

DESCRIPTIONS OF NEW, LITTLE KNOWN, AND TYPICAL ATHERINIDÆ.

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The material on which the present paper is based is all contained in the collections of the Academy of Natural Sciences of Philadelphia.

ATHERINIDÆ.

Subfamily *Atherininae*.

Premaxillaries freely protractile, skin not continuous with that of forehead.

ATHERINA Linnaeus.Subgenus *ATHERINA* Linnaeus.Type *Atherina hepsetus* Linnaeus.

Rami of mandible elevated inside of mouth.

Atherina lacustris Bonaparte.

Fauna Italica, Pesc., III, xvii, xviii, 1836, descr., Pl. 91, fig. 3. Albano, Nemi. [Lakes in Italy.]—Bonaparte, Cat. Met. Pesc. Europ., 1846, p. 57. Lace. Nem. Alb. Bols. [No descr.]

Head $4\frac{1}{5}$; depth $6\frac{1}{8}$; D. VIII–I, 10; A. I, 12; P. I, 12; V. I, 5; scales 48 to base of caudal; 21 before spinous dorsal; 10 between latter and base of ventral; width of head 2 in its length; depth of head $1\frac{1}{2}$; snout 4; eye 3; maxillary $2\frac{1}{2}$; interorbital space $3\frac{1}{2}$; pectoral $1\frac{2}{5}$; ventral $1\frac{3}{4}$; caudal peduncle from last dorsal ray a little shorter than head; least depth of caudal peduncle 4.

Body elongate, slender and greatest depth about base of ventral fin. Side compressed, somewhat flattened. Caudal peduncle elongate, compressed, and least depth near base of caudal.

Head elongate, rather deep, and blunt in front. Width of head posterior to eyes much wider than anterior portion and a little wider than any portion of trunk. Sides of head compressed, somewhat constricted below. Snout above, and interorbital space, flattened, and with three low longitudinal ridges, but not extending posteriorly beyond eyes. Top of head posterior to eyes convex. Snout rather large, conic, not much broader than deep. Eye rather large, anterior, hardly impinging on upper profile. Mouth moderately large, oblique, and lower jaw protruding. Maxillary narrow, reaching below front

rim of orbit. Mandible rather small, not broad, and each ramus elevated inside of mouth. Teeth minute, jaws forming a thin narrow cutting edge. No teeth on vomer and palatines. Tongue far back in mouth, rather small, elongate, free along sides, and united by median frenum with floor of mouth. Nostrils lateral, in front of eye above. Interorbital space a trifle broader than snout, and flattened. Post-ocular ridge distinct.

Gill-opening large, carried forward till about under front rim of orbit. Rakers long, slender and numerous on first arch. Filaments numerous, about equal to rakers in length. Pseudobranchiæ large, much longer than filaments. Isthmus long and narrow. Branchiostegal membranes united by narrow frenum in front. Lower surface of isthmus with a shallow groove.

Scales large, thin, cycloid, and not imbricated. Three rows on cheek. Opercles scaled, and top of head posteriorly scaled to eyes. Snout, interorbital space, jaws, and lower hyal region naked. Snout, both above and on sides, together with interorbital space with cavernous bones, ridges connected by soft membranes. This region also furnished with pores. Pectoral without flap. Ventrals with rather short scaly flap between their bases, and each with a small short axillary scale.

Origin of spinous dorsal nearer tip of snout than base of caudal by length of ventral. Spines pungent, slender, third and fourth longest and subequal. Soft dorsal inserted a little behind anal, much nearer origin of ventral or spinous dorsal than base of caudal, and second ray highest. Anal inserted nearer base of caudal than origin of pectoral, and anterior rays highest. Caudal rather small, deeply emarginate. Pectoral broad, level with eye, and reaching over origin of ventral. Ventral reaching under posterior portion of spinous dorsal or half way to origin of anal. Anus well posterior or a little nearer tip of ventral than origin of anal.

Color in alcohol pale brown, sides of head and trunk more or less pale silvery. Back specked with small dark brown dots. Side with longitudinal narrow silvery band about as wide as pupil of eye extending to base of caudal. Fins plain pale brown. Peritoneum black.

Length (caudal damaged) $4\frac{3}{16}$ inches.

Type of *Atherina lacustris* Bonaparte, No. 9,953, A. N. S. P. Italy. Bonaparte Coll. (No. 341). Dr. T. B. Wilson.

Twenty-one co-types with same data.

Thirty-eight examples, also from Italy, with the same data except that the lake from which they were taken is not given. (No. 348.)

Three examples from Bracciano, the data otherwise like preceding. (No. 348.)

Ninety-five examples from Italy, also with same data. (No. 412.)

This species, originally from the lakes in the State of Rome, is easily distinguished from the other species of *Atherina* by the slender body.

***Atherina sardinella* sp. nov.** Plate XLI (upper figure).

Head 4; depth 5; D. VII-I, 11; A. I. 13; P. I, 12; V. I, 5; scales 46 to base of caudal; 20 before spinous dorsal; 10 between spinous dorsal and base of ventral; width of head $2\frac{1}{10}$ in length; depth of head $1\frac{1}{2}$; snout $3\frac{1}{3}$; eye $3\frac{1}{3}$; maxillary $2\frac{2}{5}$; interorbital space $3\frac{1}{3}$; pectoral $1\frac{4}{5}$; ventral 2; caudal peduncle, from base of last dorsal ray, a little shorter than head; least depth of caudal peduncle $4\frac{1}{2}$.

Body elongate, fusiform, greatest depth about ventral fin. Sides compressed, slightly flattened. Caudal peduncle elongate, slender, compressed, and its least depth near base of caudal.

Head elongate, attenuate, compressed, not broad behind eyes where greatest width is found. This is also widest part of body. Side of head more or less flattened and constricted below. Snout above, and interorbital space flattened, with three low longitudinal ridges extending posteriorly over latter but not beyond eyes. Top of head posterior to eyes and interorbital space convex. Snout long, conic, pointed and not broad. Eye moderately large, anterior, and hardly impinging on upper profile. Mouth moderate, oblique, and lower jaw protruding. Maxillary narrow, slightly curved, and reaching posteriorly a little beyond front rim of orbit. Mandible conspicuous, moderately large, not broad, and each ramus elevated somewhat inside of mouth. Teeth distinct, small, sharp-pointed, conic, and in several series forming narrow bands in jaws. Vomer with conspicuous patch of small conic pointed teeth. Palatines with short narrow band of similar teeth. Tongue with small patch of minute pointed teeth, rather far back. Tongue small, far back in mouth, elongate, free along sides, and united with floor of mouth by a median frenum. Nostrils lateral, rather high, and in front of eye above. Interorbital space a little wider than snout. Postocular ridge distinct.

Gill-opening large and carried forward till nearly below front rim of orbit. Gill-rakers long, compressed, slender, numerous, and longer than longest gill-filaments on first arch. Gill-filaments numerous, and short on hypo and ceratobranchials. Pseudobranchiæ large, much longer than longest gill-filaments. Isthmus long, narrow, branchiostegal membrane united by a narrow frenum in front. Lower surface of isthmus with rather broad groove.

Scales large, thin, cycloid, and not especially imbricated. Two rows on cheek. Opercle and top of head till behind eyes and interorbital space also scaled, rest of head naked. Snout and interorbital space more or less cavernous, bony ridges connected by soft membranes furnished with pores. Pectoral without scaly flap at axil. A single rather small scaly flap between bases of ventrals.

Origin of spinous dorsal nearer tip of snout than base of caudal. Dorsal spines slender, third probably longest, and fin reaching about $\frac{3}{5}$ of distance to origin of soft dorsal. Soft dorsal inserted posterior to origin of anal, much nearer origin of spinous dorsal than base of caudal, and anterior rays much higher than others. Anal with anterior rays longest. Caudal emarginate. Pectoral rather broad, high, and reaching about opposite root of ventral. Ventral small, inserted much nearer origin of anal than posterior rim of orbit. Anus placed about first third of space between tip of ventral and origin of anal.

Color in alcohol pale brown, more or less dull silvery, especially below. Side of body with a narrow silvery longitudinal band, nearly as wide as pupil of eye, extending to base of caudal. Fins pale brown, without markings. Each scale on back with a number of fine dark dots. Peritoneum silvery.

Length (caudal damaged) $4\frac{5}{16}$ inches.

Type No. 15,397, A. N. S. P. Italy. Bonaparte Coll. Dr. T. B. Wilson.

Twenty-nine co-types with same data.

Ten examples. Same data. (No. 345.) Identified as "*Atherina sarda*."

This species may be found identical with *Atherina sarda* Valenciennes, but the latter is said to have D. VI-9, A. 10. The description, like that of *Atherina corneda* Rafinesque, is too imperfect to permit of identification.

(*Sardinella*, diminutive of *Sardina*, a sardine.)

ATHERINOMORUS subgen. nov.

Type *Atherina laticeps* Poey.

Rami of mandible not elevated inside of mouth. Anus well anterior to tips of ventrals. Head broad. Eyes large.

(*Ἀθερίνη*, *Atherina*; *ῥόμος*, near.)

ISCHNOMEMBRAS gen. nov.

Type *Ischnomembras gabunensis* sp. nov.

A single row or series of scales on cheek. Mandible slightly protruding. Mouth curved in profile. Eye large. Scales moderate. Peritoneum pale. Anal rather long. Apparently near *Chirostoma*.

(Ἰσχυρότερος, slender; Μεμβράς, *Membras*, an old name congeneric with *Atherina*.)

Ischnomembras gabunensis sp. nov. Plate XLII (upper figure).

Head $3\frac{3}{4}$; depth 6; D. VI-I, 9; A. I, 16; P. I, 13?; V. I, 5; scales about 40 (squamation injured), to base of caudal; about 14 before spinous dorsal; 7 between second dorsal and origin of anal; width of head $2\frac{1}{8}$ in its length; depth of head $1\frac{4}{5}$; snout $3\frac{3}{5}$; eye $3\frac{1}{4}$; maxillary 3; width of mouth $4\frac{1}{8}$; interorbital space $3\frac{1}{2}$; pectoral $1\frac{1}{2}$; ventral 2; length of caudal peduncle a little less than head; least depth of caudal peduncle $3\frac{1}{3}$.

Body rather elongate, compressed, and slender. Sides slightly convex. Caudal peduncle elongate, compressed, and its least depth about $\frac{2}{5}$ its length.

Head large, elongate, conic, depressed above, compressed laterally and broadly constricted below. Greatest width, also greatest width of body, at postocular region. Side of head more or less flat. Top of head smooth, without conspicuous ridges, and slightly convex till behind eyes. Snout rather long, pointed, and broadly depressed. Eye rather large, anterior, and close to upper profile. Mouth large, oblique, and mandible slightly protruding. Premaxillaries protractile. Front of upper jaw depressed. Mouth curved in profile. Maxillaries narrow, small, and not reaching opposite front rim of orbit. Mandible expanded anteriorly till as wide as upper jaw, and each ramus elevated rather high inside of mouth. Teeth minute, in narrow bands along edges of each jaw, and none on vomer and palatines. Tongue moderately long, flattened, free in front, and placed rather far back. Nostrils well separated, lateral, anterior circular about half-way in length of snout, and posterior a small slit above eye in front. Interorbital space scarcely wider than snout. Postocular ridge distinct.

Gill-opening large, carried forward below middle of orbit. Rakers short, small, not much more than half of length of filaments and moderate. Filaments long. No pseudobranchiæ. Isthmus narrow and trenchant below, and anteriorly gill-membranes united across for short distance.

Scales small, thin, cycloid, and somewhat imbricated. Top of head scaled, but scales not extending forward to eye. Opercles scaled, and row of broad scales on cheek. Snout and interorbital space naked, not especially cavernous, and without any ridges.

Origin of spinous dorsal nearer tip of snout than base of caudal. Dorsal spines weak, somewhat pungent, and when depressed fin reaches $\frac{3}{4}$ of distance to soft dorsal. Second and third spines longest. Soft

dorsal inserted before middle of base of anal, and anterior rays highest. Anal large, inserted much nearer base of caudal than tip of snout, and first rays highest. Pectoral elongate, pointed, and reaching a little beyond root of ventral. Ventral rather small, reaching about $\frac{2}{5}$ of space to anal fin. Caudal emarginate. Anus placed nearer tip of ventral than origin of anal fin.

Color in alcohol uniform pale brown, with traces of silvery, especially on lower surface and side of head. A narrow silvery band, not wider than pupil, extending along side to base of caudal. Fins pale brown. Peritoneum silvery.

Length $2\frac{5}{16}$ inches.

Type No. 14,934, A. N. S. P. Gabun river, Gabun country, West Africa. P. B. DuChaillu.

Two examples inclusive of type.

(*Gabunensis*, of the Gabun river.)

PHOXARGYREA gen. nov.

Type *Phoxargyrea dayi* sp. nov.

Peritoneum silvery, otherwise close to *Menidia*.

($\Phi\omicron\acute{\xi}\acute{o}\varsigma$, tapering; $\text{'}\text{A}\rho\gamma\tilde{\upsilon}\rho\acute{\epsilon}\alpha$, *Argyrea*, an old name applied to *Menidia*, from silver, or made of silver.)

Phoxargyrea dayi sp. nov. Plate XLI (lower figure).

Head $4\frac{2}{5}$; depth $6\frac{1}{2}$; D. IV-I, 10; A. I, 24; P. I, 13; V. I, 5; scales 48 to base of caudal; 28 before spinous dorsal counting from interorbital space; about 9 obliquely between spinous dorsal and anal; width of head $2\frac{1}{6}$ in its length; depth of head $1\frac{3}{4}$; snout 3; eye $3\frac{3}{5}$; maxillary $3\frac{7}{8}$; interorbital space $3\frac{1}{3}$; pectoral $1\frac{1}{8}$; ventral 2; length of caudal peduncle from last dorsal ray a little over length of head; least depth of caudal peduncle $3\frac{1}{4}$.

Body elongate, slender, compressed, and greatest depth about origin of anal. Side compressed, and more or less flattened. Caudal peduncle elongate, narrow, compressed, and its least depth midway in its length.

Head elongate, compressed, attenuate, rather narrow, flattened above in front, then convex posteriorly and sides flattened. Top of head smooth, without ridges. Snout elongate, conic, and somewhat flattened above. Eye moderately large, a little anterior, and not impinging on upper profile. Mouth rather small, oblique, and jaws subequal in closed mouth. Premaxillary broad posteriorly, its edge strongly curved. Corner of mouth about midway between tip of snout and front rim of orbit. Mandible rather small, not forming a

beak with upper jaw, and each ramus elevated inside of mouth. Lips thin, fleshy at corner of mouth. Teeth small in jaws, those in front of upper curved downward. Vomer and palatines edentulous. Tongue far back, flattened, elongate, rounded, and free in front. Nostrils lateral, above and in front of eyes. Interorbital space broad, slightly convex. Postocular ridge not distinct.

Gill-opening rather large, carried forward till below middle of eye. Rakers fine, numerous, and slender on first arch. Filaments moderately long, or about equal to rakers, and numerous. No pseudo-branchiæ. Isthmus a long, narrow, sharp-edged keel anteriorly. Branchiostegal membranes united for short distance at first, also adnate by means of frenum to anterior portion of isthmus.

Scales small, cycloid, not imbricated, and smooth. Head scaled, with exception of jaws, snout, and under surface. Bones of snout and front of head above more or less cavernous. Several pores present. Axil of pectoral without flap. Ventrals close together, without median scaly flap.

Origin of spinous dorsal a little nearer tip of snout than base of caudal. Dorsal spines pungent, slender, rather weak, and first and second longest. Origin of soft dorsal nearly midway between that of spinous dorsal and tip of last depressed anal ray. Anterior rays highest. Anal long, beginning just above base of last dorsal spine, or a little nearer base of caudal than tip of snout. Length of its base a little less than $\frac{1}{3}$ of body without caudal. Anterior rays highest. Caudal broad, emarginate. Pectoral large, elongate, reaching well beyond root of ventral, but not to origin of dorsal. Ventral shorter, reaching to anus or not quite to origin of anal. Anus directly in front of anal fin or at tip of depressed ventral.

Color in alcohol pale, more or less uniform brown. Side of body with a well-defined narrow silvery-white longitudinal band about width of pupil, and extending to base of caudal. Fins uniform pale brown. Peritoneum bright silvery.

Length (caudal damaged) $3\frac{1}{2}$ inches.

Type No. 10,177, A. N. S. P. India. R. Coates.

One example, the type.

(Named for Dr. Francis Day, among late Ichthyologists a most able author of many papers on Indian fishes.)

BASILICHTHYS Girard.

Proc. Acad. Nat. Sci. Phila., 1854, p. 198 (*microlepidotus*).

Basilichthys regia (Humboldt and Valenciennes).

Atherina regia Humboldt and Valenciennes,¹ in Humboldt and Bonpland, Rec. Obs. Zool. Anat. Comp., II, 1833, p. 187. Surtout dans l'Océan-Pacifique, près du Callao de Lima.

Atherina laticlavia Valenciennes, Hist. Nat. Poiss., X, 1835, p. 351. Valparaiso. (M. d'Orbigny.) La lagune de Taguatagua du Chili. (M. Gay.)—Cope, Proc. Amer. Philos. Soc., XVII, 1878, p. 44. Callao Bay. Peru. (Prof. James Orton.)

Atherinichthys laticlavia Günther, Cat. Fish. Brit. Mus., III, 1861, p. 402. Salt water, Valparaiso. (Mr. Bridges.) Falkland Islands, Port Louis. (Haslar Collection.)

Chirostoma laticlavia Steindachner, Zool. Jahrb., Suppl. IV (Fauna Chilensis), 1898, p. 313. Tumbes (Talcahuano).

Head $4\frac{2}{5}$; depth $4\frac{4}{5}$; D. VIII–I, 50; A. I, 18; P. I, 14; V. I, 5; scales 92 in lateral series to base of caudal; 50 before spinous dorsal; 16 in transverse series between root of ventral and middle of back before spinous dorsal; width of head $2\frac{1}{5}$ in its length; depth of head $1\frac{4}{5}$; snout 3; eye $5\frac{1}{2}$; tip of upper jaw to corner of mouth 5; to end of maxillary 3; interorbital space $3\frac{2}{3}$; length of depressed spinous dorsal 3; first dorsal ray $2\frac{1}{2}$; base of soft dorsal $2\frac{1}{2}$; second anal ray $2\frac{2}{5}$; base of anal $1\frac{3}{7}$; pectoral $1\frac{2}{5}$; ventral $2\frac{2}{3}$; least depth of caudal peduncle $3\frac{1}{3}$; length of caudal peduncle, from base of last dorsal ray $1\frac{1}{5}$.

Head large, elongate, compressed, greatest depth about tip of pectoral. Sides compressed, somewhat flattened, or only slightly convex. Caudal peduncle elongate, compressed, its least depth near base of caudal.

Head elongate, conic, compressed, rather broad posteriorly so that greatest width is about midway in postocular region, also widest part of body. Side of head more or less flattened, though broadly constricted below. Snout rather long, flattened above, and with jaws produced some distance beyond. Eye small, high, not impinging on upper profile, and posterior rim a little posterior in head. Adipose eyelid slightly developed. Mouth rather small, horizontal, and jaws equal. Maxillary expanded distally till $\frac{2}{3}$ of pupil, upper portion more or less concealed below preorbital, and not reaching opposite front rim of orbit. Teeth conic, rather large, and in two rather irregular series in jaws. No teeth on vomer or palatines. Tongue small, narrow, pointed, rather thick, and free in front. Mandible moderately large, with each ramus well elevated inside of mouth. Lips thin. Anterior

¹ Credited to Humboldt on the authority of Valenciennes. The paper in which this species is described is by these authors jointly, but later Valenciennes credits to Humboldt.

nostril circular, about last third of space between tip of upper jaw and front rim of orbit. Posterior nostril slit-like and a little before front rim of orbit above. Interorbital space broad, slightly convex. Top of head posterior to interorbital space evenly convex.

Gill-opening large, extending forward nearly opposite front rim of pupil. Rakers long, slender, compressed, $8+25$ on first arch, longest about $\frac{4}{5}$ of longest filaments. No pseudobranchiæ. Isthmus long, narrow, trenchant and branchiostegal membranes not united across.

Scales small, thin, cycloid, and rather narrowly imbricated. No lateral line. Head, with exception of snout, jaws and space in front of eyes, scaled. About five series of scales on cheek. Base of caudal covered with small scales, none on other fins. Between bases of ventrals several small scales, and each fin with a small axillary scale. No pectoral flap.

Spinous dorsal a little posterior, its origin a little nearer base of caudal than tip of upper jaw, weak, depressable in a groove, and reaching $\frac{2}{5}$ of distance to soft dorsal. Soft dorsal with anterior rays elevated and inserted about midway between base of caudal and origin of ventral or over middle of base of anal. Anal inserted posterior to tip of depressed spinous dorsal, and anterior rays longest. Caudal moderately large, forked, and lobes rounded. Pectoral small, high, and reaching about $\frac{2}{3}$ of distance to origin of ventral. Ventral small, inserted nearer origin of anal than origin of pectoral, and reaching hardly half-way to anus. Anus as far from tip of ventral as length of that fin or just before origin of anal.

Color in alcohol pale brown below, darker above, and each series of scales longitudinally with a narrow dark band. A broad brassy band, as wide as pupil, more or less olivaceous along its upper margin, extending from pectoral to base of caudal. A pale median olivaceous streak from occiput to first dorsal, and continued posteriorly to base of caudal. Lower surface of head brassy. Fins more or less uniform pale brown. Peritoneum black.

Length $8\frac{1}{8}$ inches.

One example, identified as *Atherina laticlavia* by Cope. Callao Bay. Peru. Prof. James Orton. Presented by Prof. E. D. Cope. Dr. Smitt has recently figured an example identified as *Atherinichthys regia* var. *laticlavia*.² However, it shows about 70 scales in a lateral count to base of caudal. *Basilichthys microlepidotus* is also united with *regia*.

² *Bih. Kon. Sven. Vet.-Ak. Hand. Stockholm*, XXIV, iv., 1899, p. 31, Pl. 4, fig. 30.

THYRINA Jordan and Culver.

Contr. Hopkins Lab. Biol., I, 1895, p. 419 (*evermanni*).

Thyrina guatemalensis (Günther). Plate XLIII (lower figure).

Atherinichthys guatemalensis Günther, Proc. Zool. Soc. Lond., 1864, p. 151.

Lakes of Huamuchal. (Mr. Salvin.)—Günther, Trans. Zool. Soc. Lond., 1868, p. 443. [Same examples.]

Chirostoma guatemalensis Gill and Bransford, Proc. Acad. Nat. Sci. Phila., 1877, p. 187. Lake Nicaragua. [No description.]

Menidia guatemalensis Jordan and Evermann, Bull. U. S. Nat. Mus. (Fish N. Mid. Amer.) No. 47, I, 1896, p. 801. [Copied.]

Thyrina guatemalensis Jordan and Evermann, Rep. U. S. Fish Com., 1896, p. 332. [Reference.]

Head $4\frac{1}{5}$; depth $4\frac{1}{2}$; D. IV–I, 9; A. I, 22; P. I, 12; V. I, 5; scales 40 to base of caudal; 27 before spinous dorsal; 8 in transverse series between origin of anal and spinous dorsal; width of head $1\frac{7}{8}$ in its length; depth of head $1\frac{1}{2}$; snout $3\frac{3}{5}$; eye $2\frac{2}{3}$; maxillary 3; mandible 3; interorbital space $3\frac{1}{4}$; length of spinous dorsal 3; first dorsal ray 2; first anal ray $1\frac{1}{3}$; pectoral 1; ventral 2; least depth of caudal peduncle $2\frac{3}{4}$; length of base of anal a little less than $\frac{1}{3}$ of length of body.

Body elongate, strongly compressed, greatest depth at origin of anal, and lower profile forming obtuse angle at this point. Upper profile evenly convex. Abdomen strongly compressed, and edge not sharp or trenchant, but rather narrowly convex. Greatest width of trunk a little less than that of head, and found at bases of pectorals.

Head elongate, conic, rather obtuse in front, sides compressed and constricted below. Snout broad, and flattened above. Eye large, anterior, and close to upper profile. Mouth small, oblique, and superiorly terminal. Jaws nearly equal when closed, and premaxillaries protractile. Maxillary slender, and reaching posteriorly below front edge of eye. Teeth rather large, conic, sharp-pointed, and biserial in jaws. No teeth on vomer and palatines. Tongue small, rather narrow, and free in front. Each ramus of mandible elevated inside of mouth. Lips thin. Anterior nostrils lateral, about midway between tip of snout and orbit, posterior above front rim of orbit. Interorbital space flat. Top of head posterior to eyes, convex. Top of snout somewhat cavernous.

Gill-opening extending forward about opposite first $\frac{2}{5}$ of eye. Rakers long, slender, and numerous. Filaments numerous, and long. No pseudobranchiæ. Isthmus narrow, constricted and trenchant.

Scales large, rather thin, cycloid, with uneven margins, and somewhat imbricated on side of trunk. Scales of head extending on interorbital space where they become enlarged. Single row of large scales on cheek. Scales on sides of head above, large. Snout and jaws naked.

No pectoral flap. Ventrals with rather broad scales between bases, and each with short basal scaly flap.

Origin of spinous dorsal well behind that of anal, or much nearer tip of snout than tip of caudal, small, spines weak, and when depressed reaching nearly $\frac{2}{3}$ of distance to soft dorsal. Soft dorsal inserted a little nearer base of caudal than origin of ventral, first ray undivided and longest. Anal inserted a little nearer base of caudal than tip of snout, base long, and base of last ray distant from base of caudal more than half of length of base of fin itself. Extending posteriorly beyond base of last dorsal ray, anterior rays elongate and first longest. Caudal rather long, emarginate, and both lobes apparently sharp-pointed. Pectoral long, falcate, sharp-pointed, and falling a little short of tip of ventral. Ventral small, united posteriorly, and reaching almost to origin of anal. Anus placed a little before tips of ventrals.

Color in alcohol pale straw-brown. A few of scales along dorsal surface sprinkled with brown dots. Lower surface more or less pale silvery. A broad silvery-lead-colored band as wide as pupil extending from axil of pectoral to base of caudal. Upper edge of band more or less dark. Dorsal and caudal grayish-brown. Peritoneum brownish.

Length $2\frac{3}{16}$ inches.

One example. Nicaragua. Dr. J. F. Bransford. Probably one of the examples recorded by Drs. Gill and Bransford.

Subfamily *Atherinopsiinae*.

Premaxillaries not freely protractile, the skin continuous mesially with forehead.

PROTISTIUS Cope.

Proc. Acad. Nat. Sci. Phila., 1874, p. 66 (*semotilus*).

Teeth simple, pointed, in bands in jaws, and also present on vomer. A single small dorsal spine.

This genus was first provisionally referred to the *Mugilidæ* by Cope, which was certainly in better propinquity than his final attempt to merge it in the "*Cyprinodontidæ*."

Protistius semotilus Cope. Plate XLIV.

L.c. Some portion of the Peruvian Andes, from an elevation of twelve thousand feet.

Head 4; depth about 5; D. I-I, 10; A. I, 13; P. 1, I, 15; V. I, 5; about 75 scales to base of caudal in lateral series; width of head $1\frac{1}{8}$ in its length; snout 3; eye about 5; maxillary about $2\frac{7}{8}$; interorbital space $2\frac{2}{3}$; pectoral $1\frac{3}{7}$; ventral 2; least depth of caudal peduncle $2\frac{3}{5}$. Snout projecting a little beyond mandible. Teeth rather elongate,

pointed, and a small patch present on vomer. Tongue small, and not free from floor of mouth. Nostrils well separated. Gill-opening extending forward nearly opposite front rim of orbit. Rakers slender, rather numerous, and shorter than filaments. Isthmus trenchant, narrow. Middle of base of pectoral about opposite lower rim of orbit. Anal beginning a little in front of second dorsal. Anus close in front of anal. Peritoneum blackish.

Length $5\frac{1}{2}$ inches.

Type of *Protistius semotilus* Cope, No. 14,404, A. N. S. P. Peruvian Andes, from an elevation of twelve thousand feet.

GASTEROPTERUS Cope.

Proc. Amer. Philos. Soc., XVII, 1878, p. 700 (*archæus*).

Pisciregia J. F. Abbott, Proc. Acad. Nat. Sci. Phila., 1899, p. 342 (*beardsleei*).

Differs from *Protistius* chiefly in the presence of more than one dorsal spine.

Originally confounded with the *Mugilidæ* by Prof. Cope, this genus has recently been redescribed by Mr. J. F. Abbott under the name of *Pisciregia*.

Gasteropterus archæus Cope. Plate XLIII (upper figure).

L.c. At Arequipa, on the Pacific slope, at an elevation of 7,500 feet. [Peru.] (Coll. Prof. James Orton.)

Head 4; depth about 6; D. IV-I, 11; A. I, 15; P. I, I, 16; V. I, 5; scales about 86 in lateral series to base of caudal; width of head 2 in its length; snout $3\frac{1}{3}$; eye about 5; maxillary about $2\frac{7}{8}$; interorbital space $2\frac{7}{8}$; pectoral $1\frac{1}{3}$; ventral a little over 2; least depth of caudal peduncle $2\frac{7}{8}$. Snout protruding a little beyond mandible. Tongue small, rather narrow, and a little free in front. Nostrils well separated. Gill-opening extending forward nearly opposite front rim of pupil. Rakers shorter than filaments, slender, and rather numerous. Pseudo-branchiæ rather small. Isthmus narrow and compressed. Several irregular lateral series of porous or tubular scales, and though lower is broken in places it is more complete than others. Pectoral extends a little more than $\frac{3}{4}$ of distance to base of ventral. Anus about midway between tip of ventral and origin of anal. Peritoneum deep brown.

Length $6\frac{1}{2}$ inches.

Type of *Gasteropterus archæus* Cope, No. 22,002, A. N. S. P. Arequipa on the Pacific slope at an elevation of 7,500 feet. Peru. Prof. James Orton, collection of 1874. Prof. E. D. Cope. Also a co-type with same data.

Pisciregia beardsleei J. F. Abbott is closely related, if distinct, and while included in Mr. Abbott's paper on "The Marine Fishes of Peru"

as evidently having been obtained at Callao, could it not have been brought there from the neighboring mountains? There is little to distinguish it in the original account from *G. archæus*, still it may be a salt-water representative.

ATHERINOPSIS Girard.

Proc. Acad. Nat. Sci. Phila., 1854, p. 134 (*californiensis*).

Atherinopsis californiensis Girard.

L.c., San Francisco, Cal. (Dr. A. L. Heermann.)

Atherinichthys californiensis Günther, Cat. Fish. Brit. Mus., III, 1861, p. 406. [Copied.]

Chirostoma californiense Jordan and Gilbert, Proc. U. S. Nat. Mus., III, 1880, p. 29. San Diego, California.

Atherina storeri Ayres, in Girard, *L.c.*, 1856, p. 136.

Head $4\frac{1}{2}$; depth $5\frac{1}{2}$; D. IX-I, 12; A. I, 22; P. I, 16; V. I, 5; scales about 73 in lateral series to base of caudal (squamation injured); 51 before spinous dorsal; about 15 in oblique transverse series between origins of soft dorsal and anal; width of head $2\frac{1}{8}$ in its length; depth of head $1\frac{3}{4}$; snout $3\frac{1}{8}$; eye $4\frac{7}{8}$; tip of upper jaw to corner of mouth 5; to end of maxillary $3\frac{2}{5}$; interorbital space $3\frac{2}{5}$; length of depressed dorsal $2\frac{2}{5}$; base of soft dorsal 2; base of anal 1; pectoral $1\frac{1}{10}$; ventral $2\frac{1}{3}$; least depth of caudal peduncle $3\frac{1}{3}$; length of caudal peduncle from base of last dorsal ray $1\frac{3}{7}$.

Body elongate, well compressed, fusiform, and greatest depth a little before origin of ventral. Sides slightly convex. Caudal peduncle elongate, strongly compressed, and least depth close to base of caudal. Head elongate, pointed, compressed, greatest width in middle of postocular region, and also equal to greatest width of trunk at bases of pectorals. Side of head more or less flattened, becoming conspicuously constricted below eyes. Snout broad, jaws produced, so that upper is bluntly pointed when viewed from above. Eye high, not impinging on upper profile, and posterior rim a little posterior to middle of head. Eyelid somewhat thick and adipose-like. Mouth high, nearly horizontal and upper jaw slightly longer than lower. Posteriorly gape of mouth turns obliquely down. Premaxillaries not protractile or with a distinct frenum above separating them from snout. Maxillary narrow, its distal expanded portion about half of pupil, oblique, upper portion more or less concealed below preorbital, and falling well short of front orbital rim. Articulation of mandible with quadrate nearly opposite front rim of orbit, and expanded somewhat in front till equal to orbit. Each ramus of mandible high and well elevated inside of mouth. Teeth in jaws small, pointed, and bi-

serial. No vomerine or palatine teeth. Tongue small, elongate, and free in front. Anterior nostril circular, nearly midway between tip of upper jaw and front of eye. Posterior nostril well separated, slit-like, in advance of front of orbit. Interorbital space broad, and slightly conic. Top of head posterior to eyes conic.

Gill-opening large, extending forward till nearly opposite front rim of orbit. Rakers long, slender, compressed, 7+37 on first arch, and longest about $\frac{4}{5}$ of longest filaments. Filaments numerous and long. Pseudobranchiæ absent. Isthmus long narrow and branchiostegal membranes not united.

Scales small, cycloid, somewhat imbricated, and with uneven edges. About six rows on cheek, and first three small and close to eye. With exception of snout, jaws and space in front of eye, head scaled. No scaly flaps except small one between bases of ventrals.

Spinous dorsal in groove, weak, and inserted a little nearer tip of snout than tip of caudal. Soft dorsal small, inserted a little nearer base of caudal than origin of ventral, or nearly over middle of base of anal. Like anal rays, anterior highest. Anal begins about opposite tip of depressed dorsal or a little nearer base of caudal than origin of pectoral. Caudal forked, lobes pointed. Pectoral high, broad at base, and falcate tips not reaching base of ventral. Ventral small, pointed, and not reaching opposite origin of spinous dorsal. Anus remote from ventrals, near front of anal.

Color in alcohol dull brown, paler beneath, and all more or less brassy. An indistinct longitudinal band about as wide as eye from base of pectoral to base of caudal. Fins plain uniform brown. Peritoneum black.

Length $7\frac{1}{2}$ inches.

Type of *Atherinopsis californiensis* Girard, No. 10,208, A. N. S. P. San Francisco, California. Dr. A. L. Heermann.

Two co-types with same data, also other material from Monterey Bay and San Diego, has been compared.

***Atherinops magdalenæ* sp. nov.** Plate XLII (lower figure).

Head $4\frac{1}{2}$; depth 5; D. V-I, 10; A. I. 22; P. I, 14; V. I, 5; scales 47 in a lateral series to base of caudal; 10 scales obliquely back from spinous dorsal to base of anal in front; width of head $2\frac{1}{5}$ in its length; depth of head $1\frac{3}{5}$; snout $3\frac{1}{3}$; eye 4; maxillary $3\frac{1}{8}$; interorbital space $3\frac{1}{4}$; pectoral a little shorter than head; ventral 2; least depth of caudal peduncle $2\frac{1}{2}$.

Body well compressed, lower profile more convex than upper, and

greatest depth about midway in its length. Caudal peduncle compressed, its least depth a little less than half its length.

Head rather small, compressed, more or less constricted below, upper profile nearly straight, and lower well curved convexly. Snout long. Eye moderate, high, circular and anterior. Mouth horizontal, jaws subequal or lower only slightly projecting. Upper jaw broad and depressed. Teeth uniserial, bicuspid, and rather small in jaws. No teeth on vomer. Tongue small, far down and little free in mouth. Each ramus of mandible well elevated inside of mouth. Maxillary slender, vertically inclined, and falling little short of front rim of orbit. Nostrils well separated. Interorbital space rather broad and slightly convex.

Gill-opening extending forward about opposite front rim of pupil. Rakers slender, rather numerous, and shorter than filaments. No pseudobranchiæ. Isthmus narrow, trenchant.

Scales of moderate size, cycloid, and hardly imbricated, those on chest smaller and crowded. Head scaly, about three rows on cheek. Bases of soft dorsal and anal with scaly sheaths. Base of caudal with small scales. Several irregular or broken series of tubes on side of body representing lateral system, lowest most perfect.

Spinous dorsal inserted a little behind anus, small, much lower than soft dorsal and second spine apparently largest. Soft dorsal low, anterior rays highest, and inserted a little before middle of base of anal. Anal large, similar in shape to soft dorsal and beginning close behind anus. Caudal damaged, evidently emarginate. Pectoral rather long, reaching past base of ventral, and first rays longest. Ventral rather small. Anus nearly midway between tip of depressed ventral and origin of anal, at least distinctly before origin of spinous dorsal.

Color in alcohol dull brown, back a little darker. A broad silvery lateral band equal to $\frac{2}{3}$ eye-diameter, and upper half grayish. Sides of head with silvery reflections. Fins plain brownish. Orbit brassy. Peritoneum silvery-gray.

Length (caudal damaged) $3\frac{1}{2}$ inches.

Type No. 10,206, A. N. S. P. Magdalena Bay, Lower California. W. N. Lockington. Two examples, inclusive of type.

This species appears to be a southern representative of *Atherinops affinis* (Ayres), differing in the anterior position of the vent.

(Named for Magdalena Bay, Lower California.)

EXPLANATION OF PLATES XLI-XLIV.

PLATE XLI.—*Atherina sardinella* Fowler.

Type No. 15,397, A. N. S. P. Italy.

Phoxargyrea dayi Fowler.

Type No. 10,177, A. N. S. P. India.

PLATE XLII.—*Ischnomembras gabunensis* Fowler.

Type No. 14,934, A. N. S. P. West Africa.

Atherinops magdalenæ Fowler.

Type No. 10,206, A. N. S. P. Lower California.

PLATE XLIII.—*Gasteropterus archæus* Cope.

Type No. 22,002, A. N. S. P. Peru.

Thyrina guatemalensis (Günther).

No. 15,983, A. N. S. P. Nicaragua.

PLATE XLIV.—*Protistius semotilus* Cope.

Type No. 14,404, A. N. S. P. Peru.



Fowler, Henry W. 1904. "Descriptions of new, little known, and typical Atherinidae." *Proceedings of the Academy of Natural Sciences of Philadelphia* 55, 727-742.

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