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A NEW SPECIES OF POECILIID FISH OF THE GENUS
Poecilia FROM HISPANIOLA,
WITH REINSTATEMENT AND REDESCRIPTION OF
P. dominicensis (EVERMANN AND CLARK)¹

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ABSTRACT: Exploration of the streams and lakes of Hispaniola and available collections of poeciliid fishes from that island are discussed, followed by the taxonomic history and generic status of the two species described. The genera *Limia* and *Mollienesia* were synonymized with *Poecilia* by Rosen and Bailey (1963) and the former *Mollienesia dominicensis* of Evermann and Clark (1906) became a junior homonym of *Limia dominicensis* of Valenciennes (1846). Rosen and Bailey, therefore, renamed *M. dominicensis* of Evermann and Clark as *Poecilia montana*. Because *Mollienesia* is herein retained as a synonym of *Poecilia* but *Limia* is reinstated as a valid genus, *Poecilia dominicensis* of Evermann and Clark is no longer a junior homonym of *Limia dominicensis* of Valenciennes. The name *montana*, therefore, becomes a junior objective synonym of Evermann and Clark's *dominicensis*. The new species herein described, although available to previous authors, had been hitherto confused with *Poecilia dominicensis* of Evermann and Clark. Both species are superficially similar but clearly distinct and more closely related to each other than either is to any of the other species of *Poecilia*. They are restricted to the island of Hispaniola and show character displacement in the several localities where they occur together.

Before the late forties and early fifties, little was known about the poeciliid fishes of Hispaniola and only a few lots of specimens were available in museums. Most of the few localities previously collected were restricted to the vicinities of Port-au-Prince, Haiti, or Santo Domingo, Dominican Republic, and most of the river systems of the island remained unexplored.

During April, 1949, I conducted an expedition to the Dominican Republic to obtain specimens, especially poeciliids, from previously unexplored streams. Subsequently, in April, 1951, I conducted another expedition, this time to Haiti, for the same purpose. Both of these expeditions were sponsored by the

University of Miami Department of Zoology (now Biology) where I was Curator of Fishes at that time.

These expeditions resulted in the coverage of most of the lakes and stream systems of Hispaniola, including all localities previously reported in the literature, and in the discovery of several undescribed species of poeciliid fishes.

Only two of the new poeciliids, *Gambusia pseudopunctata* (Rivas, 1969) and *G. hispaniolae* (Fink, 1971) have been published and *Mollienesia*=*Poecilia elegans* (Trewavas, 1948) was designated the type species of a new genus, *Curtipenis*=*Poecilia* by Rivas and Myers (1950) on the basis of additional material collected during my 1949 Hispaniola expedition. Further than that, study and publication of the remaining new species

¹Contribution number 78-52M, Southeast Fisheries Center, Miami Laboratory.

and the extensive material collected could not be continued because of other commitments. Four of the new species belong to the genus *Limia* and will be described in a preliminary review of the genus now in preparation (see below on status of *Limia*). The other, a new species of *Poecilia*, is described herein.

MATERIALS AND METHODS

The new species of *Poecilia* described in this paper is based on 461 adult males, 860 undeveloped males, 791 adult females, and 2,600 juveniles for a total of 4,712 specimens from 14 localities. The holotype and a series of paratypes have been deposited in the National Museum of Natural History (USNM). Series of paratypes have been deposited in the Museum of Comparative Zoology (MCZ), the Museum of Zoology University of Michigan (UMMZ), and the Florida State Museum (FSM). *Poecilia dominicensis (montana)* of Rosen and Bailey, 1963; see below) previously known only from the female holotype and two female paratypes is redescribed from 108 adult males, 85 undeveloped males, 233 adult females, and 316 juveniles for a total of 742 specimens from eight localities. Series of specimens have been deposited in the USNM, the MCZ, the UMMZ, and the FSM.

Gonopodial characters are self-explanatory or named and counted as previously described (Rivas, 1963). Scales are counted according to methods described by Miller (1948). In the dorsal and anal fins the last two rays are, in some specimens, very close set and appear as a single ray, branched, or split, to the base. In other specimens, the last two rays are distinctly separate but still close to each other. For these reasons,

the last two rays, regardless of their degree of separation, are always counted as a single ray. All pectoral fin rays are counted.

Proportional body measurements in relation to standard length are omitted for reasons discussed by Hubbs and Springer (1957) and Rivas (1963; 1969). In poeciliid fishes there is considerable variation in these characters individually, ontogenetically, seasonally, geographically, and environmentally and, therefore, they are of little or no value in distinguishing species. Fin measurements and the relative position of fins may be better expressed quantitatively by indicating their magnitude in relation to one another, their relative position to one another, or their position and extent in relation to points of reference. This procedure has been followed in the descriptions, under the section dealing with morphological characters. In the description of the new species the meristic characters for the holotype are given first followed in parentheses by those of the male and female paratypes.

TAXONOMIC HISTORY AND GENERIC STATUS

The new species described below belongs to the group of poeciliid fishes formerly placed in the genus *Mollienesia* and hitherto represented by only two species in Hispaniola. The first species, was described as *Platypoecilus dominicensis* by Evermann and Clark (1906) and the second as *Mollienesia elegans*, by Trewavas (1948). *Platypoecilus dominicensis* was erroneously synonymized with *Poecilia dominicensis* Valenciennes (1846) by Regan (1913) who placed both species in the genus *Limia*. Subsequently, however, Myers (1931) correctly indicated that

Platy-poecilus dominicensis was not a *Limia* but a distinct, valid species of *Mollienesia* and placed it in that genus to stand as *M. dominicensis* (Evermann and Clark). Myers did not explain how he came to this conclusion since the holotype of *dominicensis* is a female and in the absence of adult males, female poeciliids are difficult to identify as to genus and species. Nevertheless, with males now available for ascertaining generic relations and by comparing females of the new material described below with the holotype of *dominicensis* (USNM 53277), I have confirmed Myers' conclusions. Myers (1935) re-described and figured what he thought was *M. dominicensis* but his description, figures, and material actually represent the species herein described as new. In that paper Myers also designated *M. dominicensis* as the type species of *Psychropoecilia*, a new subgenus of *Mollienesia*. As to *Mollienesia elegans*, previously known only from four specimens, Rivas and Myers (1950) designated it the type species of a new genus, *Curtipenis*, on the basis of additional material.

In the most recent revision of the family Poeciliidae, Rosen and Bailey (1963) synonymized *Mollienesia*, *Psychropoecilia*, *Curtipenis*, *Limia*, and other genera with *Poecilia*, but *Limia* was retained as a subgenus. With their consolidation of *Limia* and *Mollienesia* with *Poecilia* the former *Mollienesia*=*Poecilia dominicensis* (Evermann and Clark, 1906) became a junior homonym of *Limia*=*Poecilia dominicensis* Valenciennes, 1846. Rosen and Bailey therefore renamed *dominicensis* of Evermann and Clark as *montana*. I provisionally accept the consolidation of *Mollienesia* and *Curtipenis*, but not of *Limia* with *Poecilia*, for the reasons stated in the

following paragraphs.

Other than introductory philosophical remarks on the taxonomic role of genera as indicators of relationships, Rosen and Bailey did not give specific reasons to justify their synonymizing *Limia* with *Poecilia* (see critique by Rivas, 1965). It is significant, however, that Rosen and Bailey retained *Limia* as a subgenus.

As pointed out by Rosen and Bailey, the genus can and should serve to express relationships. In keeping with this observation, it seems to me that lumping *Limia* and *Poecilia*, rather than keeping them separate, would mask their affinities and falsely indicate that they are more closely related than they really are. In further agreement with Rosen and Bailey's other remarks, generic groups should be constructed on similar standards of morphological distinctiveness. This, however, would apply much better to *Limia* and *Poecilia* as separate genera rather than as a consolidated generic group. I also believe that premature shifting of ranks within a family, before certain groups of species and their relationships are better known, can lead to misinterpretation of what should constitute a valid genus. Admittedly, criteria for generic separation are mostly subjective and, in the end, a genus is accepted or rejected as valid according to the personal judgement of the researcher. I do believe, however, that a genus can be more objectively defined as a group of species more closely related among themselves than with other species which form similar groups within the family (the tribe Poeciliini in this case). This concept is further strengthened if there are, within the genus, definable groups of species each of which could be interpreted as subgenera and/or as species groups. After nearly 40 years of research on the ex-

tensive material of poeciliid fishes available to me, I have found that according to these criteria, *Limia* should stand as a valid genus in the tribe *Poeciliini*. The characters distinguishing *Limia* from *Poecilia*, its closest relative in the tribe, are given in the key below. Subgenera and species groups within *Limia* will be defined in a revision of that genus now in preparation (Rivas, MS).

1a.- Subdistal segments of ray 3 of gonopodium with erect or retorse spines, or with broadly T-shaped, somewhat bifurcate processes; distal arc of ray 5a not bending abruptly toward ray 4p; ray 5p extending distally to within 2 to 6 segments from tip of ray 5a. Segments distal to ray 4p serrae 12 or fewer. Three subgenera (*Poecilia*, *Lebistes*, and *Pamphorichthys*) as diagnosed by Rosen and Bailey (1963) and about 23 species. Mainland of North, Central, and South America (20 species) and the island of Hispaniola (3 species)

Genus *Poecilia*

1b.- Subdistal segments of ray 3 of gonopodium without spines or processes; distal arc of ray 5a bending abruptly toward ray 4p; ray 5p extending distally to within 10 to 15 segments from tip of ray 5a. Segments distal to ray 4p serrae 14 or more. Three subgenera to be diagnosed by Rivas (MS) and 14 species. Confined to the Greater Antilles in Cuba (one species), Hispaniola (11 species), Jamaica (one species), and Grand Cayman Island (one species).

Genus *Limia*

With the reinstatement of *Limia* to full generic rank, *Poecilia dominicensis* (Evermann and Clark) is no longer a junior homonym of *Limia dominicensis*

(Valenciennes). In accordance with the International Code of Zoological Nomenclature, therefore, as provided by Article 59(c), the name *montana* of Rosen and Bailey (1963), proposed in replacement of Evermann and Clark's *dominicensis*, becomes a junior objective synonym of the latter.

Poecilia hispaniolana, New Species

Figs. 1 (A, B), 2 (A), and 3

Mollienisia dominicensis (misidentification, not of Evermann and Clark), Myers, 1935: 310 (name, original reference, and synonymy excluded; diagnosis only), 311 (male and female figured; *Psychropoecilia*, new subgenus; species erroneously referred to *dominicensis* of Evermann and Clark; comments excluded), 312 (USNM material only, except holotype of *dominicensis*).

Mollienisia (Psychropoecilia) dominicensis, Trewavas, 1948: 410 (synonymy in part; reference to Myers, 1935, only as to his diagnosis, figure, and USNM material, except holotype of *dominicensis*).

Poecilia montana (in part), Rosen and Bailey, 1963: 48 (reference to Myers, 1935, only as to his diagnosis, figure, and USNM material, except holotype of *dominicensis*).

Synonymy. - As shown below, the diagnosis and figures given by Myers (1935) clearly refer to this species, not to *P. dominicensis*. I have examined the material (USNM 88884, and 100287) used by Myers for his figures and diagnosis, as well as additional material from the same locality (St. Michel de l'Atalaye). At the time of Myers' study *P. dominicensis* was known only from the female holotype (USNM 53277) and two female paratypes

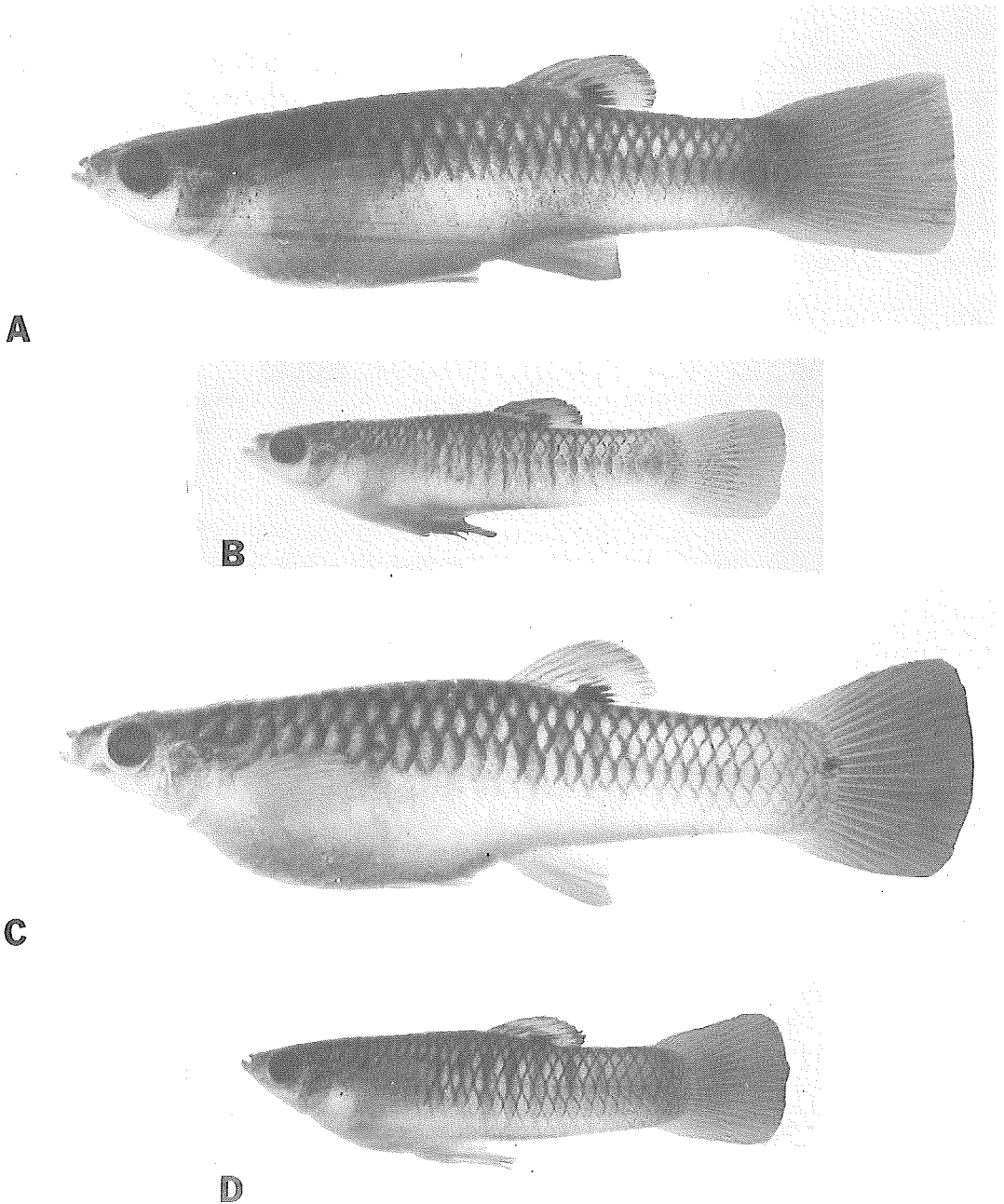


Figure 1. A. Adult 48mm female paratype of *Poecilia hispaniolana*, new species from Rio Yaque del Norte at Jarabacoa, Dominican Republic (USNM 218711). B. Adult 27mm male paratype of *P. hispaniolana*, new species from the same locality (USNM 218711). C. Adult 42mm female of *P. dominicensis* (Evermann and Clark) from Rio Camu, 9 km west of La Vega, Dominican Republic (FSM 25276). D. Adult 26mm male of *P. dominicensis* (Evermann and Clark) from the same locality (FSM 25276).

(USNM 126137). Females of *P. hispaniolana* and *P. dominicensis* are difficult to distinguish, especially if only a few specimens of one species are available. As mentioned above, with males now available, the identity of *P. dominicensis* and its distinctiveness from *P. hispaniolana* can be established by comparison of females of both species with the holotype of *P. dominicensis*.

Types. - The holotype (USNM 218706) is an adult male 35.5 mm SL collected by Luis R. Rivas and Burton P. Hunt in the Rio Mijo, at road from Azua to San Juan, Province of Benefactor, Dominican Republic, on April 21, 1949. Paratypes (USNM 218707), collected with the holotype, comprise 218 juveniles and undeveloped males 13.6-35 mm, 68 adult males 21.8-36.0 mm, and 38 adult females 35.0-51.4 mm. The rest of the material collected, from the following 13 localities, are also designated as paratypes. Rio Yaque del Sur at bridge of road from Azua to San Juan, Prov. Azua, D.R., 166 juveniles and undeveloped males 14.5-34.3 mm, 28 adult males 28.6-34.8 mm, and 46 adult females 35.5-47.2 mm, L.R.R. and B.P.H., April 21, 1949 (USNM 218708). Rio Vallejuelo at El Cercado, Prov. Benefactor, D.R., 178 juveniles and undeveloped males 11.0-35.2 mm, 34 adult males 24.0-45.5 mm, and 26 adult females 35.0-47.2 mm, L.R.R. and B.P.H., April 21, 1949 (USNM 218709). Rio Artibonite at Pedro Santana (Cercadillo), Prov. San Rafael, D.R., 136 juveniles and undeveloped males 11.0-31.0 mm, 9 adult males 22.0-34.5 mm, and 12 adult females 31.6-48.0 mm, L.R.R. and B.P.H., April 22, 1949 (USNM 218710). Rio Massacre at Loma de Cabrera, Prov. Libertador, D.R., 413 juveniles and undeveloped males

13.4-32.5 mm, 61 adult males 22.5-32.4 mm, and 95 adult females 32.5-51.0 mm, L.R.R. and B.P.H., April 22, 1949 (UMMZ 200218). Rio Yaque del Norte at Jarabacoa, Prov. La Vega, D.R., 44 juveniles and undeveloped males 12.8-31.0 mm, 22 adult males 24.9-32.0 mm, and 44 adult females 31.8-53.3 mm, L.R.R. and B.P.H., April 24, 1949 (USNM 218711). Rio Camu, 9 km west of La Vega, Prov. La Vega, D.R., 140 juveniles and undeveloped males 12.0-34.5 mm, 23 adult males 27.0-36.0 mm, and 49 adult females 34.5-58.5 mm, L.R.R. and B.P.H., April 24, 1949 (USNM 218712). Rio Yuna at highway, north of Monsenor Noel, Prov. La Vega, D.R., 687 juveniles and undeveloped males 15.6-33.2 mm, 27 adult males 25.5-32.0 mm, and 94 adult females 35.0-58.5 mm, L.R.R. and B.P.H., April 24, 1949 (MCZ54057). Riviere Trois Rivieres at bridge of road from Gonaives to Port-de-Paix, Dept. de l'Artibonite, Haiti, 379 juvenile and undeveloped males 13.2-34.0 mm, 51 adult males 24.5-35.6 mm, and 66 adult females 35.0-51.3 mm, L.R.R., April 9, 1951 (USNM 218713). Stream about 5 km west of St. Michel de l'Atalaye, Dept. de l'Arbonite, Haiti, 568 juveniles and undeveloped males 12.0-31.5 mm, 32 adult males 23.7-32.0 mm, and 101 adult females 31.5-43.4 mm, L.R.R., April 10, 1951 (FSM25275). Riviere Canot at fork of road from St. Michel de l'Atalaye to Hinche, Dept. de l'Artibonite, Haiti, 19 juveniles and undeveloped males 13.0-26.0 mm, 3 adult males 24.6-25.6 mm, and 4 adult females 28.0-40.0 mm, L.R.R., April 10, 1951 (USNM 218714). Riviere Guayamouc at Hinche, Dept. de l'Artibonite, Haiti, 323 juveniles and undeveloped males 12.2-29.5 mm, 53 adult males 21.0-32.0 mm, and 58 adult females 30.0-41.0 mm, L.R.R., April 10,

1951 (USNM 218715). Riviere Los Pine at road from Hinche to Las Cahobas, 2 km north of Las Cahobas, Dept. de l'Ouest, Haiti, 147 juveniles and undeveloped males 13.5-29.8 mm, 29 adult males 24.0-32.5 mm, and 118 adult females 29.8-46.0 mm, L.R.R., April 11, 1951 (USNM 218716). Riviere La Tombe at side road from Mirebalais to Saut d'Eeau, Dept. de l'Ouest, Haiti, 34 juveniles and undeveloped males 17.2-28.0 mm, 20 adult males 22.6-26.7 mm, and 40 adult females 29.4-42.2 mm, L.R.R., April 11, 1951 (USNM 218717).

Name. - This species is named after the Island of Hispaniola to which it is confined and where it occurs in both Haiti and the Dominican Republic.

Gonopodial characters. - Terminal segments of ray 3, without inner processes, 14(10-15, usually 12 or 13). Ray 4p serrae 9(7-11, usually 9). Segments distal to 4p serrae 11(9-12, usually 10). Free flap of membranous swelling of ray 3 much longer than width of gonopodium at insertion of flap (Fig. 2A), reaching to, or beyond the most distal serra of ray 4p. Processes on anterior margin of subterminal segments of ray 3 broadly T-shaped, somewhat bifurcate. Subterminal segments of ray 4a smooth. A membranous hook at tip of ray 3 and a bony hook at tip of ray 5p. Anterior margin of ray 5a facing distal spines of ray 4p smooth.

Meristic characters. - Dorsal rays 8(8, rarely 7 or 9). Anal rays 9(9). Pectoral rays 16(14-16, usually 15 or 16). Branched caudal rays 15(13-16, usually 14). Lateral scales 28(27-30, usually 28). Scales around caudal peduncle 16(16).

Morphological characters. - Preorbital not free, the skin covering it not folded under its ventral edge. Preorbital canal closed, with 4 pores. Anterior supra-

orbital canal closed, with 3, rarely 2 pores. Posterior supraorbital canal closed below, with 2 pores, opening above into a U-shaped, open pit. Mandibular canal closed posteriorly, with 2 pores below tip of maxillary, opening anteriorly into a U-shaped groove connecting each side across mandible. Preopercular canal closed, with 7 pores.

Outer teeth in both jaws uniserial, forming a weak arc on each side of symphysis, close-set, movable, spatulate or scooplike, slightly curved inward, wider at the crown and tapering toward the base, their cutting edge convex and slanted. Inner teeth in both jaws movable, tricuspid, much smaller than teeth of outer row, irregularly arranged, forming a band several teeth wide on each side of symphysis. Upper and lower jaws weakly united at symphysis.

Second pelvic ray of males expanded medially, forming a bulbous process on its outer margin. Gonopodium not reaching to vertical from end of dorsal base.

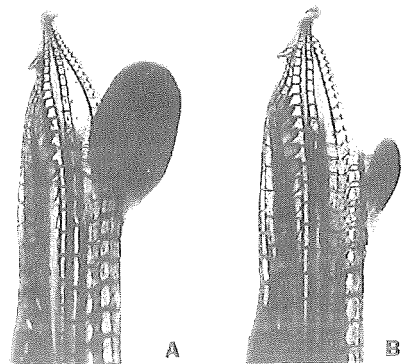


Figure 2. Distal end of gonopodium. A. From adult 28.5 mm male paratype of *Poecilia hispaniolana*, new species from Rio Mijo, at road from Azua to San Juan, Dominican Republic (USNM 218707). B. From adult 26.5 mm male of *P. dominicensis* (Evermann and Clark) from Rio Camu, 9 km west of La Vega, Dominican Republic (FSM 25276).

Predorsal contour nearly straight or slightly convex longitudinally in males, convex, but not strongly, in females; transversely convex in both sexes. Body axis straight, the axis of caudal peduncle not forming an angle with axis of anterior portion of body. Origin of dorsal fin above midlength of gonopodium in males, slightly behind origin of anal in females, much nearer to upper end of opercle than to middle of caudal base in males, about midway between upper end of opercle and middle of caudal base in females. Origin of anal fin nearer to upper end of opercle than to middle of caudal base in females. Caudal fin truncate or slightly convex, about as long as wide, its upper and lower posterior corners angulate.

Coloration. - After original fixation in 10% formalin and 27 to 29 years in 60% ethanol the color pattern is as follows.

Ground color yellowish-brown on back and upper sides, becoming lighter, more or less abruptly, on lower sides and ventral region. Darker margins of scale pockets producing a reticulate pattern on back and upper sides. Nape dark brown, the dark pigment extending as a middorsal streak to origin of dorsal fin. Sides of body in males with 8 to 10 thin, dark crossbars, much narrower than the interspaces; crossbars also present, and thicker, in juveniles and young females; absent in adult females. Dorsal fin margined with melanophores and with a conspicuous dark blotch on last four rays. Pectoral, pelvic, anal, and caudal fins hyaline sometimes a transverse row of dark spots on caudal fin of males.

Size. - The largest male measures 36 mm SL and the largest female 59 mm. On the average, males are about half as large as females.

Relationships. - This species belongs to the subgenus *Poecilia* as diagnosed by Rosen and Bailey (1963). In addition to *hispaniolana*, this subgenus comprises *caucana*, *elegans*, *dominicensis*, *vivipara*, *sphenops*, *butleri*, *mexicana*, *formosa*, *latipinna*, *petenensis*, *velifera*, *latipunctata*, and *sulphuraria*. I have examined material of all these species for comparison with *hispaniolana*.

Poecilia hispaniolana, is readily distinguished from *formosa*, *latipinna*, *petenensis*, *velifera*, and *latipunctata*, all mainland species, by its color pattern and fewer dorsal rays: 8, rarely 7 or 9 vs. 9 to 19, rarely 9 or 19. It is further distinguished from these species by characters relating to the dentition and to the gonopodium. In *hispaniolana* the inner teeth are tricuspid whereas in the others they are unicuspid. In *hispaniolana*, the processes on the anterior margin of the subdistal segments of ray 3 of gonopodium are broadly T-shaped and somewhat bifurcate whereas in the others, these processes are spinelike and retrorse. These same gonopodial differences and the color pattern distinguish *hispaniolana* from *vivipara*. In addition, *hispaniolana* differs from *vivipara* in several other gonopodial characters such as the subterminal segments of ray 4a which are smooth in *hispaniolana* and serrate in *vivipara*. The membranous hook at tip of ray 3 and the hook at tip of ray 5p are present in *hispaniolana* and absent in *vivipara*. The anterior margin of ray 5a facing the distal spines of ray 4p is smooth in *hispaniolana* and serrate in *vivipara*.

The color pattern and the shape of the processes on anterior margin of ray 3 of gonopodium, as described above, separate *hispaniolana* from *caucana*, *butleri*, *mexicana*, *sulphuraria*, *sphenops*,

and *elegans*. In addition, *hispaniolana* differs from *caucana*, *butleri*, *mexicana*, *sulphuraria*, and *elegans* in having tricuspid instead of unicuspid inner teeth, and from *sphenops* in the pre-orbital which is free in the latter but not in *hispaniolana*. Also, the anterior margin of ray 5a of gonopodium facing the distal spines of ray 4p are smooth in *hispaniolana* and serrate in *sphenops*. Other differences are the posterior margin of ray 3 of gonopodium which is serrate in *hispaniolana* and smooth in *caucana*, and the membranous hook at tip of that ray which is present in *hispaniolana* and absent in *elegans*. In *hispaniolana*, the number of dorsal rays is 8, rarely 7 or 9 and usually 9 in *elegans*. Also, in *hispaniolana* the membranous swelling of ray 3 forms a free flap and hood, but not in *elegans*.

Poecilia hispaniolana is more closely related to *P. dominicensis* than to any other species of the subgenus *Poecilia*. Both species differ from others of that subgenus in the same characters given above to separate *P. hispaniolana*. Of these 11 characters shared by *P. hispaniolana* and *P. dominicensis*, the most important is the structure of the subdistal segments of ray 3 of the gonopodium. The processes on the anterior margins of these segments are broadly T-shaped and bifurcate in *P. hispaniolana* and *P. dominicensis* whereas in all the other species of the subgenus *Poecilia* these processes are spinelike and retrorse. Both species occur together in several localities and their ranges are partly sympatric. At least in one locality *hispaniolana* occurs together with *dominicensis* and *elegans*. Males and females of *hispaniolana* and *dominicensis* are so similar in appearance that the presence of two species was not detected in the field

while collecting in the localities where either species occurs alone, or where both species are now known to occur together. This may be the reason why *hispaniolana* has been confused with *dominicensis* plus the fact that *dominicensis* was previously known only from the three female types. In spite of their very similar appearance and close relationship however, *hispaniolana* and *dominicensis* differ in several characters as shown in the following key.

1a.- Gonopodium not reaching to vertical from end of dorsal base. Free flap of subterminal membranous swelling of ray 3 much longer than width of gonopodium at insertion of flap (Fig. 2A) reaching to, or beyond the most distal serra of ray 4p. Ray 4p serrae 7 to 11, usually 9. Segments distal to ray 4p serrae 9 to 12, usually 10. Second pelvic ray of male expanded medially, forming a bulbous process on its outer margin. Caudal fin truncate or slightly convex, its upper and lower posterior corners angulate. Pectoral rays 14 to 16, usually 15 or 16. Branched caudal rays 13 to 16, usually 14. Lateral scales 27 to 30, usually 28. In fast water with bottom composed of rock, stones, or gravel.

Poecilia hispaniolana, new species
1b.- Gonopodium reaching to, or beyond vertical from end of dorsal base. Free flap of subterminal membranous swelling of ray 3 much shorter than width of gonopodium at insertion of flap (Fig. 2B) not reaching to the most distal serra of ray 4p. Ray 4p serrae 8 to 11, usually 10. Segments distal to ray 4p serrae 7 to 10, usually 8. Second pelvic ray of male not expanded medially, not forming a

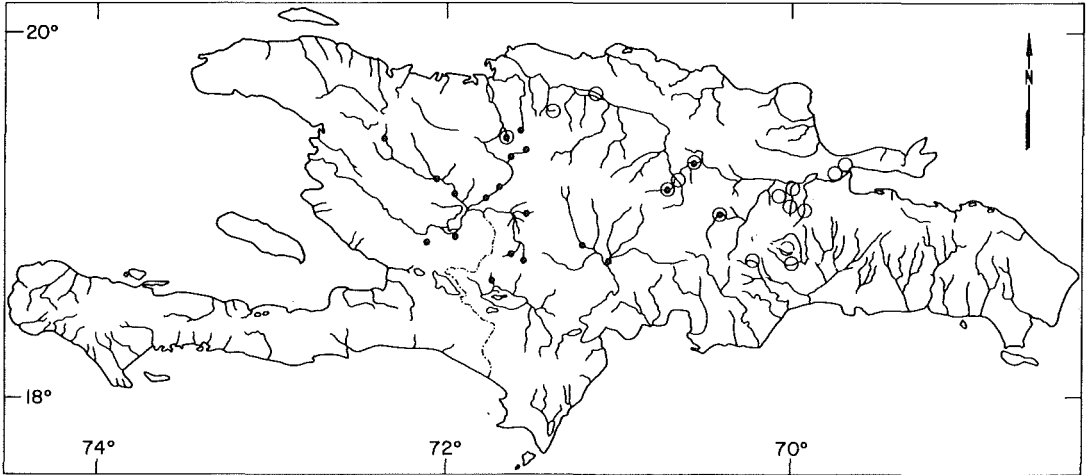


Figure 3. Geographical distribution of *Poecilia hispaniolana* (solid circles) and *P. dominicensis* (open circles) according to 1949 and 1951 locality records by Rivas and recent records by Richard Franz and Fred G. Thompson. Solid circles inside open circles indicate localities where both species occur together.

bulbous process on its outer margin. Caudal fin convex, its upper and lower posterior corners rounded. Pectoral rays 13 or 14, usually 14. Branched caudal rays 14 to 18, usually 16. Lateral scales 26 to 28, usually 27. In sluggish water with bottom composed of sand or mud.

Poecilia dominicensis (Evermann and Clark, 1906)

There is no doubt that *hispaniolana* and *dominicensis* constitute distinct, reproductively isolated genetic entities, each representing a valid species. This is well demonstrated by the fact that, where the two species occur together, they show greater divergence and less individual variation. This phenomenon, known as "character displacement," will be the subject of a separate study.

Distribution, poeciliid associations, and ecology. - The range of *P. hispaniolana* is apparently confined to the highland streams of central Hispaniola (Fig. 3). This region is sharply separated from the southwestern highlands by the Cul-de-Sac Plain (mostly below sea level) which extends from Port-au-Prince Bay,

Haiti eastward to Neiba Bay, Dominican Republic. Many localities were visited throughout the southwestern highlands and the Cul-de-Sac lowlands and although several species of poeciliids were collected there, no species of *Poecilia* were obtained.

Based on the many localities collected throughout the central highlands, the known range of *hispaniolana* extends, on the north slope, from the upper Trois Rivières and Artibonite systems of northwestern Haiti to the upper Río Yuna system of northern Dominican Republic. On the south slope, the known range extends from a small stream emptying into the northwest corner of Lake Enriquillo, in southwestern Dominican Republic, to the upper Río Yaque del Sur system. The westernmost locality on the south slope is a recent addition to those visited by me in 1949. This new record was recently obtained by Richard Franz and Fred G. Thompson, of the Florida State Museum, who kindly made it available to me (*in litt*).

As shown on the map, *hispaniolana* occurs with *dominicensis* in four locali-

ties, all of which are on the north slope. Only at two localities in the Rio Yaque del Norte at Jarabacoa and in the Rio Yuna was *hispaniolana* found to occur with *elegans*, in addition to *dominicensis*. In the Rio Yuna, a species of *Limia* was also found to occur with these three species of *Poecilia*. In several localities, however, especially in the western section of its range, the only poeciliid found to occur was *hispaniolana* and, in a few others, it occurred with only one of two species of *Limia*.

The known altitudinal distribution of *hispaniolana* ranges from 91 to 732 m (300 to 2,400 ft.) with a mean of 422 m (1,384 ft.). At these elevations, shallow riffles and rapids over rock, stone, or gravel bottom, alternate with deeper, sluggish pools with sandy or muddy bottom. According to my field observations, *hispaniolana* prefers the riffles over hard bottoms. This species occurs at a much higher elevation than *dominicensis*.

Material examined. - In addition to the type material described above, I have examined the material reported by Myers (1935) as *dominicensis*, from St. Michel de l'Atalaye, Haiti (USNM 88884, 100286, and 100287). I have not examined the material in the Florida State Museum recently collected by Richard Franz and Fred G. Thompson. I have verified (*in litt.*), however, their identification of this species in their collections, from a drawing of the gonopodium.

Poecilia dominicensis
(Evermann and Clark)

Figs. 1 (C, D), 2 (B), and 3

Platypoecilus dominicensis Evermann and Clark, 1906: 852 (original description; stream in San Francisco Mountains, Dominican Republic), 853 (compared to *Platypoecilus*=*Limia*

perugiæ; description of eggs), fig. 2 (female holotype). Regan, 1913: 1015 (erroneously synonymized without comment with *Limia dominicensis*). Myers, 1931: 2 (not a synonym of *Limia dominicensis*, transferred to genus *Mollienisia*; distribution; Rio Camu in part).

Limia caudofasciata (misidentification, not of Regan), Nichols and Myers, 1923: 2 (in part?).

Mollienisia dominicensis, Myers, 1935: 310 (name, original reference, and synonymy only; diagnosis excluded), 311 (name only as type species of the subgenus *Psychropoecilia*; name erroneously applied to species described; male and female figures excluded; comments), 312 (holotype only, all other USNM material excluded).

Mollienisia (Psychropoecilia) dominicensis, Trewavas, 1948: 410 (synonymy in part; reference to Myers, 1935, only as to name; his diagnosis, figures, and USNM material excluded, except holotype). Rivas and Myers, 1950: 289 (gonopodium compared with *Curtipenis*).

Limia noblei (*nomen nudum*, authorship attributed to G. S. Myers), Rosen and Gordon, 1953: 30, fig. 37 (drawing of tip of gonopodium), 35 (system of nerve fibers of gonopodium).

Poecilia montana Rosen and Bailey, 1963: 48 (new name; synonymy and references in part; renaming of *dominicensis* Evermann and Clark, 1906 a junior homonym of *dominicensis* Valenciennes, 1846 because of consolidation of *Limia* with *Poecilia*; holotype of *dominicensis* E. and C. becomes holotype of *montana*; material; range).

Synonymy. - Most of the above synonymy is self-explanatory and the

majority of items have been discussed above in the section on taxonomic history and under the synonymy of *hispaniolana*. The name *noblei*, however, requires clarification. This name appears twice in a paper on the functional anatomy and evolution of male genitalia in poeciliid fishes by Rosen and Gordon (1953). There is no reference to that study to the original publication or date of the name *noblei* and no description, diagnosis, or mention of where that nominal species occurs, museum material, etc. On page 30, "*Limia noblei* Myers" is simply given in the caption of fig. 37 (C) as referring to the drawing of the tip of a gonopodium, with no other comment. On page 35, the name *Limia noblei* is listed, without Myers appended to it, with several other species sharing a system of gonopodial nerve fibers. Shortly after the publication of Rosen and Gordon's study, I contacted Dr. Myers (*in litt.*) seeking an explanation for the name *noblei*. He promptly replied (*in litt.*) that *Limia noblei* was a manuscript, label name that he had put in some museum jars containing "Noble's *Mollienesia dominicensis*" from Central Dominican Republic and that he had never published it. He also implied that he did not intend to publish the name. As of this writing (August 7, 1978), the name has not been formally published by Myers or by anyone else. According to the International Code of Zoological Nomenclature the name *noblei* is, therefore, a *nomen nudum* because it fails to satisfy the conditions of Article 13a. The gonopodium figured as *Limia noblei* by Rosen and Gordon, however, can be identified as that of *Poecilia dominicensis* by the small size of the free flap of the membranous swelling, by the number of ray 4p serrae (10), and by the number of

segments distal to ray 4p serrae (8).

Types. - The holotype (USNM 53277) is an adult female 38.7 mm SL collected by August Busck in a small stream in the San Francisco Mountains, "some 40 miles from Santo Domingo City," Dominican Republic, September, 1905. The paratypes, collected with the holotype, comprise two adult females 34.5 mm (USNM 126137) and 29.0 mm SL (CAS-SU 9350). The type locality described above is a small creek tributary to Rio Haina near Villa Altagracia, just off the road from Santo Domingo. A series of topotypes (USNM 218722) was collected by me on that locality on April 24, 1949. This material comprises 26 juveniles and undeveloped males 19.5-26.2 mm, 13 adult males 21.4-25.4 mm, and 59 adult females 24.8-43.0 mm.

Name. - This species was named after Santo Domingo, better known today as the Dominican Republic.

Gonopodial characters. - Terminal segments of ray 3, without inner processes, 10-14, usually 12. Ray 4p serrae 8-11, usually 10. Segments distal to 4p serrae 7-10, usually 8. Free flap of membranous swelling of ray 3 much shorter than width of gonopodium at insertion of flap (Fig. 2B), not reaching to the most distal serrae of ray 4p. Processes on anterior margin of subterminal segments of ray 3 broadly T-shaped, somewhat bifurcate. Subterminal segments of ray 4a smooth. A membranous hook at tip of ray 3 and bony hook at tip of ray 5p. Anterior margin of ray 5a facing distal spines of ray 4p smooth.

Meristic characters. - Dorsal rays 8(8, rarely 7 or 9). Anal rays 9(9). rays 13 or 14, usually 14. Branched caudal rays 14-18, usually 16. Lateral scales 26-28, usually 27. Scales around caudal peduncle 16. The holotype has

8 dorsal rays, 9 anal rays, 14 pectoral rays, 27 lateral scales, and 16 scales around the caudal peduncle; the caudal fin and the branched rays could not be counted.

Morphological characters. - Preorbital not free, the skin covering it not folded under its ventral edge. Preorbital canal closed, with 4 pores. Anterior supra-orbital canal closed, with 3, rarely 2 pores. Posterior supraorbital canal closed below, with 2 pores, opening above into a U-shaped, open pit. Mandibular canal an open U-shaped groove across mandible. Preopercular canal closed, with 7 pores.

Outer teeth in both jaws uniserial, forming a weak arc on each side of symphysis, close-set, movable, curved inward and away from symphysis, narrowly spatulate, slightly tapering toward the base, bluntly pointed. Inner teeth in both jaws movable, tricuspid, much smaller than teeth of outer row, uniserial and regularly arranged or irregularly arranged and forming a band several teeth wide on each side of symphysis. Upper and lower jaws weakly united at symphysis.

Second pelvic ray of males not expanded medially, not forming a bulbous process on its outer margin. Gonopodium reaching to, or beyond vertical from end of dorsal base.

Predorsal contour nearly straight or slightly convex longitudinally in males, convex, but not strongly, in females; transversely convex in both sexes. Body axis straight, the axis of caudal peduncle not forming an angle with axis of anterior portion of body. Origin of dorsal fin slightly behind mid-length of gonopodium in males, above origin of anal in females, much nearer to upper end of opercle than to middle of caudal base in males, about midway

between upper end of opercle and middle of caudal base in females. Origin of anal fin about midway between upper end of opercle and middle of caudal base, or nearer to middle of caudal base in females. Caudal fin convex, about as long as wide in males, wider than long in females, its upper and lower posterior corners rounded.

Coloration. - After original fixation in 10% formalin and 27 to 29 years in 60% ethanol the color pattern is as follows.

Ground color yellowish-brown on back and upper sides becoming lighter, more or less abruptly, on lower sides and ventral region. Darker margins of scale pockets producing a reticulate pattern on back and upper sides. Nape dark brown, the dark pigment extending as a middorsal streak to origin of dorsal fin. Sides of body in males with 6 to 9 thick, dark crossbars, narrower than the interspaces; crossbars also present, but thicker, in juveniles and young females; present or absent in adult females. Dorsal fin margined with melanophores, the dark margin more conspicuous in males, faint or absent in females; a conspicuous, dark blotch on last four rays. Pectoral, pelvic, anal, and caudal fins colorless, sometimes a faint, transverse row of dark spots on caudal fin of males.

Size. - The largest male measures 27 mm SL and the largest female 52 mm. On the average, males are about half as large as females.

Relationship. - This species differs from all the others of the subgenus *Poecilia*, except *hispaniolana*, in the same characters already given above for the latter. The relationships and differences between *dominicensis* and *hispaniolana* have also been discussed under the latter.

Distribution, poeciliid associations,

and ecology. - As is the case with *hispaniolana*, the range of *dominicensis* is apparently confined to the highland streams of Central Hispaniola (Fig. 3). As already explained in more detail under *hispaniolana*, this region is separated from the southwestern highlands by the Cul-de-Sac Plain.

Based on the many localities collected throughout the central highlands, the known range of *dominicensis* extends, on the north slope, from the Rio Massacre, which forms part of the boundary between Haiti and the Dominican Republic, to the lower Rio Yuna system of northern Dominican Republic. On the south slope, the known range appears to be confined to the closely adjacent systems of the Rio Haina and the Rio Ozama. The six easternmost localities on the north slope (Rio Yuna) and the two easternmost (Rio Ozama) localities on the south slope are recent additions to those visited by me in 1949. These new records were recently obtained by Richard Franz and Fred. G. Thompson, of the Florida State Museum.

As already indicated, *Poecilia dominicensis* occurs with *P. hispaniolana* in four localities, all of which are on the north slope (Fig. 3). Only at two localities was *P. dominicensis* found to occur with *P. elegans* in addition to *P. hispaniolana*. In the Rio Yuna, a species of *Limia* was also found to occur with these three species of *Poecilia*. In several localities, however, *dominicensis* occurred with only one of two species of *Limia* and in one locality, only with *elegans*.

The known altitudinal distribution of *dominicensis* ranges from nearly sea level to about 580 m (1,900 ft.). According to my field observations, *dominicensis* prefers sluggish water over sandy

or muddy bottom. This species occurs at much lower elevations than *hispaniolana*.

Material examined. - In addition to the holotype, paratypes, and topotypes described above I have examined the following lots from seven localities. Rio Massacre at Loma de Cabrera, Prov. Libertador, Dominican Republic, 9 undeveloped males 20.8-25.0 mm, 9 adult males 22.0-25.0 mm, and 30 adult females 25.5-42.0 mm, collected by Luis R. Rivas and Burton P. Hunt, April 22, 1949 (MCZ 54058). Rio Tomines at Santiago Rodriguez, Prov. of Monte Cristi, D. R., 268 juveniles and undeveloped males 11.3-25.5 mm, 42 adult males 22.0-25.5 mm, and 51 adult females 24.2-39.0 mm, L. R. R. and B. P. H., April 23, 1949 (USNM 218718). Rio Yaque del Norte at bridge of road between Valverde and Guayacanes, Prov. Santiago, D. R., one adult female 27.5 mm, L. R. R. and B. P. H., April 23, 1949 (USNM 218719). Rio Yaque del Norte at Jarabacoa, Prov. La Vega, D. R., 20 juveniles and undeveloped males 15.6-28.5 mm, 11 adult males 21.0-26.0 mm, and 22 adult females 26.3-46.5 mm, L. R. R. and B. P. H., April 24, 1949 (UMMZ 200219). Rio Jimenoa at road between Jarabacoa and La Vega, Prov. La Vega D. R., 8 undeveloped males 18.5-25.5 mm, 2 adult males 20.2-21.0 mm, and 11 adult females 22.8-30.0 mm, L. R. R. and B. P. H., April 24, 1949 (USNM 218720). Rio Camu 9 km west of La Vega, Prov. La Vega, D. R., 4 undeveloped males 23.6-45.3 mm, 9 adult males 23.5-27.0 mm, and 22 adult females 33.0-52.0 mm, L. R. R. and B. P. H., April 24, 1949 (FSM 25276). Rio Yuna at road north of Monsenor Noel, Prov. La Vega, D. R., 66 juveniles and undeveloped males 16.7-26.2 mm, 22 adult males

22.0-26.0 mm, and 37 adult females 28.3-47.0 mm, L. R. R. and B. P. H., April 24, 1949 (USNM 218721).

I have not examined the material in the Florida State Museum recently collected by Richard Franz and Fred G. Thompson. I have verified (*in litt.*), however, their identification of this species in their collections from a drawing of the gonopodium.

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