

Three New Species of Rainbowfishes (*Melanotaeniidae*) from the Triton Lakes, Irian Jaya, New Guinea

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Abstract:

Three new melanotaeniid fishes are described from the Triton Lakes area of western Irian Jaya, Indonesia. They are closely related to one another and apparently evolved from an ancestor of the wide-ranging *Melanotaenia goldiei*.

Melanotaenia kamaka n. sp. is described from 29 specimens, 38.5-60.5 mm SL, collected at Lake Kamakawaiar, and *M. lakamora* n. sp. is described on the basis of 75 specimens, 25.5-54.9 mm SL, from nearby Lake Lakamora and Lake Aiwaso. They differ primarily in colour pattern, but also in modal number of anal fin rays and the length of the posterior rays of males (those of *M. lakamora* are more elongate). *Melanotaenia pierucciae*, the third new species, is described from 13 specimens, 28.9-58.7 mm SL, collected from a small creek near Lake Kamakawaiar. It is similar to *M. kamaka* and *M. lakamora*, but differs in colour pattern and proportions. Males are more slender and the species also has a more slender

caudal peduncle, and shorter dorsal rays in the second dorsal fin. It further differs from *M. kamaka* in having a shorter caudal peduncle and shorter anal rays.

Zusammenfassung:

Drei neue *Melanotaeniiden* aus den Triton-Seen im westlichen Irian Jaya, Indonesien, werden beschrieben. Sie sind eng miteinander verwandt und entwickelten sich offenbar aus einem Vorläufer der weitverbreiteten Art *Melanotaenia goldiei*.

Melanotaenia kamaka n. sp. wird anhand von 29 Exemplaren (38,5-60,5 mm SL) beschrieben, gesammelt im Lake Kamakawaiar; *M. lakamora* n. sp. wird auf der Basis von 75 Exemplaren (25,5-54,9 mm SL) aus den nahebei gelegenen Seen Lake Lakamora und Lake Aiwaso beschrieben. Die Arten unterscheiden sich hauptsächlich im Farbmuster, aber auch in den Modalzahlen der Analflossenstrahlen und in der Länge der hinteren Flossenstrahlen der Männchen (die von *M. lakamora* sind länger). *Melanotaenia pierucciae*, die dritte neue Art, wird anhand von 13 Exemplaren (28,9-58,7 mm SL) beschrieben, die aus einem kleinen Bach nahe dem Lake Kamakawaiar stammen. Die Art ähnelt *M. kamaka* und *M. lakamora*, unterscheidet sich aber in Farbmuster und Proportionen. Die Männchen sind schlanker, der Schwanzstiel der Art ist schmaler und die Flossenstrahlen der zweiten Dorsale sind kürzer. Von *M. kamaka* unterscheidet sie sich außerdem durch einen kürzeren Schwanzstiel und kürzere Analflossenstrahlen.

Introduction

Rainbowfishes are common freshwater inhabitants of New Guinea and Australia. They are small (usually under 12 cm SL), brightly-coloured fishes, believed to have evolved in relatively recent times from marine atherinoids (Allen, 1980a). They appear to have a sister-group relationship with the Pseudomugilidae (Saeed et al., 1989). Approximately 60 species, including several undescribed ones, belonging to six genera

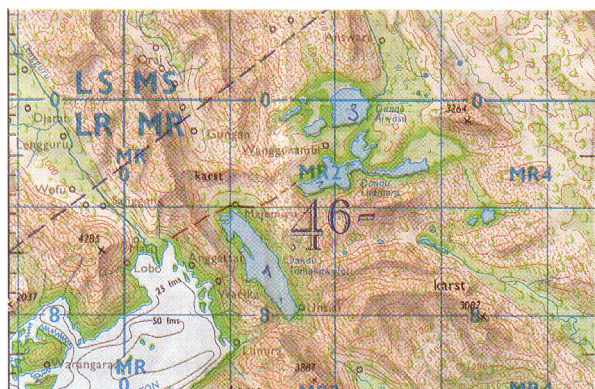


Fig. 1. Map of Triton Lakes, Irian Jaya, Indonesia.

have been recorded to date (Allen, 1995). The majority occur in New Guinea, which has been a particularly fertile region for new discoveries; 22 species have been described thence by the first author and colleagues since 1980 (Allen, 1980b and c, 1981a, b and c, 1982a and b, 1983, 1985, 1987, and 1990; Allen and Cross, 1980).

The present paper describes the melanotaeniid fauna of the Triton Lakes, which are situated on the southern coast of Irian Jaya, immediately east of the Bomberai Peninsula and about 50 km due east of the seaport of Kaimana (Fig. 1). The lakes are surrounded by high limestone hills and lie just inland from Triton Bay. There are three main lakes: Kamakawaiar, Lakamora, and Aiwaso. Kamakawaiar (usually referred to as Kamaka, Fig. 2) lies less than 5 km from the coast and is separated from the second lake, Lakamora (Fig. 3), by a distance of about 7 kilometres, which takes 5-6 hours to negotiate on foot. The third lake, Aiwaso (Fig. 4), lies only a few hundred metres from Lakamora. The lakes do not appear to have any outlet streams and drainage is presumably subterranean.

The fish fauna of this area is relatively small, but highly unique. It consists of 10 species, including two atherinids, three melanotaenids, and five eleotrids. All species, except the widely-distributed gudgeon *Oxyeleotris fimbriata*, appear to be endemic to the lakes or immediate area. They were collected for the first time on expeditions by G. Allen and colleagues in 1991, by Heiko Bleher and colleagues in 1995, and by the authors later in 1995. One species, the atherinid *Craterocephalus fistularis* (Crowley et al., 1995), was recently described, and descriptions are at present being prepared for the remainder of the fauna by the present authors and colleagues.

Methods:

The first author visited Lake Kamakawaiar for a few hours on 14 May 1991 with David Price and Gary Friesen. A small fish collection was made with a seine net in shallow water. Heiko Bleher, a German aquarium fish collector, researcher, author, and photo-journalist, visited this lake, a small creek, and also Lake Lakamora over a two-day period in June 1995 together with Paola Pierucci and Patrick de Rham. He made live collections of the three new rainbowfishes, whose progeny will soon be released into the international aquarium trade. The present authors made collections in the area over a five-day period in July 1995. We visited all three lakes, and also collected at the small creek visited by Heiko Bleher, about 2 km from Lake Kamakawaiar along the foot track leading to Lake Lakamora.

Collection Stations. - Collections were made with seine nets and powdered rotenone at the localities listed below.

Station 1. - Lake Kamakawaiar, (3°47'S, 134°14'E), southeastern side of lake, seine net in 0.5-1.5 m depth, G. Allen, D. Price and G. Friesen, 14 May 1991.

Station 2. - Lake Lakamora (3°41'S, 134°17'E); creek-like extension of shoreline on middle of north side of lake; water clear over mud bottom; patchy aquatic vegetation; altitude 210 m; water temperature 27.9°C; pH 8.4; conductivity 190 µS; fishes collected with seine, hook and line, and 0.25 kg of rotenone powder by G. Allen and S. Renyaan on 17 July 1995.

Station 3. - Lake Aiwaso (3°39'S, 134°16'E); water slightly turbid over limestone boulder bottom on margin of lake; dense aquatic vegetation; altitude 210 m; water temperature 28.9°C; pH 8.0; conductivity 60 µS; fishes collected with seine and 0.25 kg of rotenone powder by G. Allen on 17 July 1995.

Station 4. - Small (1-2 m wide) tributary of Werfyang Creek, about 1 km NE of Lake Kamakawaiar (3°42.6'S, 134°11.7'E); water clear and slow-flowing over mud, rock, and leaf-covered bottom; sparse aquatic vegetation; altitude 110 m; water temperature 24.8°C; pH 7.4; conductivity 260 µS; fishes collected with 0.25 kg of rotenone powder by G. Allen and S. Renyaan on 18 July 1995.

The methods of counting and measuring are as follows: **dorsal and anal rays** - the last ray of the anal and second dorsal fins is divided at the base and counted as a single ray; **lateral scales** - number of scales in horizontal row from upper corner of gill cover to caudal-fin base, excluding the small scales posterior to the hypural junction; **transverse scales** - number of scales in vertical row between anal fin origin and base of first dorsal fin; **predorsal scales** - number of scales along midline of nape in front of first dorsal fin; **cheek scales** - total number of scales covering the suborbital and preoperculum; **standard length (SL)** - measured from the tip of the upper lip to the caudal-fin base; **head length** - measured from the tip of the upper lip to the upper rear edge of the gill opening; **caudal peduncle depth** is the least depth and **caudal peduncle length** is measured between two vertical lines, one passing through the base of the last anal ray and the other through the caudal-fin base.

Counts and measurements that appear in parentheses in the new species descriptions refer to the range for paratypes if different to the holotype. Type specimens are deposited at the Museum Zoologicum Bogoriense, Bogor, Indonesia (MZB) and the Western Australian Museum, Perth (WAM).

Descriptions

Melanotaenia kamaka n. sp. Kamaka Rainbowfish (Figs. 2 & 3)



Fig. 2. *Melanotaenia kamaka* n. sp., male, alive, approximately 55 mm SL, Lake Kamaka. Coll. & photo: G. R. Allen.



Fig. 3. *Melanotaenia kamaka* n. sp., female, alive, approximately 50 mm SL, Lake Kamaka. Coll. & photo: G. R. Allen.

Holotype: MZB 6203, male, 56.5 mm SL, Lake Kamakawair, Station 1.

Paratypes: MZB 6204, 18 specimens, 38.5-58.1 mm SL, Lake Kamakawair, Station 1; WAM P.30519-001, 10 specimens, 42.5-60.5 mm SL, Lake Kamakawair, Station 1.

General description

Dorsal rays V-I, 13 (IV to VI, 10 to 13); anal rays I, 21 (I, 19-22); pectoral rays 14 (13 to 15); pelvic rays I, 5; branched caudal rays 15; lateral scales 36 (33 to 38); transverse scales 11 (11 or 12); predorsal scales 19 (17 to 19); cheek scales 21 (16-20); gill rakers on first arch $2 + 14 = 16$ (2 + 12 to 14).

Body depth 2.1 (2.1-2.8), head length 3.6 (3.6-3.8), both in SL. Greatest width of body 3.4 (2.7-3.4) in greatest body depth. Snout length 3.4 (3.1-3.6), eye diameter 2.8 (2.3-3.0), interorbital width 3.0 (2.6-3.0), depth of caudal peduncle 2.5 (2.4-2.7), length of cau-

dal peduncle 1.7 (1.5-1.9), all in head length.

Jaws about equal, oblique, premaxilla with an abrupt bend between the anterior horizontal portion and lateral part; maxilla ends at level of front border of eye or slightly anterior; lips thin; teeth conical with slightly curved tips, extending on to outer surface of lips; teeth in upper jaw in 2-3 irregular rows anteriorly, reduced to a single row posteriorly, where they are exposed when mouth is closed; about 70-75 teeth in outer row of upper jaw; teeth in lower jaw in about 6-8 irregular rows anteriorly, reduced to 1 or 2 rows posteriorly; several rows of small, conical teeth on vomer; palatines with row of small conical teeth, although teeth sometimes absent.

Scales relatively large, arranged in regular horizontal rows; most of body scales with crenulate margins; predorsal scales extending to posterior half of interorbital; preopercle with 2 (2 or 3) scale rows from posterior angle to edge of eye.

First dorsal fin originates about even with level of anal fin origin; longest spine (first in females, third in males) of first dorsal fin 2.1 (1.6-2.5) in head length, its depressed tip reaching spine of second dorsal fin or falling just short of this point in females and first soft ray in mature males. Longest rays (anterior rays in females, posterior rays in males) of second dorsal fin 2.4 (2.0-2.5) in head length, the depressed posterior rays extending about one-half length of caudal peduncle in females and one half to two thirds length of caudal peduncle in mature males. Longest (middle rays in both males and females) anal rays 2.0 (2.0-2.5) in head length. Pelvic fin tips when depressed reaching first or second soft anal ray; length of pelvic fins 1.6 (1.6-2.1), of pectoral fins 1.4 (1.2-1.4), of caudal fin 1.3 (1.0-1.2), all in head length. Caudal fin moderately forked.

Colour in life: bronze to silvery blue-green on upper back, grading to silvery white on lower half; upper half of body of males frequently flecked with silver; body scales with narrow dark outline, more intense on two midlateral scale rows; males can expand melanophores of these two rows, forming blue to blackish midlateral stripe on posterior part of body, including caudal peduncle; blue to blackish patch usually present, especially on mature males, between the upper rear corner of eye and region under the pectoral fin; first dorsal, pelvic, and anal fins whitish; second dorsal and caudal fins translucent with bluish suffusion; pectoral fins translucent; female fin coloration generally more diffuse and more translucent compared to males.

Colour in alcohol: upper half of body light brown, lower half yellow-tan to whitish; scales of body, particularly on upper half, with narrow dark outline; fins translucent to dusky grey.

Sexual dimorphism: besides the colour differences mentioned above, females often exhibit a diffuse

midlateral stripe, about one and a half scales wide and extending from the eye to the base of the caudal fin. Fin shape differences between sexes are not as apparent as in most other members of the genus, but as in most *Melanotaenia* there is a pronounced difference in body depth. Males increase in body depth with advanced age. A comparison of the maximum depth in specimens exceeding 50 mm SL reveals an average depth

(as percentage of SL) of 44.7 for males ($n = 5$) and 38.0 for females ($n = 5$). A similar comparison for specimens under 50 mm SL shows an average depth of 40.3 for males ($n = 5$) and 36.0 for females ($n = 10$).

Distribution and habitat

The species is apparently restricted to Lake Kamaka (Fig. 4 & 5). The lake is approximately 10 km long and



Fig. 4. LakeKamakawaiar (Kamaka), Irian Jaya, Indonesia. Type locality of *Melanotaenia kamaka* n. sp.. Photo: G. R. Allen.



Fig. 5. A large part of the shore of Lake Kamakawaiar consists of rough white stone. Photo: G. R. Allen.

2-4 km wide and is surrounded by steep, forested hills. Aggregations were common in shallow areas next to shore over boulder and weed bottoms. Underwater visibility in the lake was about 3-5 m. The following measurements were recorded on 19 July 1995: water temperature 28.9°C; pH 8.0; and conductivity 220 µS.

Comparisons

Melanotaenia kamaka is closely related to *M. lakamora*, which is described below. The two species no doubt evolved from the same ancestral stock and are related to *M. goldiei*, a species distributed widely in southern New Guinea. They differ primarily in colour pattern. In addition, there appears to be a discrepancy in the modal number of anal fin rays (Table I), with 20, 21, and 22 rays being equally represented in *M. kamaka* compared to the situation in *M. lakamora* where there is a peak of 20 rays with about half of the specimens having either 19 or 21 rays. Finally, there is also a difference in the length of the posterior rays of males. Those of *M. lakamora* are more elongate, nearly reaching the caudal fin base, whereas in *M. kamaka* the posterior rays fall well short of the caudal.

Etymology

The species is named *kamaka*, the name used by inhabitants of Triton Bay for Lake Kamakawaiar, the type locality.

Melanotaenia lakamora n. sp. Lakamora Rainbowfish (Figs. 6 & 7)

Holotype: MZB 6205, male, 48.0 mm SL, Lake Lakamora, Station 2.

Paratypes: MZB 6206, 46 specimens, 31.5-54.9 mm SL, Lake Lakamora, Station 2; WAM P.31043-001, 22 specimens, 37.7-51.7 mm SL, Lake Lakamora, Station 2; WAM P.31042-004, 6 specimens, 25.5-54.3 mm SL, Lake Aiwaso, Station 3.



Fig. 6. *Melanotaenia lakamora* n. sp., male, alive, ca. 50 mm SL, Lake Lakamora. Coll. H. Bleher. Photo: G. R. Allen.



Fig. 7. *M. lakamora* n. sp., female, alive, paratype, 43.0 mm SL, Lake Lakamora. Coll. & photo: G. R. Allen.



Fig. 8. *M. lakamora*, male, alive, paratype, 54.3 mm SL, Lake Aiwaso. Coll. & photo: G. R. Allen.

General description

Dorsal rays V-I, 12 (IV to VI, 10 to 13); anal rays I, 21 (I, 18-22); pectoral rays 14 (13 to 15); pelvic rays I, 5; branched caudal rays 15; lateral scales 35 (34 to 36); transverse scales 11 (10 to 12); predorsal scales 19 (17 to 19); cheek scales 16 (15-19); gill rakers on first arch 3 + 12 = 15 (2 + 12 to 13).

Body depth 2.4 (2.1-3.0), head length 3.4 (3.3-3.7), both in SL. Greatest width of body 2.8 (2.4-3.4) in greatest body depth. Snout length 3.5 (3.1-3.8), eye diameter 2.7 (2.6-3.1), interorbital width 2.6 (2.6-3.0), depth of caudal peduncle 2.5 (2.4-2.6), length of caudal peduncle 2.2 (1.7-2.2), all in head length.

Jaws about equal, oblique, premaxilla with an abrupt bend between the anterior horizontal portion and lateral part; maxilla ends at level of front border of eye; lips thin; teeth conical with slightly curved tips, extending on to outer surface of lips; teeth of upper jaw in 2-3 irregular rows anteriorly, reduced to a single row posteriorly, where they are exposed when mouth is closed; about 65-70 teeth in outer row of upper jaw; teeth in lower jaw in about 6-7 irregular rows anteriorly, reduced to 1 or 2 rows posteriorly; several rows of small, conical teeth on vomer; palatines with row of small conical teeth, although teeth sometimes absent.

Scales relatively large, arranged in regular horizontal rows; most of body scales with distinctly scalloped margins; predorsal scales extending to posterior half of interorbital; preopercle with 2 (2 or 3) scale rows from posterior angle to edge of eye.

First dorsal fin originates about even with level of anal fin origin; longest spine (first in females, third in males) of first dorsal fin 1.6 (1.6-2.4) in head length, its depressed tip reaching spine or first soft ray of second dorsal fin in females and second or third soft ray in mature males. Longest rays (anterior rays in females, posterior rays in males) of second dorsal fin 2.2 (1.9-2.4) in head length, the depressed posterior rays extending about one half length of caudal peduncle in females and nearly to caudal fin base in mature males. Longest (middle rays in both males and females) anal rays 2.1 (2.1-2.6) in head length. Pelvic fin tips when depressed reaching base of anal spine or first soft anal ray in females and first or second anal ray in mature males; length of pelvic fins 1.5 (1.6-1.9), of pectoral fins 1.3 (1.2-1.4), of caudal fin 1.2 (1.0-1.4), all in head length. Caudal fin moderately forked.

Colour in life: an adult male, approximately 50 mm SL, from Lake Lakamora, photographed in an aquarium (Fig. 6), was overall mauve except for silvery white on breast and lower half of head; four lateral scale rows on middle of body separated by bright orange stripes; broad, blackish to dark blue, midlateral stripe, most intense from eye to pectoral region and on caudal peduncle, one scale wide anteriorly and occupying two scale rows posteriorly; scales of body with narrow dark margins, most evident on lower half, particularly above anal fin where several "zig-zag" lines may be apparent; dorsal and anal fins reddish (sometimes bright red); pelvic fins slightly orange to translucent; caudal and pelvic fins mainly translucent. Female specimens from Lake Lakamora were bronze on upper half and whitish below with blackish midlateral stripe 1-1 1/2 scales wide; narrow orange stripes along upper and lower edge of dark midlateral stripe; body scales with narrow dark margins, particularly evident on lower half; fins whitish to translucent, except second dorsal and anal with pale orange suffusion. A male paratype, 54.3 mm SL, from Lake Aiwaso was pale mauve on the upper half and silvery white below with golden scale margins (Fig. 8).

Colour in alcohol: brownish on upper half of body, whitish on lower half, with broad, blackish, midlateral stripe, frequently interrupted or diffuse on middle of side behind pectoral region; dorsal, anal, and pelvic fins very dusky, nearly blackish in males, lighter in females; caudal fin grey to translucent. Females and immature fish generally paler with narrower, less distinct, dark midlateral stripe, more or less continuous from eye to caudal fin base. Specimens less than

about 40 mm SL frequently with several small dark blotches just posterior to pectoral fin and overlying midlateral stripe. The 54.3 mm SL male from Lake Aiwaso that exhibited golden-orange scale margins in life (Fig. 8) is identical in preservative to similar-sized specimens from Lake Lakamora.

Sexual dimorphism: males have a longer first dorsal fin and more pointed, elongate posterior dorsal fin rays. They are also significantly more deep-bodied than females. The average body depth as percentage of SL of specimens exceeding 47 mm SL is 42.6 ($n = 6$) for males compared to 32.6 for females ($n = 2$); in specimens less than 47 mm SL the figures are 37.7 for males ($n = 10$) and 32.9 ($n = 4$).

Distribution and habitat

The species occurs in Lake Lakamora (Fig. 9) and nearby Lake Aiwaso (Fig. 10). Lakamora is approximately 6-7 km long and 1-3 km wide. Aiwaso is roughly circular with a diameter of about 2.5 km. Both lakes are surrounded by steep forested hills. The two are separated by a 100 m high ridge. Aggregations are common in shallow areas next to shore over boulder and weed bottoms. Underwater visibility is about 3-5 m.

Etymology

The species is named *lakamora*, with reference to Lake Lakamora, the type locality.



Fig. 9. Lake Lakamora, Irian Jaya, Indonesia, type locality of *Melanotaenia lakamoran*. sp.. Photo: G. R. Allen.



Fig. 10. Lake Aiwaso. Photo: G. R. Allen.



Fig. 11. *Melanotaenia pierucciae* n. sp., male, alive, holotype before preservation, 59.0 mm SL, Werfyang Creek near Lake Kamakawaiar, Irian Jaya, Indonesia. Coll. & photo: G. R. Allen.



Fig. 12. *M. pierucciae*, male, alive, ca. 60.0 mm SL, Werfyang Creek near Lake Kamakawaiar. Coll. & photo: G. R. Allen.

***Melanotaenia pierucciae* n. sp.**
Pierucci's Rainbowfish (Figs. 11 & 12)

Holotype: MZB 6207, male, 58.7 mm SL, Werfyang Creek, Station 4.

Paratypes: MZB 6208, 7 specimens, 28.9-49.1 mm SL, Werfyang Creek, Station 4; WAM P.31044 -002, 5 specimens, 36.9-51.6 mm SL, Werfyang Creek, Station 4.

General description

Dorsal rays VI-I, 13 (IV to VII, 11 to 14); anal rays I, 21 (I, 20-24); pectoral rays 14 (14 or 15); pelvic rays I, 5;

branched caudal rays 15; lateral scales 35 (34 to 35); transverse scales 10 (9 or 10); predorsal scales 17 (16 to 18); cheek scales 23 (16-21); gill rakers on first arch $3 + 13 = 16$ (2 or $3 + 13$ or 14).

Body depth 2.6 (2.6-2.9), head length 3.5 (3.3-3.5), both in SL. Greatest width of body 3.0 (2.4-2.9) in greatest body depth. Snout length 3.1 (3.5-4.7), eye diameter 3.2 (3.3-4.0), interorbital width 3.4 (3.4-3.9), depth of caudal peduncle 2.7 (3.1-3.8), length of caudal peduncle 2.0 (2.1-2.7), all in head length.

Jaws about equal, oblique, premaxilla with an abrupt bend between the anterior horizontal portion and lat-

eral part; maxilla ends at about level of front border of eye; lips thin; teeth conical with slightly curved tips, extending on to outer surface of lips; teeth of upper jaw in 4-5 irregular rows anteriorly, reduced to a single row posteriorly, where they are exposed when mouth is closed; about 60 teeth in outer row of upper jaw; teeth in lower jaw in about 7-8 irregular rows anteriorly, reduced to 1 or 2 rows posteriorly; several rows of small, conical teeth on vomer; palatines with row of small conical teeth, although teeth sometimes absent.

Scales relatively large, arranged in regular horizontal rows; most of body scales with crenulate margins; predorsal scales extending to posterior half of interorbital; preopercle with 2 (2 or 3) scale rows from posterior angle to edge of eye.

First dorsal fin originates about even with level of anal fin origin; longest spine (first in females, third or fourth in males) of first dorsal fin 2.0 (2.2-3.1) in head length, its depressed tip reaching spine or first ray of second dorsal fin in females and first or second soft ray in mature males. Longest rays (middle rays in males and females) of second dorsal fin 2.5 (2.8-3.7) in head length, the depressed posterior rays extending about 1/2 length of caudal peduncle in females and to posterior third of caudal peduncle in mature males. Longest (middle rays in males and females) anal rays 2.5 (2.8-3.5) in head length. Pelvic fin tips when depressed reaching spine or first soft ray of anal fin; length of pelvic fins 2.0 (2.0-2.4), of pectoral fins 1.4 (1.5-1.8), of caudal fin 1.3 (1.3-1.7), all in head length. Caudal fin moderately forked.

Colour in life: mauve or purplish on upper back with bronze sheen, white or very pale mauve on lower half (except a large violet patch may be evident just behind pectoral fin); body scales with narrow dark outline, more intense on ventral half, particularly those above anal fin where scales often have greatly expanded black margins; broad, blackish to dark blue, midlateral stripe between eye and base of caudal fin, occupying about two horizontal scale rows, except interrupted on middle of side for about 6-7 vertical scale rows (scales in this area have a bronze sheen); first dorsal fin white; second dorsal fin bluish; anal fin dusky grey to whitish; caudal and pectoral fins translucent, dorsal and ventral edge of caudal fin narrowly black on basal half; female fin coloration generally less intense and more translucent compared to males.

Colour in alcohol: similar to live coloration except brown on upper half and whitish on lower half; fins translucent to dusky grey.

Sexual dimorphism: males have a more intense colour pattern, particularly with regard to the midlateral stripe. The species exhibits fin shape differences, typical for the genus, in which males have a longer first dorsal fin and the posterior profiles of the second dorsal and anal

fins are somewhat elongate and pointed. Males probably have a deeper body as well, although only a single mature female, 49.1 mm SL, was collected; it had a body depth 34.7 percent of SL. The average body depth of three males, 50.4-58.7 mm SL, was 36.3 percent of SL, and 35.9 percent of SL for four males, 36.0-46.3 mm SL.

Distribution and habitat

The species is known only from Werfyang Creek, which flows into the northwestern end of Lake Kamakawaiar. The habitat lies about 1-2 km upstream from the lake and is separated from it by a scenic 20 m high waterfall. The fish was common in the main creek (about 4-5 m wide and 1-2 m deep) as well as a small tributary (about 1-2 m wide and 0.3-0.5 m deep), both flowing through dense rainforest. The water was crystal clear and flowing rapidly in Werfyang Creek, but slowly in the small tributary.



Fig. 13. Werfyang Creek near Lake Kamakawaiar, type locality of *M. pierucciae* n. sp.. Photo: H. Bleher.

Comparisons

Melanotaenia pierucciae is closely related to *M. kamaka* and *M. lakamora*, which are described above. It differs in both colour pattern and proportions. Males are more slender; the average depth of specimens over 50 mm SL was 36.7 versus more than 42.0 for the other species. It also has a more slender caudal peduncle (least depth 2.7-3.8 versus 2.4-2.7 in head length), and shorter dorsal rays in the second dorsal fin (2.5-3.7 versus 1.9-2.5 in head length). It further differs from *M. kamaka* in having a shorter caudal peduncle (2.0-2.7 versus 1.5-1.9 in head length), and shorter anal rays (2.5-3.5 versus 2.0-2.5 head length). Finally, there is also a discrepancy in modal counts of first dorsal fin spines. *Melanotaenia pierucciae* most often has six spines compared to a mode of five spines in the other two species.

Etymology

The species is named in honour of Miss Paola Pierucci, who, together with Mr. Heiko Bleher, discovered the species.

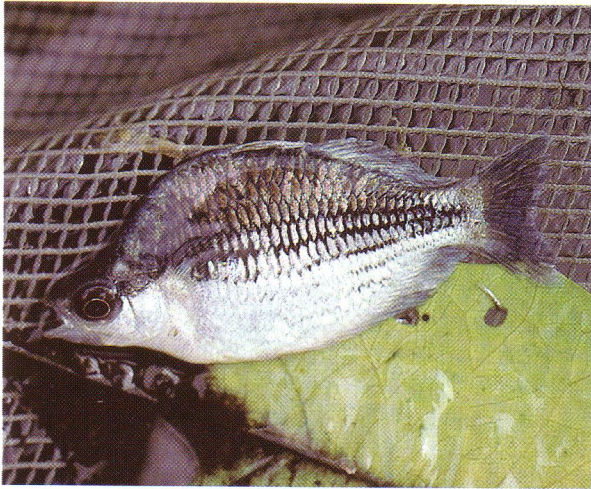


Fig. 14. *M. kamaka*, male, adult, alive, photographed in the net, at the type locality. Coll. & photo: H. Bleher.



Fig. 15. *M. kamaka*, male, adult, alive, photographed in the aquarium about 6 months after coll.. Photo: P. Schupke.

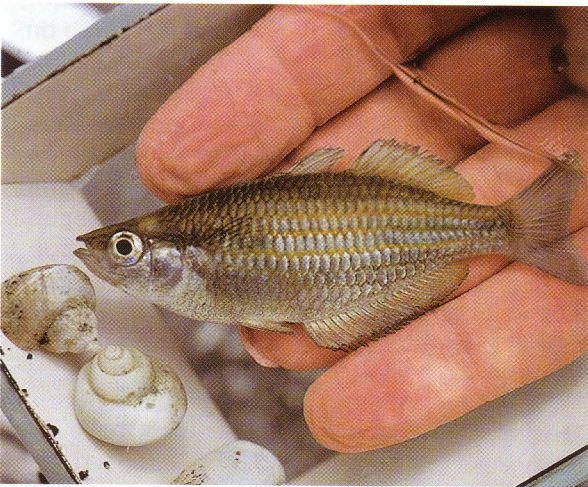


Fig. 16. *M. lakamora*, female, adult, alive, photographed at type locality. Coll. & photo: H. Bleher.



Fig. 17. *M. lakamora*, female, adult, alive, photographed about 7 months after coll. in aquarium. Photo: P. Schupke.



Fig. 18. *M. pierucciae*, semi-adult, female, alive, photographed at type locality. Photo: H. Bleher.



Fig. 19. *M. pierucciae*, female, adult, alive, photographed about 6 months after coll.. Photo: H. Bleher.

Table I. Summary of dorsal, anal, and pectoral fin-ray counts for type specimens of *Melanotaenia kamaka*, *M. lakamora*, and *M. pierucciae*.

	First Dorsal Fin Spines				Soft Dorsal Rays				
	IV	V	VI	VII	10	11	12	13	14
<i>M. kamaka</i>	1	20	6		1	9	11	6	
<i>M. lakamora</i>	3	22	4		1	11	13	4	
<i>M. pierucciae</i>	1	3	8	1		1	5	5	2

	Soft Anal Rays				Pectoral Rays				
	18	19	20	21	22	23	24	13	14
<i>M. kamaka</i>		3	8	8	8			3	23
<i>M. lakamora</i>	1	7	14	6	1			7	18
<i>M. pierucciae</i>			2	5	3	2	1		11

Table II. Proportional measurements of selected type specimens of *Melanotaenia kamaka* expressed as percentages of the standard length.

	Holotype MZB 6203	Paratype WAM P.30519 -001	Paratype MZB 6204	Paratype WAM P.30519 -001	Paratype WAM P.30519 -001	Paratype MZB 6204
	male	male	female	female	male	female
Standard length (mm)	56.5	60.5	55.5	51.9	49.6	46.0
Body depth	46.9	41.0	36.8	39.5	42.5	35.2
Body width	13.8	12.4	13.2	14.1	13.3	13.3
Head length	27.8	27.3	27.6	27.9	26.4	27.8
Snout length	8.1	8.3	8.1	7.9	8.5	8.5
Eye diameter	9.9	9.9	11.2	10.2	11.3	9.3
Bony interorbital width	9.4	9.3	10.1	10.0	10.1	9.3
Depth of caudal peduncle	11.0	10.9	10.3	11.8	10.3	10.9
Length of caudal peduncle	15.9	1.7	17.5	16.0	15.1	15.9
Predorsal distance	51.0	52.4	51.2	49.5	48.2	48.7
Preanal distance	51.3	49.3	52.4	54.1	50.8	51.1
Prepelvic distance	38.1	36.7	40.4	41.4	39.1	38.0
2nd dorsal fin base	27.1	25.6	22.3	24.3	27.8	22.8
Anal fin base	41.9	42.1	36.9	38.5	43.3	36.7
Pectoral fin length	19.5	20.7	20.2	20.8	23.2	21.1
Pelvic fin length	17.7	15.7	13.2	17.1	14.3	14.8
Longest ray 1st dorsal fin	13.3	17.0	10.6	11.9	14.3	13.5
Longest ray 2nd dorsal fin	11.5	11.6	11.0	11.9	10.9	11.7
Longest anal ray	13.6	12.9	11.2	14.1	12.1	11.7
Caudal fin length	20.7	22.8	22.7	23.1	25.6	25.9

Comparison of male colour pattern features of new *Melanotaenia*.

	<i>M. kamaka</i>	<i>M. lakamora</i>	<i>M. pierucciae</i>
Flanks:	bronze-blue	overall mauve	mauve/purplish
Abdomen:	silvery white	silvery white	silvery/bluish
Scales:	dark outlines	dark outlines	dark outlines
Stripe:	blue midlateral*	dark blue midlateral* + 4 orange vertical stripes	dark blue midlateral* + 3 "zig-zag" stripes above anal fin
Head:	blue patch, eye to pectoral	blue patch, eye to pectoral	blue patch, eye to pectoral
Fins:	dorsal/anal fins whitish/bluish	dorsal/anal reddish	dorsal/anal fins bluish

* all 3 species have this midlateral stripe in the center interrupted.

Table III. Proportional measurements of selected type specimens of *Melanotaenia lakamora* expressed as percentages of the standard length.

	Holotype MZB 6205	Paratype MZB 6206	Paratype WAM P.31042 -004	Paratype WAM P.31043 -001	Paratype WAM P.31043 -001	Paratype WAM P.31043 -001
	male	female	male	male	female	female
Standard length (mm)	48.0	55.0	54.3	47.4	45.7	42.2
Body depth	42.1	33.3	47.5	41.8	33.0	33.6
Body width	15.0	13.5	13.8	14.8	13.8	14.2
Head length	29.2	28.2	29.5	28.9	28.0	26.8
Snout length	8.3	8.7	8.8	9.1	7.9	8.8
Eye diameter	10.8	9.3	9.6	10.1	10.5	10.4
Bony interorbital width	11.0	9.8	9.9	9.5	10.3	10.2
Depth of caudal peduncle	11.9	11.8	12.7	11.6	10.7	11.1
Length of caudal peduncle	13.1	15.1	16.6	13.1	16.8	13.7
Predorsal distance	53.1	49.3	51.4	50.6	49.9	50.9
Preanal distance	52.9	52.7	52.5	52.1	53.0	53.8
Prepelvic distance	40.8	39.1	40.5	38.8	39.6	38.9
2nd dorsal fin base	27.1	25.5	26.7	22.6	22.1	25.8
Anal fin base	39.4	37.3	42.0	40.3	33.9	36.0
Pectoral fin length	22.3	20.4	21.4	20.5	22.3	21.6
Pelvic fin length	19.0	16.2	15.5	17.7	15.8	16.8
Longest ray 1st dorsal fin	18.8	14.2	12.2	16.2	14.0	13.3
Longest ray 2nd dorsal fin	13.1	12.2	13.6	11.8	14.2	14.2
Longest anal ray	14.0	13.3	13.6	11.0	11.4	12.3
Caudal fin length	23.5	20.7	2.0	25.1	25.2	26.1

Table IV. Proportional measurements of selected type specimens of *Melanotaenia pierucciae* expressed as percentage of the standard length.

	Holotype MZB 6207	Paratype WAM P.31044 -002	Paratype WAM P.31044 -002	Paratype MZB 6208	Paratype MZB 6208	Paratype WAM P.31044 -002
	male	male	male	female	female	male
Standard length (mm)	58.7	51.6	50.4	49.1	46.3	44.0
Body depth	39.0	32.7	30.3	30.5	30.8	25.9
Body width	12.9	11.2	12.1	12.8	10.7	9.4
Head length	28.6	25.0	24.2	25.0	22.7	21.1
Snout length	9.4	7.2	7.7	8.2	7.5	6.1
Eye diameter	9.0	8.7	7.8	8.3	7.8	7.2
Bony interorbital width	8.5	7.7	8.3	8.3	7.7	7.3
Depth of caudal peduncle	10.6	9.2	8.5	8.9	9.0	7.5
Length of caudal peduncle	14.0	10.7	13.6	11.2	11.1	10.7
Predorsal distance	52.3	43.4	43.1	43.8	40.0	36.1
Preanal distance	51.1	43.8	45.1	46.0	41.2	37.3
Prepelvic distance	38.3	32.9	33.0	33.2	28.8	27.8
2nd dorsal fin base	25.2	22.1	20.3	19.6	19.4	17.4
Anal fin base	39.7	34.8	31.5	29.8	31.7	28.4
Pectoral fin length	20.4	17.9	18.9	16.2	16.0	17.0
Pelvic fin length	14.5	14.5	14.5	12.6	14.1	11.9
Longest ray 1st dorsal fin	14.0	13.3	10.1	9.5	11.9	9.4
Longest ray 2nd dorsal fin	11.2	9.4	9.5	10.2	9.9	7.8
Longest anal ray	11.2	9.5	10.2	9.9	9.0	8.2
Caudal fin length	22.1	19.6	20.1	20.1	20.4	16.7

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Cover photo: *Boophis anjanaharibeensis* n. sp. from Anjanaharibe-Sud Special Reserve, Madagascar. Photo: F. Andreone.



Melanotaenia kamaka n. sp., male, adult, photographed in the aquarium 6 months after collection. Photo: P. Schupke.