

58. A Revision of the Cyprinodont Fishes of the Subfamily Pœciliinæ. By C. TATE REGAN, M.A., F.Z.S.

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The Pœciliinæ are viviparous Cyprinodonts in which the anal fin of the male is advanced and modified into an intromittent organ. They are American, ranging from Carolina to Argentina and from Arizona to Ecuador; many of the species live in the sea as well as in fresh water. Most of the species are quite small, two or three inches long; the giant of the group, *Belonesox belizanus*, attains a length of eight inches. In some forms the males are much smaller than the females, and the adult male of *Heterandria formosa*, 15 to 20 mm, long, is one of the smallest fishes known; in several species males are rather scarce.

In Günther's classification (Cat. Fish. vol. vi.) the Cyprinodonts were divided into Carnivoræ, with the intestine short or but little convoluted and the bones of the lower jaw firmly united, and Limnophagæ, with the intestine long and convoluted and the bones of the lower jaw loosely connected. It is now known that both types occur in two distinct subfamilies, Characodontinæ and Pœciliinæ, and there is good evidence that in the latter the

* For explanation of the Plates see p. 1018.

limnophagous structure has been evolved three or four times independently.

The intromittent organ is freely movable and is supported internally by bony stays, 2 to 5 in number, that project downwards and forwards from the bridges that connect the parapophyses of the posterior præcaudal vertebræ. It is formed by the prolongation of the third, fourth, and fifth anal rays, the first and last of which are stout and are more or less expanded transversely so as to margin a groove on one side or the other, or they may even meet so as to form a tube. The urogenital orifice is directly in front of the base of the fin, and may often be covered by the pelvic fins, which, doubtless, help to conduct the seminal fluid into the groove, or in certain forms where the pelvic fins of the male are considerably enlarged they may be closely applied to the intromittent organ, converting the grooves into closed tubes. The distal segments of the prolonged rays may be variously modified into spines, hooks, barbs, etc., which may help to retain the organ in position during coition.

The differences in structure of the intromittent organ are of great systematic importance; hitherto they have been almost neglected, except by Eigenmann (Proc. U.S. Nat. Mus. xxxii. 1907, p. 425), who has described them in the genera *Lebistes*, *Girardinus*, *Glaridichthys*, *Phalloceros*, and *PhalLOPTYCHUS* *.

Many of the species eat Mosquito larvæ, and the "Millions" fish (*Lebistes reticulatus*) has been introduced into many countries in the hope that it will check malarial fever †. On account of their small size, pretty appearance, and interesting habits the Pæciliinæ are great favourites with European aquarium-lovers, especially in Germany; several of the new species described below have been sent to me by my valued correspondents in Hamburg, Herr J. P. Arnold and Herr A. Rachow, as newly imported aquarium-fishes. In the German aquarium-journals and in two booklets by Stansch (Die lebendgebärende Zahnfarkfen, Leipzig, Wenzel, 1910, 1911) have appeared many accounts of the habits of different species: from these one gathers that the broods follow each other at intervals of only a few weeks, but that the number of young varies greatly according to the species; thus a pair of *Pæcilia parva* had broods of 8, 11, and 10 at intervals of four weeks, but in *P. vivipara* 124 were counted in a single brood. The new-born young are usually from 5 to 10 mm. long and grow rapidly, in many species attaining sexual maturity in about three months. The breeding-habits are of great interest: in species where the males are brilliantly ornamented (*Mollienisia*, *Xiphophorus*, *Pæcilia brammeri*) they dart about displaying their beauty; in these and in related forms the females appear to encourage their advances, but in others they are quite shy and their mates have to exercise cunning to get near them. It

* Some additional figures are given by Langer in a paper on the morphology of these fishes, just published (Morph. Jahrb. xlvii.).

† See P. Z. S. 1910, p. 146; 1912, p. 906.

is of some interest to note that in *Pacilia* and related genera the females welcome the attentions of the males and the intromittent organ is quite short, but as in *Gambusia* and *Phalloceros* the females try to make the males keep their distance it is much longer.

Synopsis of the Genera *.

- I. Lower edge of caudal peduncle sharp, without a median series of scales; bones of lower jaw firmly united; teeth conical or villiform.
- Body rather deep; pelvic fins well developed, behind base of pectorals; anal fin of male without long appendages 1. *Alfaro*.
- Body elongate; pelvic fins absent in female, minute and below gill-openings in male; anal fin of male ending in a pair of long appendages with spine-like processes 2. *Tomeurus*.
- II. Lower edge of caudal peduncle rounded or obtuse, with median series of scales.
- A. Pelvic fins similar in both sexes.
1. First produced ray of anal fin of male without long processes or appendages.
- a. Third and posterior branch of second produced ray of anal fin of male each ending in a retrorse spine or hook.
- Jaws not produced; teeth conical or villiform; anal fin of male with distal part of first produced ray serrated, the terminal serrations directed towards its tip; third produced ray and posterior branch of second each ending in a retrorse hook. Dorsal 6-12; origin behind that of anal 3. *Gambusia*.
- Jaws produced; teeth slender, pointed, depressible; anal fin of male with terminal segments of first produced ray not forming serrations; third produced ray and posterior branch of second each ending in a retrorse spine..... 4. *Belousoa*.
- b. Third and posterior branch of second produced rays of anal fin of male not bearing retrorse hooks or spines.
- a. Anal fin of male ending in a more or less distinct antorse hook, the anterior branch of the second produced ray curved forward.
- * Mouth moderate, with distinct lateral cleft; teeth conical or villiform.
- † Dorsal 7-12; origin behind that of anal.
- Extremity of anal fin of male supported equally by third and anterior branch of second produced rays 5. *Priapichthys*.
- Extremity of anal fin of male supported equally by first and anterior branch of second produced rays 6. *Priapella*.
- †† Dorsal 11-17; origin in advance of that of anal; extremity of male anal fin a strong hook formed by the unsegmented end of the anterior branch of the second produced ray 7. *Pseudoxiphophorus*.
- ** Mouth small, without distinct lateral cleft; hook at end of anal fin of male formed by anterior branch of second produced ray.

* The differences in the structure of the male intromittent organ used in this synopsis are illustrated in text-figs. 168, 169 (genera 1 to 4 and 11), 170 (genera 5 to 10), 171 (genera 10 and 13), 172 (genera 14 to 22), and 173 (genera 23 to 26).

- Teeth somewhat compressed, pointed; anal fin of male with first produced ray not serrated, third longer than posterior branch of second 8. *Heterandria*.
- Teeth broad incisors; anal fin of male with first produced ray serrated not far from tip, third shorter than posterior branch of second 9. *Pseudopœcilia*.
- *** Mouth small, transverse; teeth movable, oar-shaped. Extremity of anal fin of male supported equally by first and anterior branch of second produced rays; first not serrated 10. *Pœciliopsis*.
- β. Anal fin of male short, ending in a small retrorse hook formed by second and third produced rays; teeth conical or villiform 11. *Brachyrhaphis*.
- γ. Anal fin of male long and slender, not ending in an antrorse hook.
- Bones of lower jaw firmly united; teeth conical or villiform, fixed 12. *Leptorhaphis*.
- Bones of lower jaw loosely connected; teeth more or less expanded and compressed, movable 13. *Phalloptychus*.
2. First produced ray of anal fin of male ending in an antrorse appendage; mouth small, but bones of lower jaw rather firmly joined.
- Appendage forked, each fork antler-like; teeth oar-shaped 14. *Phalloceros*.
- Appendage not forked, long, doubly curved, pointed; teeth chisel-shaped 15. *Cuæsterodon*.
3. First produced ray of anal fin of male bearing a pair of curved horn-like processes not far from its end.
- a. Bones of lower jaw firmly united.
- Teeth chisel-shaped; outer series close-set 16. *Glavidichthys*.
- Teeth spear-shaped; outer series spaced 17. *Toxus*.
- b. Bones of lower jaw loosely connected; teeth movable 18. *Girardinus*.
- B. Pelvic fins enlarged in the males, the second ray longest.
1. Bones of lower jaw firmly united; outer series of teeth slender, pointed 19. *Pamphorichthys*.
2. Bones of lower jaw rather firmly united; outer series of teeth broad incisors 20. *Pamphoria*.
3. Bones of lower jaw loosely connected; outer series of teeth slender, curved, oar- or spoon-shaped; intromittent organ short.
- a. Extremity of intromittent organ unprotected; first produced ray with terminal hook and strong subterminal serrations; anterior branch of second hooked forward; posterior branch of second with distal segments produced into serrations beyond extremity of third.
- Third produced ray without hook; anterior branch of second unsegmented distally; caudal similar in both sexes. Dorsal 9-11 21. *Platypœcilus*.
- Third produced ray ending in a retrorse hook; anterior branch of second segmented throughout; caudal of male with lower rays produced into a long pointed appendage. Dorsal 11-15 22. *Xiphophorus*.
- b. Extremity of intromittent organ protected by a hood of thick skin that can be slipped off frontwards, being attached only at its base to the first prolonged ray.
- a. First prolonged ray tapering evenly, sharply serrated distally.

- First prolonged ray without antrorse spine; last without terminal process..... 23. *Pecilia*.
 First prolonged ray without antrorse spine; end of last bearing a pair of processes directed outwards and towards the base of the fin 24. *Lebistes*.
 First prolonged ray bearing a small antrorse spine at or near its end; last with processes as in *Lebistes* 25. *Mollienia*.
 β. First prolonged ray becoming abruptly slender at some distance from end, not sharply serrated, bearing a small antrorse spine at or near its end; last prolonged ray without terminal processes 26. *Limia*.

1. ALFARO MEEK, 1912.

Petalosoma (non Lewis) Regan, Ann. Mag. Nat. Hist. (8) ii. 1908, p. 462.

Alfaro Meek, Field Mus. Publ. Zool. x., Sept. 1912, p. 72.

Petalurichthys Regan, Ann. Mag. Nat. Hist. (8) x., Nov. 1912, p. 494.

This genus resembles *Gambusia*, except for the sharp lower edge of the tail. The intromittent organ (text-fig. 169 F, p. 990) is simple in structure, and the pelvic fins are enlarged in the male.

1. ALFARO CULTRATUS.

Petalosoma cultratum Regan, Ann. Mag. Nat. Hist. (8) ii. 1908, p. 462.

Alfaro acutiventralis Meek, Field Mus. Publ., Zool. x. 1912, p. 72.

Depth $3\frac{1}{3}$ in the length. Dorsal 7-8; when laid back nearly reaching caudal. Anal 9-10, in advance of dorsal. 32 to 35 scales in a longitudinal series. Total length 45 to 90 mm.

Costa Rica.

2. ALFARO AMAZONUM.

Petalosoma amazonum Regan, Ann. Mag. Nat. Hist. (8) viii. 1911, p. 659, figs.

Depth $3\frac{2}{3}$ in the length. Dorsal 8-9, when laid back not reaching caudal. Anal 10, in advance of dorsal. 33 or 34 scales in a longitudinal series. Total length 35 to 51 mm.

R. Amazon at Obidos.

2. TOMEURUS Eigenm., 1909.

Ann. Carnegie Mus. vi. p. 53.

TOMEURUS GRACILIS.

Eigenm. l. c. and Mem. Carnegie Mus. v. 1912, p. 460, pl. lxx. figs. 7-8.

British Guiana.

3. GAMBUSIA Poey, 1855*.

Mem. i. p. 382.

Gambusia (part.) Günth. Cat. Fish. vi. p. 333 (1866); Garman,

* *G. picturata* Poey ('Synopsis,' p. 410, 1868) is a doubtful species of uncertain position.

Mem. Mus. Comp. Zool. xix. 1895, p. 82; Regan, Biol. Centr.-Amer., Pisces, p. 93 (1907).

Paragambusia Meek, Publ. Columbian Mus., Zool. v. 1904, p. 133.

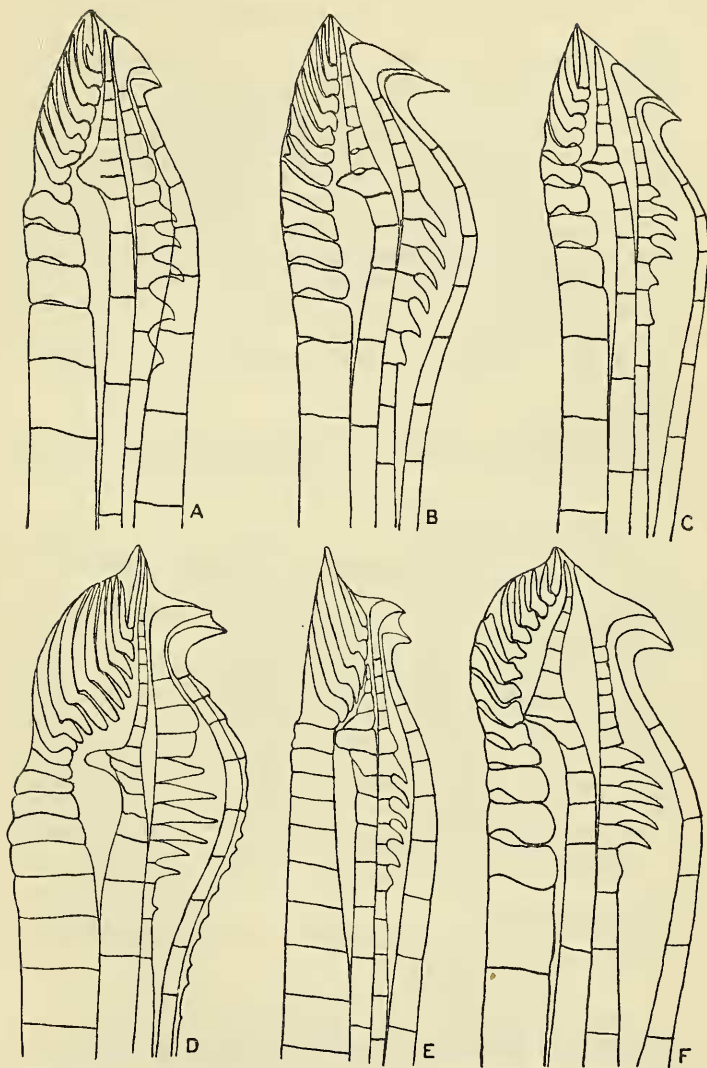
This genus, as now restricted, includes species in which the male intromittent organ is moderately long, nearly $\frac{1}{3}$ of the length of the fish (without caudal), and is formed on a definite plan which is subject to considerable modification in the different species. The distal segments of the first prolonged ray are produced into processes directed more or less towards its apex; the anterior branch of the second prolonged ray is slender distally and at some distance from the end has an antrorse projection which may be termed the "elbow"; the posterior branch of this ray ends in a retrorse pointed hook or barb, and the segments immediately proximal to the elbow of the anterior branch are produced backwards into serræ; the third prolonged ray ends in a hook more or less similar to that of the second.

Of the 17 species here recognized I have seen males of 9, the distal part of the anal fin of each of them is figured. Of *Gambusia holbrookii* (text-fig. 169 A) I have examined two adult males, of *G. oligosticta* (text-fig. 169 B) four, of *G. nicaraguensis* (text-fig. 168 A) two, of *G. wrayi* (text-fig. 168 B) four, of *G. gracilior* (text-fig. 168 C) three, of *G. dominicensis* (text-fig. 169 C) two, of *G. nigropunctata* (text-fig. 168 F) one, of *G. punctata* (text-fig. 168 D) three, and of *G. senilis* (text-fig. 168 E) one. These suffice to prove that the differences shown in the figures are really specific; the number, form, and size of the modified segments of the first prolonged ray, the number of segments distal to the elbow, the form of the hook, and the number and length of the serræ of the second prolonged ray, and the form of the hook of the third, vary but slightly for each species. The most noticeable variation is in *G. oligosticta*, the other examples differing from the one figured in the addition of a segment to each hook, so that the anterior hook has a short stem and the posterior quite a long one.

The following table gives the number of dorsal rays, of scales in a longitudinal series, and the distribution of the species:—

	D.	Sc.	Distribution.
1. <i>G. holbrookii</i>	8	30	Virginia to Alabama.
2. <i>G. patruelis</i>	7	31-32	Florida to Texas.
3. <i>G. affinis</i>	6-7	30-31	Florida to Tampico.
4. <i>G. senilis</i>	8-9	30	Chihuahua, Mexico.
5. <i>G. nicaraguensis</i>	7-8	28	S. Mexico to Nicaragua.
6. <i>G. dovii</i>	7	32	Nicaragua.
7. <i>G. caudorittata</i>	8	31	R. San Juan, Colombia.
8. <i>G. punctata</i>	10	31-33	Cuba.
9. <i>G. nigropunctata</i>	9	30	"
10. <i>G. melanosticta</i>	9-10	29-30	"
11. <i>G. puncticulata</i>	9	29-30	"
12. <i>G. melanopleura</i>	11-12	30-31	Jamaica.
13. <i>G. wrayi</i>	8	31-33	"
14. <i>G. oligosticta</i>	8-9	29-31	"
15. <i>G. gracilior</i>	8-9	31-33	"
16. <i>G. dominicensis</i>	9	28-29	Haiti.
17. <i>G. caymanensis</i>	9	30-31	Grand Cayman.

Text-fig. 168.



Distal part of intromittent organ of A. *Gambusia nicaraguensis*. B. *G. vrayi*.
 C. *G. gracilior*. D. *G. punctata*. E. *G. senilis*. F. *G. nigropunctata*.

I. GAMBUSIA HOLBROOKII. (Text-fig. 169 A, p. 990.)

Heterandria holbrookii Girard, Proc. Acad. Philad. 1859, p. 61.
Gambusia holbrookii Günth. Cat. Fish. vi. p. 334 (1866);

Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 82, pl. xi. figs. 4-13.

Haplochilus melanops Cope, Proc. Amer. Phil. Soc. xi. 1877, p. 457.

Zygonectes atrilatus Jord. & Brayton, Bull. U.S. Nat. Mus. xii. 1878, p. 84.

♀. Depth of body $3\frac{1}{2}$ to 4 in the length, length of head 4. Diameter of eye 3 to $3\frac{1}{3}$ in length of head, interorbital width 2. 30 scales in a longitudinal series. Dorsal 8; origin above posterior end of anal, equidistant from base of pectoral and base of caudal; longest rays $\frac{2}{3}$ length of head. Anal 10. Pectoral $\frac{3}{4}$ length of head; pelvics extending to origin of anal. Least depth of caudal peduncle $\frac{2}{3}$ length of head. Olivaceous; usually a dark bar below the eye; a blackish spot above the vent; dorsal and caudal fins with small dark spots.

♂. Origin of dorsal fin equidistant from eye and base of caudal.

Virginia to Alabama.

Here described from specimens from North Carolina and Virginia, 3 females 38-48 mm. in total length and 2 males of 26 mm.

2. GAMBUSIA PATRUELIS.

Heterandria patruelis Baird & Girard, Proc. Acad. Philad. 1854, p. 390.

Gambusia patruelis Girard, U.S. Mex. Bound. Surv., Fish. p. 72, pl. xxxix. figs. 1-7.

♀. Depth of body 3 in the length, length of head 4. Diameter of eye $3\frac{1}{4}$ in length of head, interorbital width 2. 31 or 32 scales in a longitudinal series. Dorsal 7; origin behind end of base of anal, nearer to base of caudal than to base of pectoral; longest rays $\frac{3}{5}$ the length of head. Anal 10; first branched ray longest. Pectoral $\frac{4}{5}$ length of head; pelvics extending to vent. Least depth of caudal peduncle $\frac{3}{4}$ length of head. Brownish above, yellowish below; dorsal and caudal fins with small dark spots.

Florida to Texas.

Here described from two specimens from Pensacola (*Jordan*), 47 and 50 mm. in total length.

3. GAMBUSIA AFFINIS.

Heterandria affinis Baird & Girard, Proc. Acad. Philad. 1854, p. 390.

Gambusia affinis Girard, U.S. Mex. Bound. Surv., Fish. p. 72, pl. xxxix. figs. 12-15 (1859); Günth. Cat. Fish. vi. p. 336 (1866).

Gambusia speciosa Girard, Proc. Acad. Philad. 1859, p. 121.

Gambusia gracilis Girard, l. c.

Gambusia humilis Günth. t. c. p. 334.

Zygonectes brachypterus Cope, Bull. U.S. Nat. Mus. xx. 1880, p. 34.

Zygonectes inurus Jord. & Gilb. Proc. U.S. Nat. Mus. 1882, p. 543.

♀. Depth of body $3\frac{1}{2}$ to $4\frac{1}{4}$ in the length, length of head $3\frac{1}{2}$ to $4\frac{1}{4}$. Diameter of eye $3\frac{1}{2}$ to 4 in length of head, interorbital width $1\frac{1}{5}$ to 2. 30 or 31 scales in a longitudinal series. Dorsal 6-7; origin above posterior part or end of anal, equidistant from some part of operculum or base of pectoral and base of caudal; longest rays $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Anal 10-11. Pectoral from $\frac{3}{4}$ to nearly as long as head; pelvics reaching vent or origin of anal. Brownish or olivaceous above, yellowish or silvery below; scales dark-edged; usually a dark suborbital bar; dorsal and caudal fins with small dark spots.

Florida to Tampico; Mississippi.

Numerous females, measuring up to 50 mm. in total length, from Florida and Louisiana; one from Tampico.

4. GAMBUSIA SENILIS. (Text-fig. 168 E.)

? *Heterandria nobilis* Baird & Girard, Proc. Acad. Philad. 1853, p. 390.

? *Gambusia nobilis* Girard, U.S. Mex. Bound. Surv., Fish. p. 71, pl. xxxix. figs. 8-11 (1859).

Gambusia senilis Girard, Proc. Acad. Philad. 1859, p. 122.

♀. Depth of body 3 to $3\frac{1}{2}$ in the length, length of head $3\frac{2}{3}$ to 4. Diameter of eye $3\frac{1}{2}$ in length of head, interorbital width 2. 30 scales in a longitudinal series. Dorsal 8-9; origin above middle or posterior part of anal, equidistant from base of pectoral and base of caudal; longest rays $\frac{2}{3}$ length of head. Anal 9-10. Pectoral $\frac{2}{3}$ length of head; pelvics reaching vent. Least depth of caudal peduncle $\frac{2}{3}$ length of head. Brownish above, yellowish below; scales dark-edged, especially on sides of abdomen; a dark suborbital bar and a dusky lateral band from eye to base of caudal.

♂. Origin of dorsal fin equidistant from præoperculum and base of caudal.

Chihuahua, Mexico.

Several females, 45 to 50 mm. in total length, and one male of 25 mm.

5. GAMBUSIA NICARAGUENSIS. (Text-fig. 168 A.)

Gambusia nicaraguensis Günth. Cat. Fish. vi. p. 336 (1866), and Trans. Zool. Soc. vi. 1868, p. 483, pl. lxxxii. fig. 3; Regan, Biol. Centr.-Amer., Pisces, p. 96 (1907).

Paragambusia nicaraguensis Meek, Publ. Columbian Mus., Zool. v. 1904, p. 133.

♀. Depth of body about 3 in the length, length of head $3\frac{1}{2}$ to 4. Diameter of eye 3 to $3\frac{1}{3}$ in length of head, interorbital width 2. 28 scales in a longitudinal series. Dorsal 7-8;

origin above or a little behind posterior end of anal, twice as far from middle of eye as from base of caudal; longest rays $\frac{3}{5}$ or $\frac{2}{3}$ length of head. Anal 11; second branched ray longest, edge of fin emarginate. Pectoral a little shorter than head; pelvics reaching vent or origin of anal. Least depth of caudal peduncle $\frac{2}{3}$ length of head. Upper part of body with 2 or 3 series of small dark spots along the rows of scales; dorsal and caudal fins spotted.

♂. Origin of dorsal fin twice as distant from end of snout as from base of caudal.

Southern Mexico; Nicaragua.

Several females, 40 to 55 mm. in total length, and two males of 30 mm., including the types from Lake Nicaragua, and specimens from El Hule (*Meek*) and Coaxacoalcos (*Arnold*).

6. GAMBUSIA DOVII, sp. n.

♀. Depth of body $3\frac{3}{4}$ in the length, length of head $3\frac{3}{4}$. Diameter of eye $3\frac{1}{2}$ in length of head, interorbital width $1\frac{3}{4}$. 32 scales in a longitudinal series. Dorsal 7; origin behind end of anal, twice as far from end of snout as from base of caudal. Anal 10; anterior branched rays longest, but edge not emarginate. Least depth of caudal peduncle slightly more than $\frac{1}{2}$ length of head. Olivaceous; traces of spots on back and on caudal fin.

Lake Nicaragua.

A single specimen of 33 mm., collected by Captain Dow.

7. GAMBUSIA CAUDOVITTATA.

Regan, Ann. Mag. Nat. Hist. (8) xii. 1913, p. 471.

Recently described from a single specimen from the Condoto, a tributary of the San Juan, W. Colombia.

8. GAMBUSIA PUNCTATA. (Text-fig. 168 D.)

Gambusia punctata Poey, Mem. i. p. 384 (1855); Günth. Cat. Fish. vi. p. 334 (1866); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 680.

♀. Depth of body 3 to 4 in the length, length of head $3\frac{1}{2}$ to 4. Diameter of eye 3 to $3\frac{1}{2}$ in length of head, interorbital width 2. 31 to 33 scales in a longitudinal series. Dorsal 10; origin above posterior end of anal, nearer to base of caudal than to head; longest rays $\frac{2}{5}$ to $\frac{1}{2}$ the length of head. Anal 11; last simple or first branched ray longest; edge of fin straight or slightly emarginate. Pectoral $\frac{3}{4}$ length of head; pelvics reaching vent. Least depth of caudal peduncle $\frac{1}{2}$ to $\frac{3}{4}$ length of head. Upper part of side with a dark spot on each scale, forming 3 to 5 regular longitudinal series; usually small dark spots on dorsal and caudal.

♂. Dorsal origin about equidistant from head and base of caudal; longest rays $\frac{1}{2}$ length of head.

Cuba.

Here described from 16 females, measuring up to 85 mm. in total length, and 3 males of 40 to 50 mm.

9. *GAMBUSIA NIGROPUNCTATA*, sp. n. (Text-fig. 168 F.)

♀. Depth of body $3\frac{1}{2}$ to $3\frac{2}{3}$ in the length, length of head $3\frac{2}{3}$ to $3\frac{3}{4}$. Diameter of eye 3 to $3\frac{1}{4}$ in length of head, interorbital width 2 to $2\frac{1}{4}$. 30 scales in a longitudinal series. Dorsal 9; origin above posterior part of anal, equidistant from base of pectoral and base of caudal. Anal 10-11. Least depth of caudal peduncle less than $\frac{3}{5}$ length of head. Coloration as in related species.

♂. Depth of body 4 in the length, length of head $3\frac{2}{5}$. Diameter of eye 3 in length of head, interorbital width $2\frac{1}{3}$. Dorsal origin equidistant from middle of opercle and base of caudal; longest rays $\frac{1}{2}$ length of head. Pectoral $\frac{2}{3}$ length of head.

Cuba.

Here described from two females of 34 and 50 mm. and a male of 25 mm. from Fernina, Bemba.

10. *GAMBUSIA MELANOSTICTA*, sp. n.

♀. Depth of body 3 in the length, length of head $3\frac{3}{5}$ to $3\frac{1}{2}$. Diameter of eye 3 to $3\frac{1}{4}$ in the length of head, interorbital width 2. 29 to 30 scales in a longitudinal series. Dorsal 9-10; origin above end of anal, equidistant from base of pectoral and base of caudal; longest rays $\frac{1}{2}$ to $\frac{3}{5}$ length of head. Anal 10-11; first branched ray longest. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head; pelvics reaching vent. Least depth of caudal peduncle $\frac{2}{3}$ length of head. Brownish above, golden below; upper parts with scattered small dark spots; dorsal and caudal fins spotted.

Cuba.

Three females from Havana, 35 to 42 mm. in total length, received from Dr. D. S. Jordan.

11. *GAMBUSIA PUNCTICULATA*.

Gambusia puncticulata Poey, Mem. i. pp. 386, 390, pl. xxxi. figs. 6, 7 (1855); Günth. Cat. Fish. vi. p. 334 (1866); Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 87.

♀. Depth of body $3\frac{1}{4}$ to $3\frac{1}{2}$ in the length, length of head 4 to $4\frac{1}{3}$. Diameter of eye $3\frac{1}{2}$ in length of head, interorbital width 2. Mouth smaller than in any other species of the genus. 29 or 30 scales in a longitudinal series. Dorsal 9; origin above middle or posterior part of anal, equidistant from head and base of caudal; fin rounded, the longest rays $\frac{1}{2}$ length of head. Anal 11, pointed. Pectoral $\frac{2}{3}$ or $\frac{3}{4}$ length of head; pelvics small. Least depth of caudal peduncle $\frac{3}{5}$ length of head. Upper parts with scattered small dark spots; 2 or 3 series of small black spots on dorsal and caudal fins.

♂. Origin of dorsal equidistant from eye and base of caudal; longest rays $\frac{3}{4}$ length of head.

Cuba.

Here described from two females, 35 mm. in total length, presented by Captain Vipian.

12. GAMBUSIA MELANOPLEURA.

Pacilia melanopleura Gosse, Soj. in Jamaica, p. 84, pl. i. fig. 3 (1851).

Haplochilus melanopleurus Günth. Cat. Fish. vi. p. 317 (1866).

Gambusia melanopleura Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 88.

Depth of body 3 in the length, length of head $3\frac{1}{2}$. Diameter of eye 3 to $3\frac{1}{4}$ in length of head, interorbital width $1\frac{3}{4}$. 30 or 31 scales in a longitudinal series. Dorsal 11-12; origin above posterior part of anal, equidistant from base of pectoral and base of caudal; longest rays $\frac{1}{2}$ length of head. Anal 10-11; branched rays slightly decreasing from first or second. Pectoral $\frac{3}{4}$ length of head; pelvics reaching vent. Least depth of caudal peduncle $\frac{2}{5}$ or $\frac{2}{3}$ length of head. Traces of spots on dorsal and anal fins and in some of a few spots on the back.

Jamaica.

Several females, the largest 47 mm. in total length, types of the species.

13. GAMBUSIA WRAYI, sp. n. (Pl. XCIX. figs. 3, 4, and Text-fig. 168 B.)

♀. Depth of body $3\frac{1}{3}$ to 4 in the length, length of head $3\frac{2}{5}$ to $3\frac{4}{5}$. Diameter of eye 3 to $3\frac{1}{2}$ in length of head, interorbital width 2. 31 to 33 scales in a longitudinal series. Dorsal 8; origin above posterior part of anal, equidistant from base of pectoral and base of caudal; longest rays $\frac{1}{2}$ length of head. Anal 10-11; second branched ray longest. Pectoral $\frac{3}{4}$ length of head; pelvics reaching vent. Caudal rounded or subtruncate. Least depth of caudal peduncle $\frac{1}{2}$ to $\frac{2}{5}$ length of head. Coloration probably as in *G. gracilior*.

♂. Dorsal origin equidistant from middle or posterior part of operculum and base of caudal; longest ray $\frac{2}{3}$ length of head. Least depth of caudal peduncle $\frac{2}{5}$ or $\frac{2}{3}$ length of head.

Jamaica.

Eight females measuring up to 55 mm. in total length, and four adult males of 35 to 40 mm., collected by C. A. Wray.

14. GAMBUSIA OLIGOSTICTA, sp. n. (Pl. XCIX. figs. 1, 2, and Text-fig. 169 B.)

♀. Depth of body $2\frac{2}{3}$ to $3\frac{1}{3}$ in the length, length of head 3 to $3\frac{1}{2}$. Diameter of eye 3 to $3\frac{1}{3}$ in length of head, interorbital width 2. 29 to 31 scales in a longitudinal series. Dorsal 8-9; origin above last 2 or 3 rays of anal, equidistant from base of caudal and base of pectoral; fin rounded, longest rays $\frac{1}{2}$ length of head. Anal 10-11; first branched ray longest, the rest regularly decreasing. Pectoral $\frac{3}{4}$ length of head; pelvics reaching vent. Caudal rounded or subtruncate. Least depth of caudal peduncle $\frac{2}{5}$ or $\frac{2}{3}$ the length of head. Brownish above, yellowish below; edges of scales darker; usually a dark lateral stripe and a few scattered spots; dorsal and caudal with small spots.

♂. Dorsal origin equidistant from eye or postorbital part of head and base of caudal; longest rays $\frac{2}{3}$ the length of head.

Jamaica.

Six females, measuring up to 47 mm. in total length, and seven males, the largest 33 mm. Some of these were collected by C. A. Wray, others by the Rev. J. Seed Roberts.

15. *GAMBUSIA GRACILIOR*, sp. n. (Pl. XCIX. figs. 5, 6, and Text-fig. 168 C.)

♀. Depth of body equal to or a little more than length of head, which is $3\frac{1}{2}$ (young) to 4 in the length of the fish. Diameter of eye 3 in length of head, interorbital width 2. 31 to 33 scales in a longitudinal series. Dorsal 8-9; origin above end of anal, a little nearer to base of caudal than to base of pectoral; fin rounded, longest rays $\frac{1}{2}$ length of head. Anal 10-11; first or second branched rays longest, the rest regularly decreasing. Pectoral as long as head without snout; pelvics reaching vent. Caudal rounded or subtruncate. Caudal peduncle slender, its least depth $\frac{1}{2}$ the length of head. Brownish above, yellowish below; usually a narrow dark lateral stripe, sometimes a few scattered dark spots; dorsal and caudal with small spots.

♂. Dorsal further forward and more elevated; origin about equidistant from middle of opercle and base of caudal; longest rays about $\frac{2}{3}$ the length of head. Least depth of caudal peduncle $\frac{3}{5}$ the length of head.

Jamaica.

Eight females, measuring up to 50 mm. in total length, and five males, the largest 37 mm., collected by C. Wray. These were mixed up with the examples of *G. oligosticta*, and could be picked out by their more slender form and smaller head, characters found to be associated with differences in the structure of the intromittent organ.

16. *GAMBUSIA DOMINICENSIS*, sp. n. (Pl. XCIX. fig. 7, and Text-fig. 169 C.)

♀. Depth of body $3\frac{1}{2}$ in the length, length of head $3\frac{3}{4}$. Diameter of eye $3\frac{1}{3}$ in length of head, interorbital width 2. 28 or 29 scales in a longitudinal series. Dorsal 9; origin above posterior end of anal, nearer base of caudal than base of pectoral; longest rays $\frac{2}{3}$ length of head. Anal 10-11; first branched ray longest. Pectoral $\frac{3}{4}$ length of head; pelvics reaching origin of anal. Least depth of caudal peduncle $\frac{2}{3}$ length of head. Brownish, scales dark-edged; a faint lateral stripe; a few scattered dark spots on upper parts; abdomen golden; dorsal and caudal fins with series of small dark spots.

♂. Dorsal origin equidistant from head and base of caudal.

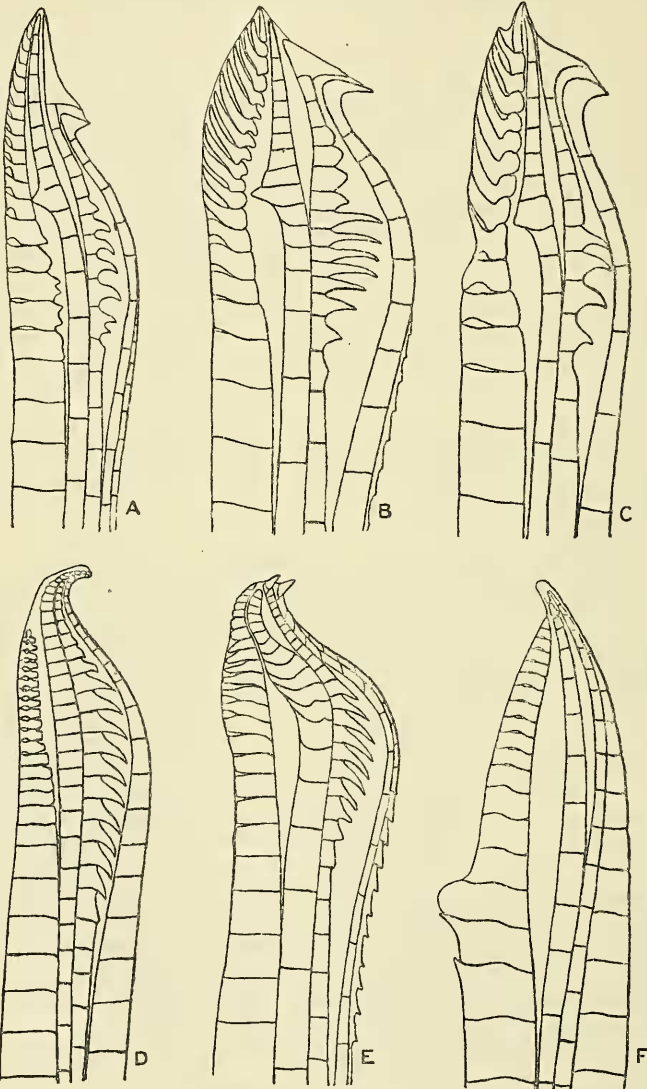
Haiti.

A female of 52 mm., and two males, each 25 mm. in total length, presented by Herr A. Rachow.

17. *GAMBUSIA CAYMANENSIS*, sp. n.

Depth of body $3\frac{1}{2}$ to 4 in the length, length of head 3 to $3\frac{1}{3}$.
 Diameter of eye 3 to $3\frac{1}{3}$ in length of head, interorbital width

Text-fig. 169.



Distal part of intromittent organ of A. *Gambusia holbrooki*. B. *G. oligosticta*.
 C. *G. dominicensis*. D. *Brachyrhaphis rhabdophora*. E. *Belonesox belizanus*. F. *Alfaro amazonum*.

2 to $2\frac{1}{4}$. 30 or 31 scales in a longitudinal series. Dorsal 9; origin above middle of anal, equidistant from operculum and base of caudal; longest rays nearly $\frac{1}{2}$ length of head. Anal 10; first branched ray longest. Pectoral $\frac{2}{3}$ length of head; pelvics reaching vent. Least depth of caudal peduncle $\frac{1}{2}$ length of head. Olivaceous; scales dark-edged; a dark bar below eye; dorsal fin with two series of dark spots; caudal faintly spotted.

Grand Cayman.

Two females, 22 and 26 mm. in total length.

4. BELONESOX Kner, 1860.

Sitzungsb. Akad. Wien, xl. p. 419.

Related to *Gambusia*, but the jaws produced, with broad bands of slender, pointed, depressible teeth. Anal fin of male very similar to that of *Gambusia*, differing in that the terminal segments of the first produced ray are not serrated, while rather small retrorse spines at the ends of the third and the posterior branch of the second produced rays represent the hooks of *Gambusia*.

A single species.

BELONESOX BELIZANUS. (Text-fig. 169 E.)

Belonesox belizanus Kner, Sitzungsb. Akad. Wien, xl. 1860, p. 419, fig.; Günth. Cat. Fish. vi. p. 333 (1866); Meek, Publ. Columbian Mus., Zool. v. 1904, p. 135; Regan, Biol. Centr.-Amer., Pisces, p. 93 (1907).

Depth of body 4 to 6 in the length, length of head nearly 3. Snout $\frac{1}{2}$ the length of head. 55 to 65 scales in a longitudinal series. Dorsal 9-10. Anal 10-12, in advance of dorsal.

Atlantic Slope of Vera Cruz, British Honduras, and Guatemala.

The largest species of the group, the males attaining 100 mm., the females 200 mm. in total length. Here described from ten specimens from Perez, Belize, and Lake Peten.

5. PRIAPICHTHYS, gen. nov.

Differs from *Gambusia* in that the intromittent organ is longer, when laid back nearly reaching the caudal fin, and is quite differently formed; the terminal part is hooked forward and the prolonged rays taper distally and have no specially modified segments, except the usual serræ of the posterior branch of the second; the first prolonged ray does not extend to the apex, and the hook is supported by the anterior branch of the second and the third (text-fig. 170 B).

It is here assumed that five species from Central America and Colombia are congeneric with *P. annectens*, the only species of which I have examined males; in all but *P. parismina* males are known and agree with those of *P. annectens* in their long intromittent organ.

Synopsis of the Species.

- I. Origin of dorsal fin in, or a little in advance of, middle of entire length (including caudal fin), above anterior part or middle of anal.
- A. D. 10-12; no black spot on anal fin *annectens*.
- B. D. 8-9; a blackish spot on anal fin.
- Length of head $3\frac{1}{2}$ to $3\frac{3}{4}$ in length of fish (without caudal) *episcopi*.
- Length of head $4\frac{1}{2}$ to $4\frac{3}{4}$ in length of fish (without caudal) *nigroventralis*.
- II. Origin of dorsal fin much nearer to end of caudal fin than to tip of snout, above posterior part or posterior end of anal. D. 7-8.
- A blackish spot on anal fin *parismina*.
- 7 or 8 dark vertical bars on posterior part of body *tridentiger*.
- 8 or 9 dark bars on anterior $\frac{1}{3}$ of body *turrubarensis*.

1. PRIAPICHTHYS ANNECTENS. (Text-fig. 170 B.)

Gambusia annectens Regan, Ann. Mag. N. H. (7) xix. 1907, p. 259, and Biol. Centr.-Amer., Pisces, p. 97, pl. xiv. figs. 5, 6 (1907).

Costa Rica.

2. PRIAPICHTHYS EPISCOPI.

Gambusia episcopi Steind. Sitzungsab. Akad. Wien, lxxvii. 1878, p. 387, pl. ii. figs. 3, 4.

Panama.

3. PRIAPICHTHYS NIGROVENTRALIS.

Gambusia nigroventralis Eigenm. Indiana Univ. Studies, 1912, No. 3, p. 26.

Rio San Juan, Colombia.

4. PRIAPICHTHYS PARISMINA.

Gambusia parismina Meek, Publ. Field. Mus., Zool. x. 1912, p. 71.

Costa Rica.

5. PRIAPICHTHYS TRIDENTIGER.

Gambusia tridentiger Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 89.

Panama.

6. PRIAPICHTHYS TURRUBARENSIS.

Gambusia turrubarensis Meek, Publ. Field Mus., Zool. x. 1912, p. 71.

Costa Rica.

Perhaps a synonym of *P. tridentiger*.

6. PRIAPELLA, gen. nov.

This genus shows relationship to *Priapichthys* in the structure of the long intromittent organ as well as in other characters.

PRIAPELLA BONITA. (Text-fig. 170 E.)

Gambusia bonita Meek, Publ. Columbian Mus., Zool. v. 1904, p. 132, fig. 39; Regan, Biol. Centr.-Amer., Pisces, p. 95 (1907).

Rio Papaloapam in Mexico.

7. PSEUDOXIPHOPHORUS Bleek., 1863.

Atl. Ichth. iii. p. 140; Günth. Cat. Fish. vi. p. 332 (1866).

Differs from *Priapichthys* in the longer dorsal fin originating in advance of the anal (♀) and in the structure of the intermittent organ (text-fig. 170 C), with the anterior branch of the second prolonged ray ending in an unsegmented antrorse hook, at the base of which the first and third prolonged rays terminate.

There are three species from Mexico and Central America, but males of one only (*P. bimaculatus*) have been described.

1. PSEUDOXIPHOPHORUS TERRABENSIS.

Gambusia terrabensis Regan, Ann. Mag. N. H. (7) xix. 1907, p. 260; Biol. Centr.-Amer., Pisces, p. 97, pl. xii. fig. 7 (1907).

Dorsal 12-14; origin nearly equidistant from tip of snout and base of caudal. Anal 9-10; origin nearly below middle of dorsal. No dark spot above pectoral.

Rio Grande de Terraba, Costa Rica.

2. PSEUDOXIPHOPHORUS JONESII.

Mollienisia jonesii Günth. Ann. Mag. N. H. (4) xiv. 1874, p. 371.

Pseudoxiphophorus pauciradiatus Regan, Ann. Mag. N. H. (7) xiii. 1904, p. 256 and xvi. 1905, p. 362.

Gambusia jonesii Regan, Biol. Centr.-Amer., Pisces, p. 97, pl. xii. fig. 8 (1907).

Dorsal 11-13; origin equidistant from tip of snout and middle or posterior part of caudal. Anal 9-11, below anterior part of dorsal. A dark spot above pectoral.

Mountain lakes and streams of Central Vera Cruz, Mexico.

3. PSEUDOXIPHOPHORUS BIMACULATUS. (Text-fig. 170 C.)

Xiphophorus bimaculatus Heck. Sitzungsber. Akad. Wien, i. 1848, p. 296, pl. ix. figs. 1, 2.

Pseudoxiphophorus bimaculatus Günth. Cat. Fish. vi. p. 332 (1866); Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 81.

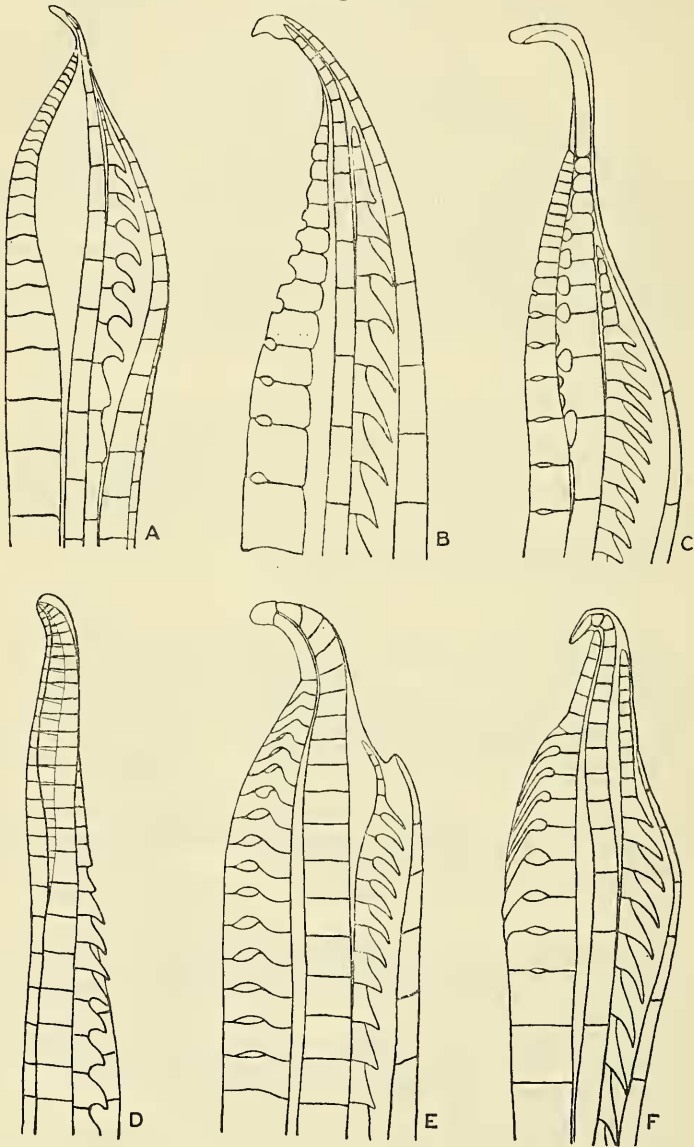
Gambusia bimaculata Regan, Biol. Centr.-Amer., Pisces, p. 98, pl. xiv. fig. 4.

Dorsal 13-17; origin nearly equidistant from tip of snout and

base of caudal. Anal 9-11, below anterior part of dorsal. A dark spot above pectoral.

Southern Mexico, British Honduras, and Guatemala.

Text-fig. 170.



Distal part of intromittent organ of A. *Heterandria formosa*. B. *Priapichthys annectens*. C. *Pseudoxiphophorus bimaculatus*. D. *Poeciliopsis presidionis*. E. *Priapella bonita*. F. *Pseudopoecilia festæ*.

8. HETERANDRIA, Agass., 1853.

Amer. Journ. Sci. xvi. p. 135.

Girardinus (part.) Günth. Cat. Fish. vi. p. 351 (1866).

Heterandria (part.) Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 90.

Differs from *Gambusia* and *Priapichthys* in the small transverse mouth and compressed pointed teeth, the enlarged outer teeth forming a close-set series. The intromittent organ is elongate, as in *Priapichthys*, and its structure indicates a close relationship to that genus. It differs in that the third prolonged ray is scarcely longer than the posterior branch of the second, so that the hook is supported only by the anterior branch of the second.

Two species from the United States and Mexico.

1. HETERANDRIA FORMOSA. (Text-fig. 170 A.)

Heterandria formosa Agass. Amer. Journ. Sci. xix. 1855, p. 136; Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 91, pls. iv. fig. 7, viii. fig. 8, and xi. figs. 1-3; Jord. & Everm. Bull. U.S. Nat. Mus. xvii. 1896, p. 687.

Girardinus formosus Günth. Cat. Fish. vi. p. 354 (1866).

Depth of body $3\frac{1}{2}$ to 4 in the length, length of head $3\frac{1}{2}$ to 4. Diameter of eye 3 to $3\frac{2}{3}$ in length of head, interorbital width 2. 28 to 30 scales in a longitudinal series. Dorsal 7-8; origin above middle of anal, scarcely nearer to end of caudal than to tip of snout. Anal 10. A dark lateral band crossed by several vertical bars; a blackish spot on basal part of dorsal, another on anal.

South Carolina to Florida.

Eight specimens, the largest female 30 mm., the males 15 to 20 mm. in total length.

2. HETERANDRIA FASCIATA.

Gambusia fasciata Meek, Publ. Columbian Mus., Zool. v. 1904, p. 129, fig. 37; Regan, Biol. Centr.-Amer., Pisces, p. 95 (1907).

Very similar to the preceding in form and coloration, except for the absence of the lateral band, differing especially in the more posterior dorsal fin, its origin above end of anal and much nearer to end of caudal than to tip of snout. Dorsal 8. Anal 9-10. 32 scales in a longitudinal series.

Southern Mexico.

Total length 55 mm.

Six specimens from Oaxaca and Tequesixtlan (*Gadow*).

The male of this species has not yet been described.

9. PSEUDOPECILIA, gen. nov.

Closely related to *Heterandria*, but with the teeth broad truncated incisors and the intromittent organ somewhat different in structure.

PSEUDOPÆCILIA FESTÆ. (Text-fig. 170 F.)

Pæcilia feste Bouleng. Boll. Mus. Zool. Torino, xiii. 1898, No. 329, p. 13.

Santa Elena, Western Ecuador.

10. PÆCILIOPSIS, gen. nov.

This genus has the mouth and dentition of *Pæcilia*, but in the males the pelvic fins are neither enlarged nor modified, and the intromittent organ is long and slender. The first prolonged ray and the anterior branch of the second extend to the end of the fin and are somewhat curved forward distally; the posterior branch of the second is short and the third still shorter and slender distally, so that the serrations of the second project beyond it (text-figs. 170 D and 171 B).

Mexico, Central America, and Colombia.

Synopsis of the Species.

- | | |
|--|--------------------------|
| 1. Dorsal origin behind that of anal. | |
| Sides of body with a series of vertical bars | 1. <i>presidionis</i> . |
| A lateral series of spots, usually more than 8 in number and smaller than the eye | 2. <i>lutzi</i> . |
| A lateral series of 4 to 8 spots, each about as large as the eye | 3. <i>pleurospilus</i> . |
| No bars or spots | 4. <i>retropinna</i> . |
| 2. Dorsal origin in advance of that of anal. | |
| Diameter of eye 3 to 3½ in length of head, which is 3½ to 3¾ in the length of fish | 5. <i>isthmensis</i> . |
| Diameter of eye 2½ to 2¾ in length of head, which is 4 to 4½ in the length of fish | 6. <i>pittieri</i> . |

1. PÆCILIOPSIS PRESIDIONIS. (Text-fig. 170 D.)

Pæcilia presidionis Jord. & Culver, Proc. Calif. Acad. (2) v. 1895, p. 413, pl. xxix.

Girardinus presidionis Regan, Biol. Centr.-Amer., Pisces, p. 99 (1907).

As I have stated in the 'Biologia' this form and the next seem to differ from *P. pleurospilus* only in coloration, and should perhaps be regarded as subspecies of that species.

Rio Presidio in Sinaloa.

Heterandria colombianus Eigenm. (Indiana Univ. Studies, 1912, No. 8, p. 27), from brackish water at the mouth of the R. Dagua, Colombia, seems to be extremely similar to *P. presidionis*.

2. PÆCILIOPSIS LUTZI.

Heterandria lutzi Meek, Publ. Colombian Mus., Zool. v. 1904, p. 148, fig. 47.

Girardinus lutzi Regan, Biol. Centr.-Amer., Pisces, p. 99 (1907).

Oaxaca, Mexico; R. Motagua in Guatemala.

3. PÆCILIOPSIS PLEUROSPILUS.

Girardinus pleurospilus Günth. Cat. Fish. vi. p. 355 (1866), and Trans. Zool. Soc. vi. 1868, p. 486, pl. lxxxvii. fig. 1; Regan, Biol. Centr.-Amer., Pisces, p. 100 (1907).

Lakes Dueñas and Nacasil in Guatemala.

4. PÆCILIOPSIS RETROPINNA.

Pæcilia retropinna Regan, Ann. Mag. Nat. Hist. (8) ii. 1908, p. 458.

Costa Rica.

5. PÆCILIOPSIS ISTHENSIS, sp. n. (Pl. C. figs. 3, 4; and Text-fig. 171 B.)

♀. Depth of body $2\frac{1}{2}$ to 3 in the length, length of head $3\frac{1}{2}$ to $3\frac{3}{4}$. Diameter of eye 3 to $3\frac{1}{4}$ in length of head, interorbital width $1\frac{1}{5}$ to 2. 26 to 28 scales in a longitudinal series. Dorsal 9-10; origin equidistant from anterior edge of eye and base of caudal; longest ray $\frac{2}{3}$ length of head. Anal 10; origin below fourth or fifth ray of dorsal; first branched ray longest, $\frac{3}{4}$ length of head or more. Pectoral a little shorter than head; pelvics reaching anal. Least depth of caudal peduncle $\frac{2}{3}$ or $\frac{3}{4}$ length of head. Olivaceous; scales dark-edged; a blackish spot above the vent; fins dusky, the dorsal with blackish basal band and dark edge.

♂. Dorsal origin equidistant from tip of snout and base of caudal, or nearer former; intromittent organ, when laid back, nearly or quite reaching caudal fin; indistinct cross-bars on body.

Colon, Panama.

8 females, 35 to 60 mm. in total length, and 4 males of 35 to 42 mm., presented by Herr A. Rachow.

6. PÆCILIOPSIS PITTIERI.

Pæcilia pittieri Meek, Field Mus. Publ., Zool. x. 1912, p. 71.

Closely related to the preceding, but described as with a smaller head and larger eye.

La Junta, Costa Rica.

Total length 43 to 65 mm., males to 53 mm.

11. BRACHYRHAPHIS, gen. nov.

Differs from *Gambusia* in the shorter intromittent organ ending in a small retrorse hook formed by the second and third produced rays.

BRACHYRHAPHIS RHABDOPHORA. (Text-fig. 169 D.)

Gambusia rhabdophora Regan, Ann. Mag. Nat. Hist. (8) ii. 1908, p. 457.

Costa Rica.

Specimens recently received show that in this species the origin of the anal fin may be behind below or in advance of that of the dorsal.

Gambusia umbratilis Meek (Publ. Field Mus., Zool. x. 1912, p. 70) seems to differ from *B. rhabdophora* only in the larger eye.

12. LEPTORHAPHIS, gen. nov.

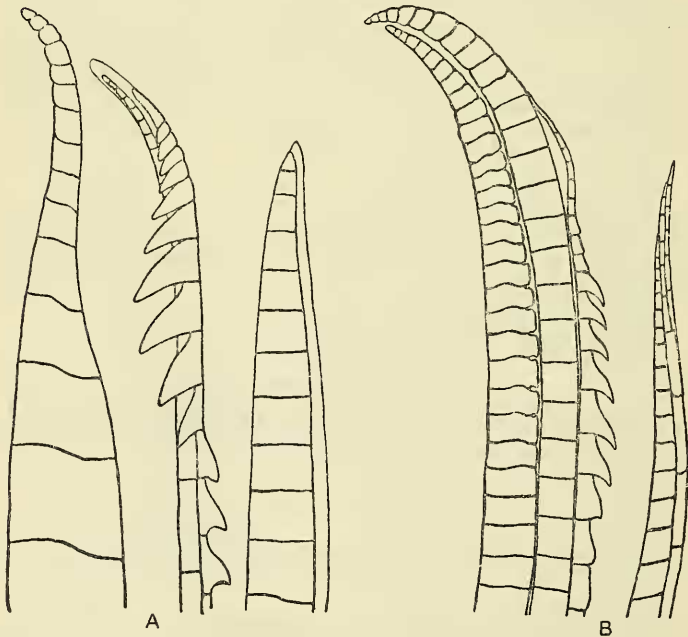
Differs from *Gambusia* only in the structure of the intromittent organ, which is longer and more slender than in that genus and slightly curved backwards distally. The first produced ray is not serrated, gradually tapers distally, and extends nearly to the tip of the fin; the second is slightly longer and has the posterior branch almost as long as the anterior and with the usual serrations, which project externally; the third ray also seems to reach nearly to the tip of the fin and appears to meet the first and form a complete tube.

LEPTORHAPHIS INFANS.

? *Xiphophorus gracilis* Heck. Sitzungsab. Akad. Wien, i. 1848, p. 300, pl. ix. figs. 3, 4.

Gambusia infans Woolman, Bull. U.S. Fish. Comm. 1894,

Text-fig. 171.



Distal part of intromittent organ of A. *Phalloptychus januarius* and B. *Pacciliopsis isthmensis*. The rays have been separated.

p. 62, pl. ii. fig. 3; Meek, Publ. Columbian Mus., Zool. v. 1904, p. 131, fig. 38; Regan, Biol. Centr.-Amer., Pisces, p. 96 (1907).
Gambusia gracilis Meek, t. c. p. 130.

Rio Lerma and Rio Balsas in Mexico; ? Orizaba.

13. PHALLOPTYCHUS Eigenmann.

Proc. U.S. Nat. Mus. xxxii. 1907, p. 430.

Mouth and dentition of *Pacilia*. Intromittent organ long and slender; third produced ray crossing second on right side near base, meeting first and forming a closed tube; second twisted distally so that the serrations are directed laterally or even forwards.

PHALLOPTYCHUS JANUARIUS. (Pl. C. figs. 7, 8, and text-fig. 171 A.)

Girardinus januarius Hensel, Arch. f. Nat. xxxiv. 1868, p. 360, and xxxv. 1869, p. 89.

Girardinus iheringii Bouleng. Ann. & Mag. Nat. Hist. (6) iv. 1889, p. 266.

Girardinus zonatus Schreiner, Arch. Mus. Rio Janeiro, xii. 1903, p. 7.

S.E. Brazil; La Plata.

This species may at once be recognized by its coloration, having several narrow blackish vertical stripes on each side of the body. Dorsal 9; origin above or a little behind that of anal.

14. PHALLOCEROS Eigenm.

Proc. U.S. Nat. Mus. xxxii. 1907, p. 431.

Mouth small, but bones of lower jaw rather firmly joined; teeth oar-shaped, slender, curved, as in *Pacilia*. Intromittent organ long (about $\frac{2}{3}$ length of fish to base of caudal); last segment of first produced ray modified into an antorse appendage which bifurcates, each fork antler-like in form; anterior branch of second ending just beyond the first in an antorse process.

PHALLOCEROS CAUDOMACULATUS. (Pl. C. figs. 5, 6, and text-fig. 172 C.)

Girardinus caudimaculatus Hensel, Arch. f. Nat. xxxiv. 1868, p. 362, and xxxv. 1869, p. 89.

Glaridodon januarius Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 42.

S.E. Brazil; La Plata.

The coloration readily distinguishes this species from *Phalloptychus januarius*. Plain olivaceous, usually with a vertical blackish spot on side below dorsal fin; sometimes a lateral series of dusky bars. Dorsal 7-8; origin above middle or posterior part of anal.

15. *CNESTERODON* Garman.

Mem. Mus. Comp. Zool. xix. 1895, p. 43.

Gulapinus Langer, Morph. Jahrb. xlvii. 1913, p. 207.

Mouth small, but rami of lower jaw rather firmly joined and teeth chisel-shaped, broader than in *Pecilia*. Intromittent organ long (nearly $\frac{2}{5}$ length of fish to base of caudal); last segment of first produced ray an appendage which is not forked, but is very long, peculiarly curved, and pointed distally; second ending in a process which is not or scarcely antrorse; third terminating in a hook, as in *Gambusia*.

CNESTERODON DECEMMACULATUS. (Text-fig. 172 B.)

Pecilia decemmaculata Jenyns, Zool. 'Beagle,' Fish. p. 115, pl. xxii. fig. 1 (1842).

Pecilia gracilis Cuv. & Val. Hist. Nat. Poiss. xviii. 1846, p. 133.

Cnesterodon decemmaculatus Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 44.

Cnesterodon carnegiei Haseman, Ann. Carnegie Mus. vii. 1911, p. 385, pl. lxxxiii.

La Plata; Rio Grande do Sul.

A small species, easily recognized by the lateral series of dark, rounded or vertically expanded spots. Dorsal 8-9; origin above or a little behind that of anal.

16. *GLARIDICHTHYS* Garman, 1896.

Glaridodon (non Seeley, Proc. R. Soc. xlv. 1888, p. 135); Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 40.

Glaridichthys Garman, Amer. Nat. xxx. 1896, p. 232.

This genus is well distinguished by the dentition and by the structure of the intromittent organ. It includes a single species from Cuba and perhaps one from Chihuahua, but males of the latter have not been described.

I. *GLARIDICHTHYS UNINOTATUS*.

Girardinus uninotatus Poey, Mem. ii. pp. 309, 383 (1861); Günth. Cat. Fish. vi. p. 351 (1866).

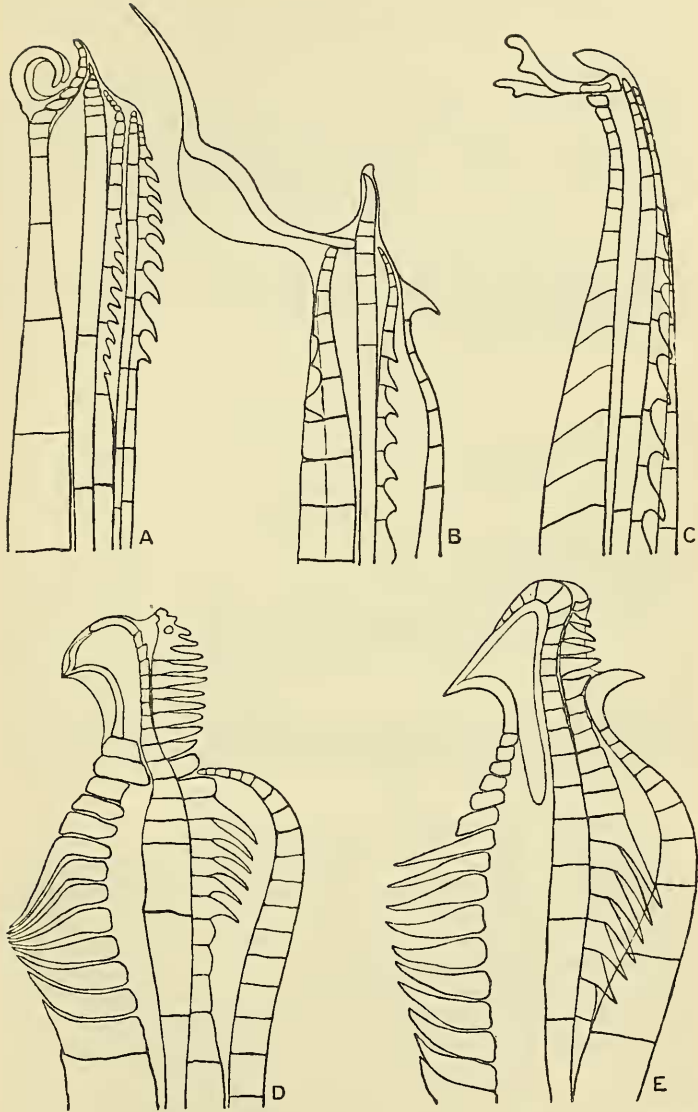
Glaridodon uninotatus Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 41.

Glaridichthys falcatus Eigenm. Bull. U.S. Fish. Comm. xxii. p. 224, fig. (1904).

Glaridichthys torralbasi Eigenm. t. c. p. 225, fig.

♀. Depth of body $3\frac{1}{2}$ to $4\frac{1}{2}$ in length, length of head 4 to 5. Eye large, more than $\frac{1}{3}$ of length of head. 28 to 31 scales in a longitudinal series. Dorsal 9-11; origin nearly equidistant from head and base of caudal. Anal 10; origin well in advance of that of dorsal. Olivaceous; edges of scales usually darker; often

Text-fig. 172.



Distal part of intromittent organ of A. *Girardinus metallicus*. B. *Cnesterodon decemmaculatus*. C. *Phalloceros caudomaculatus*. D. *Platypecilus maculatus*. E. *Xiphophorus helleri*.

a lateral series of short vertical bars; usually a blackish spot above origin of anal fin.

♂. Dorsal origin nearly equidistant from eye and base of caudal. Bars on side well marked; lateral spot indistinct; a blackish streak behind first produced ray of anal.

Here described from several specimens up to 75 mm. in total length from Cuba, including a male of 47 mm. extremely similar to the type of *G. torralbasi*, and co-types of *G. falcatus*. The last is a pale variety without the lateral spot, but structurally similar to *G. uninotatus*; the slight production of the vertical fins is found in several specimens with the typical coloration.

2. GLARIDICHTHYS LATIDENS.

Glaridodon latidens Garm. Mem. Mus. Comp. Zool. xix. 1895, p. 42.

Chihuahua; Mexico.

17. TOXUS Eigenm., 1904.

Bull. U.S. Fish. Comm. xxii. p. 226.

This genus differs from the preceding only in the dentition.

TOXUS RIDDLEI.

Eigenm. l. c. figs.

Cuba.

18. GIRARDINUS Poeys, 1855.

Mem. i. pp. 383, 390; Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 45.

Mouth and dentition as in *Pacilia*, but intromittent organ formed exactly as in the two preceding genera.

A single species from Cuba.

GIRARDINUS METALLICUS. (Text-fig. 172 A.)

Poeys, Mem. i. pp. 387, 391, pl. xxxi, figs. 8-11 (1855); Günth. Cat. Fish. vi. p. 351 (1866); Garm. Mem. Mus. Comp. Zool. xix. 1895, p. 46.

Girardinus denticulatus Garm. t. c. p. 47.

Girardinus creolus Garm. l. c.

Girardinus garmani Eigenm. Bull. U.S. Fish. Comm. xxii. p. 226, fig. (1904).

Heterandria cubensis Eigenm. t. c. p. 227, fig.

Depth of body 3 to 4 in length, length of head 4 to $4\frac{1}{2}$. Diameter of eye $2\frac{2}{3}$ to 3 in length of head. 27 to 31 scales in a longitudinal series. Dorsal 9-10; origin nearly equidistant from base of pectoral and base of caudal (a little nearer head than caudal in ♂). Anal 10-12; origin well in advance of dorsal. Olivaceous; edges of scales darker; usually a lateral

series of dark bars; dorsal with anterior edge dark and usually a blackish spot or band posteriorly near base.

Cuba.

Several specimens up to 70 mm. in total length.

19. PAMPHORICHTHYS, gen. nov.

Mouth small; bones of lower jaw firmly united; a series of firmly set, slender, pointed teeth and a band of much smaller teeth within. Intestine long, coiled. Males with anal and pelvic fins below pectorals, the former a slender pointed organ about $\frac{1}{3}$ the length of the fish (without caudal), the latter also modified, the outer rays produced, the inner about $\frac{1}{2}$ as long and forming a projection near their ends.

This genus is based on Garman's *Heterandria minor*, which seems to differ from *Heterandria* in the more slender teeth, longer intestine, and shorter intromittent organ, but especially in the modification of the pelvic fins in the male.

PAMPHORICHTHYS MINOR.

Heterandria minor Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 92.

Amazon.

20. PAMPHORIA, gen. nov.

Mouth small; bones of lower jaw rather firmly joined; a series of broad incisors and a band of minute tricuspoid teeth within. Intestine long. Males with anal fin much advanced, forming an intromittent organ that is longer than the head, and with the second ray of the pelvics produced.

PAMPHORIA SCALPRIDENS.

Cnesterodon scalpridens Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 45, pl. v. fig. 12. pl. viii. fig. 17.

Amazon.

21. PLATYPÆCILUS Günth., 1866.

Cat. Fish. vi. p. 350.

Mouth small, transverse; bones of lower jaw loosely connected; an outer series of slender curved teeth, somewhat expanded and compressed towards their apices, spoon-shaped or oar-shaped. Males with the pelvic fins enlarged, nearly as long as the intromittent organ, which is unprotected by a hood, but has the distal end remarkably modified (text-fig. 172 D).

Two species from Mexico, with the intromittent organ precisely similar in structure.

1. PLATYPÆCILUS COUCHIANUS.

Limia couchiana Girard, Proc. Acad. Philad. 1859, p. 116.

Pecilia couchiana Regan, Biol. Centr.-Amer., Pisces, p. 104, pl. xiv. fig. 1 (1907).

Depth of body about $2\frac{3}{4}$ in the length, length of head about 4. 23 to 27 scales in a longitudinal series. Dorsal 9-11; origin equidistant from snout and anterior part of caudal. Anal 7-8, opposite posterior $\frac{1}{2}$ of dorsal. Blackish or brownish above, yellowish below, the two colours sharply separated.

Rio San Juan at Monterey.

2. *PLATYPECILUS MACULATUS*. (Text-fig. 172 D.)

Platypecilus maculatus Günth. Cat. Fish. vi. p. 350 (1866).

Pecilia maculata Regan, Biol. Centr.-Amer., Pisces, p. 105 (1907).

Closely related to *P. couchianus*. Depth of body 2 to $2\frac{2}{3}$ in the length, length of head $3\frac{1}{3}$ to $3\frac{2}{3}$. Anal 8-9. Olivaceous; a dark spot or crescent or a pair of spots at base of caudal.

Atlantic Coast streams of Mexico and Guatemala.

22. *XIPHOPHORUS* Heckel, 1848.

Sitzungsb. Akad. Wien, i. p. 291.

Closely related to the preceding, as is shown by the great similarity in the structure of the anal fins of the males (text-fig. 172 E). The species occur in rivers of the Atlantic Slope from Tamaulipas to Guatemala. After examination of a large series of specimens I conclude that only 3 species are well established.

1. *XIPHOPHORUS MONTEZUMÆ*.

Jord. & Snyder, Bull. U.S. Fish. Comm. 1900, p. 131, fig. 11; Regan, Biol. Centr.-Amer., Pisces, p. 107 (1907).

Dorsal 11-13. Anal 6-8. Scales 27 to 29. Depth about 3 in the length, length of head about 4. Yellowish; scales of upper part of body dark-edged; usually a dark lateral stripe.

Rio Panuco, Mexico.

2. *XIPHOPHORUS HELLERI*. (Text-fig. 172 E.)

Heck. Sitzungsb. Akad. Wien, i. 1848, p. 291, pl. viii.; Günth. Cat. Fish. vi. p. 349 (1866); Regan, Biol. Centr.-Amer., Pisces, p. 107 (1907).

Xiphophorus guentheri Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 702.

Xiphophorus jalapæ Meek, Publ. Columbian Mus., Zool. v. 1903, p. 136, pl. xi.

Xiphophorus strigatus Regan, t. c. pl. xiv. fig. 7.

Dorsal 11-14. Anal 8-10. Scales 26 to 30. Depth 3 to 4 in the length, length of head 4 to $4\frac{2}{3}$. Sides of body blue, with red stripes between the series of scales.

Southern Mexico; Guatemala.

Mexican examples have nearly always a strong stripe from eye to base of caudal (*strigatus*), the males sometimes with another backwards from axil of pectoral (*helleri*, *jalapæ*); in specimens

from Guatemala there is, as a rule, no strong lateral stripe (*guentheri*):

Xiphophorus rachovii Regan (Ann. Mag. Nat. Hist. (8) viii. 1911, p. 373), from Puerto Barrios, Guatemala, has a pair of black spots at the base of the caudal fin; other examples received later from Puerto Barrios lack these spots, but are not very different in other respects. Whether this is another variety of *X. helleri* or a hybrid with *Platyæcilus maculatus*, as some aquarium-writers in Germany believe, still remains to be settled.

3. XIPHOPHORUS BREVIS.

Regan, Ann. Mag. Nat. Hist. (7) xix. 1907, p. 65, and Biol. Centr.-Amer., Pisces, p. 108, pl. xiv. figs. 8, 9.

Dorsal 13-15. Anal 9-10. Scales 27. Depth $2\frac{1}{2}$ to $2\frac{2}{3}$ in length, length of head $3\frac{2}{3}$ to $3\frac{3}{4}$. No strong lateral stripe.

British Honduras.

23. PÆCILIA Schneider, 1801.

Bloch's Syst. Ichth. p. 452.

Pæcilia (part.) Günth. Cat. Fish. vi. p. 339 (1866); Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 52.

Mouth small, transverse; teeth slender, curved, expanded towards the tip, spoon- or oar-shaped, forming a series with a band of minute teeth within; bones of lower jaw loosely connected. Pelvic fins in male enlarged, the second ray prolonged. Intromittent organ short, its tip protected anteriorly by a cutaneous hood; first prolonged ray without terminal spine, with several segments not far from the end forming acute serrations; last ray simple, without appendages (text-fig. 173 A-C).

As now restricted this genus only includes four (or five) species from South America.

Synopsis of the Species.

I. Dorsal 7-9; origin nearly above that of anal	1. <i>vivipara</i> .
II. Dorsal 6-7.	
Origin of dorsal above posterior end of anal; usually a dark spot above pectoral, equidistant from head and dorsal fin	2. <i>paræ</i> .
Origin of dorsal above middle or posterior part of anal; a dark spot on each scale and dark stripes between the series of scales on sides of body	3. <i>picta</i> .
Origin of dorsal above middle of anal; a blackish spot or bar at base of caudal fin	4. <i>branneri</i> .

1. PÆCILIA VIVIPARA. (Text-fig. 173 C.)

Pæcilia vivipara Schneid. Bloch's Syst. Ichth. p. 452, pl. lxxxvi. fig. 2 (1801); Günth. Cat. Fish. vi. p. 344 (1866); Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 53.

Pæcilia schneideri Val. in Humboldt, Obs. Zool. ii. p. 159 (1828); Cuv. & Val. Hist. Nat. Poiss. xviii. p. 135 (1846).

PROC. ZOOL. SOC.—1913, No. LXVII.

Pœcilia surinamensis Val. t. c. p. 158, pl. li. fig. 1; Cuv. & Val. t. c. p. 120.

Pœcilia unimaculata Val. t. c. p. 158, pl. li. figs. 2, 5, 6; Cuv. & Val. t. c. p. 128; Günth. t. c. p. 346.

♀. Depth of body $2\frac{3}{4}$ to 4 in the length, length of head $3\frac{1}{3}$ to $4\frac{1}{3}$. Diameter of eye 3 to 4 in length of head, interorbital width $1\frac{3}{4}$ to 2. 25 to 27 scales in a longitudinal series. Dorsal 7-9; origin nearly above that of anal and equidistant from some part of operculum and base of caudal. Anal 8-10. Pectoral a little shorter than head; pelvics reaching vent. Least depth of caudal peduncle $\frac{2}{3}$ to $\frac{4}{5}$ length of head. Olivaceous; edges of scales usually darker; body often with dark cross-bars; often a blackish spot, which may be pale-edged, on upper part of side 2 or 3 scales in front of dorsal fin; often a pair of blackish spots at base of caudal above and below, extending along margins of fin; fins sometimes immaculate, but dorsal and caudal sometimes with series of small spots, or dorsal with one or two blackish bands.

♂. Dorsal a little further forward and higher than in ♀.

Venezuela and Leeward Islands to the La Plata.

Numerous examples, the largest female 80 mm. and the largest male 60 mm.

2. PÆCILIA PARÆ. (Text-fig. 173 B.)

Pœcilia viripara paræ Eigenm. Ann. N.Y. Acad. vii. 1894, p. 629.

? *Pœcilia amazonica* Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 64.

Acanthophaecelus bifurcus Eigenm. Mem. Carnegie Mus. v. 1912, p. 459, pl. lxx. figs. 4-6.

♀. Depth of body $3\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$. Diameter of eye $3\frac{1}{4}$ in length of head, interorbital width 2. 28 scales in a longitudinal series. Dorsal 6; origin above posterior end of anal, nearly equidistant from head and base of caudal; middle rays longest, $\frac{1}{2}$ length of head. Anal 8-9. Pectoral $\frac{3}{4}$ length of head; pelvics extending to origin of anal. Least depth of caudal peduncle $\frac{2}{3}$ length of head. Olivaceous; usually a pale lateral stripe; a vertically expanded dark spot with pale margin on upper part of side, nearly equidistant from head and dorsal fin; fins immaculate.

♂. Dorsal origin nearer to head than to base of caudal; longest rays $\frac{3}{4}$ length of head. A dark spot above pectoral (as in ♀), a larger one just above anal fin, a third on caudal peduncle; dorsal and caudal sometimes spotted, latter with dark upper edge.

Amazon; Guiana.

Four specimens, two females of 28 mm. and two males of 22 and 24 mm. in total length, received from Prof. Eigenmann; these are co-types of the species from Para and of *A. bifurcus* from British Guiana. The intromittent organ is figured (text-fig. 173 B).

Garman's description of *P. amazonica* applies to *P. paræ*,

except that the dorsal origin is said to be a little in advance of that of anal.

3. *PÆCILIA PICTA*, sp. n. (Pl. C. figs. 1, 2, and Text-fig. 173 A.)

Acanthophaelus melanzonus (part.) Eigenm. Ann. Carnegie Mus. vi. 1909, p. 51; Mem. Carnegie Mus. v. 1912, p. 457, pl. lxiv. fig. 6.

♀. Depth of body $3\frac{1}{2}$ to 4 in the length, length of head about 4. Diameter of eye $3\frac{1}{2}$ to 4 in length of head, interorbital width $1\frac{1}{2}$. 26 to 29 scales in a longitudinal series. Dorsal 6-7, origin above middle or posterior part of anal and equidistant from base of pectoral and base of caudal; fin small, rounded. Anal 9-10, pointed. Pectoral $\frac{3}{4}$ length of head; pelvics reaching vent or origin of anal. Least depth of caudal peduncle about $\frac{2}{3}$ length of head. Olivaceous; sides of body with a dark brown spot on each scale and dark brown longitudinal stripes between the series of scales.

♂. Depth 3 to $3\frac{1}{2}$ in the length. Dorsal origin nearly equidistant from eye and base of caudal; fin elevated. Least depth of caudal peduncle $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Coloration sometimes as in female, but usually there are a few large dark spots on posterior part of body; dorsal fin usually with blackish spots; often an ocellus on upper part of base of caudal fin.

Demerara.

Numerous examples, the females measuring up to 45 mm., the males to 30 mm. in total length, presented in 1872 by F. G. Beckford, Esq.

A. melanzonus is based on a male of *Lebistes reticulatus* (type) and several females of *P. picta*.

In this species the intromittent organ differs somewhat from that of *P. vivipara*, but is formed on the same plan (text-fig. 173 A, C).

4. *PÆCILIA BRANNERI*.

Pæcilia branneri Eigenm. Ann. N.Y. Acad. vii. 1894, p. 629.

Pæcilia heteristia Regan, Ann. Mag. Nat. Hist. (8) iii. 1909, p. 235.

♀. Depth of body $3\frac{1}{2}$ in the length, length of head 4. Diameter of eye $3\frac{1}{2}$ in length of head, interorbital width nearly 2. 27 or 28 scales in a longitudinal series. Dorsal 6-7; origin above middle of anal and nearly equidistant from base of pectoral and base of caudal. Anal 8, pointed. Pectoral $\frac{3}{4}$ length of head; pelvics extending to origin of anal. Least depth of caudal peduncle $\frac{2}{3}$ length of head. Olivaceous; edges of scales darker; some blackish vertical streaks on the side and a blackish spot or vertical bar at base of caudal fin.

♂. Dorsal origin equidistant from middle of operculum and base of caudal; two last rays produced into long filaments. Caudal spot larger than in ♀; sometimes a blackish stripe near upper edge of caudal fin.

Para.

Here described from the types of *P. heteristia*, ♂ and ♀, each 35 mm. in total length.

The intromittent organ is very like that of *P. vivipara*, but the anterior branch of the second ray has fewer segments, as in *P. picta*.

24. LEBISTES Filippi, 1861.

Arch. Zool. Anat. Fisiol. i. p. 69.

Acanthophaelus Eigenmann, Proc. U.S. Nat. Mus. xxxii. 1907, p. 426, fig. 1.

Differs from *Pæcilia* only in that the third prolonged anal ray of the male has its last segments modified into a pair of projections which are directed obliquely outwards and towards the base of the fin.

A single species from South America.

LEBISTES RETICULATUS. (Text-fig. 173 D.)

Pæcilia reticulata Peters, Monatsb. Akad. Berlin, 1859, p. 412; Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 458.

Lebistes pæcilioides Filippi, Arch. Zool. Anat. Fisiol. i. 1861, p. 69, pl. iv. f. 6; Günth. Cat. Fish. vi. p. 356 (1866).

Girardinus reticulatus Günth. t. c. p. 352.

Girardinus guppyi Günth. t. c. p. 353; Regan, Proc. Zool. Soc. 1906, p. 390, pl. xxii. figs. 1, 1 a.

Acanthophaelus reticulatus Eigenm. Proc. U.S. Nat. Mus. xxxii. 1907, p. 426, f. 1; Mem. Carnegie Mus. v. 1912, p. 458, pl. lxxv. figs. 1-3.

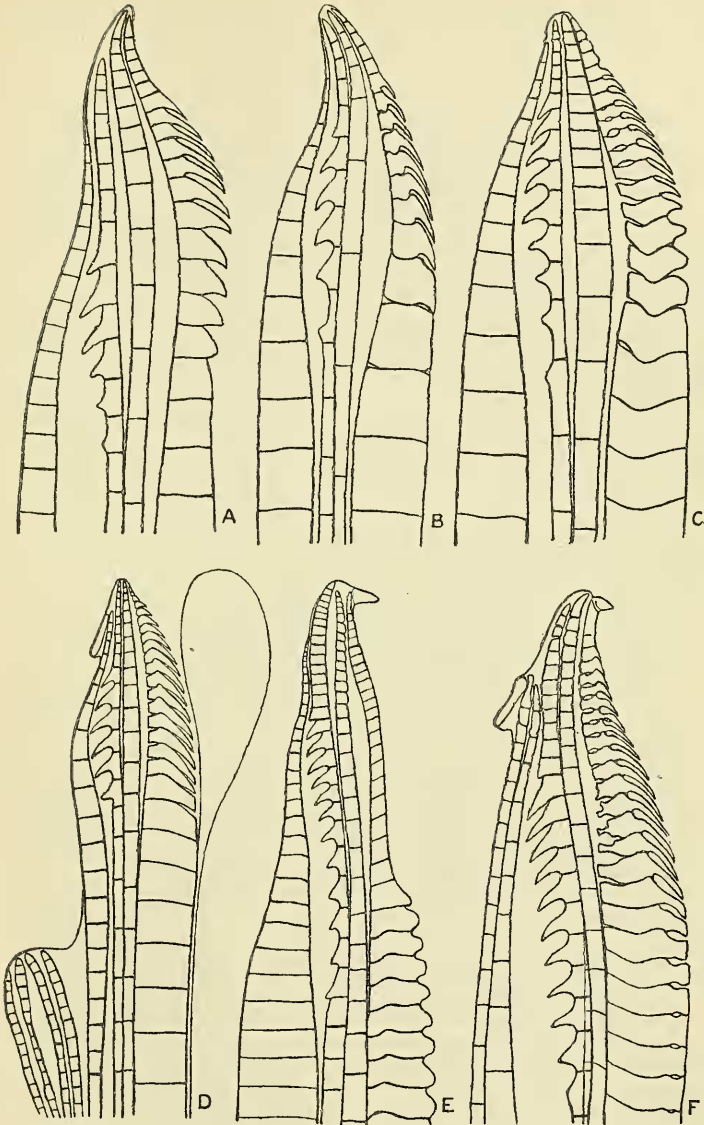
Acanthophaelus melanzonus (part.) Eigenm. Mem. Carnegie Mus. v. 1912, p. 457, pl. lxxiv. fig. 5.

♀. Depth of body 3 to 4 in the length, length of head $3\frac{2}{3}$ to $4\frac{1}{2}$. Diameter of eye 3 to $3\frac{1}{2}$ in length of head, interorbital width $1\frac{2}{3}$ to 2. 26 to 28 scales in a longitudinal series. Dorsal 7-8, rounded or obtuse; origin equidistant from eye or operculum and base of caudal. Anal 9-10, pointed; origin below or a little in advance of that of dorsal. Pectoral $\frac{4}{5}$ length of head; pelvics extending to origin of anal. Least depth of caudal peduncle $\frac{3}{5}$ to $\frac{3}{4}$ length of head. Olivaceous; edges of scales darker, forming a network; fins immaculate, except sometimes a small dark spot on middle of caudal.

♂. Dorsal more elevated than in ♀, when laid back nearly reaching base of caudal fin; pelvics nearly as long as the short intromittent organ. Coloration very variable; often a blackish spot above or behind base of pectoral, another above anal fin or on middle of side, a third at base of caudal peduncle; often also several bluish-silvery spots, which may unite to form a lateral band, margined above and below by dark longitudinal stripes; dorsal and caudal sometimes spotted, often dark-edged.

Venezuela and St. Lucia to Santos.

Text-fig. 173.



Distal part of intromittent organ of :—A. *Poecilia picta*. B. *P. parva*. C. *P. vivipara*. D. *Lebistes reticulatus*. E. *Limia versicolor*. F. *Mollienisia sphenops*. The prepuce-like hood is indicated in fig. D.

In comparing with preceding figures note that these are reversed, the first prolonged ray being on the right, the third on the left.

Numerous examples, including co-types of the species received from the Berlin Museum and the types of *Girardinus guppyi*; females to 55 mm., males to 25 mm., in total length.

25. MOLLINIENSIA Le Sueur, 1821.

Journ. Acad. Philad. ii. p. 3; Günth. Cat. Fish. vi. p. 347 (1866); Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 49.

This genus differs from *Pœcilia* in having a small antrorse spine at the end of the first prolonged ray of the male anal fin, as in *Limia*, and at the end of the third a paired process, probably the modified terminal segment, directed obliquely outwards and towards the base of the fin, as in *Lebistes* (text-fig. 173 F).

Some species hitherto referred to *Pœcilia* (*M. sphenops*, *M. gracilis*) have an intromittent organ exactly similar to that of *Mollienisia latipinna* and *M. petenensis*, and as the little-known *M. formosa* is intermediate between the two groups in the size of the dorsal fin, all may be placed in *Mollienisia*. Some other species, with the dorsal fin further back than the anal, are provisionally included; all that is known of the males is Garman's statement that in *P. cuneata* the anal fin of the male is shorter than the head, indicating that the species is neither a *Pœciliopsis* nor a *Girardinus*, although it may be a *Limia*.

Synopsis of the Species.

- | | |
|---|--------------------------|
| I. Dorsal 11-16; in adult males origin nearer end of snout than base of caudal, base longer than distance from caudal. | |
| A. Caudal rounded or subtruncate (♀) or lower angle slightly produced (♂); scales 28 to 30. Dorsal 15-16 | 1. <i>petenensis</i> . |
| B. Caudal rounded; scales 26 to 28. | |
| Dorsal 14-16; in females origin equidistant from end of snout and base of caudal (young) or nearer snout (adult); base equal to (young) or more than (adult) distance from caudal | 2. <i>latipinna</i> . |
| Dorsal 11-13; in females origin a little nearer base of caudal than end of snout, even in the adult; base equal to (adult) or less than (young) distance from caudal..... | 3. <i>formosa</i> . |
| II. Dorsal 10-11; origin nearly equidistant from end of snout and base of caudal fin; base shorter than distance from caudal; anal origin below fourth ray of dorsal; scales 28 to 30 | 4. <i>gracilis</i> . |
| III. Dorsal 7-11; origin nearly equidistant from end of snout and middle or posterior end of caudal fin; base shorter than distance from caudal. | |
| A. Origin of anal below or a little behind that of dorsal | 5. <i>sphenops</i> . |
| B. Origin of anal in advance of that of dorsal. | |
| Dorsal 8-10. Anal 8-10. Scales 29-33 | 6. <i>elongata</i> . |
| Dorsal 7-9. Anal 9-11. Scales 27-30..... | 7. <i>occidentalis</i> . |
| Dorsal 8. Anal 9. Scales 26 | 8. <i>spilurus</i> . |

1. MOLLINIENSIA PETENENSIS.

Günth. Cat. Fish. vi. p. 348 (1866), and Trans. Zool. Soc. vi. 1868, p. 485, pl. lxxxvi. figs. 1-3; Regan, Biol. Centr.-Amer., Pisces, p. 106 (1907).

♀. Depth of body $2\frac{2}{3}$ to 3 in the length, length of head 4. Diameter of eye 4 in length of head, interorbital width $1\frac{3}{4}$. 28 to 30 scales in a longitudinal series. Dorsal 15-16; base about as long as its distance from end of snout, longer than its distance from caudal fin; longest rays $\frac{2}{3}$ or $\frac{3}{4}$ length of head. Anal 9-10; origin below middle of dorsal. Pectoral as long as head; pelvics reaching origin of anal. Caudal rounded or subtruncate. Least depth of caudal peduncle nearly equal to length of head. A small spot on each scale, most conspicuous posteriorly; dorsal and caudal with series of small spots.

♂. Base of dorsal $1\frac{1}{2}$ to $1\frac{3}{4}$ its distance from end of snout and about twice its distance from caudal; longest rays longer than head. Anal below anterior part of dorsal; produced rays $\frac{2}{3}$ length of head; second pelvic ray about as long. Lower angle of caudal slightly produced. Spots on lower part of dorsal forming undulating stripes; a series of large spots, one on each interradiation membrane, along middle of fin. Lower margin of caudal blackish.

Lake Peten in Guatemala.

Three females, 100 to 110 mm., and three males, 100 to 130 mm. in total length, types of the species.

2. MOLLINIENISIA LATIPINNA.

Le Sueur, Journ. Acad. Philad. ii. 1821, p. 3, pl. iii.; Cuv. & Val. Hist. Nat. Poiss. xviii. p. 139, pl. 527; Günth. Cat. Fish. vi. p. 348 (1866); Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 50, pl. xii.; Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 699.

Pecilia multilineata Le Sueur, t. c. p. 4.

Pecilia lineolata Girard, U.S. Mex. Bound. Surv., Fish. p. 70, pl. xxxv. figs. 9-11 (1859).

Limia pecilioides Girard, t. c. p. 70, pl. xxxviii. figs. 8-11; Proc. Acad. Philad. 1859, p. 115.

Limia matamorensis Girard, Proc. Acad. Philad. 1859, p. 116.

♀. Depth of body $2\frac{2}{3}$ to 3 in the length, length of head $3\frac{1}{3}$ to 4. Diameter of eye $3\frac{1}{3}$ to 4 in length of head, interorbital width $1\frac{4}{5}$ to 2. 26 to 28 scales in a longitudinal series. Dorsal 14-16; in adults base somewhat shorter than its distance from end of snout, longer than its distance from caudal; rays $\frac{1}{2}$ length of head. Anal 9-10; origin below middle of dorsal. Pectoral a little shorter than head; pelvics reaching vent or origin of anal. Caudal rounded. Least depth of caudal peduncle about $\frac{2}{3}$ length of head. Spots on scales forming longitudinal stripes; dorsal and basal part of caudal with series of small spots.

♂. Dorsal base, in adult, about $1\frac{1}{2}$ its distance from end of snout or twice its distance from caudal; rays longer than head. Anal below anterior part of dorsal; produced rays $\frac{2}{3}$ length of head, a little longer than second pelvic ray; caudal rounded. Spots on lower part of dorsal forming longitudinal stripes; a series of large spots, one on each interradiation membrane, along middle of fin; caudal spotted superiorly, with blackish lower edge.

Southern United States.

Five females, 40 to 68 mm., and two males, 65 and 78 mm., from Pensacola and New Orleans.

3. MOLLINIENISIA FORMOSA.

Limia formosa Girard, Proc. Acad. Philad. 1859, p. 115.

Mollinienisia formosa, Günth. Cat. Fish. vi. p. 349 (1866).

♀. Depth of body $2\frac{1}{2}$ to 3 in the length, length of head $3\frac{1}{3}$ to 4. Diameter of eye 3 to $3\frac{1}{2}$ in length of head, interorbital width $1\frac{3}{4}$ to 2. 26 to 28 scales in a longitudinal series. Dorsal 11-14; origin a little nearer to base of caudal than to end of snout; base, in adult, nearly equal to its distance from caudal, but less than its distance from head; longest rays $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Anal 9-10; origin below fourth ray of dorsal. Pectoral a little shorter than head; pelvics reaching vent or origin of anal. Caudal rounded. Least depth of caudal peduncle $\frac{2}{3}$ to $\frac{3}{4}$ length of head. A spot on each scale; dorsal usually spotted.

♂. Dorsal origin nearer to end of snout than to base of caudal; base as long as its distance from eye; longest rays nearly $\frac{3}{4}$ length of head.

Atlantic slope of Mexico and Central America.

Several small specimens (♂ and ♀) up to 45 mm. from Tampico (*Jordan*). Also three large females, 65 to 80 mm. in total length, from Colon (*Rachow*); these are structurally similar to the others, but have the coloration obscured by blackish mottling.

4. MOLLINIENISIA GRACILIS, nom. nov.

Pœcilia petenensis (non *Mollinienisia petenensis* Günth.) Günth. Cat. Fish. vi. p. 342, and Trans. Zool. Soc. vi. 1868, p. 484, pl. lxxxv. figs. 3, 4.

♀. Depth of body 4 to $4\frac{1}{2}$ in the length, length of head $4\frac{2}{7}$ to $4\frac{1}{4}$. Diameter of eye $3\frac{1}{2}$ to $3\frac{3}{4}$ in length of head, interorbital width 2. 28 to 30 scales in a longitudinal series. Dorsal 10-11; origin equidistant from præorbital and base of caudal; anterior branched rays $\frac{2}{3}$ length of head. Anal 8-10, acutely pointed; origin below fourth ray of dorsal. Pectoral as long as head. Least depth of caudal peduncle $\frac{3}{4}$ length of head. Olivaceous; scales dark-edged; dorsal and caudal speckled.

♂. Depth $3\frac{1}{3}$ to $3\frac{2}{3}$ in length; depth of caudal peduncle equal to length of head. Dorsal origin equidistant from end of snout and base of caudal; posterior rays longest, as long as or longer than head.

Lake Peten in Guatemala.

Two females, 120 and 150 mm. and three males, 95 to 120 mm. in total length, types of the species.

5. MOLLINIENISIA SPHENOPS. (Text-fig. 173 F.)

Pœcilia sphenops Cuv. & Val. Hist. Nat. Poiss. xviii. p. 130, pl. 526 (1846); Regan, Biol. Centr.-Amer., Pisces, p. 102, pl. xiii. (1907) (with synonymy).

Girardinus caucanus Steind. Denkschr. Akad. Wien, xlii. 1880, p. 87, pl. vi. figs. 4, 5.

Pecilia salvatoris Regan, Ann. Mag. Nat. Hist. (7) xix. 1907, p. 65; Biol. Centr.-Amer., Pisces, p. 104, pl. xiv. figs. 2, 3 (1907).

Pecilia amates Miller, Bull. Amer. Mus. xxiii. 1907, p. 108.

? *Platypæcilus tropicus* Meek, Publ. Columbian Mus., Zool. vii. 1907, p. 146.

Pecilia tenuis Meek, t. c. p. 147.

Pecilia spilonotæ Regan, Ann. Mag. Nat. Hist. (8) ii. 1908, p. 460.

♀. Depth of body $2\frac{1}{2}$ to 4 in the length, length of head $3\frac{1}{3}$ to $4\frac{3}{4}$. Diameter of eye 3 to 4 in length of head, interorbital width $1\frac{1}{2}$ to 2. 25 to 30 scales in a longitudinal series. Dorsal 8-11; origin equidistant from eye or operculum and base of caudal. Anal 8-10; origin below or a little behind that of dorsal. Pectoral as long as or shorter than head. Least depth of caudal peduncle equal to or less than length of head. Dark greenish to pale olivaceous; edges of scales sometimes darker; often a dark spot on each scale of side of body; sometimes narrow vertical bars on sides; dorsal and caudal sometimes immaculate, often with series of small spots, or with a dark basal spot which may extend over most or all of the fin.

♂. Dorsal further forward and more elevated; spots on sides rarely present, dark cross-bars often distinct.

Coasts and rivers from Sinaloa to Panama and from Tamaulipas to Colombia, Venezuela, and the Leeward Islands.

Numerous examples to 120 mm. in total length, from all parts of the range of the species.

6. MOLLINIENSIA ELONGATA.

Pecilia elongata Günth. Cat. Fish. vi. p. 342, and Trans. Zool. Soc. vi. 1869, p. 484, pl. lxxxv. fig. 2; Regan, Biol. Centr.-Amer., Pisces, p. 102 (1907).

? *Pecilia cuneata* Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 62.

Panama.

7. MOLLINIENSIA OCCIDENTALIS.

Heterandria occidentalis Baird & Girard, Proc. Acad. Philad. 1853, p. 390.

Pecilia occidentalis Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 71; Regan, Biol. Centr.-Amer., Pisces, p. 102 (1907).

Pacific Coast Rivers from Arizona to Jalisco.

8. MOLLINIENSIA SPILURUS.

Pecilia spilurus Günth. Cat. Fish. vi. p. 345 (1866); Regan, Biol. Centr.-Amer., Pisces, p. 101 (1907).

Mexico or Central America.

26. LIMIA Poey, 1855.

Mem. Cuba, i. p. 383.

Acropacilia Hilgendorf, Sitzungsab. Ges. Nat. Freund. 1889, p. 52.

This genus is well marked off from *Pacilia* by the structure of the intromittent organ (text-fig. 173 E). At some distance from its end the first produced ray becomes abruptly slender; the distal part is not serrated, and near its extremity it bears an antrorse spine; the second and third produced rays are nearly as in *Pacilia*. As in *Pacilia*, the intromittent organ is short, usually shorter than the head, and its extremity is protected anteriorly by a cutaneous hood; in fully adult males the second pelvic ray is more or less prolonged.

Of eight species seven are from Cuba, Haiti, and Jamaica, and one from Venezuela. I have examined adult males in all but *L. ornata*.

Synopsis of the Species.

- I. Origin of dorsal fin about equidistant from middle of eye and base of caudal; origin of anal below fifth ray of dorsal 1. *vittata*.
- II. Origin of dorsal nearer to base of caudal than to eye.
- A. Origin of anal below anterior part of dorsal.
- Dorsal 8-9; length of head $3\frac{3}{4}$ to 4 in length of fish 2. *dominicensis*.
 Dorsal 10; length of head $3\frac{3}{8}$ to 4 in length of fish 3. *nigrofasciata*.
 Dorsal 10-11; length of head 3 to $3\frac{1}{2}$ in length of fish 4. *arnoldi*.
- B. Origin of anal below or very slightly in advance of that of dorsal.
1. Length of head $\frac{2}{3}$ length of fish (in adults of 50 mm.); a lateral series of dark bars in both sexes.
- Interorbital width less than $\frac{1}{2}$ length of head 5. *ornata*.
 Interorbital width $\frac{1}{2}$ length of head, or more 6. *caudofasciata*.
2. Length of head less than $\frac{1}{4}$ length of fish (in a specimen of 43 mm.). ♂ with 3 or 4 blackish cross-bars, ♀ with a blackish lateral stripe anteriorly 7. *heterandria*.
- C. Origin of anal always distinctly in advance of that of dorsal; head $\frac{1}{4}$ length of fish (in adults of 50-60 mm.). 8. *versicolor*.

1. LIMIA VITTATA.

Pacilia vittata Guichenot in Ramon de la Sagra, Hist. Nat. Cuba, Poiss. p. 146, pl. v. fig. 1 (1850); Günth. Cat. Fish. vi. p. 339 (1866); Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 58.

Limia cubensis Poey, Mem. Cuba, i. p. 388, pl. xxxi. figs. 12-13 (1855).

Limia vittata Poey, t. c. p. 389, pl. xxxi. figs. 14, 15.

?*Platypacilia perugia* Evermann & Clark, Proc. U.S. Nat. Mus. xxx. 1906, p. 851, fig.

♀. Depth of body $2\frac{1}{2}$ to 3 in the length, length of head $3\frac{1}{2}$ to $4\frac{2}{3}$. Diameter of eye 3 to $3\frac{1}{2}$ in length of head, interorbital width $1\frac{1}{5}$ to 2. 26 to 28 scales in a longitudinal series. Dorsal

9-11; origin nearly equidistant from middle of eye and base of caudal; branched rays subequal, or the middle ones the longer, $\frac{2}{3}$ or $\frac{3}{5}$ length of head. Anal 10; origin below fifth ray of dorsal. Pectoral $\frac{3}{4}$ length of head or more; pelvics reaching vent. Least depth of caudal peduncle $\frac{2}{5}$ to $\frac{1}{2}$ length of head. Olivaceous; edges of scales darker; often a dark lateral band or 1 to 3 series of dark spots along the series of scales on middle of side; dorsal and caudal usually with small dark spots.

♂. Dorsal origin equidistant from snout and base of caudal; posterior rays longest, longer than head in the adult. Intromittent organ a little shorter than head; second pelvic ray produced, inner rays ending in a knob. Least depth of caudal peduncle nearly equal to length of head. Usually dark cross-bars on body; spots on dorsal and caudal fins larger and blacker than in females.

Cuba; ? San Domingo.

Several specimens from Cuba, the males 45 to 70, the females 40 to 100 mm., in total length.

2. LIMIA DOMINICENSIS.

Pœcilia dominicensis Cuv. & Val. Hist. Nat. Poiss. xviii. p. 131, pl. 526. fig. 1 (1846).

Pœcilia melanogaster Günth. Cat. Fish. vi. p. 345 (1866).

Platyptecilus dominicensis Evermann & Clark, Proc. U.S. Nat. Mus. xxx. 1906, p. 852, fig.

Depth of body $2\frac{1}{2}$ to 3 in the length, length of head $3\frac{3}{4}$ to 4. Diameter of eye 3 to $3\frac{1}{3}$ in length of head, interorbital width $1\frac{3}{4}$. 26 or 27 scales in a longitudinal series. Dorsal 8-9; origin equidistant from occiput or operculum and base of caudal, or tip of snout and end of caudal, first or second branched ray longest, $\frac{2}{3}$ length of head. Anal 10; origin below second or third ray of dorsal; anterior branched rays longest. Pectoral $\frac{3}{4}$ length of head; pelvics reaching vent. Least depth of caudal peduncle $\frac{2}{5}$ to $\frac{3}{4}$ length of head. Olivaceous; sometimes traces of dark bars on upper part of sides and of a dark spot at base of caudal; a blackish spot on basal part of posterior $\frac{1}{2}$ of dorsal fin; ripe females with abdomen golden in front, blackish behind, the two colours separated by a ventral line at insertion of pelvic fins.

San Domingo; ? Jamaica.

Seven specimens: two of the types of the species, ♂ and ♀, 38 and 42 mm. in total length, and five females of 50 to 60 mm., types of *P. melanogaster*.

3. LIMIA NIGROFASCIATA, sp. n. (Pl. CI. figs. 1, 2.)

♀. Depth of body $2\frac{1}{2}$ to 3 in the length, length of head $3\frac{2}{5}$ to 4. Diameter of eye $3\frac{1}{2}$ to $3\frac{2}{3}$ in length of head, interorbital width $1\frac{1}{5}$. 27 or 28 scales in a longitudinal series. Dorsal 10; origin equidistant from middle of operculum and base of caudal; fin rounded, the longest rays $\frac{1}{2}$ length of head. Anal 9, obtuse;

origin below anterior $\frac{1}{4}$ of dorsal. Pectoral $\frac{2}{3}$ length of head; pelvics not or barely reaching vent. Least depth of caudal peduncle $\frac{2}{3}$ or $\frac{3}{4}$ length of head. Body with 7 to 9 blackish vertical bars; a dark spot near base of posterior part of dorsal.

♂. Depth $2\frac{1}{4}$ to $2\frac{1}{2}$ in the length. Dorsal origin equidistant from eye or præoperculum and base of caudal; longest rays $\frac{3}{5}$ length of head, or in adult nearly as long as head.

Miragoâne, Haiti.

Two females, 43 mm. in total length, an immature male of 41 mm., and an adult male of 48 mm., presented by Messrs. J. Paul Arnold and A. Rachow.

4. LIMIA ARNOLDI, sp. n. (Pl. CI. fig. 5.)

♀. Depth of body 3 to $3\frac{2}{3}$ in the length, length of head 3 to $3\frac{1}{2}$. Diameter of eye 3 to $3\frac{1}{2}$ in the length of head, interorbital width 2. 26 or 27 scales in a longitudinal series. Dorsal 10-11; origin equidistant from postorbital part of head and base of caudal; fin rounded, the longest rays $\frac{1}{2}$ length of head. Anal 9-10, rounded or obtusely pointed; origin below anterior part of dorsal. Pectoral $\frac{3}{4}$ length of head; pelvics extending to vent. Least depth of caudal peduncle $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Body with 8 to 12 narrow dark vertical bars; dorsal sometimes spotted, often with a small dark spot posteriorly near its base.

♂. Depth of body 3 in the length. Dorsal origin equidistant from eye and base of caudal; longest rays $\frac{2}{3}$ length of head. Intromittent organ $\frac{1}{4}$ length of fish (to base of caudal); second pelvic ray stout, a little produced beyond third and fourth, which are truncated distally. Least depth of caudal peduncle $\frac{3}{4}$ length of head. No dark vertical bars, but several series of vertically expanded spots.

Miragoâne, Haiti.

Ten females, 26 to 42 mm. in total length, and three males of 28 to 38 mm., presented by Herr J. Paul Arnold.

5. LIMIA ORNATA, sp. n. (Pl. CI. fig. 7.)

Depth of body $3\frac{1}{2}$ to 4 in the length, length of head 3 to $3\frac{1}{2}$. Diameter of eye $3\frac{1}{2}$ to 4 in length of head, interorbital width $2\frac{1}{2}$ to $2\frac{3}{4}$. 28 scales in a longitudinal series. Dorsal 8-10; origin equidistant from some part of operculum and base of caudal; fin rounded, the longest rays $\frac{1}{2}$ length of head. Anal 10; origin below that of dorsal. Pectoral $\frac{2}{3}$ or $\frac{3}{4}$ length of head; pelvics reaching vent or origin of anal. Least depth of caudal peduncle $\frac{2}{3}$ the length of head. Head, body, and usually vertical fins with blackish spots more or less developed; body also with a series of dark bars or large vertically expanded spots.

Haiti.

Five females, 31 to 55 mm. in total length, presented by Herr J. Paul Arnold.

6. *LIMIA CAUDOFASCIATA*, sp. n. (Pl. CI. fig. 6.)

♀. Depth of body 3 to $3\frac{1}{2}$ in the length, length of head 3 to $3\frac{1}{2}$. Diameter of eye $3\frac{1}{4}$ to $3\frac{1}{2}$ in length of head, interorbital width $1\frac{4}{5}$ to 2. 26 scales in a longitudinal series. Dorsal 8-10; origin equidistant from some part of operculum and base of caudal; anterior branched rays longest, $\frac{1}{2}$ length of head. Anal 10; origin below or a little in advance of that of dorsal. Pectoral $\frac{3}{4}$ length of head; pelvics reaching vent. Least depth of caudal peduncle $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Olivaceous or brownish; edges of scales darker; a series of dark vertical bars on posterior part of body; a dark spot near base of posterior part of dorsal; abdomen yellowish, or when tumid golden anteriorly and blackish posteriorly, as in *L. dominicensis*.

♂. Dorsal origin about equidistant from eye and base of caudal; longest rays $\frac{1}{2}$ to $\frac{2}{3}$ (adult) length of head. Intromittent organ less than $\frac{1}{4}$ length of fish; second pelvic ray produced in adult, nearly as long as prolonged anal rays. Least depth of caudal peduncle $\frac{2}{3}$ length of head.

Jamaica.

Several females, 28 to 42 mm. in total length, and six males of 25 to 48 mm., collected by C. A. Wray. In males of 25 to 30 mm., the anal fin has not attained the adult structure and the second pelvic ray is scarcely prolonged; males of 35 to 48 mm. have the anal fully formed, but only the largest has the pelvics strongly produced.

7. *LIMIA HETERANDRIA*, sp. n. (Pl. CI. figs. 3, 4.)

♀. Depth of body $3\frac{1}{2}$ in the length, length of head $3\frac{2}{3}$ to $4\frac{1}{4}$. Diameter of eye 3 to $3\frac{1}{2}$ in length of head, interorbital width 2. 26 scales in a longitudinal series. Dorsal 8; origin equidistant from some part of operculum and base of caudal; fin rounded, longest rays a little more than $\frac{1}{2}$ length of head. Anal 9, pointed; origin below that of dorsal. Pectoral $\frac{3}{4}$ length of head; pelvics reaching vent. Least depth of caudal peduncle $\frac{1}{2}$ or $\frac{2}{3}$ length of head. Olivaceous; a dark longitudinal stripe from above pectoral to level of origin of anal; a dark spot above vent; a black spot near base of posterior part of dorsal.

♂. Dorsal origin equidistant from middle of eye and base of caudal; longest rays $\frac{3}{4}$ length of head. Intromittent organ about $\frac{2}{7}$ length of fish (to base of caudal); second ray produced, $\frac{3}{4}$ as long as prolonged anal rays. Stripe on side of body and spot above vent absent; body with 3 or 4 narrow dark vertical bars.

La Guayra, Venezuela.

Two females, 43 and 27 mm., and a male of 25 mm. (adult), presented by Herr J. Paul Arnold.

8. *LIMIA VERSICOLOR*. (Text-fig. 173 E.)

Pecilia dominicensis (non Cuv. & Val.) Günth. Cat. Fish. vi.

p. 346 (1866); Garman, Mem. Mus. Comp. Zool. xix. 1895, p. 57.

Girardinus versicolor Günth. t. c. p. 352.

Acropécilia tridens Hilgendorf, Sitzungsab. Naturf. Freunde, 1889, p. 52.

♀. Depth of body 3 to 4 in the length, length of head $3\frac{1}{2}$ to 4. Diameter of eye 3 to $3\frac{1}{2}$ in length of head; inter-orbital width $1\frac{3}{4}$ to 2. 26 to 28 scales in a longitudinal series. Dorsal 7-9; origin equidistant from some part of operculum and base of caudal; middle rays longest, about $\frac{2}{3}$ the length of head. Anal 8-10; origin a little in advance of that of dorsal. Pectoral a little shorter than head; pelvics about reaching vent. Least depth of caudal peduncle $\frac{2}{3}$ to $\frac{5}{6}$ the length of head. Olivaceous, edges of scales darker; an indistinct lateral band or a series of short vertical bars; sometimes irregular dark spots on the back; a blackish spot on base of posterior part of dorsal; caudal sometimes with vertical bands.

♂. In specimens of 30 mm. dorsal and pelvic fins as in ♀, but in those of 40 to 45 mm. dorsal more elevated, the longest rays $\frac{3}{4}$ length of head, second pelvic ray somewhat produced and inner pelvic rays expanded and truncated at ends.

San Domingo.

Ten females, 35 to 60 mm., including the types of the species, and four males, 30-45 mm.

EXPLANATION OF THE PLATES.

PLATE XCIX.

- Figs. 1, 2. *Gambusia oligosticta*, ♀ & ♂.
 3, 4. " *wrayi*, ♀ & ♂.
 5, 6. " *gracilior*, ♀ & ♂.
 7. " *dominicensis*, ♀.

PLATE C.

- Figs. 1, 2. *Pécilia picta*, ♀ & ♂.
 3, 4. *Péciliopsis isthmensis*, ♀ & ♂.
 5, 6. *Phalloceros caudomaculatus*, ♀ & ♂.
 7, 8. *Phalloptychus januarius*, ♀ & ♂.

PLATE CI.

- Figs. 1, 2. *Limia nigrofasciata*, ♀ & ♂.
 3, 4. " *heterandria*, ♀ & ♂.
 5. " *arnoldi*, ♀.
 6. " *caudofasciata*, ♂.
 7. " *ornata*, ♀.