

NOTES ON FRESHWATER FISHES OF FORMOSA, WITH DESCRIPTIONS
OF NEW GENERA AND SPECIES.

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Since the publication of my paper entitled "Contributions to the Study of the Fresh Water Fishes of the Island of Formosa" (*Ann. Carn. Mus.*, 1919, pp. 169-328), many new fresh water fishes have been obtained from Formosa. Moreover, as a result of extended collections made by myself during the year 1918-1919, several species formerly considered very rare have been secured in abundance from the type-localities, or from other places on the island.

In the present paper the following eight species which seem to be new to science are fully described, and the record of new localities for the known species is given as well.

1. *Acrossocheilus invirgatus*.
2. *Lissochilichthys matsudai* (gen. et. sp. nov.).
3. *Scaphiodontella alticorpus* (gen. et sp. nov.).
4. *Leucisculus fuscus* (gen. et sp. nov.).
5. *Spinibarbus elongatus*.
6. *Rasborinus tanakii* (gen. et sp. nov.).
7. *Rasborinus formosæ*.
8. *Cultriculus akoensis*.

Here I express my sincere thanks to Dr. David Starr Jordan for his kind assistance in determining new species; and to Mr. Eiji Matsuda, of the Ako Public school, Formosa, who very kindly forwarded to me a fine collection of fresh water fishes from Ako.

The numbers in parenthesis, following the localities, refer to the number of specimens examined.

1. *Salmo formosanus* Jordan & Oshima.

Head 3.51 in length to base of caudal; depth 4, 66; D. 3, 11; A. 3, 10; P. 13; V. 9; snout 3.77 in head; eye 4.66; interorbital space 4; maxillary 1.84; pectoral 1.50; ventral 1.75; scales about 140 in an oblique series; branchiostegals 12; gill-rakers on first arch 7 + 10.

Jaws subequal. Origin of the dorsal nearer to the tip of snout than base of caudal, its longest ray 1.23 in head; caudal peduncle 3 in head.

Color in formalin bluish gray above, paler below; lower parts of the sides silvery; small black round spots scattered on the back and below the lateral line; sides with eight dark oval spots; base of the dorsal dusky; caudal fin fuscous; the rest of the fins whitish; head uniformly dark, paler below. Total length 148 mm.

The present specimen Taiko River at Saramao, Nanto differs slightly from the type, being a young individual. I have also fortunately obtained three grown specimens from the type-locality.

2. *Plecoglossus altivelis* Temminck & Schlegel.

Three full-grown specimens from Nankan River at Hokuzanko, Nanto. It is reported that in Sansan River and Takkiri River, Kwarenko several specimens were secured early in the spring, 1919.

3. *Parasilurus asotus* (Linnaeus).

Two from Ako.

4. *Pseudobagrus brevianalis* Regan.

Suisha River at Fumpo, Nanto (1); Nankan River at Ogyuran, Nanto (2); Ako (2).

5. *Pseudobagrus taiwanensis* Oshima.

Shishito, Nanto (2); Tozen River, Shinchiku (1); Suisha River at Fumpo, Nanto (1); Daito River, Nanto (2); Nankan River at Ogyuran, Nanto (3).

6. *Liobagrus nantoensis* Oshima.

One specimen from Ogyuran, Nanto.

7. *Liobagrus formosanus* Regan.

Head 4.19 in length; depth 5.66; D. 1, 5; A. 15; P. 1, 7; V. 6; width of head 1, 14 in its length; snout 2, 50 in head; interorbital space 2; pectoral 1, 14; ventral 2. Body strongly compressed posteriorly; dorsal outline abruptly inclined in front of the origin of the dorsal; head large, flattened, with a median shallow groove, both sides of which slightly swollen; interorbital space depressed; snout rather short, its anterior margin obtusely rounded; mouth terminal, broad, with fleshy lips; upper jaw slightly longer than the lower, with a band of villiform teeth, similar band of the lower jaw crescent-shaped, longer than that of the upper; palatine and vomer smooth; barbels 8, four on snout, two at the angle of mouth, other two on the lower jaw; root of the barbel thick; nasal barbel as long as the mental, the rostral nearly as long as the maxillary which reaches to the base of pectoral; nostrils superior, distinctly separated, the anterior in a short tube, the posterior in contact with the root

of the rostral barbel; eyes minute, superior, imbedded in skin; gill-openings rather large; gill-membranes entirely separated. Dorsal fin small, inserted anteriorly, its spine nearly half as high as the soft rays, hidden beneath the skin; adiposé dorsal low and long, connected posteriorly with the base of caudal; pectoral with a sharp spine hidden in the skin, tip of the fin scarcely reaching the end of the base of dorsal; ventral entirely behind the dorsal, reaching beyond the vent; anal beneath the adipose dorsal, much shorter than the latter; caudal fin elongate, its tip slightly rounded. Body smooth; lateral line indistinct. Color in alcohol light brown, fins somewhat paler; ventral surface whitish. Total length, 80 mm.

One specimen from Shishito, Nanto, collected by the writer on March 5, 1919.

In the former paper the present species was not described in detail, because of the absence of the specimen. Shishito, where my specimen was collected, is located near the type-locality (Lake Candidius.)

8. *Clarias fuscus* (Lacépede).

Shori, Toyen (1); Ako (2).

9. *Misgurnus anguillicaudatus* (Cantor).

Inzampo, Giran (1); Ako (2); Tamazato, Kwarenko (2).

10. *Misgurnus decmcirrosus* (Basilewsky).

One specimen from Ako and Kwarenko.

11. *Formosania gilberti* Oshima.

Suisha River at Fumpo, Nanto (7); Shishito, Nanto (3); Nanan River at Ogyuran, Nanto (2).

12. *Hemimyzon formosanus* (Boulenger).

Shinchiku (2); Shishito, Nanto (30); Kananau River at Kapiyan, Ako (10).

13. *Carassius auratus* (Linnaeus).

Buroko River, Giran (2); Ritakukan, Giran (5); Raupi, Giran (1); Karewan, Kwarenko (5); Rigyoichi, Kwarenko (3); Kwaren River, Kwarenko (2); Tamazato, Kwarenko (5); Shori, Toyen (2); Ruhikutsu, Nanto (2); Horisha, Nanto (3); Taichu (3); Daiko River, Taichu (3); Ako (2); Kirai, Ako (1); Rinraku, Ako (2).

14. *Cyprinus carpio* Linnaeus.

Tensonpi, Giran (1); Giran River (3); Karewan, Kwarenko (1); Rigyoichi, Kwarenko (2); Lake Candidius (3).

15. *Labeo jordani* Oshima.

Nankan River at Hokuzanko, Nanto (275); Shimo-tamusui River, Ako (1); Tamusui River, Taihoku (2).

16. *Acrossocheilus formosanus* (Regan).

Nankan River at Hokuzanko, Nanto (8); Shishito, Nanto (2); Horisha, Nanto (2); Heirinbi, Giran (4).

17. *Acrossocheilus invirgatus* new species. Plate V, figure 2.

Head 4.47 in length; depth 4.19; D. 3, 8; A. 2, 5; P. 15; V. 9; width of head 1.66 in its length; interorbital space 2.73 in head; snout 2.50; eye 5; pectoral 1.11; ventral 1.20; 42 scales in the lateral line, 6 scales in an oblique series between origin of dorsal and lateral line, 5 scales between the latter and the middle of belly, 3 scales between lateral line and the root of ventral; pharyngeal teeth 5, 3, 1-1, 3, 4; gill-rakers 5 + 9. Body elongate, moderately compressed, rather low; abdomen rounded; head smooth, with many mucous cavities below and behind the orbit, upper surface slightly convex; snout rounded, more or less overhanging the upper lip, sides with traces of small tubercles; upper jaw projecting beyond the lower; mouth inferior, transverse, maxillary scarcely reaching a vertical through anterior border of nostril; upper lip fleshy; lower lips thick, separated anteriorly by an interspace which is about $\frac{1}{2}$ the width of mouth; anterior border of lower jaw naked, with a sharp, transverse, horny edge; barbels four, the rostral nearly half as long as the maxillary which reaches the middle of the orbit; eye superior and slightly anterior; nostrils close together, in front of eye above; anterior nostril in a short tube; pharyngeal teeth slender, pointed; gill-rakers short. Origin of the dorsal nearer to tip of snout than base of caudal, first ray the longest; anal behind the dorsal, rather high, inserted nearer to origin of ventral than the root of caudal, when depressed scarcely reaching the root of the caudal, anterior ray the longest; ventral inserted three scales behind the origin of dorsal, not reaching the vent; pectoral reaches two-thirds distance to ventrals; caudal peduncle compressed, its depth 2 in head; caudal fin slightly forked, tip of each lobe sharply pointed. Body covered with uniform scales; lateral line continuous, nearly straight, running along the middle of the sides. Color in alcohol dark bluish gray above, sides silvery, with no black stripes; throat and belly whitish; tip of head dark; membrane of dorsal fin dark; pectorals grayish; ventrals and anal whitish, their branched rays reddish yellow; caudal fin fuscous, partially reddish-yellow colored. Total length 160 mm.

Type No. 49,946, A. N. S. P. Buraku River at Ako, collected by Eiji Matsuda on February 2, 1919.

Differs from *Acrossocheilus formosanus* in having the body lower; no black stripes on sides; 5, 3, 1-1, 3, 4 pharyngeal teeth instead of 5, 3, 2-2, 3, 5, and the anal with two undivided rays.

LISSOCHILICHTHYS new genus.

Body elongate, compressed, head smooth, pointed anteriorly; snout obtuse, bluntly rounded, slightly prominent, sides with no tubercles, no lateral lobes. Upper jaw projecting beyond the lower. Mouth transverse, inferior, horse-shoe shaped; upper lip entire, with no inner fold. Lower lips considerably broader than the upper, scarcely in contact with each other, distinctly separated from the lower jaw; postlabial groove is restricted to the lateral parts of the lower lip, not continuous. Tip of the lower jaw naked, obtusely rounded, rather fleshy, with no horny substance. Barbels four, two rostrals and two maxillaries. Dorsal 3, 8, inserted opposite to ventrals. Anal short, with 5 branched rays. Scales moderate, about 42 in the lateral line; l. l. running along the middle of the tail. Pharyngeal teeth 5, 3, 2-2, 3, 5; gill-rakers short. Type, *Lissochilichthys matsudai* Oshima.

This genus is very closely related to *Lissochilus* Weber and Beaufort, differing from it in having smaller scales, thick lower lips, lower jaw with no horny substance, and connected lower lips.

18. *Lissochilichthys matsudai* new species. Plate III, figure 2.

Head 4 in length; depth 4; D. 3, 8; A. 3, 5; P. 14; V. 8; width of head 2 in its length; interorbital space 3 in head; snout 3; eye 3.66; pectoral 1, 36; ventral 1.36; 42 scales in the lateral line, 6 scales in an oblique series between origin of dorsal and lateral line, 5 scales between the latter and the middle of belly, 3 scales between the lateral line and the root of the ventral; pharyngeal teeth 5, 3, 2-2, 3, 5; gill-rakers 3 + 10. Body elongate, compressed, abdomen rounded; top of head more or less fallen from the back; head smooth, pointed anteriorly, bluntly rounded in front, tip of the skin partially overlapping the upper lip, sides with no tubercles; interorbital space slightly convex; lateral lobes none; upper jaw projecting beyond the lower; mouth transverse, inferior, horse-shoe shaped, maxillary scarcely reaching a vertical through the posterior border of nostril; upper lip continuous, rather thick, entire, with no inner fold; lower lip nearly twice as broad as the upper, both connected anteriorly, postlabial parts distinctly separated from the

jaw, postlabial groove interrupted; tip of the lower jaw entirely naked, edge rounded, fleshy, with no horny substance; barbels four, the rostral nearly as long as the eye, the maxillary longer, reaching beyond the posterior border of orbit; eye slightly superior and anterior; nostrils close together, in front of the eye above, anterior nostril in a short tube; pharyngeal teeth slender, hooked; gill-rakers short. Origin of the dorsal midway between the tip of snout and base of caudal, opposite to ventrals, armed with three undivided rays, the last one the longest; pectoral as long as the ventral, reaching two-thirds the distance to the latter; ventral inserted below first branched ray of the dorsal, scarcely reaching the vent; anal nearer to origin of ventral than the root of caudal, anterior ray the longest, when depressed not reaching the caudal; caudal peduncle compressed, its depth 2 in head; caudal fin deeply forked, tip of the lobes sharply pointed. Body covered with uniform cycloid scales, ventral with a scaly flap; lateral line nearly straight, running along the middle of the tail, slightly decurved anteriorly. Color in alcohol yellowish gray above, paler below; top of head dark; sides with seven dark vertical stripes, one of which at the base of caudal; back with a series of irregular, dark spots; membrane of the dorsal fin with a series of dark stripes; pectoral and anal grayish; ventrals white; caudal uniformly dark. Total length 72 mm.

Type, No. 49,947, A. N. S. P. Kunanau River, Ako, collected by Eiji Matsuda on January 2, 1919.

Kunanau River, Ako; Tamsui River at Shinten; Shishito, Nanto; Dakusui River at Musha; Suisha River at Fumpo.

Besides the type, 9 paratypes, 2 of which from the Kimanian River, show the following: Head 3.52 to 4.40; depth 3.83 to 4.13; D. III, 8; A. III, 5; P. 14, few 15 or 16; V. 8, few 9; head width 1.66 to 2; interorbital space 2.71 to 3; eye 3.40 to 4; snout 2.62 to 3; scales 6—41 or 42—5; length 77 to 116 mm.

19. *Scaphesthes tamusiensis* Oshima.

Koshiryo, Giran (2); Taiko, Giran (6); Inzampo, Giran (1); Takkiri River, Kwarenko (16); Mokuui River at Doman, Kwarenko (3); Nankan River at Hokuzanko, Nanto (3); Dakusui River at Musha, Nanto (11); Shishito, Nanto (2); Kunanau River at Kapiyan, Ako (10).

SCAPHIODONTELLA Oshima, new genus.

Body elongate, deep, compressed. Snout short, pointed anteriorly, tip of the skin extends downwards, overlapping the upper lip.

Mouth transverse, inferior; lower jaw with no lip, edge of the mandible sharp, covered with a horny layer. No labial fold. Barbels none. Dorsal fin with not more than 9 branched rays, armed with three undivided rays, inserted opposite to ventrals. Anal rather short. Pharyngeal teeth 5, 3, 2-2, 3, 5, laterally compressed, plough-shaped. Scales large, less than 45 in a longitudinal series. Lateral line continuous, running along the middle of the tail. Type *Scaphiodontella alticorpus* Oshima..

The type is very closely related to *Scaphesthes tamusuiensis* Oshima. It differs however, in having a deeper body, no barbel, plough-shaped teeth instead of canine-like, pointed ones.

20. *Scaphiodontella alticorpus* new species. Plate IV, figure 1.

Head 4.67 in length; depth 3.27; D. 3.8; A. 3.5; P. 17; V. 9; width of head 1.36 in its length; eye 5 in head; interorbital space 2; snout 2.47; pectoral 1.08; ventral 1.08; scales 43 in the lateral line, 8 in an oblique series between origin of dorsal and lateral line, 8 between the latter and the middle of belly, 4 between the lateral line and the root of ventral; pharyngeal teeth 5, 3, 2-2, 3, 5; gill-rakers 8 + 30. Body deep, elongate, slightly compressed, deepest in front of the dorsal, abdomen rounded; head rather small and short, with mucous cavities below and behind the orbit, its upper surface strongly convex; interorbital space broad, vaulted remarkably; snout short, pointed anteriorly, tip of the skin extends downwards and overlaps the upper lip; mouth transverse, inferior, crescent-shaped, maxillary scarcely reaching the anterior border of the orbit; mandibular edge sharp, broadly rounded, covered with a horny layer; upper lip smooth, with no inner fold; lower jaw with no lip; barbels none; eye small, slightly anterior and superior; nostrils close together, in front of the eye; pharyngeal teeth in three rows, laterally compressed, each tooth with an oval grinding surface; gill-rakers slender, set close together; gill-openings moderate, extending downwards and forwards. Dorsal fin inserted nearer tip of snout than base of caudal, with three smooth undivided rays, the first minute, the third nearly four times as long as the second, first branched ray the longest; anal fin entirely behind the dorsal, inserted midway between origins of ventral and caudal, rather short, outer margin nearly straight; origin of ventral below the third branched ray of the dorsal, not reaching the vent; pectoral as long as the ventral, reaching beyond half the distance to the latter; caudal peduncle short, its depth 1.72 in head; caudal fin long, deeply forked, tip of each lobe sharply pointed. Body covered with uni-

form cycloid scales; ventral with a scaly flap; lateral line continuous, slightly decurved in front, running along the middle of the tail. Color in alcohol grayish above, belly and lower parts of sides silvery; head dark; all the fins dusky, fin membranes reddish; caudal fin uniformly dark, interspace between the middle rays reddish. Total length 220 mm.

Type No. 49,948, A. N. S. P. Buraku River, Ako, collected by Eiji Matsuda on February 2, 1919.

Also paratype, Kwaren River at Kado, Kwareno. It shows: Head 4.53; depth 3.43; fins as in type; head width 1.60; interorbital space 2.18; snout 2.66; eye 4.50; scales 8—43—7; length 138 mm.

21. *Hemibarbus labeo* (Pallas).

Heirinbi, Giran (1); Taihoku (3).

22. *Barbodes paradoxus* (Günther).

Five from Ako.

23. *Puntius snyderi* Oshima.

One from Nankan River at Ogyuran, Nanto.

24. *Spinibarbus hollandi* Oshima.

Ako (2); Rinraku, Ako (2); Shukoran River at Suibi, Kwareno (3); Kwaren River at Kada, Kwareno (20).

25. *Spinibarbus elongatus* new species. Plate IV, figure 2.

Head 3.58 in length; depth 5.27; D. III, 8; A. II, 5; P. 16; V. 9; width of head 1.59 in its length; eye 6 in head; interorbital space 3.12; snout 2.67; pectoral 1.36; ventral 1.53; 28 scales in the lateral line, 4 in an oblique series between origin of dorsal and lateral line, 5 between the latter and the middle of belly, 2 between the lateral line and the root of ventral; pharyngeal teeth 5, 3, 2-2, 3, 5; gill-rakers 3 + 11. Body elongate, low, slightly compressed; head elongate, rounded, dorsal outline convex; interorbital space broad, more or less compressed, with many mucous cavities around the orbit; snout long, rounded anteriorly; eye rather small, anterior and superior; nostrils close together, in front of eye; mouth sub-inferior, maxillary scarcely reaching a vertical through anterior border of nostril; upper lip fleshy; lower lips not continuous, distinct at the angle of the mouth; upper jaw slightly longer than the lower, protractile; anterior margin of the lower jaw rounded, rather sharp; barbels four, the rostral reaching beyond the nostrils, much more slender and shorter than the maxillary which reaches far beyond the orbit; gill-openings moderate; gill-rakers on first arch

slender, apical ones on the lower limb rudimentary. Dorsal fin inserted midway between the tip of snout and the base of caudal, osseous rays smooth, the first one minute, anterior ray the longest; a recumbent spine in front of the origin of the dorsal, partially hidden beneath the scales; pectoral reaching beyond two-thirds the distance to ventral; origin of ventral two scales behind that of the dorsal; anal entirely behind the dorsal, inserted nearer to origin of ventral than base of caudal, when depressed scarcely reaching the root of caudal, anterior ray the longest; caudal peduncle elongate, its depth 2.89 in head; caudal fin deeply forked, tip of each lobe sharply pointed. Body covered with large cycloid scales; ventral fin with a scaly flap; lateral line decurved, running along the middle of the side, gradually entering the middle of the tail.

Color in alcohol dark gray above; belly and lower parts of the sides silvery; base of each scale dark, dorsal fin grayish, with a series of black streaks; pectoral uniformly dusky; ventrals, anal, and caudal fuscous, more or less reddish; top of head uniformly dark. Total length 233 mm.

Type. No. 49,949, A. N. S. P. Buraku River, Ako, collected by Eiji Matsuda on February 2, 1919.

The present species is very closely allied to *Spinibarbus hollandi*. It differs from the latter in having much more lower body, round snout and 28-29 scales in the lateral line instead of 26-27.

26. Gnathopogon iijimae Oshima.

Eight from Rihikutsu, Nanto.

27. Pseudorasbora Parva (Schlegel).

Lake Candidius (1); Rihikutsu, Nanto (abundant); Kirai, Ako (3); Shinkaiyen, Daito (11); Shukoran River at Suibi, Kwarenko (1); Kwaren River at Kada, Kwarenko (3).

28. Phoxiscus kikuchii Oshima.

Raupi, Giran (2); Karewan, Kwarenko (7); Kwarenko (20); Kwaren River at Kada, Kwarenko (15); Rigyochi, Kwarenko (17); Riran, Daito (6); Shinkaiyen, Daito (abundant).

LEUCISCULUS new genus.

Body robust, more or less compressed posteriorly. Head rather short, triangular; snout pointed. Mouth transverse, oblique; upper lip entire, thin; lower lips widely separated in front, postlabial folds discontinuous; anterior edge of the lower jaw naked, trenchant. Barbels none. Pharyngeal teeth in a single series, 5-4; teeth molar-like, with smooth, oval grinding surface. Dorsal fin short,

with no osseous ray or spine; anal short, with 8 branched rays, entirely behind the dorsal; root of the ventral covered by tiled scaly sheath. Scales large, imbricated. Lateral line continuous, slightly decurved, running along the middle of the tail. Type *Leucisculus fuscus* Oshima.

Very closely related to *Leuciscus*, differing from it in having single-rowed, molar-like teeth.

29. *Leucisculus fuscus* new species. Plate V, figure 1.

Head 3.46 in length; depth 3.40; D. 3.7; A. 3.8; P. 19, V. 9; width of head 1.57 in its length; interorbital space 2.43 in head; snout 3.38; eye 5.50; pectoral 1.38; ventral 1.49; 43 scales in the lateral line, 7 scales in an oblique series from origin of dorsal to lateral line, 7 scales between the latter and the middle of belly; 4 scales between lateral line and the root of ventral; pharyngeal teeth 5-4; gill-rakers minute. Body robust, elongate, more or less compressed posteriorly; deepest in front of the dorsal; dorsal outline much more curved than that of the ventral; head triangular, strongly depressed, its dorsal outline straight, inclined; interorbital space broad, nearly flat; postoperculum radially striped; snout short, sharply pointed anteriorly; mouth terminal, oblique, maxillary reaching a vertical through posterior border of the anterior nostril; upper jaw slightly longer than the lower; upper lip entire, rather thin, lower lips discontinuous, postlabial folds distinctly separated in front; tip of the lower jaw naked, trenchant; barbels none; eye large, anterior; nostrils large, close together, on the upper surface of the snout, anterior nostril in a short tube, the posterior covered by a large flap; pharyngeal teeth in a single series, molar-like, very large, with smooth, oval grinding surface; gill-rakers minute, rudimentary; gill-openings large; gill-membranes connected below the postoperculum. Origin of the dorsal a little nearer to the tip of snout than base of caudal, rather short, high, first branched ray the longest, when depressed reaching to the origin of anal, outer margin rounded; origin of anal midway between origin of ventral and the root of caudal, rather short, anterior branched ray the longest, when depressed scarcely reaching the root of the caudal; pectoral large, not reaching the root of ventral; ventral inserted below the second divided ray of the dorsal, scarcely reaching the vent; caudal peduncle short, slightly compressed, its depth 2.16 in head; caudal fin broad, forked, its lobes obtusely pointed. Scales large, cycloid, imbricated; pectoral and ventral with a short scaly flap; lateral

line continuous, weakly decurved, running along the middle of the tail. Color in alcohol uniformly grayish brown; lower parts whitish; all the fins dark brownish gray; head dark brown. Total length 230 mm.

Type. No. 49,950, A. N. S. P. Ako, collected by Eiji Matsuda in June, 1917.

30. *Achilognathus himantegus* Gunther.

Shori, Toyen (1); Kirai, Ako (4).

31. *Zacco platypus* (Schlegel).

Dakusui, Giran (1); Koshiryo, Giran (4); Heirinbi, Giran (11); Daito River, Nanto (1); Nankan River at Hokuzanko, Nanto (1); Ako (7).

32. *Zacco temminckii* (Schlegel).

Dakusui, Giran (5); Buroko River, Giran (14); Taiko, Giran (2); Raupi, Giran (1); Horisha, Nanto (4); Nankan River at Hokuzanko, Nanto (16); Rinraku, Ako (1); Kapiyan, Ako (7).

33. *Zacco pachycephalus* (Gunther).

Nine from Dakusui River at Musha, Nanto.

34. *Candidia barbata* (Regan).

Horisha, Nanto (1); Kirai, Ako (2).

RASBORINUS new genus.

Body elongate, compressed, rather high. Abdomen compressed, a soft median keel at the postventral part only. Head pointed. Mouth terminal, oblique, maxillary not reaching beyond the orbit. Lower jaw slightly projecting beyond the upper, with no prominent hook or knob. Lips thin; barbels none. Dorsal fin with no spine, with 7-8 branched rays, above the space between ventrals and anal. Anal entirely behind the dorsal, elongate, many rayed. Scales moderate, thin, deciduous. Lateral line broadly curved, running along the lower half of the tail. Pharyngeal teeth in three series, 5 or 4, 4, 2-2, 4, 4; gill-rakers slender. Type *Rasborinus takakii* Oshima.

Rasborinus is a nearest relative of *Rasborichthys* Bleeker. It differs from it in having lateral line running along the lower half of the tail and pharyngeal teeth of 5 or 4, 4, 2-2, 4, 4, instead of 5, 3, 1-1, 3, 5.

35. *Rasborinus takakii* new species. Plate III, figure 3.

Head 4 in length; depth 3.10; D. 3.7; A. 3.16; P. 14; V. 8; width of head 2 in its length; interorbital space 2.50 in head; snout

3.33; eye 3; pectoral 1.25; ventral 1.50; 36 scales in the lateral line, 7 scales in an oblique series between origin of dorsal and lateral line, 6 scales between the latter and the middle of belly, 4 scales between lateral line and the root of ventral; pharyngeal teeth 4, 4, 2-2, 4, 4; gill-rakers 3 + 9. Body elongate, compressed, rather high, dorsal and ventral profiles equally curved; abdomen compressed, proventral part rounded, postventral part with a well-developed, soft, median keel; head pointed; interorbital space broad, nearly straight; snout short, truncated in front; mouth terminal, oblique, maxillary not reaching the orbit; lower jaw slightly projecting beyond the upper, with no knob-like protuberance on the symphysis; lips thin; barbels none; eye large, anterior; nostrils close together, in front of eye above, the anterior in a short tube; pharyngeal teeth slender; gill-rakers short. Dorsal fin inserted above the space between ventral and anal, nearer base of caudal than tip of snout, with no spine, rather high, anterior ray the longest; pectoral elongate, reaching beyond the root of ventral; ventrals slender, not reaching the vent; anal fin elongate, entirely behind the dorsal, with a scaly sheath along the base, anterior ray, the longest; caudal peduncle short, its depth 2.29 in head; caudal fin deeply forked, tip of each lobe sharply pointed. Scales moderate, thin, deciduous; lateral line broadly decurved, running along the lower half of the tail. Color in alcohol grayish above, yellowish below, with a thin, dark stripe along the middle of the sides; all the fins whitish. Total length 63 mm.

Type, No. 49, 951, A. N. S. P. Ako, collected by Eiji Matsuda.

Named for Dr. Tomoe Takaki, former Director of the Institute of Science, Government of Formosa.

Besides the type, 2 paratypes from Ako and one from Rinraku, Ako which show: Head 3.73 to 4; depth 3 to 3.50; D. III, 7; A. III, 15 or 16; P. 14 or 15; V. 8; head width 1.71 to 2; interorbital space 2.40 to 3; snout 3.50; eye 3 to 4; scales 7-35 or 36-6; length 54 to 125 mm.

36. *Rasborinus formosae* new species. Plate III, figure 1.

Body 4 in length; depth 4; D. 2.8; A. 2.14; P. 13; V. 8; width of head 2.25 in its length; interorbital space 3 in head; snout 3.33; eye 3; pectoral 1.38; ventral 1.50; 47 scales in the lateral line, 10 scales in an oblique series between origin of dorsal and lateral line, 5 scales between the latter and the middle of belly, 3 scales between lateral line and the root of ventral; pharyngeal teeth 5, 4, 2-2, 4, 4; gill-rakers 3 + 12. Body elongate, compressed, deepest in front of

the dorsal; dorsal outline weakly curved; proventral part rounded; postventral part trenchant, with a sharp, soft, median keel; head rather small, triangular; dorsal outline straight, slightly fallen from the back; interorbital space broad, slightly arched; snout short, truncated in front; mouth terminal, slightly oblique, maxillary reaching a vertical through anterior border of nostril; lower jaw more or less protruding beyond the upper; lips thin; barbels none; eye large, anterior; nostrils close together, in front of the eye above, the anterior covered with a small flap; pharyngeal teeth slender, hooked; gill-rakers rather slender, long. Dorsal fin above the space between ventrals and anal, inserted nearer base of caudal than tip of snout, with no spine, rather high, anterior ray the longest; pectoral short, reaching three-fourths the distance to ventral; ventral inserted in advance of the origin of dorsal, not reaching the vent; anal elongate, outer margin incurved, inserted below the last divided ray of the dorsal, anterior ray the longest; caudal peduncle depressed, its depth 2.50 in head, caudal fin deeply forked, tip of each lobe sharply pointed. Scales moderate, thin; lateral line broadly de-curved, running along the lower half of the tail. Color in formalin greenish gray above, lower parts of sides whitish, sides with a dark, longitudinal band above the middle; a dark narrow band along the dorsal median line; a brownish round spot on occiput; all the fins whitish, caudal somewhat dusky. Total length 88 mm.

Type No. 49,952, A. N. S. P. One specimen from a small pond near Manka, Taihoku, collected by Takeo Aoki in June, 1919.

Also 2 paratypes, same data, which show: Head 3.81 to 3.93; depth 3.81 to 3.93; fins as in type; head width 2; interorbital 3 to 3.25; snout 3.66; eye 3 to 3.25; scales 10—45 to 47—5; length 75 to 79 mm.

The scale row of the present species distinctly differs from that of *Rasborinus takakii*.

37. *Chanodichthys macrops* Gunther.

One from Heirinbi, Giran.

38. *Cultricusulus akoensis* new species. Plate III, figure 4.

Head 4.39 in length; depth 5; D. 11.7; A 3.12; P. 14; V. 9; width of head 2.25 in its length; interorbital space 3.27 in head; snout 3.40; eye 3.40; pectoral slightly longer than head; ventral 1.38; 45 scales in the lateral line, 9 scales in an oblique series between origin of dorsal and lateral line, 3 scales between the latter and the middle of belly; one scale between lateral line and the root of ventral;

pharyngeal teeth 5, 4, 2-2, 4, 5; gill-rakers 4 + 16. Body elongate, compressed, dorsal outline nearly straight, ventral profile strongly curved; abdomen compressed, pro- and post-ventral edge distinctly carinated; head moderate, its dorsal outline fallen from the back; interorbital space nearly straight; snout pointed anteriorly; mouth terminal, oblique, maxillary scarcely reaching a vertical through anterior border of nostril; jaws subequal, the lower more or less projecting beyond the upper; anterior edge of lower jaw rather sharp; eye large, anterior; nostrils close together, in front of the eye above, the anterior in a short tube; pharyngeal teeth slender, canine-like; gill-rakers setiform, slender and long. Dorsal fin inserted nearer tip of snout than base of caudal, armed with two smooth spines, first spine nearly half as long as the second, anterior ray the longest; pectoral elongate, scarcely reaching the root of the ventral; origin of ventral in advance of that of the dorsal, rather slender, not reaching the vent; anal fin high, elongate, entirely behind the dorsal, anterior ray the longest; caudal peduncle long, strongly compressed, its depth 2.43 in head; caudal fin strongly forked, tip of each lobe sharply pointed. Body covered with thin cycloid scales; lateral line continuous, abruptly bending downwards above the pectoral, thence extends backwards making a weak curve, running along the lower half of the tail. Color in alcohol grayish above, belly and lower parts of sides silvery; fins whitish; caudal fin gray. Total length 93 mm.

Type, No. 49,953, A. N. S. P. Ako, collection of Eiji Matsuda.

Differs distinctly from *Cultricus kneri* in having 45 scales in the lateral line.

39. *Oryzias latipes* (Temminck & Schlegel).

Kizan Island, Giran (abundant); Lake Candidius (15); Taiko, Giran (4).

40. *Gambusia affinis* (Baird & Girard).

This American species was originally brought from Texas to Hawaii, by Mr. Alvin Seale. Collected from rice-fields at Kwarenko. As a result of artificial propagations enforced by the Government for the purpose of extirpation of mosquitoes the present species is becoming very common in streams and stagnant pools of Formosa.

41. *Fluta alba* (Zuiew).

Shori, Toyen (1); Ako (2).

42. *Anguilla mauritiana* Bennett.

One from Ako and 5 from Shinkaiyen, Daito.

43. *Anguilla japonica* Temminck & Schlegel.

Tozen River, Shinchiku (1); Lake Candidius (1); Shinchiku (2); Ako (1).

44. *Mugil cephalus* Linnaeus.

Kwaren River at Kada, Kwarengo (3); Inzampo, Giran (1).

45. *Mugil oeur* Forskal.

Kwaren River at Kada, Kwarengo (2); Botansha, Daito (1).

46. *Liza troscheli* (Bleeker).

One from Rinraku, Ako.

47. *Polyacanthus operculatus* (Linnaeus).

Maruyama, Taihoku (8); Ako (2).

48. *Kuhlia marginata* (Cuvier & Valenciennes).

Mokui River at Domon, Kwarengo (1); Kwarengo (2); Shukoran River, Kwarengo (3); Tamazato, Kwarengo (12); Beiron River, Kwarengo (3); Shinchiku (3).

49. *Ophicephalus tadianus* Jordan & Evermann.

Inzampo, Giran (1); Ako (2).

50. *Eleotris oxycephala* (Schlegel).

Inzampo, Giran (2); Kirburan, Giran (6); Beiron River, Kwarengo (5); Ako (2).

51. *Eleotris fusca* (Schneider).

Two from Surenbi, Kwarengo.

52. *Sicyopterus japonicus* (Tanaka).

Taiko, Giran (5); Heirinbi, Giran (2); Taichu (5); Kunanau River at Kapiyan, Ako (9).

53. *Rhinogobius candidus* (Regan).

Maruyama, Giran (5); Shito, Giran (1); Tensonpi, Giran (1); Wodensho, Taichu, (1); Lake Candidius (18); Koshiryo, Giran (6); Shishito, Nanto (4).

54. *Rhinogobius giurinus* (Rutter).

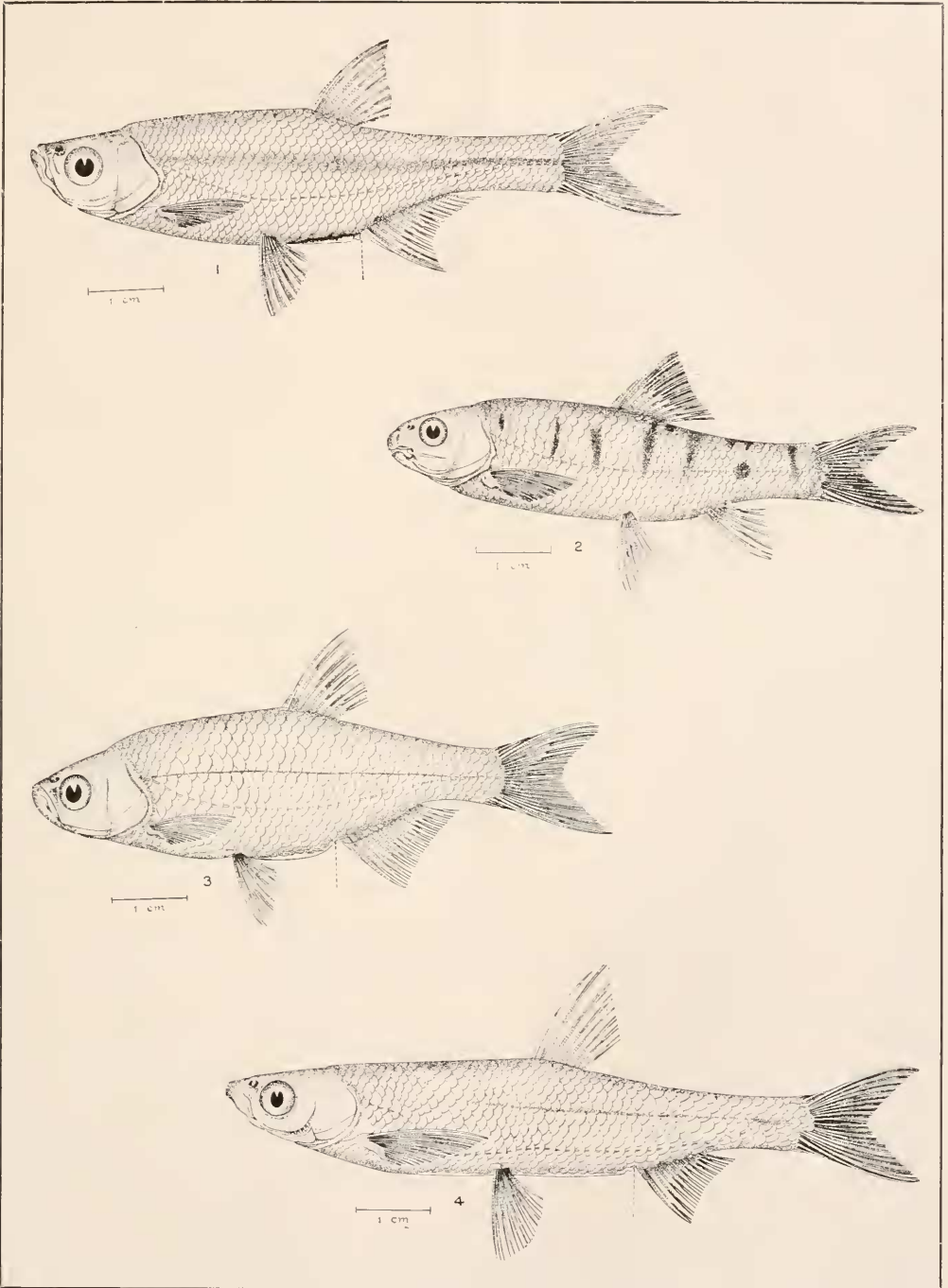
Taiha, Giran (9); Heirinbi, Giran (1); Tensompi, Giran (3); Buroko River, Giran (1); Raupi, Giran (3); Inzampo, Giran (1); Beiron River, Kwarengo (1); Sobun River, Tainan (1); Ako (1).

55. *Rhinogobius formosanus* Oshima.

Dakusui, Giran (1); Koanronsha, Taichu (1); Ogyuran, Nanto (3); Lake Candidius (16); Sobun River, Tainan (4).

56. *Rhinogobius taiwanus* Oshima.

Ogyuran, Nanto (5); Heirinbi, Giran (1); Taiko River, Taichu (1).



OSHIMA: FORMOSA FISHES.