The "Maccullochi Species Group" of Rainbowfishes (Melanotaeniidae) with the Description of *Melanotaenia papuae*, new Species

by Gerald R. ALLEN*

Fig. 1. - *Melanotaenia papuae* (approximately 60 mm SL), male, Sogeri Plateau, Papua New Guinea, photographed in an aquarium. **G. Schmida**
Melanotaenia papuae (approximativement 60 mm LS), mâle, Sogeri Plateau, Nouvelle-Guinée Papouasie, photographié en aquarium.

The rainbowfishes which constitute the family Melanotaeniidae are among the most abundant inhabitants of freshwater streams, marshes, ponds, and lakes in northern Australia and at the lower elevations (below about 1500 meters) of New Guinea. There are about 40 known species, but others will certainly be discovered with further collecting activity, particularly in Irian Jaya, the little explored western half of New Guinea. Rainbowfishes exhibit a variety of colorful patterns and adapt remarkably well to life in captivity. Indeed, even specimens captured in the wild will spawn in a relatively small aquarium after a brief period of acclimation.

Melanotaeniids have been the primary subject of my research since 1974. Initial interest was confined to the species of Western Australia, but this study was soon expanded to include other areas of Australia and eventually the New Guinea region. My interest culminated in a recent investigation of the generic relationships within the family (**Allen**, 1980) and I am currently preparing a monograph of the Melanotaeniidae to be published as a book. The main stimulus for my continuing research on this interesting group has been a series of fieldtrips which afforded me the opportunity to collect and observe most of the rainbowfishes in their natural habitat. During 1974 and 1977 three separate visits were made to the Northern Territory and Kimberley region of Western Australia (**Allen**, 1978). Additional expeditions were undertaken during 1978 and 1979 to coastal New South Wales and Queensland, the Gulf of Carpentaria drainage, Cape York Peninsula, and much of Papua New Guinea.

One of the more confusing problems associated with melanotaeniid taxonomy involves the status of certain fishes belonging to the «maccullochi group» of species. *Melanotaenia maccullochi* Ogilby was described from the Barron River, near the northern Queensland town of Cairns (see map, fig. 2). Until recently its distribution was believed to be confined mainly to the area from which it was first collected and it was thought to be relatively rare. However, recent collecting efforts by both colleagues and myself indicate a much wider distribution which extends across the Torres Strait to New Guinea.

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Table 1

Proportional measurements of selected type specimens of *Melanotaenia papuae*
Expressed as a percentage of the standard length

	Holotype	Paratypes				
	WAM P26393-002	WAM P26393-001	WAM P26394-001	WAM P26396-001	WAM P26403-001	WAM P26406-001
	male	male	male	female	female	female
Standard length (mm)	60.0	53.8	46.2	57.0	53.2	47.6
Depth	34.0	33.5	34.2	30.7	30.1	33.6
Width	12.0	12.5	13.0	13.9	12.6	12.6
Head length	25.5	26.0	27.1	27.5	26.1	26.9
Snout length	7.6	8.0	7.8	8.1	7.5	8.4
Orbit diameter	7.8	8.0	9.1	8.4	8.1	8.4
Bony interorbital width	9.7	9.5	9.7	10.4	10.0	9.9
Depth of caudal peduncle	12.5	11.5	11.9	10.5	10.2	10.7
Length of caudal peduncle	19.2	19.0	20.3	20.4	20.7	19.1
Snout to 1st dorsal fin origin	43.5	43.9	46.1	47.2	46.1	45.6
Snout to anal fin origin	48.3	52.0	51.9	50.9	52.3	54.0
Snout to pelvic fin origin	36.7	37.5	39.4	37.2	37.0	38.4
Length of 2nd dorsal fin base	24.3	22.1	19.9	21.1	19.5	21.4
Length of anal fin base	38.5	35.9	34.0	36.0	33.1	31.7
Length of pectoral fin	18.3	18.6	19.0	16.7	18.8	16.8
Length of pelvic fin	17.3	18.0	14.5	12.8	15.0	13.2
Longest ray of 1st dorsal fin	18.5	21.0	21.6	13.7	15.4	14.1
Longest ray of 2nd dorsal fin	18.3	23.6	22.7	14.6	13.7	12.2
Longest anal ray	14.3	20.4	18.4	13.9	11.3	12.2
Length of caudal fin	23.3	22.7	27.1	23.7	24.6	23.1

The present study reveals there are four closely related species in the «maccullochi group» : *M. maccullochi* Ogilby (northeastern Queensland and southwestern Papua New Guinea) ; *M. ogilbyi* Weber (Lorentz River, Irian Jaya); *M. sexlineata* (Munro) (upper Fly River, Papua New Guinea) ; and a new species described herein, *M. papuae* (Port Moresby district, Papua New Guinea). Munro (1964) listed several paratypes of *M. sexlineata* from the vicinity of Port Moresby. Subsequent examination of these specimens and the procurement of numerous additional examples from this area during 1978-1979 facilitated the recognition of *M. papuae* as a distinct species. In addition to the description of this species, a brief diagnosis is provided below for the other three related species and a key to their identification is included.

I have deposited type specimens of *M. papuae* at the following institutions : Australian Museum, Sydney (AMS); Kanudi Fisheries Research Laboratory, Port Moresby, Papua New Guinea (PNG) ; and Western Australian Museum, Perth (WAM). Specimens of *M. ogilbyi, M. maccullochi,* and *M. sexlineata* were provided by the Zoologisch Museum, Universiteit van Amsterdam, Netherlands (ZMA); Queensland Museum, Brisbane (QM); and U.S. National Museum of Natural History, Washington, D.C. (USNM).

Standard length (SL) was taken from the most anterior point of the upper lip to the midbase of the caudal fin (end of hypural plate). Head length was measured from the front of the upper lip to the end of the opercular membrane. The depth of the body was measured at the level of the pelvic fin base. Body width was measured just behind the gill opening. The diameter of the orbit is the horizontal fleshy diameter. The interorbital width is the bony width at the middle of the orbits. The depth of the caudal peduncle is the least depth. The length of the caudal peduncle is the horizontal measurement connecting two verticals, one passing through the base of the last dorsal ray and the other through the base of the middle caudal rays. Predorsal, preanal, and prepelvic distances were measured from the snout tip to the base of the first dorsal, anal, and pelvic spines respectively. Predorsal scales were counted on the dorsal mid-line between the origin of the first dorsal fin and the interorbital. Preopercle scale counts refer to the total number of scales overlying the preopercle bone. Pectoral ray counts include the rudimentary lowermost rays. Proportional measurements and fin-ray counts are summarized in Tables 1-3.

Table 2

Dorsal fin ray counts for members of the «Maccullochi group» of Rainbowfishes

Species	1st Dorsal fin spines IV	V	VI	VII
M. maccullochi :				
Cairns to Cardwell		13	4	
McIvor River	2	26	10	
Jardine River	1	22	12	
New Guinea	1	10	14	1
M. ogilbyi		1	2	
M. papuae	6	58	8	
M. sexlineata		4	6	1

Species	2 nd Dorsal fin soft rays 7	8	9	10	11	12
M. maccullochi :						
Cairns to Cardwell		5	7	4		
McIvor River			14	22	2	
Jardine River		16	16	3		
New Guinea	3	15	7	1		
M. ogilbyi					3	
M. papuae			28	36	11	1
M. sexlineata				1	7	3

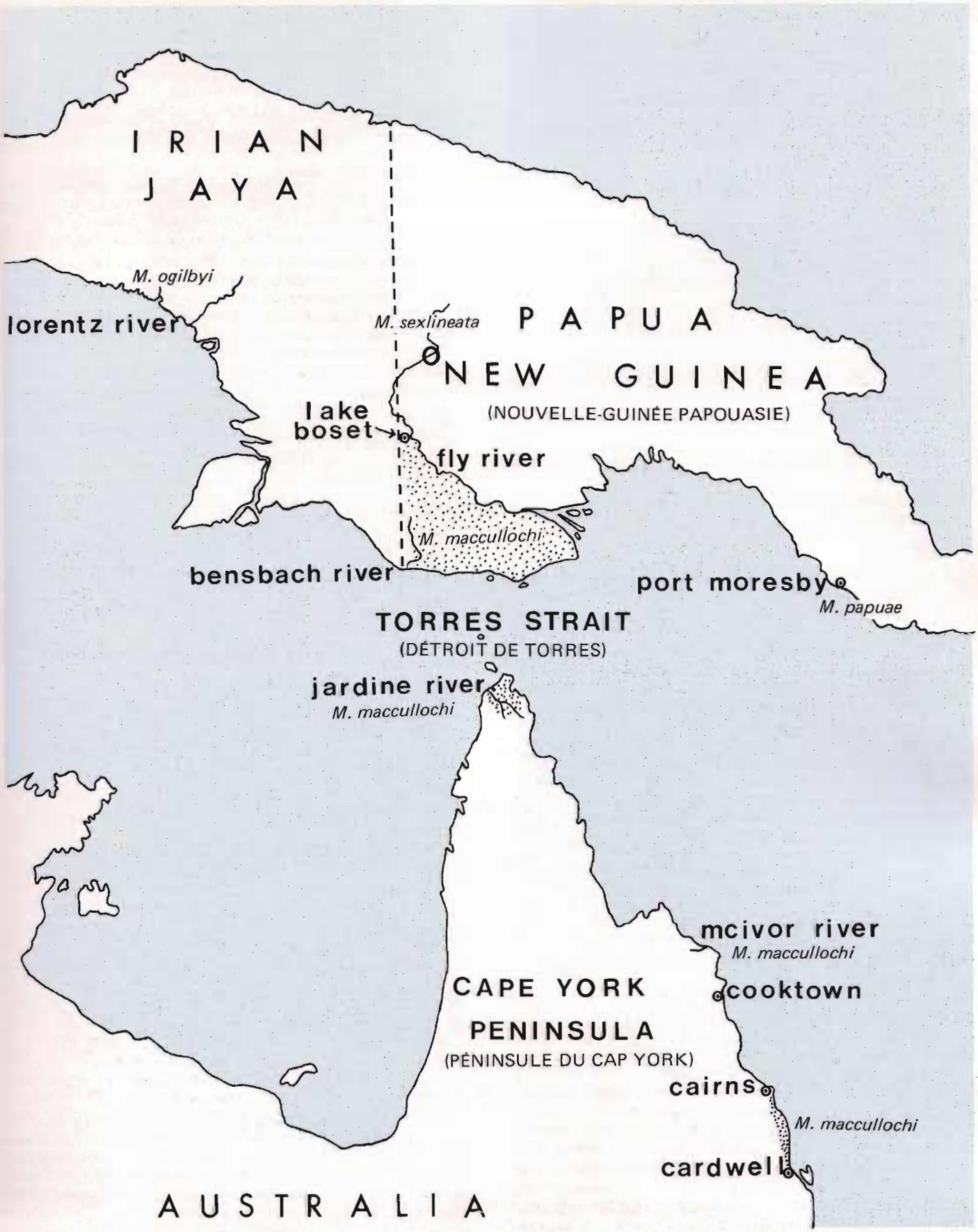

Fig. 2. - Map of northeastern Australia and central New Guinea. The circled area on the upper Fly River indicates the known distribution of *Melanotaenia sexlineata*. Stippled area represents the range of *M. maccullochi* which also inhabits the McIvor River.

Carte de l'Australie nord-orientale et de la Nouvelle-Guinée centrale. Le territoire encerclé sur la haute Fly River indique la distribution connue de *Melanotaenia sexlineata*. Les territoires pointillés correspondent à l'aire de *M. maccullochi* qui habite aussi McIvor River.

Table 3

Anal and pectoral fin ray counts for members of the «Maccullochi group» of Rainbowfishes

Species	Anal fin soft rays 13	14	15	16	17	18	19
M. maccullochi :							
Cairns to Cardwell	1	4	11				
McIvors River		4	17	15			
Jardine River		4	16	15	2		
New Guinea		2	4	12	8		
M. ogilbyi					2	1	
M. papuae		1	12	37	25	2	
M. sexlineata				2	6	1	2

Species	Pectoral fin rays 11	12	13	14
M. maccullochi :				
Cairns to Cardwell		11	5	
McIvor River		26	12	
Jardine River	2	15	17	1
New Guinea	1	17	8	
M. ogilbyi		2	1	
M. papuae		28	42	7
M. sexlineata			10	1

KEY TO THE SPECIES OF THE «MACCULLOCHI GROUP» OF RAINBOWFISHES

1a. Intense black streak immediately above pectoral fin base resulting from expansion of anterior part of lower mid-lateral stripe; mid-lateral pair of stripes frequently more darkly pigmented than stripes above and below ; distributed only in southern New Guinea . . . 2

1b. Intense black streak above pectoral fin base absent; mid-lateral stripes usually not darker than stripes above and below; distributed in northeastern Queensland and southwestern Papua New Guinea . . *M. maccullochi*

2a. Stripes on lower portion of body absent or very faint ; mid-lateral stripes frequently fused around the margins of the scales which form the mid-lateral scale row resulting in a broad horizontal black band broken only by pale scales centers (Lorentz River, Irian Jaya). *M. ogilbyi*

2b. Stripes on lower portion of body usually well developed, at least in adults; mid-lateral pair of stripes not fused together to form broad black band . . . 3

3a. Soft rays in 2nd dorsal fin usually 11 or 12, rarely 10 ; ground color of sides uniformly pale with 5-8 narrow black stripes of more or less uniform width and intensity (Upper Fly River, Papua New Guinea) . . *M. sexlineata*

3b. Soft rays in 2nd dorsal fin usually 9 or 10, occasionally 11 or rarely 12; ground color of sides noticeably darker (brown) on upper half with series of 5-9 narrow black stripes of which mid-lateral pair is often broader and/or darker than other stripes (vicinity of Port Moresby, Papua New Guinea) . . . . . *M. papuae*, n.sp.

PAPUAN RAINBOWFISH

Melanotaenia papuae, new species

figs. 1 and 3

Nematocentris sexlineatus Munro, 1964 (in part) : 162 (7 paratypes from Laloki River and 25 miles inland from Port Moresby).

Holotype. WAM P26393-002, male, 60.0 mm SL, small rainforest stream at Mount Diamond, about 23 km east of Port Moresby, Papua New Guinea (approximately 9°27'S, 147°17'E), shrimp seine, **G. Allen** on 29 September 1978.

Paratypes. AMS I.21387-001, 94 specimens, 31.0-55.3 mm SL, Sogeri Plateau, about 32 km northeast of Port Moresby, Papua New Guinea (approximately 9°28'S, 147°28'E), gill net, PNG Fisheries Department on 8 June 1973; PNG unregistered, 22 specimens, 25.0-55.0 mm SL, same data as AMS paratypes; WAM P26393-001, 34 specimens, 18.0-53.8 mm SL, collected with holotype; WAM P26394-001, 8 specimens, 37.0-47.0 mm SL, small steam about 12 km north of Port Moresby, Papua New Guinea (approximately 9°25'S, 147°14'E), seine, **G. Allen** and **D. Crossfield** on 30 September 1978 ; WAM P26395-001, 116 specimens, 19.0-42.0 mm SL, Dasiama Creek, about 20 km northeast of Port Moresby, Papua New Guinea (approximately 9°18'S, 147°13'E), seine, **G. Allen** on 30 September 1978 ; WAM P26396-001, 43 specimens, 22.0-57.0 mm SL, small stream about 15 km south of Brown River in forestry reserve, Papua New Guinea (approximately 9°16'S, 147° 15'E), seine, **G. Allen** and **D. Crossfield** on 30 September 1978 ; WAM P26399-001, 20 specimens, 22.0-39.0 mm SL, small stream about 10 km northwest of Brown River crossing on Port Moresby Road, Papua New Guinea (approximately 9°01'S, 147°02'E), seine, **G. Allen** on 30 September 1978 ; WAM P26400-001, 21 specimens, 16.0-42.0 mm SL, small stream about 15 km east of Port Moresby airport (Jackson Aerodrome) on Rigo Road, Papua New Guinea (approximately 9°35'S, 147°22'E), seine, **G. Allen** on 1 October 1978 ; WAM P26403-001, 13 specimens, 31.0-59.2 mm SL, Goldie River near junction with Hiwick River, Papua New Guinea (approximately 9°21'S, 147° 16'E), seine, **G. Allen** and **B. Parkinson** on 2 October 1978 ; WAM P26404-001, 1 specimen, 36.0 mm SL, Brown River at bridge crossing, about 32 km north of Port Moresby, Papua New Guinea (approximately 9°12'S, 147°14'E), dipnet, **G. Allen** on 2 October 1978 ; WAM P26405-001, 21 specimens, 30.0-44.0 mm SL, small stream about 15 km south of Brown River in forestry reserve, Papua New Guinea (approximately 9°16'S, 147°15'E), dipnets and torchlight at night, **G. Allen** and **F. Parker** on 2 October 1978 ; WAM P26406-001, 2 specimens, 44.0 and 48.0 mm SL, Eilogo Creek at Eilogo Rubber Plantation, Sogeri Plateau about 32 km northeast of Port Moresby, Papua New Guinea (approximately 9°28'S, 147°28'E), seine, **G. Allen** and **B. Parkinson** on 3 October 1978.

Description

Counts and measurements are summarized in Tables 1-3. Data in parentheses indicate the range for paratypes when differing from the holotype. Proportional measurements are presented as percentage of the standard length. These data are based on the holotype and 20 paratypes, 45.0-60.0 mm SL, unless stated otherwise.

Dorsal rays V-I,10 (IV to VI-I,9 to 12) ; anal rays I,17 (I,14 to 18) ; pectoral rays 13 (12 to 14) ; horizontal scale rows 9 (8 or 9) ; vertical scale rows 34 (32 to 35) ; predorsal scales 16 (13 to 16) ($\bar{x}$ = 15, N = 50) ; preopercle scales 11 (9 to 12) ($\bar{x}$ = 10, N = 46).

Greatest body depth 34.0, greatest depth of paratypes by sex and size class as follows :
males - (a) 30-49 mm SL, 31.0-35.4 ($\bar{x}$ = 32.6, N = 27), (b) 50-60 mm SL, 32.7-35.2 ($\bar{x}$ = 33.7, N = 8) ;

females - **(a)** 30-49 mm SL, 27.7-36.1 ($\bar{x}$ = 31.3, N = 28), **(b)** 50-60 mm SL, 26.0-32.0 ($\bar{x}$ = 29.8, N = 8) ; head length 25.5 (24.5-27.9) ; snout length 7.6 (7.3-8.6) ; eye diameter 7.8 (7.8-9.1) ; interorbital width 9.7 (9.5-10.4) ; caudal peduncle depth 12.5 (10.2-12.7) ; caudal peduncle length 19.2 (17.7-20.7) ; predorsal distance 43.5 (43.9-47.2) ; preanal distance 48.3 (48.2-54.0) ; prepelvic distance 36.7 (36.0-38.4).

Jaws about equal, oblique, premaxilla with an abrupt bend between the anterior horizontal portion and lateral part ; maxilla ends opposite front border of eye or slightly posterior ; lips thin ; teeth conical with slightly curved tips, those in outer row slightly stouter ; teeth in upper jaw in 2 to 3 irregular rows anteriorly, reduced to single row posteriorly, where they are most stout and are exposed when mouth is closed ; about 45-55 teeth in outer row of upper jaw ; teeth in lower jaw in about 5 or 6 irregular rows anteriorly, reduced to 1 or 2 rows posteriorly ; edentulous space between outer row teeth and those inside present or absent ; several rows of small, conical teeth on vomer ; palatines with a narrow band of similar teeth.

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

First dorsal fin originates opposite anal opening, about 1/2 eye diameter ahead of anal fin origin ; first dorsal spine 14.2 (12.4-15.2), its length is slightly (in females) to distinctly (in males) shorter than longest (usually 3rd) spine ; longest spine of first dorsal fin 18.5 (13.7-21.6), its tip reaching base of spine or lst soft ray of second dorsal fin in females and 3rd to 5th soft ray in mature males when depressed. Spine of second dorsal fin 12.5 (12.2-15.4) ; longest (first 3 in females, last in males) soft ray of second dorsal fin 18.3 (12.2-23.6) ; depressed posterior rays of second dorsal fin extends 1/2 to 2/3 length of caudal peduncle in females and nearly to caudal fin base in mature males. Anal fin spine 8.7 (7.7-10.0) ; longest (middle rays in females, penultimate ray in males) anal rays 14.3 (11.3-20.4). Soft dorsal and anal fin rectangular in outline, the posterior rays somewhat elongate and pointed, particularly in males. Pelvic fin tips when depressed reaching base of anal spine or slightly beyond in males ; length of pelvic fin 17.3 (12.8-18.0). Pectoral fins pointed, the length 18.3 (16.7-19.0). Caudal fin moderately forked, its length 23.3 (22.7-27.1).

Color in life : generally grey or olive-green on back and silvery-white on lower half ; a red spot frequently present on upper part of operculum ; a pair of prominent black stripes at upper and lower edge of mid-lateral scale row, lower stripe continuing as broad band across upper portion of opercle, its color grading to red in males and yellow or pale orange in females on posterior half of body; 3-4 very faint stripes on back and frequently 3-4 black stripes on lower half ; dorsal, caudal, and anal fins slightly yellow, a row of black spots on basal portion of anal fin, most evident in mature males ; pelvic fins whitish with anterior edge slightly dusky ; pectoral fins translucent. The markings and colors of females are generally less brilliant than those of males.

Color in alcohol : brown on back and yellow-white on lower half with series of black stripes (one per scale row) on sides, fins generally pale tan to translucent.

Remarks

Melanotaenia papuae is closely allied to *M. ogilbyi, M. maccullochi,* and *M. sexlineata.* It is separable primarily on the basis of color pattern (see key above and accompanying illustrations). These species have clearly evolved from a common ancestor, probably in relatively recent times judging from their degree of similarity. *Melanotaenia papuae* differs from *M. maccullochi* and *M. sexlineata* by having the mid-lateral pair of stripes significantly broader and darker

Fig. 3. - *Melanotaenia papuae,* male holotype, 60.0 mm SL (upper) and female paratype, 55 mm SL, Mount Diamond, Papua New Guinea.
Melanotaenia papuae, mâle holotype, 60 mm LS (en haut) et femelle paratype, 55 mm LS, Mount Diamond, Nouvelle-Guinée Papouasie.

than the stripes above and below. The color and structure of the mid-lateral stripes of *M. papuae* appear to be unique among the «maccullochi group». The anteriormost portion of the upper member of the mid-lateral pair of stripes is very faint or absent whereas the lower stripe is well developed anteriorly and grows fainter posteriorly. In life the posterior portion of the latter stripe is bright red or yellow-orange. Differences in fin coloration (see figs) are also helpful for separating the various species, although two different patterns are found in *M. maccullochi* depending on geographic location. *Melanotaenia ogilbyi* has a color pattern similar to that of *M. papuae,* but apart from the mid-lateral pair there is very weak stripe development. It also differs from *M. papuae* in fin coloration. The margins of the dorsal and anal fins are dark, although this feature is not evident on the dorsal fin in the drawing (fig. 9). The color differences are probably of greater magnitude, but are difficult to assess until fresh specimens of *ogilbyi* can be obtained. There also appears to be a difference in caudal peduncle length. The three specimens of *ogilbyi* examined had peduncle lengths (in % of SL) of 15.5, 16.3, and 17.4 compared to lengths between 18.0 and 20.5 in similar sized *M. papuae.*

There appears to be a significant difference in habitat between *M. papuae* and *M. maccullochi.* The former species is found in streams which are usually flowing through rainforest (fig. 4) with mud and detritus substrata or through more open country near the coast with mud or gravel bottoms, and in both situations aquatic vegetation is relatively sparse. In contrast *M. maccullochi* is usually encountered in grass-swamp areas or lily-lagoons (fig. 8) where aquatic vegetation is abundant. The habitats of *M. ogilbyi* and *M. sexlineata* are poorly documented, but that of the former species is apparently similar to that of *M. maccullochi.*

Melanotaenia papuae is thus far known only from the vicinity of port Moresby, Papua New Guinea, but further collecting will probably expand the known distribution. I have collected specimens from many streams within a 35 km radius of Port Moresby. It is most abundant in lowland areas, although specimens were obtained at approximately 350 m elevation on the Sogeri Plateau. However, at this locality it was less abundant than *M. goldiei* and was replaced by this species in a number of cooler, faster flowing foothill streams which were sampled inland from Port Moresby.

Fig. 4. - Habitat of *Melanotaenia papuae*. A small rainforest tributary of the Brown River, 30 km inland from Port Moresby, Papua New Guinea. This stream was also inhabited by *M. goldiei*.

Biotope de *Melanotaenia papuae*. Un petit ruisseau forestier tributaire de Brown River, à 30 km de Port Moresby dans les terres, Nouvelle-Guinée Papouasie. Ce cours d'eau était aussi habité par *M. goldiei*.

Specimens of *M. papuae* were collected mainly in clear water which was usually flowing although at several locations flow had ceased due to dry season conditions. Temperatures and pH readings ranged from 27-29 °C and 7.3-7.8 respectively, except lower temperatures (25.5 °C) were recorded on the Sogeri Plateau.

Gut contents of several paratypes indicate a diet consisting mainly of small insects and filamentous algae. This species becomes mature at a very small size. The smallest female containing near ripe eggs was a mere 24 mm SL and the smallest ripe male was 32 mm SL.

This species is named *papuae* with reference to the type locality, Papua, which is the name for the southern portion of Papua New Guinea.

Aquarium notes

This species is well suited for aquarium life because of its small size, attractive color pattern, and ability to breed in confined spaces. I have maintained 8 specimens in a 90 liter aquarium for over one year. They are fed twice daily with dry flake food and a mixture of fresh frozen fish, beef, and prawn. If spawning is desired it is necessary to provide a dense cover of fine filamentous «weed» (for example *Fontinalis* or *Ceratophyllum*). Fish in good condition spawn almost daily, each female releasing several small eggs which adhere to the plants by short filaments. The plants and eggs should be removed and placed in a nursery tank. Hatching occurs in about 8-9 days at 28 °C. The young should be fed several times daily on finely pulverized dry food. Their growth is rapid and a length of about 12 mm at two months and 30-35 mm at five months is attained. The fish become sexually mature before the end of the first year.

McCULLOCH'S RAINBWOFISH

Melanotaenia maccullochi Ogilby

figs. 5-7

Melanotaenia maccullochi Ogilby, 1915 : 118 (Barron River, North Queensland).

Diagnosis

The following counts and proportions are based on 25 specimens, 21-46 mm SL, unless indicated otherwise. Fin-ray counts are summarized in Tables 2 and 3.

Dorsal rays IV to VII-I,7 to 12; anal rays I,13 to 19; pectoral rays 11 to 14; vertical scale rows from upper edge of gill opening to base of caudal fin 31 to 35; horizontal scale rows from base of anal fin origin to base of first dorsal fin 9 or 10; predorsal scales 14 to 18 (x = 16, N = 81); preopercle scales 9 to 14 (x = 11, N = 79).

Greatest body depth 30.6-34.0; head length 25.3-31.0; snout length 7.0-9.3; eye diameter 9.0-12.5; interorbital width 8.5-11.4; caudal peduncle depth 10.0-13.1; caudal peduncle length 16.7-25.4; predorsal distance 43.0-56.3; preanal distance 49.9-58.4.

Fig. 5. - *Melanotaenia maccullochi*, male, 46 mm SL (upper) and female, 41 mm SL, Pahoturi River, Papua New Guinea.

Melanotaenia maccullochi, mâle, 46 mm LS (en haut) et femelle, 41 mm LS, Pahoturi River, Nouvelle-Guinée Papouasie.

Fig. 6. - *Melanotaenia maccullochi*, male, 20 mm SL, Jardine River, Cape York Peninsula, Australia.

Melanotaenia maccullochi, mâle, 20 mm LS, Jardine River Cape York Peninsula, Australie.

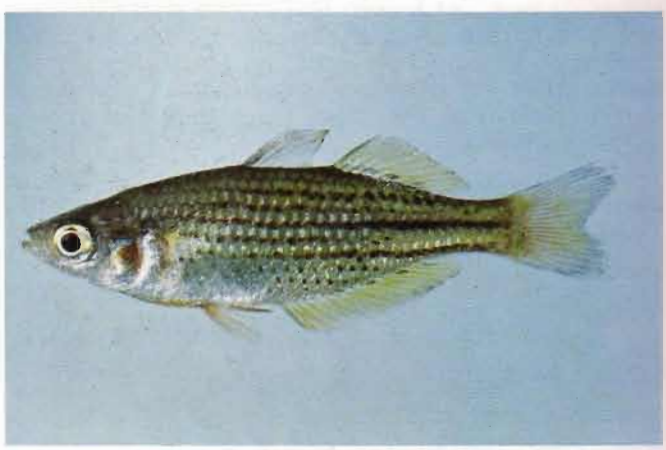

Fig. 7. - *Melanotaenia maccullochi*, female, 30 mm SL, Harvey's Creek, near Cairns, Australia.

Melanotaenia maccullochi, femelle, 30 mm LS, Harvey's Creek, près de Cairns, Australie.

Color in life : ground color generally whitish or slightly silvery with series of brown or black stripes on sides; fins and body sometimes with yellowish suffusion; dorsal and anal fins with or without brown or black bands at base and near outer margin.

Color in alcohol : similar to live coloration except whitish areas tan or yellowish and yellow suffusion lacking on fins and body.

Remarks

Until recently *M. maccullochi* was known only from the vicinity of Cairns, northern Queensland. Although not uncommon in the aquarium trade it was believed to be rare in its native habitat. However, recent collecting efforts have greatly expanded the known distribution (fig. 2). Although further collecting is needed there appears to be several isolated populations. The species occurs on the narrow coastal plain from Cairns to about Cardwell which lies 155 km to the south. It is not found in most areas north of Cairns probably due to the absence of coastal plain habitat. However, it has recently been taken at the McIvor River, about 80 km north of Cooktown. The only other locality in Australia where it has been recorded is the northern tip of Cape York Peninsula, primarily the Jardine River and its tributaries (**Allen** and **Hoese**, in press). The population from the latter area greatly resembles that of southwestern Papua New Guinea with regards to coloration. This resemblance is not surprising as the distance across the Torres Strait is only 150 km and this region has been a continuous land mass for much of its geologic history up until about 6,500-8,000 years before present (**Allen** and **Hoese**, in press). The New Guinea distribution extends along the southern lowlands from the middle Fly River to the Bensbach River near the Irian Jaya border and possibly further west.

There are two distinct geographic variations of *M. maccullochi* which are separable on the basis of color pattern. Typically this species is characterized by a series of narrow black stripes on the sides, one per scale row, although females generally have the stripes less pronounced. The southernmost variety of *M. maccullochi,* found between **Cairns** and Cardwell, often has the stripes interrupted or extremely faint. The dorsal and anal fins of this form and a similar one from the McIvor River, are weakly marked in contrast to specimens from the northern tip of Cape York Peninsula and the far western part of Papua New Guinea (compare figs. 5-7). Fish from the latter areas frequently have the fins and body suffused with yellow, a feature not apparent in the Cairns to Cardwell and McIvor River specimens. There is also a great deal of variability in fin ray counts for the various populations (Tables 2 and 3).

There are slight differences in habitat throughout the distributional range of *M. maccullochi.* In the southern portion of its distribution at the McIvor River and on the coastal plain between Cairns and Cardwell it is usually found in clear streams with moderate flow having pH values between about 6.5 and 7.5. At the tip of Cape York and directly across the Torres Strait in papua New Guinea it frequents grass-swamps or lily-lagoons (fig. 8). Cape York pH values ranged from 5.2-5.8 and readings of 5.5-6.6 were obtained in Papua New Guinea. Water temperatures in the streams inhabited by this species range from about 24°-30 °C.

Melanotaenia maccullochi is one of the smallest members of the genus with sexual maturity being attained between 25-35 mm SL in both males and females. The largest specimen examined was a male 46 mm SL which was maintained for about two years in an aquarium. Specimens which I collected in the wild were invariably small. The average standard length of 76 specimens obtained in Queensland during 1978-1979 was 28.7 mm.

I have studied 118 specimens, 18-46 mm SL from northeastern Queensland and western Papua New Guinea. Most of these are deposited in the WAM collection.

Fig. 8. - Habitat of *Melanotaenia maccullochi.* A small lily-pond along-side the main channel of the Jardine River, Cape York Peninsula, Australia.

Biotope de *Melanotaenia maccullochi.* Une petite mare à Nénuphars le long du lit principal de Jardine River, Cape York Peninsula, Australie.

OGILBY'S RAINBOWFISH

Melanotaenia ogilbyi Weber

fig. 9

Melanotaenia ogilbyi Weber, 1910 : 230 (Lorentz River, southern New Guinea).

Diagnosis

The following counts and proportions are based on three specimens, 49-54 mm SL.

Dorsal rays V or VI-I,11; anal rays I,17 or 18; pectoral rays 12 or 13; vertical scale rows from upper edge of gill opening to base of caudal fin 34 or 35; horizontal scale rows from base of anal fin origin to base of first dorsal fin 9 or 10; predorsal scales 15 or 16; preopercle scales 11 to 15.

Greatest body depth 32.7-38.0; head length 27.2-28.2; snout length 7.2-7.8; eye diameter 9.1-9.5; interorbital width 10.7-11.2; caudal peduncle depth 11.9-12.6; caudal peduncle length 15.5-17.4; predorsal distance 44.8-49.2; preanal distance 47.0-52.5.

Color in life : live colors are unknown, but are probably similar to those of *M. papuae* and *M. maccullochi,* with black stripes on a whitish ground, becoming darker on the back.

Color in alcohol : generally pale yellow or tan, brownish on back; a pair of black mid-lateral stripes, or these stripes expanded to form a single broad stripe; 3-4 faint stripes (one per scale row) above and below mid-lateral one; fins pale to slightly dusky, sometimes with row of black spots on basal portion.

Remarks

Melanotaenia ogilbyi is a poorly known species which is known only on the basis of 7 specimens collected from *Pandanus* swamps on the lower Lorentz River, Irian Jaya (see map, fig. 2). These were taken during the Dutch New Guinea Expedition of 1907 and no further specimens have been collected. The main differences between this species and its nearest relatives, *M. papuae, M. maccullochi,* and *M. sexlineata* are related to color pattern, which are discussed in the remarks section under *M. papuae* (also compare figures).

I have studied the lectotype (ZMA 103.110), 51.5 mm SL and two paralectotypes (ZMA 103.111), 48.9-53.9 mm SL, from the Lorentz River of Irian Jaya.

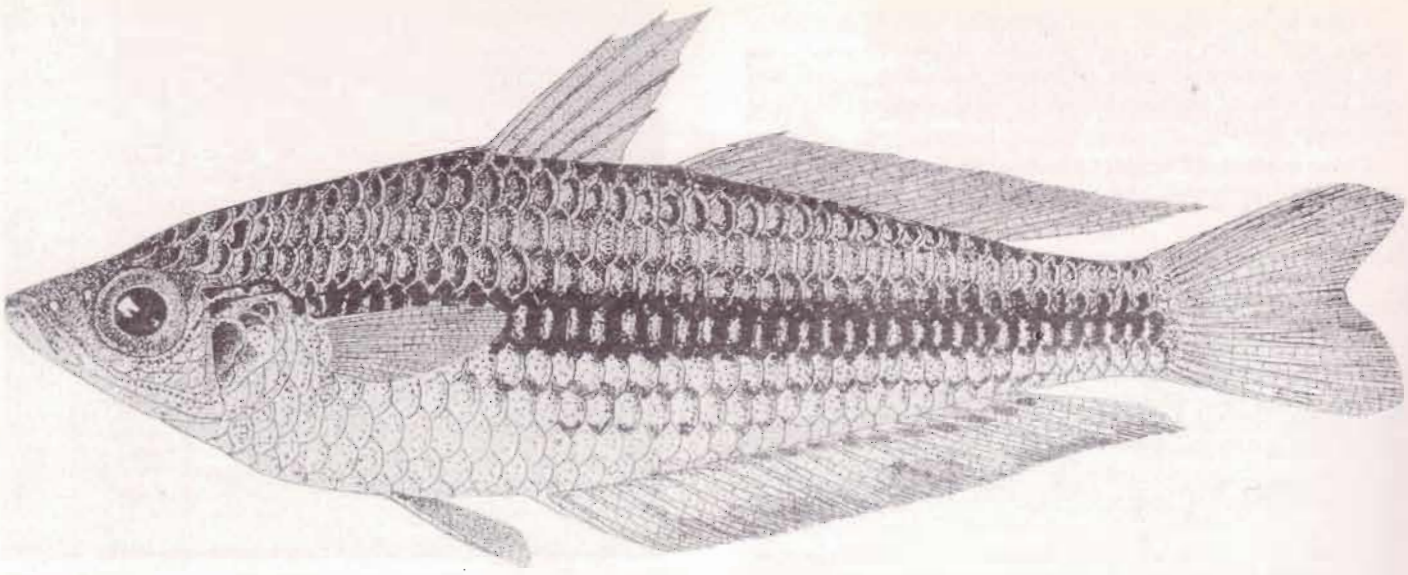

Fig. 9. - *Melanotaenia ogilbyi,* male, about 50 mm SL, Lorentz River, Irian Jaya (from **Weber** and **de Beaufort,** 1922).
Melanotaenia ogilbyi, mâle, environ 50 mm LS, Lorentz River, Irian Jaya (d'après **Weber** et **de Beaufort,** 1922).

FLY RIVER RAINBOWFISH

Melanotaenia sexlineata (Munro)

fig. 10

Nematocentris sexlineatus Munro, 1964 : 162 (Upper Fly River, Papua New Guinea).

Diagnosis

The following counts and proportions are based on 11 specimens, 25-59 mm SL.

Dorsal rays V to VII-I,10 to 12; anal rays I,16 to 19; pectoral rays 13 or 14; vertical scale rows from upper edge of gill opening to base of caudal fin 31 to 35; horizontal scale rows from base of anal fin origin to base of first dorsal fin 9 or 10; predorsal scales 14 to 17 ($\bar{x}$ = 15, N = 11), preopercle scales 11 to 14 ($\bar{x}$ = 13, N = 11).

Greatest body depth 33.7-40.0 ($\bar{x}$ = 36.7, N = 10 males, 42-59 mm SL; no females available); head length 27.4-28.8; snout length 7.6-9.0; eye diameter 8.5-10.3; interorbital width 10.5-12.0; caudal peduncle depth 12.2-13.3; caudal peduncle length 15.4-19.0; predorsal distance 41.4-47.6; preanal distance 49.9-56.7.

Color in life : live colors are unknown, but are probably similar to those of *M. maccullochi,* with black stripes on a whitish ground.

Color in alcohol : generally pale yellow or tan with series of 5-8 narrow black stripes on sides; distinct black streak above pectoral fin base, formed by expansion of lower member of mid-lateral stripe pair; fins pale yellow with dusky margin on dorsal and anal fins and anterior edge of pelvic fins.

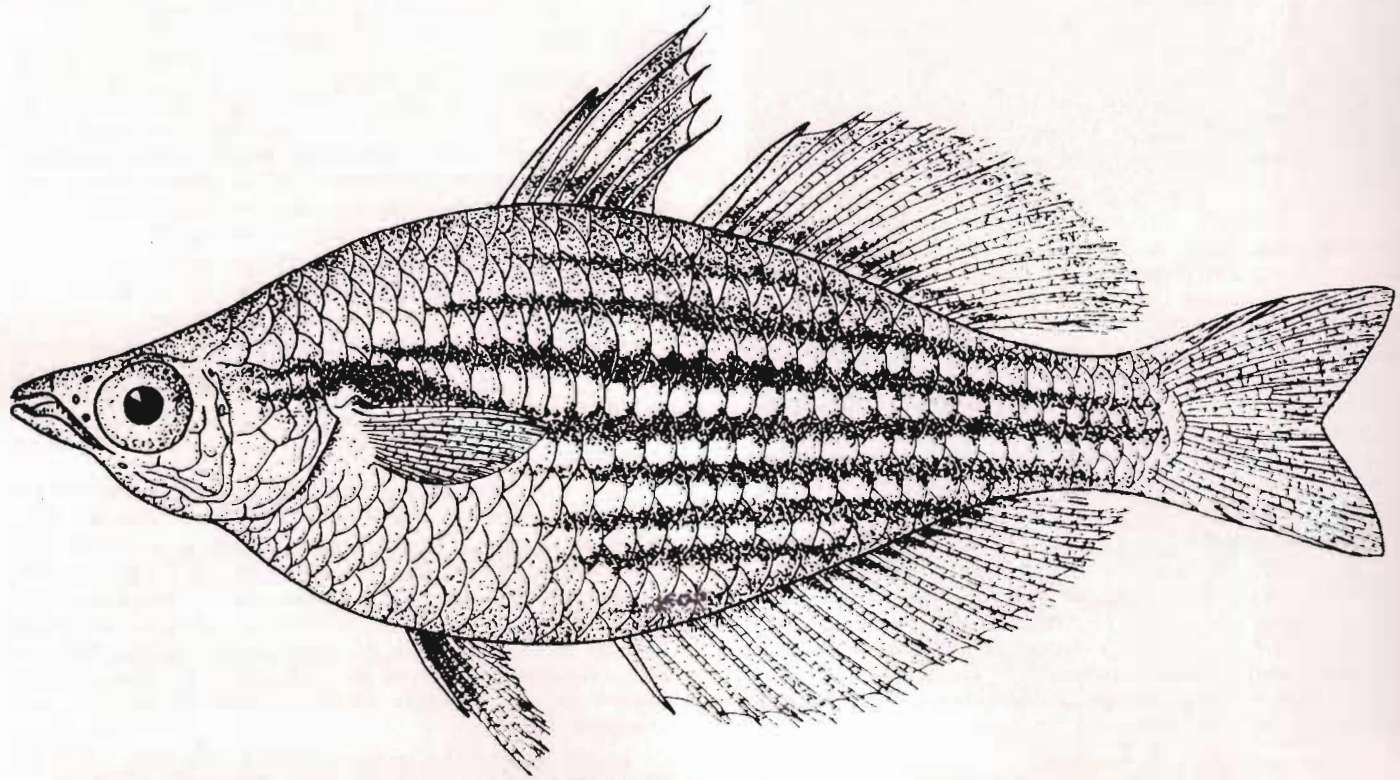

Fig. 10. - *Melanotaenia sexlineata,* male holotype, 57 mm SL, Upper Fly River, Papua New Guinea (from **Munro,** 1964).
Melanotaenia sexlineata, mâle holotype, 57 mm LS, haute Fly River, Nouvelle-Guinée Papouasie (d'après **Munro,** 1964).

Remarks

Melanotaenia sexlineata is known only on the basis of 11 specimens collected from the upper Fly River, a short distance upstream of the junction with the Elevala River (approximately 6°03'S, 141°24'E) or about 850-875 km upstream from Toro Pass. Both the eight specimens comprising the type series and three additional ones reported by **Roberts** (1978) are from this general area (see map, fig. 2). Seven additional specimens reported as *M. sexlineatus* by **Roberts** from Lake Boset on the middle Fly River are referrable to *M. maccullochi*. In addition, seven paratypes of *M. sexlineata* from the Port Moresby district have been re-identified as *M. papuae*.

Little is known about the habitat conditions. **Roberts** (1978) collected it from small tributaries. He did not record the pH and temperature, but readings of 7.1-7.4 and 25.0°-25.5°C respectively were obtained about 20 km farther downstream of the collection site.

I have studied 11 specimens, 25.4-58.5 mm SL including the holotype (AMS I.20726-001), 57.1 mm SL and 7 paratypes (AMS IA.7246-49), 41.6-58.5 mm SL.

Acknowledgments

I am very grateful for the assistance of Mr. **Brian Parkinson** who accompanied me on collecting expeditions to Papua New Guinea during 1978 and 1979. I also thank Mr. **Dick Dunham**, **Agatha Ivoro**, and **David Crossfield** for their assistance in collecting specimens of *M. papuae*. Mr. **Dunham** generously provided holding facilities for live specimens and helped me with their shipment to Australia. Mr. **Fred Parker** and Mr. **Mick Raga**, the former Director and present First Assistant to the Director respectively, of the Wildlife Division, Department of Lands and Environment (Government of Papua New Guinea) provided collection and exportation permits. Drs. **Douglass Hoese** and **John Paxton** of AMS, **Han Nijssen** of ZMA, and **Leslie Knapp** and **Victor Springer** of USNM provided loan specimens of *M. maccullochi*, *M. ogilbyi*, and *M. sexlineata*. Dr. **Hoese** also sent a valuable collection of *M. maccullochi* from the McIvor River which he obtained in 1979. I thank Mr. **Norbert Cross** of WAM for his assistance with counts and measurements and Mr. **Rolly McKay** of QM for allowing me to examine specimens under his care. Mr. **Günther Schmida** of Sydney kindly donated the excellent aquarium photograph of *M. papuae* and also assisted with the shipment of live specimens of *M. papuae* to my laboratory in Perth. Dr. **Herbert Axelrod** kindly provided financial assistance for this study. Finally, I thank Mrs. **Connie Allen** for her careful preparation of the typescript.

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RÉSUMÉ

Le «Groupe d'Espèces maccullochi» de Poissons Arc-en-Ciel (Mélanoténiidés) avec la Description de *Melanotaenia papuae* n. sp.

Les Poissons Arc-en-Ciel (Mélanoténiidés) sont parmi les habitants les plus nombreux de toutes les collections d'eaux douces d'Australie septentrionale et, à base altitude (au-dessous de 1500 m environ), de Nouvelle-Guinée, 40 espèces environ sont connues, mais d'autres seront certainement découvertes, en particulier en Irian Jaya, la moitié occidentale peu explorée de la Nouvelle-Guinée. Ces Poissons montrent une grande variété de couleurs et de dessins, et s'adaptent remarquablement bien à la captivité. Même pris dans la nature, ils se reproduiront dans un bac relativement petit après une courte période d'acclimatation.

Les Mélanoténiidés ont été mon principal sujet de recherches depuis 1974. Au début, mon intérêt fut limité aux espèces d'Australie occidentale, mais il s'étendit bientôt aux autres régions d'Australie et, éventuellement, à la Nouvelle-Guinée. Mon plus grand pôle d'intérêt fut la recherche des relations inter-génériques dans la famille (**Allen**, 1980) et je prépare maintenant une monographie des Mélanoténiidés qui fera l'objet d'un volume. Le stimulant majeur dans la poursuite de ma recherche fut les missions de terrain qui me me permirent de récolter et d'observer la plupart des Poissons Arc-en-Ciel dans leur biotope. En 1974 et 1977, j'ai visité à trois reprises le Northern Territory et la région de Kimberley, en Australie occidentale (**Allen**, 1978). D'autres expéditions furent menées, en 1978 et 1979, dans la région côtière des Nouvelles-Galles du Sud et du Queensland, le bassin du Golfe de Carpentaria, Cape York Peninsula et la majeure partie de la Papouasie.

L'un des problèmes les plus embrouillés de la taxinomie des Mélanoténiidés concerne le statut de certains Poissons appartenant au «groupe *maccullochi*». *M. maccullochi* Ogilby fut décrit de Barron River, près de la ville de Cairns au Queensland sptentrional (voir la carte). Récemment encore, on le croyait confiné à la région où il fut découvert et on l'estimait relativement rare. Toutefois, les récoltes récentres de mes collègues et de moi-même révèlent une beaucoup plus large répartition qui s'étend, par delà le détroit de Torres, à la Nouvelle-Guinée.

Le présent travail montre que quatre espèces très voisines sont incluses dans le «groupe *maccullochi*» : *M. maccullochi* Ogilby (Nord-Est du Queensland et Sud-Ouest de la Papouasie) ; *M. ogilbyi* Weber (Lorentz River, Irian Jaya) ; *M. sexlineata* (Munro) (haute Fly River, Papouasie) ; et une nouvelle espèce, décrite ici, *M. papuae* (district de Port Moresby, Papouasie) **Munro** (1964) avait catalogué plusieurs paratypes de *M. sexlineata* des environs de Port Moresby. Un nouvel examen de ces spécimens et l'acquisition de nombreux spécimens supplémentaires de cette région, en 1978-1979, ont facilité la reconnaissance de *M. papuae* comme espèce distincte. En plus de la description de la nouvelle espèce, je donne une brève diagnose des trois autres espèces et une clé pour leur détermination.

Les types de *M. papuae* ont été déposés dans trois Institutions scientifiques d'Australie et de Nouvelle-Guinée (voir texte anglais).

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Melanotaenia sexlineata is known only on the basis of 11 specimens collected from the upper Fly River, a short distance upstream of the junction with the Elevala River (approximately 6°03'S, 141°24'E) or about 850-875 km upstream from Toro Pass. Both the eight specimens comprising the type series and three additional ones reported by **Roberts** (1978) are from this general area (see map, fig. 2). Seven additional specimens reported as *M. sexlineatus* by **Roberts** from Lake Boset on the middle Fly River are referrable to *M. maccullochi.* In addition, seven paratypes of *M. sexlineata* from the Port Moresby district have been re-identified as *M. papuae.*

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Les types de *M. papuae* ont été déposés dans trois Institutions scientifiques d'Australie et de Nouvelle-Guinée (voir texte anglais).

Mesures et méristique

(Se reporter au texte anglais et aux tableaux 1 à 3).

Clé de détermination des espèces du «groupe *maccullochi*»

1a. Un trait d'un noir intense, juste au-dessus de la pectorale, issu du prolongement de l'extrémité antérieure de la rayure latéro-médiane inférieure ; les rayures de la paire latéro-médiane souvent plus sombres que celles situées au-dessus et au-dessous d'elles ; Nouvelle-Guinée méridionale exclusivement 2

1b. Pas de trait noir au-dessus de la pectorale ; les rayures de la paire latéro-médiane ordinairement pas plus sombres que celles situées au-dessus et au-dessous d'elles ; Nord-Est du Queensland et Sud-Ouest de la Papouasie . . . . . *M. maccullochi*

2a. Rayures de la partie inférieure du corps absentes ou très faibles; rayures de la paire latéro-médiane souvent fusionnées le long des bords des écailles de la rangée médio-latérale, ce qui forme une large bande noire horizontale, interrompue seulement par les centres pâles des écailles (Lorentz River, Irian Jaya) *M. ogilbyi*

2b. Rayures de la partie inférieure du corps ordinairement bien développées, au moins chez les adultes ; les rayures de la paire latéro-médiane non fusionnées entre elles pour former une large bande noire 3

3a. Rayons mous de la 2e dorsale au nombre de 11 ou 12, rarement 10 ; couleur de fond des flancs uniformément pâle avec 5 à 8 étroites rayures noires d'épaisseur et d'intensité plus ou moins uniformes (haute Fly River, Papouasie) . . . *M. sexlineata*

3b. Rayons mous de la 2e dorsale au nombre de 9 ou 10, parfois 11 ou plus rarement 12 ; couleur de fond des flancs notablement plus sombre (brun) sur la partie supérieure du corps, avec 5 à 9 étroites rayures noires, parmi lesquelles celles de la paire latéro-médiane sont souvent plus larges et/ou plus sombres que les autres (environs de Port Moresby, Papouasie) . . *M. papuae* n.sp.

Poisson Arc-en-Ciel papou *Melanotaenia papuae* n.sp.

Types et description

Se reporter aux figures 1 et 3, et au texte anglais.

Remarques

Très voisine des 3 autres espèces du complexe, elle s'en distingue avant tout par le patron de coloration (voir clé). Il est clair que ces espèces ont évolué à partir d'un ancêtre commun, probablement à une époque relativement récente à en juger par le degré de similitude.

Il semble exister des différences significatives dans le biotope entre *papuae* et *maccullochi* ; le premier vit dans des cours d'eaux de la forêt hygrophile sur un fond de vase et de débris ou, dans des milieux plus ouverts, vers la côte, sur des fonds de vase ou de gravier avec, dans tous les cas, une végétation clairsemée ; le second, au contraire, habite ordinairement des zones de marais herbeux ou les mares à Nénuphars où la végétation est abondante.

M. papuae n'est connu que des environs de Port Moresby, dans un rayon de 35 km, mais son aire est sans doute plus vaste. Très abondant dans les régions basses, il est remplacé progressivement par *M. goldiei* dans les cours d'eau plus frais et plus rapides (350 m et au-dessus). Eau claire, $t^{o} = 27\text{-}29\ ^{o}C$ (sauf sur le Sorgeri Plateau : 25,5 °C), pH = 7,3-7,8. Se nourrit principalement de petits Insectes et d'Algues filamenteuses.

Notes aquariologiques

Très approprié à l'aquarium par sa petite taille (60 mm LS), ses couleurs attrayantes et son aptitude à se reproduire dans un espace restreint. J'en ai conservé 8 pendant plus d'un an dans 90 l, nourris 2 fois par jour de flocons et d'un mélange de Poisson, Bœuf et Crevettes congelés. Pour la ponte, il est nécessaire de prévoir une couverture dense de plantes fines (*Fontinalis* ou *Ceratophyllum*). Les Poissons pondent presque tous les jours, chaque femelle émettant plusieurs petits œufs qui sont fixés aux plantes par de courts filaments. Les plantes portant les œufs devraient être placées dans un bac nurserie. Eclosion après 8-9 jours à 28 °C. Les jeunes sont nourris plusieurs fois par jour de nourriture sèche pulvérulente. Croissance rapide : 12 mm à 2 mois et 30-35 mm à 5 mois. Sexuellement mûrs avant la fin de la première année (24 mm LS minimum pour la femelle dans la nature et 32 mm LS pour le mâle).

Poisson Arc-en-Ciel de McCulloch *Melanotaenia maccullochi* Ogilby

Types et description

Se reporter aux figures 5 à 7 et au texte anglais.

Remarques

Répartition beaucoup plus vaste qu'on ne le croyait ; il existe plusieurs populations isolées et l'on peut reconnaître deux formes géographiques d'après la coloration (comparer les figures 5, 6 et 7) : l'une dans la zone côtière entre Cairns et Cardwell (155 km) et dans McIvor River, à 80 km au Nord de Cooktown, l'autre à l'extrémité de Cap York Peninsula (Jardine River) et dans le Sud-Ouest de la Papouasie. La ressemblance entre les populations de la péninsule du Cap York et de la Papouasie n'est pas étonnante, car le détroit de Torres, large de 150 km seulement, se trouve à l'emplacement d'une masse continentale qui a subsisté jusqu'il y a 6.500 à 8.000 ans. De légères différences dans les biotopes fréquentés sur l'ensemble de l'aire de distribution ; pH = 5,2 à 7,5 et $t^{o} = 24\text{-}30\ ^{o}C$.

Un des plus petits représentants du genre, sexuellement mûr entre 25 et 35 mm LS. Le plus grand spécimen, un mâle de 46 mm LS, avait été environ 2 ans en aquarium ; dans la nature, la moyenne est 28,7 mm.

Poisson Arc-en-Ciel d'Ogilby *Melanotaenia ogilbyi* Weber

Connu seulement par 7 spécimens collectés en 1907. La couleur en vie est inconnue ; elle est probablement semblable à celle de *M. papuae* et *M. maccullochi*. La large bande noire horizontale est caractéristique.

Poisson Arc-en-Ciel de Fly River *Melanotaenia sexlineata* (Munro)

Connu seulement par 11 spécimens ; la couleur sur le vivant, encore inconnue, est probablement semblable à celle de *maccullochi*.

Remarques

On sait peu de choses sur son biotope, le pH et la température n'ont pas été relevés ; à 20 km en aval on a enregistré 7,1-7,4 et 25-25,5 °C.