

# *Pseudomugil paludicola*, a new Species of Freshwater Blue-eye (Melanotaeniidae) from Papua New Guinea

by Gerald R. ALLEN \* and Raymond MOORE \*\*



Fig. 1. - *Pseudomugil paludicola*, male, 20 mm SL.

G. Schmida.

The genus *Pseudomugil*, commonly known as « blue-eyes » contains the following six species which inhabit fresh and brackish waters of the Australia-New Guinea region : (1) *P. gertrudae* Weber, (2) *P. inconspicuus* Roberts, (3) *P. novaeguineae* Weber, (4) *P. signifer* Kner, (5) *P. tenellus* Taylor, and (6) *P. paludicola* n. sp. Additional species will no doubt be discovered as a result of future collecting expeditions, particularly in southern New Guinea. These fishes are extremely common in certain areas, but easily overlooked because of their diminutive size, which ranges from about 50 mm SL in the eastern Australian *signifer* to 25 mm or less in several other species. Although generally lacking bright colours some of the male members of the group have attractive fin shapes and all species adapt well to life in captivity. Most previous workers have included *Pseudomugil* in the family Atherinidae which contains mainly small silvery fishes found in temperate and tropical seas. However, recent investigations by the senior author (Allen, 1980) indicate a closer affinity to the rainbowfishes of the family Melanotaeniidae and they are now provisionally included in this group.

During 1978-1979 the senior author conducted field investigations of freshwater fishes in Papua New Guinea and northern Australia. During the course of this work several new melanotaeniids were collected including *Pseudomugil paludicola* n. sp. which is described below. Additional specimens were procured by the junior author as part of a sampling program while investigating the life history and habits of *Lates calcarifer*, an important commercial fish.

We have deposited type specimens of the new *Pseudomugil* at the following institutions : Australian Museum, Sydney (AMS) ; Academy of Natural Sciences, Philadelphia (ANSP) ; California Academy of Sciences, San Francisco (CAS) ; Museum National d'Histoire Naturelle, Paris (MNHN) ; Kanudi Fisheries Research Laboratory, Port Moresby, Papua New Guinea (PNG) ; Rijksmuseum van Natuurlijke Historie, Leiden (RMNH) ; United States National Museum of Natural History, Washington, D.C. (USNM) ; Western Australian Museum, Perth (WAM) ; and Zoologisch Museum, Amsterdam (ZMA).

Standard length (SL) was taken from the most anterior point of the upper lip to the midbase or 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 a vertical measurement taken at the level of the pelvic fin origin. The width of the body was measured at the level of the gill opening. The diameter of the orbit is the horizontal fleshy diameter. The interorbital width is the bony width across the middle of the interorbital region. The depth of the caudal peduncle is the least depth. The length of the caudal peduncle is the horizontal measurement connecting two vertical lines, one passing through the base of the last dorsal ray and the other through the base of the middle caudal rays.

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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; opercular series scale counts refer to the total number of scales overlying the combined interopercle, subopercle, and opercle bones. Gill-raker counts include rudiments; the raker at the angle was incorporated into the lower-limb count.

#### SWAMP BLUE-EYE

*Pseudomugil paludicola*, new species, fig. 1

**Holotype.** WAM P26751-001, male, 24.0 mm SL, small creek in coastal rainforest about 5 km inland from Tureture Village near walking track to Binaturi River, Western Province, Papua New Guinea (approximately 9°07'S, 143°01'E), small shrimp seine, G. Allen and B. Parkinson on 27 September 1979.

**Paratypes** (collected with holotype unless indicated otherwise): AMS I. 21302-001, 30 specimens, 14.8-22.3 mm SL; ANSP 142846, 10 specimens, 13.9-22.7 mm SL; CAS 44688, 10 specimens, 12.6-21.5 mm SL; MNHN 1979-673, 16 specimens, 13.0-19.8 mm SL; PNG unregistered, 12 specimens, 14.0-21.1 mm SL, mangrove creek near Bulla at mouth of Morehead River, Western Province, Papua New Guinea (approximately 9°05'S, 141°20'E), rotenone, R. Moore on 14 March 1973; PNG unregistered, 9 specimens, 17.8-20.9 mm SL, swamp at Sigabaduru, Western Province, Papua New Guinea (approximately 9°20'S, 142°40'E),

rotenone, R. Moore on 23 October 1973; PNG unregistered, 2 specimens, 18.5 and 20.0 mm SL, small creek just downstream from Kodoro, Pahoturi River, Western Province, Papua New Guinea (approximately 9°15'S, 142°45'E), rotenone, R. Moore on 8 February 1973; RMNH 28153, 25 specimens, 10.8-22.2 mm SL; USNM 220910, 20 specimens, 13.5-21.1 mm SL; WAM P26751-002, 100 specimens, 13.0-24.0 mm SL; ZMA 115.399, 25 specimens, 10.8-22.0 mm SL.

#### Description

Counts and proportions which appear in parentheses refer to the range for paratypes (based on 25 specimens, 13-23 mm SL) if different than the holotype.

Dorsal rays III-7 (II to IV-5 to 7); anal rays I,12 (I,12 to 14); pectoral rays 12 (12 or 13); vertical scale rows from upper edge of gill opening to base of caudal fin 27 (27 or 28); horizontal scale rows from base of anal fin origin to base of first dorsal fin 5; scales between dorsal fins 3; predorsal scales 15 (15 or 16); preopercle scales 2; scales on opercular series 7 (6 to 8); gill rakers on first arch 1 + 8 (1 or 2 + 8 or 9); vertebrae 29 or 30 (4 paratypes examined).

Body depth 4.1 (3.9 to 4.3); head length 4.0 (3.5 to 4.2), both in standard length. Greatest width of body 1.5 (1.1 to 1.5) in body depth. Snout length 4.6 (3.4 to 4.5), orbit diameter 2.7 (2.5 to 2.8), interorbital width 2.0 (1.9 to 2.5), depth of caudal peduncle 1.9 (1.7 to 2.1), length of caudal peduncle 1.3 (1.3 to 1.9), all in length of head.

TABLE I  
PROPORTIONAL MEASUREMENTS OF SELECTED TYPE SPECIMENS OF *PSEUDOMUGIL PALUDICOLA*  
(EXPRESSED AS A PERCENTAGE OF THE STANDARD LENGTH)

	Holotype WAM P276751-001		Paratypes WAM P276751-002			
	Female	Female	Male	Male	Male	Female
Standard length (mm)	24.0	23.2	22.8	22.0	20.2	20.0
Depth	24.5	25.8	22.8	23.6	24.8	25.0
Width	16.7	18.1	15.8	18.1	19.3	18.0
Head length	25.0	25.4	25.9	23.6	27.2	26.0
Snout length	5.4	6.9	5.7	6.8	7.4	7.5
Orbit diameter	9.1	9.9	9.6	9.1	9.9	10.5
Bony interorbital width	12.5	12.1	10.5	12.7	13.9	12.5
Depth of caudal peduncle	12.9	12.9	12.3	13.6	14.4	14.5
Length of caudal peduncle	18.8	18.1	14.0	18.1	17.3	15.5
Snout to 1st dorsal fin origin	62.5	65.5	65.8	62.7	64.4	65.0
Snout to anal fin origin	57.9	60.3	61.4	59.1	58.9	59.0
Snout to pelvic fin origin	41.7	45.3	44.7	43.8	43.6	42.5
Length of 2nd dorsal fin base	6.7	7.8	4.4	7.7	8.9	8.5
Length of anal fin base	18.3	20.6	19.7	19.5	20.8	20.0
Length of pectoral fin	22.9	22.4	25.4	23.6	24.7	24.0
Length of pelvic fin	14.6	13.8	14.0	14.0	15.3	15.0
Longest ray of 1st dorsal fin	7.5	8.6	7.5	7.7	8.4	7.0
Longest ray of 2nd dorsal fin	14.6	14.2	*	14.5	18.8	15.0
Longest anal ray	15.8	18.1	15.8	14.5	18.3	16.5
Length of caudal fin	29.2	30.2	*	31.8	30.7	30.0

\* denotes damaged fin



Jaws oblique, lower jaw protruding ; maxilla extends posteriorly to about level of anterior border of eye or slightly forward ; premaxilla without accessory ascending process. Nearly entire length of upper jaw and about two-thirds of lower jaw bearing villiform teeth ; upper jaw with about 40-50 teeth on each side, anteriormost teeth small and arranged in 2-3 irregular rows, posterior or lateral teeth (7-9 in number) greatly enlarged, slightly curved posteriorly, and projecting from side of mouth ; lower jaw with about 30-40 small teeth on each ramus arranged in 3-4 irregular rows anteriorly and a single row posteriorly.

Scales cycloid, relatively large and arranged in regular horizontal rows ; predorsal scales extending to anterior portion of interorbital ; two scales below eye covering cheek ; 1 or 2 small deciduous scales covering infraorbitals ; 6 large infraorbital pores on each side of interorbital region.

First dorsal fin originates opposite fourth or fifth soft anal ray ; longest ray of first dorsal fin 3.3 (3.0 to 3.9) ; of second dorsal fin 1.7 (1.4 to 2.0) ; of anal fin 1.6 (1.4 to 1.9), all in head length. All soft (segmented) rays of second dorsal and anal fins branched except first or second. Pelvic fin tips not reaching origin of anal fin ; innermost pelvic ray connected along most of length by membrane (usually damaged during collecting or examination) ; uro-genital openings positioned on mid-ventral line about one-half distance between origin and posterior tip of pelvic fins ; length of pelvic fin 1.7 (1.7 to 2.2) in head length. Pectoral fins pointed, longest rays 1.1 (1.0 to 1.1) in head length. Caudal fin slightly forked, its length 0.9 (0.7 to 1.0) in head.

**Colour in alcohol :** overall whitish ; occipital region darkly pigmented ; numerous pepper-like melanophores on dorsal surface of head and body, less numerous on sides and forming reticulated pattern which follows edge of scales particularly on upper sides ; melanophores also present on lips and chin, and scattered on side of head ; heavy concentration of dark pigment on dorsal and ventral edge of caudal peduncle ; thin line of dark pigment extending along mid-lateral scale row to base of caudal fin ; fins mainly translucent except rays finely outlined with dark pigment (except pelvics which are uniformly pale) ; slightly enlarged melanophores forming tiny spot usually present near base of posteriormost dorsal and anal fin-rays.

**Colour in life :** mainly transparent except head and abdominal region silvery ; melanophore pattern similar to that described above ; iris blue ; pelvic fins pale yellow ; mature females with base of caudal fin and anterior portion of anal fin pale yellow ; mature males with distal edge of second dorsal fin yellow.

#### Remarks

*Pseudomugil paludicola* differs from other members of the genus by virtue of the anal fin-ray count, rearward position of the dorsal fins, small size and inconspicuous nature of the first dorsal fin and the presence of an unsegmented spine at the beginning of the anal fin. The modal number of 14 total fin-ray elements (includes spine) in the anal fin is the highest for the genus. *Pseudomugil inconspicuus* and *P. gertrudae* sometimes possess 13 elements, but they lack an unsegmented spine at the beginning of the anal fin. The two dorsal fins of *P. paludicola* are set far back on the body ; the origin of the first dorsal fin is level with the base of the fourth or fifth soft anal ray, and that of the second dorsal fin with the base of the posteriormost anal rays. Most other members of the genus, including *P. gertrudae*, *P. novaeguineae*, *P. signifer*, and *P. tennellus* have the dorsals in a more anterior position ; the origin of the first dorsal fin is placed either well ahead or about even with the anal fin origin, and that of the second dorsal

fin is level with the middle or anterior portion of the anal fin. The dorsal fins of *P. inconspicuus* from the lower Fly River are positioned similarly to those of *P. paludicola*, but this species differs by having an accessory ascending process on the premaxillary bone and sexual dimorphism manifested by males having slightly larger dorsal and anal fins, sometimes with short filamentous extensions of the anterior ray. The first dorsal fin of *P. paludicola* is much reduced in size compared to that of other *Pseudomugil*. It usually consists of three extremely feeble spines and is difficult to detect without the aid of a microscope. Unlike other *Pseudomugil*, the depressed rays of the first dorsal fall well short of the origin of the second dorsal fin, even in mature males.

The type locality (Fig. 2) is situated in a belt of coastal rainforest. The senior author visited the area in late September at the end of the dry season. Most small streams were dry and standing freshwater was scarce, but after inquiring at Tureture Village a group of young boys located a small stagnant pool deep in the jungle about 5 km inland. Several drags with a one-man seine net revealed that the pool contained hundreds of *Pseudomugil paludicola*, a few *P. gertrudae* and *Melanotaenia rubrostriatus*, and several unidentified gudgeons (Eleotridae). The dimensions of the pool were approximately 4 x 1.5 metres with a maximum depth of about 0.6 metres. This pool was the last remaining water in a small tributary of the Binaturi River (Fig. 3), which is typical of the larger streams flowing into the Torres Strait region. Water turbidity in the pool was moderate and a temperature of 26.8° C and pH of 7.6 were recorded. The junior author has found this species to be very common in swamp lands of the lower Pahoturi and Morehead Rivers, which lie farther to the west.

The species is named *paludicola* (Latin for « swamp dweller ») with reference to its favoured habitat.



Fig. 2. - The type locality near Tureture Village along the southern coast of western Papua New Guinea.  
La localité type près du village Tureture, sur la côte méridionale de Nouvelle-Guinée Papouasie occidentale.





Fig. 3. - View of the Binaturi River a short distance from the type locality.  
Vue de la rivière Binaturi, à une courte distance de la localité type.

TABLE 2

DORSAL FIN RAY COUNTS OF TYPE SPECIMENS OF *PSEUDOMUGIL PALUDICOLA*

1st Dorsal fin spines			2nd Dorsal fin soft rays		
I	II	III	5	6	7
2	58	1	3	56	2

TABLE 3

ANAL AND PECTORAL FIN RAY COUNTS OF TYPE SPECIMENS OF *PSEUDOMUGIL PALUDICOLA*

Anal fin soft rays			Pectoral fin rays	
12	13	14	12	13
5	55	1	4	57

**Aquarium notes**

The senior author is presently maintaining several specimens in an 80 litre capacity aquarium with water temperature and pH similar to that recorded in the natural habitat. The species has a peaceful disposition and may be kept with other *Pseudomugil*, *Iriatherina*, and juvenile *Melanotaenia*. It spends most of the time among floating aquatic plants near the surface. Commercial flake foods are readily eaten, but should be finely pulverised between the fingertips. Male specimens are noticeably more slender than females and lack the yellow colour on the anal and caudal fins.

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**References**

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RÉSUMÉ

*Pseudomugil paludicola*, une nouvelle espèce d'Oeil-Bleu (Melanotaeniidae) de Nouvelle-Guinée Papouasie

Les représentants du genre *Pseudomugil* sont appelés familièrement « Yeux-bleus » ; 6 espèces habitent les eaux douces et saumâtres de la région Australie-Nouvelle Guinée : *P. gertrudae* Weber, *P. inconspicuus* Roberts, *P. novaeguinae* Weber, *P. signifer* Kner, *P. tenellus* Taylor et la nouvelle espèce *P. paludicola*. D'autres espèces seront découvertes sans aucun doute, en particulier dans le sud de la Nouvelle-Guinée. Ces poissons sont extrêmement communs en certaines régions, mais passent facilement inaperçus en raison de leur faible taille qui va de 50 mm LS pour la forme d'Australie Orientale, *P. signifer*, à 25 mm ou moins pour plusieurs autres espèces. Quoique ces espèces ne possèdent généralement pas de brillantes couleurs, les mâles de certaines d'entre elles ont des nageoires de formes attrayantes et toutes s'adaptent bien à la captivité. La plupart des auteurs ont placé *Pseudomugil* parmi les Athérinidés, mais les travaux récents de l'un de nous (Allen, sous presse) indiquent de plus grandes affinités avec les Mélanoténiidés.

C'est au cours de travaux de terrain, en 1978-1979, dans la province occidentale de Nouvelle-Guinée Papouasie, que la nouvelle espèce décrite ici a été collectée par G. R. Allen. Les types ont été déposés dans diverses institutions scientifiques (se reporter au texte anglais).

Oeil-Bleu de marais  
*Pseudomugil paludicola*, n.sp.

Holotype : WAM P 26751-001, mâle de 24 mm LS, petit marigot dans la forêt vierge côtière, à environ 5 km vers l'intérieur des terres du village Tureture, près de la piste conduisant à la rivière Binaturi, Province occidentale de Nouvelle-Guinée Papouasie, 27 septembre 1979.

**Description.** Se reporter au texte anglais.

Coloration en vie : voir fig. 1.

**Remarques.** *P. paludicola* diffère des autres espèces du genre par le compte des rayons de l'anale, la position reculée des dorsales et la faible taille de la première, et l'existence d'une épine non-segmentée au début de l'anale.

La station typique (fig. 2) est une mare stagnante de 4 x 1,5 et 60 cm de profondeur maximum, dans le cours d'un petit affluent de la rivière Binaturi (fig. 3). 26,80 C, pH 7,6. Des centaines de *P. paludicola* s'y trouvaient, avec quelques *P. gertrudae*, *Melanotaenia rubrostriatus* et des Eleotrides indéterminés. Le nom spécifique (habitant de marais) fait référence à l'habitat préférentiel.

**AQUARILOGIE.** G. R. Allen conserve des spécimens dans un bac de 80 l dont l'eau est conforme à celle de l'habitat naturel. Espèce paisible que l'on peut tenir avec d'autres *Pseudomugil*, *Iriatherina* et des juvéniles de *Melanotaenia*. Se tient la plupart du temps parmi les plantes flottantes. Mange les nourritures sèches finement broyées. Mâles plus élancés que les femelles, sans couleur jaune à l'anale et à la caudale.