

# THE YOUNG OF SOME FISHES OF LUZON<sup>1</sup>

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## THIRTY-FIVE TEXT FIGURES

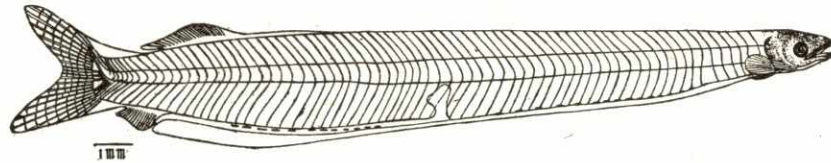
In this paper are given the descriptions of thirty-five post-larval stages of some fishes belonging to the families Elopidae, Chanidae, Cyprinodontidae, Phallostethidae, Hemiramphidae, Exocoetidae, Soleidae, Mugilidae, Apogonidae, Kyphosidae, Serranidae, Theraponidae, Platycephalidae, Scatophagidae, Scaridae, Eleotridae, Gobiidae, Blennidae, Balistidae, Tetraodontidae, and Diodontidae which were mostly collected by the writers in April and May 1949 from northwestern Luzon. A portion of the material from the Bureau of Fisheries, Dagat-dagatan Salt-water Fishery Experimental Station, Malabon, Rizal Province, is also included in this report.

## ELOPIDÆ

*ELOPS HAWAIENSIS* Regan. Ten pounder (bidbid, awa). Text fig. 1.

*Specimen 18 millimeters long.*—The larval ten pounder is transparent, with flattened, narrow and elongate body of 65 to 70 myotomes; depth 7.3 in standard length; head small and undeveloped, 11 in length; snout pointed, 2.6 in head; eyes midlateral, 5 in head; mouth oblique; angle of the maxillary beneath anterior third of the eye diameter. There are 5 branchiostegals on the lower portion of the opercle. The dorsal fin which is near the caudal fin has a trace of the dorsal finfold at the anterior portion and also traces of soft rays in the dorsal fin lobe. The anal fin lobe is small with the beginning of soft rays. Anterior to the vent is the long narrow ventral fin fold which still exists at this stage. The homocercal caudal has 24 rays attached to the upturned urostyle, epurals, and hypurals. The caudal peduncle is as long as narrow and has still the remnants of the dorsal and ventral fin folds. Few pigments are on the head, the ventral sides of the body, and between the myomere segments.

<sup>1</sup> This is the second paper on the juvenile fishes of Luzon. Presented by the Philippine Delegation before the Second Meeting of the Indo-Pacific Fisheries Council held at Cronulla, N. S. W., Australia, April 17-28, 1950. Submitted for publication June 5, 1950.

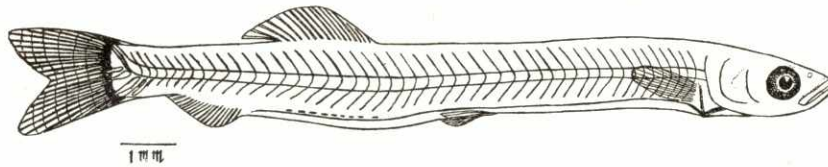
TEXT FIG. 1. *Elops hawaiiensis*. From a specimen 18 mm. long.

Four specimens, 20 to 27 millimeters long, were collected in June 1946 by Mr. Herminio R. Rabanal at the Dagat-dagatan Lagoon, Malabon, Rizal Province, Luzon.

### CHANIDÆ

**CHANOS CHANOS** (Forsk.). Milkfish fry (kawag-kawag, bugui). Text figs 2 and 3.

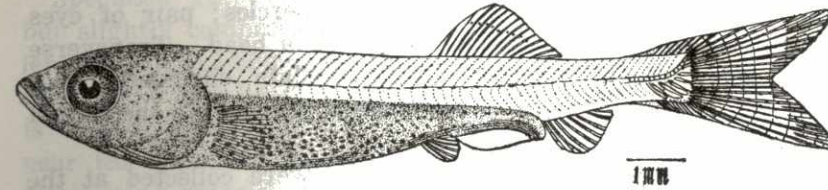
*Specimen 12.5 millimeters long.*—The postlarval fish has well-developed head with oblique mouth, lateral eyes, preopercle and opercles. The elongate and compressed body has undeveloped pelvic, dorsal, and anal fins; the forked caudal has about 20 caudal rays. There are about 53 or more myotomes traversing the midlateral notochord.

TEXT FIG. 2. *Chanos chanos*. From a specimen 12.5 mm. long.

The young fish was included in some of the coral reef juvenile fishes collected at Buraan Tidal Creek, Burgos, Ilocos Norte Province, on May 20, 1949.

*Specimen 13.5 millimeters long.*—The milkfish fry when about one to two weeks old in the nursery ponds are no longer needlelike. Body tapers posteriorly; depth 5.6 in standard length; head pointed and well developed, 3.5 in length; snout long and angular, equals eye diameter which is 3.5 in head. Eyes midlateral; mouth oblique and angle of maxillary not reaching anterior edge of eye socket; opercles broad and round edged, with branchiostegals at their ventral edge. Dorsal XII, anal VI; caudal of 20 rays deeply forked. A narrow remnant of the ventral fin fold is between the pelvic fin and anal fin, just anterior to the cloacal opening. There are no traces of

scales except of fifty-one myomeres and a distinct lateral line along the side of the body. At the base of the caudal fin are the upturned notochord, urostyle, epurals, and hypurals upon which the caudal rays are attached. Abdominal cavity elongate, at the posterior portion of which is the vent. Head and anterior half of the body pigmented with chromatophores.

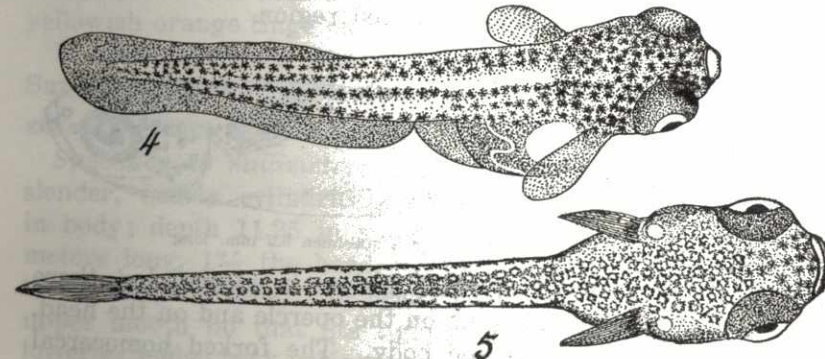
TEXT FIG. 3. *Chanos chanos*. From a specimen 13.5 mm. long.

Several specimens, 12.5 to 24 millimeters long, were collected by Mr. Herminio R. Rabanal in June 1949 from the Dagat-dagatan Lagoon, Malabon, Rizal Province, Luzon.

### CYPRINODONTIDÆ

**APLOCHEILUS LUZONENSIS** Herre and Ablan. Cyprinid (coscosleng). Text figs. 4 and 5.

*Specimen 5 millimeters long.*—Body elongate with an absorbed yolk sac with streaming developing alimentary canal. Head 4.66 in total length, well developed with dorsolateral bulging pair of eyes which are 2.5 in head; mouth small, transverse; teeth wanting; snout narrow. Pectorals well developed, leptocercal caudal still exists as the dorsal fin starts from the middorsal portion of body around the caudal and continues

TEXT FIGS. 4 & 5. *Aplocheilus luzonensis*. From specimens 5 to 7 mm. long.

with a notch to the posterior edge of the yolk. Characteristic pigments on the head and dorsolateral sides of the body are numerous stellate chromatophores which are parallel at the anterior series and posterior parts of the body.

*Specimen 7 millimeters long.*—Body elongate with absence of the continuous fin fold; with a reduced yolk as indicated below the pair of pectorals below the opercles; pair of eyes still undeveloped in the head which is 2.5 in head. Transverse mouth small, snout narrow. Dark stellate chromatophores which are irregular on the head region parallel on the dorsal and sides of the body (fig. 5).

Specimens, 5 to 12 millimeters long, were collected at the Pagsanjan River, Laoag, Ilocos Norte Province, on October 18, 1949.

#### PHALLOSTETHIDÆ

*NEOSTETHUS* sp. Cyprinodont fish. Text fig. 6.

*Specimen 8.5 millimeters long.*—The postlarval cyprinid is laterally compressed in body; depth 5.33 in standard length; head moderate, not sharply pointed, 4 times in length; snout short, 4.5 in head; eyes midlateral and oblique; angle of the maxillary of the jaws on level with the edge of the diameter. The single dorsal of VI spines is nearer the caudal; ventral fin of 16 soft rays originates from the ventral midportion of the entire length of the fish and its base is twice the length of the dorsal base of the dorsal fin. The specific numbers of dorsal and anal fin rays place this specimen under the genus *Neostethus*. Anterior to the anal fin is the female organ, oviduct, and anus below the abdominal region.



TEXT FIG. 6. *Neostethus* sp. From a specimen 8.5 mm. long.

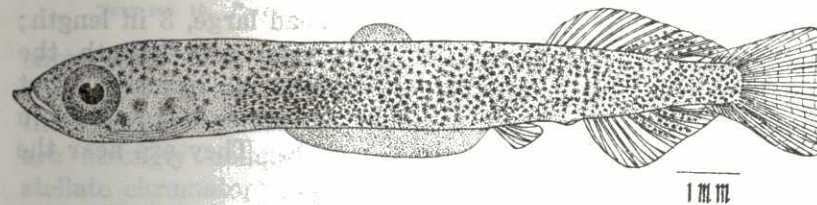
The specimen is pale yellowish brown in alcohol but there are a few stellate pigment spots on the opercle and on the head, and on the dorsal edge of the body. The forked homocercal caudal of 20 rays is equal to the length of the long and narrow peduncle; its membranes are regularly spotted with transverse pigments.

Fourteen specimens, 8.5 to 26 millimeters long, were collected by Mr. Herminio R. Rabanal on July 13, 1949, at the Dagat-dagatan Lagoon, Malabon, Rizal Province, Luzon.

#### HEMIRAMPHIDÆ

*HEMIRAMPHUS* sp. Halfbeak (bugin, barasot, buloy). Text fig. 7.

*Specimen 11 millimeters long.*—Body elongate, cylindrical but slightly compressed; height 7.66 in length. Head 3.66 in length; mouth oblique with a protruding lower jaw, the beginning of the long beak; snout convex, 1.75 in eye diameter which is almost 3 in head length. Dorsal I-11; anal I, 9; both near the truncate caudal fin of 15 principal rays; pelvic fin small, near anterior of anus just behind the narrow but long remnant of the ventral fin fold opposite. At the midportion of the body is a small lunar dorsal fin, a remnant of the fin fold. Pectoral fin narrow, pointed, reaching the anterior level of the embryonic remnant of the dorsal fin fold.



TEXT FIG. 7. *Hemiramphus* sp. From a specimen 11 mm. long.

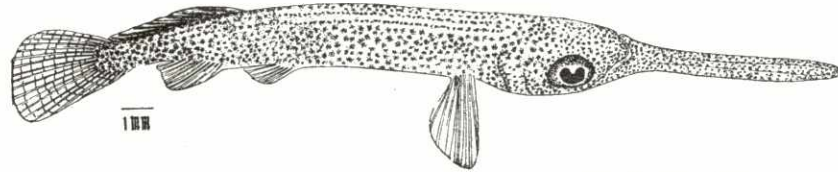
The entire postlarval fish is heavily pigmented with stellate chromatophores on the head, entire body and posterior portions of the dorsal and anal fins. In alcohol the fish is blackish with yellowish orange tinge on body and on the dorsal and anal fins.

The only specimen was collected from Pugus, Cabugao, Ilocos Sur Province, on April 19, 1949.

*ZENARCHOPTERUS* sp. Halfbeaks (bugin, barasot, buloy). Text fig. 8.

*Specimen 20 millimeters long.*—Postlarval halfbeak elongate, slender, nearly cylindrical, slightly and laterally compressed in body; depth 11.25 in standard length; lower beak 6 millimeters long,  $1\frac{2}{3}$  the head. Eyes are lateral, separated by a broad occipital area, 7 in head; mouth oblique with a rounded upper mouth lid that fits tightly on the buccal cavity of the lower extended beak. Head with the lower beak 1.2 in standard length. Dorsal and anal fins near the caudal fin; pelvic fin near the anal fin. Beak, head, and lateral sides of the body covered with pigments of dots and stellate chromatophores.

Color of this specimen is red-orange to brownish black on the dorsal and anal fins.



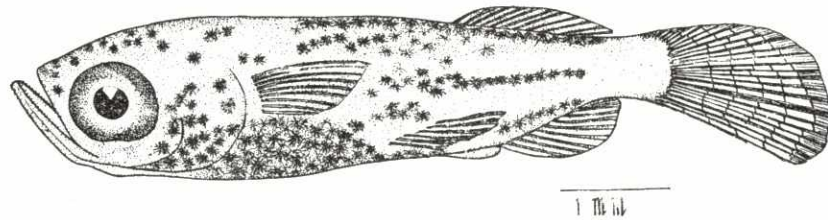
TEXT FIG. 8. *Zenarchopterus* sp. From a specimen 20 mm. long.

Several specimens, 20 to 30 millimeters long, were collected at the Dagat-dagatan Lagoon, Malabon, Rizal Province, in June, 1946.

#### EXOCOETIDÆ

**PAREXOCOETUS BRACHYPTERUS** (Richardson). Flying fish. (bolador, balang).  
Text figs. 9 and 10.

*Specimen 6 millimeters long.*—The larval bolador has a robust body; depth 4 standard length; head large, 3 in length; mouth nearly vertical; angle of the maxillary beneath the anterior third of the eye diameter which is 2.5 in head; snout small, 4.5 in head; the preopercle and opercle rounded in outline without spines. Dorsals X, anal 8. They are near the



TEXT FIG. 9. *Parexocoetus brachypterus*. From a specimen 6 mm. long.

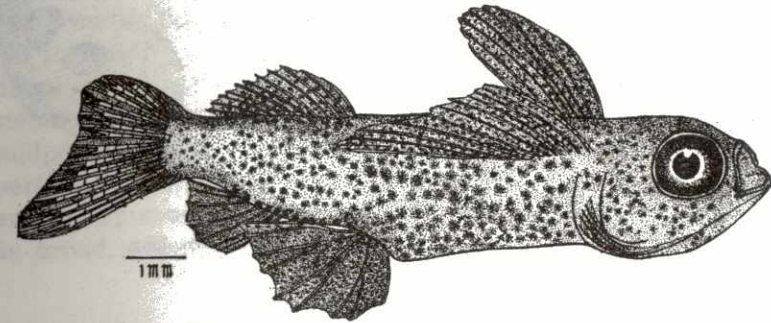
caudal fin of asymmetrical lobe of 24 rays; pectorals with 9 rays and pelvic fin with 6 rays.

At this stage there are no traces of scales. Stellate chromatophores are on the dorsal, midlateral, ventral, and abdominal sides of the body. Such pigments are also sparsely located on top of the head, on the preopercle and opercle.

The specimens preserved in alcohol are yellowish cream with olive brown to blackish pigments on the naked skin of the body.

*Specimen 11 millimeters long.*—Body robust, cylindrical and elongate and has body proportions as in the adult; depth 4.33

in standard length; head small and slightly depressed above; mouth strongly oblique but not decidedly vertical as the 6 millimeters larva; angle of the maxillary a little beyond anterior of eye socket; snout small, 4.5 in eye diameter which is 2.5 in head; preopercle and opercle semirounded in outline; branchiostegals 5. All the fins are well developed; dorsal X, and 6, ventral 5; pectorals 10 and caudal of two unequal lobes, upper



TEXT FIG. 10. *Parexocoetus brachypterus*. From a specimen 11 mm. long.

short lobe of 12 rays and lower long lobe of 12 rays. The three last longest rays of the lower lobe are twice as long as the shortest rays of the upper lobe. The margin of the fins are strongly oblique. Pigmentations are of dark-brownish, stellate chromatophores on the sides, dorsal as well as ventral sides of the body upon a yellowish cream naked background. Stellate chromatophores are on the membranes and spines of the pectoral, dorsal, ventral, and anal fins.

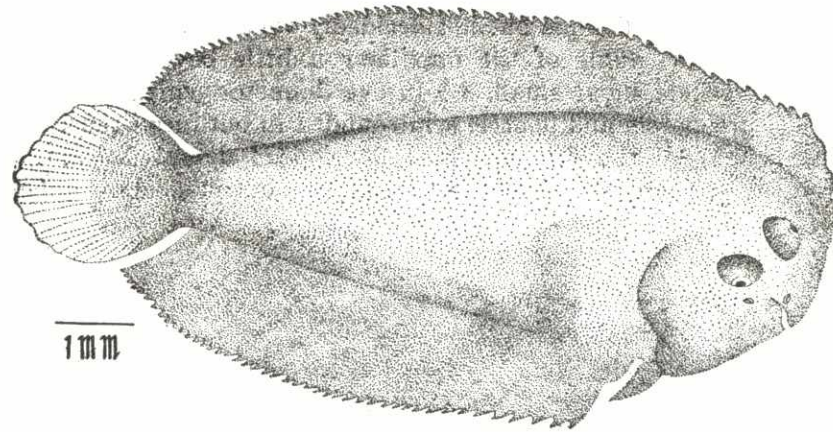
Ten specimens, 6 to 22 millimeters long, were collected at the Dagat-dagatn Lagoon, Malabon, Rizal Province, on July 13, 1949.

#### SOLEIDÆ

**SOLEA HUMILIS** Cantor. Ovate sole (tambiki). Text fig. 11.

*Specimen 8 millimeters long.*—The larval fish is ovate, flattened and compressed in body; depth 2.5 in length; head indistinct, 3.33 in length; mouth hooks down on right lateral side; opercle skin covering distinct. Dorsal fin continuous, with 70 serrations; anal also continuous, with 44 serrations; caudal rounded with 16 rays, separated from dorsal and anal fins by a short caudal peduncle. Lateral line is not very distinct in this stage. Minute brownish dots cover entire head, fins and body on right side; left side colorless or white transparent.

The single tongue fish was collected from Buraan tidal creek, Burgos, Ilocos Norte Province, on May 5, 1949.

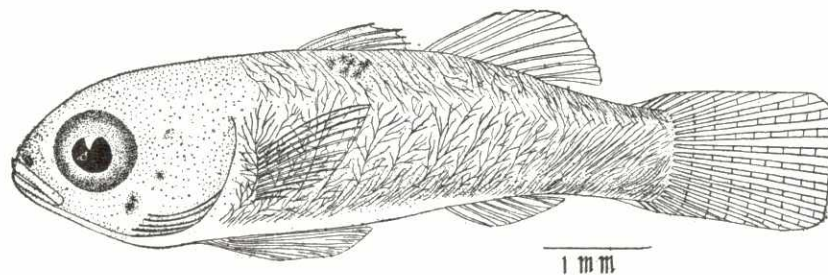


TEXT FIG. 11. *Solea humilis*. From a specimen 8 mm. long.

#### MUGILIDÆ

MUGIL sp. Mullet (banak, liza, talilong, lapes, risec). Text fig. 12.

*Specimen 6.3 millimeters long.*—The body is elongate, cylindrical and slightly compressed, height 3.66 in length, head convex almost 3 in length. Eyes is dorsolateral, 2.6 in head length; mouth slightly oblique, angle of maxillae reaching beneath perpendicular anterior edge of eye. Space between dorsal of opercle broad and convex; branchiostegals 5. Dorsal V, 1-7; anal I, 6. Caudal peduncle is 1.5 as long as broad; caudal fin with 16 rays, truncate; ventral fin terminates on level of longest upper tip of pectoral.



TEXT FIG. 12. *Mugil* sp. From specimen 6.3 mm. long.

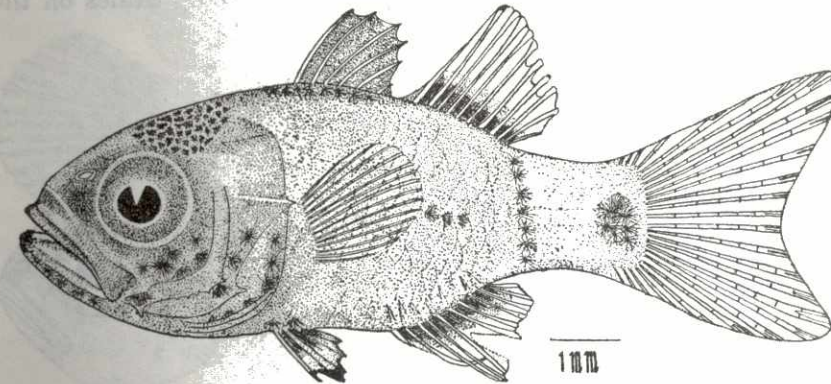
This specimen is naked and also characterized by the presence of epidermal branching blood capillaries on all sides of the body. There are stellate chromatophores on the cheek and on the dorsal side below the spines of the dorsal fin. Alcoholic specimens are creamy to yellowish brown in color.

Four specimens of larval mullets were collected from Buraan tidal creek, Burgos, Ilocos Norte Province, on May 5, 1949.

#### APOGONIDÆ

APOGON sp. Cardinal fish (bagsang taaw, bunka, benka). Text fig. 13.

*Specimen 8.75 millimeters long.*—The body is deep and compressed; depth 2.5 in length; head large, pointed, triangular, 2.3 in length; mouth oblique, angle of maxillary beneath mid-diameter of eye socket which is 2.6 times in head length; snout short, almost 4 in head. Preopercle is serrated; upper midportion of opercular edge with a spine; and below lower portion of opercle are a few branchiostegals. Dorsal VI, 1-9; anal I, 9; caudal forked with 20 rays; peduncle 1.5 as long as broad. Scales are large, covering anterior sides of body;



TEXT FIG. 13. *Apogon* sp. From a specimen 8.75 mm. long.

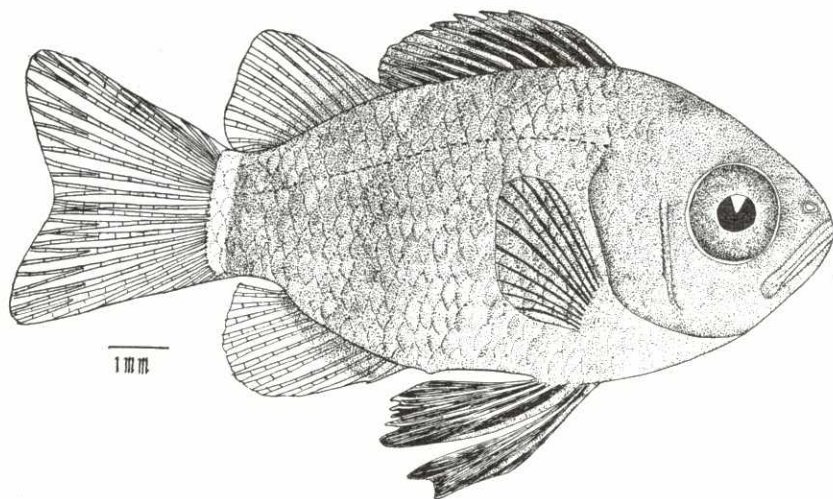
region of peduncle naked with a group 5 stellate pigments on the base of the caudal fin; transverse rows of stellate pigments located on anterior caudal peduncle; stellate chromatophores at the bases of the anal fins. Group of pigment spots on top of the head and a few groups of stellate chromatophores on the preopercle and opercles, one beneath the nostril on the snout and a series of spots under lower jaw. Membranes of dorsal, ventral, and anal fins pigmented. The fish is entirely brownish to blackish in alcohol.

Several specimens were collected at Buraan, Burgos, Ilocos Norte Province, on May 5, 1949.

## KYPHOSIDÆ

**KYPHOSUS VAIGIENSIS** (Quoy and Gaimard.) Rudder fish (ilak, ilac). Text fig. 14.

*Specimen 10.5 millimeters long.*—The body is deep and compressed; depth 2 in standard length. Head is large and convex, 2.5 in length; mouth oblique; angle of maxillary beneath and parallel to the edge of eye socket which is 2.5 in head; snout is short, 1.5 eye diameter. Opercle with smooth rounded edge; preopercle minutely serrated. Dorsals notched XII, I–12; anal III, 12; caudal of 24 rays, shallow forked; pelvic fins with sharp outer spines and eight long soft rays connected by black thin membranes. Lateral line high up following the arc of the dorsal body contour. The ctenoid scales on the body are large, 30 on lateral series, 15 on transverse series. Scales on the head, membranes of the spinous dorsal and the bases of the second dorsal and anal fins are dark pigmented. Scales on the



TEXT FIG. 14. *Kyphosus vaigiensis*. From a specimen 10.5 mm. long.

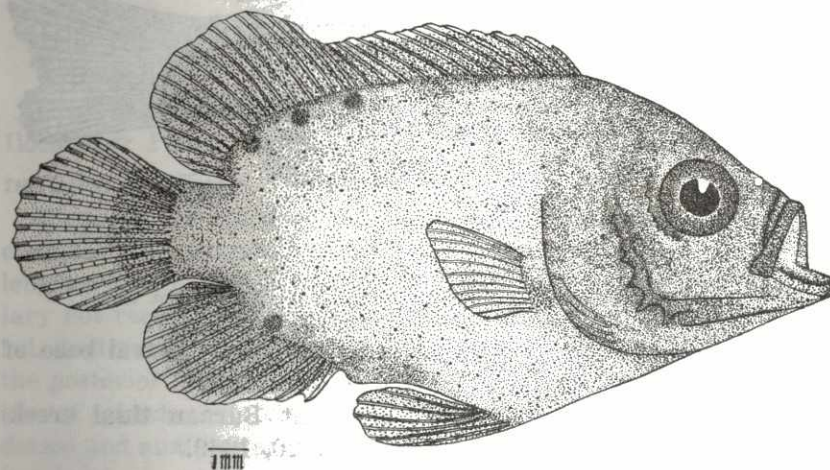
third portion of the base of caudal peduncle are of creamy brownish in color.

The only advanced larval fish was collected at Buraan tidal creek, Burgos, Ilocos Norte Province, on May 20, 1949.

## SERRANIDÆ

**EPINEPHELUS FUSCOGUTTATUS** (Forsk.) Marbled grouper (garopa). Text fig. 15.

*Specimen 16 millimeters long.*—The body is deep, compressed; height 1.8 in length; head 1.25 in length, slightly convex with an oblique mouth and concave snout. Eye is dorsolateral, 3.25 head length. Preopercle is serrated, with three big spines followed by five smaller spines. Lower angle of opercle with 5 branchiostegals. Dorsal XI–16; anal III, 12; pectorals short; caudal fin with 18 rays, rounded. The entire larval fish is leaflike brownish cream with black pigment spots on the head, all sides of body on the dorsal, ventral, anal fins and on the anterior half of caudal.



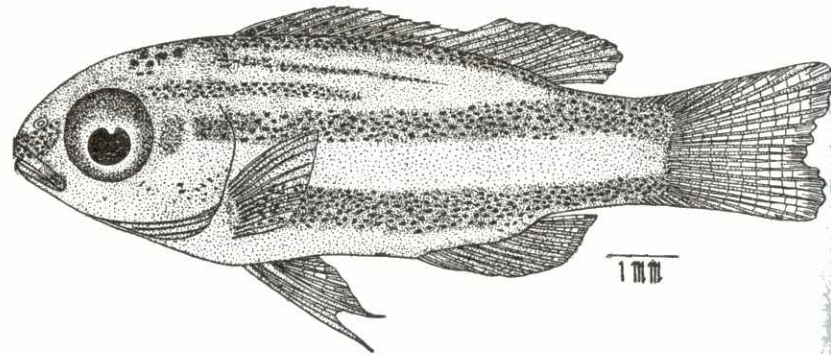
TEXT FIG. 15. *Epinephelus fuscoguttatus*. From a specimen 16 mm. long.

Four specimens, 16 to 20 millimeters long, were collected from Dagat-dagatan Salt Water Fishery Experimental Farm in 1947.

**EPINEPHELUS MORRHUA** (Cuvier and Valenciennes). Sea bass (garopa). Text fig. 16.

*Specimen 10 millimeters long.*—The body is elongate and compressed; depth 2.9 in standard length. Head is short and convex, 3 in length; mouth is small and slightly oblique; angle of maxillary not reaching parallel edge of anterior eye socket; snout, small, convex, 2 in eye diameter which is 2.5 in head. Opercle is unarmored and of square edge. Dorsals continuous, X–10; anal II, 10; caudal with 24 rays, truncate. Five unequal

parallel lateral bands of olive brown to black dot pigments are on the sides of the body; the first starts on the head and extends dorsally to the base of the caudal peduncle; the second is short and starts below the first dorsal spine and ends below third soft spine of second dorsal; the third starts from the snout and runs parallel but not reaching the end of the second parallel stripe; the fourth parallel stripe is broader than the first series of three stripes, beginning from the opercle and terminating to the dorsal third base of the caudal peduncle; the fifth parallel stripe is as wide as the fourth and starts at lower



TEXT FIG. 16. *Epinephelus morrhua*. From a specimen 10 mm. long.

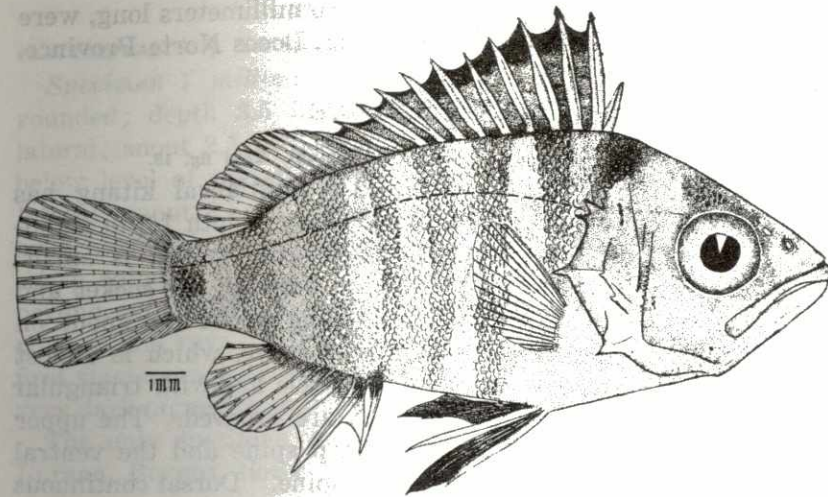
half of the opercle and terminates at the third ventral base of the caudal base.

This single specimen was collected at Buraan tidal creek, Burgos, Ilocos Norte Province, on May 20, 1949.

#### THERAPONIDÆ

**THERAPON PLUMBEUS** (Kner). Silver theraponid (ayunġin). Text fig. 17.

*Specimen 16.5 millimeters long.*—The body is deep, compressed; height 2.6 in length. Head is 2.5 in length; mouth oblique; angle of maxillary beneath midportion of diameter of dorsal lateral eye which is 3.25 in head length; snout triangular, 4 in head; preopercle serrated; opercle serrated at the upper edge followed by four moderate size spines on its outer border. Dorsal XI, 1-13, anal III, 8; pectoral 15; caudal with 20 rays, truncate. The entire fish is silvery black with minute scales on its body and with 6 narrow black transverse blotches. Dorsal fin membranes in between spines, dark pigmented; bases of soft dorsal and anal fins light pigmented. Soft rays of ventral fins

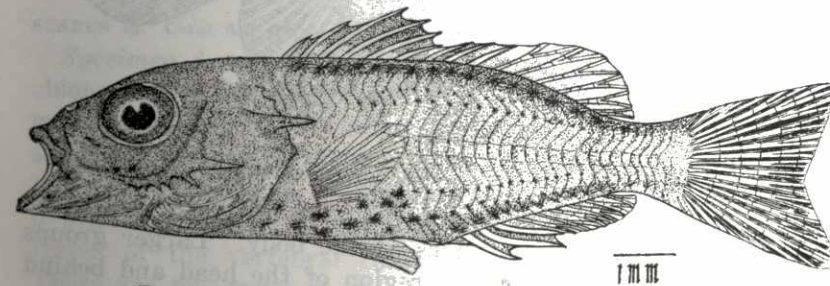


TEXT FIG. 17. *Therapon plumbeus*. From a specimen 10 mm. long.

This single specimen was collected from Pugus, Cabugao, Ilocos Sur Province, on May 5, 1949.

**THERAPON** sp. Theraponid (baraonġan). Text fig. 18.

*Specimen 12 millimeters long.*—This young theraponid is elongate and compressed in body. Head is 2.5 in standard length; mouth oblique; snout slightly convex; angle of maxillary not reaching anterior level of eye diameter; eyes dorsolateral, moderate in size. Preopercle armored with unequal spines, the posterior spine longest. Opercular spines on the upper portion of opercle still exist. Sharp spines and soft rays of notched dorsal and anal fins are developed. Pectoral fin short, not reaching level of notch of dorsal fin. Caudal peduncle 2 times as



TEXT FIG. 18. *Therapon* sp. From a specimen 12 mm. long.  
long as broad. Caudal fin shallow forked with 14 long caudal rays. Stellate chromatophores are on inverted V-shaped myomeres on the lateral sides of the body. The entire fish is olive brown to black.

Several specimens in formalin, 12 to 15 millimeters long, were collected from Gabu tidal stream, Laoag, Ilocos Norte Province, on April 5, 1949.

#### SCATOPHAGIDÆ

**SCATOPHAGUS ARGUS** (Linnaeus). Spade fish (kitang). Text fig. 19.

*Specimen 7.5 millimeters long.*—The postlarval kitang has a deep, quadriangular and compressed body; depth 1.3 in standard length; head large, 2 times in length; mouth is small; angle of maxillary is midway between edge of eye socket and the snout; paired nostrils are protruding above the snout on level of the mid-anterior diameter of the eye, which is almost 3 in the head. The preopercle and opercle are with triangular and trapezoidal areas or plates which are grooved. The upper portion of opercle is with a long sharp spine and the ventral base of the preopercle is with a short spine. Dorsal continuous IX-16; anal IV, 12; pectoral, small and rounded; caudal is oblong with 20 rays.

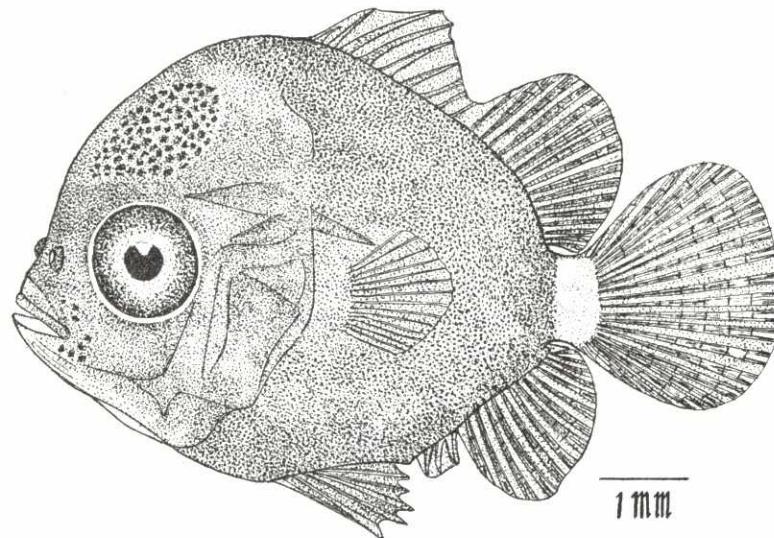


FIG. 19. *Scatophagus argus*. From 2 specimens 7.5 mm. long.

This specimen is olive brown with no traces of scales but dark pigment spots on the sides of the body. Larger groups of pigments are on the cranial region of the head and behind the maxillaries.

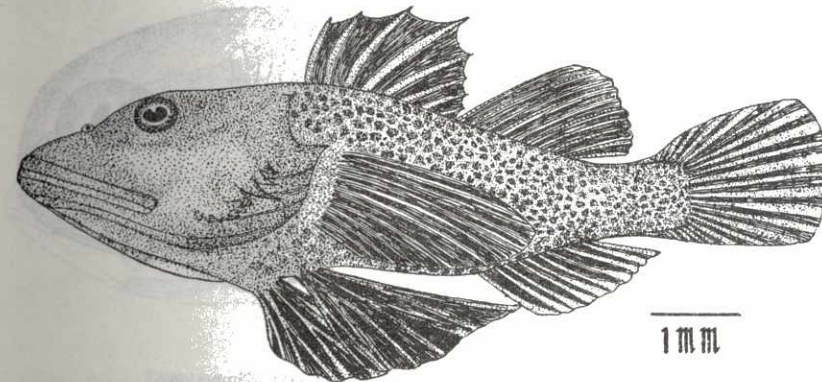
Forty-six specimens, 6 to 24 millimeters long, were collected at the Dagat-dagatan Experimental Fish Farm, Malabon, Rizal Province, on July 13, 1949.

#### PLATYCEPHALIDÆ

**PLATYCEPHALUS** sp. Flathead (sunog, uramuram, lacyo). Text fig. 20.

*Specimen 7 millimeters long.*—The body tapers posteriorly, rounded; depth 3.5 in length. Head is large, triangular in lateral; snout 2.5 in head, caving in with protruding nostrils; below level of mid-diameter of eye which is small and dorso-lateral; snout 2.5 in head, caving in with protruding nostrils; branchiostegals 4. Preopercle serrated with three large lateral sharp spines. Dorsal VII-9; anal I, 8; pectoral long reaching beyond anterior 7th rays of anal; caudal truncate with 16 principal caudal rays. Pair of ventral fins large, tips also reaching first spinous rays of ventral. Entire larval fish olive black with very dark pigments on fins and on rounded spots on sides of body.

The only specimen was collected from the rocky shores of Buraan, Burgos, Ilocos Norte Province, on May 20, 1949.



TEXT FIG. 20. *Platycephalus* sp. From a specimen 7 mm. long.

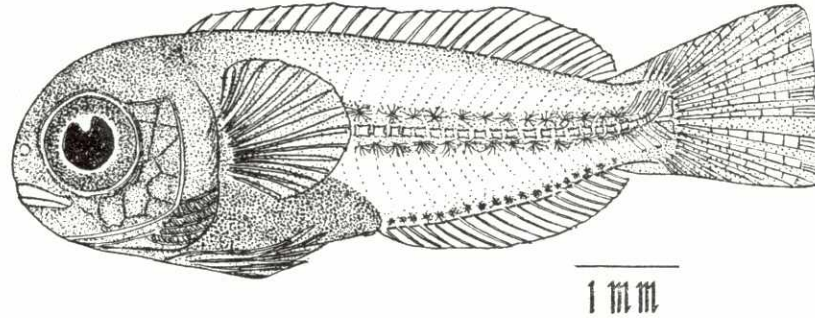
#### SCARIDÆ

**SCARUS** sp. Coral fish (loro). Text figs. 21 and 22.

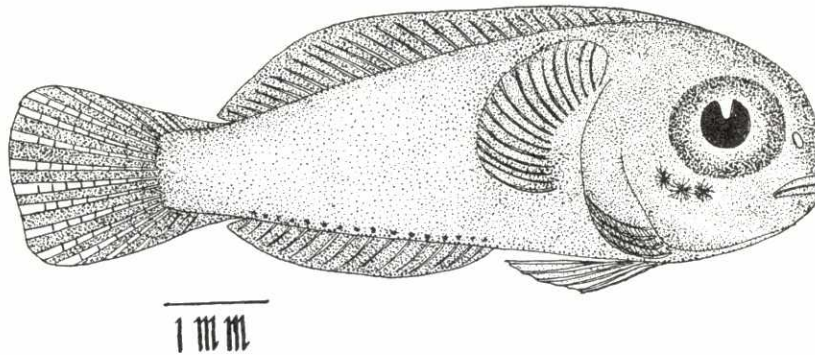
*Specimen 6 millimeters long.*—The young parrot fish has an oblong, moderately compressed and robust body. Head is short, moderately deep; mouth small, terminal; snout short; lower jaw spoon-shaped; eyes large, 2 in head. Trapezoidal areas or cheek bones are present in preopercle; opercular edge rounded with 5 branchiostegals. A 6-millimeter stage is transparent with traces of the vertebral column with the upturned urostyle. There are two rows of stellate chromatophores, the midlateral portion of the body and a row of stellate pigments above the base of the anal fin. Dorsal and anal fins are continuous, with traces of hard and soft rays; pectorals rounded; caudal with 12 long rays, truncate.



The juvenile fish, 6.5 millimeters long (fig. 22), has the body proportions as the above specimen but it is no longer transparent. Its head is dark with three stellate pigments



TEXT FIG. 21. *Scarus* sp. From a specimen 6 mm. long.



TEXT FIG. 22. *Scarus* sp. From a specimen 6.5 mm. long.

below the eye and a row of dot pigments at the ventral side of the body above the ventral fin. The body is cream in color.

The herbivorous adult species of the family Scaridae are mostly of large size, abundant in coral reef banks in nearly all tropical seas.

Numerous specimens were collected at Buraan tidal creek, Burgos, Ilocos Norte Province, on May 20, 1949.

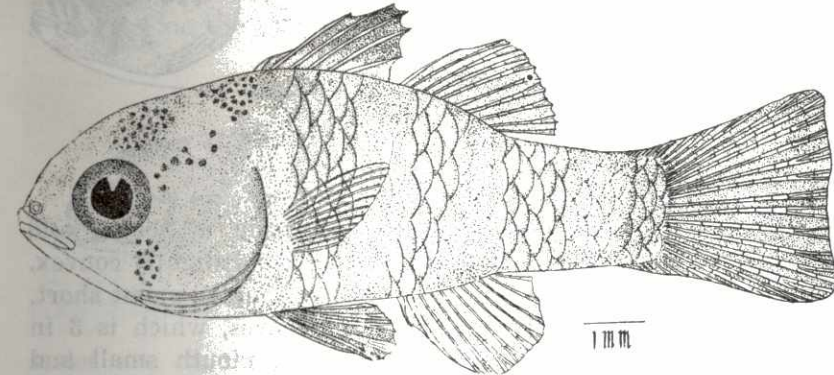
#### ELEOTRIDÆ

*EVIOTA* sp. Eleotrid (birot). Text fig. 23.

*Specimen 11 millimeters long.*—Body is elongate, compressed; depth 4 in standard length; head large, robust, conical, as long as high; eye 3 in head and 1.5 the short snout; mouth oblique, angle of maxillary reaches anterior level of eye; opercle entire,

rounded, preopercle indistinct; branchiostegals 4. Dorsal VI, I-9; anal I, 10; first dorsal moderately elongated, third, fourth and fifth the longest; second dorsal and anal fin similar in outline; pectoral fin long, narrow, nearly reaching anal pre-anal spine; pectoral fin has 11 rays, largest ray reaching perpendicular level of posterior base of first dorsal fin. Scales in longitudinal series 17 to 18; transverse scales in greatest depth 10. Peduncle 1.25 as long as broad; caudal with 14 long rays truncate.

There are on each side of the body four vertical blotches of olive to blackish pigments on the scales in each of the band. The scales of the interspaces are light pigmented. There are four groups of small chromatophores on the head, below and above the eye, posterior to the eye, and before the first spine of the first dorsal fin.



TEXT FIG. 23. *Eviota* sp. From a specimen 11 mm. long.

A close relative of this minute eleotrid is *Eviota sealie* Herre but they differ greatly in body pigmentations, number of scales on the longitudinal series, and type of caudal fin.

Species of *Eviota* are among the smallest living vertebrates which are abundant in the crevices of coral reefs of the South Sea Islands, northward to the Philippines and southern Japan. The generic characters are not well defined (Herre 1927).

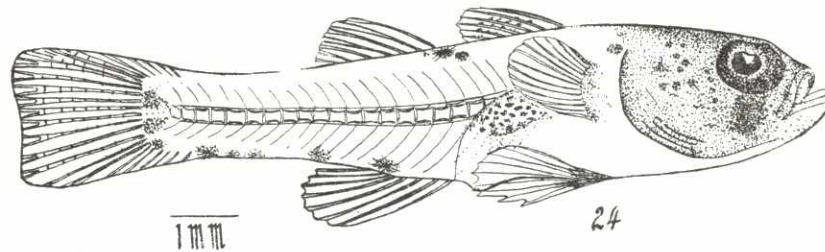
The only specimen, 11 millimeters long, was collected at a coral reef bank of Buraan tidal creek, Burgos, Ilocos Norte Province, on May 20, 1949.

#### GOBIIDÆ

*VAIMOSA PIAPENSIS* Herre. Goby fry (ipon). Text figs. 24, 25, and 26.

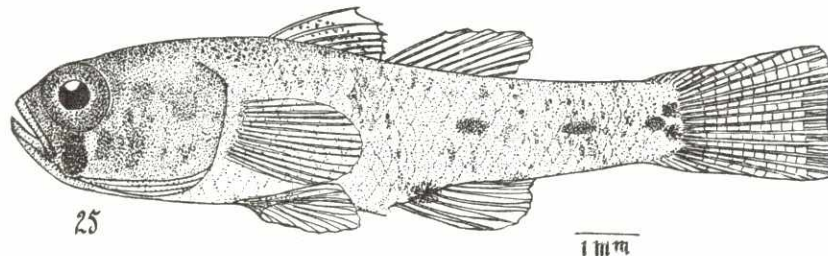
*Specimens 8.5 millimeters long.*—The transparent body is robust and elongate; depth 4.5 in standard length; the head a little convex; short and broad across opercles, 3.3 in length;

snout short, blunt, convex, broadly rounded, 2 in eyes, which is 3 in head. Eyes high up, dorsolateral; the mouth small, slightly oblique and the angle of maxillary beneath anterior third of eye. Branchiostegals 5. Caudal of 16 rays, truncate. Dorsal VI, 1-7; anal I, 7; pectorals of 14 rays, rounded. Pigmentations, dark on head region with a rounded black spot below the eye. The abdominal region with black spots. There are two chromatophores on dorsal side of body between the first and second dorsal fins and five chromatophores on the ventral side of body. Two rounded black spots are at the base of the caudal fin. There are also pigment spots on the first dorsal fin.



TEXT FIG. 24. *Vaimosa piapensis*. From a specimen 8.5 mm. long.

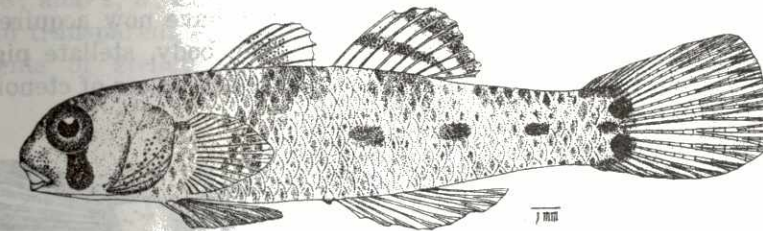
*Specimen 10.5 millimeters long.*—The body is robust and elongate; depth 4.2 in standard length; the head slightly convex, short and broad across the opercles, 3.25 in length; snout short, blunt, convex and broadly rounded, 2.5 in eyes, which is 3 in head. Eyes are high up and dorsolateral; mouth small and oblique; angle of maxillary beneath anterior third of eye. Dorsal VI, 1-7; anal I, 7; pectorals of 14 rays, rounded and caudal of 16 rays, truncate. At this stage there are microscopic ctenoid scales with sparsely distributed pigment spots on the side of the body, the most significant of which are 3 small rounded black spots at the base of the caudal fin and two or three short but elongate black spots at the middle sides



TEXT FIG. 25. *Vaimosa piapensis*. From a specimen 10.5 mm. long.

of body. Small dot pigments are on the midmembranes of the spines of the first dorsal fin. A single chromatophore is on the anterior portion of the anal fin. The cheeks and opercles are pigmented; a single short and elongate pigment dot is below the eye, similar to that of *Chonophorus lacrymosus*.

*Specimen 24 millimeters long.*—The body is robust and elongate; depth 4.5 in standard length, head little convex, short and broad across the opercles, 4 times in length; snout, short, blunt, convex, broadly rounded, 1.5 in eyes which is 3.3 in head. Eyes are high up and dorsolateral; the mouth oblique and the angle of the maxillary beneath anterior third of eye. Dorsal VI, 1-7; anal I, 7; pectorals with 18 rays and caudal with 20 rays, more or less rounded. At this stage the larval fish is similar to the adult form in every respect. The scales are ctenoid, 28 of which are on the longitudinal series and 8 to 9 are on the transverse series. Four groups of pigmented



TEXT FIG. 26. *Vaimosa piapensis*. From specimen 24 mm. long.

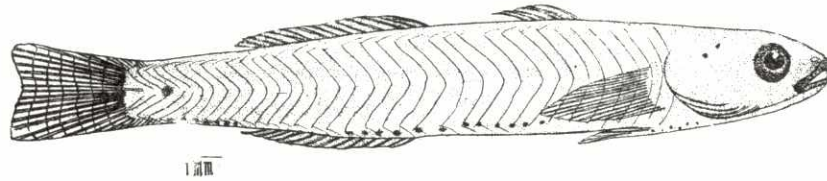
scales are on the dorsal sides of the body; four short and blunt pigments are on the midportion of posterior portion of body. Two rounded black pigments are at the base of the caudal fin. The membranes of the first dorsal are sparsely pigmented and the second dorsal fin with two rows of pigments spots on the fin membranes. The snout with a few black spots and below the eye is the *lacrymosus* spot of black pigments. The opercle with large scales and small black pigments on the branchiostegals.

Several specimens, 8.5 to 24 millimeters long, were collected at the Dagat-dagatan Lagoon, Malabon, Rizal Province, Luzon in June, 1949.

**CHONOPHORUS OCELLARIS (Broussonet).** Goby fry (ipon). Text figs. 27, 28, and 29.

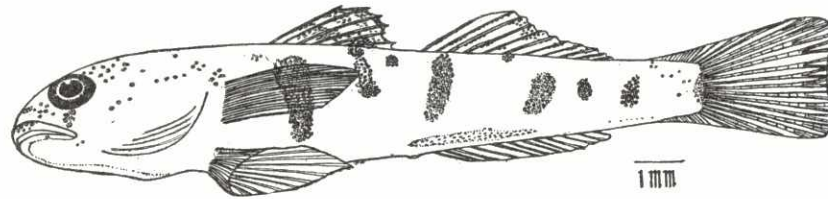
*Specimens 10 to 12 millimeters long.*—The larval goby when caught at the mouth of rivers is colorless with a few melanophores on its head. On the ventral sides of the body and on each side of the caudal peduncle are pigment spots. A 12-milli-

meter stage has all the diagnostic character of the external characters of the adult with reference to the robust elongate rounded body with 38 myotomes, large long convex head. Dorsal VI, 1-10; anal I, 10; pectorals rounded; caudal fin slightly notched, with 14 long caudal rays. Mouth oblique, end of maxillary not reaching anterior level of eye diameter. Opercle rounded; branchiostegals 5.



TEXT FIG. 27. *Chonophorus ocellaris*. From a specimen 10 mm. long.

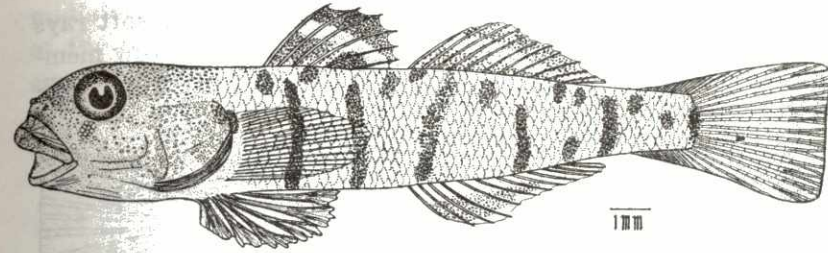
*Specimen 15 millimeters long.*—Goby fry that have migrated further up the Pagsan river creek after their initial appearance at the sandy shores and mouth of the river have now acquired blotches or parr marks on the sides of the body, stellate pigments on the snout and on the head. There are traces of ctenoid



TEXT FIG. 28. *Chonophorus ocellaris*. From a specimen 15 mm. long.

microscopic scales. There are pigment spots on the dorsal and anal fins the most significant of which in *Chonophorus ocellaris* is the rounded black pigment spot at the base of the first dorsal fin on the membrane and spines of the fourth, fifth, and sixth spines.

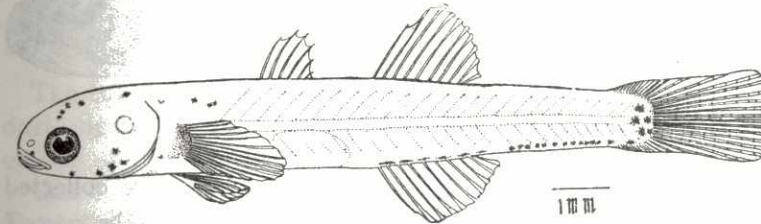
*Specimens 16-20 millimeters long.*—The goby fry when still a few kilometers from the mouth of the river in their migration up stream after three to four weeks have grown bulky, the body proportions having changed a great deal; the fins, narrow vertical blotches and the grouped dark pigments of the ctenoid scales on each side of the body are now very distinct, so with the ocellie pigmentation on the first dorsal fin, and striations on the membranes of dorsal and anal fins are very distinct.



TEXT FIG. 29. *Chonophorus ocellaris*. From a specimen 20 mm. long.

*SICYOPTERUS* sp. Goby fry (ipon). Text fig. 30.

*Specimen 12 millimeters long.*—The body is low, elongate, slightly compressed; height 7 in length; the obtuse convex head about 4.5 in body length; diameter of eye almost 4 in length of head; mouth terminal slightly oblique; snout obtuse to convex; maxillae extending beneath anterior third of eye which is lateral. Opercle with branchiostegals. Dorsals separate VI, I-8; anal I, 8; caudal of 18 rays truncate. Specimen is naked and transparent with traces of notochord and myomeres. Pigments of stellate chromatophores are scanty on the head.



TEXT FIG. 30. *Sicyopterus* sp. From a specimen 12 mm. long.

ventral base of anal fin, ventral side of peduncle and base of caudal peduncle. The species of *Sicyopterus* are small dull-colored fishes found in tide pools, rocky, shallow, coastal waters, and river mouths. They are sources of goby fry in northern Luzon.

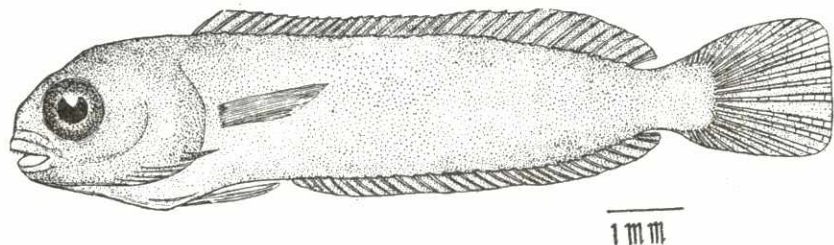
Numerous specimens were collected from a tidal stream at Libong, Bacarra, Ilocos Norte Province, on April 29, 1949.

#### BLENNIDÆ

*SALARIAS* sp. Locust fish (dodon). Text figs. 31 and 32.

*Specimen 8.75 millimeters long.*—Naked body is slender, elongate and laterally compressed; depth 4.66 in standard length. Head is 3.5 in length; mouth transverse with conical teeth; angle of maxillary beneath anterior diameter of eye which is 3.25 in head; snout shorter than diameter of eye. Opercles have spines on lower edge above the branchiostegals. Soft

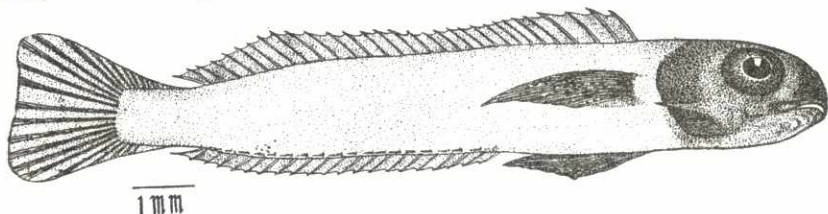
dorsal starts above edge of opercle, continues with 26 soft rays connected with a narrow membrane. Anal also of narrow membrane of 24 soft rays. Caudal, truncate with 16 rays. Pec-



TEXT FIG. 31. *Salarias* sp. From a specimen 8.75 mm. long.

toral fin short not reaching beyond level of eleventh dorsal rays.

In formalin, specimens are creamy white on the sides of the body with dark pigment spots on the head.



TEXT FIG. 32. *Salarias* sp. From a specimen 11 mm. long.

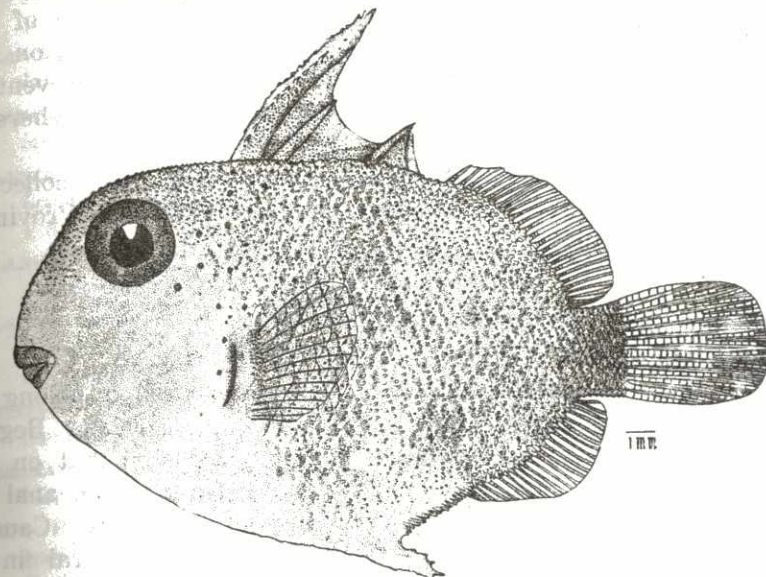
A few specimens, 8.75 to 11 millimeters long, were collected at the Dagat-dagatan Salt Water Fish Farm in 1948.

#### BALISTIDÆ

**BALISTES** sp. Trigger fish (papakol). Text fig. 33.

*Specimen 24 millimeters long.*—The body is oblong, compressed; depth 1.5 in standard length; head short and deep, convex; mouth small and terminal lips thick; eye high up, dorsolateral diameter 2.33 in head. One gill slit is anterior of the pectoral fin. Opercles covered the demarcation of which is noted by the mark of the gill slit. Dorsal fin III, 24; anal 21. Origin of first spinous dorsal is anterior to the base of the pectoral; second spine is very close to the first, being one half as long; third spine is shorter than the second and are far apart but connected with thin membrane. The soft dorsal is low, ends slightly rounded. The anal is similar to the second dorsal; caudal peduncle is twice as long as broad. The caudal fin of 12 rays is subtruncate when spread. The ventral spine is short and broad. Pectoral of 13 rays is small not reaching the

midlateral portion of the body. Scales on the head and sides of the body up to the base of the caudal fin are covered with small, rough, placoid scales.



TEXT FIG. 33. *Balistes* sp.

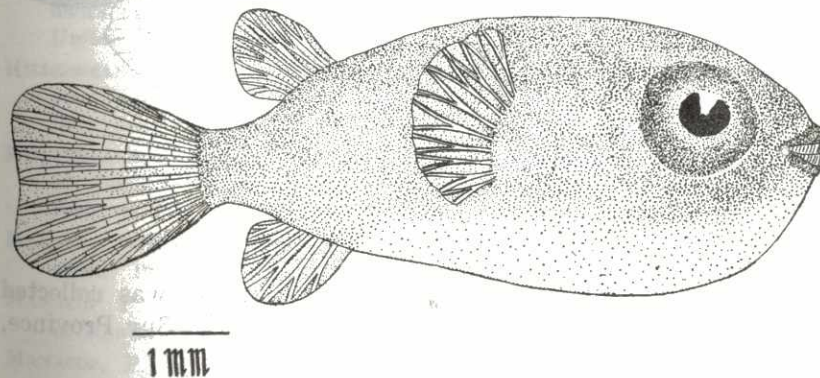
The color of the specimen in alcohol is brownish yellow with dark pigment spots evenly distributed on the sides of the body, on the spines and membranes of the first dorsal fin.

One specimen was collected at the Dagat-dagataan Salt Water Experimental Farm in June, 1946.

#### TETRAODONTIDÆ

**SPHEROIDES** sp. Puffer (bote). Text fig. 34.

*Specimen 6.5 millimeters long.*—The larval puffer is shaped



TEXT FIG. 34. *Spheroides* sp. From a specimen 6.5 mm. long.

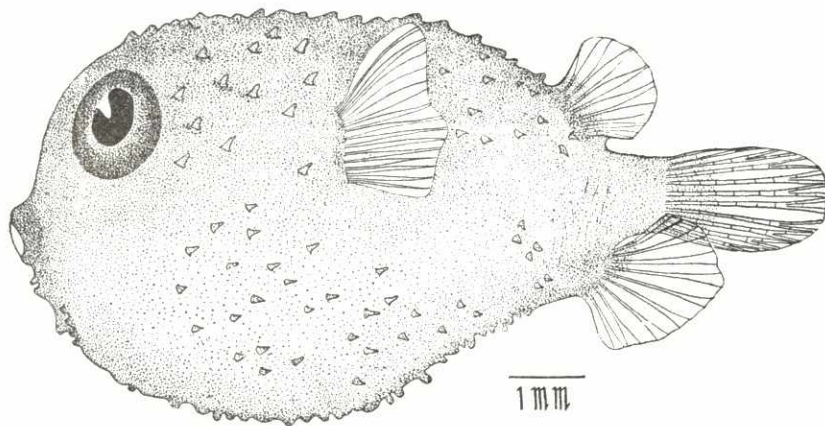
like a bowling pin, with the short caudal peduncle as a neck. The single dorsal with 7 rays and anal fin with 6 rays are near the truncate caudal which has 10 principal rays. The base of the arched pectoral is the middle portion of the body. The fish is pigmented with dot chromatophores on the lateral and dorsal portions of the body except the ventral portion of the head abdomen anterior to the anal fin where it is denuded with such spots.

Several specimens, 6 to 10 millimeters long, were collected from the tidal creek of Pugus, Cabugao, Ilocos Sur Province, on April 19, 1949.

### DIODONTIDÆ

**DIODON BLEEKERI** Gunther. Puffer (boteteng laot). Text fig. 35.

*Specimen 10 millimeters long.*—The young fish is oblong in shape with a tubular mouth; eye high up in the head. Beginnings of spinelike structures are sparsely distributed on all over the body. The dorsal with 7 soft rays and the anal of 10 rays are nearer the rounded caudal fin of 10 rays. Caudal peduncle as long as narrow. The base of the pectoral fin is at the middorsolateral portion of the body.



TEXT FIG. 35. *Diodon bleekeri*. From a specimen 10 mm. long.

This single specimen is greyish to black and was collected from the tidal stream at Pugus, Cabugao, Ilocos Sur Province, on May 5, 1949.

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