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# AN AMERICAN CYPRINODONT IN PHILIPPINE SALT PONDS

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## THREE PLATES

*Mollienisia latipinna* Le Sueur is a small cyprinodont fish native to the coastal region of the southern United States. It occurs from Virginia to northern Mexico and is very abundant in lowland streams and swamps. It often enters salt-water bays and inlets and is common in the shallow water about ports of the southern Atlantic and Gulf States. Le Sueur's type specimen came from New Orleans.

It was, therefore, a matter of great interest to discover that this little fish, belonging to a family confined to America, occurs in vast numbers in some of the salt-water fishponds and salt ponds around Manila Bay.

In the spring of 1927, while I was engaged in an exhaustive survey of the bañgos ponds along the shore of Manila Bay, a small cyprinodont fish was discovered in certain localities. The fish was very well known to the caretakers of the ponds and was called "bubuntis" by them. Bubuntis is a Tagalog word meaning pregnant and is applied to this fish because of its large belly.

At first I supposed that bubuntis was new to science, but comparison with specimens of *Mollienisia latipinna* from Savannah, Georgia, showed their identity. Bubuntis is, therefore, a fish accidentally naturalized in a new locality halfway round the world from its natural habitat.

The most noticeable thing about the life of bubuntis in the Philippines is its remarkable toleration for salt. In the salt works it is rare in ponds filled with water fresh from the bay, with a salinity as low as 3.1 to 3.2 per cent, but is abundant in those with a salinity of 3.5 per cent. It continues to be abundant in salt ponds until the salinity increases to 6.3 per cent. When evaporation has brought the salinity up to 6.7 per cent bubuntis becomes very abundant, and continues to be so until the water of the ponds attains a salinity of 8.7 per cent.

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This, however, seems to be near its limit of tolerance, for in ponds with a salinity of 9.4 per cent it has entirely disappeared. All other kinds of fish occurring in the salt ponds disappeared while *bubuntis* were still very numerous and lively.

In the Philippines *bubuntis* is thus far known only from the salt-water ponds maintained for the culture of *bañgos* (*Chanos chanos* Forskål), the salt-water creeks supplying them with fresh water from Manila Bay, and the ponds of salt works, situated only along the shore of Manila Bay, Luzon.

In 1905, Mr. Alvin Seale was commissioned by the Hawaiian Government to go to the United States and obtain fish feeding upon mosquito larvæ, these fish to be used in the antimalarial campaign then in progress in the Hawaiian Islands. At Seabrook, Texas, Mr. Seale obtained a quantity of *Gambusia affinis* and some specimens of *Mollienisia latipinna*. These he succeeded in transporting to Honolulu, where they were placed in ponds, streams, and irrigation ditches. Here they found conditions just as congenial as in their native habitat. *Gambusia* proved to be wonderfully efficacious in devouring mosquito larvæ, but *Mollienisia* was of no practical utility for this purpose.

In 1913 while returning to Manila from the United States, Mr. Seale took twenty-four specimens of *Gambusia affinis* from Honolulu to the Philippines. Here they reproduced as rapidly and were just as valuable in destroying mosquito larvæ as in the Hawaiian Islands.

In 1914, the Director of the Bureau of Science sent to Honolulu for a shipment of *Gambusia*. A barrel of small fish was sent, but when the shipment arrived the fishes were found to be nearly all *Mollienisia*. These fish were placed in aquarium tanks, and Mr. Seale gave orders that they were not to be distributed with mosquito fish.

Apparently this order was disregarded after Mr. Seale left the Philippines in 1916. As a result *Mollienisia*, or *bubuntis*, now occurs in such abundance in some of the fishponds as to be a serious detriment to their success. This is especially true in the nursery ponds, since *bubuntis* there devour the food that *bañgos* fry feed upon, thus cutting down their food supply.

*Bubuntis* feed upon the algal complex that covers the bottom of nursery ponds. This layer, known as "cream of the mud" and called "lab-lab" by the Tagalogs, is composed of a mat of blue-green algæ with which are mingled diatoms, desmids, some fine filamentous green algæ, and quantities of protozoans and other microscopic animals. *Bubuntis* also eat the common green

filamentous algæ, the "frog spittle," or "lumut," of the fishponds, to a limited extent. The position of the mouth and the character of the teeth indicate that very small insects and insect larvæ must form a portion of their diet. I have examined microscopically the digestive tracts of many specimens and found them to contain large quantities of mud, mineral crystals, bits of filamentous algæ, unicellular algæ, and minute crustaceans or parts of them.

Bubuntis is one of the very few fishes not eaten by Filipinos, the reason being that the flesh is bitter.

### POECILIDÆ

The statement made by most authors that in the Poecilidæ the dorsal fin begins in the caudal half of the body should be modified. In *Mollienisia* the dorsal fin begins in the middle or more often in the anterior half of the body, usually nearer the tip of the snout than the base of the caudal.

#### Genus MOLLIENISIA Le Sueur

*Mollienisia* LE SUEUR, Journ. Acad. Nat. Sci. Philadelphia 2 (1821)  
3, pl. 3.

This genus is composed of small, viviparous, laterally compressed fishes, the females deeper bodied than the males; the depressed head flattened above, with a wide, blunt snout and very short mandible, its bones not united, the dentary movable; the vertical mouth protractile, the chin projecting; an outer row of very small, slender, pointed, curved teeth in each jaw; within and separated from the outer row by an interspace a double row of smaller teeth; upper and lower pharyngeals covered with minute, curved, pointed teeth; dorsal elevated in the male, of twelve or more rays, anal behind the dorsal and modified in the male to serve as an intromittent organ; ventral of six rays; caudal bluntly rounded, caudal peduncle deep; pectorals inserted on lower half of body; scales large, cycloid, covering the entire body except lips and preorbital; no lateral line; intestine much coiled, five or six times the total length, the anus posterior; gill opening broad, gill membranes free from isthmus; no pseudobranchiæ; branchiostegals 5 or 6.

Small fishes of fresh, brackish, and salt water, from Virginia to Central America.

#### MOLLIENISIA LATIPINNA Le Sueur.

*Mollienisia latipinna* LE SUEUR, Journ. Acad. Nat. Sci. Phila. 2 (1821)  
3, pl. 3; GUNTHER, Cat. Fishes Brit. Mus. 6 (1866) 348; JORDAN

and EVERMANN, Fishes N. and M. Am. 1 (1896) 699; GARMAN, Mem. Mus. Comp. Zool. 19 (1895) 50, pl. 5, fig. 1; pl. 8, fig. 12; pl. 12.

*Poecilia multilineata* LE SUEUR, Journ. Acad. Nat. Sci. Phila. 2 (1821) 4, pl. 1.

*Poecilia lineolata* GIRARD, U. S. Mexican Boundary Surv., Ichthyology (1858) 70, pl. 35, figs. 9-11.

*Limia poeciloides* GIRARD, U. S. Mexican Boundary Surv., Ichthyology (1858) 70, pl. 38, figs. 8-14.

*Limia matamorensis* GIRARD, Proc. Acad. Sci. Phila. (1859) 116.

Tagalog name, bubuntis.

Dorsal II-10, or 11; anal III-6 in female; anal in male II+4 + 3, the middle rays much enlarged and modified to serve as an intromittent organ; scales 25 in longitudinal series, 9 or 10 in transverse series; predorsal scales 13 in female, 10 or 11 in male; branchiostegals 6 (Garman, and Jordan and Evermann give 5).

Head and body strongly compressed in male, depth 3 to 3.5 in length, not including caudal fin; the female has a large and often protuberant belly and the anterior half of the body somewhat thicker than in the male, depth 2.5 to 3 in length in female; caudal fin not included; dorsal outline arched, descending from dorsal to tip of snout in a straight or nearly straight line, head and nape broad and flat above, snout depressed and very broad; anterior dorsal and ventral profiles nearly equal, converging in straight lines at tip of chin; head 3.3 to 3.6 in length in female, 3.6 to 4 in male; interorbital 1.85 to 2.2, width of tip of snout 2.75 to 2.85 in head; eye 3.4 to 3.5 in head in female, 3.1 to 3.3 in male; snout equals or may slightly exceed eye in the female; in the male snout may equal eye but is usually shorter, 3.3 to 4 in head; mouth vertical or nearly so, upper jaw with about forty, minute, laterally inclined teeth in a curved row, which is indented at the middle; at a little distance behind is a band of two rows of very minute teeth, divided into two parts by a central toothless portion, as shown in Plate 2; the lower jaw has a row of about sixty teeth like those above, arranged in two curves with a strongly marked incurved central loop; behind this and separated by a toothless space is a double row of very minute teeth as in the upper jaw, also divided into a right and a left half; three large pores on lower margin of preopercle and four on its posterior margin; scales on top of head larger than those elsewhere; origin of dorsal above pectoral, far in advance of anal and above or in front of ventrals; origin of dorsal sometimes at posterior end of first third of body in males and always well forward in the anterior half; in females it

never begins so far forward and sometimes is midway between tip of snout and base of dorsal; in females the longest dorsal ray is 2 or 2.2 times in head, the posterior rays little if any elongated; in males the dorsal is much more developed, first dorsal spine 2 in head, the rays longer, posterior rays successively elongated, the next to the last one longest, equal to head or to depth; least depth of caudal peduncle about 1.2 or 1.4 times in head; caudal broadly rounded, equal or nearly equal to head; pectoral a little shorter than caudal; in females origin of anal beneath posterior part of dorsal, opposite eleventh scale in the longitudinal series, and far behind pectoral; in males its origin is beneath anterior part of dorsal, beneath posterior half of pectoral and opposite eighth scale in the longitudinal series; origin of anal seven scales behind that of ventrals in females, four scales in males; anal shorter in females than in males, its base tumid and elevated in males, the longest modified ray in males 0.7 or 0.8 of length of head; six ventral rays, but apparently only five in males, second and third rays fused and elongate; the elongate modified ventral ray in males extends over half of anal; about 1.4 times in head; ventral shorter in females, more than twice in head; an enlarged scale covers the angle between the two ventrals; gill rakers 24 on outer arch, 28 on inner arch; peritoneum shining black.

Color silvery to brownish, dusky above, belly yellowish or whitish; some specimens have more or less yellow below dorsal and behind eyes, and also on caudal peduncle; opercle bright silver in females, dark in males; each scale with a black or yellow spot, except on breast and belly, these forming seven to nine longitudinal rows; males with eight vertical bluish dusky bars, the posterior ones often disappearing; rarely they are present on females; dorsal with three or four longitudinal or diagonal rows of circular black spots, and in males with an orange margin; caudal gray in females; caudal orange in males, with a broad black margin and several partial crossbars of blackish spots; other fins colorless or like body.

Here described from a study of 774 specimens, 13 to 48 millimeters in length, obtained from fishponds and salt ponds near Obando, Bulacan Province, Luzon, where this fish is exceedingly abundant. I also have 168 specimens from a salt-water creek at Malolos and a few from fishponds near Malabon. In the catching ponds of bañgos fishpond systems in the above-mentioned localities I have seen many tens of thousands of bubuntis in a single great shoal. From such a mass at least five thousand may

be scooped up in one stroke of a large long-handled dipnet. It is easy to see how harmful these defenseless little fishes really are to the financial well being of the fishpond owners, and how difficult it is for the young bañgos fry to get their living under the fierce competition with swarms of full-grown bubuntis.

Specimens 30 millimeters long are sexually mature. Males rarely reach a length of more than 35 millimeters, and never grow to the size attained ordinarily by females. Collections made during the latter part of May contained many females full of eggs, which had an average diameter of 2 millimeters. The number of eggs is variable, even in fishes of the same size. A specimen 42 millimeters long contained 75 eggs; one 46 millimeters long had 64 eggs, and another 44 millimeters in length had only 55 eggs. A few specimens had embryos nearly ready for birth; a female 32 millimeters long contained 24 embryos almost mature. The coiled embryos are about 3 millimeters in diameter when nearly ready for delivery. The anal opening in females is separated by a comparatively wide space from the opening of the oviduct, which is at the base of the first anal spine.

## ILLUSTRATIONS

[Drawings by Pablo Bravo.]

### PLATE 1. MOLLINISIA LATIPINNA LE SUEUR; $\times$ 4

#### PLATE 2. MOLLINISIA LATIPINNA LE SUEUR

- FIG. 1. Teeth of upper jaw.  
2. Teeth of lower jaw.  
3. Upper pharyngeal teeth.  
4. Lower pharyngeal teeth.  
5. Ventrals of male.  
6. Anal of male, enlarged.  
7. Anal, greatly enlarged.  
8. Male, dorsal aspect of head.

#### PLATE 3. MOLLINISIA LATIPINNA LE SUEUR

- FIG. 1. Adult female, lateral view;  $\times$  1.5.  
2. Adult female, with eggs;  $\times$  1.5.  
3. Adult female, with embryos ready to deliver.  
4. Female, dorsal aspect of head.  
5. Embryos.

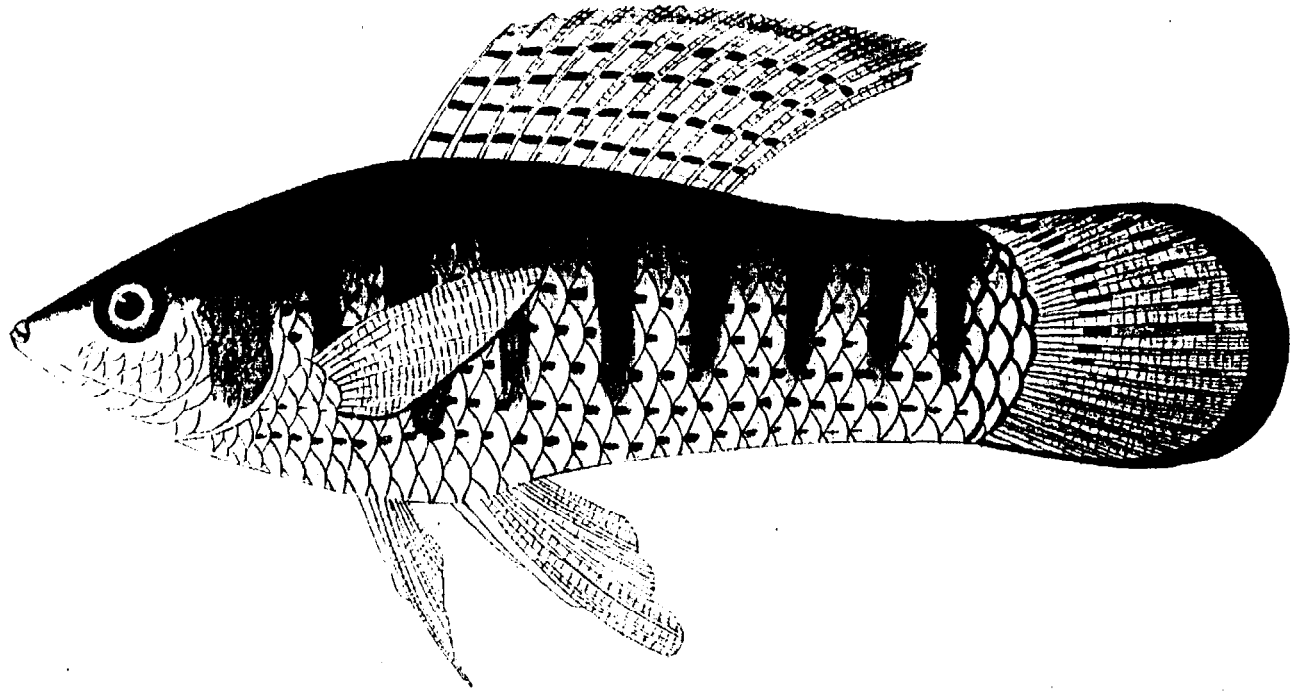


PLATE 1. MOLLINIENISIA LATIPINNA LE SUEUR.



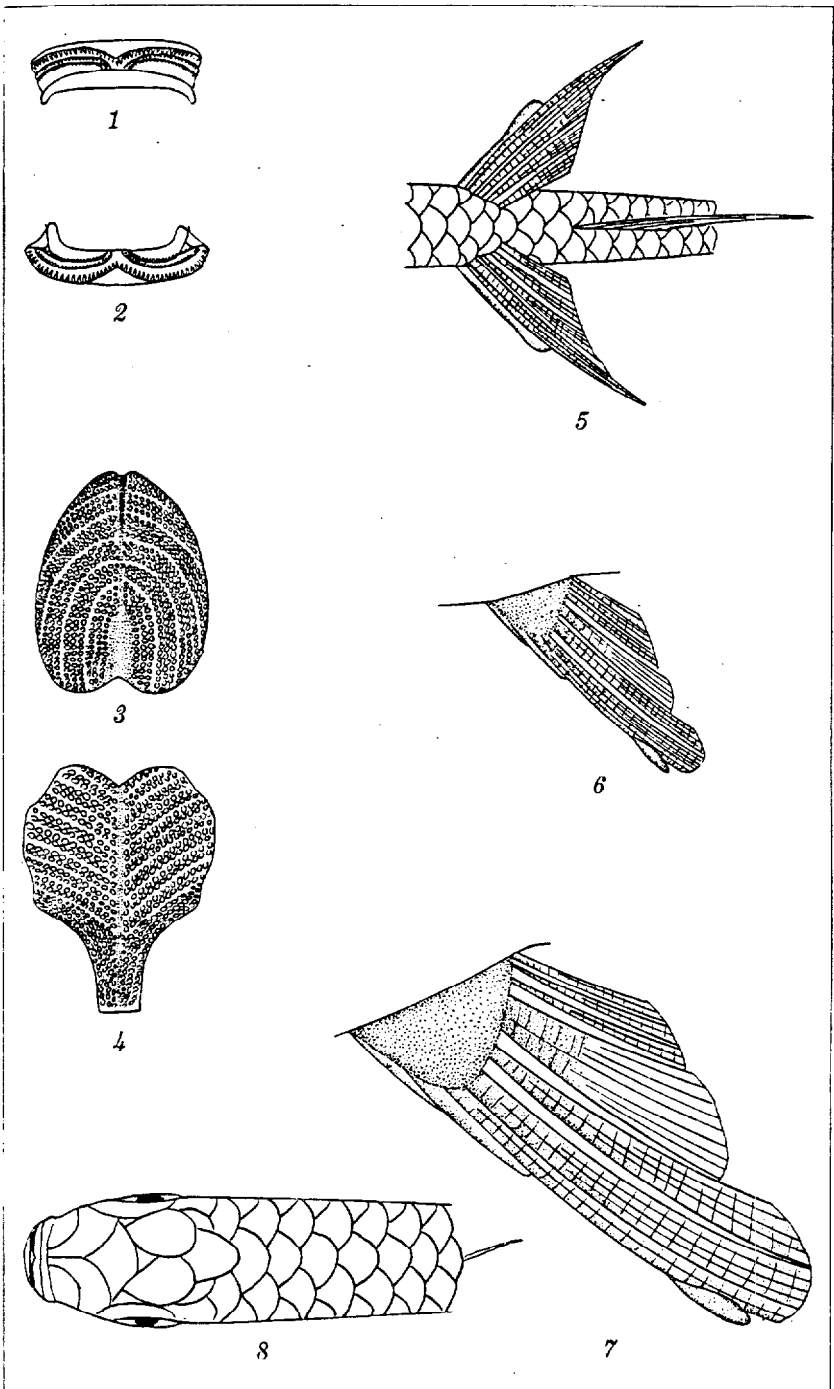


PLATE 2. MOLLINIENIA LATIPINNA LE SUEUR.

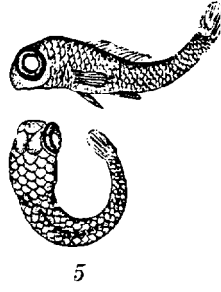
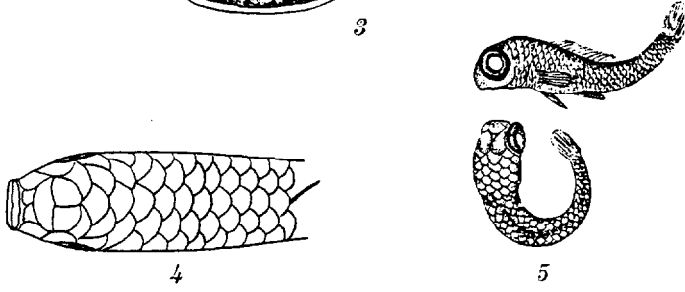
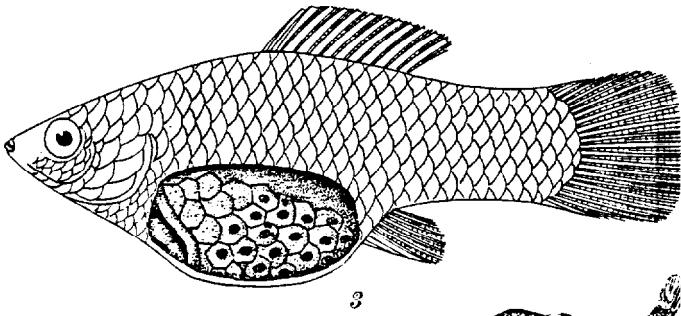
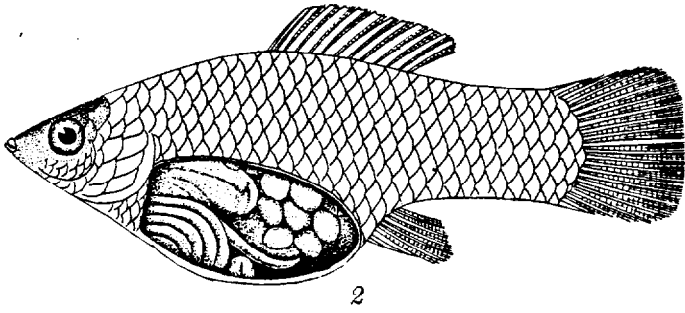
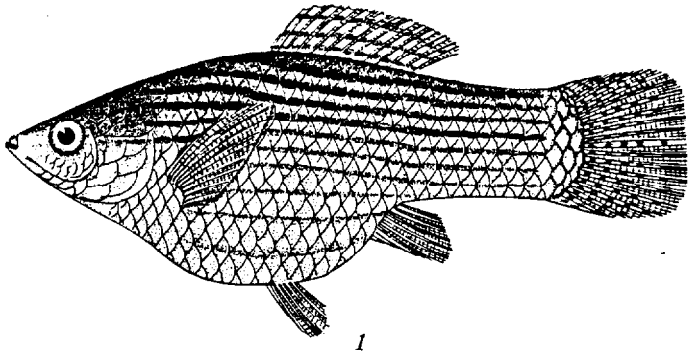


PLATE 3. MOLLINIENIA LATIPINNA LE SUEUR.