Description of *Melanotaenia fasinensis*, a new species of rainbowfish (Melanotaeniidae) from West Papua, Indonesia with comments on the rediscovery of *M. ajamaruensis* and the endangered status of *M. parva*

by

KADARUSMAN (1, 2), SUDARTO (3), Emmanuel PARADIS (1)
& Laurent POUYAUD* (1)

ABSTRACT. - A new species of rainbowfish (Melanotaeniidae) is described from the Bird's Head Peninsula in West Papua (Indonesia). *Melanotaenia fasinensis* is described from the Fasin River in the vicinity of Ween village, 25 km W of Lake Ayamaru. It is distinguished from other melanotaeniids occurring on the Peninsula and in the adjacent Raja Ampat Islands by a distinct colour, the number of transverse scales, lateral scales, predorsal scales, cheek scales and gillrakers, a short head with a long and pointed snout, a narrow interorbital region, relatively small eyes, short and slender caudal, long dorsal and anal fins and a moderately short predorsal length, and moderately short pectoral and pelvic fins. *Melanotaenia fasinensis* is morphologically similar to *M. ajamaruensis*, a species that has not been seen since it was first captured in 1955 (Allen, 1990), but rediscovered during our expedition in 2007 near Ajamaru Lakes. It seems likely that the upstream portion of the Kaliwensi River is the last place where *M. ajamaruensis* still survives. We also highlight the alarming depletion of *M. parva,* which is endemic to Kurumoi Lake. This lake is now nearly dry and contains large numbers of exotic tilapia.

RÉSUMÉ. - Description de *Melanotaenia fasinensis*, une nouvelle espèce de poisson arc-en-ciel (Melanotaeniidae) de Papouasie occidentale, Indonésie, et commentaires sur la redécouverte de *M. ajamaruensis* et sur le statut menacé de *M. parva*.

Une nouvelle espèce de poisson arc-en-ciel (Melanotaeniidae) est décrite sur la Péninsule de la Tête d'Oiseau en Papouasie Occidentale (Indonésie). *Melanotaenia fasinensis* est une espèce endémique de la rivière Fasin dans la région du village de Ween, 25 km à l'ouest des lacs d'Ayamaru. Cette espèce se distingue de toutes les autres espèces nominales présentes sur la Péninsule et dans l'archipel des Raja Ampat par son patron de coloration, le nombre d'écailles transversales, latérales et prédorsales, le nombre d'écailles sur la joue, le nombre de branchiospines sur le premier arc branchial, une tête courte, un museau relativement long et pointu, un os interorbital fin, des yeux modérément petits, un pédoncule caudal court et fin, de longues nageoires anale et dorsale et une distance prédorsale assez courte, des nageoires pelviennes et pectorales assez courtes. *Melanotaenia fasinensis* est morphologiquement proche de *M. ajamaruensis*, une espèce considérée comme éteinte par Allen (1990) mais redécouverte durant notre expédition de 2007 autour des lacs d'Ayamaru. Il semblerait que la partie amont de la rivière Kaliwensi, à proximité de sa résurgence, soit le dernier endroit où *M. ajamaruensis* survit. Nous signalons également l'effondrement alarmant de *M. parva*, endémique du lac Kurumoi. Ce lac peuplé d'une importante population de tilapias introduits est proche de l'assèchement.

Key words. - Melanotaeniidae - *Melanotaenia fasinensis* - *M. ajamaruensis* - *M. parva* - Indonesia - West Papua - New species.

Rainbowfishes of the family Melanotaeniidae are commonly distributed throughout New Guinea and Australia below elevations of 1500 m in most freshwater habitats including streams, lakes and swamps (Allen, 1991). Rainbowfishes are very popular ornamental fish because of their vivid colouration, placid nature and ability to thrive in captivity.

The taxonomy of Melanotaeniidae has a long history with about thirty species described between 1843 and 1964. Numerous expeditions to New Guinea during the past four decades by the Australian ichthyologist Gerald R. Allen increased significantly their known diversity with the description of more than 40 new species.

Melanotaeniids belong to the order Atheriniformes (Nelson 2006) and are believed to have evolved from ancestral marine atherinoids in relatively recent times (Allen, 1980). They are considered to be the sister-group of Pseudomugilidae from freshwaters of Australia and New Guinea (Saeed *et al*., 1989; Sparks and Smith, 2004).

Melanotaeniidae includes seven genera and 76 species (Allen *et al*., 2008). Five genera are represented on the island of New Guinea: *Chilatherina* Regan, 1914, *Glos-*

(1) Institut de Recherche pour le Développement, UR 175, BP 5095, 361 rue J. F. Breton, 34196 Montpellier CEDEX 5, FRANCE. [laurent.pouyaud@ird.fr] [emmanuel.paradis@ird.fr]
(2) Akademi Perikanan Sorong, Jalan Kapitan Pattimura, Tanjung Kasuari, Box 109, Sorong 98410, Papua Barat, INDONESIA. [kadarusman@apsordkp.ac.id]
(3) Loka Riset Budidaya Ikan Hias Air Tawar, Jalan Perikanan, RT 01, RW 02, Pancoran Mas PO Box 06, Depok 16436, INDONESIA.
* Corresponding author

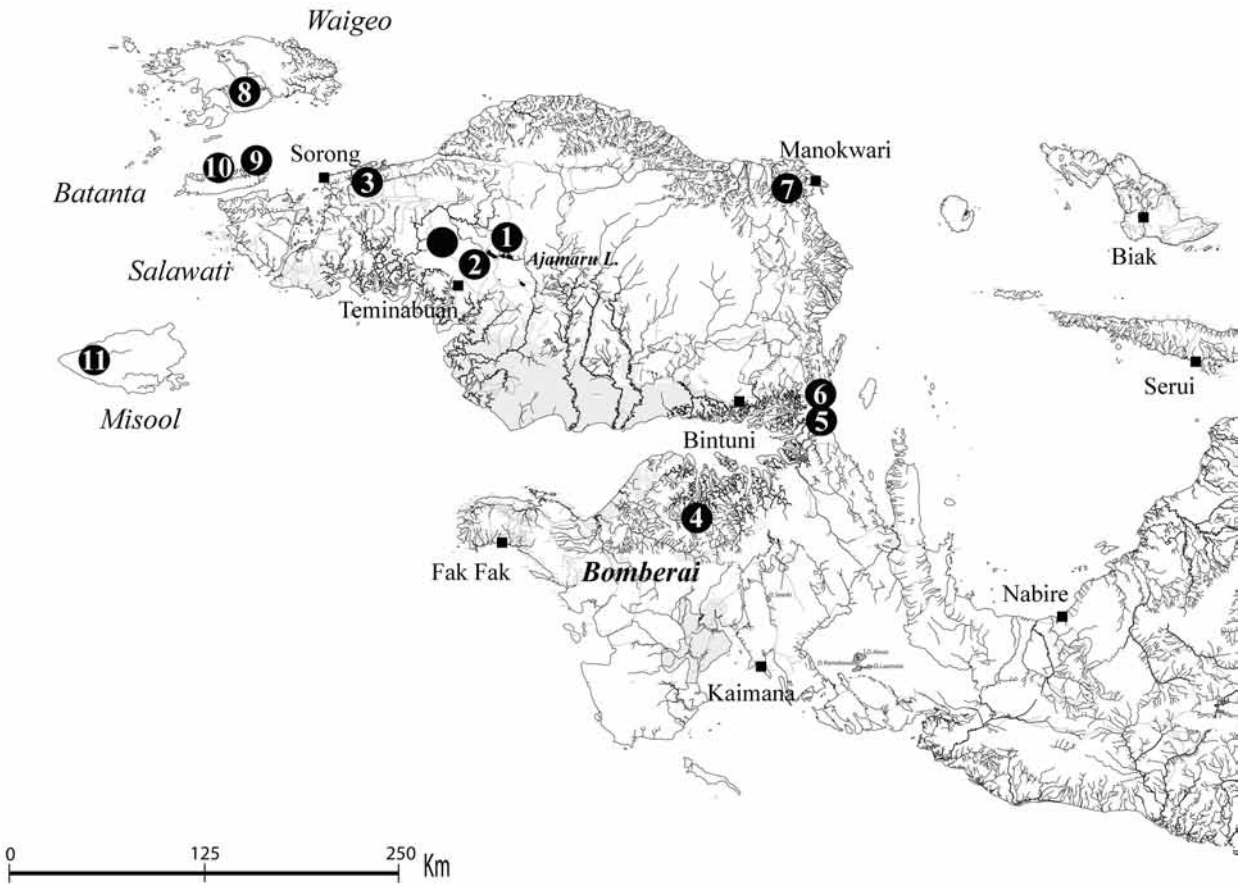

Figure 1. - Type locality of *Melanotaenia fasinensis* (black circle) and all stations (1-11) sampled for the nominal species on Bird's Head Peninsula and Raja Ampat.

solepis Weber, 1907, *Iriatherina* Meinken, 1974, *Melanotaenia* Gill, 1862 and *Pelangia* Allen, 1998. *Melanotaenia* is by far the most diverse genus with 37 species described in New Guinea (Allen and Cross, 1982; Allen, 1991, 1996a, 1996b; Allen and Renyaan, 1996, 1998; Allen and Unmack, 2008; Allen *et al*., 2008).

Following Allen (1995), McGuigan *et al*. (2000) and Allen *et al*. (2008), the Bird's Head region (including the nearby Raja Ampat Islands and Bomberai Peninsula) is a centre of diversity for species of *Melanotaenia*. Currently, 13 species have been described from this region: *Melanotaenia ajamaruensis* Allen & Cross, 1980, *M. ammeri* Allen *et al*., 2008, *M. angfa* Allen, 1990, *M arfakensis* Allen, 1990, *M. batanta* Allen & Renyaan, 1996, *M. boesemani* Allen & Cross, 1980, *M. catherinae* (de Beaufort, 1919), *M. fredericki* (Fowler, 1939), *M. irianjaya* Allen, 1985, *M. kokasensis* Allen *et al*., 2008, *M. misoolensis* Allen, 1982, *M. parva,* Allen, 1990, *M. synergos* Allen & Unmack, 2008.

Except for *M. irianjaya,* which is widespread throughout much of the Bird's Head region, all other species are generally restricted to a small geographic area. The ability of rainbowfishes to colonise a wide range of habitats, their high percentage of local endemism explain their high species richness and lead us to expect the discovery of many new species during upcoming expeditions in remote and unexplored areas.

The island of Papua New Guinea is divided from east to west by a massive complex of mountains. Deep valleys and rivers have dissected the island, which was geologically formed by the accretion of distinct terrains with independent evolutionary histories (Heads, 2006). Papua's important altitudinal range promoted the evolution of an extraordinary array of terrestrial ecosystems. These include the equatorial glaciers of Puncak Jaya and surrounding alpine valleys, a variety of mountain forests and lakes in the multiple rugged ranges throughout the island, an extreme and diverse mix of lowland rainforest types, numerous and vast swamps, savannah forests, and mangroves.

Undoubtedly, the complexity of Papua's biogeography has contributed to its extraordinary species diversity (Heads, 2006). Indeed many taxa have restricted ranges as a consequence of the complex geologic history and resulting numerous barriers to dispersal. The remote characteristics of most parts of Papua and the patchy distribution patterns of organ-

isms suggest that Papuan biodiversity is grossly underestimated.

This research is part of an international research program aiming to characterise and to domesticate Indonesian rainbowfishes, several scientific expeditions have been undertaken since 2007 by the Institut de Recherche pour le Développement (IRD), the Akademi Perikanan Sorong (APSOR) and the Badan Riset Kelautan dan Perikanan in Depok (BRKP).

The present paper describes a new species of *Melanotaenia* that was collected during two ichthyological surveys in the central part of the Bird's Head Peninsula in 2007-2008 near the Ayamaru Lakes (Fig. 1, site 1).

MATERIAL AND METHODS

Specimens of the new species are deposited at the Museum Zoologicum Bogoriense (MZB), the Muséum national d'Histoire naturelle de Paris (MNHN) and the Naturalis Museum in Leiden (RMNH).

Counts and measurements in parentheses refer to the range for paratypes, if different from the holotype.

The methods of counting and measuring are derived from Allen and Cross (1980) with some modifications and additions. Measurements were taken with digital dial callipers under lightening monocular lens (x2) and counts were made under lightening binocular lens (x4). Measurements were taken on the left side and are expressed to the nearest 0.1 mm. All proportions are expressed as percentage of the standard length.

Counts are as follow: Lateral scales are the number of scales in a vertical row from the upper corner of the gill cover to the caudal-fin base, excluding the small scales posterior to the hypural junction. Transverse scales are the number of scales in vertical rows between the base of the first dorsal fin and the base of the anal fin origin. Predorsal scales are the number of scales along the midline of the nape in front of the first dorsal fin. Cheek scale is the total number of scales covering the suborbital and preoperculum. Dorsal rays are the number of spines in the first dorsal fin and the spine and soft rays in second dorsal fin. Anal rays are the single spine and number of soft rays. The last soft ray of the anal and second dorsal fins is divided at the base and counted as a single ray. Pectoral rays are the total number of segmented rays. Pelvic rays are the single spine and number of soft rays. Gillrakers are the total number on the first branchial arch.

Measurements are as follow. - Standard length is measured from the anteriormost tip of the upper lip to the posteriormost point of the fold formed when the caudal peduncle is bent. Head length is measured from the tip of the upper lip to the upper rear edge of the gill opening. Snout length is the least distance measured from the tip of the upper lip to the fleshy anterior border of the eye. Interorbital width is the least width between eyes anteriorly. Eye diameter is the maximal horizontal width of the orbital cavity. Body depth is measured from the base of the first dorsal spine to the base of the first anal spine. Body width is the maximal width measured posteriorly just behind the pectoral-fin base. Caudal peduncle depth is the minimum depth. Caudal peduncle length is measured from the base of the last dorsal fin ray to the vertebral-hypural junction at the caudal-fin base. Predorsal length is measured from the tip of the upper lip to the base of the spine at the origin of first dorsal fin. Prepelvic length is measured from the tip of the upper lip to the base of the spine at the origin of pelvic fin. Preanal length is measured from the tip of the upper lip to the spine at the origin of anal fin. Pectoral fin length is measured from the anteriormost part of pectoral-fin base to the tip of the longest soft ray. Pelvic fin length is measured from the anteriormost part of pelvic-fin base to the tip of the longest soft ray. Spine length of the first dorsal fin is measured from the base to the tip of the first spine on the first dorsal fin. Spine length of the second dorsal fin is measured from the base to the tip of the spine on the second dorsal fin. Spine length of the anal fin is measured from the base to the tip of the single anal spine. Dorsal-fin base length is measured from the posterior base of the first spine of first dorsal fin to the posterior base of last soft ray of second dorsal fin. Second dorsal-fin base length is measured on the second dorsal fin from the posterior base of the first spine to the posterior base of last soft ray. Anal-fin base length is measured from the posterior base of the spine to the posterior base of the last soft ray.

Comparative material

The comparative material included all nominal *Melanotaenia* species described from the Bird's Head Peninsula (including Bomberai Peninsula) and nearby Raja Ampat Islands (namely Waigeo, Batanta, Salawati and Misool). This material includes the type specimens housed at MZB and RMNH and additional specimens of eleven nominal species caught at or near the type localities during two surveys (2007-2008). These additional specimens were deposed at MZB, RMNH and MNHN.

The type specimens examined are listed below.

Melanotaenia ajamaruensis. - Indonesia. RMNH 28068 (holotype), 77.9 mm SL, Ajamaru Lakes; RMNH 28069 (paratypes), 3 specimens (57.5-63.8 mm SL), same data as holotype; RMNH 28070 (paratypes), 3 spms (57.4-62.4 mm SL), same data as holotype; RMNH 28071 (paratypes), 57.0 mm SL, same data as holotype.

Melanotaenia boesemani. - Indonesia. RMNH 28061 (holotype), 67.2 mm SL, Ajamaru Lakes; RMNH 28067 (paratypes); 2 spms (63.8-86.9 mm SL), same data as holotype.

Melanotaenia irianjaya. - Indonesia. MZB 4952 (holotype), 58.8 mm SL, Fruata; MZB 4953 (paratypes); 3 spms (39.6-57.8 mm SL), Fruata.

Melanotaenia kokasensis. - Indonesia. MZB 16453 (holotype), 57.2 mm SL, Kokas; MZB 16454 (paratypes), 2 spms (49.1-53.7 mm SL), Kokas.

Melanotaenia ammeri. - Indonesia. MZB 16455 (holotype), 82.0 mm SL, Gusimawa; MZB 16456 (paratypes); 4 spms (55.9-71.0 mm SL), Gusimawa.

The collection stations of additional specimens for most nominal species are presented below. Their geographic locations are presented on figure 1. Sampling was made with cast nets.

Station 1. - *Melanotaenia boesemani*, small (3-4 m wide) tributary of Tiwit Creek, less than 1 km N of Lake Ayamaru shoreline (1°15.463'S, 132°14.939'E); water clear and slow-flowing over gravel and limestone boulder bottom; patchy aquatic vegetation; water temperature 24.8°C; pH 7.24; conductivity 252 μS; 22 May 2007. Material examined: MZB 17691, 6 spms (54.7-60.7 mm SL); MNHN 2009-1616, 4 spms (61.8-66.0 mm SL).

Station 2. - *Melanotaenia ajamaruensis*, River Kaliwensi, Soroang Village, Ayamaru District, about 5 km W of Lake Ayamaru (1°15.073'S, 132°08.156'E); a river (10-15 m wide, 1-3 m depth) flowing to Lake Ayamaru some decades ago and probably only connected today by subterranean outlets; water clear and fast-flowing over gravel and limestone boulder bottom; no aquatic vegetation; water temperature 24.7°C; pH 7.88; conductivity 217 μS; 22-23 May 2007. Material examined: MZB 17692, 5 spms (85.3-96.5 mm SL); MZB 17693, 5 spms (62.5-70.7 mm SL); MZB 17694, 6 spms (73.4-90.6 mm SL); MNHN 2009-1617, 6 spms (55.5-66.5 mm SL). Old bungalows bordering the river at the sampling location and presented by villagers as vestiges of a resort used during the Dutch Episode. Following explanations from old villagers, a locality probably visited by M. Boeseman in 1955 and putatively the type locality of the species.

Station 3. - *Melanotaenia fredericki*, Sampson River (0°49.361'S, 131°24.193'E); a large river (40-50 m wide, 3-4 m depth); water turbid and fast-flowing over muddy and sandy bottom; water temperature 26.1°C; pH 7.18; conductivity 111.8 μS; 13 Jun. 2007. Material examined: MZB 17695, 4 spms (65.0-71.9 mm SL); RMNH.PISC.35673, 4 spms (65.0-81.5 mm SL); MNHN 2009-1618, 4 spms (55.7-71.1 mm SL).

Station 4. - *Melanotaenia irianjaya*, Padang Creek, 40 km NW from Fruata (2°34.691'S, 133°08.973'E), a small creek (1-2 m wide); water clear slow-flowing in dense forest over gravel and sandy bottom; 30 Apr. 2008. Material examined: MZB 17696, 3 spms (82.2-93.2 mm SL); MZB 17697, 3 spms (65.4-73.9 mm SL); MNHN 2009-1619, 4 spms (65.6-76.5 mm SL); RMNH.PISC.35674, 4 spms (59.0-64.1 mm SL).

Station 5. - *Melanotaenia angfa*, Pondok Creek (2°11.067'S, 134°05.584'E), a small creek (4-5 m wide) flowing westward to River Yakati and situated 2 km S of Lake Kurumoi; slow-flowing in dense forest over gravel and limestone boulders; 11 Apr. 2008. Material examined: MZB 17698, 3 spms (69.2-86.2 mm SL); MNHN 2009-1620, 5 spms (62.1-68.6 mm SL); RMNH.PISC.35675, 5 spms (59.5-62.6 mm SL).

Station 6. - *Melanotaenia parva*, Lake Kurumoi (2°09.761'S, 134°05.155'E); a small, rapidly drying lake with a water surface area less than 1 hectare; 7-8 Jun. 2007. Material examined: MZB 17699, 2 spms (65.4, 67.0 mm SL); MNHN 2009-1621, 3 spms (57.7-62.0 mm SL); RMNH.PISC.35676, 3 spms (50.7-58.6 mm SL).

Station 7. - *Melanotaenia arfakensis*, Supsan Creek (4-5 m wide), a tributary of Prafi River (0°58.376'S, 133°54.964'E); water clear and slow-flowing over gravel bottom in palm plantation; vegetal detritus and patchy leaf-covered bottom; water temperature 25.4°C; pH 7.85; conductivity 267 μS; 30 May 2007. Material examined: MZB 17702, 2 spms (68.7, 76.9 mm SL); MNHN 2009-1622, 4 spms (60.7-70.6); RMNH.PISC.35677, 3 spms(60.9-71.3 mm SL).

Station 8. - *Melanotaenia catherinae*, Waiwo Creek, 5.5 km N of Saonek Island (0°25.060'S, 130°46.462'E); a small river (4-5 m wide); water clear and flowing over pebble and limestone boulders; water temperature 27.0°C; pH 8.3; conductivity 390 μS; 14 May 2007. Material examined: MZB 17703, 4 spms (65.4-79.8 mm SL); MNHN 2009-1623, 4 spms (58.1-67.1 mm SL).

Station 9. - *Melanotaenia synergos*, a small creek flowing to the north on eastern part of Batanta Island, less than 3 km from the type locality (0°50.288'S, 130°47.227'E); water clear in dense forest flowing over sandy and muddy bottom; water temperature 26.0°C; pH 7.6; conductivity 467 μS; 15 May 2007. Material examined: MZB 17704, 2 spms (61.8, 67.1 mm SL); MNHN 2009-1624, 3 spms (57.7-63.5 mm SL).

Station 10. - *Melanotaenia batanta*, Warmon Creek (0°50.256'S, 130°43.287'E); water clear and flowing over gravel and limestone boulders; 30 Apr. 2008. Material examined: MZB 17705, 2 spms (91.2, 99.2 mm SL); MZB 17706, 3 spms (88.2-95.4 mm SL); MNHN 2009-1625, 5 spms (79.5-107.9 mm SL); RMNH.PISC.35678, 5 spms (73.9-110.0 mm SL).

Station 11. - *Melanotaenia misoolensis*, River Wai Tama (1°50.978'S, 129°54.654'E); a small creek (1 m wide, 500 m long) flowing in dense forest and karstic environment with sandy bottom; 28 Apr. 2008. Material examined: MZB 17707, 3 spms (59.8-77.4 mm SL); MNHN 2009-1626, 4 spms (54.0-58.4 mm SL); RMNH.PISC.35679, 3 spms (46.1-48.9 mm SL).

MELANOTAENIA FASINENSIS, SP. NOV.

(Figs 2, 3, Tab. I)

Material examined

Holotype. - MZB 17700, male, 108.6 mm SL, 1°13.856'S, 131°58.186'E, Ween village, Fasin Creek, a tributary of Kladuk River, 25 km west from Ayamaru Lakes, Sorong Selatan, Papua Barat, Indonesia. Sumanta, E. Krenak, Kadarusman, E. Paradis, L. Pouyaud, 24 May 2007.

Paratypes. - MZB 17701, 4 spms (91.0-120.2 mm SL); MNHN 2009-1627, 4 spms (77.1-90.8 mm SL); RMNH.

Table I. - Measurements taken on the holotype and 12 paratypes of *Melanotaenia fasinensis* sp. nov.

	Holotype	Paratypes				
SL (mm)	108.6	69.9-120.2				
in % standard length		n	min	max	mean	SD
Head length	24.5	12	23.1	25.0	24.4	0.5
Snout length	9.2	12	9.2	9.5	9.3	0.1
Interorbital width	7.8	12	7.6	8.2	7.9	0.2
Eye diameter	6.9	12	6.4	8.1	7.4	0.5
Body depth	37.9	12	27.8	36.7	32.6	2.2
Body width	12.1	12	12.5	14.2	12.9	0.5
Caudal peduncle depth	10.4	12	10.1	10.8	10.4	0.2
Caudal peduncle length	13.3	12	13.5	15.6	14.7	0.7
Predorsal length	49.2	12	48.1	49.8	48.8	0.6
Prepelvic length	35.0	12	34.5	38.8	36.3	1.1
Preanal length	46.2	12	45.6	48.4	46.8	0.9
Pectoral fin length	-	11	17.4	19.9	18.6	0.8
Ventral fin length	17.8	10	17.0	19.5	18.5	0.8
Spine length of first dorsal fin	10.0	12	10.2	12.7	11.2	0.8
Spine length of second dorsal fin	7.3	12	7.7	11.6	9.4	1.2
Spine length of anal fin	7.0	11	7.0	8.8	8.2	0.6
Total dorsal fin length	42.2	12	39.0	41.7	40.2	1.0
Second dorsal fin length	28.8	12	25.9	29.5	27.0	1.0
Anal fin length	48.4	12	40.6	45.4	42.5	1.7

PISC.35680, 4 spms (69.9-78.5 mm SL); same data as for holotype.

Diagnosis

Melanotaenia fasinensis is distinguished from all of its congeners present on the Bird's Head Peninsula and Raja Ampat Islands by the combination of the following characters: Dorsal rays IV to VI-I,14 to 17; anal rays I,24-27; lateral scales 37-39 (usually 38-39); transverse scales in horizontal rows 9; predorsal scales 17-19; cheek scales 14-18; gillrakers 17-19; a short head length 23.1-25.0% of standard length; a long and pointed snout 9.2-9.5% of SL; a thin interorbital width 7.6-8.2% of SL; a relatively small eye diameter 6.4-8.1% of SL; a short and slender caudal peduncle (its length 13.3-15.6 and depth 10.1-10.8% of SL); a moderately short predorsal length 48.1-49.8% of SL; a long dorsal-fin base with total length 39.0-42.2% of SL and second dorsal fin-base length 25.9-29.5% of SL; a moderately short prepelvic length 34.5-38.8% of SL; a short preanal length 45.6-48.4% of SL and a long anal-fin base length 40.6-48.4% of SL; moderately short pectoral fin length 17.4-19.9% of SL and pelvic fin length 17.0-19.5% of SL; fresh colouration generally bright red on side of body with a series of alternating broad pink to red stripes corresponding with horizontal scale rows and narrower orange stripes between each scale row; bluish dorsally from nape to dorsal-fin origin and ventrally directly behind pectoral fin base and above abdomen; intense dark blue blotch just behind pectoral-fin base of male; a midlateral black stripe from upper edge of preopercle to caudal-fin base covering one scale row (sometimes faint in middle part of body); pectoral fin translucent; remaining fins reddish with a prominent white margin on entire dorsal fin.

Description

Counts and proportions that appear in parentheses refer to the range for paratypes (based on 12 specimens, 69.9-120.2 mm SL) if different from the holotype. Morphometric data are given in table I.

Dorsal rays VI-I,17 (IV to VI,14-16); anal rays I,27 (I,24-26); pectoral rays 14 (13-15); pelvic rays I,5; branched caudal rays 17; lateral scales 38 (37-39); transverse scales 9; predorsal scales 19 (17-19); cheek scales 16 (14-18); total gillrakers on first arch 17 (17-19).

Jaws about equal, oblique, premaxilla with an abrupt bend between the anterior horizontal portion and lateral part; maxilla ends below anterior edge of eye; lips thin; teeth conical with slightly curved tips, arranged in dense bands in upper and lower jaws; teeth at front of upper jaw in about 4-5 irregular rows, reduced to 1 or 2 rows posteriorly; teeth of upper jaw and middle portion of lower jaw extending outside of mouth onto lip; teeth at front of lower jaw in about 6-7 irregular rows, reduced to 1 or 2 rows posteriorly; a narrow edentulous space at symphysis of lower jaw; several rows of small, conical teeth on vomer; palatines with a narrow band of similar teeth.

Scales of body relatively large, cycloid, and arranged in regular horizontal rows; most of body scales with slightly crenulate margins; predorsal scales extending to posterior portion of interorbital; preopercle scales from posterior angle to edge of eye arranged in 3 rows.

First dorsal fin originates behind anal fin origin, between base of first to fifth anal soft ray; tip of first dorsal fin when depressed, reaching base of third to fifth soft ray of second dorsal fin in males and base of first to third soft ray in females; tip of second dorsal fin reaching base of caudal fin in mature males and terminating before base in females. Pelvic fin tips when depressed reaching base of first to second anal soft ray in females and reaching base of second to fourth anal soft ray in males. Soft dorsal and anal fins rectangular in outline, the posterior rays somewhat elongate and pointed in males. Pectoral fins pointed. Caudal fin forked with pointed extremities.

Colour of mature male when fresh including holotype (Fig. 2): overall colour bluish dorsally from nape to base

of second dorsal fin and bright orange red on side of body; operculum steel blue with a golden patch on upper part; a large dark blue patch directly above abdomen and behind pectoral fins; lateral flanks with seven or eight pink-reddish stripes, corresponding with horizontal scale rows, alternating with narrower bright orange stripes; black midlateral stripe about one scale wide extending from upper edge of preopercle to caudal-fin base, mainly formed by dark scale margins and sometimes faint in middle part of body; a dusky blackish stripe from near edge of eye to upper rear margin of operculum; pectoral fin translucent; pelvic and anal fins blood-red; both dorsal fins dark purple with red reflections and marked with a white margin; caudal fin blood-red with purple reflections at base, and along dorsal and ventral margin. Colour pattern of mature females similar to that of male except red hues of body generally less vivid (Fig. 3).

Sexual dimorphism: Similar to many *Melanotaenia*, mature males are deeper bodied than females (34-38 *vs* 32-34% SL). Males have a more elongate and pointed shape posteriorly on the soft anal and dorsal fins. The longest soft dorsal-fin rays of males are located in the posterior extremity of the fin, in contrast to that of females, which are situated in the anterior part of the fin.

Comparisons

The distinctive colour pattern of *Melanotaenia fasinensis* n. sp. is unique among congeneric species (Figs 2, 3). *Melanotaenia ajamaruensis* has an overall orange-red coloration and similar pattern of alternating broad red stripes and narrower bright orange stripes on the posterior part of the body (Figs 4, 5). However, the former is distinguished from the new species by the presence of 2-5 diffuse bars of darker purple on the lower half of the pectoral region (*vs* a blue patch for the new species) and by a series of four faint darker yellow-orange stripes, one per scale row, directly below the midlateral stripe on the pectoral and ventral regions (*vs* absent for the new species).

Melanotaenia ajamaruensis and *M. boesemani* are the closest geographic neighbours to *M. fasinensis* (Fig. 1). Morphologically, the new species differs from *M. ajamaruensis* and *M. boesemani* by more transverse scales (9 *vs* usually 7-8), more predorsal scales (17-19 *vs* 14-16), a longer snout (9.2-9.5 *vs* 7.2-8.7% SL), a longer anal-fin base (40.6-48.4 *vs* 32.2-40.4% SL) and a shorter preanal length (45.6-48.4 *vs* 49.4-57.6% SL). Moreover, *M. fasinensis* can be distinguished from *M. boesemani* by more anal soft rays (24-27 *vs* 17-23), more dorsal soft rays (14-17 *vs* 10-14), a shorter head (23.1-25.0 *vs* 25.5-28.5% SL), a smaller eye diameter (6.4-8.1 *vs* 8.6-10.7% SL), a shorter prepelvic length (34.5-38.8 *vs* 40.0-42.0% SL), longer pelvic fins (17.0-19.5 *vs* 13.8-16.7% SL), a longer dorsal-fin base (39.0-42.2 *vs* 33.5-37.4% SL) and a longer second dorsal-fin base (25.9-29.5 *vs* 22.1-24.7% SL).

Melanotaenia fasinensis differs from all other Bird's Head (including Raja Ampat Islands) species, namely *M. ammeri, M. angfa, M. arfakensis, M. batanta, M. catherinae, M. fredericki, M. irianjaya, M. kokasensis, M. parva, M. synergos*, by fewer transverse scales (9 *vs* usually 10-11). With the exception of *M. fredericki*, the new species also has a narrow interorbital width compared to the other species (7.6-8.2 *vs* 8.2-10.4% SL). The snout length of *Melanotaenia fasinensis* is similar to that of *M. angfa* (9.0-9.5% SL), *M. batanta* (9.2-9.5% SL) and *M. synergos* (9.2-9.6% SL) but has a shorter snout than *M. irianjaya* (9.2-9.5 *vs* 9.6-10.9% SL) and a longer snout than the remaining species (9.2-9.5 *vs* 7.2-9.1% SL). Except for *M. arfakensis, M. batanta* and *M. fredericki*, the new species has a shorter preanal length than all other Bird's Head species (45.6-48.4 *vs* 48.5-57.6% SL).

Key to the species of *Melanotaenia* from the Bird's Head and Raja Ampat Islands

1a. - Dorsal fins with a prominent margin stripe 2
1b. - Dorsal fins without a margin stripe 3

2a. - Transverse scale rows 7 or 8 4
2b. - Transverse scale rows 9 to 12 5

3a. - Caudal peduncle depth 11.6-14.9% SL 6
3b. - Caudal peduncle depth 9.3-11.4% SL. 7

4a. - Head length 23.1-25.1% SL. Eye diameter 7.2-8.2% SL. Prepelvic length 36.3-39.5% SL. Dorsal-fin base length 38.6-43.5% SL . . . . . *Melanotaenia ajamaruensis*
4b. - Head length 25.5-28.5% SL. Eye diameter 8.6-10.7% SL. Prepelvic length 40.0-42.0% SL. Dorsal-fin base length 33.5-37.4% SL . . . . . *Melanotaenia boesemani*

5a. - Snout length 7.6-8.6% SL 8
5b. - Snout length 9.2-10.9% SL. 9

6a. - Interorbital width 9.7-10.4% SL 10
6b. - Interorbital width 8.2-9.5% SL 11

7a. - Snout length 7.7-8.4% SL. Interorbital width 8.0-8.4% SL . . . . . *Melanotaenia fredericki*
7b. - Snout length 8.6-9.5% SL. Interorbital width 8.6-9.5% SL 12

8a. - Head length 23.9-25.3% SL. Body width 13.0-14.6% SL. Caudal peduncle depth 12.0-13.2% SL. Second dorsal-fin base length 24.2-27.0% SL. Anal-fin base length 39.7-43.6% SL. Gillrakers 13-15. . . . . *Melanotaenia arfakensis*
8b. - Head length 25.9-26.7% SL. Body width 11.3-11.8% SL. Caudal peduncle depth 11.2-11.5% SL. Second dorsal-fin base length 21.0-23.1% SL. Anal-fin base length 37.4-37.9% SL. Gillrakers 16-19. . . . . *Melanotaenia kokasensis*

9a. - Caudal peduncle depth 11.6-12.9% SL . . . . . *Melanotaenia batanta*
9b. - Caudal peduncle depth 9.4-11.3% SL. 13

Figure 2. - *Melanotaenia fasinensis*, MZB 17700 (holotype), male, 108.6 mm SL, Bird's Head Peninsula, West Papua, Indonesia (Photo L. Pouyaud).
Figure 3. - *Melanotaenia fasinensis*, MZB 17701 (paratype), female, 120.2 mm SL, same data as for holotype (Photo L. Pouyaud).

Figure 4. - *Melanotaenia ajamaruensis*, male, 89.5 mm SL, Kaliwensi River near Ayamaru Lakes on Bird's Head Peninsula (Photo L. Pouyaud).
Figure 5. - *Melanotaenia ajamaruensis*, female, 85.3 mm SL, Kaliwensi River (Photo L. Pouyaud).

10a. - Snout length 8.5-9.1% SL. Eye diameter 8.5-9.1% SL. Caudal peduncle length 14.3-15.5% SL. Predorsal length 49.6-51.0% SL. Spine length of the first dorsal spine 9.2-10.5% SL. . . . . *Melanotaenia catherinae*

10b. - Snout length 9.2-9.6% SL. Eye diameter 7.9-8.3% SL. Caudal peduncle length 15.8-18.2% SL. Predorsal length 47.5-49.5% SL. Spine length of the first dorsal spine 8.3-8.9% SL. . . . . *Melanotaenia synergos*

11a. - Caudal peduncle length 11.4-16.1% SL. Pelvic fin length 17.8-23.4% SL. Gillrakers 16-18 . . . . . *Melanotaenia ammeri*

11b. - Caudal peduncle length 16.8-19.4% SL. Pelvic fin length 15.1-17.3% SL. Gillrakers 13-16 . . . . . *Melanotaenia parva*

12a. - Eye diameter 7.3-8.1% SL. Spine length of the anal fin 6.5-8.4% SL . . . . . *Melanotaenia angfa*

12b. - Eye diameter 8.4-9.9% SL. Spine length of the anal fin 9.0-11.1% SL . . . . . *Melanotaenia misoolensis*

13a. - Snout length 9.6-10.9% SL. Interorbital width 8.8-9.4% SL. Predorsal length 50.0-51.7% SL. Preanal length 48.5-53.2% SL. Spine length of the second dorsal fin 12.5-14.6% SL. Spine length of the anal fin 9.8-12.1% SL. Dorsal-fin base length 34.2-37.9% SL. Second dorsal-fin base length 20.5-23.9% SL . . . . . *Melanotaenia irianjaya*

13b. - Snout length 9.2-9.5% SL. Interorbital width 7.6-8.2% SL. Predorsal length 48.1-49.8% SL. Preanal length 45.6-48.4% SL. Spine length of the second dorsal fin 7.3-11.6% SL. Spine length of the anal fin 7.0-8.8% SL. Dorsal-fin base length 39.0-42.2% SL. Second dorsal-fin base length 25.9-29.5% SL. . . . . *Melanotaenia fasinensis*

Habitat and distribution

The new species is currently known only from the type locality (Figs 1, 6), a small tributary of the Kladuk River. It is important to note that the Fasin Creek is only connected to the main river by subterranean outlets. This region, NW of Teminabuan, consists of a vast karstic formation, which includes poorly known and complex systems of rivers and lakes (e.g., Aitinyo, Ayamaru). The species occurs in nearby streams connected to the Fasin River but was not observed elsewhere in the basin, probably because streams in the area drain mainly underground after flowing for relatively short distances on the surface, thus limiting its geographic distribution. Due to these geologic and topographic features, it seems that *M. fasinensis* has a restricted geographic distribution and is confined to the vicinity of Ween village. The type locality consists of a crystalline, narrow (to about 4-5 m wide), relatively shallow (up to about 1 m) stream with gradual gradient flowing through secondary forest. The type specimens were collected over gravel and limestone boulder bottom with substantial dead tree branches. This small river is also home of various species of eleotrids, small freshwater gobies and several varieties of crayfishes (*Cherax* sp.).

Physical water parameters at the type locality on May 2007 were: water temperature 25.3ºC; pH 7.7; conductivity 281 μS. Chemical parameters (in mg/L): K: 0.03; Ca: 45.05; Mg: 2.14; Na: 0.4; Mn: 0.01; PO4: 0.01; SO4: 1.11; HCO3: 168; CO3: 0.0; Cl: 2.75; Cd: 0.0; Ni: 0.02.

Figure 6. - Type locality of *Melanotaenia fasinensis*, Fasin River near Ween village, Sorong Selatan (Photo L. Pouyaud).

Figure 7. - Type locality of *Melanotaenia parva* on 15 June 2007 with an overview of the vanishing Kurumoi Lake in Bintuni Regency (Photo L. Pouyaud).

Etymology

The new species is named *fasinensis* in reference to the river name at the type locality, the Fasin creek.

Remarks on the endangered *M. ajamaruensis* and *M. parva*

Specimens of *M. ajamaruensis* were caught by Boeseman during March 1955 in the Ayamaru Lakes region (Allen and Boeseman, 1982) and were described as a new species by Allen and Cross (1980). The species was described on the basis of 67 specimens and was apparently abundant at the time of capture. However, Allen (1990) failed to find this species during two visits (1982 and 1989) to the Ayamaru Lakes and suggested it might be extinct due to habitat degradation. During an expedition in 2007, we caught several specimens of *M. ajamaruensis* at Soroang on Kaliwensi River. We include colour photographs (Figs 4 and 5) of freshly captured male and female specimens. The species was originally described from preserved specimens and the fresh/living colouration was previously unknown. To our knowledge and from several surveys made in the vicinity of Ayamaru, it is probable that the upstream part of the Kaliwensi River is unfortunately the last locality where the species still survives. With the objective to promote its ex-situ conservation and to discourage wild catches, we have already started a program of domestication in a governmental aquaculture station located in West Java.

Melanotaenia parva was described by Allen (1990) from specimens caught in Kurumoi Lake (Fig.1, site 6). Allen indicated that the water level of the lake was decreasing dramatically and far from its outlet into the Yakati River. He mentioned that *M. parva* was abundant and also noted the presence of tilapia *Oreochromis mossambicus,* an alien species probably introduced in earlier times by the Dutch. Our own observations at the lake in June 2007 indicate it is now almost completely dry with less than 1 hectare of water surface area remaining. The lake is shallow (less than 1 m) and infested by tilapia. *Melanotaenia parva* has become less abundant and very difficult to catch. The species now occurs in narrow creeks resulting from water erosion in the dry part of the lake (Fig. 7), precisely at the place where G.R. Allen and P. Erftemeijer took their picture, some 20 years ago (see fig. 11 in Allen, 1990).

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REFERENCES

ALLEN G.R., 1980. - A generic classification of the rainbowfishes (family Melanotaenidae). *Rec. West. Aust. Mus.*, 8(3): 449-490.

ALLEN G.R., 1990. - Les poissons arc-en-ciel (Melanotaenidae) de la péninsule de Vogelkop, Irian Jaya, avec description de trois nouvelles espèces. *Rev. Fr. Aquariol.*, 16(4): 101-112.

ALLEN G.R., 1991. - Field Guide to the Freshwater Fishes of New Guinea. 268 p. Publication No. 9. Christensen Research Institute.

ALLEN G.R., 1995. - Rainbowfishes in Nature and the Aquarium. 180 p. Melle, Germany: Tetra-Verlag.

ALLEN G.R., 1996a. - *Chilatherina pricei,* a new species of rainbowfish (Melanotaenidae) from Irian Jaya. *Rev. Fr. Aquariol.*, 23(1-2): 5-8.

ALLEN G.R., 1996b. - Two new species of rainbowfishes (Melanotaeniidae) from the Kikori River system, Papua New Guinea. *Rev. Fr. Aquariol.*, 23(1-2): 9-16.

ALLEN G.R., 1998. - A new genus and species of rainbowfish (Melanotaeniidae) from fresh waters of Irian Jaya, Indonesia. *Rev. Fr. Aquariol.*, 25(1-2): 11-16.

ALLEN G.R. & BOESEMAN M., 1982. - A collection of freshwater fishes from western New Guinea with descriptions of two new species (Gobiidae and Eleotridae). *Rec. West. Aust. Mus.*, 10(2): 67-103.

ALLEN G.R. & CROSS N.J., 1980. - Description of five new rainbowfishes (Melanotaenidae) from New Guinea. *Rec. West. Aust. Mus.*, 8(3): 377-396.

ALLEN G.R. & CROSS N.J., 1982. - Rainbow Fishes of Australia and Papua New Guinea. 141 p. New Jersey, USA: T.F.H. Publications, Inc.

ALLEN G.R. & RENYAAN S.J., 1996. - Three new species of rainbowfishes (Melanotaeniidae) from the Triton Lakes, Irian Jaya, New Guinea. *Aqua, Int. J. Ichthyol.*, 2(2): 13-24.

ALLEN G.R. & RENYAAN S.J., 1998. - Three new species of rainbowfishes (Melanotaeniidae) from Irian Jaya, Indonesia. *Aqua, Int. J. Ichthyol.*, 3(2): 69-80.

ALLEN G.R. & UNMACK P.J., 2008. - A new species of rainbowfish (Melanotaeniidae: *Melanotaenia*), from Batanta Island, western New Guinea. *Aqua, Int. J. Ichthyol.*, 13(3-4): 109-120.

ALLEN G.R., UNMACK P.J. & HADIATY R.K., 2008. - Two new species of rainbowfishes (*Melanotaenia*: Melanotaeniidae), from western New Guinea (Papua Barat Province, Indonesia). *Aqua, Int. J. Ichthyol.*, 14(4): 209-224.

HEADS M., 2006. - Biogeography, ecology and tectonics in New Guinea. *J. Biogeogr.*, 33: 957-958.

McGUIGAN K., ZHU G., ALLEN G.R. & MORITZ C., 2000. - Phylogenetic relationships and historical biogeography of melanotaeniid fishes in Australia and New Guinea. *Aust. J. Mar. Freshw. Res.*, 51: 713-723.

NELSON J.S., 2006. - Fishes of the World. (4th edit.). 624 p. New York: John Wiley & Sons.

SAEED B., IVANTSOFF W. & ALLEN G.R., 1989. - Taxonomic revision of the family Pseudomugilidae (Order Atheriniformes). *Aust. J. Mar. Freshw. Res.*, 40: 719-787.

SPARKS J.S. & SMITH W.L., 2004. - Phylogeny and biogeography of the Malagasy and Australasian rainbowfishes (Teleostei: Melanotaenioidei): Gondwanian vicariance and evolution in freshwater. *Mol. Phylogenet. Evol.*, 33: 719-734.

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