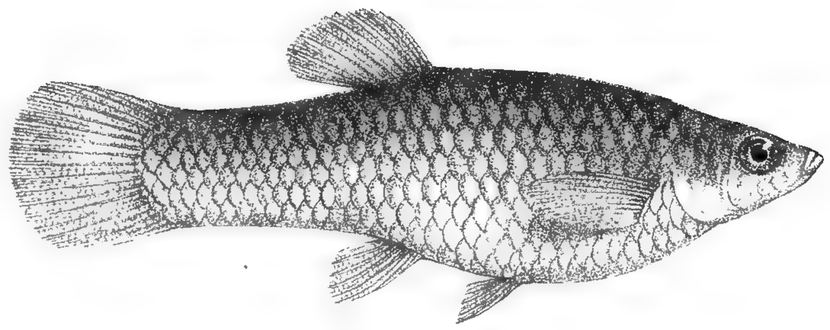

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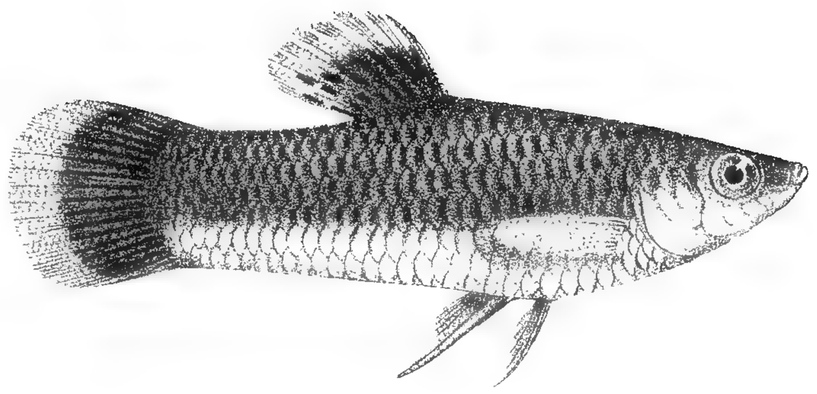

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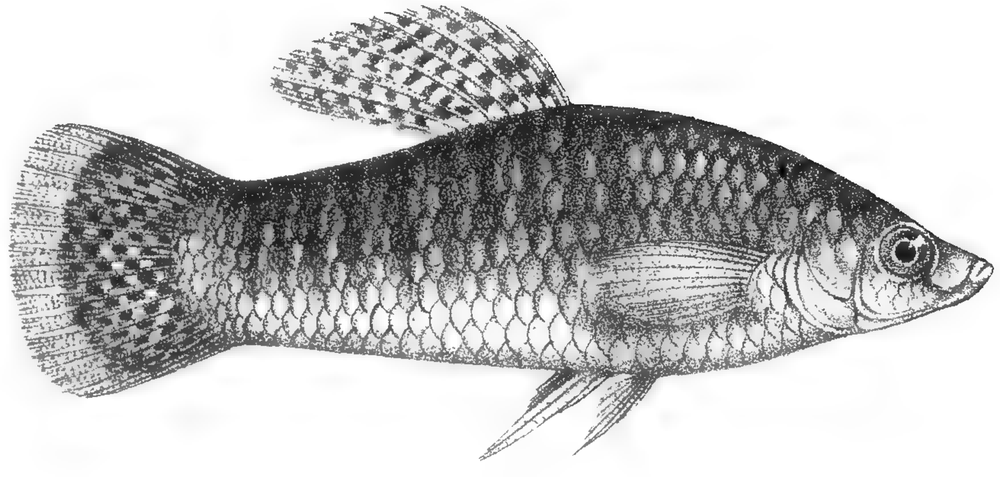

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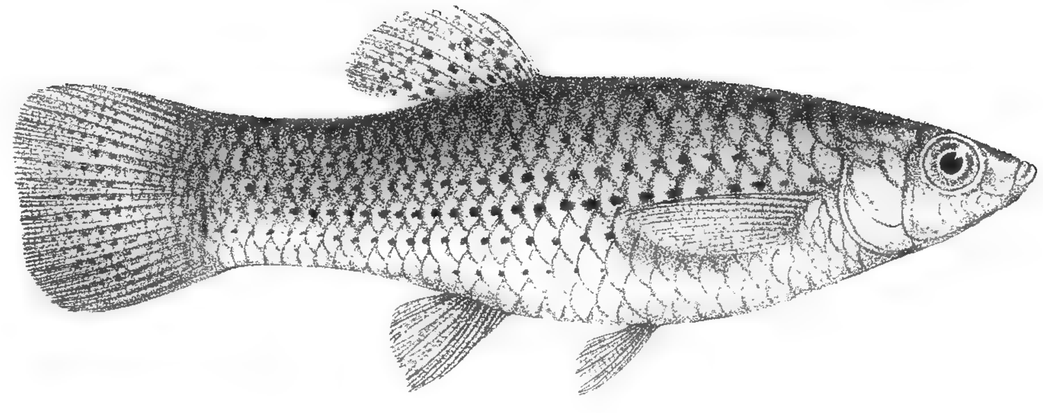
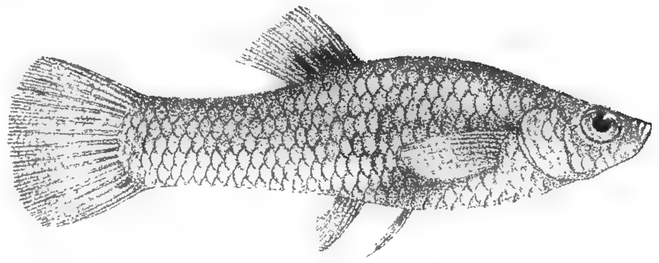


7.

1-7. POECILIA SPHENOPS.

J.Green del. lith et imp.



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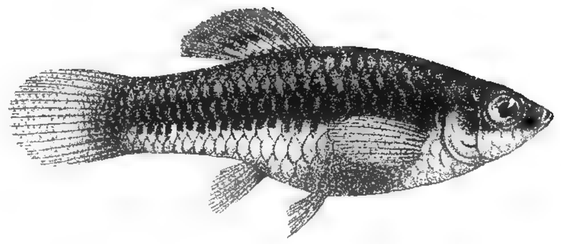

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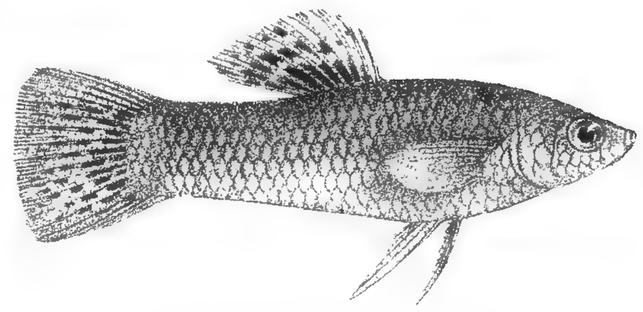

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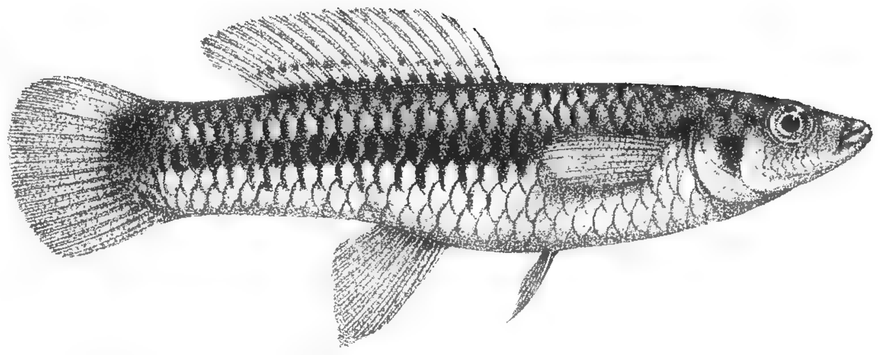

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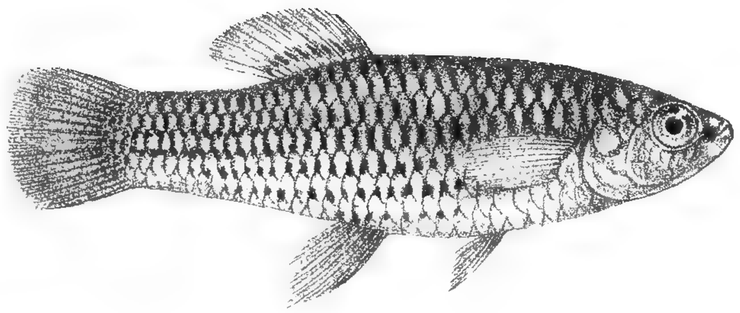

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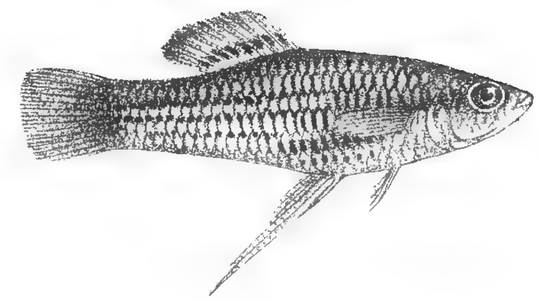
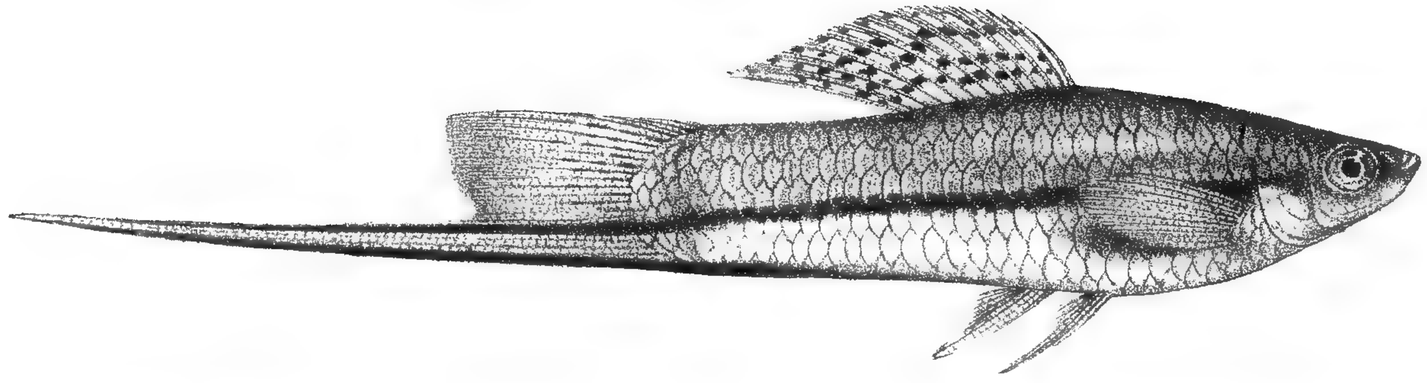


6 ♂



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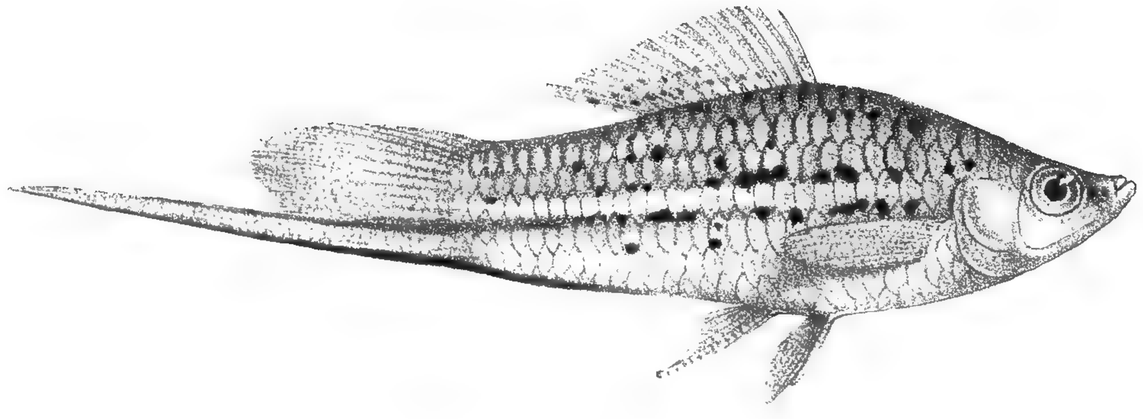

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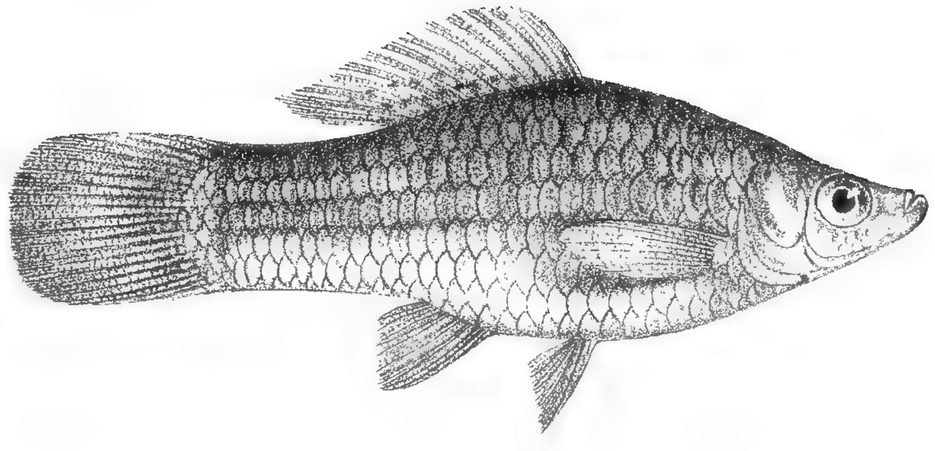
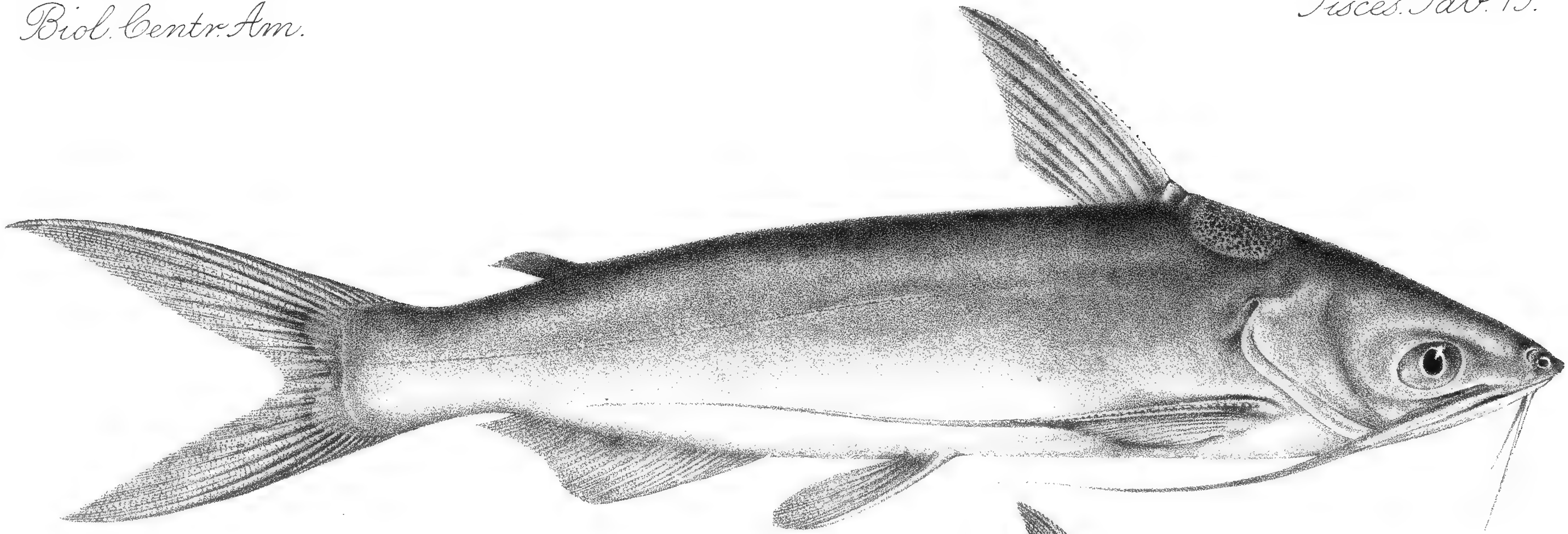


9 ♀

1. POECILIA COUCHIANA. 2, 3. P. SALVATORIS. 4. GAMBUSIA BIMACULATA.
5, 6. G. ANNECTENS. 7. XIPHOPHORUS STRIGATUS. 8, 9. X. BREVIS.

J. Green del. lith et. imp.



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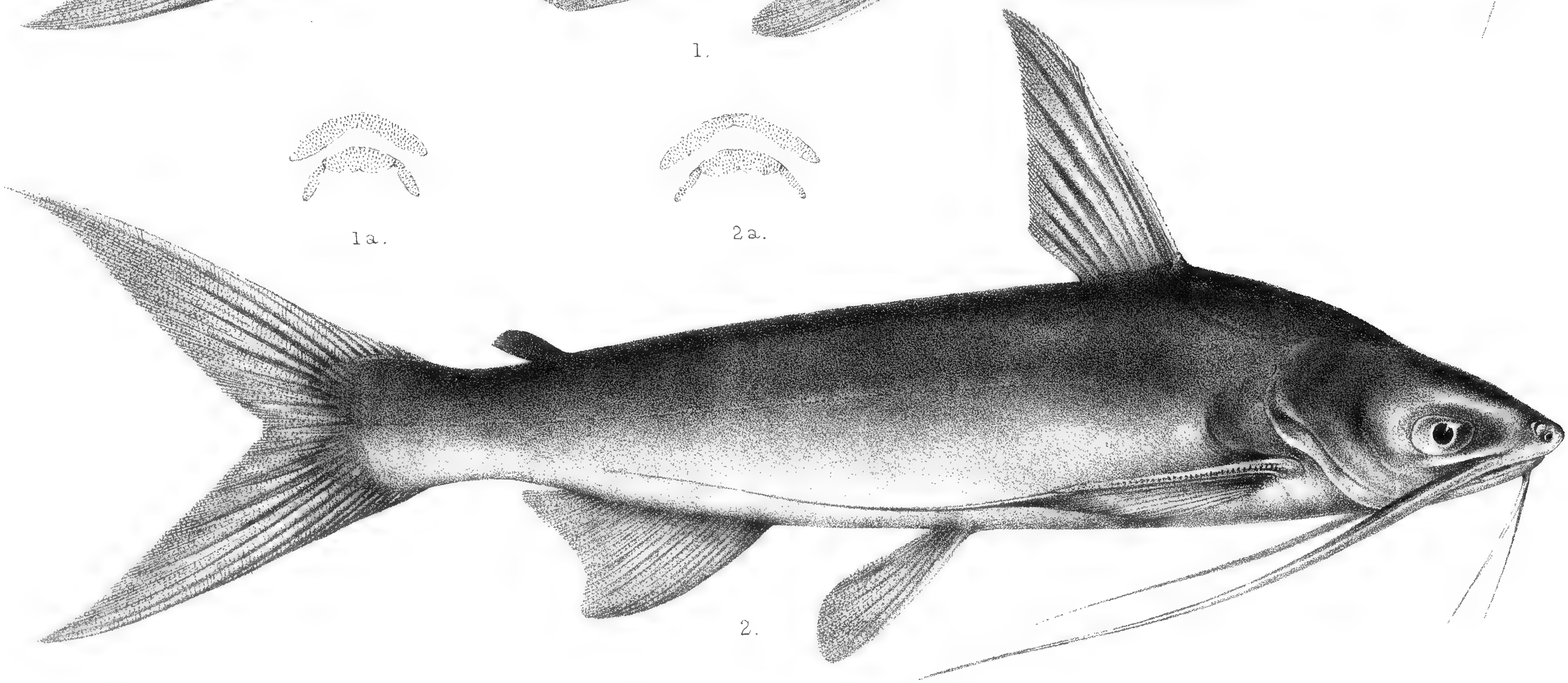
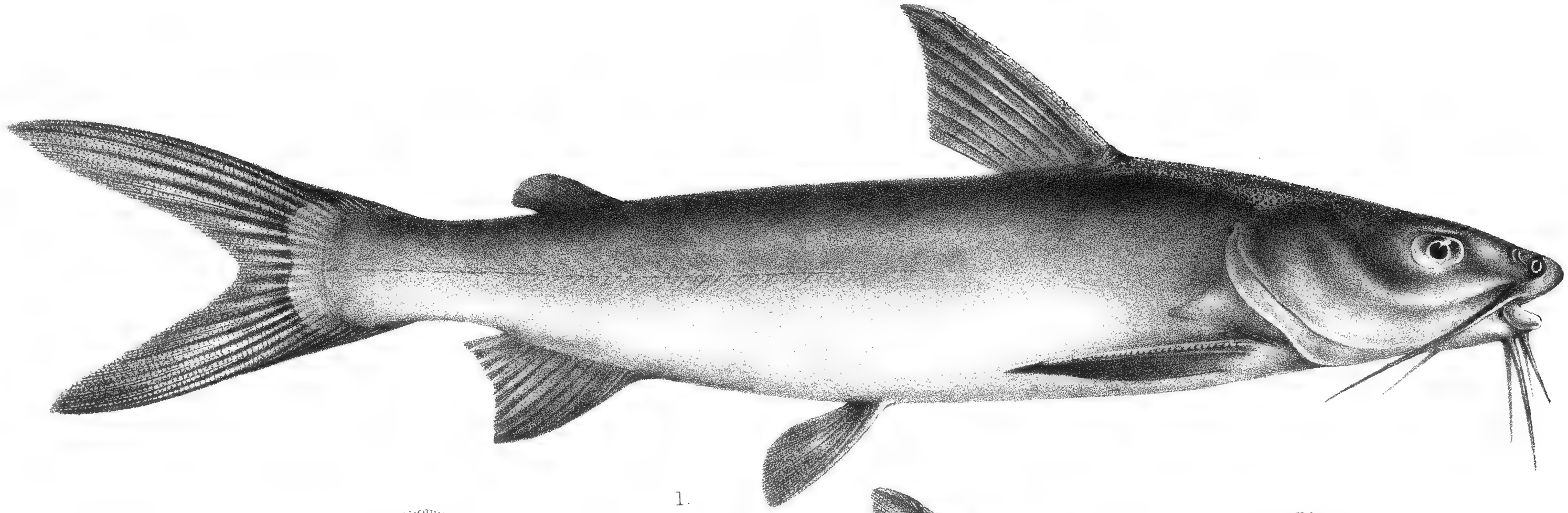


2.

1. ÆLURICHTHYS ISTHMENSIS. 2. Æ. SCUTATUS.

J. Green del. lith et imp.



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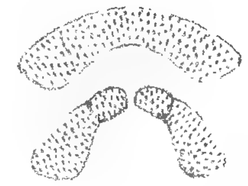

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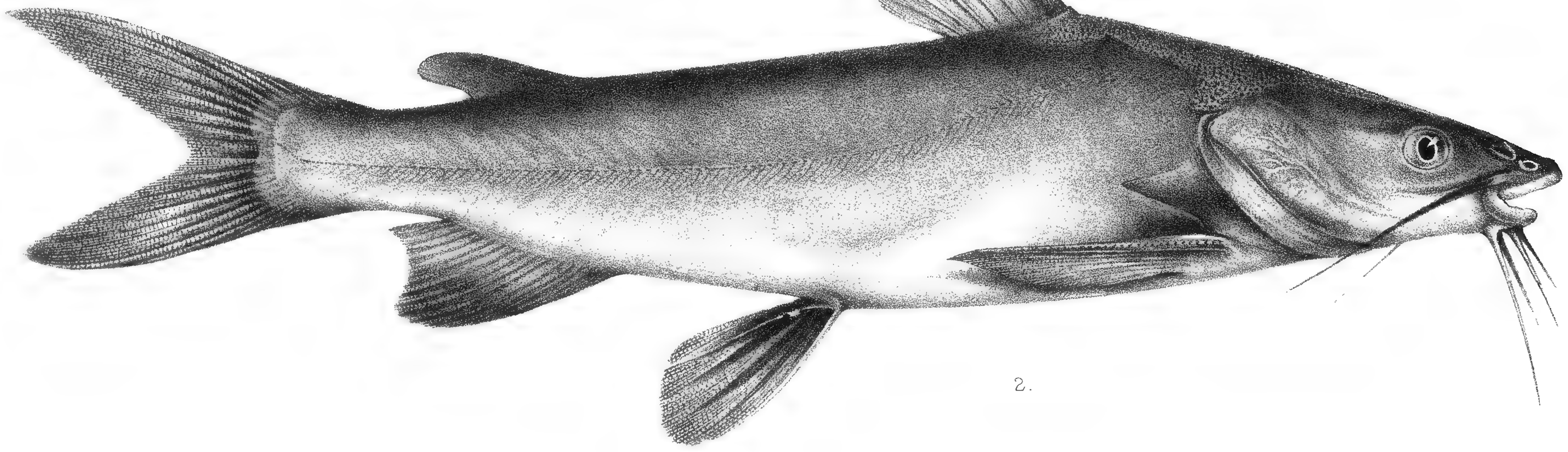

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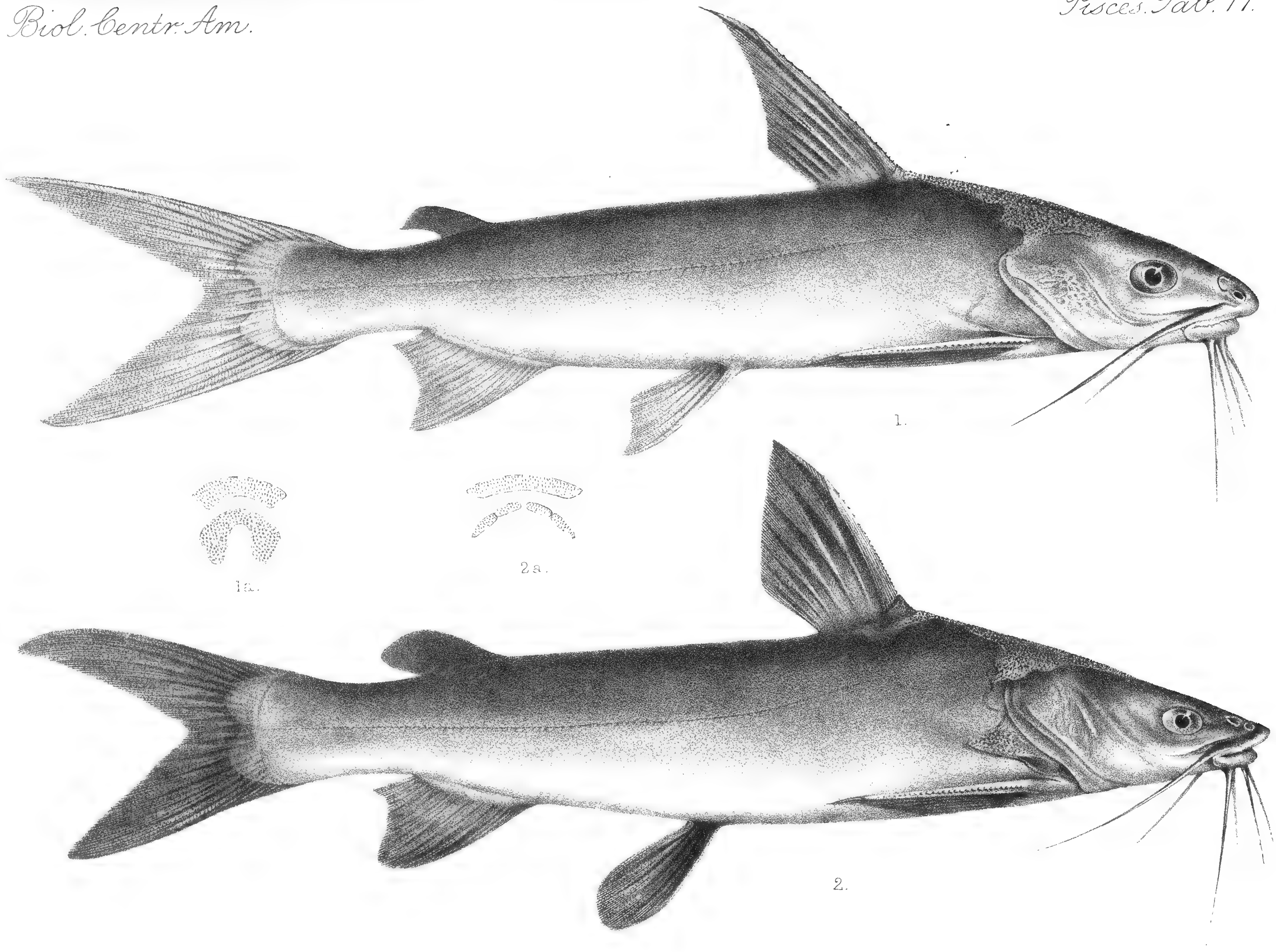
1. GALEICHTHYS GUENTHERI. 2. G. ASSIMILIS.

J. Green del. lith. et imp.



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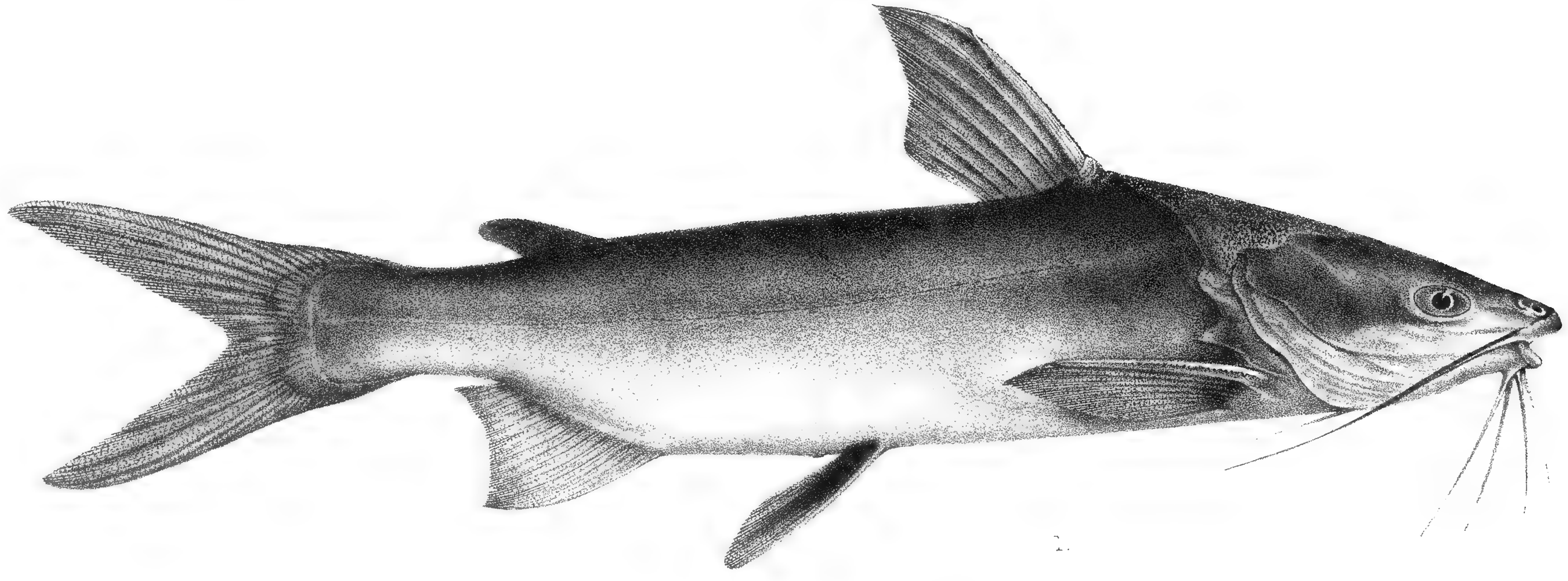
J. Green del lith. et imp.



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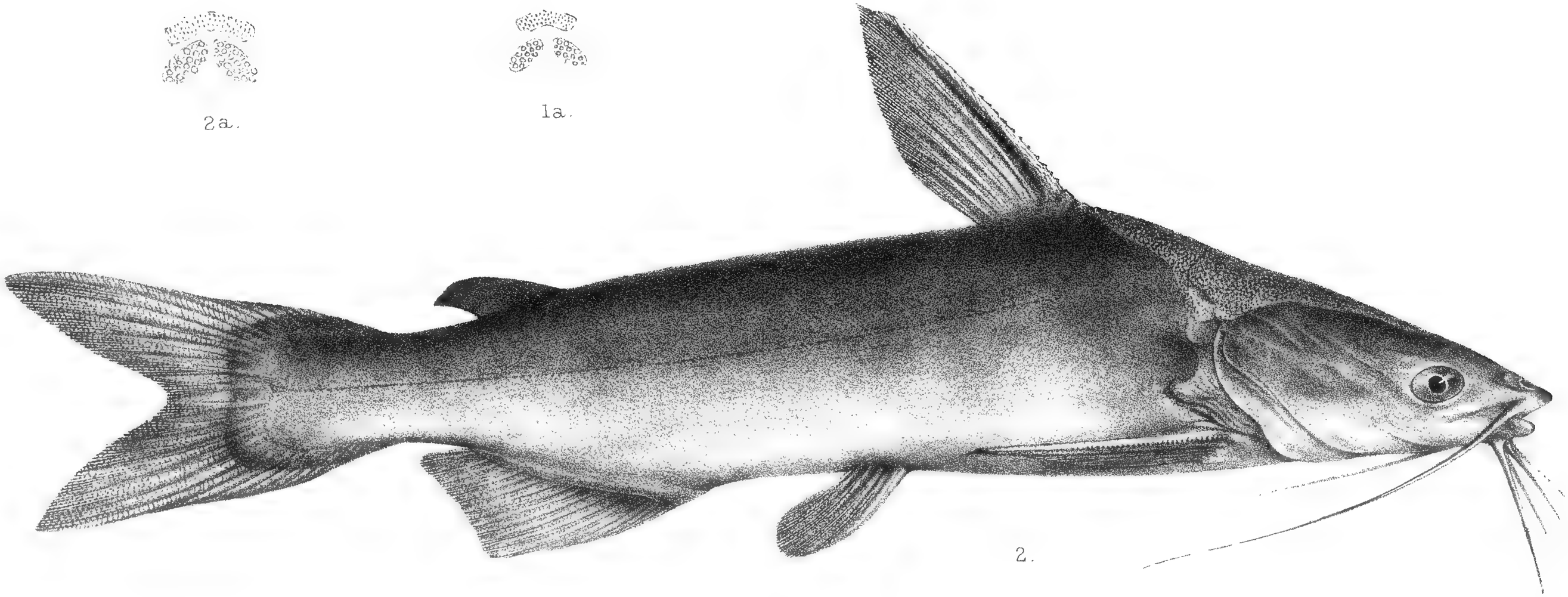

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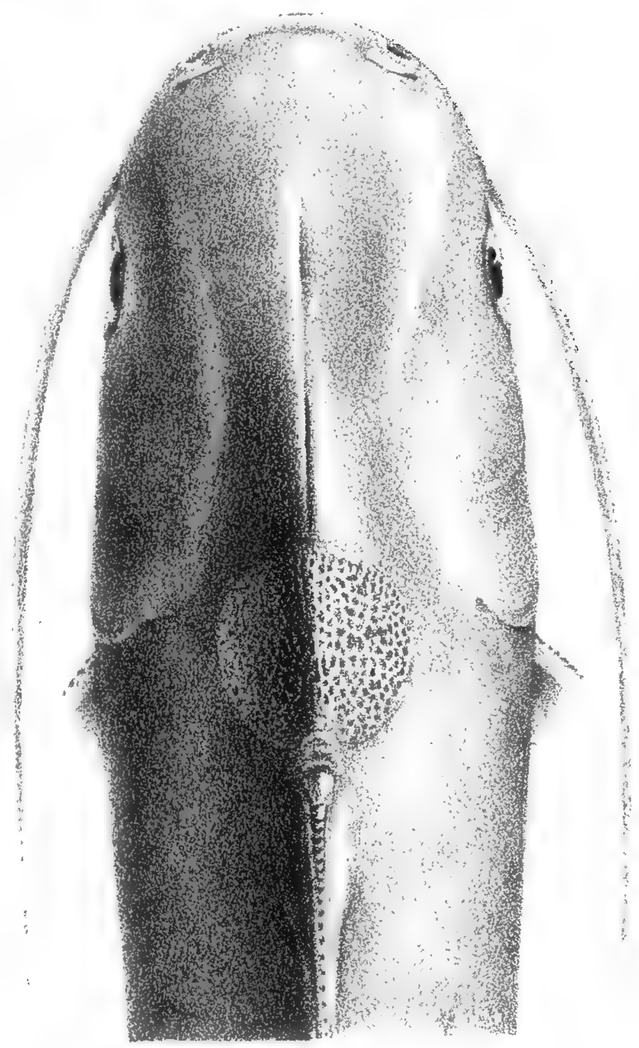
J. Green del. lith. et imp.



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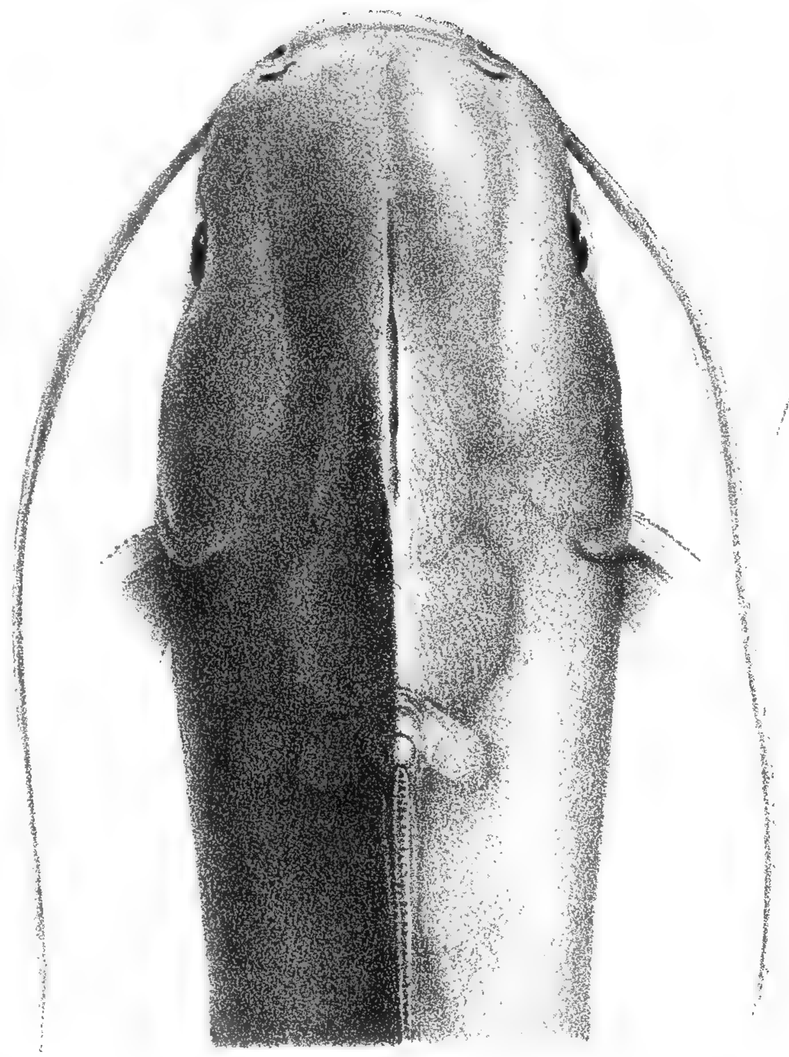

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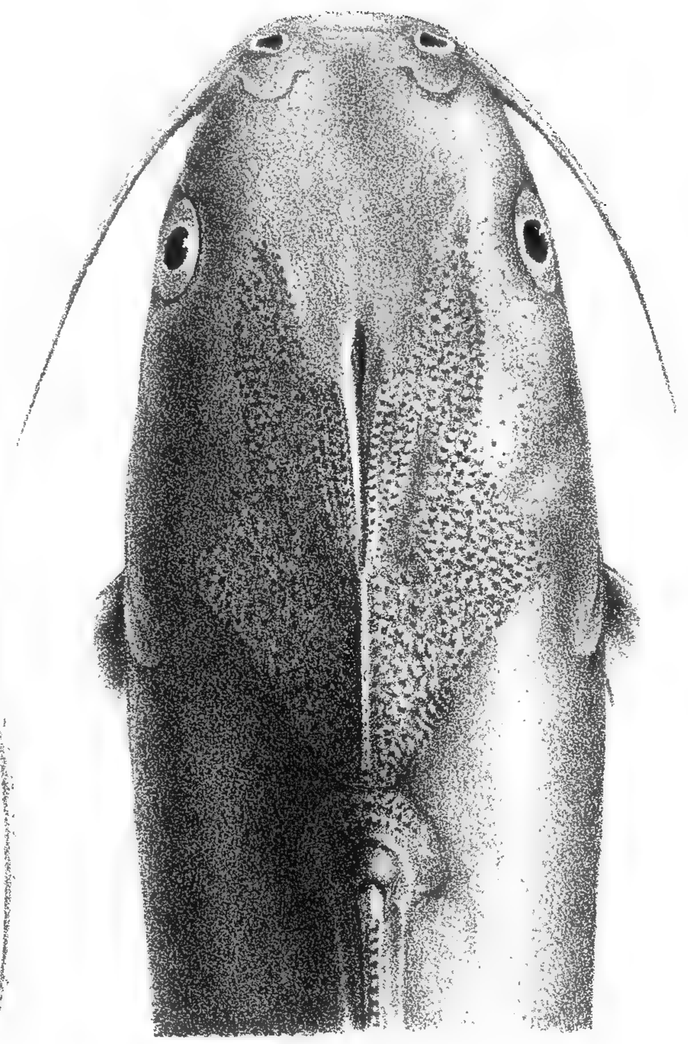

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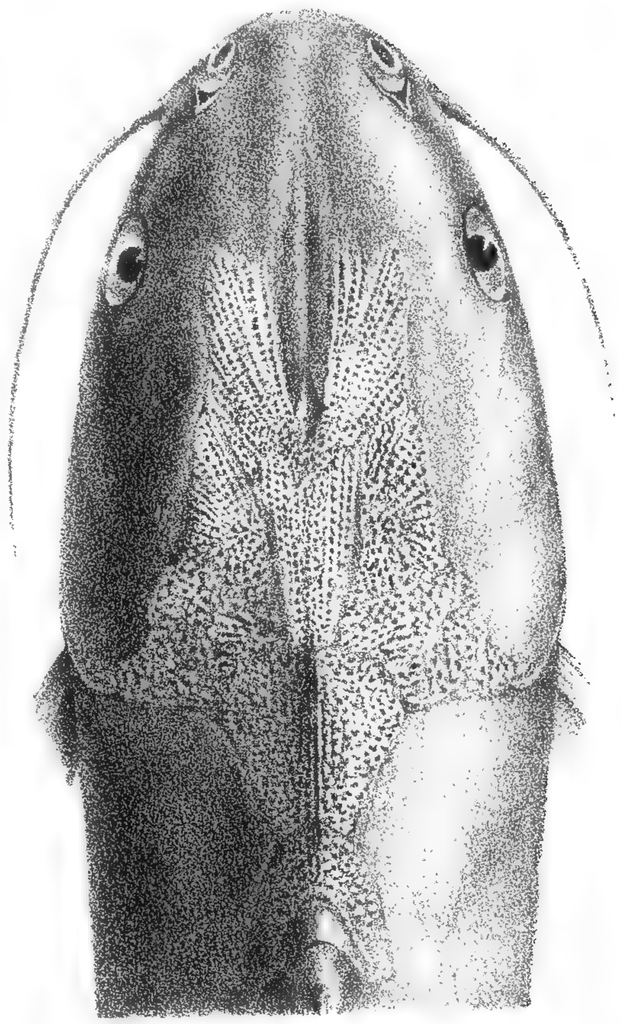

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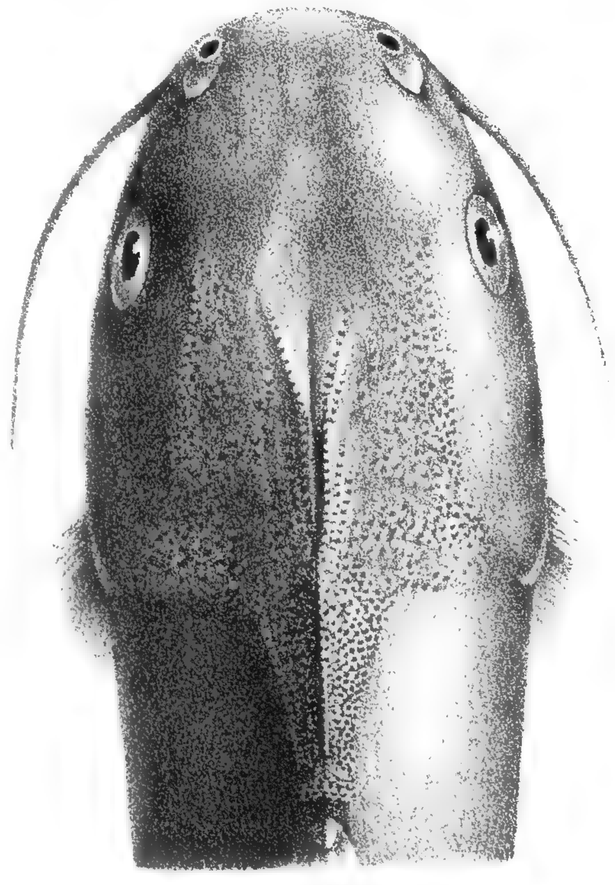

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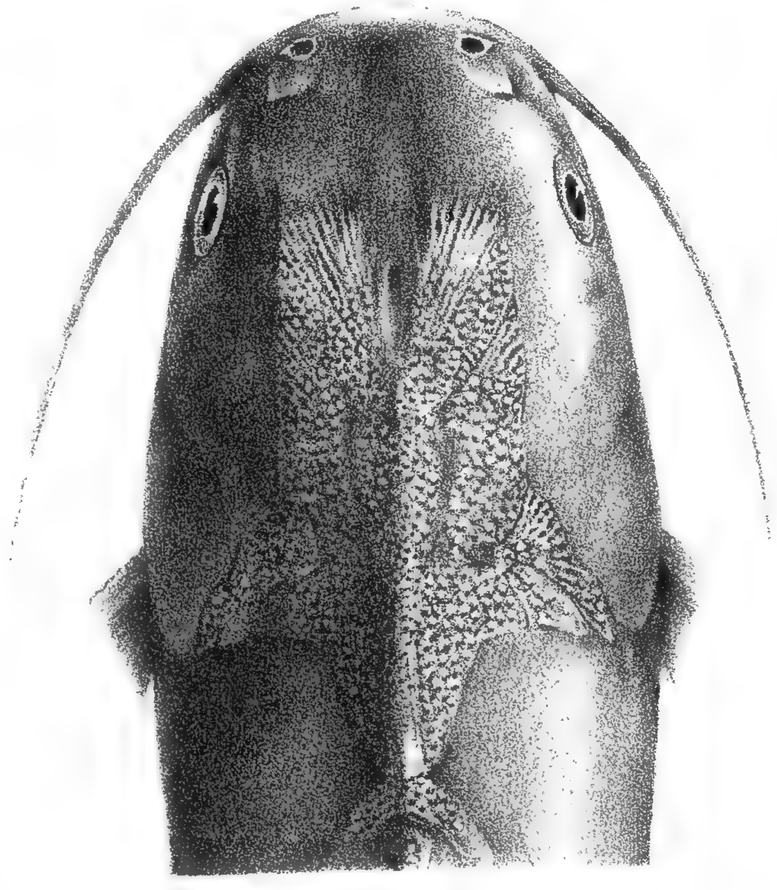

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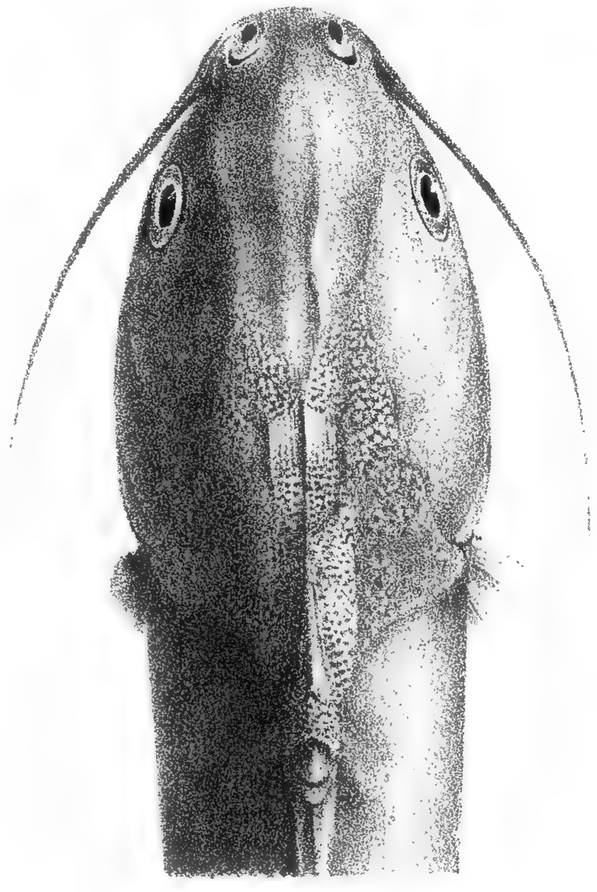

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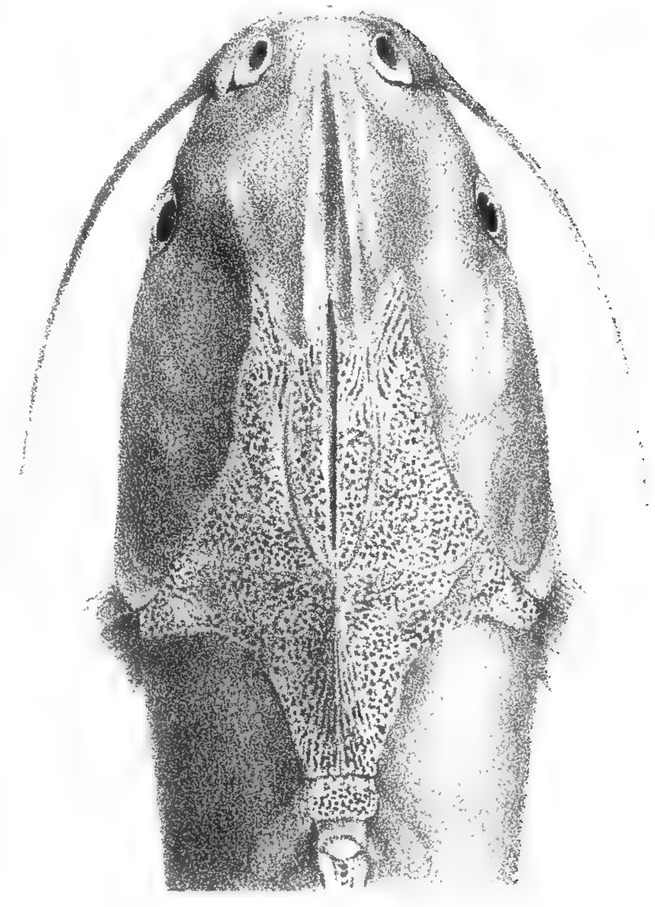

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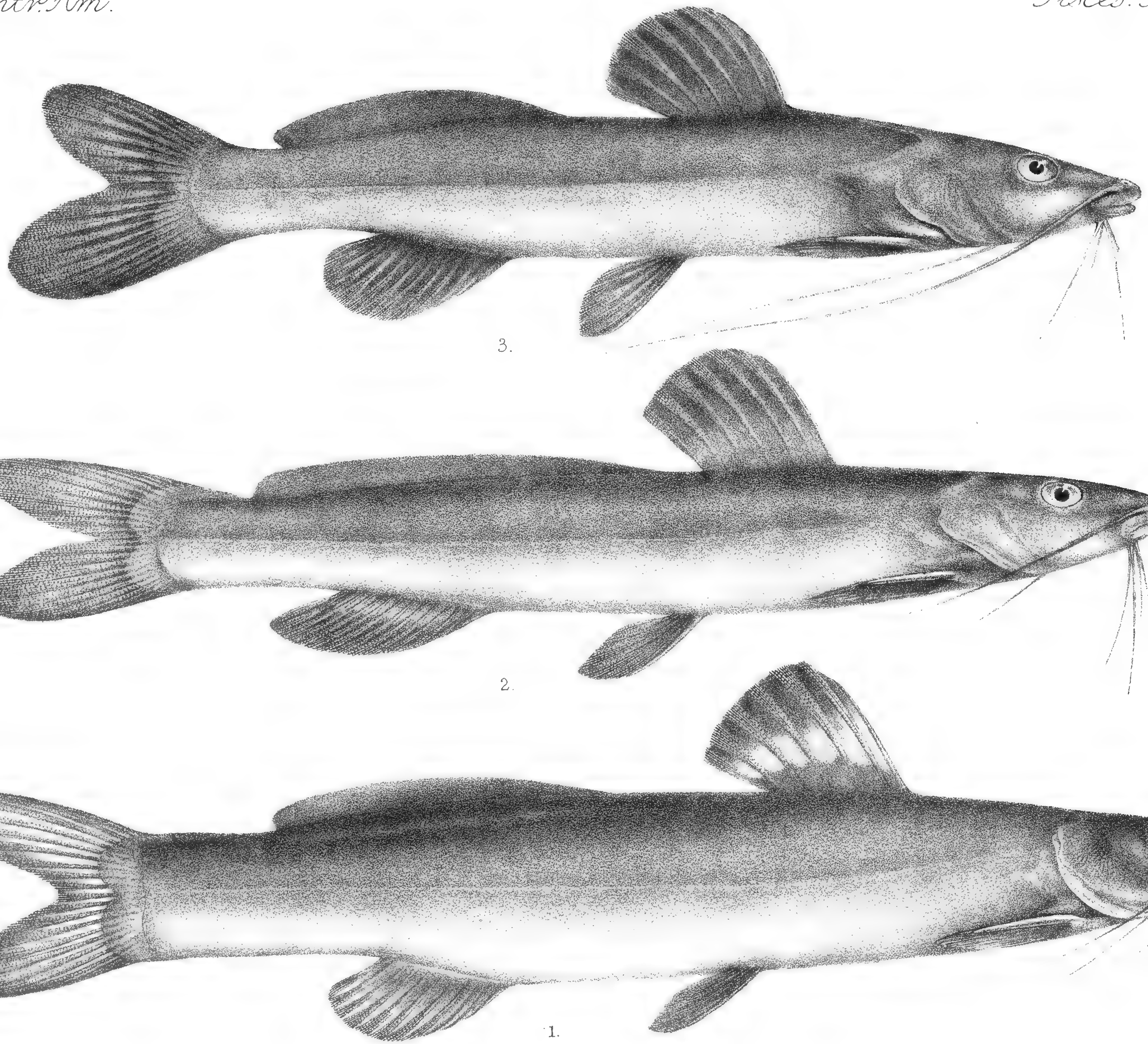
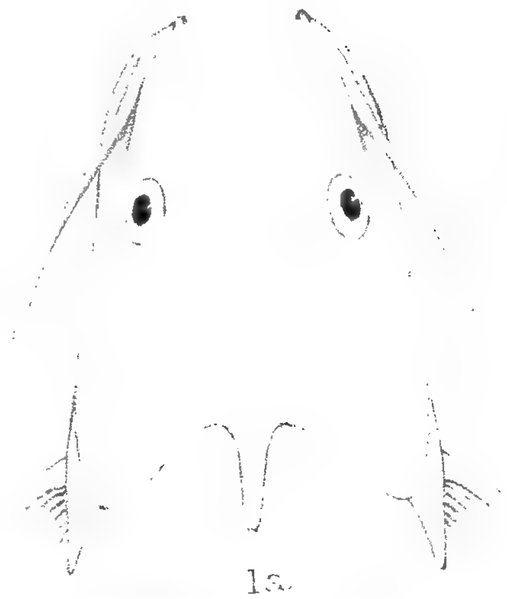
1. ÆLURICHTHYS ISTHMENSIS.
2. „ SCUTATUS.
3. GALEICHTHYS GUENTHERI.
4. „ ASSIMILIS.
5. GALEICHTHYS PLATYPOGON.
6. „ CÆRULESCENS.
7. ARIUS MELANOPUS.
8. „ FUERTHII.

J. Green del. lith. et imp.



1. RHAMDIA MOTAGUENSIS 2. R. NICARAGUENSIS. 3. R. BOUCARDI.

J. Green del. lith. et imp



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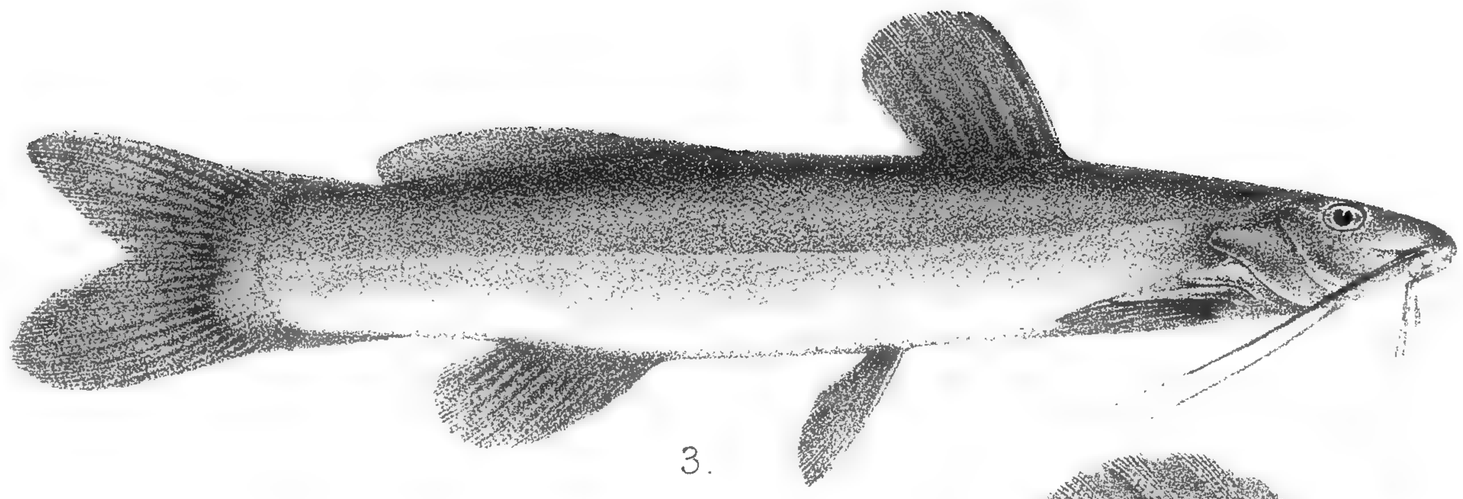

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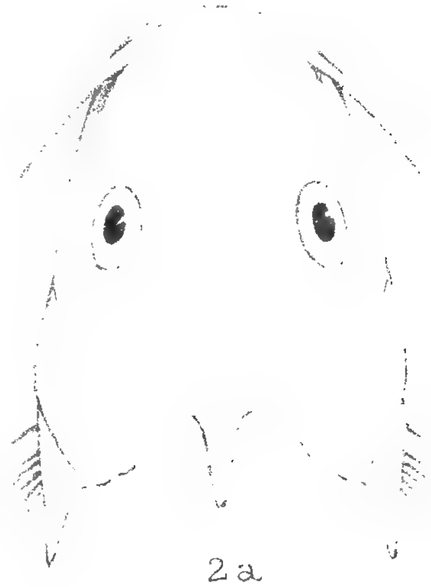

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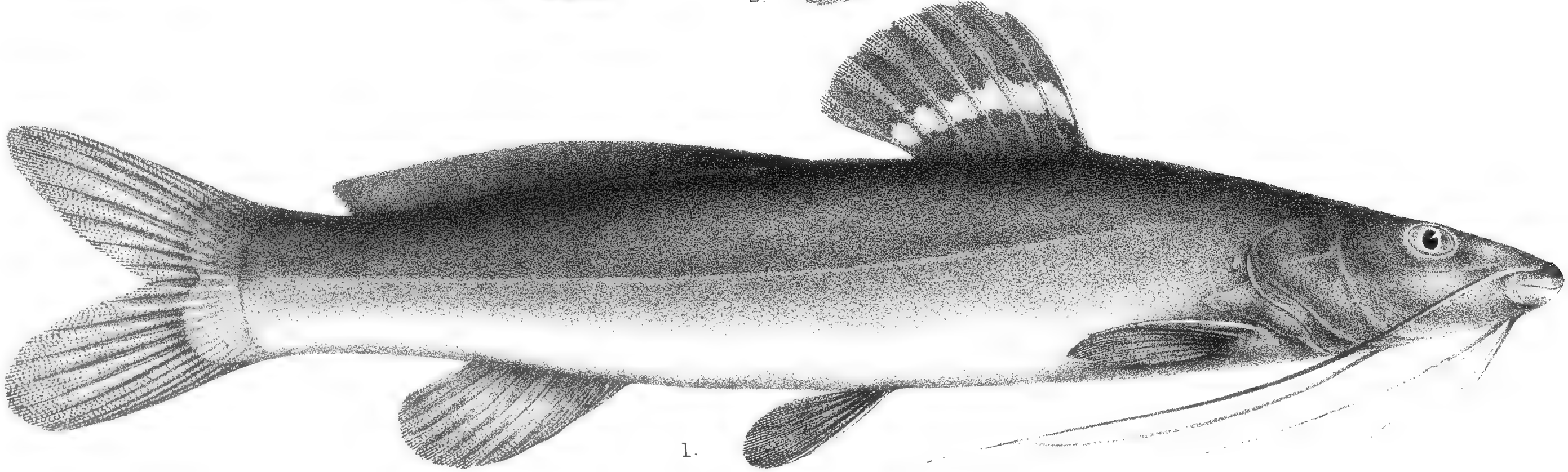

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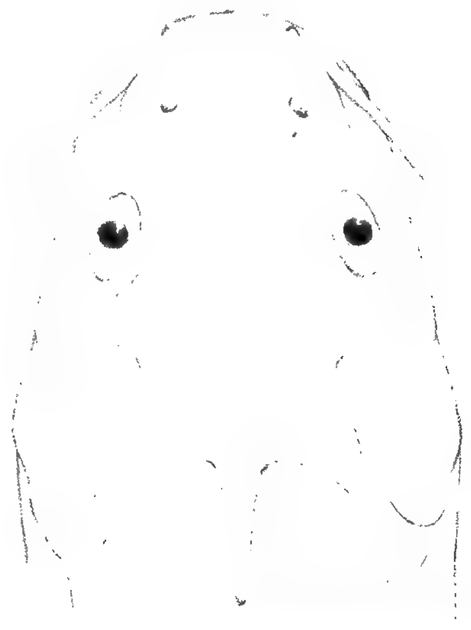
1. RHAMDIA GODMANI. 2. R. MANAGUENSIS. 3. R. HYPSELURA.

J. Green del. lith. et imp.



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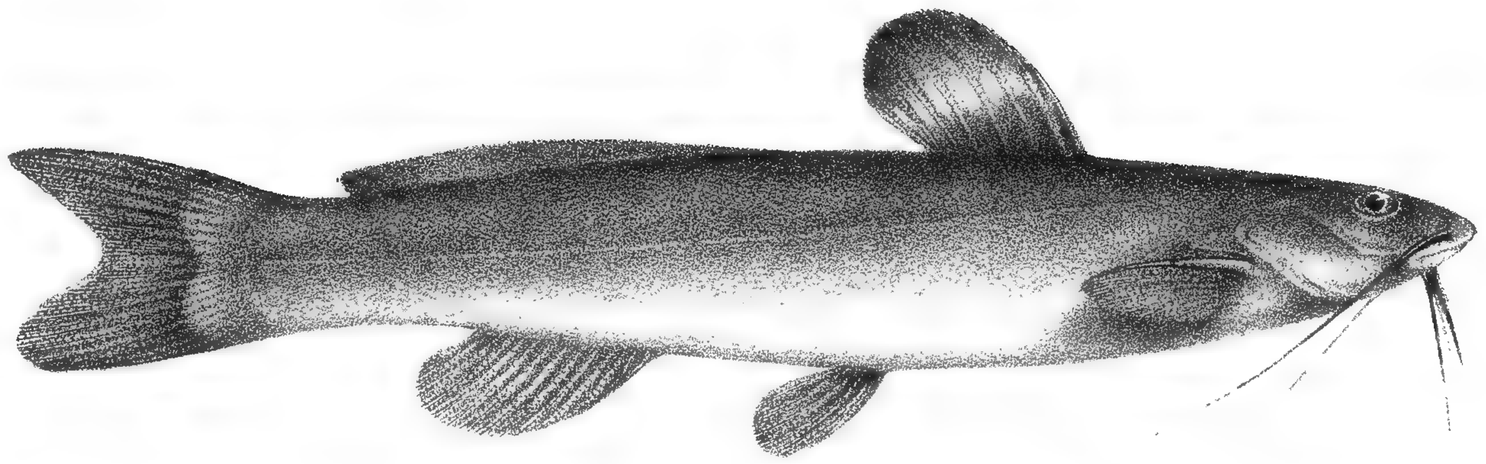

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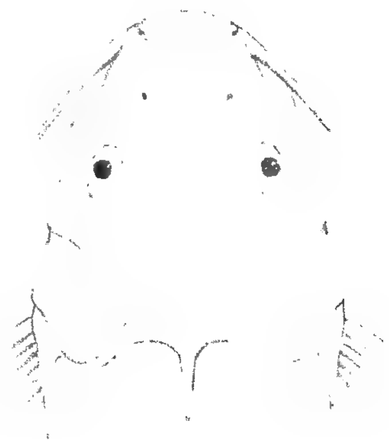

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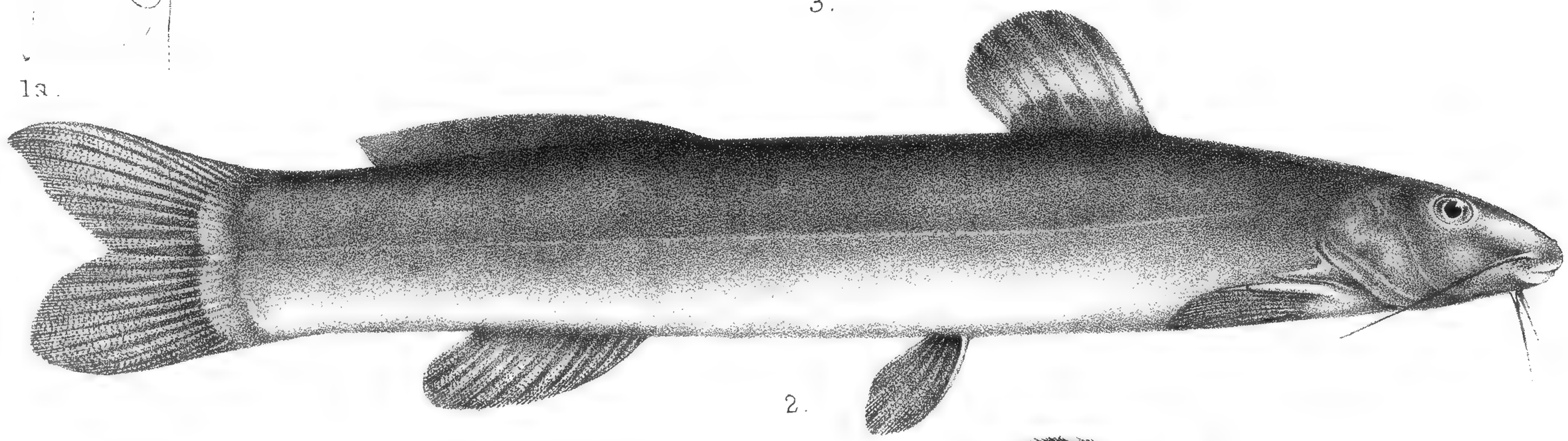

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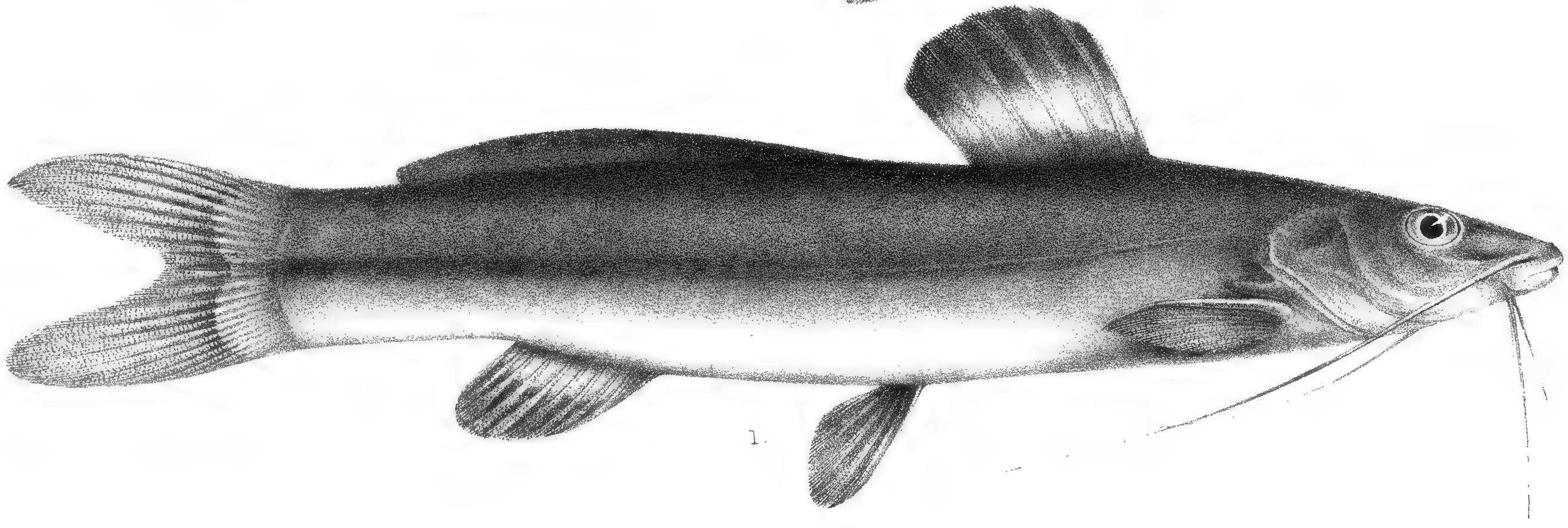

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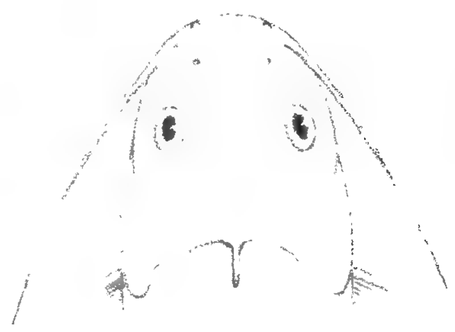
1. RHAMDIA PETENENSIS. 2. R. BRACHYCEPHALA. 3. R. POLYCAULUS.

J. Green del. lith. et imp.



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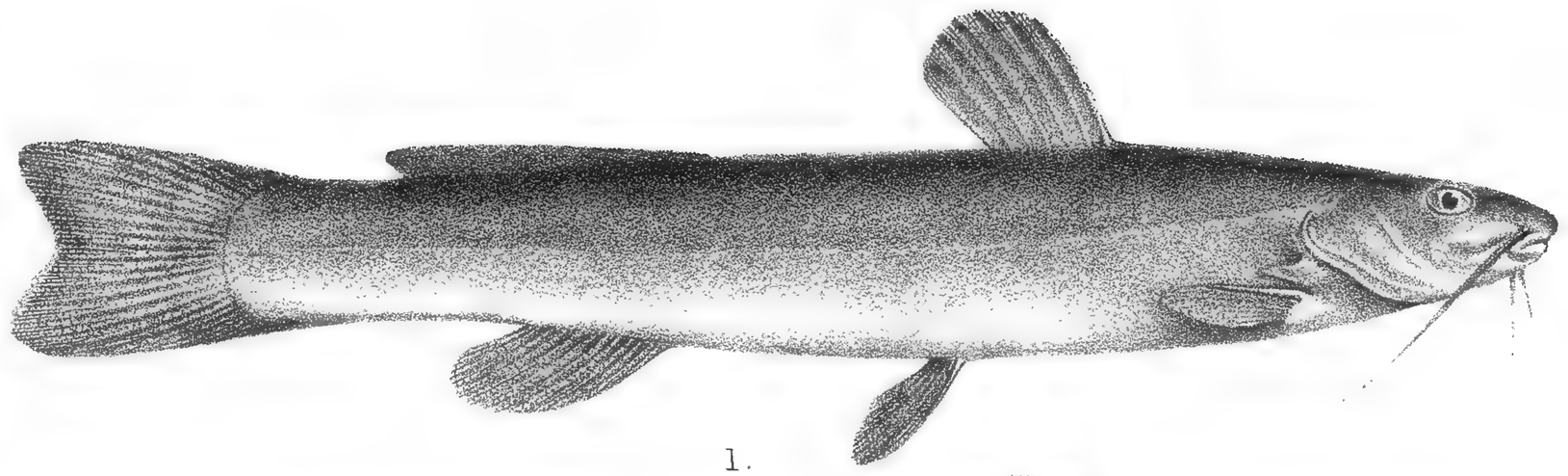

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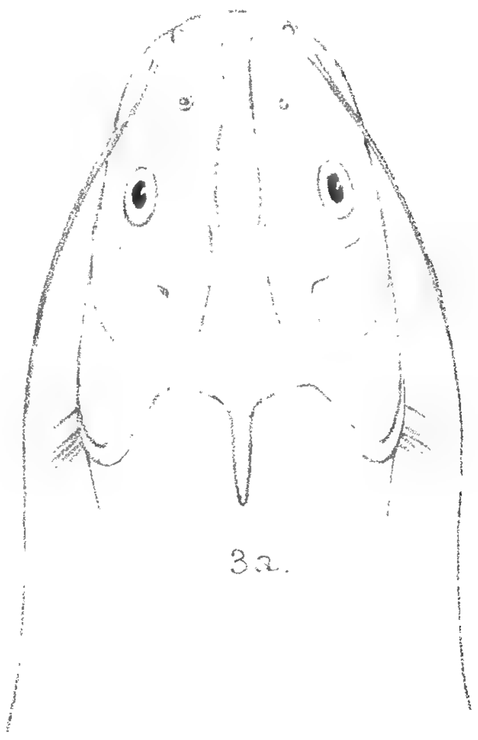

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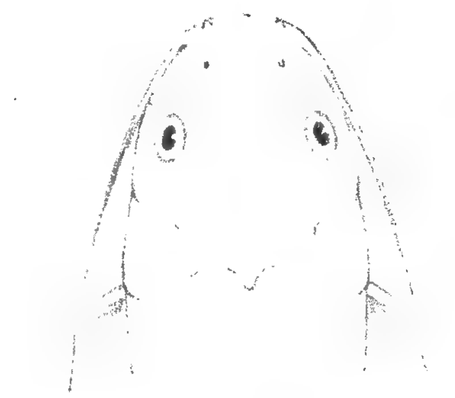

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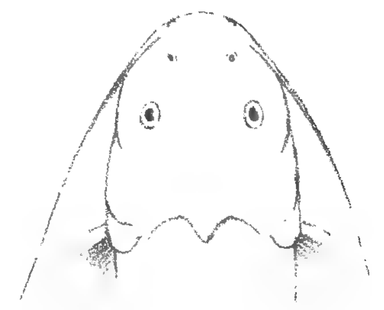

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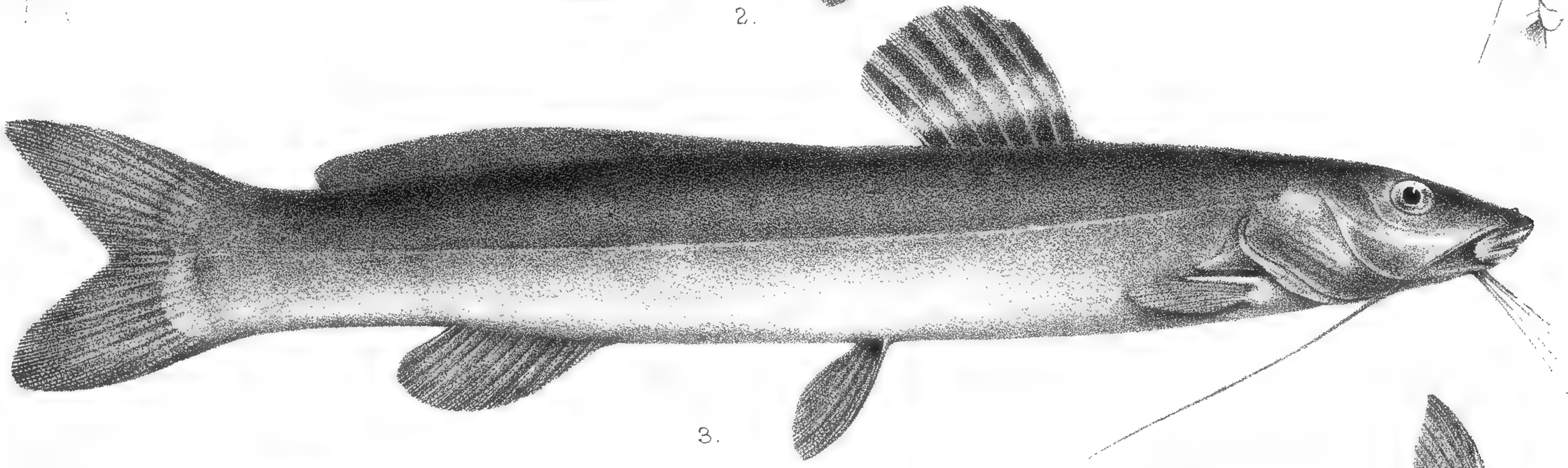

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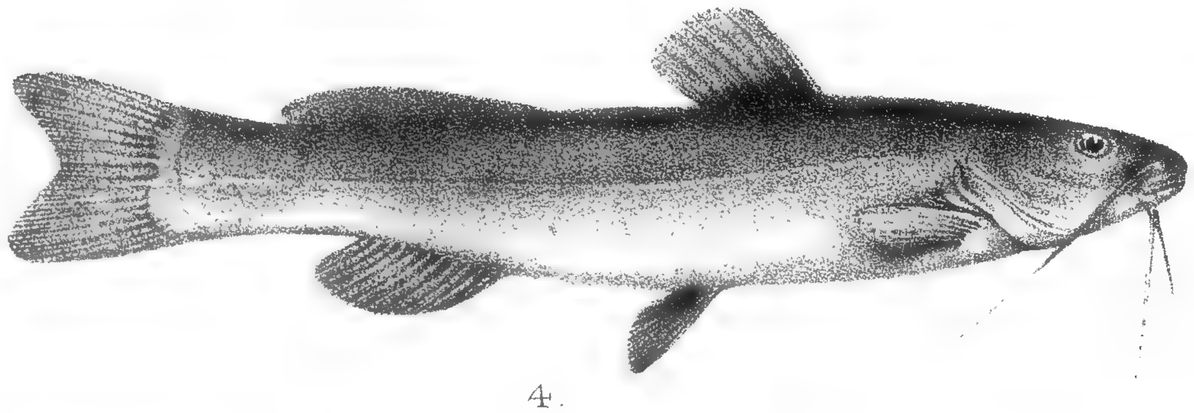

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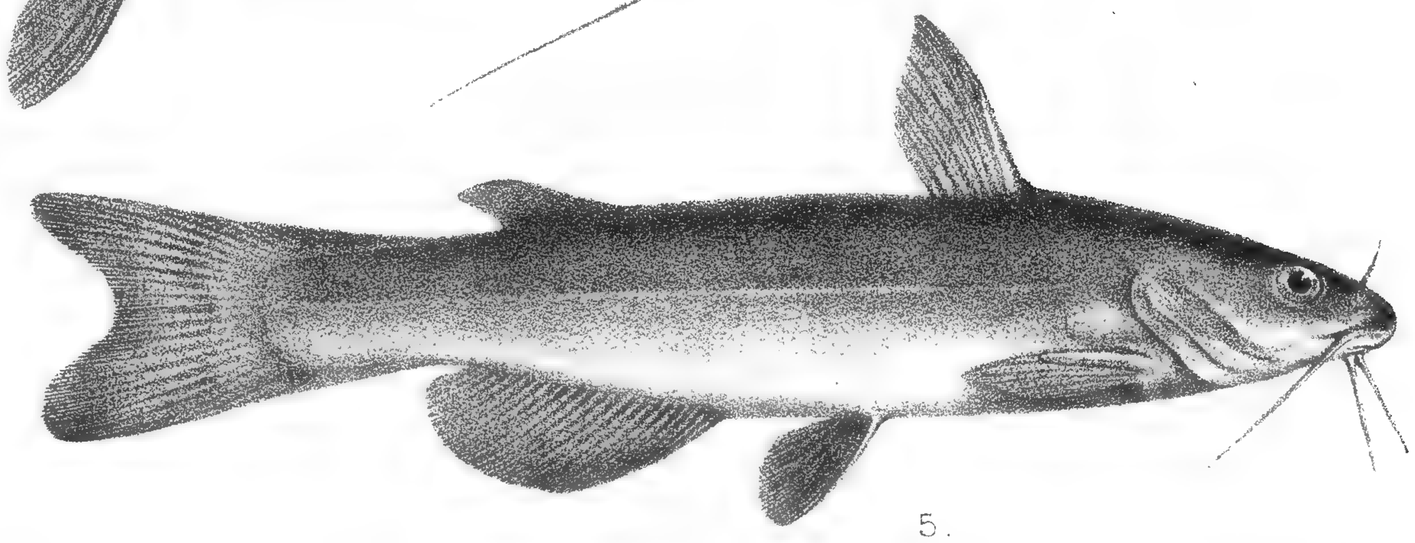

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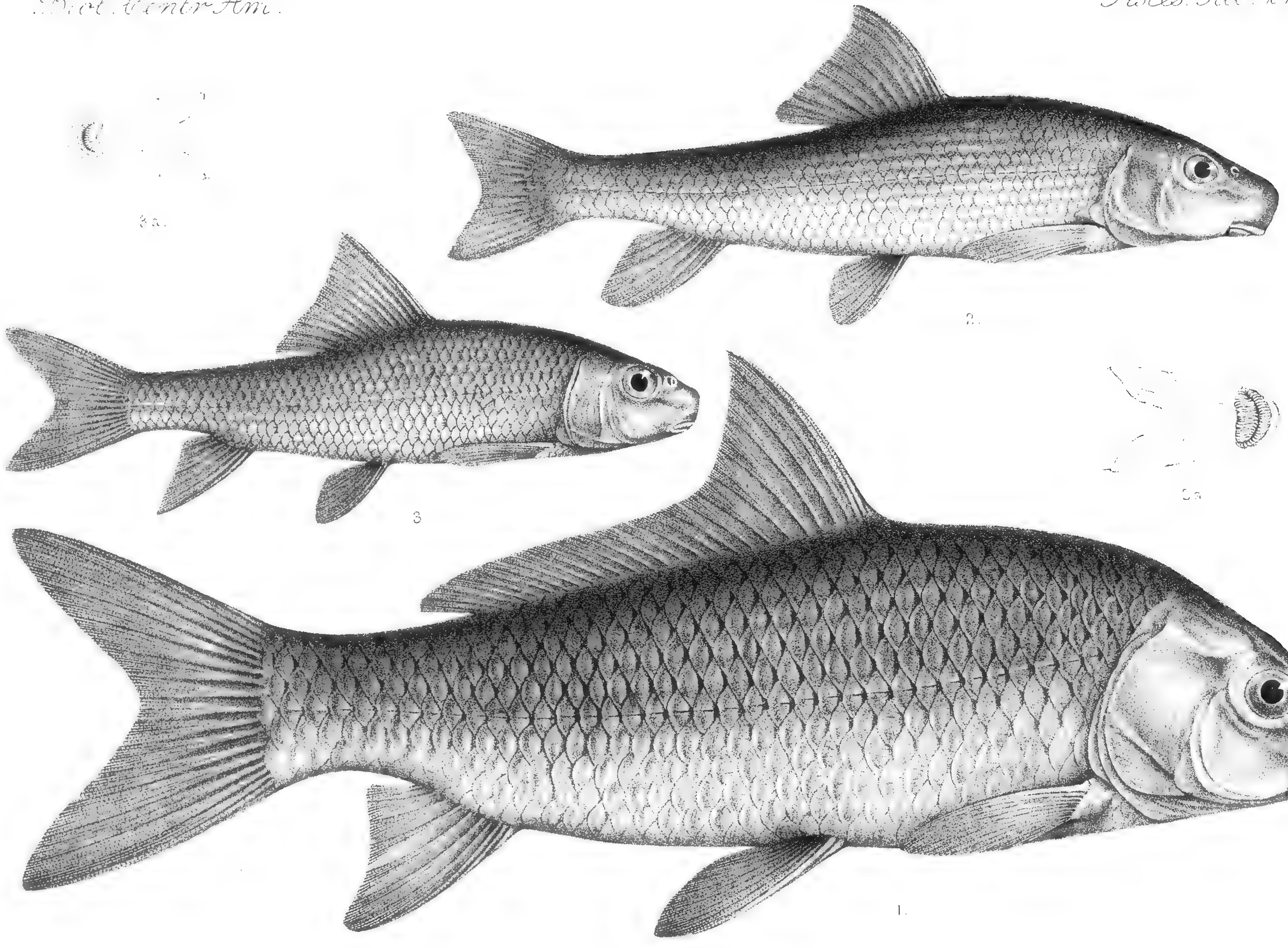
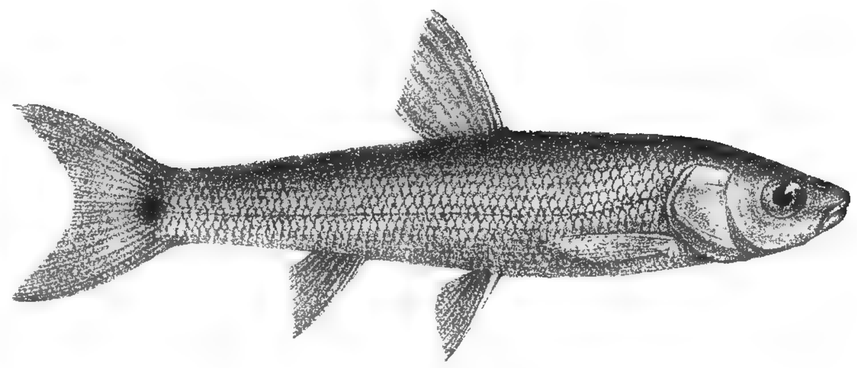
1. RHAMDIA ROGERSI. 2. R. SALVINI. 3. R. MICROPTERA. 4. R. UNDERWOODI. 5. AMIURUS MEEKI.

J. Green del. lith. et imp.



1. ICTIOBUS MERIDIONALIS. 2. MOXOSTOMA MASCOTAE. 3. M. PARVIDENS.

J. Green del. lith et imp.



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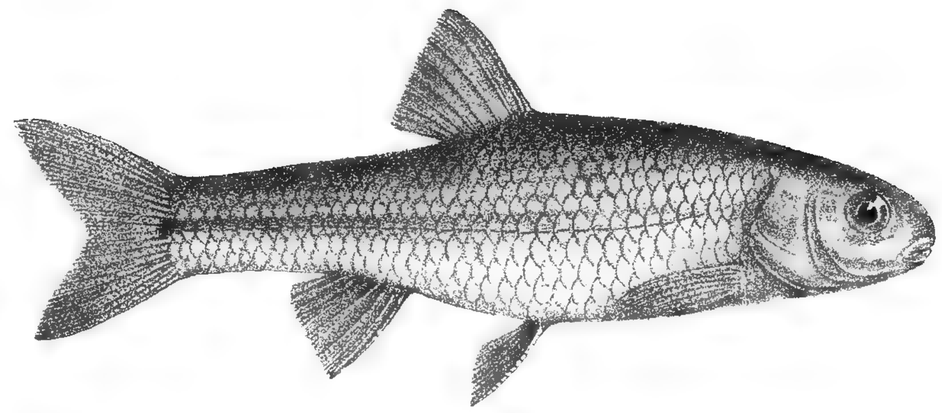

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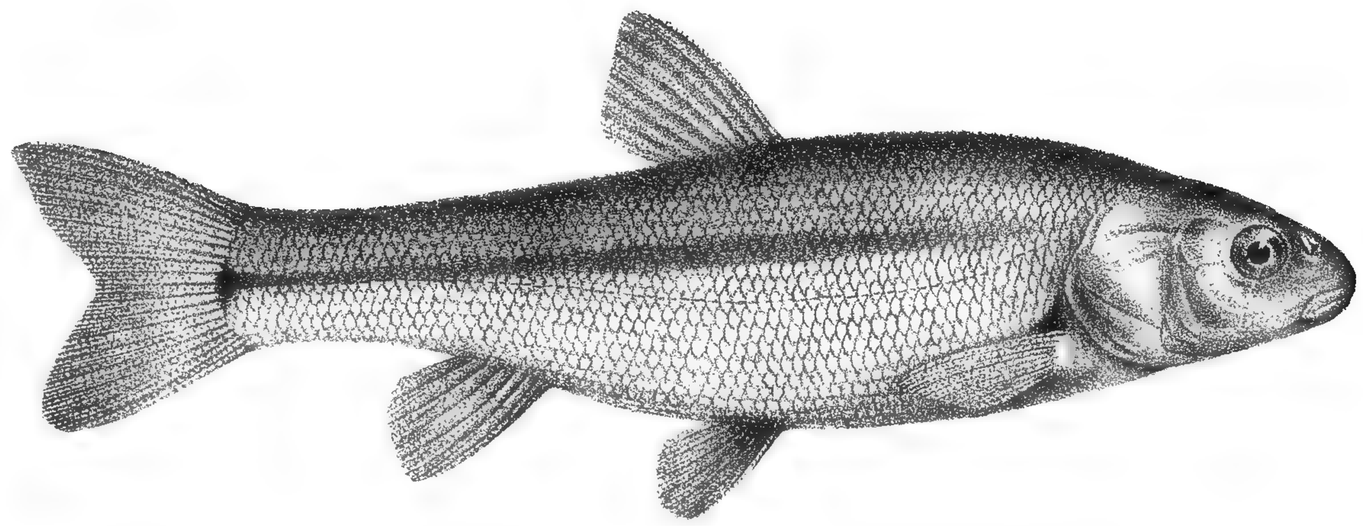

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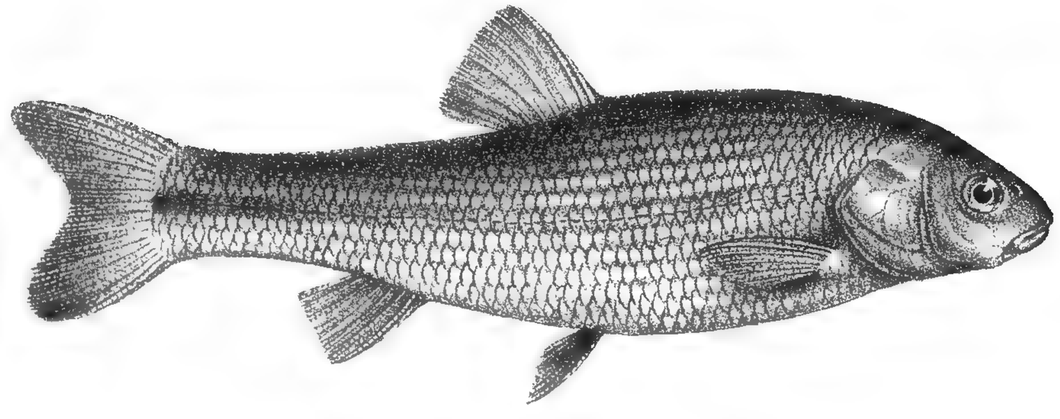

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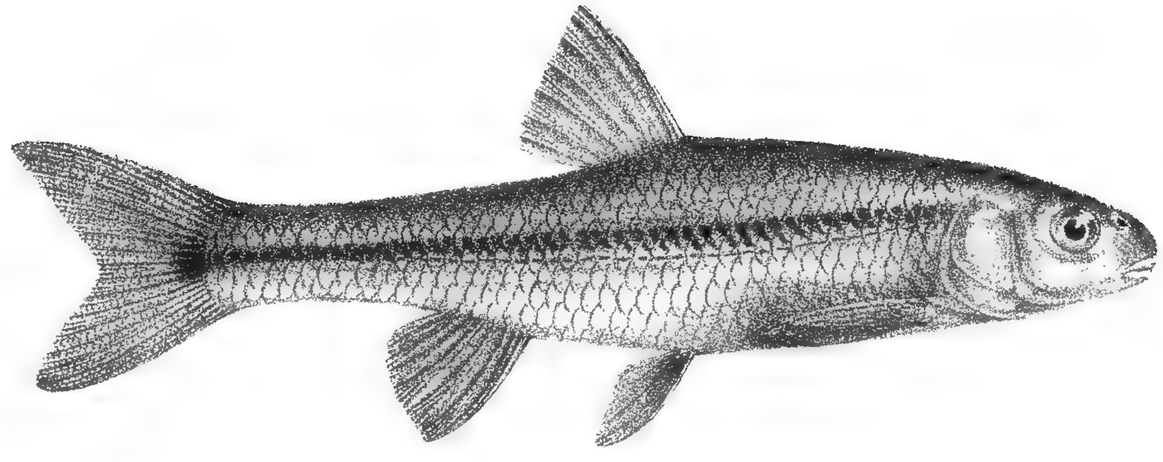

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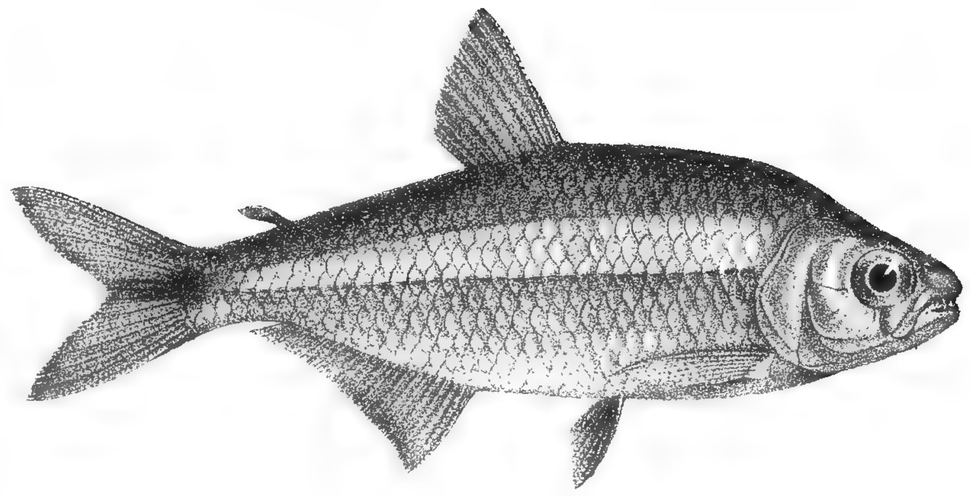
J. Green del. lith. et imp.



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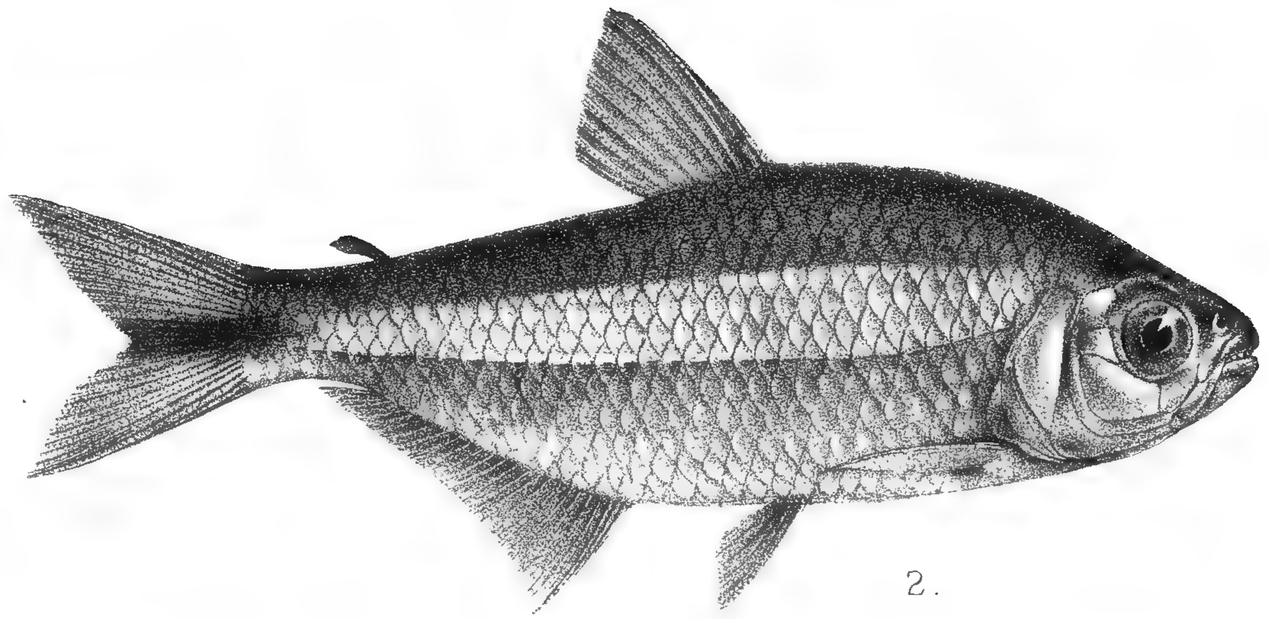

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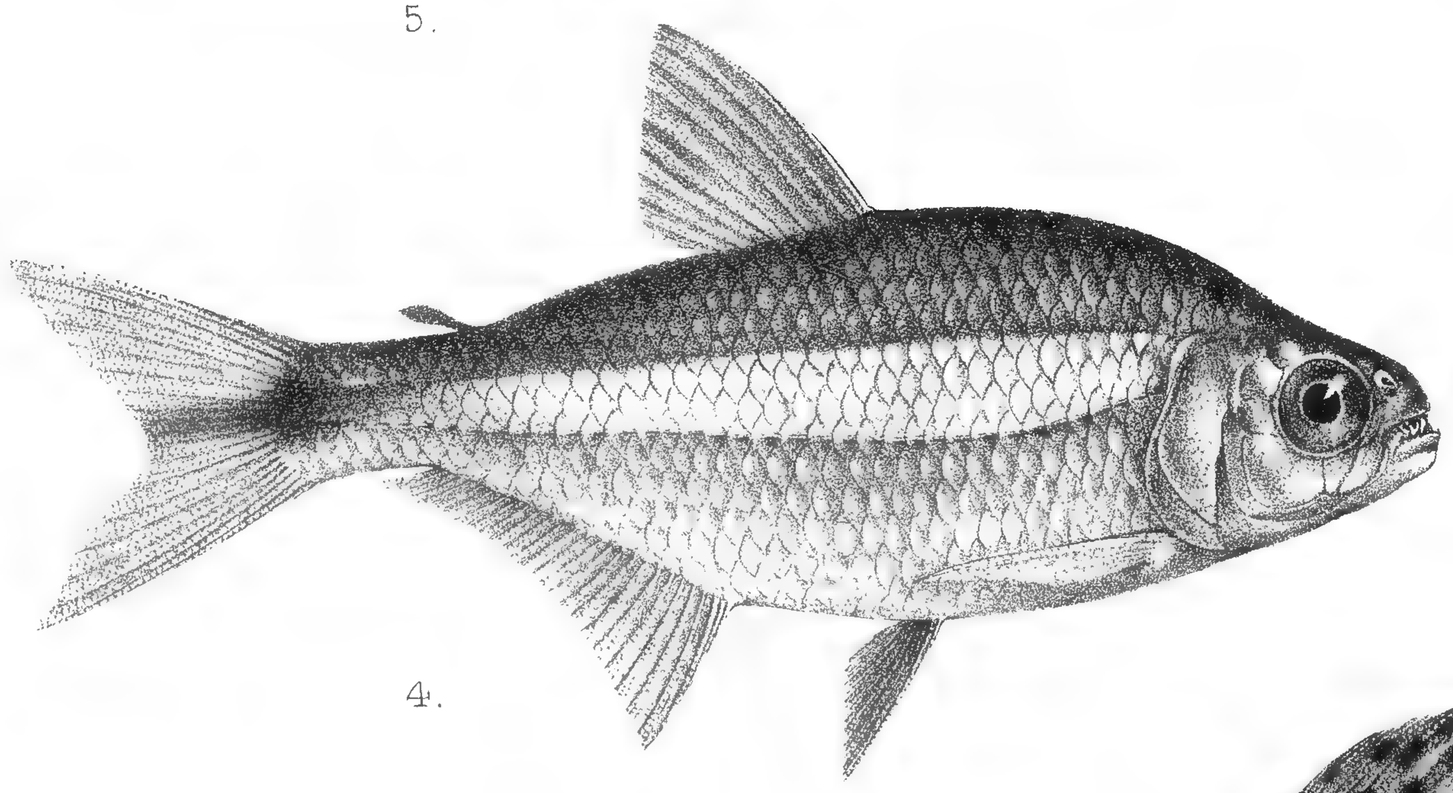

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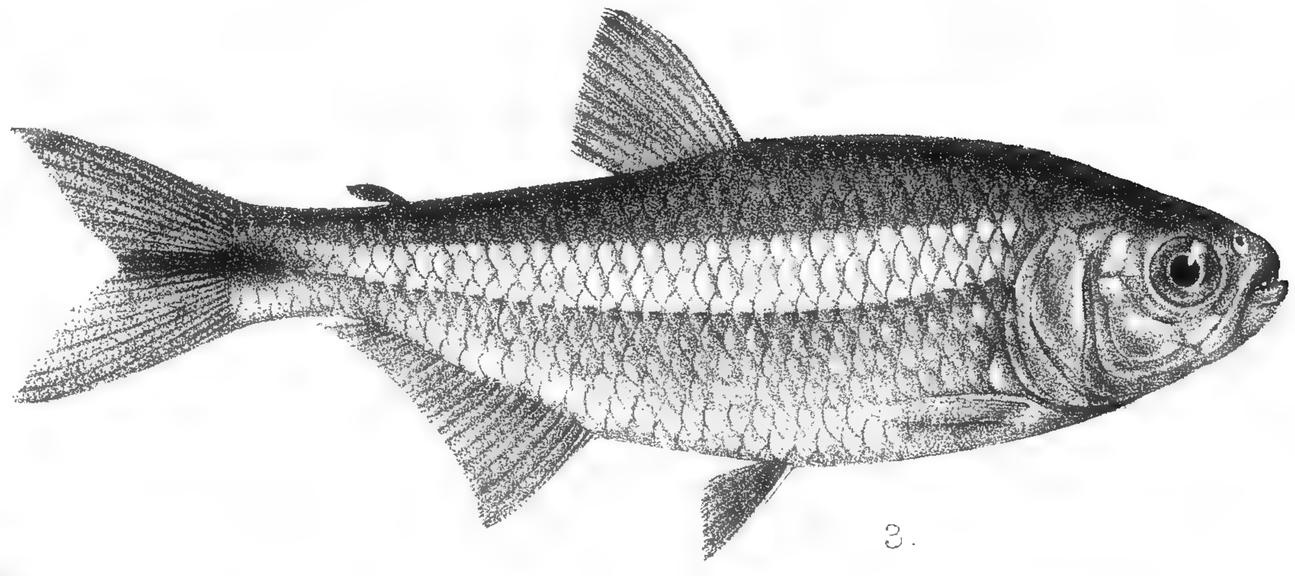

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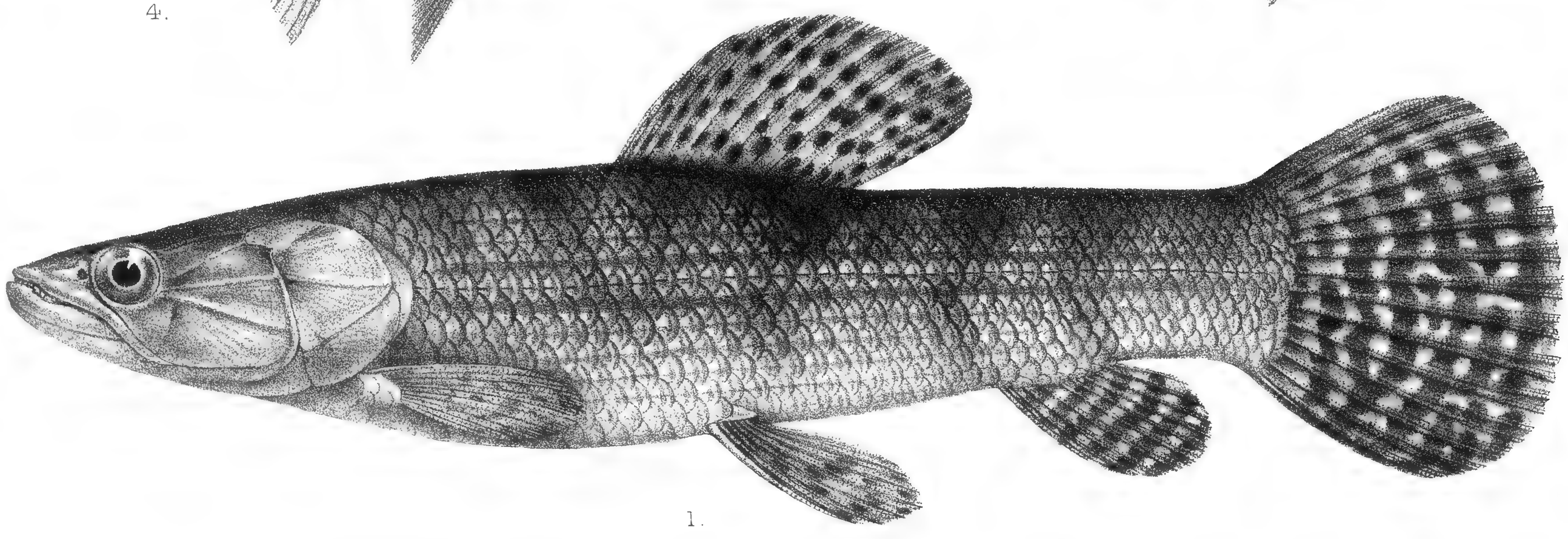

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1. HOPLIAS MICROLEPIS. 2, 3. TETRAGONOPTERUS MEXICANUS. 4. T. MACROPHTHALMUS. 5. T. ANGUSTIFRONS.

J. Green del. lith. et imp.

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