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Cover photo: Underwater photograph of the Raja Ampat region with it's incredible fish diversity. Photo by B. Jones.

Aquarium photograph of *Melanotaenia synergos,* male, approx. 70 mm SL. Aquarium population (approx. F_{10}) from Warey River, Batanta, Raja Ampat Islands. See pages 107-118. Photo by N. Khardina taken at Mr. Marcel Dielen's home, Belgium.

"Blue Auction" Special Edition

Preface

It is my pleasure to introduce this *aqua* special edition which includes the description of eleven fish species recently discovered in the 183,000 km^2 Bird's Head Seascape region of Papua, Indonesia (Fig. 1). Other than a new *Melanotaenia* rainbowfish, all of the species described herein were collected during rapid marine ecological assessments of Cenderawasih Bay and the Fakfak-Kaimana coastline conducted by Conservation International and our Indonesian governmental and academic partners in 2006. These ecological and biodiversity surveys were done under the auspices of the Indonesian Department of Nature Conservation (PHKA), with the aim of assessing the conservation status of existing marine protected areas (MPAs) in the Bird's Head region and identifying additional sites with high biodiversity and conservation value that should be targeted for gazettement within new MPAs.

These surveys, along with additional work by Gerald R. Allen in the Raja Ampat Islands conducted from 1998 through to the present, have resulted in an impressive tally of 1315 coral reef fish species recorded from the Bird's Head Seascape (Allen, unpublished data). The fact that at least 20, and possibly as many as 27 of the currently recorded taxa (including seven of the species herein described, as well as a number that remain undescribed) are believed to be regional Bird's Head endemics confers a very high conservation value to this area (Allen, in press). Indeed, Briggs (2005) has argued strongly that areas such as the Bird's Head should receive the highest priority for marine conservation efforts in order to conserve not only the high diversity of species in the area but also the very evolutionary processes which have created and maintained this outstanding biodiversity (and which significantly influence biodiversity patterns in the broader Indo-Pacific Realm).

However, the Bird's Head region ranks as a global marine conservation priority not only because of its impressive biodiversity and overall conservation value; it is also highly threatened from destructive fishing practices such as blast and cyanide fishing, as well as a wide range of current and proposed economic development activities including mining and timber harvesting in coastal areas and planned industrial fishing development. The urgency of strengthening seascape-wide marine conservation efforts, combined with the overwhelmingly positive public response to media coverage of the Bird's Head marine biodiversity surveys, led to a plan to link the description of many of the newly-discovered Bird's Head species to a fundraising effort for priority marine conservation programs in the region. Under the visionary leadership of Cherie Nursalim, Francesco Bongiovanni, Enki Tan, Peter Seligmann, and Hugh Edmeades, plans for a "Blue Auction" to raise urgently needed conservation funding for the Bird's Head Seascape were quickly developed. While this was certainly not a new idea (the Wildlife Conservation Society had previously auctioned the naming rights to the titi monkey *Callicebus aureipalatii* Wallace et al., 2006 in order to raise funding for the management of Madidi National Park in Bolivia, where the monkey was discovered), it had never before been attempted on such a grandiose scale nor with a marine conservation focus.

The Indonesian Institute of Sciences (LIPI) and Ministry of Marine Affairs and Fisheries (DKP) enthusiastically endorsed the plan, and on 20 September 2007 the gala Blue Auction was held in the historic Musée Oceanographique de Monaco. Sponsored by the Monaco-Asia Society and Conservation International, and under the high patronage of HSH Prince Albert II of Monaco, the charity auction was conducted by Christie's Inter-

national. The naming rights to ten of the eleven new species described herein were auctioned and together raised a total of US $ 1,595,000. These revenues from the Blue Auction are allocated exclusively to three priority programs in the Bird's Head Seascape: a marine enforcement initiative designed to dramatically reduce destructive and illegal fishing practices in the region, a marine conservation education initiative which will use an innovative "floating education center" as a platform for teaching interactive conservation education courses in the remote coastal villages of the Bird's Head region, and a taxonomic capacity building initiative to foster the development of taxonomic expertise amongst young Indonesian marine scientists working in the region. Further details of these programs and periodic updates can be found at the website: www.theblueauction.com.

We are exceedingly grateful to Heiko Bleher and Friedhelm Krupp for agreeing to edit and publish this special issue, and to the reviewers who dedicated time and energy to improving the manuscripts. We are aware that the auctioning of naming rights to new species is by no means universally endorsed by taxonomists, but we feel strongly that this has been done in the best interest of the new species themselves, of the reefs and indigenous peoples of the Bird's Head Seascape, and indeed of the future of Indonesian marine taxonomy.

Mark V. Erdmann
Conservation International Indonesia

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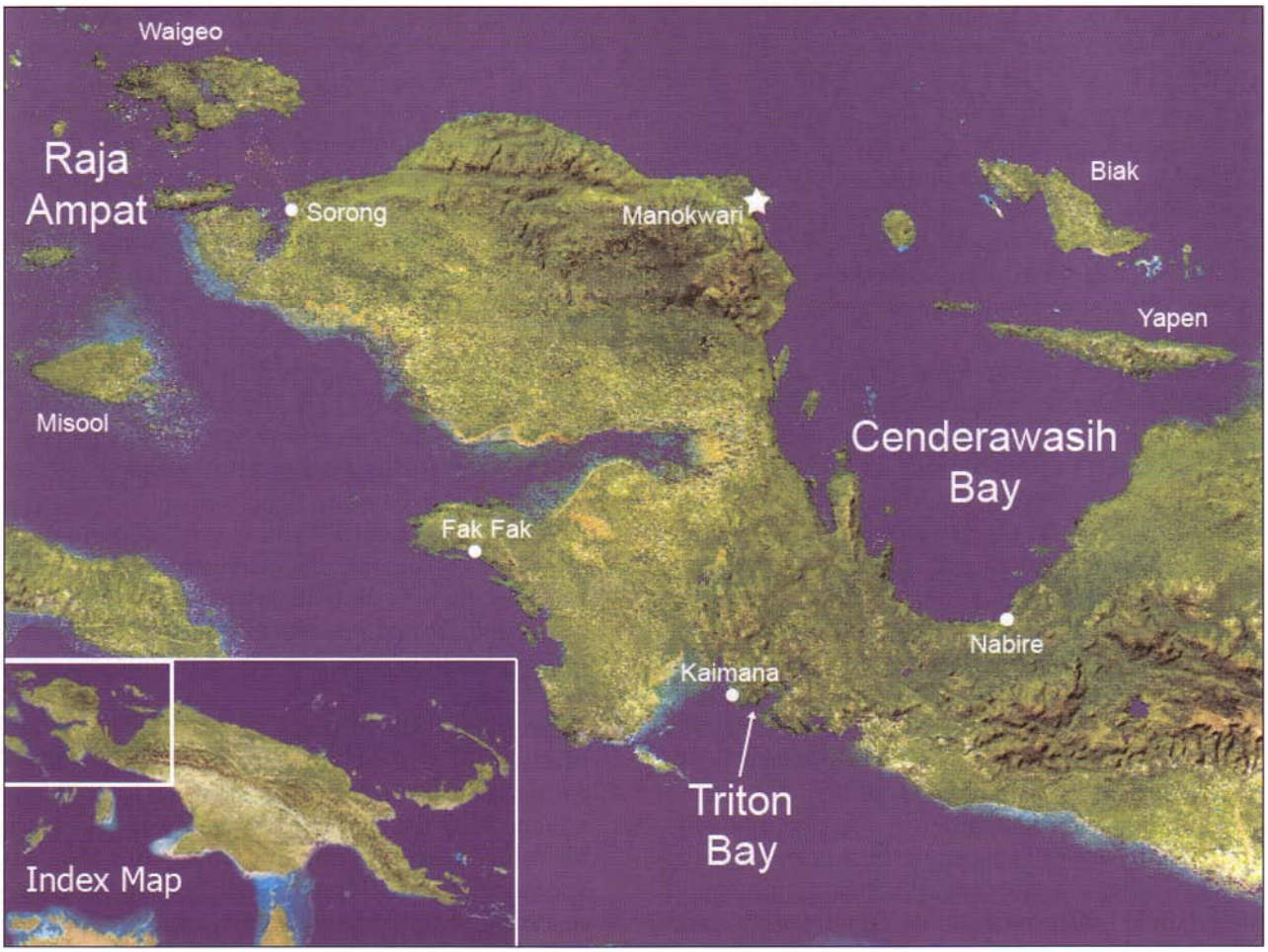
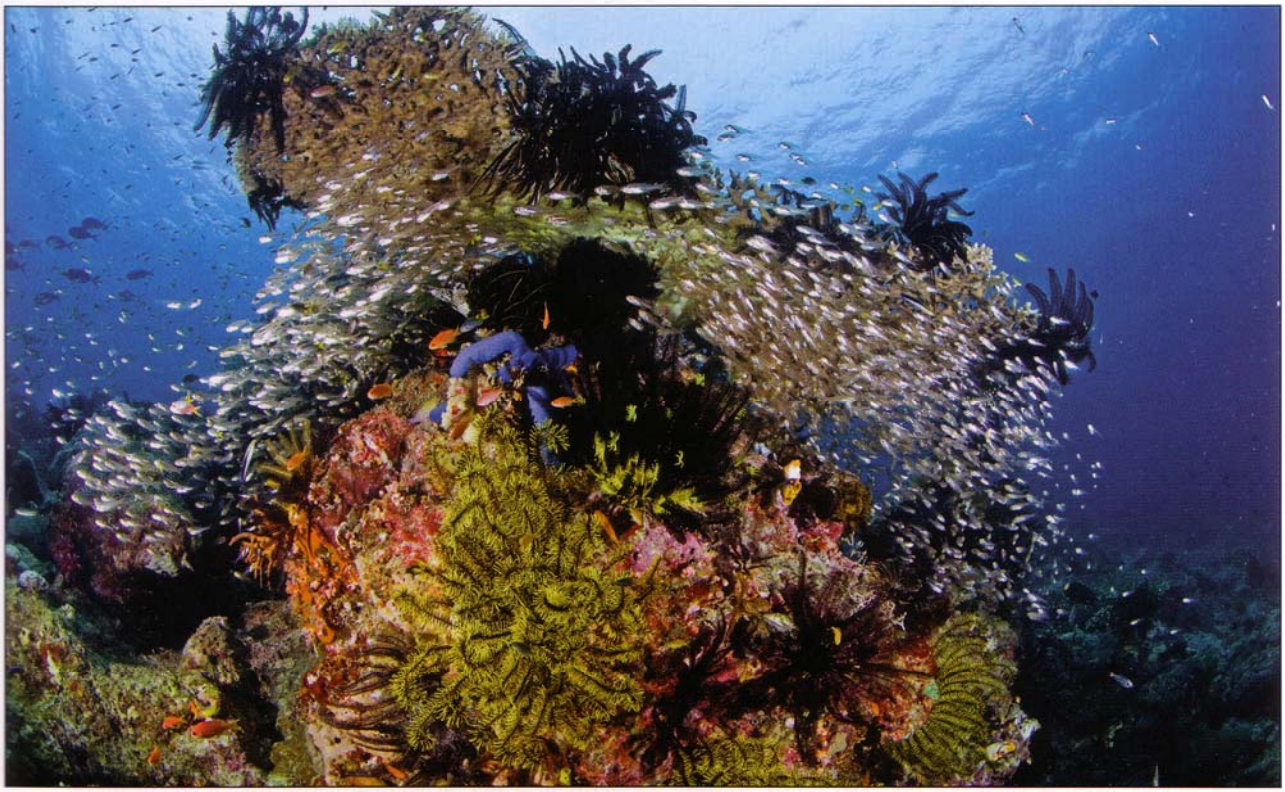
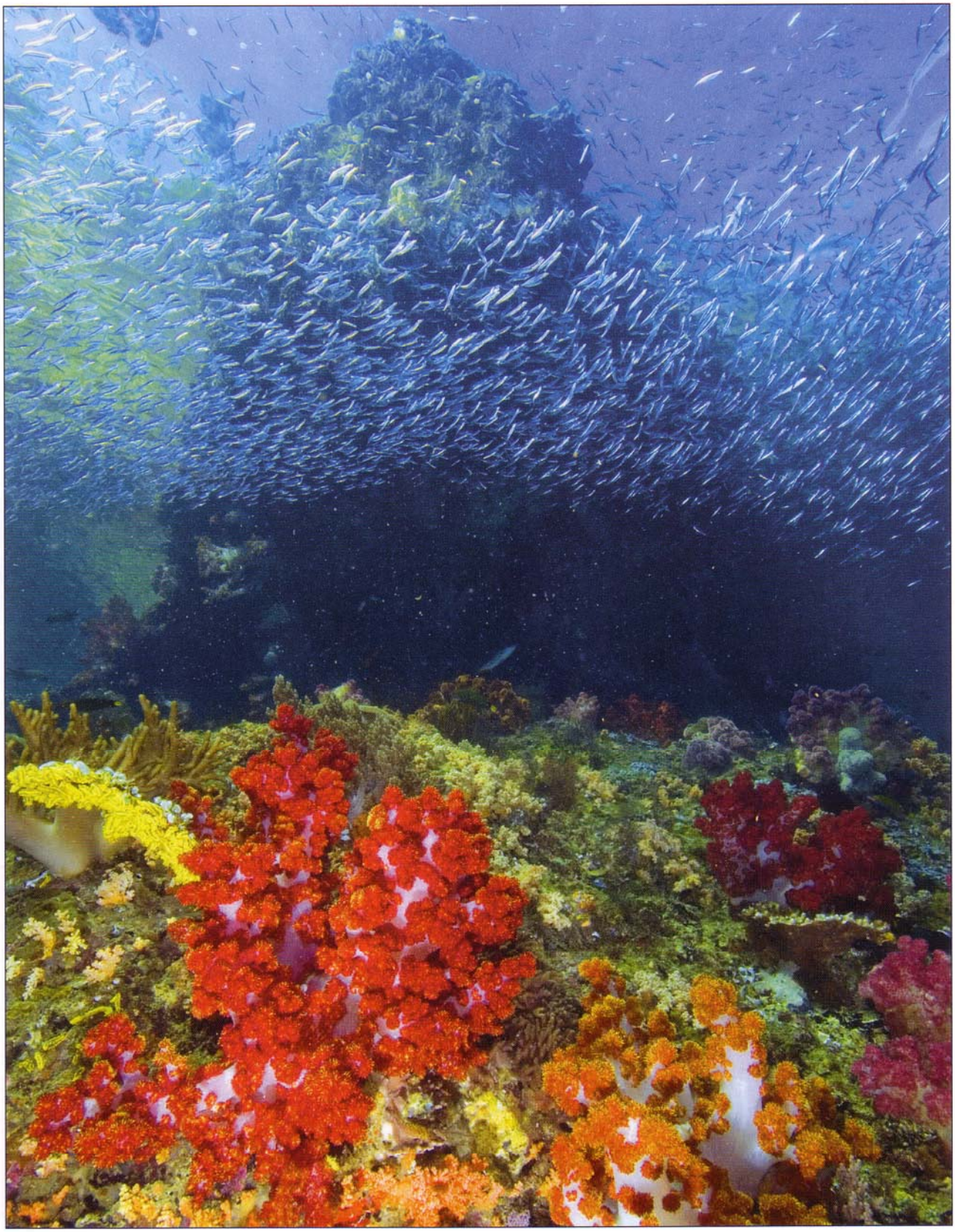


Fig. 1. Map of the Bird's Head Seascape region of Papua Barat Province, Indonesia. Map prepared by M. G. Allen.

Wayag Islands, Raja Ampat. Photo by M. V. Erdmann



Underwater photograph of the Raja Ampat region. Photo by B. Jones.



Underwater photograph of the Raja Ampat region. Photo by B. Jones.

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Two new species of bamboo sharks (Orectolobiformes: Hemiscylliidae) from Western New Guinea

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Abstract

Two new species of hemiscylliid sharks are described from the Bird's Head region of western New Guinea (Papua Barat Province, Indonesia). They differ from congeners on the basis of both colour patterns and DNA composition. *Hemiscyllium galei* is described from two specimens, 542.5-567.5 mm TL, collected at Cenderawasih Bay. The species is similar in appearance to *H. freycineti*, reported from areas immediately westward including the Raja Ampat Islands. The new species differs from *H. freycineti* in possessing white lines and spots along the margin of the large, dark dorsal saddles as well as scattered white spots, mainly on the upper side. In addition, *H. galei* is characterised by a row of about seven well-defined, horizontally-ovate, dark spots on the lower side between the abdomen and caudal-fin base. *Hemiscyllium henryi* is described from three specimens, 564.0-815.0 mm TL, collected in the vicinity of Triton Bay. It is most similar in general appearance to *H. ocellatum* from northern Australia, but differs in the structure of the post-cephalic ocellus (usually a pair of merged "twin-ocelli" with a poorly defined white halo) and possesses well-defined dark brown saddles/bars along the back and dorsal margin of the caudal fin as well as a dark spot at the origin of the pectoral and pelvic fins. A final difference concerns the presence of numerous small brown spots on the dorsal fins of *H. ocellatum*, in contrast to the mainly spotless pattern on the dorsal fins of *H. henryi*.

Zusammenfassung

Beschrieben werden zwei neue Arten der Hemiscylliiden-Haie aus der Gegend von Bird's Head vor dem westlichen Neuguinea (Provinz Papua Barat, Indonesien). Von den anderen Angehörigen der Gattung lassen sie sich durch Farbmerkmale und DNS-Zusammensetzung unterscheiden. *Hemiscyllium galei* wird auf der Grundlage von zwei Exemplaren mit 542,5-567,5 mm TL (Gesamtlänge) beschrieben, die an der Cenderawasih-Bucht gefangen wurden. Die Art ähnelt im Erscheinungsbild *H. freycineti*, deren Exemplare in einem Gebiet beobachtet wurden, das sich westlich anschließt und bis zu den Raja-Ampat-Inseln reicht. Die neue Art unterscheidet sich aber durch weiße Linien und Flecken am Rand des großen dunklen Rückensattels sowie durch verstreute weiße Flecken hauptsächlich auf der Oberseite. Außerdem ist *H. galei* durch eine Reihe sieben klar begrenzter horizontal-ovaler dunkler Flecken gekennzeichnet, die sich auf der Unterseite zwischen Abdomen und Schwanzflossen-Basis erstrecken. *Hemiscyllium henryi* wird anhand von drei Exemplaren mit 564,0-815,0 mm Gesamtlänge (TL) beschrieben, die in der Nähe der Triton-Bucht gesammelt wurden. Sein Erscheinungsbild ähnelt stark *H. ocellatum* von Nord-Australien, unterscheidet sich aber durch die Struktur der hinter dem Kopf sichtbaren "Augenflecken" (normalerweise ein verschmolzenes Paar von "Zwillingsflecken" mit undeutlichem weißen Ring) und zeigt außerdem klar begrenzte dunkelbraune sattel- oder streifenförmige Flecken am Rücken entlang und am dorsalen Rand der Schwanzflosse sowie einen dunklen Fleck am Ursprung der Brust- und der Bauchflossen. Schließlich unterscheidet sich *H. ocellatum* durch zahlreiche kleine braune Flecken an den Rückenflossen im Gegensatz zu der fast fleckenlosen Farbgebung an den Rückenflossen bei *H. henryi*.

Résumé

Deux nouvelles exoèces de requins hémiscylliidés sont décrites, originaires de la région du Vogelkop, Nouvelle-Guinée occidentale (Province de Papua Barat, Indonésie). Ils se distinguent de leurs congénères à la fois par le patron de coloration et la composition de l'ADN. *Hemiscyllium galei* est décrit sur base de deux spécimens, de 542.5-567.5 mm de LT, collectés à Cenderawasih Bay. L'espèce est similaire à *H. freycineti*, signalé dans des régions immédiatement à l'ouest, incluant les îles Raja Ampat. La nouvelle espèce se distingue de *H. freycineti* par des lignes et des taches blanches en bordure des grandes selles dorsales sombres ainsi que par des taches blanches disséminées, sourtout sur la partie supérieure. En outre, *H. galei* se caractérise par une rangée d'environ sept taches sombres bien nettes, horizontalement ovales sur la partie inférieure, entre l'abdomen et la base de la caudale. *Hemiscyllium henryi* est décrit sur base de trois spécimens, de 564.0 à 815.0 mm de LT, collectés aux environs de Triton Bay. Son apparence générale évoque le plus *H. ocellatum*, du nord de l'Australie, mais se distingue par la

structure de l'ocelle postcéphalique (généralement une paire d'ocelles jumelés avec un halo blanc plus marqué) et il possède des barres en selle brun foncé et bien nettes le long du dos et du lobe dorsal de la caudale, ainsi qu'une tache obscure à la naissance des pectorales et de pelviennes. Une dernière différence concerne la présence de nombreuses petites taches brunes sur les dorsales de *H. ocellatum*, alors que le dorsales de *H. henryi* en sont pratiquement dépourvues.

Sommario

Si descrivono due nuove specie di squali hemiscillidi dalla regione di Bird's Head della Nuova Guinea occidentale (provincia di Papua Barat, Indonesia). Esse differiscono dai congeneri sia per la colorazione sia per la composizione del DNA. *Hemiscyllium galei* è descritto sulla base di due esemplari di 542.5-567.5 mm TL raccolti nella baia di Cenderawasih. La specie è superficialmente simile a *H. freycineti*, che abita le vicine aree ad occidente incluse le isole di Raja Ampat. La nuova specie differisce da *H. freycineti* nell'avere linee e macchie bianche lungo il margine delle larghe selle dorsali scure e anche per macchie bianche disperse, principalmente sul lato superiore. In aggiunta, *H. galei* è caratterizzato da una fila di circa sette ben definite macchie scure di forma ovoidale sul lato inferiore tra l'addome e la base della pinna caudale. *Hemiscyllium henryi* è descritto sulla base di tre esemplari di 564.0-815.0 mm TL raccolti nelle vicinanze della baia del Tritone. La specie più simile nell'aspetto generale è *H. ocellatum* dell'Australia settentrionale, ma se ne discosta per la struttura dell'ocello post-cefalico (di solito una coppia di "ocelli gemelli" fusi tra loro circondati da un alone bianco poco definito) e poiché possiede ben definite barre o selle brune lungo il dorso e il margine dorsale della pinna caudale e una macchia scura all'origine della pinna pettorale e delle pinne pelviche. Un'altra differenza è la presenza di numerose piccole macchie brune sulle pinne dorsali di *H. ocellatum*, mentre le pinne dorsali di *H. henryi* ne sono sostanzialmente prive.

INTRODUCTION

The bamboo sharks of the genus *Hemiscyllium* Müller & Henle, 1837 are confined to shallow coral reefs of northern Australia and New Guinea. They are small (to about 100 cm TL), relatively sedentary, nocturnal sharks that appear to lack efficient dispersal capabilities; hence most of the known species exhibit relatively limited regional distributions. They are generally active at night, foraging on benthic invertebrates and small fishes. During the day they typically seek shelter under large rocks, coral formations, or under ledges. The genus was revised by Dingerkus & DeFino (1983), who recognised five species. More recent coverage includes reviews by Compagno & Niem (1998), and Compagno (2001). In addition, the two Australian species were diagnosed and illustrated by Last & Stevens (1994).

Our knowledge of species from New Guinea is poor and based on relatively few specimens. Four species are generally recognised in current literature (e.g. Compagno, 2001): *H. freycineti* (Cuvier, 1824), *H. hallstromi* Whitley, 1967, *H. ocellatum* (Bonnaterre, 1788), and *H. strahani* Whitley, 1967. An additional species, *H. trispeculare* Richardson, 1843, occurs in northern Australia. Although *H. ocellatum* was reported from the entire coast of New Guinea, as well as the Solomon Islands, Malaysia and Sumatra, it is apparently restricted to Australia. The extra-limital records are apparently based on misidentifications. Similarly, distribution maps for *H. freycineti* in Compagno & Niem (1998) and Compagno (2001) indicate a circum-New Guinea range. However, according to Allen (unpublished data) it is restricted to the far-western part of New Guinea and a similar-patterned shark from eastern Papua New Guinea previously identified as *H. freycineti* represents an undescribed taxon (*Hemiscyllium* species in key below).

The present paper describes two new *Hemiscyllium* that we collected in 2006 and 2007 during separate Conservation International marine biological surveys of Cenderawasih Bay and Triton Bay. Although the two bays are only 115 km apart, they are separated by the New Guinea mainland, which in this region forms a narrow isthmus between the Bird's Head Peninsula to the west and main portion of New Guinea to the east (Fig. 1).

MATERIALS AND METHODS

Type specimens are deposited at Pusat Penelitian dan Pengembangan Oseanologi, Jakarta, Indonesia (NCIP), the United States National Museum of Natural History, Washington, D.C. (USNM), and the Western Australian Museum, Perth (WAM).

Proportional measurements and counts of vertebral centra in the descriptions are given first for the holotype followed by the value(s) for the paratype(s) if different. Technical terms and measurements follow those explained and illustrated by Compagno (1984) and Dingerkus & DeFino (1983) except the term "nose" of the latter authors has been replaced here with snout tip. Terms which require clarification include the head length, which is measured from the tip of the snout to the origin of the pectoral fin, snout length, which is the distance between the snout tip and anterior edge of the eye, and preanal body depth, which is measured at the level of the anal-fin origin. Total length

(TL) is the distance from the snout to the caudal-fin tip.

The tip of the caudal fin of the paratype of *H. galei* is missing. Extrapolation from the holotype and other similar-sized hemiscyllids revealed that the missing section is approximately 40 mm in length. Therefore, the total length of the paratype was increased from 542.5 to 582.0 in order to facilitate the comparison of morphometric proportions.

Tissue samples for DNA analysis were obtained from the two new taxa and the sister taxa *H. freycineti* and *H ocellatum* and sent to Christine Dudgeon, a geneticist from Queensland University, who has done prior work (unpublished) on the phylogeny of *H. ocellatum* from eastern Australia. Total genomic DNA was extracted from 25 mg of fin tissue using the DNeasy Tissue Extraction Kit (Qiagen) following the instructions of the supplier. A fragment including partial mitochondrial NADH Dehydrogenase subunit 4 gene (ND4), tRNA-His and tRNA-Ser genes was amplified through polymerase chain reaction (PCR) using the primers: ND4-F: 5' – CACCTATGACTAC-CAAAAGCTCATGTAGAAGC - 3' (Arevalo et al. 1994) and H12293-Leu-R: 5' – TTGCACCAA-GAGTTTTTGGTTCCTAAGACC - 3' (Inoue et al. 2001). Reactions were conducted in 30 μl total amounts and consisted of: 10 μM each primer, 400 μM of each dNTP, 3 units *Taq* polymerase, 1 x PCR Buffer (Qiagen) and 30-50 ng extracted DNA. PCRs were conducted on 9700 Perkin Elmer thermocyclers and consisted of an initial denaturation step at 95°C for 5 min, followed by 30 cycles of 95°C for 15 sec, 56°C for 30 sec and

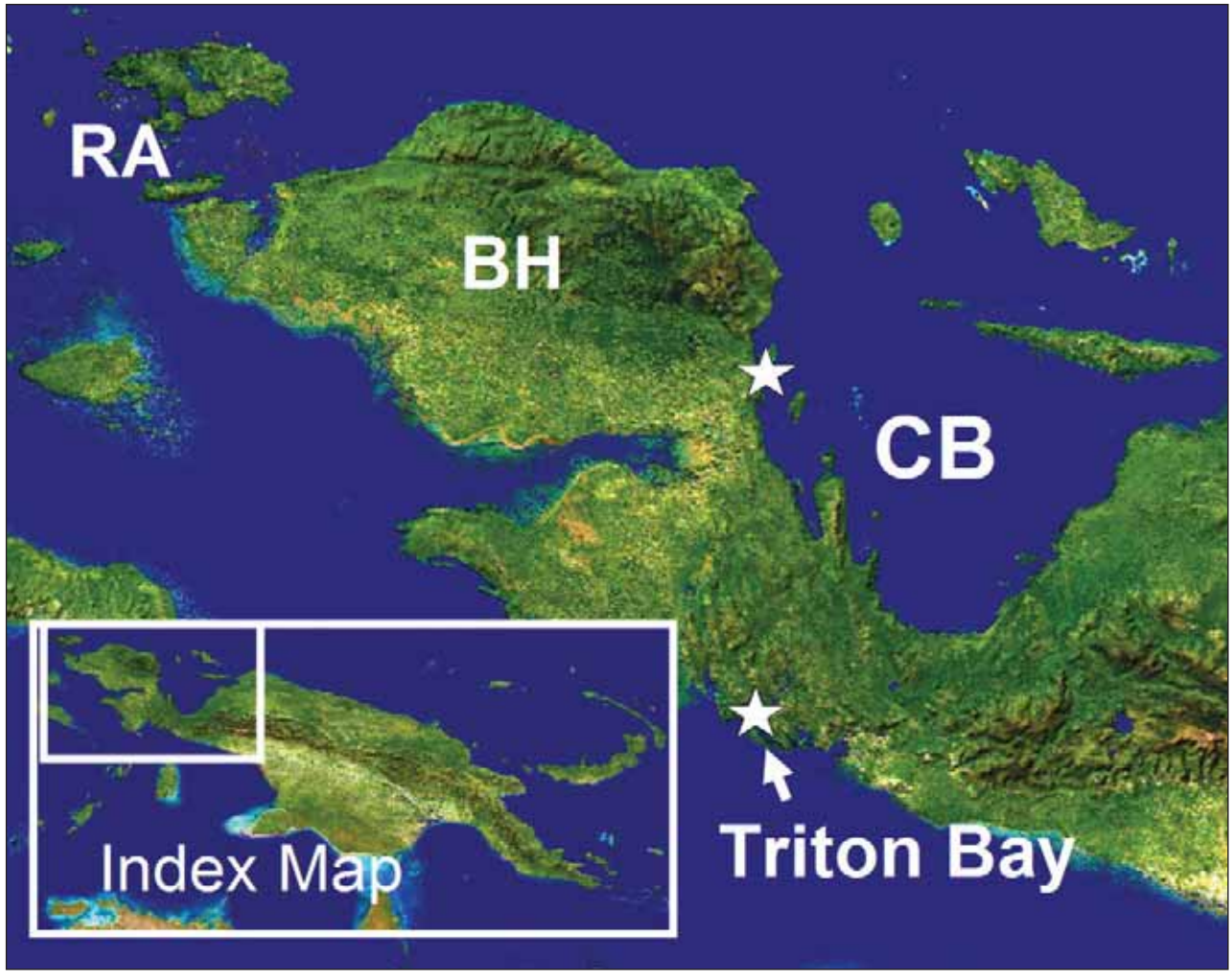

Fig. 1. Map of western New Guinea (Papua Barat Province, Indonesia) showing collection locations (star symbols) of new species of *Hemiscyllium*. Abbreviations as follows: BH = Bird's Head Peninsula, CB = Cenderawasih Bay, and RA = Raja Ampat Islands. NASA satellite images.

72°C for 1 min, and a final extension at 72°C for 7 min. The PCR products were cleaned using QIAquick PCR Purification Kit (Qiagen). Sequences were conducted in the forward direction using Big Dye Terminator v3.1 Cycle Sequencing Kit (Applied Biosystems) following manufacturer's instructions. Sequencing products were precipitated by adding 4 μL sodium acetate (3 M, pH 5.2) and 50 μL 100% ethanol and centrifuged for 30 min at 13000 rpm. The pellet was washed twice with 500 μL 70% ethanol and then products resolved on a 3730xl Genetic Analyser (Applied Biosystems).

Sequences were aligned using Sequencher software (GeneCodes). The program Modeltest version 3.7 (Posada & Crandall 1998) was used to assess the best-fit model for the nucleotide substitution. The hierarchical likelihood ratio test ranked the TrN + G substitution model (gamma distribution = 0.3674) as having the best fit to the data. The Tamura-Nei (Tamura & Nei 1993) substitution model accounts for variable base frequencies, transition rates and rate variation among sites. Akaike's Information Criterion ranked the TrN + I model as having best fit which is also the Tamura-Nei model, but includes invariable sites and no rate variation among sites. Phylogenetic trees were constructed in PAUP version 4.0b (Swofford 1998) using both models. Maximum likelihood, maximum parsimony and neighbour-joining trees were constructed with a specimen of *Chiloscyllium punctatum* as the outgroup taxon. Confidence in tree topology was evaluated by bootstrapping across 1000 bootstrap replicates (Felsenstein 1985). Pairwise distances within and between putative taxa were calculated using the TrN + G model implemented in Mega version 3.1 (Kumar et al. 2004).

Hemiscyllium galei n. sp.

(Figs 2-6; Tables I-III)

Holotype: NCIP 6324, male, 567.5 mm TL, reef near Rumberpon Village, 03°53.757'S 134°06.638'E, western Cenderawasih Bay, Papua Barat Province, Indonesia, 3-4 m, collected by hand, M. and A. Erdmann, 19 February 2007.

Paratype: WAM P.32888-001, male, 542.5 mm TL, collected with holotype.

Diagnosis: A species of bamboo shark belonging

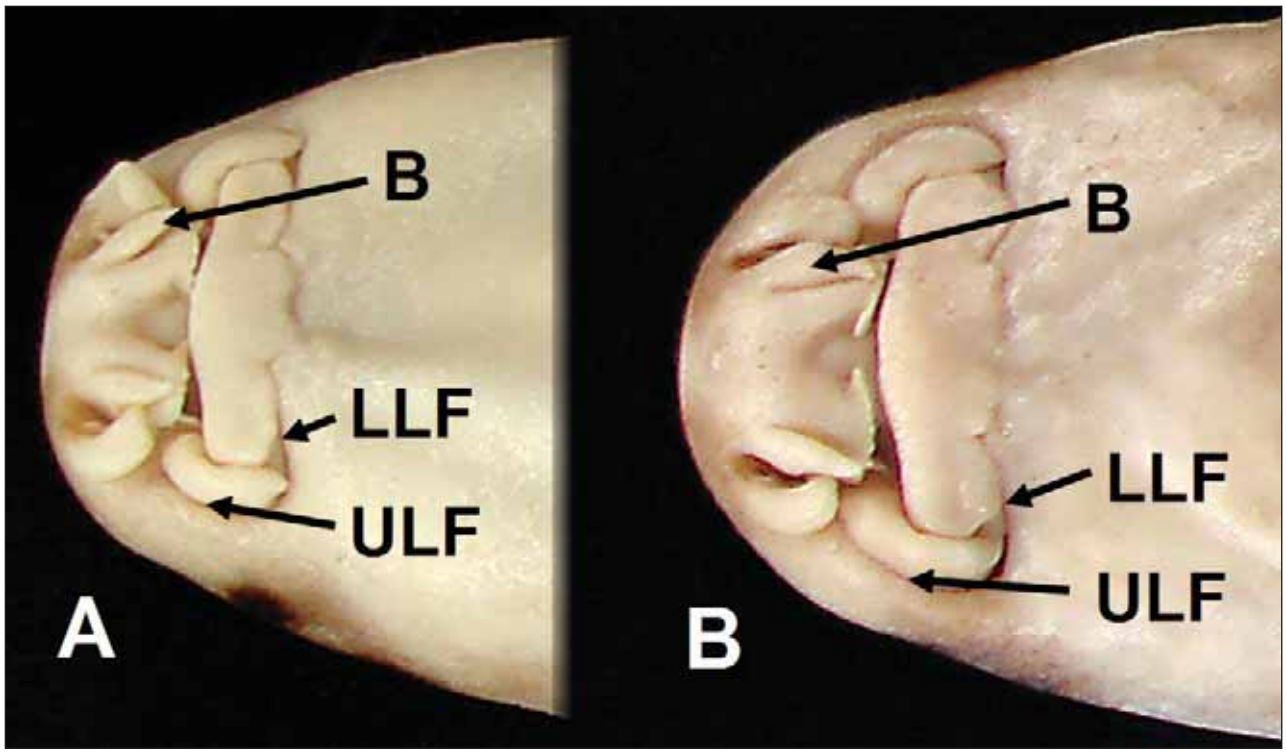

Fig. 2. Ventral view of heads of *Hemiscyllium galei* (A), holotype, 567.5 mm TL, Cenderawasih Bay, Papua Barat Province, Indonesia, and *Hemiscyllium henryi* (B), paratype, 564.0 mm TL, Triton Bay, Papua Barat Province, Indonesia. Abbreviations as follows: ULF = upper labial fold, LLF = lower labial fold, and B = barbel. Photos by G. R. Allen.

Table I. Morphometric proportions for type specimens of *Hemiscyllium galei* and *H. henryi* expressed as percentage of the TL.

	H. henryi		*H. galei*		
Character	Holotype NCIP 6324	Paratype WAM P.32888	Holotype NCIP 6323	Paratype USNM 390771	Paratype WAM P.32889
Sex	male	male	male	female	male
Total length	567.5	582.0	783.0	815.0	564.0
Precaudal length	76.8	82.7	82.8	83.9	75.5
Head length	12.7	13.8	13.4	13.7	13.7
Head width	8.8	7.5	9.7	9.8	8.5
Head depth	7.8	8.6	7.9	8.2	7.3
Preanal body depth	3.5	3.6	3.8	3.8	3.9
Snout to first gill slit	11.7	12.1	10.7	11.4	11.2
First to fifth gill slit	4.3	4.8	4.9	5.2	4.8
First gill-slit height	1.4	1.2	1.5	1.9	1.5
Fifth gill-slit height	2.6	1.8	2.2	2.6	2.2
Eye diameter (horizontal)	1.7	1.8	1.7	1.6	1.5
Eye diameter (vertical)	1.0	0.7	0.6	0.7	0.6
Fleshy interorbital width	4.8	4.2	4.7	4.0	4.4
Bony Interorbital width	3.4	3.2	3.3	3.2	3.4
Snout to eye	6.2	6.2	5.0	6.0	5.5
Snout to spiracle	11.9	7.1	6.6	6.9	6.2
Snout to mouth	2.6	2.5	2.2	2.0	2.0
Lower labial furrow length	0.9	0.9	1.1	1.2	1.1
Lower labial flap width	1.3	1.4	1.5	1.0	1.3
Postoral fold	1.8	1.7	1.8	1.5	1.8
Mouth width	5.1	4.8	5.1	4.9	4.3
Barbel length	1.1	1.4	1.7	1.5	1.6
Snout to first dorsal fin	37.4	37.2	40.4	36.8	38.1
Snout to pelvic fin origin	27.8	28.0	27.5	30.1	28.7
Snout to vent	29.7	30.2	30.3	31.3	31.6
Vent to anal fin	40.5	41.6	44.1	42.3	41.7
Vent to caudal-fin tip	68.9	69.6	69.3	66.7	69.9
Interdorsal width	11.9	11.2	13.7	13.3	12.9
Pectoral-fin length	11.0	11.6	11.2	11.0	11.5
Pelvic-fin length	11.5	11.2	10.5	10.2	9.9
First dorsal-fin base	8.4	9.3	7.7	7.1	6.9
First dorsal-fin height	6.7	7.2	8.2	9.1	10.1
Free margin of first dorsal fin	5.2	3.7	4.9	4.2	4.3
Second dorsal-fin base	8.1	7.7	8.3	7.0	8.0
Second dorsal-fin height	7.2	7.5	7.8	7.0	8.0
Free margin of second dorsal fin	3.3	2.4	4.1	3.8	3.5
Anal-fin base	8.8	9.8	9.1	9.8	9.0
Anal-fin height	2.9	2.9	3.2	3.3	3.0
Free margin of anal fin	1.5	1.7	2.0	1.5	1.8
Subcaudal length	17.3	damaged	17.2	17.7	17.4
Clasper length (inner)	11.1	10.3	10.7	–	4.9
Clasper length (outer)	6.3	6.6	7.4	–	1.4

to the genus *Hemiscyllium*, distinguished by its unique colour pattern, particularly the combination of white lines/spots along the margin of the large, dark saddles on the back, scattered white spots (mainly on upper side), and a row of 7-8 well-defined, horizontally-ovate, dark spots on the lower side between the abdomen and caudal-fin base.

Description: Vertebral centra 195 (160, but end of caudal fin missing); body and tail relatively slender, tapering posteriorly; precaudal length 1.2, head length 7.9 (7.2), both in TL; maximum depth of head (at pectoral fin origin) about equal to width of head at level of eye; horizontal eye diameter 3.6 (3.5) in snout length, the vertical diameter 1.8 (2.5) in horizontal diameter; fleshy interorbital width 1.3 (1.5), bony interorbital width 1.8 (1.9), both in snout length; snout blunt and short, snout

tip to eye 2.0 (2.2), snout tip to mouth 2.4 (2.5), snout tip to spiracle 1.1 (1.9), snout tip to first gill slit 3.0 (2.9), all in head length; gill slits on rear part of head, above to slightly anterior of pectoral-fin base; distance between first and fifth gill slit 3.0 (2.9) in head length; height of gill slits gradually increasing posteriorly, the first 4.4 (5.2) and fifth 2.4 (3.5), both in snout length.

Mouth small and transverse, positioned well forward on ventral surface of head (Fig. 2B), its width 1.2 (1.3) in snout length; short barbel on each side of ventral snout, its length 5.5 (4.5) in snout length; maximum width of lower labial flap 4.8 (4.6), length of postoral fold (upper labial furrow) 3.4 (3.6), length of lower labial furrow 6.7 (6.6), all in snout length; teeth pavement-like, composed of numerous rows; individual teeth broad-based with singe posteriorly-directed spike-like projection, the spikes of innermost rows more developed.

Snout tip to first dorsal-fin origin 2.7, snout tip to pelvic-fin origin 3.6, snout tip to vent 3.4 (3.3), vent to anal fin origin 2.5 (2.4), vent to tail tip 1.5 (1.4), all in TL. Pectoral fins below gill openings, their length 1.2 in TL; pelvic fins immediately anterior to vertical line passing through first dorsal fin origin, their length 1.1 (1.2) in TL; dorsal fins positioned well back on body, about equal in height; first dorsal-fin base 1.5 in head length, first dorsal-fin height 1.3 in first dorsal-fin base; free margin of first dorsal fin 1.7 (1.9) in first dorsal-fin height; interdorsal distance 1.1 (1.2) in head length; second dorsal-fin base 1.6 (1.8) in head length; second dorsal-fin height 1.1 (1.0) in second dorsal-fin base; free margin of second dorsal fin 2.2 (3.1) in second dorsal-fin height; a long and low anal fin just anterior to caudal fin; anal-fin base 1.4 in head length, anal-fin height 3.1(3.3) in anal-fin base; free margin of anal fin 1.9 (1.8) in anal-fin height; an elongated and thick precaudal tail, its depth at level of anal-fin origin 3.7 (3.9) in head length; subcaudal length 5.8 in TL.

Male clasper stout and elongate, about same length as pelvic fins, inner length 1.1 (1.3), outer length 2.0 (2.1), both in head length; clasper width at base 3.3 (3.3), in outer length of clasper.

Colour in life (Fig. 3 upper and Fig. 4. lower): generally pale reddish-brown (fawn), white on ventral surface, with relatively large, dark-brown, post-cephalic ocellus usually poorly defined) on middle of side and dark brown bar (composed of several merged spots), immediately

Fig. 3. Underwater photograph of *Hemiscyllium galei* (upper), approximately 650 mm TL, Cenderawasih Bay and *H. freycineti* (lower), approximately 650 mm TL, Raja Ampat Islands. Photos by G. R. Allen.

Table II. Comparison of mean values for selected proportional measurements (as percentage of TL) of species of *Hemiscyllium*. Data for *H. galei* and *H. henryi* were obtained from the current study, but all others except *H. freycineti* are from Dingerkus & DeFino (1983). The data for *H. freycineti* were taken by the authors from type specimens at MNHN.

	H. freycineti	*H. galei*	*H. hallstromi*	*H. henryi*	*H. ocellatum*	*Hemiscyllium* sp.	*H. strahani*	*H. trispeculare*
Number specimens	3	2	9	3	20	6	2	7
Snout to first dorsal fin	36.02	37.28	35.98	38.43	36.18	37.99	36.96	36.13
Snout to pelvic fin	28.01	27.91	25.93	28.75	28.58	28.62	28.63	29.39
Snout to vent	30.13	29.94	30.07	31.04	30.32	29.52	29.36	31.51
Vent to anal fin	45.34	41.05	42.67	42.69	43.11	43.87	43.82	39.96
Vent to tail tip	69.15	69.24	68.59	68.55	68.37	69.62	68.67	67.26
Interdorsal distance	13.39	11.56	12.06	13.29	12.48	13.02	12.33	11.60
Pelvic-fin length	9.95	11.35	9.70	10.20	9.59	9.69	10.19	10.50
First dorsal-fin base	7.69	8.88	8.64	7.23	8.39	7.00	7.67	8.90
First dorsal-fin height	6.36	6.94	6.97	9.12	6.48	7.20	6.92	8.42
Second dorsal-fin base	8.24	7.92	7.79	7.76	7.81	7.24	7.65	7.67
Second dorsal-fin height	6.02	7.36	6.55	7.59	6.45	6.53	6.31	7.65
Anal-fin base	8.00	9.31	9.02	9.31	9.02	7.77	9.17	10.25
Anal-fin height	3.10	2.90	2.33	3.17	2.28	2.08	2.66	2.91

behind (Fig. 5); three, progressively smaller dark brown saddles across back from rear edge of head to dorsal-fin base, a similar saddle between dorsal fins, and four additional dark saddles on dorsal edge of tail; the four large saddles on body outlined with large brown spots, darker than surrounding spots; each saddle with white anterior and posterior margins; also, an irregular matrix of white spots on side of body; head and body covered with relatively dense network of round to polygon-shaped brown spots, those on dorsal surface of head smaller than eye, numbering about 25 (only

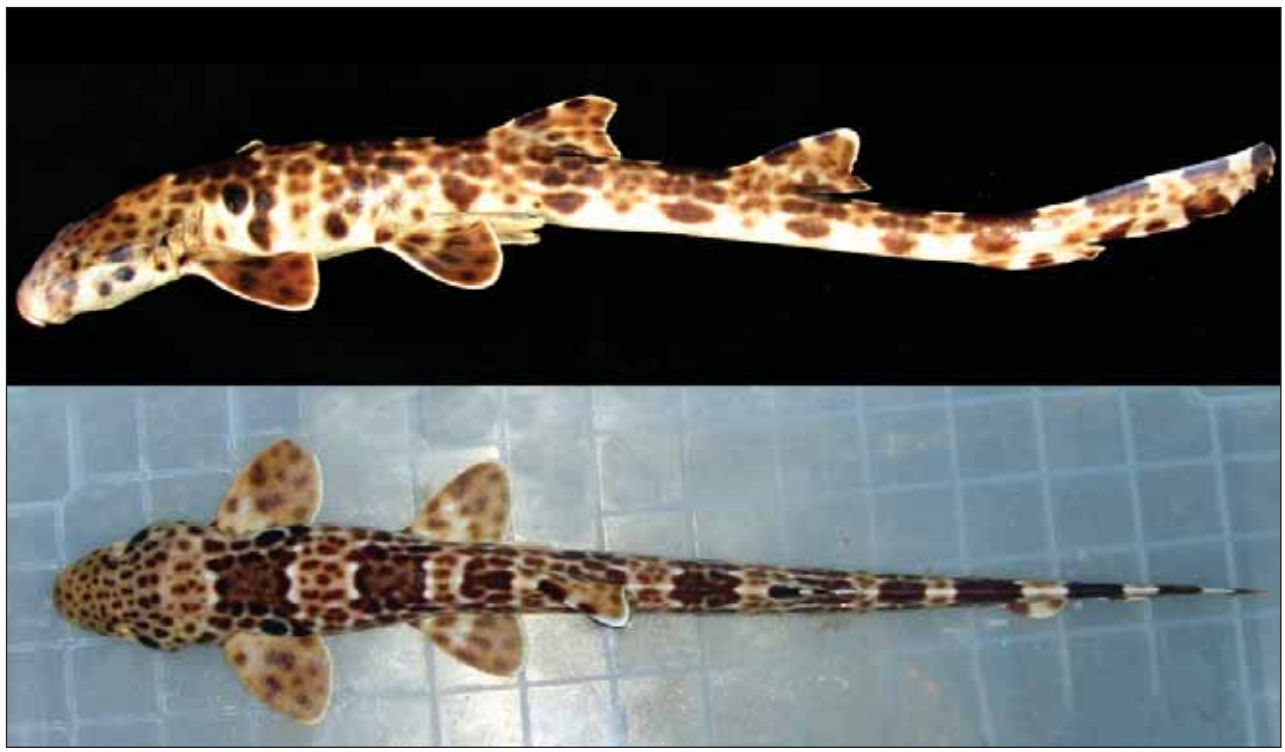

Fig. 4. Dorsal (fresh specimen) (lower) and lateral (preserved specimen) (upper), views of holotype of *Hemiscyllium galei*, 567.5 mm TL, Cenderawasih Bay, Papua Barat Province, Indonesia. Photos by G. R. Allen and M. V. Erdmann.

Table III. Inter-specific pairwise distance matrix calculated from the TrN + G model with corresponding matrix (above diagonal) of SE estimates (bootstrap method, 500 replicates).

	H. henryi	*H. ocellatum*	*H. freycineti*	*H. galei*	*C. punctatum*
H. henryi		0.00852	0.00386	0.00503	0.04048
H. ocellatum	0.03988		0.00853	0.00896	0.04422
H. freycineti	0.01058	0.03990		0.00454	0.04109
H. galei	0.01901	0.04324	0.01336		0.04373
C. punctatum	0.21586	0.22250	0.21535	0.22252	

8 on specimen photographed in 2006, Fig. 3 upper) on snout anterior to eye level; side of head with whitish area below spiracle edged posteriorly with 2-3 large, dark-brown spots, each about eye size or larger, the uppermost overlapping posterior edge of spiracle; dorsal fins each with about 4-5 poorly defined brown spots and pair of prominent blackish saddles on anterior edge; pectoral and pelvic fins with 9-13 and 8-11 variable-sized brown spots respectively on dorsal surface and narrow white posterior margin; side of body with variable-sized dark brown to blackish spots, the largest and most prominent of these arranged in horizontal row of 7-8 well-defined, horizontally-ovate, spots on the lower side between the abdomen and caudal-fin base.

Colour in alcohol (Fig. 4 upper): similar to live colour provided above, except ground colour is tan to yellowish brown and the brown spotting on the head, body, and fins is less intense.

Remarks: The new species is most similar to and obviously a close relative of *H. freycineti* (Fig. 3 lower), which inhabits shallow reefs of the western Bird's Head Peninsula, particularly the Raja Ampat Islands (Fig. 1). Colour pattern features and DNA analysis (see DNA comparison section below) provide the best means of separation between these species. Both taxa possess similar brown spotting on the head and body as well as distinctive dark saddles on the back. The configuration of the post-cephalic ocellus and associated dark bar (Fig. 5) is also remarkably similar and both species have three, vertically-oriented, large dark spots immediately posterior to the spiracle. The best means of separation is the presence of brilliant white margins on the dorsal saddles and scattered white spots in *H. galei* and lack of these markings in *H. freycineti* (compare photos in Fig. 3). In addition, *H. galei* is characterised by a row of 7-8, horizontally-ovate, dark spots on the lower side between the abdomen and caudal-fin base. In contrast, *Hemiscyllium freycineti* has pairs of leopard-like spots in approximately the same positions, but these are not well differentiated from surrounding spots and usually have paler brown centres (see Fig. 3 lower).

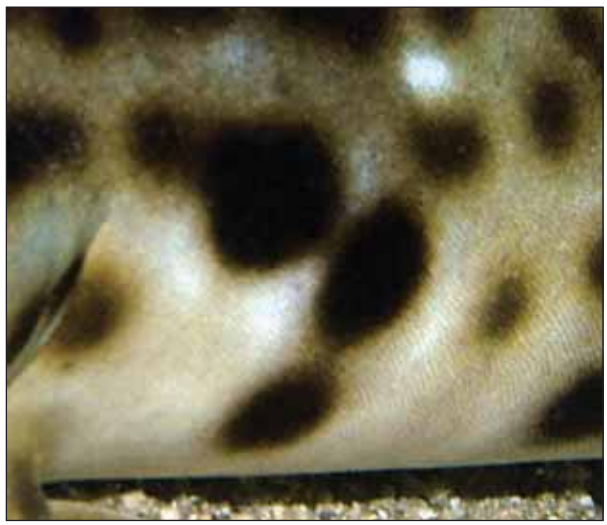

Fig. 5. Post-cephalic spots of *Hemiscyllium galei*. Photo by G. R. Allen.

The relatively large clasper size in relation to total length is probably indicative of a small maximum size for this species. The claspers on the two male types, 542.5-567.5 mm TL, are considerably larger than the similar-sized paratype of *H. henryi* (Fig. 6, Table I) and approximately the same size of those present on the 783 mm TL holotype of that species. Hemiscylliids in general are relatively small sharks. The largest specimen reported by Dingerkus & DeFino (1983) was 790 mm TL for *H. trispeculare* from Australia. Our largest example reported herein is 815 mm TL for *H. henryi* (see below).

Body proportions are generally similar among the members of the genus, although *H. galei* appears to have a relatively narrow interdorsal space and longer pelvic fins compared to other *Hemiscyllium* (Table II). However, more specimens are required to confirm these differences.

Distribution and habitat: The new species is

Fig. 6. Comparison of claspers for *Hemiscyllium henryi* (upper), 564.0 mm TL, and *H. galei* (lower), 567.5 mm TL. Photos by G. R. Allen.

apparently confined to Cenderawasih Bay, Papua Barat Province, Indonesia. The habitat typically consists of shoreline fringing reefs or shallow patch reefs. The three individuals reported to date have all been encountered at night at depths between 2-4 m. They were usually seen resting on the bottom, but occasionally were observed while slowly swimming or "walking" over the bottom with the pectoral and pelvic fins. Presumably it is sedentary during daylight hours, sheltering under rocky outcrops or tabular corals, which is typical for other family members.

Etymology: The new species is named *galei* in honour of Jeffrey Gale, an avid underwater photographer, shark enthusiast, and benefactor of the marine realm. Mr. Gale successfully bid to support the conservation of this species at the Blue Auction in Monaco on 20 September 2007 and has given generously to support Conservation International's Bird's Head Seascape marine conservation initiative.

Hemiscyllium henryi n. sp.
(Figs 2, 6-9, 11; Tables I-III)

Holotype: NCIP 6323, male, 783 mm TL, small bay in northwestern portion of Selat Iris, 03°54.544'S 134°09.679'E, immediately south of Triton Bay, Papua Barat Province, Indonesia, 3-4 m, collected by hand, M. V. Erdmann and M. Allen, 24 April 2006.

Paratypes: USNM 390771, female, 815 mm TL, patch reef near centre of Triton Bay, 03°50'01.89"S 134°05'47.94"E, Papua Barat Province, Indonesia, 3-5 m, collected by hand, M. V. Erdmann, January 2007; WAM P.32889-001, 564 mm SL, collected with USNM paratype.

Diagnosis: A species of bamboo shark belonging to the genus *Hemiscyllium*, distinguished by its unique colour pattern, particularly the combination of small scattered spots on the head, body and fins including 13-18 spots on interorbital/dorsal snout region and 6-18 spots on dorsal surface of pectoral fins, and a unique "double-ocellus" marking on middle of side, just behind the head.

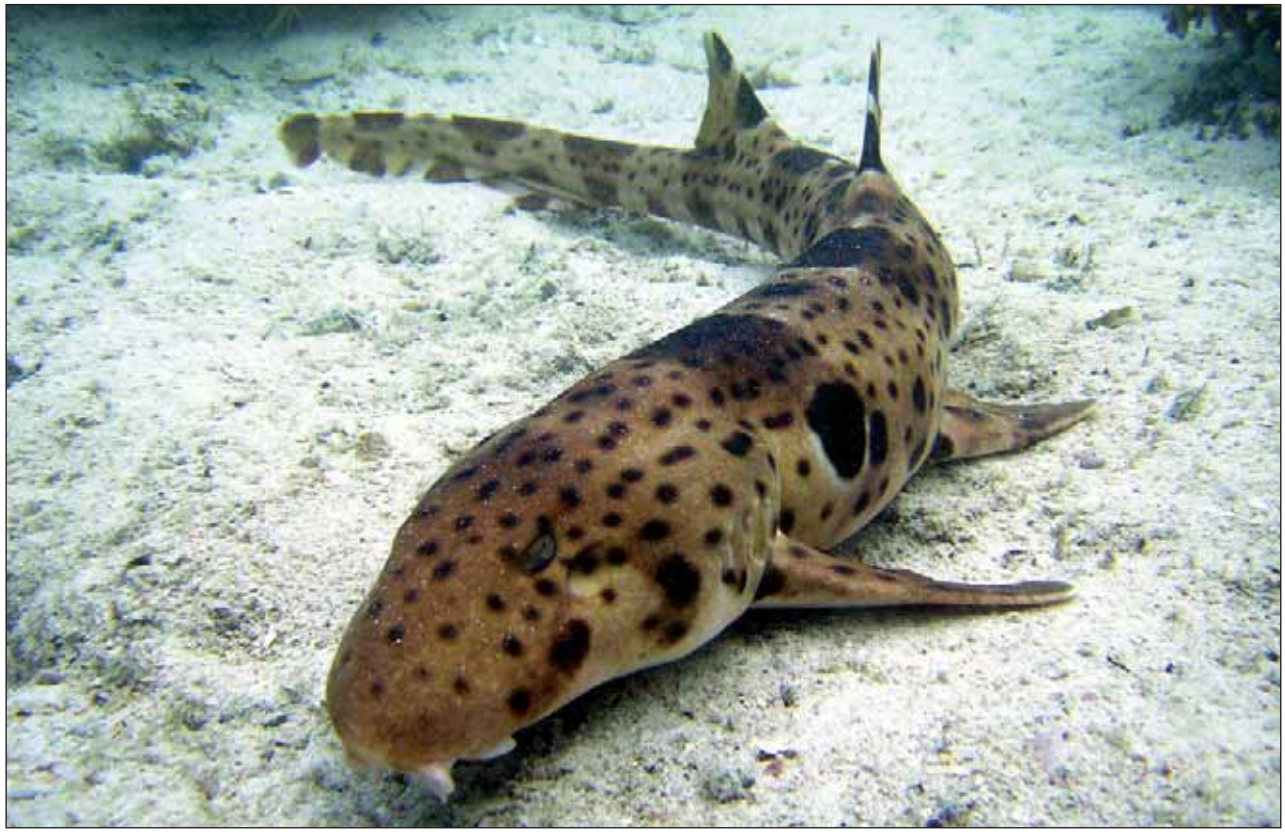

Fig. 7. Underwater photograph of *Hemiscyllium henryi*, holotype, 783 mm TL, Triton Bay vicinity, Papua Barat Province, Indonesia. Note characteristic dark spot at origin of pectoral and pelvic fins. Photo by M. V. Erdmann.

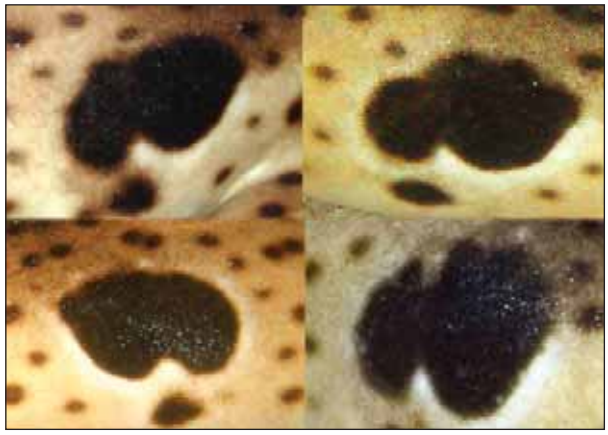

Fig. 8. Comparison of post-cephalic ocelli in four different individuals of *Hemiscyllium henryi*. Photos by G. R. Allen, M. V. Erdmann, P. Krupela, and B. Jones.

Description: Vertebral centra 193 (191-194); body and tail relatively slender, tapering posteriorly; precaudal length 1.2 (1.3), head length 7.5 (7.3), both in TL; maximum depth of head (at pectoral fin origin) about equal to width of head at level of eye; horizontal eye diameter 3.0 (3.3.6-3.8) in snout length, the vertical diameter 2.8 (2.3-2.6) in horizontal diameter; fleshy interorbital width 1.1 (1.2-1.5), bony interorbital width 1.5 (1.6-1.9), both in snout length; snout blunt and short, snout tip to eye 2.7 (2.3-2.5), snout tip to mouth 2.2 (2.7-3.1), snout tip to spiracle 2.0 (2.0-2.2), snout tip to first gill slit 1.3 (1.2), all in head length; gill slits on rear part of head, above to slightly anterior of pectoral-fin base; distance between first and fifth gill slit 2.8 (2.7-2.9) in head length; height of gill slits gradually increasing posteriorly, the first 3.3 (3.2-3.6) and fifth 2.3 (2.3-2.5), both in snout length.

Mouth small and transverse, positioned well forward on ventral surface of head (Fig. 2A), its width 1.4 in snout length; short barbel on each side of ventral snout, its length 3.0 (3.4-4.1) in snout length; maximum width of lower labial flap 3.3 (4.1-6.1), length of postoral fold (upper labial furrow) 2.8 (3.1-4.1), length of lower labial furrow 4.3 (5.0-5.1), all in snout length; teeth pavement-like, composed of numerous rows; individual teeth

Fig. 9. Dorsal and lateral views of holotype of *Hemiscyllium henryi*, 783 mm TL, Triton Bay vicinity, Papua Barat Province, Indonesia. Photo by G. R. Allen.

broad-based with single posteriorly-directed spike-like projection, the spikes of innermost rows more developed.

Snout tip to first dorsal-fin origin 2.5 (2.6-2.7), snout tip to pelvic-fin origin 3.6 (3.3-3.5), snout tip to vent 3.3 (3.2), vent to anal fin origin 2.3 (2.4), vent to tail tip 1.4 (1.4-1.5), all in TL; pectoral fins below gill openings, their length 1.3 (1.4) in TL; pelvic fins immediately anterior to vertical line passing through first dorsal fin origin, their length 1.3 (1.4) in TL; dorsal fins positioned well back on body, about equal in height; first dorsal-fin base 1.8 (1.9-2.0) in head length, first dorsal-fin height 0.9 (0.7-0.8) in first dorsal-fin base; free margin of first dorsal fin 1.7 (2.2-2.4) in first dorsal-fin height; interdorsal distance 1.0 (1.0-1.1) in head length; second dorsal-fin base 1.6 (1.7-2.0) in head length; second dorsal-fin height 1.1 (1.0) in second dorsal-fin base; free margin of second dorsal fin 1.9 (1.8-2.3) in second dorsal-fin height; a long and low anal fin just anterior to caudal fin; anal-fin base 1.5 (1.4-1.5) in head length, anal-fin height 2.8 (3.0) in anal-fin base; free margin of anal fin 1.6 (1.7-2.3) in anal-fin height; an elon-

Fig. 10. Underwater photograph of *Hemiscyllium ocellatum*, adult approximately, 700 mm TL, Great Barrier Reef, Australia. Photo by R. Steene.

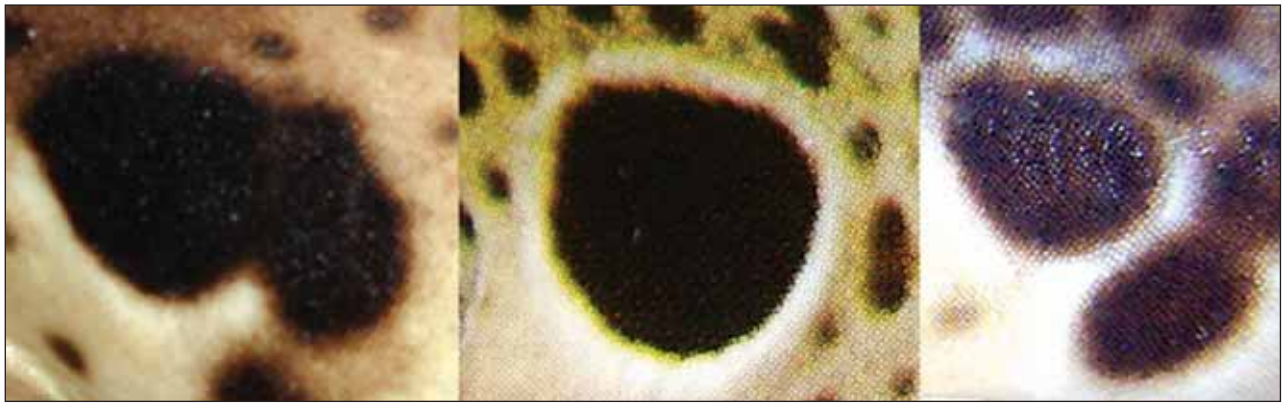

Fig. 11. Comparison of post-cephalic ocelli of: *H. henryi* (left), *H. ocellatum* (middle), and *H. freycineti*. Photos by G. R. Allen.

gated and thick precaudal tail, it depth at level of anal-fin origin 3.5 (3.5-3.6) in head length; subcaudal length 5.5 (5.6-6.0) in TL.

Male clasper stout and elongate, about same length as pelvic fin in holotype, but much reduced in smallest paratype (Fig. 6), inner length 1.3 (2.8), outer length 1.8 (9.9), both in head length; clasper width at base 4.5 (1.4), in outer length of clasper.

Colour of adults in life (Fig. 7): overall pale grey-brown, white on ventral surface, with large, well-defined and merged, "double-ocellus" marking (except separate twin ocelli on left side of holotype) on middle of side immediately posterior to head (Fig. 8), and numerous brown spots covering head and body, these becoming more numerous with increased growth; pectoral and pelvic fin

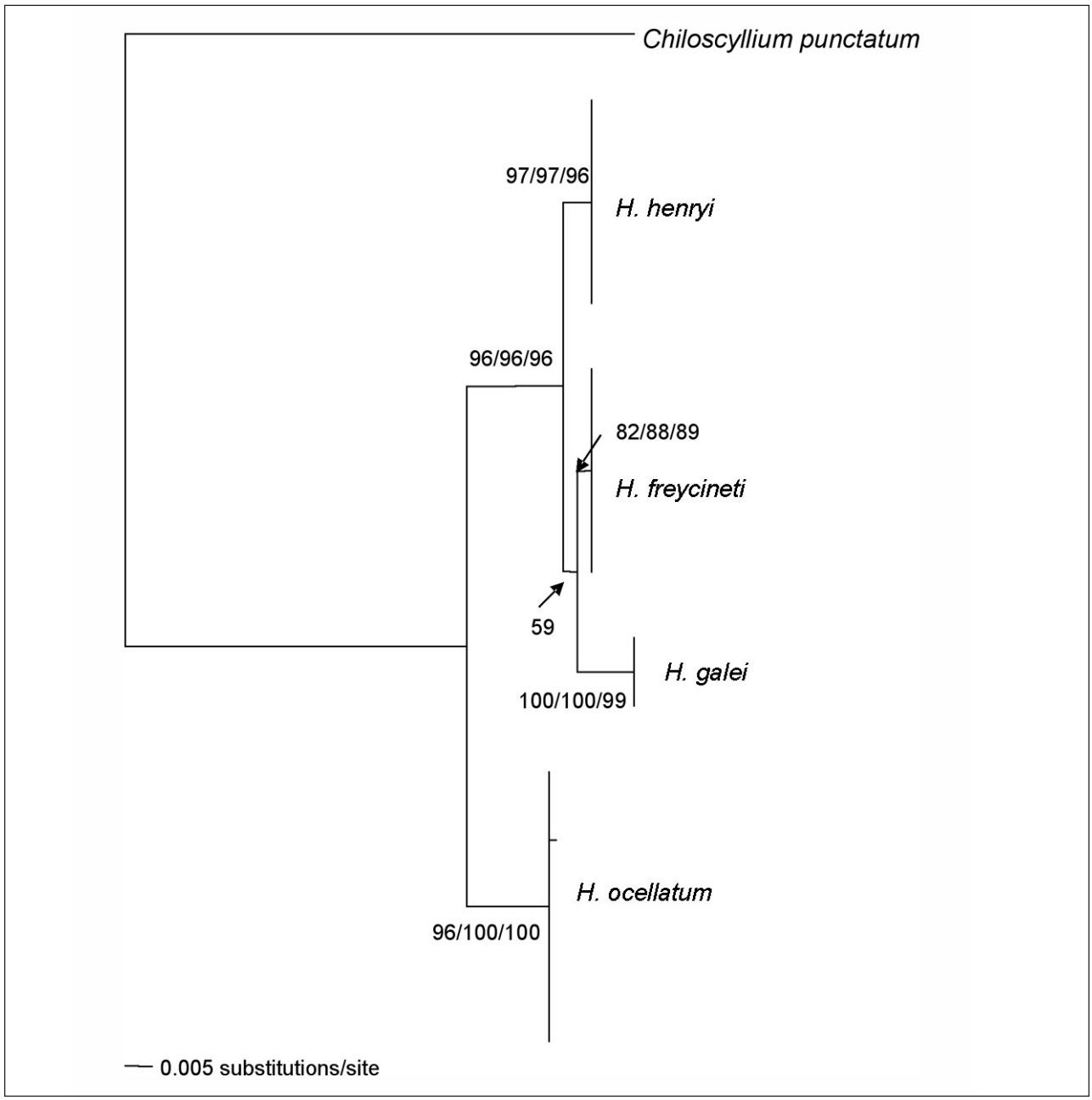

Fig. 12. Maximum Likelihood Tree (TrN + G) of the ND4 data. ML, MP and NJ bootstrap support of 1000 replications are shown, respectively. The number of specimens is shown in parentheses. The outgroup is *Chiloscyllium punctatum* Müller & Henle, 1838, a member of the only other genus in the family Hemiscyllidae.

origins with large spot; pectoral and pelvic fins with 6-18 and 6-10 variable-sized brown spots respectively on dorsal surface and narrow white posterior margin; dorsal fins largely devoid of spots (except along base) with pair of prominent blackish saddles on anterior edge.

Colour in alcohol (Fig. 9) similar to live colour provided above, except base colour is tan to yellowish brown and the brown spotting on the head, body, and fins is less intense.

Remarks: The new species is most similar to *H. ocellatum* (Bonnaterre, 1788) (Fig. 10), which inhabits shallow reefs of northern Australia between Shark Bay, Western Australia and the Great Barrier Reef with occasional vagrants reported as far south as Sydney, New South Wales. It has also been reported from New Guinea by various authors (Munro 1967; Kailola 1987; Compagno & Niem 1998; Compagno 2001), but doubtfully occurs there. Records from this locality appear to be based on misidentifications of related species.

Colour pattern features and DNA analysis (see DNA Comparisons sections below) provide the best means of separation between *H. henryi* and *H. ocellatum*. Both species possess a general pattern of brown spotting and a pair of black saddle-like markings along the anterior edge of each dorsal fin. However, they differ markedly with respect to several features, particularly the shape of the large ocellus immediately behind the head (Fig. 11). This marking is generally round in shape, intensely black, and very large (more than one-third body depth) in *H. ocellatum*. In contrast, the post-cephalic ocellus of *H. henryi* usually consists of a pair of merged ocelli, except those on the left side of the holotype, which are separated. Moreover, the surrounding white halo of *H. henryi* is poorly defined in comparison with that of *H. ocellatum.* Another difference is the presence of a dark spot at the origin of the pectoral and pelvic fins of *H. henryi* and the lack of this feature in *H. ocellatum*. In addition, the dark brown saddle-like markings and bars characteristic of the new species are weakly developed in *H. ocellatum*. A final difference concerns the presence of numerous small brown spots on the dorsal fins of *H. ocellatum*, in contrast to the mainly spotless pattern of *H. henryi.* Although additional specimens are required to strengthen the data, *H. henryi* appears to have taller first dorsal and anal fins compared to other *Hemiscyllium* (Table II).

The largest paratype contained eight full-sized ova ranging in diameter between about 25-30 mm.

Distribution and habitat: The new species is known only from western New Guinea (Papua Barat Province, Indonesia) in the vicinity of Triton Bay in the southern Bird's Head region. It has been observed/collected both in the bay and at nearby Selat Iris, a narrow channel between the mainland and Aiduma Island. Unlike other parts of the Bird's Head Peninsula such as Cenderawasih Bay and the Raja Ampat Islands, there is almost no shallow, fringing reef habitat due to the unique geomorphology of the area. Hence, the typical habitat for this shark extends into deeper water (at least 30 m), although it has also been sighted in depths less than 4 m. It is usually seen resting on the bottom, but occasionally is observed while slowly swimming or "walking" over the bottom with the pectoral and pelvic fins. During the day it is generally sedentary, sheltering under rocky outcrops or tabular corals.

Etymology: The species is named *H. henryi* in honour of Wolcott Henry of Washington D.C., who has generously supported Conservation International's marine initiatives, including taxonomy of western New Guinea fishes.

DNA COMPARISONS

We analysed a 791 base pair (bp) fragment from the ND4 gene and adjacent tRNA genes in 15 individuals from the following four species of *Hemiscyllium*: *H. henryi* (n = 4); *H. ocellatum* (n = 5); *H. freycineti* (n = 4); *H. galei* (n = 2). Of these, 38 bp were variable with 37 parsimony informative characters. Nucleotide frequencies were as follows: A = 0.31, C = 0.25, G = 0.11, T = 0.32. The transition : transversion ratio was 7.8:1. A total of five haplotypes was detected. All species had only one haplotype except for *H. ocellatum* that showed two haplotypes, one found in four individuals and the other from one individual. Pairwise distances *(d)* between the *Hemiscyllium* spp. ranged from 0.01058 to 0.04324 with *H. ocellatum* differing from the other species by at least twice the distance (Table III). Pairwise distances between the *Hemiscyllium* spp. and the outgroup *Chiloscyllium punctatum* were an order of magnitude higher (d_{ave} = 0.21906). Only *H. ocellatum* had more than one haplotype and therefore showed within species distances. This was over two orders of magnitude lower than the within-genus distances, d = 0.00051 ± 0.00052.

Maximum likelihood, maximum parsimony and neighbour-joining analyses for both model types

resulted in identical tree topologies (Fig. 12) revealing reciprocal monophyly of the four *Hemiscyllium* species with high bootstrap support. Only maximum likelihood resulted in >50% bootstrap support to *H. freycineti* and *H. cendrawasih* forming a sister clade to *H. henryi*.

Based on these results there is strong phylogenetic support for monophyletic clades of each *Hemiscyllium* species. All three tree methods produced similar tree topology. In addition, bootstrap values for each monophyletic clade are high. Although actual genetic divergence values are relatively low, it is difficult to interpret these data due to a general lack of comparative data for hemiscylliids and other sharks, at least in published literature. The interspecific divergence values for *Hemiscyllium* generally range from 1% to 4%.

Key to the Species of *Hemiscyllium*

1a. Head and snout with an abrupt black hood; body covered with conspicuous large white spots (eastern Papua New Guinea) ..... *H. strahani*

1b. Head and snout light, without a black hood but with conspicuous black spots above pectoral fins; body with inconspicuous light spots or spots absent 2

2a. Dark spot behind gills relatively small, forming a weak ocellus (or semi-ocellated dark spot) and followed posteriorly by dark brown bar (consisting of 2-3 merged spots in vertical row) 3

2b. Dark spot behind gills large, forming 1-2 conspicuous white-rimmed ocelli or merged double ocelli without dark brown bar immediately behind 4

3a. Network of white lines/spots mainly associated with edge of large dark saddles on back; conspicuous row of 7-8 large, horizontally-oval, dark spots along lower side (Cenderawasih Bay, Papua) ..... *H. galei*

3b. Network of white lines/spots mainly associated with edge of large dark saddles on back absent; row of dark spots along lower side relatively inconspicuous and not well differentiated from surrounding spots (Raja Ampat Islands, western Bird's Head region, Papua) ... *H. freycineti*

4a. Head, body, and fins covered with polygonal, leopard-like spots (Milne Bay Province, Papua New Guinea) ..... *H.* species

4b. Head body, and fins covered with numerous spots, but more or less round in shape and not polygonal and leopard like 5

5a. Body covered with numerous, densely clustered dark small and large spots that form a reticular network of light base colour between them; dark cross bands strong on ventral surface of tail (northern Australia) ..... *H. trispeculare*

5b. Body with more sparse, large spots that do not form a reticular network of light ground colour between them; dark cross bands on tail relatively weak or not reaching ventral surface 6

6a. Lateral ocellus surrounded by large black spots; spots absent on head in front and below eyes (southeastern Papua New Guinea) ..... *H. hallstromi*

6b. Lateral ocellus surrounded by relatively small spots; spots present on head in front and below eyes 7

7a. Lateral ocellus composed of single large, round spot surrounded by distinct white halo; dark spot absent at origin of pectoral and pelvic fins; numerous small dark spots usually present on dorsal fins (northern Australia) ..... *H. ocellatum*

7b. Lateral ocellus usually composed of double, merged ocelli surrounded by poorly defined white halo; dark spot present at origin of pectoral and pelvic fins; dorsal fins usually without small dark spots or if present they are restricted to basal portion of fins (Triton Bay vicinity of Bird's Head region, Papua) ..... *H. henryi*

ACKNOWLEDGEMENTS

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A new species of rainbowfish (Melanotaeniidae: *Melanotaenia)*, from Batanta Island, western New Guinea

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Abstract

A new species of rainbowfish, *Melanotaenia synergos*, is described on the basis of 45 specimens, 24.1-63.3 mm SL, collected in 1998 at Batanta Island, western New Guinea (Papua Barat Province, Indonesia). It is closely allied to *M. catherinae* from the nearby island of Waigeo in the Raja Ampat Group. The two species share similar meristic and morphological features as well as general colour pattern similarities. However, they differ in modal counts for pectoral-fin rays and lateral scales. They also exhibit slight colour pattern differences related to the width of the dark midlateral stripe, which is generally narrower in *M. synergos*, covering one and a half scale rows for most of its length versus 2 to 3 scale rows for *M. catherinae*. Analysis of genetic relationships based on cytochrome *b* sequences indicates a close relationship between the two species. Of four species that were analysed *(M. synergos, M. catherinae, M. batanta,* and *M. affinis)* the mean Kimura 2-parameter genetic divergences between species varied from 1.3 to 17.1%. The new species differed from *M. catherinae* by between 2.4 and 2.7%.

Zusammenfassung

Eine neue Art der Regenbogenfische: *Melanotaenia synergos*, wird auf der Grundlage von 45 Exemplaren mit 24,1-63,3 mm SL beschrieben, die 1998 an der Batanta-Insel vor dem westlichen Neuguinea (Provinz Papua Barat, Indonesien) gesammelt wurden. Sie ähneln stark den Vertretern von *M. catherinae*, die von der nahe gelegenen Insel Waigeo in der Raja-Ampat-Gruppe bekannt sind. Beide Arten haben ähnliche meristische und morphologische Merkmale und auch eine ähnliche allgemeine Farbgebung. Sie unterscheiden sich jedoch durch die mittlere Zahl an Brustflossenstrahlen und Lateralschuppen. Außerdem gibt es kleine Unterschiede im Farbmuster, nämlich bei der Breite des dunklen medilateralen Streifens: Bei *M. synergos* ist er grundsätzlich schmaler, auf dem größten Teil der Länge nimmt er nur eine Breite von eineinhalb Schuppenreihen ein, während bei *M. catherinae* sich die Breite über zwei bis drei Schuppenreihen erstreckt. Tatsächlich ergibt die genetische Analyse auf der Basis von Cytochrom-*b*-Sequenzen eine enge Verwandtschaft zwischen den beiden Arten. Bei der Untersuchung von vier Vergleichsarten *(M. synergos, M. catherinae, M. batanta* und *M. affinis)* konnte eine Divergenz nach den mittleren Kimura-2-Parametern zwischen 1,3 und 17,1% ermittelt werden. Die neue Art unterschied sich von *M. catherinae* durch einen Wert zwischen 2,4 und 2,7%.

Résumé

Une nouvelle espèe de poisson arc-en-ciel, *Melanotaenia synergos* est décrit sur base de 45 pécmens, de 24,1 à 63,3 mm de LS, collectés en 1998 sur l'île Batanta, Nouvelle-Guinée occidentale (province de Papua Barat, Indonésie). elle est très proche de *M. catherinae*, de l'île voisine de Waigeo, dans l'archipel de Raja Ampat. Les deux espèces ont en commun des données méristiques et morphologiques ainsi que des similitudes globales de coloration. Neanmoins, elles se distinguent par le nombre modal de rayons des pectorales et des écailles latérales. Elle montrent aussi de légers écarts de coloration, en rapport avec la largeur de la ligne médiane foncée qui est généralement plus étroite chez *M. synergos*, où elle couvre une rangér et demie d'écailles sur l'essentiel de la longueur, contre 2 à 3 rangérs d'écailles pour *M. catherinae*. L'analyse de relations génétiques, basée sur des séquences de cytochrome *b*, révèle une parenté étroite entre les deux espèces. Sur quatre espèces analysées *(M. synergos, M. catherinae, M. batanta* et *M. affinis)* les écarte principaux des paramètres génétiques Kimura 2 entra ces espèces varient de 1,3 à 17,1%. La nouvelle espèce se distingue de *M. catherinae* par des valeurs de 2,4 à 2,7%.

Sommario

Una nuova specie di pesce arcobaleno, *Melanotaenia synergos*, è descritta sulla base di 45 esemplari di 24.1-63.3 mm SL raccolti nel 1998 all'isola di Batanta, Nuova Guinea occidentale (provincia di Papua Barat, Indonesia). È strettamente imparentata a *M. catherinae* della vicina isola di Waigeo del gruppo Raja Ampat. Le due specie hanno tratti morfologici e meristici quasi sovrapponibili e una colorazione generale molto simile. Tuttavia, esse differiscono nei valori modali dei raggi della pinna pettorale e in quelli delle scaglie della linea laterale. Mostrano anche lievi differenze di colorazione, in particolare nella larghezza della stria scura mediolaterale, che è generalmente più stretta in *M. synergos*, in grado di ricoprire una fila di scaglie e mezza per la mag-

gior parte della sua lunghezza rispetto a 2-3 file di scaglie per *M. catherinae.* Le analisi genetiche basate sulla sequenza del citocromo *b* indicano una stretta parentela tra le due specie. Delle quattro specie analizzate *(M. synergos, M. catherinae, M. batanta* e *M. affinis)* le divergenze genetiche misurate con il testo Kimura a 2 parametri tra le specie variavano da 1.3 a 17.1%. La nuova specie differiva da *M. catherinae* per un valore variabile dal 2.4 al 2.7%.

INTRODUCTION

Rainbowfishes of the family Melanotaeniidae are common freshwater inhabitants of Australia and New Guinea. The group is believed to have evolved in relatively recent times from marine atherinoids (Allen 1980) and is closely related to the Pseudomugilidae (Saeed et al. 1989). Allen (1995) provided a popular account, including colour illustrations, and a summary of biological information for all known species. Seven genera are currently recognised: *Cairnsichthys* Allen, 1980, *Chilatherina* Regan, 1914, *Glossolepis* Weber, 1907, *Iriatherina* Meinken, 1974, *Melanotaenia* Gill, 1862, *Pelangia* Allen, 1998, and *Rhadinocentrus* Regan, 1914. Allen (1996) summarised the 42 known species of *Melanotaenia,* which is by far the largest genus, but since then two additional species were described (Allen & Renyaan 1998) from New Guinea, another from Australia (McGuigan 2001), and *M. solata* Taylor, 1964 from northern Australia was elevated from subspecific to full species status (Allen et al. 2002). New Guinea is inhabited by 35 species of *Melanotaenia,* including the new species described in this paper. Nine species are found in Australia and two species are shared by the two regions.

Rainbowfishes are exceptionally abundant throughout their distributional range. Clear, running streams and lakes are the preferred habitats, although they also occur in turbid waters, ponds, swamps, and isolated rocky pools in otherwise dry

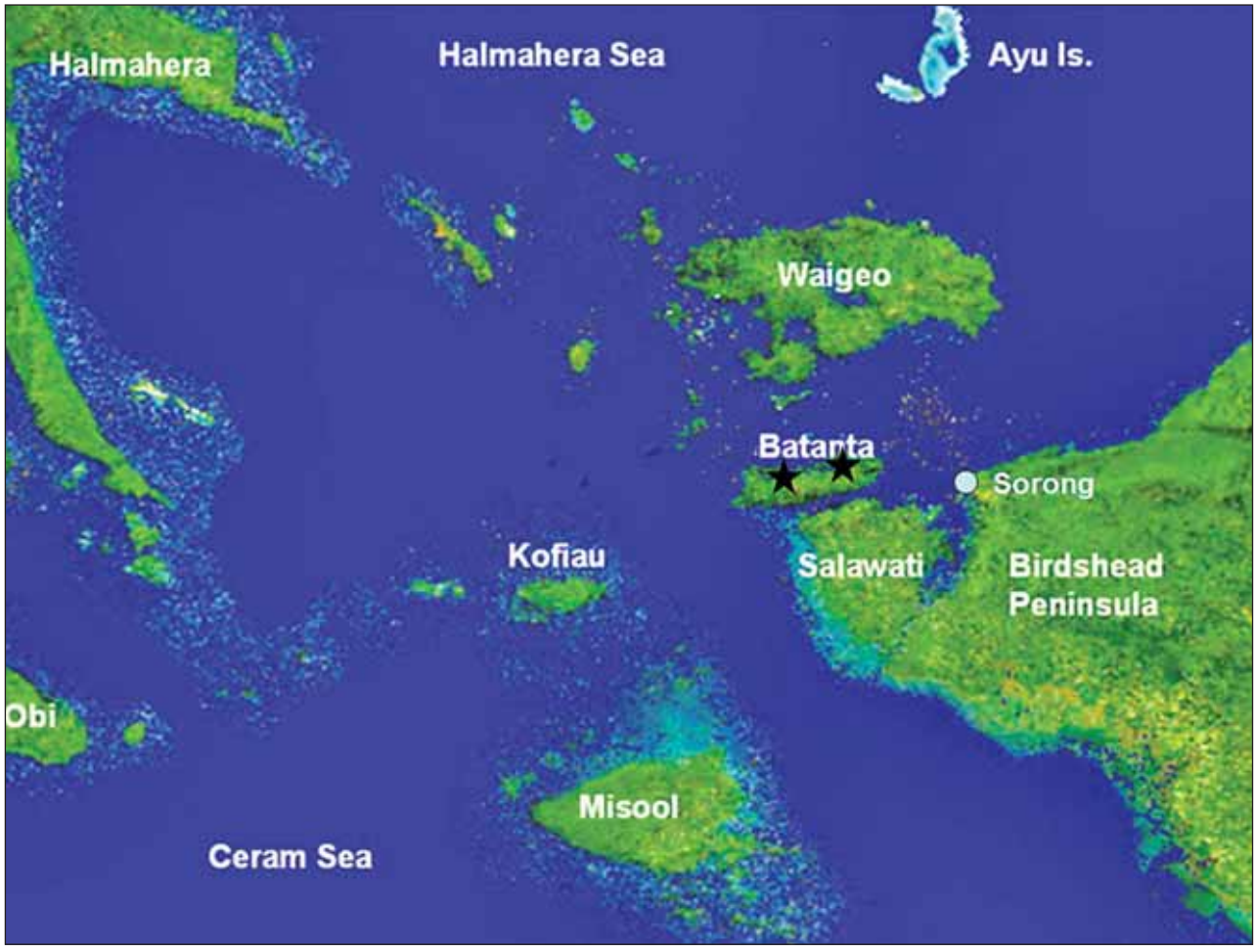

Fig. 1. Map of the Raja Ampat Islands. The approximate collections locations of *Melanotaenia synergos* on Batanta shown by stars.

streambeds. Most species form loose aggregations, which swim either in midwater or just below the surface. The main dietary items include insects which fall onto the surface and micro-crustaceans. Spawning occurs year round in most species, but reproductive activity often peaks at the onset of rainy periods.

The present paper describes a new species of *Melanotaenia* that was collected during a National Geographic-sponsored fish survey of the Raja Ampat Islands of far western New Guinea (Fig. 1) in 1998-1999. The two collection sites are located 27 km apart on the island of Batanta, which was first explored for freshwater fishes by Bleher (1992). We also include genetic comparisons with allied species including *M. catherinae* (De Beaufort, 1910) its closest relative from the nearby island of Waigeo, the sympatric *M. batanta* Allen & Renyaan 1996, and *M. affinis* (Weber, 1907), a widespread species from northern New Guinea.

MATERIALS AND METHODS

Counts and measurements that appear in parentheses refer to the range for paratypes if different from the holotype. Type specimens are deposited at Pusat Penelitian dan Pengembangan Oseanologi, Jakarta, Indonesia (NCIP), Natural Museum of Natural History (Naturalis), Leiden (RMNH), United States National Museum of Natural History, Washington, D.C. (USNM), and the Western Australian Museum, Perth (WAM).

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

DNA sequencing included the following populations: *M. catherinae* collected at two sites on Waigeo Island (Wei Sam and Kali Raja), one population of the new taxon from Batanta Island (Wei Bin Creek), and two additional species known to be closely related to *M. catherinae* (McGuigan et al., 2000), *M. batanta* and *M. affinis*, the latter being used as the outgroup. Three individuals of each population/-species were sequenced except *M. affinis* for which only a single individual was sequenced.

Total DNA was obtained from approximately 0.25 cm^3 of caudal fin or muscle via standard phenol/chloroform extraction or Quigen DNeasy tissue kit following the manufacturer's protocol. The entire cyt*b* gene was amplified by standard polymerase chain reaction (PCR) techniques using primers Glu31 – 15938. When this failed to produce sufficient PCR product the gene was amplified in two halves using Glu31 – HD and rainL505 – 15938. Primer Glu31 (5' TGRCTTGAAAAACCAC-CGTTGT 3') was modified from Schmidt & Gold (1993), and HD (5'GGGTTGTTTGATCCT-GTTTCGT 3') is from T. Schmidt as given in Dowling & Naylor (1997). Primers rain L505 (5' TCYGTAGATAATGCCACCCT 3') and 15938 (5' CGGCGTCCGGTTTACAAGAC 3') were designed as part of this study. Final concentrations for PCR components per 25 ml reaction were as follows: 25 ng template DNA, 0.25 mM of each primer, 0.5 units of Taq DNA polymerase, 0.2 mM of each dNTP, 5 mL of reaction buffer and 2.5 mM $MgCl_2$. Amplification parameters were as follows: 95°C for 2 min followed by 35 cycles of 95°C for 30 s, 48°C for 30 s, and 72°C for 9 or 60 s, and 72°C for 7 min. PCR products were examined on a 1.5% agarose gel using cyberstain. The PCR products were purified using a Montage PCR 96 plate (Millipore, Billerica, Massachusetts, USA). Sequencing reactions and clean up were performed using a Parallab 350 (Parallabs, Worcester, Massachusetts, USA). Sequences were obtained with an Applied Biosystems (Foster City, California, USA) 3730 XL Automated Sequencer at the Brigham Young University DNA Sequencing Center.

DNA sequences were edited using Chromas Lite 2.0 (Technelysium, Tewantin, Queensland, Australia) and then imported and aligned by eye in BioEdit 7.0.5.2 (Hall 1999). Sequences were checked via amino acid coding in Mega 3.1 (Kumar et al. 2004) to test for unexpected frame shift errors or unexpected stop codons. Phylogenetic analyses were performed using both parsimony and likelihood approaches using PAUP* (Swofford 2003).

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

	Holotype NCIP 6330	Paratype WAM P.31555	Paratype WAM P.31462	Paratype RMNH 3558	Paratype USNM 391010	Paratype USNM 391010	Paratype RMNH 3558
Sex	male	male	male	male	male	female	female
Standard length (mm)	55.0	63.7	60.8	44.3	37.5	37.4	32.5
Body depth	20.0	22.5	21.9	15.5	12.9	12.2	10.4
Body width	7.7	8.9	8.4	6.4	5.2	5.0	4.5
Head length	16.5	16.3	16.8	12.6	11.2	10.8	9.6
Snout length	5.5	5.5	5.6	3.8	3.3	3.3	3.0
Eye diameter	4.9	4.5	4.9	3.8	3.5	3.1	3.4
Bony interorbital width	6.1	6.1	6.6	4.7	3.8	3.4	3.7
Depth of caudal peduncle	8.2	8.5	8.5	6.0	5.0	5.0	4.2
Length of caudal peduncle	7.4	9.0	8.8	6.0	5.3	5.1	5.0
Predorsal distance	27.4	30.2	29.4	21.3	18.0	18.2	16.2
Preanal distance	28.2	31.1	30.6	22.5	19.3	19.2	17.1
Prepelvic distance	22.2	23.3	23.0	16.7	15.4	17.5	13.0
2nd dorsal fin base	14.3	16.8	15.6	10.9	8.5	7.4	7.6
Anal fin base	22.5	26.6	25.4	17.0	13.6	13.7	12.1
Pectoral fin length	11.2	11.8	12.0	9.0	8.0	7.3	7.0
Pelvic fin length	9.2	11.6	9.4	8.0	6.6	6.3	6.0
Longest ray 1st dorsal fin	7.8	7.4	8.7	6.8	5.3	4.0	3.7
Longest ray 2nd dorsal fin	9.9	11.0	10.0	8.0	6.3	4.8	5.0
Longest anal ray	8.6	9.2	9.9	7.1	5.5	6.2	5.2
Caudal fin length	12.4	15.8	13.3	11.6	9.6	9.3	9.4
Caudal concavity	3.7	4.7	3.8	2.9	3.0	2.1	2.1

Maximum parsimony (MP) was conducted via a heuristic search with 1,000 random additions and TBR branch-swapping. Maximum likelihood (ML) models were estimated via AIC in Modeltest 3.7 (Posada & Crandall 1998). ML was performed under the TrN+I+G model of evolution: Lset Base=(0.2556 0.2370 0.2114) Nst=6 Rmat=(1.0000 5.5094 1.0000 1.0000 6.8661) Rates=gamma Shape=0.7315 Pinvar=0.4516. Robustness of nodes was estimated with PAUP* by bootstrap with 1,000 replicates for MP using a heuristic search with 10 random additions of taxa and TBR branch-swapping, and 1000 replicates for ML via a heuristic search with 10 random additions of taxa and TBR branch-swapping. All tree lengths reported for MP include both informative and uninformative characters. Among species variation was calculated using Kimura 2-parameter divergences in MEGA 3.1.

Melanotaenia synergos n. sp.

(Figs 2-7; Tables I-II)

Holotype. NCIP 6330, male, 55.0 mm SL, Wei Bin Stream, 0°49.774'S 130°45.874'E, on northeastern end of Pulau Batanta, Raja Ampat Islands, Papua Barat Province, Indonesia, 0-2 m depth, rotenone, G. R. Allen and S. Renyaan, 28 April 1998.

Paratypes (collected with holotype unless stated otherwise): NCIP 6331, 10 specimens, 24.5-45.5 mm SL; RMNH 3558, 8 specimens, 26.5-50.0 mm SL; USNM 391010, 8 specimens 24.1-50.5 mm SL; WAM P.31462-001: 15 specimens, 25.0-60.8 mm SL; WAM P. 31555-007, 3 specimens: 46.6-63.3 mm SL, Warey River, 0°50.815'S 130°31.139'E, on northwestern end of Pulau Batanta, 0-2.5 m depth, seine net, G. R. and M. Allen, 28 April 1999.

Comparative material examined: *Melanotaenia catherinae* – WAM P. 31560-001, 9 specimens, 26.2-74.3 mm SL, Marur River, western Waigeo, 0°23.141'S 130°43.090'E, G. R. Allen and S. Renyaan, 2 May 1999, G. R. Allen and S. Renyaan; WAM P. 31562-002, 8 specimens, 55.0-72.5 mm SL, Rumei River, eastern Waigeo, 0°17.349'S 131°17.223'E, G. R. Allen and S. Renyaan, 5 May 1999; WAM P. 31466-001, 26 specimens, 33.0-57.0 mm SL, Wei Sam Creek, near entrance to Mayalabit Bay, eastern Waigeo, 0°17.415'S 130°57.079'E, G. R. Allen and S. Renyaan, 1 May 1998.

Table II. Summary of dorsal, anal, pectoral fin-ray, and lateral-scale counts for *Melanotaenia synergos* and *M. catherinae*.

	First Dorsal Fin Spines			Soft Dorsal Rays			
	IV	V	VI	11	12	13	14
M. synergos	5	11	3	4	11	3	1
M. catherinae	4	26	-	-	16	14	2

	Soft Anal Rays				Pectoral Rays	
	19	20	21	22	13	14
M. synergos	1	8	8	2	11	8
M. catherinae	4	10	18	-	4	28

	Lateral Scales		
	31	32	33
M. synergos	1	2	16
M. catherinae	4	16	12

Diagnosis: A species of melanotaeniid rainbowfish distinguished by the following combination of characters: dorsal rays IV to VI-I,11 to 14; anal rays I,19-22; pectoral rays 13 or 14; lateral scales 31-33 (usually 33); colour generally brownish on back (blue in life), pale tan or whitish below with blackish (bluish black in life) midlateral stripe from upper edge of preopercle to caudal-fin base, covering about one and a half scale rows for most of its length and more strongly contrasted in males.

Description: Dorsal rays IV-I,12 (IV to VI,11 to 14); anal rays I,29 (I,19 to 22); pectoral rays 14 (13 or 14); pelvic rays I,5; branched caudal rays 16 (14 to 16); lateral scales 32 (31 or 33); transverse scales 10 (one paratype with 9); predorsal scales 17 (15 to 17); cheek scales 18 (13 to 18); gill rakers on first arch 2+14 = 16 (1 to 3 + 13 to 15 = 14 to 18).

Body depth 2.8 (2.6-3.1), head length 3.3 (3.3-3.9), both in SL; greatest width of body 2.6 (2.3-2.7) in greatest body depth; snout length 3.0 (3.0 -3.4), eye diameter 3.4 (2.8 -3.6), interorbital width 2.7 (2.5-3.2), depth of caudal peduncle 2.0 (1.9-2.3), length of caudal peduncle 2.2 (1.8-2.1), all in head length.

Jaws about equal, oblique, premaxilla with an abrupt bend between the anterior horizontal portion and lateral part; maxilla ends just anterior to front border of eye; lips thin; teeth conical with slightly curved tips, extending on to outer surface of lips; teeth of upper jaw in 4-5 irregular rows anteriorly, reduced to a single row posteriorly, where they are exposed when mouth is closed; teeth in lower jaw in about 6 irregular rows anteriorly, reduced to 1 or 2 rows posteriorly; narrow row containing several small, conical teeth on vomer and palatines.

Scales of body cycloid, relatively large, and arranged in regular horizontal rows; scale margins smooth or slightly crenulate; predorsal scales extending forward to rear portion of interorbital space; preopercle with 3 scale rows between its posterior angle and eye.

First dorsal fin origin about level with anal fin origin; longest spines (usually second to fourth) of first dorsal fin 2.1 (1.9-2.6) in head length, its depressed tip not reaching or barely reaching spine of second dorsal fin in females and reaching to about base of second soft ray in mature males; longest rays (generally anterior ones in females and posterior ones in males) of second dorsal fin 1.7 (1.5-2.3 in head length, the depressed posterior rays extending about one-half length of caudal peduncle or less in females and full length of caudal peduncle in mature males; longest (middle rays in females, last 2 or 3 rays in males) anal rays 1.9 (1.7-2.0) in head length; pelvic fin tips when depressed reaching to base of first or second soft anal fin ray; length of pelvic fins 1.8 (1.4-1.8), of pectoral fins 1.5 (1.4-1.5), of caudal fin 1.3 (1.0-1.3), all in head length; caudal fin moderately forked, caudal concavity 4.5 (3.4-5.1) in head length.

Colour of holotype in life (Fig. 2): bluish with silvery reflections on upper third of body, individual scales with narrow dark blue margins; lower half of body whitish, although individual scales with grey centres; a blue-black stripe extending from upper preopercular margin to upper pectoral-fin base, continuing along middle of side to caudal-fin base, generally about 1 or 1.5 scales wide, except considerably broader on caudal peduncle where it covers about 3 scale-rows; dorsal surface of head and nape brown; lower half of head whitish with silvery reflection on operculum; dorsal and caudal fins dusky brownish; anal fin translucent whitish; pelvic fins white; pectoral fins clear.

The largest male paratype (WAM P. 31555-007, 63.7 mm SL), shown in Fig. 5 has a more uniform midlateral stripe with a silvery-white “halo” immediately above posterior one-third. Like the holotype, the portion of the midlateral stripe on the caudal peduncle is generally darker than the remainder of the stripe. The largest female specimen (USNM 391010, 37.4 mm SL) is shown in Fig. 3. Its general colour is similar to that of males,

Fig. 2. Aquarium photograph of *Melanotaenia synergos*, male holotype, 55.0 mm SL, Wei Bin Stream, Batanta, Raja Ampat Islands. Photo by G. R. Allen.

Fig. 3. Aquarium photograph of *Melanotaenia synergos*, female paratype (USNM 391010), 37.4 mm SL, Wei Bin Stream, Batanta, Raja Ampat Islands. Photo by G. R. Allen.

Fig. 4. *Melanotaenia synergos*, preserved male, holotype, 55.0 mm SL, Wei Bin Stream, Batanta, Raja Ampat Islands. Photo by G. R. Allen.

Fig. 5. Aquarium photograph of *Melanotaenia synergos*, male paratype (WAM P. 31555-007), 63.3 mm SL, Warey River, Batanta, Raja Ampat Islands. Photo by G. R. Allen.

Fig. 6. Aquarium photograph of *Melanotaenia synergos*, male, approx. 70.0 mm SL, collected and photographed 1992 at Warey River, Batanta, Raja Ampat Islands. Photo by H. Bleher.

Fig. 7. Aquarium photograph of *Melanotaenia synergos*, female, approx. 70.5 mm SL. Aquarium population (approx. F_{10}) from Warey River, Batanta, Raja Ampat Islands. Photo by N. Khardina taken at Mr. Marcel Dielen's home, Belgium.

Table III. Mean Kimura 2-parameter divergences between rainbowfish species for cytochrome *b*.

	M. catherinae Wei Sam Creek	*M. catherinae* Kali Raja Creek	*M. synergos*	*M. batanta*
M. catherinae Kali Raja	0.006			
M. synergos	0.027	0.024		
M. batanta	0.128	0.130	0.124	
M. affinis	0.170	0.169	0.169	0.155

but the midlateral dark stripe is slightly narrower and less vivid. It also exhibits a yellowish white streak immediately below the midlateral dark stripe immediately behind the pectoral fin base and there is a diffuse bluish stripe immediately below across the belly region. The fins are generally clear.

The new species was also illustrated in colour by Bleher (1992) who collected the first live examples for the aquarium trade from the Warey River, western Batanta in 1992 (Fig. 6). The same stock still exists in the European aquarium hobby (Fig. 7).

Colour of holotype in alcohol (Fig. 4): upper third of body light brown, lower half tan to whitish; a diffuse blackish stripe, occupying about 2 scale rows extending from pectoral region to caudal-fin base; extending forward as relatively narrow stripe from upper pectoral-fin base to rear edge of eye; dorsal surface of head brown, cheek and opercle pale yellowish; fins translucent dusky grey, the dorsal fins slightly darker.

The paratypes are similar, but most have a narrower midlateral stripe that covers only a single scale row for most of its length, widening to about two scales on the caudal peduncle. Several of the smaller (< about 45 mm SL) male paratypes have a series of about 8 to 10 narrow grey bars on the body, just below and joining the midlateral stripe. The USNM female is overall pale yellowish with just a hint of the brownish back and dark midlateral stripe.

Sexual dimorphism: Similar to most *Melanotaenia*, males are generally deeper bodied and have a more elongate, somewhat pointed shape posteriorly on the soft dorsal and anal fins. In addition, the depressed first dorsal fin of adult males overlaps the second dorsal fin in males, but falls short of this point or barely reaches it in females. The body depth (as percentage of the standard length) of 26 males, 28.9-63.7 mm SL, ranged from 31.3-38.0 with an average of 35.0; that of 13 females, 27.2-37.4 mm SL, was 29.5-33.4 with an average of 33.8. However, if the females are compared with similar-sized males (7 specimens, 28.9-37.5), there is no difference between sexes with the body depth of both males and females averaging 33.8 % of the SL. The smallest individual with detectable ova was 27.2 mm SL and the smallest male exhibiting

Fig. 8. Aquarium photograph of *Melanotaenia catherinae*, male (WAM P.31560-001), 74.3 mm SL, Marur River, western Waigeo, Raja Ampat Islands. Photo by G. R. Allen.

secondary sexual characteristics (elongate first dorsal fin and pointed shape posteriorly of anal and second dorsal fins) was 28.9 mm SL. Judging from the first author's experience with aquarium-raised *Melanotaenia* spp. sexual maturity is probably reached before the end of the first year.

Comparisons: Meristic, morphological, and genetic data (see DNA analysis section below) indicate that the new species is most closely allied to *M. catherinae* (Fig. 8) from the nearby island of Waigeo. Only a few modal differences were detected, the most prominent of these involving counts for pectoral-fin rays and lateral scales (Table II). *Melanotaenia synergos* had 58% of specimens with 13 pectoral-fin rays and the remainder with 14 rays. By comparison, only 12.5% of specimens of *M. catherinae* possessed 13 rays and 87.5% had 14 rays. Similarly, 84% of *M. synergos* specimens had 33 lateral scales with the remainder possessing 31 or 32 scales. In contrast, 62.5% of *M. catherinae* specimens had 31 or 32 scales with the remainder characterised by 33 scales.

The two species also share similar live colour patterns, basically bluish on the back and whitish below with a bluish black midlateral stripe. However, closer inspection reveals that the new species generally has a narrower stripe that is about one and a half scales wide over most of its length compared to the 2 to 3 scale width in *M. catherinae*. In addition, the midlateral stripe of the latter species tends to be slightly darker.

DNA analysis: A total of 15 individuals from 4 populations (Table III) were sequenced for 1,140 bp of cyt*b*. Of 1,140 bp, 900 were constant, 96 variable characters were parsimony uninformative, and 144 characters were parsimony informative. A heuristic search via MP with all characters weighted equally recovered one most parsimonious

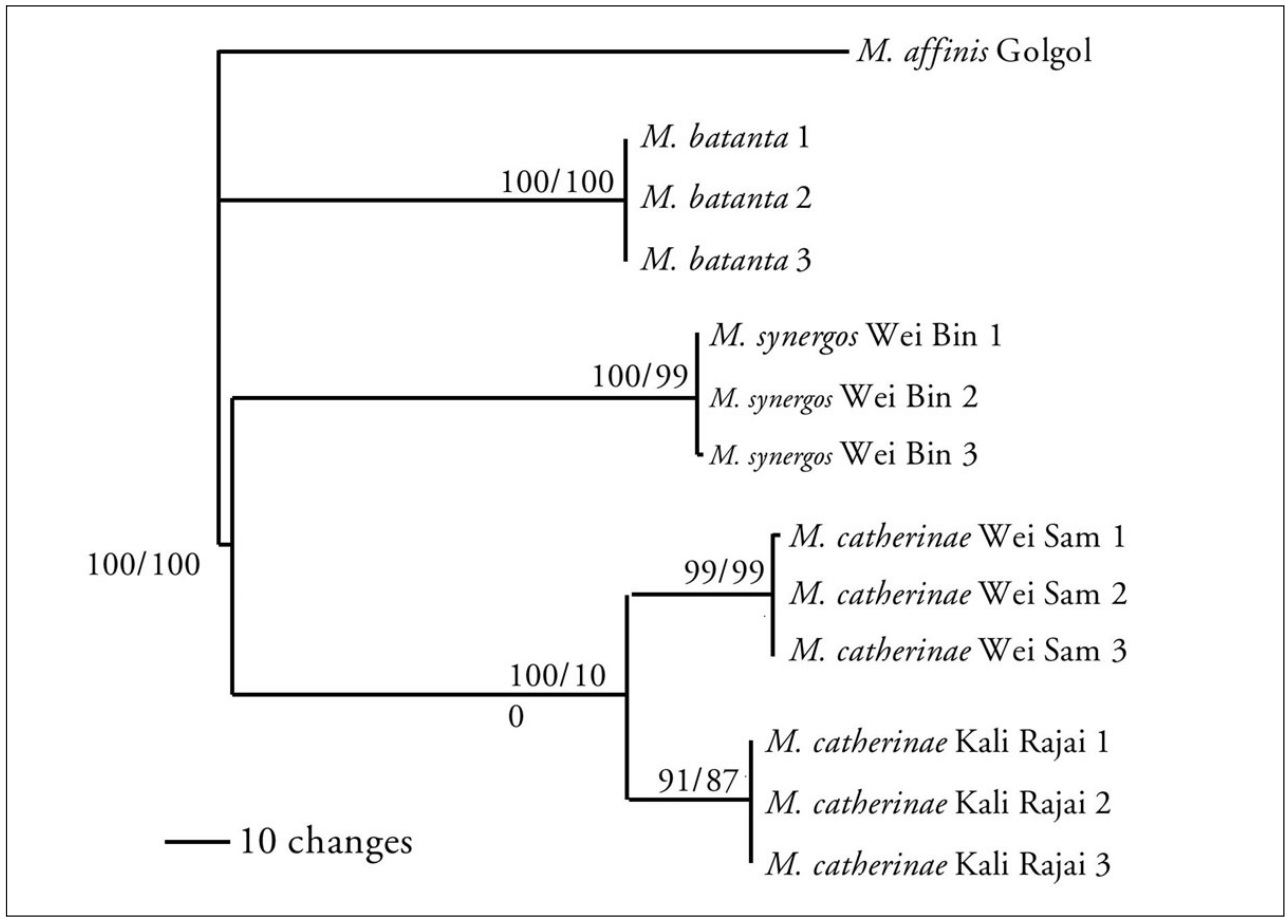

Fig. 9. Maximum likelihood tree for rainbowfish species based on analysis of cytochrome *b* sequences (1,140 bp) sampled from 15 individual fish. Branch lengths were estimated using maximum likelihood assuming the TrN+I+G model of evolution. Bootstrap values were obtained from 1,000 replicates from Maximum Parsimony and Maximum Likelihood (MP/ML). The tree was rooted with *Melanotaenia affinis*.

tree with a length of 260 (CI=0. 954, RI=0.972) (Fig. 9).

Within population variation was typically low, with one individual from both Wei Bin and Wei Sam populations being different by one base pair. No variation was found within the Kali Raja population of *M. catherinae* or within *M. batanta* (Fig. 10). Some variation exists within Waigeo Island with the two *M. catherinae* populations differing by 0.6% (Table III). Between species the mean Kimura 2-parameter genetic divergences varied between 1.3% and 17.1%, with the new species differing from *M. catherinae* by between 2.4% and 2.7% (Table III). These levels of genetic divergence, while not particularly large, are similar to those between many other rainbowfish species. Based on the first 601 bp of cytb most pairwise species comparisons within the "australis", "maccullochi", and "nigrans" species groups (clades A-C respectively in McGuigan et al. 2000) differ by only 2% to 5% (15 species total; Unmack 2005). In northern New Guinea *Glossolepis maculosus* Allen, 1981 and *G. ramuensis* Allen, 1985 also differ by 2% (Unmack 2005) and many other closely related species from New Guinea are yet to be examined genetically, but will likely have similar divergences. Thus, the levels of divergence found between *M. catherinae* and *M. synergos* are well within the range for the family Melanotaeniidae.

Fig. 10. Aquarium photographs of *Melanotaenia* species of the Raja Ampat Islands including *M. fredericki* (upper) from Salawati I., *M. batanta* (middle) from Batanta I., and *M. misoolensis* (lower) from Misool I.

Zoogeography and habitat: The new species is endemic to Batanta, which is in the Raja Ampat Islands, and lies 36 km from Sorong near the western extremity of New Guinea (Fig. 1). The Raja Ampat Group is spread over a huge area, roughly 48,000 km^2 and contains hundreds of variable sized islands. The four largest, which include Batanta, Waigeo, Salawati, and Misool, were formerly connected to the mainland of New Guinea and support extensive freshwater habitat. Salawati is separated from the mainland by a narrow, shallow channel that averages less than 3 km in width. Not surprisingly, it is inhabited by a melanotaeniid species that also occurs on the mainland, *M. fredericki* (Fowler, 1939) (Fig. 10, upper). Misool Island lies about 70 km southwest of Salawati, being separated by shallow seas (less than about 80 m depth) that were exposed dry land as recently as the last Pleistocene sea lowering. It is inhabited by *M. misoolensis* Allen, 1982 (Fig. 10, lower) as well as the only non-mainland populations of freshwater catfish (Plotosidae: *Neosilurus)* and grunter (Terapontidae: *Hephaestes)*.

Unlike Salawati and Misool, the islands of Batanta and Waigeo are separated from the mainland by deep water and support mainly oceanic insular freshwater fishes, particularly sicydiine gobiids such as *Sicyopterus*, *Sicyopus*, and *Stiphodon*. According to the paleogeographic reconstruction

of the southwest Pacific by Hill & Hall (2003) the two islands have oceanic origins and drifted south and then westward along the northern edge of the New Guinea/Australia continental block to their present position. It is not entirely clear how melanotaeniids reached these islands as deep marine waters form an insurmountable barrier to this family. One possible explanation is that the islands collided with the northern New Guinea craton and were temporarily docked before breaking loose to continue their westerly drift. This theory is strengthened by the apparent relationship between the rainbowfishes of these islands and *M. affinis*, which is widely distributed along New Guinea's northern coast. Moreover, the sicydiine-dominated fauna of the islands is very similar to that of steep gradient coastal watersheds of the northern New Guinea mainland.

It appears that a single species, *M. catherinae* (De Beaufort, 1910) inhabits Waigeo, although much of this 125 km long island remains unexplored. Batanta Island lies about 35 km directly to the south across the Dampier Strait. The island is long (61 km) and slender (averaging less than 10 km in width) and mountainous with a maximum elevation of about 1,050 m. It is separated from Salawati by the Sagewin Strait, which averages only 5 km in width, but has impressive depths to 521 m. The southern, Salawati-facing slopes are steep and drained by numerous small, steep gradient creeks, but no rainbowfishes occur there. The opposite side of the island is also steep, but is dissected by a few gradual valleys. Melanotaeniids have been collected from three of these: *M. synergos* from the Wei Bin (type locality) and Warey River, at the respective eastern and western ends of the island. And a second species of rainbowfish, *M. batanta* Allen & Renyaan, 1998 (Fig. 10, middle), that although is allied to *M. catherinae* and *M. synergos*, but genetically well-separated from them (Table III), is from the Warmon Stream at the northern-central Batanta Island region.

The following key differentiates the five species of *Melanotaenia* that inhabit the Raja Ampat Islands.

Key to the species of *Melanotaenia* of the Raja Ampat Islands

1a. Maximum width of midlateral dark stripe on side usually covering a single scale row and poorly defined 2

1b. Maximum width of midlateral dark stripe on side usually covering two or more scale rows and well defined..... 3

2a. Cheek scales 17-20; dorsal rays usually 13 (occasionally 12 or 14) (western Bird's Head Peninsula and Salawati Island) .... *M. fredericki*

2b. Cheek scales 11-13; dorsal rays usually 14 (occasionally 13 or 15-16) (Batanta Island) ... . *M. batanta*

3a. Midlateral dark stripe on side not continuous, interrupted in middle section; anal rays usually 22-25 (rarely 20-21) (Misool Island) .... *M. misoolensis*

3b. Midlateral dark stripe on side continuous; anal rays usually 19-21 (rarely 22)..... 4

4a. Midlateral dark stripe on side covering 1.5 scale rows over most of its length (Batanta Island) ..... *M. synergos* n. sp.

4b. Midlateral dark stripe on side wider, covering 3 scale rows over most of its length (Waigeo Island) ..... *M. catherinae*

Fig. 11. Habitat of *Melanotaenia synergos* at type locality, Warey River, norhwestern Batanta Island, Raja Ampat Islands. Photo by G. R. Allen.

The habitat (Fig. 11) of *M. synergos* consists of narrow (to about 15-20 m wide), clear rivers with gradual gradients flowing initially through second growth forest, but entering primary, nearly closed-canopy forest after about 1 km upstream from the sea. The type specimens were collected from deeper pools (to about 2-3 m) over limestone cobble/-gravel bottoms with slow to moderate flow rates. Temperature and pH values of 25.5 °C and 8.7 respectively were recorded at the type locality.

Etymology: The new species is named *synergos* to honour Peggy Dulany on the twentieth anniversary of the Synergos Institute, which she founded in 1986 to create a more just and equitable global society in which all individuals, families and communities have a meaningful opportunity to improve the quality of their lives for themselves and future generations. It is treated as a noun in apposition.

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Corythoichthys benedetto, a new pipefish (Pisces: Syngnathidae) from Indonesia and Papua New Guinea

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Abstract

A new species of pipefish, *Corythoichthys benedetto*, is described on the basis of five specimens, 59.5-67.6 mm SL, collected in 5 to 15 m depth from rock and coral reefs at two Indonesian locations including Triton Bay, Papua Barat Province (western New Guinea) and Kabaena Island, off southern Sulawesi. Underwater photographs also indicate its occurrence at Bali and Flores, Indonesia and Madang, Papua New Guinea. It is most similar to *C. amplexus*, which is widely distributed in the Indo-western Pacific region. The two species differ notably in colour pattern: *C. benedetto* is overall pale with about 12 relatively narrow dark (red in life) bars, whereas *C. amplexus* is overall dark brown with 10-13 narrow white bars. In addition *C. benedetto* has a red caudal fin with a white posterior margin compared to the mainly white caudal fin of *C. amplexus*. The two species also exhibit a strong modal difference in the number of dorsal-fin rays (24-25 for *C. benedetto* versus a usual range of 26-28 for *C. amplexus)*.

Zusammenfassung

Beschrieben wird eine neue Art der Seenadeln: *Corythoichthys benedetto,* anhand von fünf Exemplaren mit 59,5-67,6 mm SL, die in 5 bis 15 Metern Tiefe über Felsen und Korallenriffen an zwei indonesischen Orten gesammelt wurden: am westlichen Neuguinea, Provinz Papua Barat, bei der Triton-Bucht und an der Kabaena-Insel, vor dem südlichen Sulawesi. Durch Unterwasserfotos lässt sich zusätzlich ihr Vorkommen bei Bali und Flores, Indonesien und Madang, Papua-Neuguinea, nachweisen.

Die neue Art ähnelt stark *C. amplexus*, deren Vertreter im west-indopazifischen Raum weit verbreitet sind. Die Farbgebung aber ist deutlich verschieden: *C. benedetto* ist insgesamt blass und zeigt 12 relativ schmale dunkle (beim lebenden Tier rote) Bänder, während *C. amplexus* eine dunkelbraune Grundfarbe mit 10 bis 13 schmalen weißen Bänden aufweist. Außerdem hat *C. benedetto* eine rote Schwanzflosse mit einem weißen hinteren Rand, während bei *C. amplexus* die Schwanzflosse hauptsächlich weiß ist. Außerdem unterscheiden sich die beiden Arten deutlich bei der durchschnittlichen Zahl der Rückenflossenstrahlen (24-25 bei *C. benedetto* im Gegensatz zu 26-28 bei *C. amplexus).*

Résumé

Une nouvelle espèce de poisson-aiguille, *Corythoichthys benedetto,* est décrite sur base de cinq spécimens, de 59,5 à 67,6 mm de LS, collectés à une profondeur de 5 à 15 m de récifs coralliens et rocheux, dans deux localisations indonésiennes incluant Triton Bay, province de Papua Barat (Nouvelle-Guinée occidentale) et l'île Kabaena, au large du sud de Sulawesi. Des photos sous-marines révèlent aussi sa présence à Bali et à Flores, Indonésie, ainsi qu'à Madang, Papouasie-Nouvelle-Guinée. L'espèce se rapproche le plus de *C. amplexus* qui jouit d'une large distribution dans la région de l'Indo-Pacifique occidental. Les deux espèces se distinguent normalement par le patron de coloration. *C. benedetto* est pâle partout avec 12 barres sombes relativement étoites (rouges in vivo), alors que *C. complexus* est brun foncé avec 10 à 13 barres blanches étroites. En outre, *C. benedetto* a une caudale rouge avec une marge postérieure blanche, alors que la caudale de *C. amplexus* est blanche. Les deux espèces montrent aussi une forte divergence modale dans le nombre de rayons de la dorsale (24-25 pour *C. benedetto* et 26-28 pour *C. amplexus).*

Sommario

Una nuova specie di pesce ago, *Corythoichthys benedetto,* è descritta sulla base di cinque esemplari di 59.5-67.6 mm SL raccolti a profondità di 5-15 m presso la barriera corallina e le scogliere rocciose di due località indonesiane, quali la baia del Tritone, provincia di Papua Barat (Nuova Guinea occidentale) e l'isola di Kabaena, a sud di Sulawesi. Fotografie subacquee indicano la sua presenza anche a Bali e Flores, Indonesia, e a Madang, Papua Nuova Guinea. La specie più simile è *C. amplexus,* che è ampiamente diffusa nell'Indo-Pacifico occidentale. Le due specie differiscono sensibilmente nella colorazione: *C. benedetto* è pallido con circa 12 barre scure (rosse in vivo) relativamente strette, mentre *C. amplexus* è completamente marrone scuro con 10-13 strette barre bianche. In aggiunta *C. benedetto* ha una pinna caudale rossa con il margine posteriore bianco rispetto alla pinna caudale di *C. amplexus* quasi completamente bianca. Le due specie mostrano anche una forte differenza modale nel numero dei raggi della pinna dorsale (24-25 per *C. benedetto* rispetto ad una gamma di valori generalmente di 26-28 per *C. amplexus).*

INTRODUCTION

The syngnathid genus *Corythoichthys* Kaup, 1853 is a common inhabitant of shallow coral reefs of the Indo-west and central Pacific region ranging from the Red Sea and East African coast to Polynesia. Dawson (1985) recognised the following 10 species (general distribution in parentheses after author names): *C. amplexus* Dawson & Randall, 1975, western Indian Ocean and Gulf of Oman to Samoa; *C. flavofasciatus* (Rüppell, 1838) (Red Sea to Tuamotus), *C. haematopterus* (Bleeker, 1851) (East Africa to Vanuatu), *C. insularis* Dawson, 1977 (Amirante and Comoro islands), *C. intestinalis* (Ramsay, 1881) (Kalimantan to Tonga and Samoa), *C. nigripectus* Herald, 1953 (northern Red Sea and central Pacific), *C. ocellatus* Herald, 1953 (Indonesia and Philippines to Solomon Islands and Australia), *C. paxtoni* Dawson, 1977 (Great Barrier Reef, Australia), *C. polynotatus* Dawson, 1977 (Philippines and Palau), and *C. schultzi* Herald, 1953 (Red Sea to Tonga).

Kuiter (2000) provided a comprehensive, well-illustrated review of sygnathiform fishes. He confirmed the validity of the 10 species of C*orythoichthys* recognised by Dawson (1985) and also added *C. conspicillatus* Jenyns, 1842 (Coral Sea to central Pacific), *C. isigakius* Jordan & Snyder, 1901 (Japan), *C. waitei* Jordan & Seale, 1906 (Philippines to Samoa), as well as 10 potential undescribed species. No distinguishing features other than colour pattern were provided for the undetermined taxa, although the accompanying colour illustrations lend support to Kuiter's contention there are far more species in this genus than currently recognised.

The present paper describes a new pipefish that Kuiter (2000) referred to as *Corythoichthys* sp. 2. It was collected by the authors in January 2007 at Triton Bay, situated 35 km southeast of Kaimana on the southern coast of the Bird's Head region of western New Guinea (Papua Barat Province, Indonesia). The area harbours an exceptionally diverse marine fauna, including an extraordinary number of new fish, coral, and stomatapod taxa that were collected by the authors and colleagues during Conservational International-sponsored expeditions in 2006 and 2007. Two additional specimens, collected by V. Springer at Sulawesi in 1974, were located among collections of the United States Natural History Museum.

MATERIALS AND METHODS

Terminology and methods of counting and measuring follow Dawson (1985). Trunk ring counts begin with the ring bearing the pectoral-fin base and terminate with the ring containing the anus; tail-ring counts begin with the ring bearing the anal fin and terminate with the last ring. Standard length (SL) is measured from the tip of the lower jaw to the base of the caudal fin; body length is measured from the rear edge of the operculum to the base of the caudal fin; trunk length is the distance between the rear edge of the operculum and the ring suture immediately behind the anus; tail length is the distance between the caudal-fin base and the ring suture immediately behind the anus; trunk depth and width are the maximum measurements; head length (HL) is measured from the tip of the lower jaw to the posterior edge of the operculum; head width is the maximum width measured at the level of the operculum; snout length is measured from the tip of the lower jaw to the inner bony margin of the front of the orbit; snout depth is the least depth; eye diameter is the greatest bony diameter; interobital width is the least bony width; heights of dorsal and anal fins are measured from the base of the longest fin ray to its distal tip; pectoral-fin length is measured from the base of the longest ray to its distal tip; the dorsal and pectoral-fin bases are measured between the base of the first and last rays; caudal-fin length is measured from the tip of the longest ray to its base.

Proportional measurements as percentages of the standard length are presented in Table I. Data in parenthesis refer to the paratypes if different from the holotype. Type specimens are deposited at Pusat Penelitian dan Pengembangan Oseanologi, Jakarta, Indonesia (NCIP), United States Natural History Museum, Washington, D.C. (USNM), and the Western Australian Museum, Perth (WAM).

Corythoichthys benedetto n. sp.

(Figs 1-4; Table I)

Holotype: NCIP 6321, female, 67.4 mm SL, northwest entrance to Selat Iris, 03°53.757'S 134° 06.638'E, Triton Bay, Papua Barat Province, Indonesia, 14 m depth, clove oil and hand net, G. R. Allen and M. V. Erdmann, 30 January 2007.

Paratypes: USNM 214895, male, 59.5 mm SL, Tallabassi Bay, 05°17'20"S ca. 122°04'E, off north-

Table I. Proportional measurements of type specimens of *Corythoichthys benedetto* as percentage of the standard length.

	Holotype NCIP 6321	Paratype WAM P.32887	Paratype WAM P.32887	Paratype USNM 214895	Paratype USNM 391917
Sex	female	male	female	male	male
Standard length	67.4	67.6	61.7	64.9	59.5
Body length	85.3	84.9	88.4	90.1	86.1
Trunk length	27.5	36.0	26.5	25.3	24.7
Tail length	61.3	60.8	63.9	64.9	61.3
Head length	11.6	11.4	11.6	10.3	11.9
Head width	3.1	3.5	3.2	2.8	3.0
Snout length	4.7	4.2	4.5	4.3	4.9
Snout depth	0.9	1.1	1.0	0.9	1.2
Eye diameter	2.8	2.8	2.9	2.2	2.5
Interorbital width	1.1	1.1	1.0	0.6	0.8
Trunk depth	3.4	2.9	3.7	3.1	3.2
Body width	3.2	2.6	2.9	2.5	2.9
Dorsal-fin base	9.8	9.3	9.4	8.9	9.2
Dorsal-fin height	4.1	3.9	3.4	3.5	3.9
Anal-fin height	0.9	1.1	1.3	0.9	1.2
Pectoral-fin base	1.4	1.5	1.5	1.4	1.5
Pectoral-fin length	2.8	2.6	2.7	2.5	2.7
Caudal-fin length	3.1	3.7	3.5	3.1	3.7

eastern tip of Big Damalawa Islet, Kabaena Island, Sulawesi, Indonesia, 2-15 m depth, rotenone, V. Springer and others, 25 February 1974; USNM 391917, male, 64 mm SL, same collecting data as previous USNM paratype; WAM P.32887-001, female, 61.7 and male 67.6 mm SL, collected with holotype.

Diagnosis: Rings 15 + 37-38 = 52-53; dorsal fin rays 24-25; subdorsal rings 5-6; pectoral fin rays 13-14; head length 8.6-8.8 in SL; snout length 2.5-2.7 in HL; colour pattern generally consisting of series of 12 narrow white bars, each preceded by much broader, red bar punctuated with variable-sized white ocelli; caudal fin red with broad, white posterior margin.

Description: Rings 15 +38 = 53 (15 + 37-38 = 52-53). Superior trunk and tail ridges discontinuous; lateral trunk ridge straight, ends near anal ring; inferior trunk and tail ridges continuous; median dorsal snout ridge low, entire; supraorbital and paired interorbital ridges entire and distinct; operculum with complete longitudinal ridge; supraopercular ridge present, but inconspicuous; pectoral ring (first trunk ring) clearly longer than second ring; principal body ridges distinct on anterior two-thirds of body, less distinct on posterior third, margin of superior ridge finely denticulate and slightly elevated, less pronounced and without conspicuous denticulations on tail rings; no dermal flaps or keeled scutella present.

Fig. 1. Underwater photograph of *Corythoichthys benedetto*, female, approximately 65 mm TL, Triton Bay, Papua Barat Province, Indonesia. Photo by M. V. Erdmann.

Trunk depth 29.7 (27.1-34.1) in SL; trunk width 31.1 (35.0-40.6) in SL; depth at first tail ring 32.7 (32.4-38.2) in SL; width of first tail ring 32.7 (31.3-39.7) in SL; head length 8.6 (8.4-9.7) in SL; head width at level of operculum 3.8 (3.2-3.9) in HL; trunk length 3.6 (2.8-4.0) in SL; tail length 1.6 (1.5-1.6) in SL; snout length 2.5 (2.4-2.7) in HL; snout depth 12.7 (10.1-11.5) in HL; eye diameter 4.2 (4.3-4.8) in HL; interorbital width 10.9 (10.6-16.8) in HL; least depth of tail rings 12.7 (13.8-14.8) in HL.

Dorsal-fin origin at anterior edge of first tail ring; dorsal-fin rays 25 (24-25), the last split at base and appearing as two separate elements; length of dorsal-fin base 10.2 (10.6-11.2) in SL; dorsal-fin height 2.8 (2.9-3.5) in HL; subdorsal rings 6 (5.5-6); anal-fin rays 4; anal-fin height 12.7 (8.6-11.2) in HL; pectoral-fin rays 13 (13-14); pectoral-fin base 8.4 (7.4-7.9) in HL; pectoral-fin length 4.2 (4.2-4.4) in HL; caudal-fin rays 10; all fin rays unbranched; caudal-fin length 3.8 (3.1-3.4) in HL.

The brood pouch of the male paratypes of *C. benedetto* originates on the tail, immediately behind the anal fin and occupies the ventral surface of the first 10 tail rings. When first collected the pouch of the WAM paratype contained 34 ripe eggs with an approximate average diameter of 0.7 mm.

Fig. 2. Close-up photograph of head of *Corythoichthys benedetto*, female, approximately 65 mm TL, Triton Bay, Papua Barat Province, Indonesia. Photo by G. R. Allen

Fig. 3. Underwater photograph of *Corythoichthys benedetto*, dorsal aspect of female, approximately 65 mm TL, among branches of gorgonian sea fan, Triton Bay, Papua Barat Province, Indonesia. Photo by G. R. Allen.

Colour in life (Figs 1-3): intricate and complex pattern consisting of 12 narrow white bars, each preceded by much broader, red bar punctuated with variable-sized white ocelli; on trunk the area between each set of red/white bars mainly pinkish, sometimes with yellowish mottling, also with large, Y-shaped or anvil-shaped red blotch and double row of small white spots near ventral margin; elevated sections of superior trunk ridge with bright red spots; on tail section the area between each set of red/white bars is mainly red with variable-sized white ocelli and row of larger white spots along inferior tail ridge, also a narrow pinkish stripe, with irregular constrictions and side branches, connecting anterior white bar and posterior red bar; head pinkish-grey with maze of interconnected red markings, the most prominent of which is a bar across the interorbital, extending onto dorsal surface of each eye; snout reddish with 4-5 small, dark-brown spots laterally and whitish median stripe dorsally; dorsal, pectoral, and anal fins hyaline; caudal fin red with broad white posterior margin.

Colour in alcohol (Fig. 4): overall pale tan with clear indication of 12 brown bars and intermediate markings (red in life as mentioned above),

Fig. 4. *Corythoichthys benedetto,* preserved holotype, female, 67.4 mm SL, Triton Bay, Papua Barat Province, Indonesia. Photo by G. R. Allen.

Fig. 5. Underwater photograph of *Corythoichthys amplexus*, dorsal view of adult pair, approximately 60-80 mm TL, Manado, northern Sulawesi, Indonesia. Photo by G. R. Allen.

becoming very faint on tail section; dark markings on head (red or red-brown in life) also evident with large tan blotches or spots mainly associated with median and supraopercular ridges; fins mainly hyaline; series of 4-5 small brown spots along lower edge of snout; male specimen with similar brown spot below each eye and on ventral edge of each operculum, also pair of large black spots on ventral surface of first and third trunk rings; female specimens with 2-3 pairs of smaller brown spots on ventral surface of trunk segments 1-3.

Remarks: The new species is most similar to *C. amplexus*, which is illustrated in Fig. 5. These species are apparently sympatric throughout much of their known ranges and were sometimes seen in close proximity on the reefs of Triton Bay. The two species are easily separated on the basis of colour pattern. *Corythoichthys amplexus* is characterised by about 10 to 13 broad dark bars with narrower white bars between. In addition, the caudal fin of *C. amplexus* is primarily white compared to the white-margined, red caudal fin of *C. benedetto*. Two specimens of *C. amplexus* collected at Triton Bay have a slightly higher dorsal-fin ray count than *C. benedetto* (26-27 *vs* 24-25) and a more elevated and narrower-based anterior element of the median dorsal head ridge. The length of the base of this element is 1.78-1.89 in the orbit diameter for *C. amplexus* compared to 1.40-1.67 in *C. benedetto*.

According to Kuiter (2000), *C. amplexus* is probably restricted to Fiji (type locality) and the species occurring beyond that area that is currently referred to as *C. amplexus* actually represents an undescribed taxon. However, until the status of the various populations are evaluated by DNA analysis we prefer to follow Dawson (1985), who considered *C. amplexus* as a wide-ranging western Pacific species. We have examined the Fijian holotype (USNM 213479, 63.2 mm SL) and paratypes from Fiji (USNM 213480, 2 specimens, 43.3-51.9 mm SL), Madang, Papua New Guinea (USNM 313511, 62.1 mm SL), and Sulawesi, Indonesia (USNM 213510, 7 specimens, 48.3-65.3 mm SL). The latter lot also contained a single specimen, 64.9 mm SL, which we have allocated as a paratype of *C. benedetto*. We have also examined the following non-type specimens of *C. amplexus*: USNM 219172, 3 specimens, 63.8-65.3 mm SL, Solomon Islands; USNM 323978, 15 specimens, 46.7-73.0 mm SL, Loyalty Islands; USNM 323979, 2 specimens, 50.0-54.7 mm SL, Loyalty Islands; USNM 214898, 2 specimens, 68.3-78.9 mm SL, Madang, Papua New Guinea; USNM 360889, 3 specimens, 78.3-83.0 mm SL Vanuatu.

Distribution and habitat: *C. benedetto* is currently known from Bali and southern Sulawesi, Indonesia westward to northern Papua New Guinea. The distribution is primarily based on colour photographs provided by Kuiter (2000, as *Corythoichtys* sp. 2) taken at Bali and Flores in Indonesia and Madang, Papua New Guinea. He also reported the species from the Great Barrier Reef, but the illustrated fish has slight colour pattern differences and further study is required to determine its status.

The new species was regularly encountered solitarily or in small groups containing up to four individuals on sheltered reefs in the vicinity of Triton Bay at depths of about 5-20 m. It was usually seen on algal-covered rocky surfaces, but on one occasion was found among the branches of an unidentified gorgonian sea fan.

Etymology: The new species is named *benedetto* to honour the request of Baroness Angela Vanwright von Berger, who successfully bid to support the conservation of this species at the Blue Auction in Monaco on 20 September 2007 and has given generously to support Conservation International's Bird's Head Seascape marine conservation initiative. The name is in honour of her beloved friend Benedetto Craxi, the former Prime Minister of Italy. His love and respect for nature and the sea was just one of his many great qualities.

ACKNOWLEDGEMENTS

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Pterois andover, a new species of scorpionfish (Pisces: Scorpaenidae) from Indonesia and Papua New Guinea

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Abstract

A new species of scorpionfish, *Pterois andover*, is described on the basis of six specimens, 83.9-168.0 mm SL, collected at southwestern Halmahera and western New Guinea (Papua and Papua Barat provinces, Indonesia). It has also been photographed at northern Sulawesi and Flores, Indonesia and Milne Bay Province, Papua New Guinea. The new taxon superficially resembles *P. volitans*, a sympatric widespread Pacific species, but differs in having larger body scales (< 75 in lateral row and 13-15 below lateral line versus > 81 and 18-25 respectively) and usually 13 versus 14 pectoral-fin rays. The two species are readily distinguished underwater on the basis of dorsal fin morphology, particularly the shape and colour of the spine membranes. *Pterois andover* possesses a narrow membrane posteriorly on each spine, which is more or less uniform brown and terminates in an exaggerated pennant-like structure. In contrast, the membranes of *P. volitans* are broader, boldly striped, and usually lack a well differentiated terminal pennant. The new species also has consistently fewer and fainter spots on the caudal, soft-dorsal, and soft-anal fins except for the population of *P. volitans* from western Australia.

Zusammenfassung

Eine neue Art der Skorpionsfische: *Pterois andover*, wird auf der Grundlage von sechs Exemplaren mit 83,9-168,0 mm SL beschrieben, die am südwestlichen Halmahera und am westlichen Neuguinea (Provinzen Papua und Papua Barat, Indonesien) gefangen wurden. Außerdem gibt es fotografische Belege von Nord-Sulawesi und Flores, Indonesien, und der Provinz Milne Bay in Papua-Neuguinea. Das neue Taxon ähnelt vordergründig *P. volitans*, einer sympatrischen, weit verbreiteten pazifischen Art, unterscheidet sich aber durch größere Körperschuppen (< 75 auf der Seitenlinie und 13-15 unterhalb der Seitenlinie im Gegensatz zu > 81 bzw. 18-25) sowie im Normalfall 13 im Vergleich zu 14 Brustflossenstrahlen. Die beiden Arten lassen sich unter Wasser leicht an der Morphologie der Rückenflosse unterscheiden, insbesondere an Form und Farbe der Flossenstrahl-Membranen. *Pterois andover* hat an jedem Strahl nach hinten zu eine schmale Membran, die mehr oder weniger einheitlich braun gefärbt ist und in einer auffälligen wimpelähnlichen Struktur endet. Im Gegensatz dazu sind die Membranen bei *P. volitans* breiter und deutlich gestreift und haben keine deutliche Wimpelstruktur am Ende. Auch zeigt die neue Art immer weniger und schwächere Flecken auf den Schwanz-, weichen Rücken- und weichen Anal-Flossen, was aber nicht für die Population von *P. volitans* vor Westaustralien gilt.

Résumé

Une nouvelle espèce de Scorpénidé, *Pterois andover* est décrite sur base de six spécimens, de 83,9 à 168,0 mm de LS, collectés au sud-ouest de Halmahera et en Nouvelle-Guinée occidentale (provinces de Papua et Papua Barat, Indonésie). Elle a aussi été photoraphiée au nord de Sulawesi et à Flores, Indonésie et dans la province de Milne Bay, Papouasie-Nouvelle-Guinée. Le nouveau taxon ressemble superficiellement à *P. volitans*, espèce sympatrique largement distribuée dans le Pacifique, mais se distingue par de plus grandes écailles sur le corps (< 75 en rangée latérale et 13-15 sous la ligne latérle contre > 81 et 18-25 respectivement) et, généralement, par 13 rayons pectoraux au lieu de 14. Les deux espèces se distinguent facilement dans l'eau grâce à la morphologie de la dorsale, notamment par la forme et la couleur des membranes épineuses. *Pterois andover* possède une membrane étroite à l'arrière de chaque épine, plus ou moins uniformément brune et se terminant par une structure en forme de fanion surdimensionné. Par contre, les membranes de *P. volitans* sont plus larges, nettement lignées et n'ont généralement pas de fanion terminal bien distinct. La nouvelle espèce montre aussi bien moins de taches, et plus effacées, sur la caudale et les rayons mous de la dorsale et de l'anale, excepté pour la population de *P. volitans* de l'ouest de l'Australie.

Sommario

Una nuova specie pesce scorpione, *Pterois andover*, è descritta sulla base di sei esemplari di 83.9-168.0 mm SL raccolti lungo la costa sudoccidentale dell'isola di Halmahera e nella Nuova Guinea occidentale (province di Papua e Papua occidentale, Indonesia). La specie è stata anche fotografata a nord di Sulawesi e a Flores, Indonesia, e nella provincia di Milne Bay, Papua Nuova Guinea. Il nuovo taxon assomiglia superficialmente a *P. volitans*, una specie simpa-

trica ampiamente diffusa nel Pacifico, ma differisce per avere scaglie più larghe sul corpo (< 75 della linea laterale e 13-15 sotto la linea laterale rispetto a > 81 e 18-25, rispettivamente) e di solito 13 anziché 14 raggi pettorali. Le due specie sono facilmente distinguibili nell'ambiente naturale sulla base della morfologia della pinna dorsale, in particolare per la forma e il colore delle membrane delle spine. Ogni spina di *Pterois andover* possiede una sottile membrana posteriormente, che è quasi uniformemente marrone e termina in una larga struttura simile ad una banderuola. Per contro, le membrane di *P. volitans* sono più larghe, con strie ben marcate e generalmente mancano di una parte terminale differenziata a banderuola. La nuova specie ha anche macchie meno accentuate e in minor numero sulla caudale, sulla dorsale molle e sull'anale molle eccetto per la popolazione di *P. volitans* dell'Australia occidentale.

INTRODUCTION

The scorpaenid fish genus *Pterois* Oken, 1817, commonly known as lionfishes or turkeyfishes, is well known for its spectacular appearance and possession of dangerous venom associated with the dorsal, anal, and pelvic fin spines (Allen & Eschmeyer 1973). It occurs throughout the tropical Indo-west and central Pacific region. In addition, *P. volitans* (Linnaeus, 1758) has recently become established on the east coast of the United States due to aquarium releases (Whitfield et al. 2002) and *P. miles* (Bennett, 1828) has entered the Mediterranean from the Red Sea via the Suez Canal (Golani & Sonin 1992).

Previous taxonomic works (e.g. Smith 1957, Weber & de Beaufort 1962) recognize four wide-ranging species from the Indo-Pacific including *P. antennata* (Bloch, 1787), *P. radiata* Cuvier, 1829, *P. russelii* Bennett, 1831 and *P. volitans*. However, Schultz (1986) demonstrated the latter species is restricted to the western Pacific, being replaced in the Indian Ocean by *P. miles*. Other recognised taxa include *P. mombasae* (Smith, 1957) from the Indian Ocean and far-west Pacific, *P. sphex* Jordan & Evermann, 1903 from the Hawaiian Islands, and *P. lunulata* Temminck & Schlegel, 1843 from Japan.

The present paper describes a distinctive new taxon that is seldom encountered by divers due to its proclivity for turbid coastal environments. It was first illustrated by Kuiter & Tonozuka (2001) from Indonesian locations including Bitung, northern Sulawesi and Maumere, Flores. Three specimens were eventually obtained in September 2005 when the first author joined an exploratory cruise of southwestern Halmahera. Three additional examples were collected by the authors at western New Guinea (Papua and Papua Barat provinces) in 2006 and 2007. It has also been photographed underwater at Milne Bay Province, Papua New Guinea.

MATERIALS AND METHODS

Type specimens and comparative material are deposited at the Australian Museum, Sydney (AMS), Muséum national d'Histoire naturelle, Paris (MNHN), Nationaal Natuurhistorisch Museum, Leiden, Netherlands (RMNH), National Museum of Natural History, Washington, D.C. (USNM), Natural History Museum of London (BMNH), Pusat Penelitian dan Pengembangan Oseanologi, Jakarta, Indonesia (NCIP), and the Western Australian Museum, Perth (WAM).

Eschmeyer (1969) is followed for the terminology of head spines except for the use of lacrimal for the preorbital bone and spines. Lengths for specimens are standard length (SL), the straight-line distance from the front of the upper lip (when not protruded) to the base of the caudal fin (distal end of the hypural plate). Head length (HL) is measured from the same median anterior point to the most posterior end of the opercular membrane, and snout length from the same point to the bony edge of the orbit. Body depth is maximum depth vertically from the base of the dorsal spines (as they emerge from the body, not to their internal bases). Body width is the greatest width just posterior to the gill opening. Orbit diameter is the greatest bony diameter, and interorbital width the least bony width. Caudal-peduncle depth is the least depth, and caudal-peduncle length is measured horizontally from the rear base of the anal fin to the caudal-fin base. Lateral-line scales are readily distinguished by their external median tubule. The scales in longitudinal series are the near-vertical to oblique scale rows above the lateral line from the most anterior point at the upper end of the gill opening to the caudal-fin base. Scales above the lateral line are those in the middle of the body to the base of the dorsal fin and scales below the lateral line are counted nearly vertically to the base of the first anal spine. Counts of gill rakers are made on the first gill arch and are divided into those of the upper-limb and lower-limb.

Proportional measurements in Table I are given as percentages of the standard length. Counts and measurements in parentheses in the description refer to the paratypes if different from the holotype.

Pterois andover n. sp.
(Figs 1-2, 4-6; Tables I-VII)

Holotype: NCIP 6307, female, 168.0 mm SL, Marai, 01°43.862'S 135°46.398'E, southwestern Yapen Island, Cenderawasih Bay, Papua Province, Indonesia, 17 m depth, spear, M. V. Erdmann, 14 February 2006.

Paratypes: BMNH 2007.11.26.1, 105.9 mm SL, Fiabacet Island, 02°12.982'S 130°32.732'E, off southeastern Misool, Raja Ampat Islands, Papua Barat Province, Indonesia, 70 m depth, hand net, M. V. Erdmann, 10 November 2007; MNHN 2007-1930, 83.9 mm SL, Waigeo Island, 00°25.838'S 130°42.775'E, mouth of small bay in entrance to Kabui Bay, Raja Ampat Islands, Papua Barat Province, Indonesia, 31 m depth, hand net, G. R. Allen, 17 November 2007; NCIP 6317, 98.6 mm SL, Payahi Bay, 00°20.335'N 127°40.194'E, southwestern Halmahera, Indonesia, 5-8 m depth, spear, G. R. Allen, 24 September 2005; USNM 390776, 102.0 mm SL, collected with NCIP paratype; WAM P.32893-001, 122.8 mm SL, collected with NCIP paratype.

Comparative material: *Pterois miles* (20 specimens, 88.1-280.5 mm SL): BMNH 1862.12.19.13, Natal, South Africa, 103.2 mm SL; BMNH 1863.12.15.21-22, 2 specimens, 88.1-107.5 mm SL, Natal, South Africa; BMNH 1871.7.15.7, 220.2, Red Sea; BMNH 1886.8.6.1, 154.0 mm SL, Suakin, Sudan, Red Sea; BMNH 1900.1.22.2, 132.8 mm SL, South Africa; BMNH 1906.11.19.101, 231.5 mm SL, Natal, South Africa; BMNH 1934.2.22.57, 150.6 mm SL, Mauritius; BMNH 1936.10.5.12, 241.7 mm SL, Seychelles; BMNH 1951.1.16.675-676, 2 specimens, 154.5-180.0 mm SL, Israel, Gulf of Aqaba, Red Sea; BMNH 1962.1.22.87, 121.3 mm SL, Maldives; BMNH 1967.5.13.21, 144.6 mm SL, Israel, Gulf of Aqaba, Red Sea; BMNH 1985.7.9.513, 101.4 mm SL, Dar-es-Salaam, Tanzania; MNHN 6597, 280.5 mm SL, Red Sea (syntype of *Pterois muricata* Cuvier, 1829); USNM 161330, 182.8 mm SL, Red Sea; USNM 265830, 5 specimens, 110.0-163.0 mm SL, Aldabra; *Pterois russelii* (25 specimens, 54.1-180.5 mm SL): MNHN 6558, 180.5 mm SL, Ava Coast, Myanmar (holotype of *Pterois geniserra* Cuvier, 1829); MNHN 6595, 121.3 mm SL, Ava Coast, Myanmar (non-type, but collected with holotype of *P. geniserra*); RMNH 5868, 11 specimens, 54.1-176.3 mm SL, Banka, Java, and Sumatra, Indonesia (includes 9 syntypes of *Pterois kodipungi* Bleeker, 1852); WAM P.8273, 2 specimens, 90.7-99.0 mm SL, Exmouth Gulf, Western Australia; WAM P.8275-6, 2 specimens, 91.2-117.4 mm SL, Exmouth Gulf, Western Australia; WAM P.25996-002, 194.3 mm SL, Exmouth Gulf, Western Australia; WAM P.30019-001, 3 specimens, 62.3-169.0 mm SL, Shark Bay, Western Australia; *Pterois volitans* (37 specimens, 78.7-225.5 mm SL): AMS I.12941, 174.8 mm SL, Port Hedland, Western Australia (holotype of *Pterois volitans castus* Whitley, 1951); BMNH 1858.4.21.295-296, 2 specimens, 167.5-196.3 mm SL, Ambon, Indonesia; BMNH 1875.10.5.17, 133.6 mm SL, Samoa; BMNH 1927.2.11.151, 173.9 mm SL, Queensland, Australia; BMNH 1930.10.28.4-5, 2 specimens, 160.5-173.9 mm SL; East Indies (no other locality data); BMNH 1950.7.13.28, 174.0 mm SL, Christmas Island (Indian Ocean); BMNH 1984.1.18.252, 167.8 mm SL, Singapore; USNM 99682, 114.5 mm SL,

Fig. 1. Underwater photographs of *Pterois andover* approximately 200 mm TL, Bitung, Sulawesi, Indonesia (upper), and approximately 250 mm TL, Maumere, Flores, Indonesia (lower). Photos by R. C. Steene & R. H. Kuiter.

Indonesia (no other locality data); USNM 99683, 147.5 mm SL, Sulawesi, Indonesia; USNM 99686, 166.1 mm SL, Sulawesi, Indonesia; USNM 102539, 167.1 mm SL, Iloilo, Philippines; USNM 168167, 118.2 mm SL, Buang Bay, Philippines; USNM 265828, 225.5 mm SL, Halmahera, Indonesia; USNM 265833, 173.6 mm SL, Banda Sea, Indonesia; USNM 265953, 4 specimens, 142.7-177.5 mm SL, Sulawesi, Indonesia; USNM 38292, 162.5 mm SL, Nuka Hiva, Marquesas; WAM P.2994, 78.7 mm SL, Madang, Papua New Guinea; WAM P.5833, 130.7 mm SL, Shark Bay, Western Australia; WAM P.5972, 143.6 mm SL, Christmas Island (Indian Ocean); WAM P.8185, 126.1 mm SL, Shark Bay, Western Australia; WAM P.8268, 105.8 mm SL, Exmouth Gulf, Western Australia; WAM P.8269, 150.7 mm SL, Dampier Archipelago, Western Australia; WAM P.13757-8, 2 specimens, 113.5-142.4 mm SL, Exmouth Gulf, Western Australia; WAM P.14729-001, 104.0 mm SL, Abrolhos Islands, Western Australia; WAM P.24678-001, 167.0 mm SL, Lancelin, Western Australia; WAM P.26677-002, 143.4 mm SL, Shark Bay, Western Australia; WAM P.27595-015, 102.0 mm SL, Abrolhos Islands, Western Australia; WAM P.29044-003, 106.0 mm SL, Ashmore Reef, Timor Sea; WAM P.29913-009, 88.0 mm SL, Cocos-Keeling Islands (Indian Ocean); WAM P.32422-004, 91.0 mm SL, Shark Bay, Western Australia.

Diagnosis: A species of the scorpaenid genus *Pterois* with the following combination of characters: Dorsal rays XIII,11; anal rays III,7; pectoral rays 12-14 (usually 13); vertical scale rows in longitudinal scale series 62-72; horizontal scale rows above lateral line 9-10; horizontal scale rows below lateral line 13-15; dorsal spines with narrow, inconspicuous membrane on posterior edge with exaggerated pennant-like flap distally; relatively few dark spots on median fins, 5-28 on dorsal fin, 10-19 on anal fin, and 17-41 on caudal fin; first dorsal spine relatively short, average length 14.95% of SL.

Description: Dorsal rays XIII,11; anal rays III,7; all soft dorsal and anal rays branched, the last to base; pectoral rays 13 (12-14, usually 13), all unbranched; pelvic rays I,5; all soft rays branched; principal caudal rays 12, the upper and lower unbranched; upper and lower procurrent caudal spines 3, followed by segmented soft procurrent ray; gill rakers on first arch 3 + 8 (4-5 + 9) (plus 1-2 rudi-

Fig. 2. *Pterois andover*, freshly collected female holotype, 168.0 mm SL, Cenderawasih Bay, Papua Province, Indonesia. Photo by G. R. Allen.

Table I. Proportional measurements of type specimens of *Pterois andover* expressed as percentage of the standard length.

	Holotype NCIP 6307	Paratype WAM P.32893	Paratype USNM 390776	Paratype NCIP 6317	Paratype BMNH 2007.11.26.1	Paratype MNHN 2007-1930
Standard length (mm)	168.0	122.8	102.0	98.6	105.9	83.9
Head length	36.9	38.8	37.1	35.1	35.0	38.4
Body depth	40.5	36.7	37.3	31.3	33.1	36.0
Body width	25.0	20.8	21.7	18.7	19.6	21.3
Snout length	14.9	14.4	13.8	11.8	12.2	13.6
Orbit diameter	10.4	8.8	8.4	8.7	8.3	9.4
Interorbital width	7.7	8.3	7.2	6.7	6.7	7.4
Maxillary length	19.0	18.6	17.7	17.4	17.8	18.4
Caudal peduncle depth	10.1	11.2	10.7	9.8	9.7	10.7
Caudal peduncle length	17.9	15.5	16.1	15.6	17.8	17.3
Predorsal length	32.7	34.3	33.9	32.2	29.6	34.0
Preanal length	63.7	70.8	68.5	68.5	67.0	67.3
Prepelvic length	35.7	36.5	37.0	36.6	36.3	36.8
Dorsal fin base length	58.3	63.8	61.6	61.4	59.9	62.0
Anal fin base length	17.3	17.2	17.2	17.7	18.5	18.2
1st dorsal spine length	17.9	16.9	15.9	12.3	12.6	14.1
2nd dorsal spine length	22.6	26.4	27.8	27.6	25.5	31.2
3rd dorsal spine length	33.3	31.0	36.5	35.6	32.1	39.6
4th dorsal spine length	42.9	37.4	41.0	44.7	38.1	45.3
Tallest dorsal spine length (7th)	47.6	41.0	48.5	50.6	48.7	54.0
Last dorsal spine length	13.7	13.4	14.5	16.7	15.0	13.3
Tallest soft dorsal ray	30.4	30.1	29.8	31.4	29.1	30.2
1st anal spine length	7.1	6.8	7.0	5.7	6.8	7.4
2nd anal spine length	9.5	13.5	12.1	11.7	12.4	14.1
3rd anal spine length	14.3	18.1	15.3	17.2	15.7	18.5
Tallest soft anal ray (4th)	28.0	29.0	31.1	31.7	27.7	29.2
Pectoral fin length	66.7	77.2	101.5	107.5	76.5	105.2
Pelvic fin length	38.7	40.6	44.7	44.9	37.6	40.4
Pelvic spine length	16.7	19.1	20.4	20.3	17.2	18.8
Caudal fin length	40.5	39.3	40.3	41.4	38.1	41.0

Table II. Comparison of vertical scale row counts for species of *Pterois*.

Species	61-65	66-70	71-75	81-85	86-90	91-95	96-100	101+
P. andover	3	2	1					
P. miles				7	7	3		
P. russelii	3	4	1	1				
P. volitans				2	9	9	5	5

ments on upper and lower arch of holotype and most paratypes); branchiostegal rays 7; vertebrae 24.

Body depth 2.5 (2.7-3.2) in SL; body width 1.6 (1.6-1.8) in body depth; HL 2.7 (2.6-2.9) in SL; snout length 2.5 (2.7-3.0) in HL; outer rim of eye extending above dorsal profile of head; interorbital space V-shaped and relatively deep, the least width 4.8 (4.7-5.2) in HL; orbit diameter 3.5 (4.0-4.4) in HL; caudal-peduncle depth 3.6 (3.5-3.6) in HL; caudal-peduncle length 2.1 (2.0-2.5) in HL.

Mouth large, maxilla extending to below posterior edge of orbit, the upper-jaw length 1.9 (2.0-2.1) in head; lower jaw pointed and strongly projecting; gape of mouth slightly oblique, forming an angle of about 30 degrees to horizontal axis of head and body; jaws with a band of slender, conical, incurved, inwardly depressible teeth in about 5-6 rows at front of upper jaw and 7-8 rows at front of lower jaw, narrowing abruptly to 1-2 rows at posterior end; teeth progressively longer inwardly; vomer with small, close-set, conical teeth in about 5-6 rows, forming a V-shaped patch; no palatine teeth; tongue thick and broadly rounded, with free median triangular anterior part and a rounded fleshy tip; gill rakers short and stout with small spinules, the longest at angle about equal to length of longest gill filaments.

Head spines and bony ridges generally typical for genus, and spination can be expected to increase with growth; a median ridge-like protuberance or hump on snout formed by underlying median ascending process of premaxillary and flanked by pair of posteriorly directed nasal spines; other

paired spines include supraocular, postocular, parietal and nuchal (fused to a low ridge), and sphenotics (rudimentary); pterotic, posttemporal, and humeral, each as low ridge with feeble spine posteriorly; rear margin of operculum broadly rounded, preoperculum with pair of prominent spines above angle and a blunt process below; preorbital with radiating ridges, not spinate; suborbital ridge low and inconspicuous with 2-3 blunt spines.

Supraocular tentacle slender, about equal to orbit diameter (but damaged in holotype and largest paratype), or forming low, triangular, nubbin-like flap; also pair of prominent dermal flaps on ventral edge of preorbital, pair of smaller flaps on ventral margin of opercle, and pair of short slender cirri at tip of snout; cephalic sensory pores generally inconspicuous except for a few larger pores ventrally on mandible, below suborbital ridge, and laterally on snout; anterior nostril just below base of nasal spine with an elongate dermal flap that extends to hind edge of posterior nostril when laid back; posterior nostril with low fleshy rim, lying a short distance behind anterior nostril.

Scales entirely cycloid, very small on side of head and interobital region; no scales on snout/preorbital, chin, and outer margin of preopercle, also a narrow naked area behind eye to pterotic ridge; no scales on fins except basally on caudal and pectoral fins; lateral-line scales 28 (28-30); vertical scale rows in longitudinal series 70 (62-72); horizontal scale rows above lateral line in middle of body 10 (9-10); horizontal scale rows below lateral line to base of first anal spine 15 (13-14).

Origin of dorsal fin above supracleithral spine, the predorsal length 3.1 (2.9-3.4) in SL; first dorsal spine 2.1 (2.3-2.9) in HL; second dorsal spine 1.6 (1.2-1.5) in HL; third dorsal spine 1.1 (1.0-1.3) in HL; fourth dorsal spine 0.9(0.8-1.0) in HL; seventh dorsal spine longest, 2.1 (2.0-2.4) in SL; last dorsal spine 2.7 (2.1-2.9) in HL; fifth dorsal soft ray longest, 1.2 (1.1-1.3) in HL; first anal spine 5.2 (5.2-6.2) in HL; second anal spine 3.9 (2.8-3.1) in HL; third anal spine longest, 2.6 (2.0-2.4) in HL; fourth anal soft ray longest, 1.3 (1.1-1.3) in HL; caudal fin rounded, the length 2.5 (2.4-2.6) in SL; pectoral fins very long and free from connective membranes distally, the third ray longest, 1.5 (0.9-1.3) in SL; pelvic spine 2.2 (1.7-

Fig. 3. Underwater photograph of *Pterois volitans* approximately 250 mm TL, Milne Bay Province, Papua New Guinea. Photo by R. C. Steene.

2.0) in HL; second pelvic soft rays longest, 2.6 (2.2-2.7) in SL.

Colour in life (from underwater digital photographs, Fig. 1): head white to pale pink with about 12 red-brown bars, several including those at anterior edge of eye, below middle of eye, immediately behind eye, and from nape to upper pectoral-fin base wider and more vivid than others, which are mainly diffuse; pair of prominent dermal flaps on rear half of upper jaw with brown stripe along their length; enlarged supraorbital flaps or tentacles with brown stripe along their length and faint alternating white and brown bands; smaller scattered skin flaps on head mainly pink or whitish; body with about 13 relatively broad, vivid red-brown bars interspersed with equal number of white-edged relatively diffuse brown bars; dorsal spines with alternating pink/whitish and very faint reddish/brown bands, each with a narrow dark brown membrane posteriorly and pennant-like expansion distally, the latter pinkish to brown, sometimes with a horizontally-elongate dark brown spot near its centre; soft dorsal, caudal, and anal fins with translucent membranes and pinkish rays, the latter with several brownish bands/spots; pelvic fins mainly pinkish or white on basal half and brown on outer half with 2-3 horizontal rows of relatively large brown spots; pectoral fins pale grey-brown with about six equally-spaced

Fig. 5. Underwater photograph of *Pterois andover,* approximately 300 mm TL (fish at right) and *P. volitans*, Milne Bay Province, Papua New Guinea. Photo by R. C. Steene.

Fig. 4. Underwater photographs comparing dorsal-fin spines of *Pterois andover* (upper) and *P. volitans*. Photos by G. R. Allen.

Fig. 6. Underwater photographs comparing body scales of *Pterois andover* (upper) and *P. volitans*. Photos by G. R. Allen.

Table III. Comparison of horizontal scale rows counts for species of *Pterois.*

Above lateral line							
Species	8	9	10	11	12	13	14
P. andover		3	3				
P. miles				10	7	2	
P. russelii			3	6			
P. volitans				8	12	8	2

Below lateral line													
Species	13	14	15	16	17	18	19	20	21	22	23	24	25
P. andover	1	4	1										
P. miles					1	5	7	5	1				
P. russelii			1	3	2	2		1					
P. volitans						2	1	5	8	5	5	3	1

Table IV. Comparison of pectoral ray-ray counts for species of *Pterois.* A single asterisk (*) indicates that counts were taken for both right and left fins. A double asterisk (**) indicates data taken from underwater photographs.

Pectoral rays				
Species	12	13	14	15
*P. andover**	1	10	1	
*P. andover***		5		
P. miles		1	21	
*P. russelii**	3	43	4	
P. volitans			36	1

Table V. Comparison of the average length (as percentage of the standard length) of the first and fourth dorsal spines of species of *Pterois.*

Species	n	D1	D4
P. andover	6	14.95	41.56
P. miles	16	22.09	43.26
P. russelii	13	18.54	35.29
P. volitans	15	21.34	45.64

brown bands along length of upper rays, grading to 3-4 narrower brown bands/spots across lowermost rays; pectoral-fin base white to pink with pair of broad brown stripes/bands and narrow brown stripe between them.

Colour of holotype when fresh (Fig. 2): head and body with alternating red-brown and white to pinkish bars; most of brown bars on head narrower than pale bars except for one directly below eye, one immediately behind eye, and another from nape to upper pectoral-fin base; ventral surface of mandible with red-brown dash-like markings; primary brown bars on body relatively wide (about eye width or slightly narrower) with alternating narrower pale bars, each of the latter with a slender brown bar in the middle; dorsal-fin spines pink with alternating faint brown bands; soft dorsal, caudal, and anal fins pink with widely scattered brown spots; pelvic fins dusky red-brown with three rows of relatively large brown spots; pectoral fins pink with several brown bands/spots on each ray; pectoral-fin base with pair of broad brown stripes and 2-3 narrower brown stripes; breast region white with about 3-4 diffuse brown bars.

Colour in alcohol: similar to fresh coloration except pink/whitish areas are pale yellowish-tan and brown marking lack a reddish hue.

Remarks: *Pterois andover* is closely allied to *P. volitans* (Fig. 3) for which it is easily mistaken. The two species are easily differentiated in life or in underwater photographs by the structure/shape of the dorsal fin spines (Figs 4-5). Those of *P. andover* possess a very narrow membrane posteriorly on each spine, which gives it the impression of having longer, more slender spines. In contrast, the membranes of *P. volitans* are much broader (i.e. feather shaped), at least in adults. Additionally, the membranes of *P. andover* are generally dark, in contrast to those of *P. volitans*, which are conspicuously paler with prominent dark cross-bands. The distal tip of each dorsal spine of *P. andover* is distinctly enlarged, pennant-like, and much broader than the posterior membrane along the length of the spine. The "pennant" is generally brown and sometimes has a dark spot near its centre. In contrast, the distal tip of each spine in *P. volitans* is only slightly expanded compared to the adjacent posterior membrane and is generally whitish in adults. Although reliable as a diagnostic field character, the delicate fin membranes are invariably damaged in preserved specimens.

The two species also have a pronounced differ-

ence in the size of the body scales, which is reflected in the counts of both vertical and horizontal scale rows (Tables II-III). The scales of *P. andover* are considerably larger than those of *P. volitans*, hence they form a readily visible network, imparted by individual scales on the side of the body that are thinly outlined with dark brown (Fig. 6, upper). In contrast, the individual scales are not easily discerned in *P. volitans* when viewed underwater or in photographs (Fig. 6, lower).

The new species further differs in usually having 13 pectoral rays, compared to a normal count of 14 rays in *P. volitans* (Table IV). Schultz (1986) indicated that although 14 rays is the normal count for the latter species, it sometimes has 15-16 rays in South Pacific populations (Vanuatu, Fiji, Samoa, Tahiti, Marquesas, and Pitcairn Group).

A comparison of dorsal spine length as indicated by the first and fourth spines reveals that those of *P. andover* are generally shorter than those of *P. miles* and *P. volitans* (Table V). Data were taken for a relatively small portion of the available comparative material due to the high incidence of broken spines.

There is also a difference in the pattern of small dark spots on the median fins. The new species consistently possesses fewer, less vivid spots than *P. volitans* and *P. miles* (Table VI). A notable

Fig. 7. Underwater photograph of *Pterois miles*, approximately 200 mm TL, Nosy Be, Madagascar. Photo by G. R. Allen.

Fig. 8. Underwater photograph of *Pterois russelii*, approximately 200 mm TL, Bali Indonesia. Photo by G. R. Allen.

Table VI. Comparison of number of spots on median fins of species of *Pterois.* The abbreviation WA is used for Western Australia. An asterisk (*) indicates data from underwater photos.

Caudal fin spots								
Species	< 25	26-35	36-45	56-65	66-75	76-85	86-95	96+
P. andover	2	3	1					
*P. andover**	2	2	2					
P. miles				2	1	4	7	5
P. volitans					5	9	2	3
P. volitans (WA)	5							

Dorsal fin spots							
Species	6-15	16-25	26-35	36-45	46-55	56-65	66+
P. andover	4	1	1				
*P. andover**	3	2	1				
P. miles			2	1	9	5	2
P. volitans				2	7	10	
P. volitans (WA)	3	1	1				

Anal fin spots						
Species	6-15	16-25	26-35	36-45	46-55	56-65
P. andover	4	1				
*P. andover**	3	3				
P. miles			1	9	7	3
P. volitans			1	6	10	2
P. volitans (WA)	2	3				

Table VII. Frequency distribution of supraocular tentacle-shape for species of *Pterois.* Data were taken from underwater photographs.

Species	Nubbin	Ray-like	Feather-like	Mixed
P. andover	10	2		
P. miles		4		2
P. volitans	2	12	16	2

exception is that specimens of *P. volitans* from Western Australia generally have sparse spotting, and are therefore similar to *P. andover* in this respect. We have examined Whitley's (1951) holotype of *Pterois volitans castus* and nine additional specimens from Western Australia and conclude they represent a geographic colour variant of the wide-ranging Pacific species. Although differing in the number of median fin spots, they possess small scales (>85 in lateral series) and 14 pectoral rays, which is typical for the nominal species.

The delicate membranes associated with dorsal spines and cephalic skin flaps/tentacles are invariably damaged by handling or specimen processing. Hence, underwater photographs provide the best means of evaluating these structures.

Shapes of supraocular tentacles for *P. andover*, *P. miles*, and *P. volitans* were studied from the first author's underwater photographs and a summary of the frequency for the various shapes is presented in Table VII. This structure forms either a short (about equal to eye diameter) ray-like tentacle or abbreviated nubbin in *P. andover*. In contrast, most specimens of *P. miles* and *P. volitans* have either ray-like or feather-like tentacles. Fishelson (2006) suggested that populations of *P. volitans* (= *P. miles)* from the Red Sea have rapidly (over the past 25 years) evolved a unique phenotype consisting of a feather-like supraocular tentacle (often bearing a small ocellus) instead of the typical ray-like tentacle. However, from our experience, mainly in the Indo-Malayan region, both types of supraocular structures are commonly encountered among populations of *P. volitans*. Moreover, occasional photographed individuals exhibit a "feather" over one eye, and "ray" over the other. Some individuals possess a ray-like basal stalk and a feather-shaped structure occupying the outer one-third to one-half of the tentacle (Fig. 3). Most likely, the outer portion is readily damaged and frequently missing, resulting in a short ray-like appendage.

There is also an apparent ecological difference. *Pterois volitans* occurs in a variety of habitats including clear offshore coral reefs as well as sheltered inshore waters. In contrast, *P. andover* is

much more ecologically restricted. Virtually every observation has occurred on or near turbid inshore reefs surrounded by soft sand-mud bottoms, often in the proximity of freshwater discharge, at depths between 3-70 m. The species has thus far been collected only from Indonesia at Halmahera and western New Guinea (Papua and Papua Barat provinces). However, Kuiter & Tonozuka (2001) included three photographs taken at Bitung, northern Sulawesi and Maumere Bay, Flores. In addition, Roger Steene photographed it during a recent visit to Milne Bay Province, Papua New Guinea where a lone individual in company with several *P. volitans* was encountered (Fig. 5). Judging from this notable range extension, the species probably ranges widely in the East Indian region and could certainly be expected at locations such as Sabah and the Philippines.

Our study of *Pterois andover* included comparisons with 37 specimens of *P. volitans* and 20 specimens of *P. miles* (see list of comparative material above). Schultz (1986) provided evidence for the recognition of the latter species, which was previously considered a synonym of *P. volitans*. Although the two species are very similar in appearance (Figs 3-7), Schultz (1986) showed that *P. volitans* has consistently larger pectoral fins, almost always 11 soft-dorsal rays, and seven soft-anal rays compared to the usual counts of 10 and six rays respectively in *P. miles*. Although recent authors (e.g. Allen & Adrim 2003, Poss 1999, Randall 1995, and Eschmeyer 1986) have recognized *P. miles* as a valid species, Fishelson (2006) concluded there was a lack of sufficient knowledge to warrant its separation from *P. volitans.* However, Schultz's (1986) recognition of separate Pacific and Indian Ocean species is followed here, pending further genetic work currently in progress by Paul Barber (Boston University) and the authors. Moreover, Kochzius et al. (2003) concluded that the two species were clearly separable on the basis of mtDNA sequences.

There are apparently no extant type specimens of *Gasterosteus volitans* Linnaeus, 1758. There is a dried specimen from the Gronovius collection labelled as a syntype at the Natural History Museum of London (BMNH 1853.11.12.9). However, examination of this specimen, 109 mm SL, revealed that it is *Dendrochirus zebra* (Cuvier, 1829). The specimen was discussed by Wheeler (1958), who identified it as *D. brachypterus* (Cuvier, 1829). According to Wheeler, the original description by Linnaeus (based primarily on literature sources) is adequate and "there is no necessity to interfere with the accepted nomenclature of this well known species".

Bennett's (1828) description of *Scorpaena* (= *Pterois) miles* was based on a drawing of a specimen from Ceylon (Sri Lanka) that is clearly diagnostic. Based on personal communication received from R. Myers, Fishelson (2006) indicated the oldest name for this species is *Scorpaena mahe* Lacépède, 1801. This opinion was perhaps based on Cuvier (in Cuvier & Valenciennes 1829), who considered *S. mahe* a junior synonym of *P. volitans*. However, Lacépède's pectoral ray count of 17 would appear to preclude the identification of this species as *P. miles*. There is no type specimen of *Scorpaena mahe.*

We have also examined 25 specimens of *Pterois russelii*, which bears a superficial resemblance to *P. andover*. Both species usually possess 13 pectoral-fin rays and larger, hence fewer vertical scale rows on the body than for *P. volitans* and *P. miles* (Tables II-III). However, *P. russelii* is readily distinguished by its lack of spotting on the median fins (Fig. 8). Moreover, it generally has shorter dorsal spines (Table V) and lacks pigmentation on the lower jaw. There are no known type specimens of *P. russelii*, which was described by Bennett (1831) on the basis of a drawing (no. 133) that appeared in Russell (1803). This species generally occurs on soft mud bottoms, typically offshore in depths of 15-60 m, but is occasionally seen in shallow estuaries.

Our examination of *P. russelii* specimens included the syntypes of *P. kodipungi* (see list of comparative material above), which was previously recognized as a valid species by Kuiter & Tonozuka (2001) and Allen & Adrim (2003). No significant characters were detected to distinguish it and therefore we agree with the earlier assessment of de Beaufort & Briggs (1962), which treated it as a junior synonym of *P. russelii*. We have also identified the holotype of *P. geniserra* Cuvier, 1829 as *P. russelii*. Although Cuvier's name was published two years before Bennett's description it has never been used and should therefore be suppressed under Article 23.9.1 of the International Code of Zoological Nomenclature. In contrast, *P. russelii* has been used for this species in numerous publications over the past 100 years.

Etymology: The new species is named *andover* to honour the request of Sinduchajana Sulistyo, who has given generously to support Conservation International's Bird's Head Seascape marine conservation initiative. The name is in honour of the Andover group of companies, including Andover Leisure, which is dedicated to promoting greater public

appreciation of the oceans and marine conservation in Asia. It is treated as a noun in apposition.

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Pseudanthias charleneae, a new basslet (Serranidae: Anthiinae) from Indonesia

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Abstract

Pseudanthias charleneae is described from a single specimen, 75.3 mm SL, collected at Cenderawasih Bay, western New Guinea (Papua Province, Indonesia) at a depth of 56 m. It is also reported from Bali, Indonesia on the basis of colour photographs. Diagnostic features include: X,16 dorsal rays; II,7 anal rays; 17-18 pectoral rays; 47 lateral-line scales; 28 circumpedunclar scales; 11 + 26 gill rakers on the first branchial arch; an elevated third dorsal spine; and male colour in life (mainly lavender pink, grading to orange on head and anterodorsal part of body with a broad, tapering orange bar below middle of spinous dorsal fin and a lavender-pink margined yellow band from the snout tip to the pectoral-fin base). It is most similar to *P. carlsoni* from Melanesia (Papua New Guinea to Fiji) and *P. engelhardi* from the Great Barrier Reef of Australia, but differs in having a complete rather than incomplete bar below the middle of the spinous dorsal fin and in lacking a large red spot on the spinous dorsal fin. It also differs in having a higher lateral-line scale count (47 *versus* 41-45), more circumpeduncular scales (28 *versus* 25), and a deeper caudal peduncle (least depth 1.8 in HL *versus* 2.15-2.3).

Zusammenfassung

Pseudanthias charleneae wird anhand eines Exemplares mit 75,3 mm SL beschrieben, das an der Cenderawasih-Bucht vor dem westlichen Neuguinea (Provinz Papua, Indonesien) in 56 m Tiefe gefangen wurde. Weitere Nachweise gibt es von Bali, Indonesien, auf der Grundlage von Farbfotografien. Zu den Bestimmungsmerkmalen gehören: X,16 Dorsalstrahlen, II,7 Analstrahlen, 17-18 Pectoralstrahlen, 47 Seitenlinien-Schuppen, 28 circumpedunculare Schuppen (um den Schwanzstiel); 11 + 26 Kiemenblätter auf dem ersten Kiemenbogen; ein herausragender dritter Rückenstachelstrahl; sowie die Farbgebung der Männchen beim lebenden Tier (hauptsächlich layendel-rosa, das am Kopf und dem anterodorsalen Teil des Rumpfes in Orange übergeht, mit einem breiten, sich verschmälernden Band unterhalb der Mitte der stachelartigen Rückenflosse und einem lavendel- bis rosafarbig begrenzten gelben Streifen von der Schnauzenspitze bis zur Brustflossenbasis). Die Vertreter dieser Art ähneln stark *P. carlsoni* von Melanesien (Papua-Neuguinea bis Fidschi) und *P. engelhardi* vom Great Barrier Reef Australiens, unterscheiden sich aber durch einen eher vollständigen Band unterhalb der Mitte der stachelförmigen Rückenflosse und durch das Fehlen eines großen roten Flecks auf der Rückenstachelflosse. Weitere Unterscheidungsmerkmale sind eine höhere Zahl der Seitenlinien-Schuppen (47 im Vergleich zu 41-45), eine höhere Zahl von Circumpeduncular-Schuppen (um den Schwanzstiel) (28 statt 25) und ein tieferer Schwanzstiel (mindestens 1,9 HL im Vergleich zu 2,15 bis 2,3).

Résumé

Pseudanthias charleneae est décrit sur base d'un seul spécimen, de 75,3 mm de LS, collecté à Cenderawasih Bay, Nouvelle-Guinée occidentale (province de Papua, Indonésie), à une profondeur de 56 m. Il est également signalé à Bali, Indonésie à partir de photos en couleurs. Les donnéers diagnostiques comprennent X,16 rayons dorsaux; II,7 rayons à l'anale; 17-18 rayons pectoraux; 47 écailles sur la ligne latérale; 28 écailles circumpédonculaires, 11 + 26 branchiospines sur le premier arc branchial; une troisième épine dorsale allongée; et la couleur du mâle in vivo (généralement rose à nuance lavande, tournant à l'orange sur la tête et la partie antérodorsale du corps, avec une large barre orange finissant en pointe sous le centre de la dorsale épineuse, et une bande jaune marginée de rose lavande de la pointe du rostre jusqu'à la base des pectorales). L'espèce ressemble le plus à *P. carlsoni* de Mélanésie (de la Papouasie-Nouvelle-Guinée jusqu'aux îles Fidji) et à *P. engelhardi* de la Grande Barrière de corail d'Australie, mais se distingue par une barre complète plutôt qu'incomplète sur le centre de la dorsale épineuse. Elle diffère aussi par un nombre plus élevé d'écailles sur la ligne latérale (47 contre 41-45), plus d'écailles circumpédonculaires (28 contre 25) et un pédoncule caudal plus épais (hauteur minemum de 1,0 contre 2,15-2,3).

Sommario

Pseudanthias charleneae è descritta sulla base di un singolo esemplare di 75.3 mm SL raccolto nella baia di Cenderawasih, Nuova Guinea occidentale (provincia di Papua, Indonesia) a una profondità di 56 m. È stato anche registrato a Bali, Indonesia sulla base di fotografie a colori. Le caratteristiche diagnostiche includono: X,16 raggi dorsali,

II,7 raggi anali, 17-18 raggi pettorali, 47 scaglie sulla linea laterale, 28 scaglie circumpeduncolari, 11 + 26 rastrelli branchiali sul primo arco branchiale, la terza spina dorsale prolungata e la colorazione nativa del maschio (principalmente rosa lavanda, che sfuma all'arancio sul capo e sulla parte anterodorsale del corpo, e con una larga barra conica arancione sotto il centro della porzione spinosa della pinna dorsale e una banda rosa lavanda orlata di giallo dalla punta del muso alla base della pinna pettorale). Le specie più simili sono *P. carlsoni* dalla Melanesia (da Papua Nuova Guinea alle isole Fiji) e *P. engelhardi* dalla Grande Barriera Corallina australiana, ma se ne discosta per avere la barra sotto il centro della pinna dorsale completa anziché incompleta e per l'assenza di una larga macchia rossa sulla porzione spinosa della pinna dorsale. Differisce anche per avere un maggior numero di scaglie della linea laterale (47 *vs.* 41-45), più scaglie circumpeduncolari (28 *vs.* 25) e il peduncolo caudale più largo (altezza minima 1.8 in HL *vs.* 2.15-2.3).

INTRODUCTION

The serranid subfamily Anthiinae contains at least 165 species belonging to approximately 20 genera (Anderson et al. 1990). The species *of Luzonichthys* Herre, 1936, *Pseudanthias* Bleeker, 1871, *Rabaulichthys* Allen, 1984, and *Serranocirrhitus* Watanabe, 1949 are particularly conspicuous inhabitants of Indo-Pacfic coral reefs, frequently forming large colourful shoals that feed on zooplankton a short distance above the substrate. Because of their preference for relatively deep water, most of these fishes were poorly known until the advent of scientific scuba diving a few decades ago. The genus *Pseudanthias* is by far the largest in the subfamily with 51 currently recognised species (Randall & Pyle 2001), of which 30 have been described since 1970.

The present paper describes a new species that was collected by the second author during a recent Conservation International-sponsored coral reef survey at Cenderawasih Bay in western New Guinea (Papua and Papua Barat provinces of Indonesia). This large (approximately 59,000 km^2) bay situated on New Guinea's north coast separates the Bird's Head or Vogelkop Peninsula from the main body of the island. The recent field investigations revealed a rich reef fish community with several peculiarities indicative of isolation from neighbouring areas in the relatively recent geological past (Allen & Erdmann 2006).

MATERIALS AND METHODS

Lengths of specimens are given as standard length (SL) measured from the anterior end of the upper lip to the base of the caudal fin (posterior edge of hypural plate); head length (HL) is measured from the same anterior point to the posterior edge of the opercular membrane; body depth is the maximum depth from the base of the dorsal spines; body width is the maximum width just posterior to the gill opening; snout length is measured from the anterior end of the upper lip to the anterior edge of the eye; orbit diameter is the horizontal fleshy diameter, and interorbital width the least fleshy width; upper jaw length is taken from the front of the upper lip to the posterior end of the maxilla; caudal peduncle depth is the least depth, and caudal peduncle length is the horizontal distance between verticals at the rear base of the anal fin and the caudal fin base; lengths of fin spines and rays are measured to their extreme bases; caudal fin length is the horizontal length from the posterior edge of the hypural plate to a vertical at the tip of the longest ray; caudal concavity is the horizontal distance between verticals at the tips of the shortest and longest rays; pectoral fin length is the length of the longest ray; pelvic fin length is measured from the base of the pelvic spine to the filamentous tip of the longest soft ray; pectoral ray counts include the small splint-like, uppermost rudimentary ray; gill raker counts include all rudiments and are presented as separate counts for the upper and lower limbs as well as a combined count; the last fin ray element of the dorsal and anal fins is usually branched near the base and is counted as a single ray.

Proportional measurements expressed as percentage of the SL are provided in Table I. The holotype (only known specimen) is deposited at Pusat Penelitian dan Pengembangan Oseanologi, Jakarta, Indonesia (NCIP).

Pseudanthias charleneae n. sp.

(Figs 1-3; Table I)

Holotype: NCIP 6322, male, 75.3 mm, Gayebi Reef, 2°8.246'S 135°11.729'E, Tydeman Reefs, Cenderawasih Bay, Papua Province, Indonesia, 56 m, spear, M. V. Erdmann, 20 February 2006.

Diagnosis: Dorsal rays X,16; anal rays III,7; pectoral rays 17-18; lateral-line scales 47; gill rakers 11 + 25; body moderately deep, the depth 2.4 in SL; no papillae on posterior edge of orbit; male without a fleshy protuberance at front of upper lip; vomerine teeth in a small triangular patch; third dorsal spine of male moderately elongate, 1.8 in HL; caudal fin forked or lunate, the caudal concavity 1.4 in HL; male in life mainly lavender pink with scattered

orange flecks, grading to orange on head and anterodorsal part of body; a broad, tapering orange bar below middle of spinous dorsal fin, extending to lower side; lavender-pink margined yellow band from snout tip to lower eye, continuing from lower rear corner of eye to pectoral-fin base; spinous dorsal fin lavender pink on basal half with broad yellow outer margin; soft dorsal fin mainly reddish orange, grading to yellow distally with narrow lavender-pink margin; anal fin mainly yellow with lavender pink anterior margin; caudal fin overall reddish orange with lavender submarginal band near tips of upper and lower lobes, the tips yellow-orange; pelvic fin yellow on anterior half and whitish posteriorly, with narrow lavender-pink anterior margin; pectoral fins translucent to slightly yellowish.

Description: Dorsal rays X,16; anal rays III,7; all dorsal and anal soft rays branched, the last to base; pectoral rays 17 (18 on right side), all branched except uppermost pair and lowermost ray; pelvic rays I,5; principal caudal rays 15, the median 13 branched; lateral-line scales 47; scales above first lateral line scale to base of third dorsal spine 6; scales above lateral line to base of middle dorsal spines 4; scales below lateral line to origin of anal fin 16; circumpeduncular scales 28; gill rakers 11 + 26, total rakers 37; branchiostegal rays 7; supraneural (predorsal) bones 3; vertebrae 10 + 16.

Body moderately deep for the genus, maximum depth 2.4 in SL, and laterally compressed, the width 2.5 in body depth; head length 3.2 in SL; snout shorter than orbit diameter, its length 4.7 in HL; front of upper lip without a pointed, fleshy protuberance; eye large, the orbit diameter 3.2 in HL; posterior edge of orbit without fleshy papillae; interorbital space convex, the least fleshy width 3.0 in HL; length of maxillary 2.2 in HL; caudal-peduncle depth 1.8 in HL; caudal-peduncle length 1.5 in HL.

Mouth moderately large, the maxilla reaching to below posterior edge of pupil, the upper jaw length 2.2 in HL; mouth strongly oblique, the lower jaw slightly projecting, the gape forming an angle of about 45° to horizontal axis of head and body; posterior end of maxilla truncate with strongly rounded corners; no supramaxilla; a pair of widely separated, forward-projecting canine teeth at front of upper jaw, the tips usually exposed when mouth fully closed; canines followed by an outer row of slender conical teeth and a band of two irregular inner rows of very small, inward-projecting conical teeth, this band extending medial to canines, ending on each side with one or two large recumbent canines; front of lower jaw with a well-separated pair of stout canines that project anterolaterally, these teeth just medial to upper canines and projecting outside gape when mouth fully closed; a large recurved canine tooth at side of lower jaw about one-third distance from lower jaw symphysis, preceded by a band of villiform teeth in two irregular rows that extends medial to anterior canines, and followed by a row of well-separated slender conical teeth; vomer with a small triangular patch of villiform teeth; palatines with a single irregular row of very small teeth; tongue slender and sharply pointed, the upper surface with small papillae; gill rakers long and slender with double band of minute rigid projections on inner edge, the longest rakers on lower limb near angle slightly longer than longest gill filaments.

Fig. 1. Underwater photo of freshly speared holotype of *Pseudanthias charleneae*, 75.3 mm SL, Cenderawasih Bay, Papua Province, Indonesia. Photo by G. R. Allen.

Anterior nostril a membranous tube at level slightly above centre of eye in front of orbit by a distance about half pupil diameter; posterior nostril a large subtriangular opening dorsoposterior to anterior nostril, the internarial distance about equal to greatest diameter of posterior nostril; flap on rear edge of anterior nostril reaching anterior edge of posterior nostril when laid back.

Opercle with three strong spines, the lower two acute, the upper broadly triangular; middle opercular spine largest, most posterior, at level of upper edge of pupil; rounded corner and upper edge of preopercle with 44 serrae that are progressively larger ventrally; lower edge of subopercle with 3 inconspicuous tiny serrae; upper edge of interopercle with 7 inconspicuous tiny serrae.

Scales ctenoid on head and body, some on head with auxiliary scales, but none on body; head scaled except lips, isthmus, area around nostrils, and tip of lower jaw; no scales basally on membranes of spinous portion of dorsal and anal fins, but scales present on basal one-third to one-half of soft portions; pro-

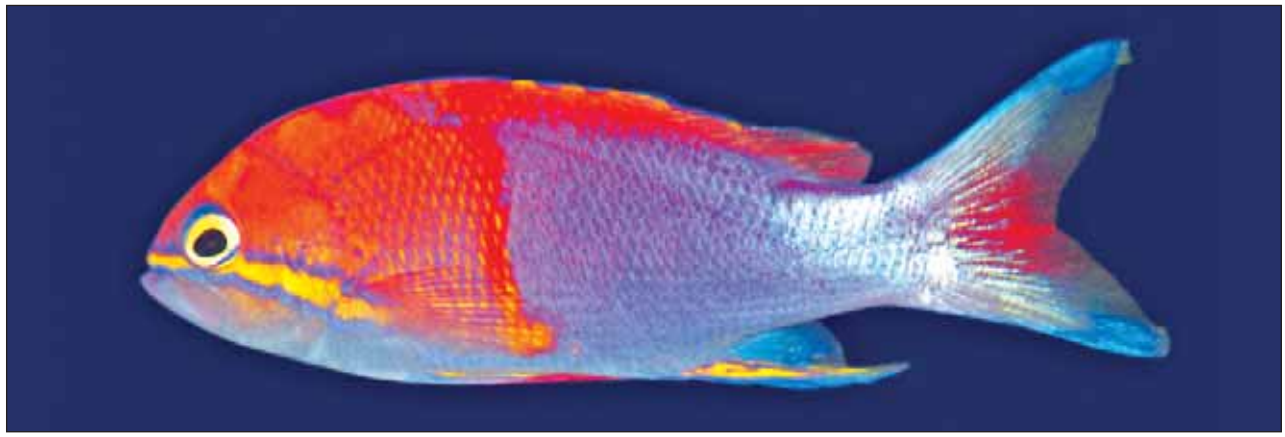

Fig. 2. *Pseudanthias charleneae*, underwater photograph of adult male, approximately 100 mm total length, Bali, Indonesia. Photo by A. Ogawa.

Fig. 3. *Pseudanthias charleneae*, underwater photograph of female or young male, approximately 60 mm total length, Bali, Indonesia Photo by G. Bell.

Table I. Proportional measurements of holotype of *Pseudanthias charleneae* as percentage of the standard length.

Measurement	Holotype NCIP 6322
Standard length (mm)	72.5
Body depth	42.0
Body width	16.5
Head length	31.1
Snout length	6.6
Orbit diameter	9.7
Interorbital width	10.5
Caudal-peduncle depth	16.9
Caudal-peduncle length	20.7
Upper jaw length	14.3
Predorsal length	30.8
Preanal length	64.0
Prepelvic length	32.7
Length dorsal-fin base	67.2
Length anal-fin base	18.9
Length pectoral fin	30.3
Length pelvic fin	26.8
Length pelvic-fin spine	18.5
Length first dorsal spine	6.2
Length second dorsal spine	10.6
Length third dorsal spine	17.0
Length last dorsal spine	14.3
Length longest dorsal ray	14.6
Length first anal spine	6.6
Length second anal spine	15.3
Length third anal spine	15.1
Length longest anal ray	25.1
Length caudal fin	34.0
Caudal concavity	22.6

gressively smaller scales on caudal fin extending nearly to posterior margin; progressively smaller scales on pectoral fins extending about three-fourths distance to posterior margin; a midventral triangular scaly process at base of pelvic fins extending posteriorly nearly half length of pelvic spine.

Origin of dorsal fin over upper end of gill opening, the predorsal distance 3.2 in SL; base of soft portion of dorsal fin slightly longer than base of spinous portion; first dorsal spine 5.0 in HL; second dorsal spine 2.9 in HL; third dorsal spine longest, 1.8 in HL; tenth dorsal spine 2.2 in HL; membranes of spinous portion of dorsal fin moderately incised; longest (third or fourth, but most of rays damaged) dorsal soft ray, 2.1 in HL; origin of anal fin below base of fourth dorsal soft ray, the preanal distance 1.6 in SL; first anal spine 4.7 in HL; second anal spine 2.0 in HL; third anal spine 2.1 in HL first 4-5 anal soft rays subequal, the longest 1.2 in HL; pectoral fins more or less pointed, middle rays longest, 3.3 in SL; origin of pelvic fins below lower base of pectoral fins, the prepelvic distance 3.1 in SL; pelvic spine 1.7 in HL; second pelvic soft ray longest, 3.7 in SL; caudal fin forked or lunate, its length 2.9 in SL, the caudal concavity 1.4 in HL.

Colour in life (Fig. 1): most of body lavender pink with scattered orange flecks on side and orange area on upper back below origin of dorsal

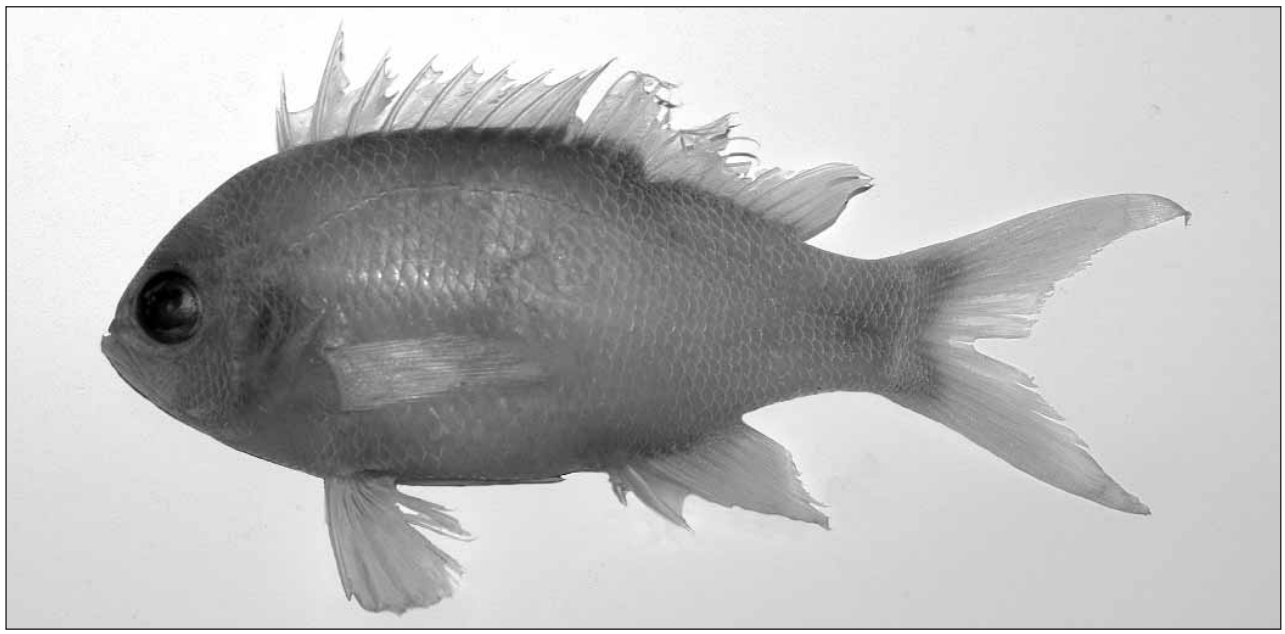

Fig. 4. *Pseudanthias charleneae*, holotype (NCIP 6322, 75.3 mm SL, Cenderawasih Bay, Papua Province, Indonesia). Photo by G. R. Allen.

fin; a broad, tapering orange bar below middle of spinous dorsal fin, extending to lower side; head orange on dorsal half and white to slightly yellowish on lower half, the two halves separated by lavender-pink margined yellow band from snout tip to lower eye, continuing from lower rear corner of eye to pectoral-fin base; iris yellow with lavender margin dorsally; tip of lower jaw lavender pink; spinous dorsal fin lavender pink on basal half with broad yellow outer margin; soft dorsal fin mainly reddish orange, grading to yellow distally with narrow lavender-pink margin; anal fin mainly yellow with lavender pink anterior margin; caudal fin overall reddish orange with lavender-pink saddle near tips of upper and lower lobes, the actual tips yellow-orange; pelvic fin yellow on anterior half and whitish posteriorly, with narrow lavender-pink anterior margin; pectoral fins translucent to slightly yellowish.

Individuals photographed at Bali, Indonesia exhibit differences in colour possibly related to geography as well as sex. A male fish (Fig. 2), approximately 10 cm TL, is purple posteriorly and the caudal peduncle and basal caudal rays are markedly white. A possible female or young male (Fig. 3) has a large red-orange saddle instead of a bar below the middle dorsal spines, lavender spots on the anterior half of the body, and undulating lavender stripes above the anal fin origin.

Colour in alcohol (Fig. 4): after one year in preservation generally yellowish tan with hyaline fins.

Remarks: Three individuals from Bali were illustrated by Kuiter (2004), who referred to it as the Nusa Penida Basslet, *Pseudanthias* sp. 3. The new species is most similar to *P. carlsoni* Randall & Pyle, 2001 from Tonga and Melanesia (Fiji, Loyalty Islands, Solomon Islands, and Papua New Guinea) and *P. engelhardi* (Allen & Starck, 1982) from the Great Barrier Reef of Australia. The three species are similar in general colouration and morphology including an elevated third dorsal spine and strongly lunate caudal fin. The male differs from that of *P. carlsoni* in lacking a large red spot on the middle of the spinous dorsal fin and has a complete rather than incomplete orange bar below the middle of the spinous dorsal fin. Males of *P. engelhardi* are very similar to those of *P. carlsoni*, but apparently lack the red dorsal-fin spot. Females of *P. carlsoni* and *P. engelhardi* are nearly identical. They are basically plain pink-orange fish without distinctive markings. Future DNA analysis may prove these species are actually conspecific. *Pseudanthias charleneae* also differs from these species in having a higher lateral-line scale count (47 *vs.* 41-45), more circumpeduncular scales (28 *vs.* 25), and a deeper caudal peduncle (least depth 1.8 in HL versus 2.15-2.3). However, it would be desirable to confirm these differences when additional specimens become available.

Pseudanthias charleneae is currently known only from Bali and the Bird's Head region of western New Guinea, Indonesia at depths below 40 m. It probably occurs at intermediate areas and beyond, but is rarely seen by divers due to its deep habitat. The holotype was collected on a steep rubble slope with abundant sea fans. It was accompanied by about six smaller females.

Etymology: The new species is named *charleneae* to honour the request of HSH Prince Albert II of Monaco, who successfully bid to support the conservation of this species at the Blue Auction in Monaco on 20 September 2007 and has given generously to support Conservation International's Bird's Head Seascape marine conservation initiative.

ACKNOWLEDGEMENTS

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aqua, International Journal of Ichthyology

A new species of *Pictichromis* (Pisces: Pseudochromidae) from western New Guinea with a redescription of *P. aurifrons*

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Abstract

The coral reef fish previously known as *Pictichromis aurifrons* is shown to consist of two species including *P. caitlinae,* which is described as new based on eight specimens, 26.3-42.6 mm SL, from Cenderawasih Bay, western New Guinea. Although both species are known only from New Guinea, the two are geographically separated by approximately 2,700 km of coastline. They share a characteristic yellow snout and forehead, but differ in several other colour pattern features. The most obvious difference is the general hue of the body, which is bright magenta in *P. caitlinae* and light purple to bluish grey in *P. aurifrons*. The gradation between the two basic colours is relatively gradual in *P. aurifrons* in contrast to the abrupt transition in *P. caitlinae.* A redescription of *P. aurifrons,* originally described on the basis of a single specimen, is included as well as a key to the species of *Pictichromis*.

Zusammenfassung

Nachgewiesen wird, dass die bisher als *Pictichromis aurifrons* bekannten Zwergbarsche in Wirklichkeit zwei Arten zugeordnet werden müssen; die zweite Art: *P. caitlinae,* wird auf der Grundlage von acht Exemplaren beschrieben, die mit 26,3-42,6 mm SL an der Cenderawasih-Bucht, West-Neuguinea, gefunden wurden. Beide Arten sind nur von Neuguinea bekannt, sind aber durch rund 2.700 km Küstenlinie geografisch getrennt. Gemeinsam haben sie eine kennzeichnende gelbe Farbe an Schnauze und Stirn, unterscheiden sich aber durch einige andere Farbmerkmale. Der augenfälligste Unterschied ist der allgemeine Farbton des Rumpfes: leuchtendes Magenta bei *P. caitlinae,* helles Purpur bis bläuliches Grau bei *P. aurifrons.* Außerdem gehen bei *P. aurifrons* die beiden Grundfarben allmählich ineinander über, während sie bei *P. caitlinae* abrupt aneinandergrenzen. Abschließend folgen eine revidierte Beschreibung von *P. aurifrons,* deren Erstbeschreibung auf einem einzigen Exemplar beruhte, sowie ein Bestimmungsschlüssel für die beiden *Pictichromis*-Arten.

Résumé

Le poisson de récifs coralliens connu sous le nom de *Pictichromis aurifrons* appartient, en fait, à deux espèces, comprenant *P. caitlinae,* qui est décrit comme espèce nouvelle sur base de huit spécimens, de 26,3-42,6 mm de LS, originaires de Cenderawasih Bay, Nouvelle-Guinée occidentale. Quoique les deux espèces ne soient connues que de Nouvelle-Guinée, elles sont séparées d'environ 2.700 km de ligne côtière. Elle partagent un rostre et un front jaunes caractéristiques, mais se distinguent par plusieurs autres données de coloration. La différence la plus marquante est la nuance générale du corps qui est magenta lumineux pour *P. caitlinae* et pourpre clair à gris bleu pour *P. aurifrons.* La gradation entre les deux couleurs de *P. aurifrons* est plutôt progressive, alors qu'elle est adaupte pour *P. caitlinae.* Une redescription de *P. aurifrons,* d'abord décrit sur base d'un seul spécimen, figure également ici ainsi qu'une clé pour les espèces de *Pictichromis.*

Sommario

La specie corallina precedentemente descritta come *Pictichromis aurifrons* si dimostra in realtà composta da due specie distinte, tra cui *P. caitlinae,* che è qui descritta come nuova sulla base di otto esemplari di 26.3-42.6 mm SL raccolti nella baia di Cenderawasih, Nuova Guinea occidentale. Sebbene entrambe le specie siano conosciute solo in Nuova Guinea, esse rimangono geograficamente separate da circa 2700 km di coste. Esse hanno in comune il muso e la fronte tipicamente gialli, ma differiscono per vari altri tratti della colorazione. La differenza più evidente è la tonalità generale del corpo, che è magenta vivace in *P. caitlinae* mentre va dal porpora chiaro al grigio bluastro in *P. aurifrons.* La sfumatura tra le due tinte è relativamente graduale in *P. aurifrons,* mentre il passaggio è brusco in *P. caitlinae.* La ridescrizione di *P. aurifrons,* originariamente rappresentato sulla base di un singolo esemplare, è inclusa insieme ad una chiave dicotomica per le specie di *Pictichromis.*

INTRODUCTION

Gill (2004) erected the genus *Pictichromis* for a small group of brightly coloured pseudochromine fishes that were previously classified in *Pseudochromis*. He distinguished the six members of the genus on the basis of a combination of features including dorsal-fin rays III,20-22 (usually 22), anal-fin rays III,10-13 (usually 12), scales in lateral series 31-43, anterior lateral-line scales 17-28, gill rakers 5-8 +13-17 = 18-24 and well developed teeth on the gill rakers arranged in two rows running most of the length of the raker. Most species are relatively well documented in museum collections and field studies with the exception of *P. ephippiata* (Gill, Pyle & Earle, 1996) and *P. aurifrons* (Lubbock, 1980). The latter species is known from a single specimen collected near Port Moresby, Papua New Guinea. However, Barrall & Gill (1997) reported on a pseudochromid photographed in 1992 by G. Barrall and K. De Wet at Biak, western New Guinea, which they identified as this species. They noted that the photographs differed markedly from Lubbock's (1980) description of the freshly dead holotype, and suggested that the holotype "must have been a relatively drab individual." No specimens were available for comparison. Gill's (2004) account of this species was accompanied by one of the Biak photographs, and his coloration description, and habitat and distribution details were based in part on the Biak fish. However, Gill's revision was in press for an extended period of time, during which additional information of *P. aurifrons* from southeastern Papua New Guinea became available. This included underwater photos of individuals by B. Halstead and by T. Shiratori (the latter's photographs on Kanagawa Prefectural Museum of Natural History fish image database, registration number KPM-NR0035892), and details from P. Munday of an individual on an underwater video tape taken by D. Knight. In all cases, the individuals more closely resembled Lubbock's original description than the Biak fish, raising doubts that they were conspecific.

Independently, the first author also became suspicious about the identity of the Biak fish. On the basis of his diving experience at New Guinea, it seemed highly unlikely that the fishes from these two locations, separated by approximately 2,700 km of coastline, were conspecific. No populations from intermediate geographic areas had been observed and comparison of recent underwater photographs of the two widely separated fishes revealed that their coloration was consistently different. This included a more recently published photo in Kuiter & Debelius (2006), allegedly taken at Rabaul, Papua New

Fig. 1. Map of New Guinea showing approximate distributions of *Pictichromis caitlinae* (red with slanting bars) and *P. aurifrons* (yellow with slanting bars).

Guinea. However, the photographer, Takamasa Tonozuka, later confirmed (personal communication) that it was taken near Loloata Dive Resort in the vicinity of Port Moresby.

Our suspicion that the western population represented an undescribed species was further aroused during a Conservation International-sponsored field survey of Cenderawasih Bay in February 2006. This large bay is situated on the north coast of New Guinea, immediately east of the Bird's Head Peninsula (Fig. 1). It contains a highly diverse reef fish community with unique peculiarities indicative of previous geological isolation. The most obvious of these include several new/recently described species that appear to be endemic to the bay, additional species that occur widely in neighbouring regions, but exhibit unusual colour variation in the bay, and several deep reef species that occur in unusually shallow water within the bay. We hypothesized that the bay was essentially isolated for a substantial period over the past five million years and present day geographic/oceanographic conditions continue to provide a degree of isolation (Allen & Erdmann 2006). The first and third authors commonly observed the Biak form on turbid reefs of Cenderawasih Bay. Underwater photographs were taken, but no specimens were procured.

Based on the photographic evidence and lack of reports from intermediate locations we decided to investigate the status of the two populations in more detail. The third author re-visited Cenderawasih Bay in March 2007 and successfully procured specimens. One month later, the first author traveled to Port Moresby and obtained comparative material of *P. aurifrons*. The present paper provides a description of the new species from Cenderawasih Bay that distinguishes it from *P. aurifrons*. We also provide a redescription of the latter species and key to the species of *Pictichromis*.

MATERIALS AND METHODS

Type specimens are deposited in the National Museum of Natural History, Washington, D.C. (USNM), Pusat Penelitian dan Pengembangan Oseanologi, Jakarta, Indonesia (NCIP), and Western Australian Museum, Perth (WAM). The descriptive format, terminology, and methods of counting and measuring follow those of Gill (2004). Standard length (SL) is the straight-line distance from the front of the upper lip to the base of the caudal fin (posterior end of the hypural plate).

Pictichromis caitlinae n. sp.

(Figs 2-4; Tables I-III)

Pseudochromis aurifrons (non Lubbock, 1980). Barrall & Gill 1997: 48 (colour photo; habitat notes).

Pictichromis aurifrons (non *Pseudochromis aurifrons* Lubbock, 1980). Gill 2004: 57, Plate 3, J (colour photo; colour description in part; distribution and habitat in part).

Holotype: NCIP 6325, 43.4 mm SL, reef near Rumberpon Village, 03°53.757'S 134°06.638'E, Cenderawasih Bay, Papua Barat Province, Indonesia, 22 m, clove oil, M. V. Erdmann, 19 February 2007.

Paratypes (collected with holotype): NCIP 6325, 26.9 mm SL; USNM 390774, 3 specimens, 35.0-42.6 mm SL; WAM P.32890-001, 3 specimens, 36.2-42.8 mm SL.

Diagnosis: *Pictichromis caitlinae* is distinguished from congeneric species by having a bright yellow-orange snout/forehead, and a strongly contrasted magenta coloration over the remainder of the head and body. *Pictichromis aurifrons* has a similar yellow colour pattern, but the remainder of the head and body is light purple to bluish grey rather than magenta and the gradation between the two contrasting colours is relatively gradual rather than abrupt.

Description (based on eight specimens, 26.9-43.4 mm SL; minimum and maximum value ranges given first for all type specimens, followed, where different, by values for holotype enclosed in parentheses): dorsal-fin rays III,22, all or all but first (all) segmented rays branched, except in smallest paratype where only last 15 are branched; anal-fin rays III,11-12 (III,12), all or all but first 1-2 (all) segmented rays branched; pectoral-fin rays 15-18 (17/16); upper procurrent caudal-fin rays 6, except in one paratype with deformed caudal and only 4 rays apparent; lower procurrent caudal-fin rays 6; total caudal-fin rays 29; scales in lateral series 33-37 (34/36); anterior lateral-line scales 21-25 (23/25); anterior lateral line terminating beneath segmented dorsal-fin ray 11-16 (14/16); posterior lateral-line scales 3-9 + 0-1 (8 + 1/7 + 0); scales between lateral lines 3-4 (4/3); horizontal scale rows above anal fin origin 11-13 + 1 + 2 = 14-16 (12 +1 + 2/12 + 1 + 2); circumpeduncular scales 16; predorsal scales 17-21 (20); scales behind eye 2-4 (3); scales to preopercular angle 4-5 (5); gill rakers 5-6 + 13-15 = 19-21 (5 + 14); pseudo-

branch filaments 8-12 (9); circumorbital pores 16-22 (22/21); preopercular pores 8-9 (8/8); dentary pores 4; posterior interorbital pores 1-2 (1).

Lower lip incomplete (interrupted at symphysis); dorsal and anal fins without scale sheaths, although sometimes with intermittent scales overlapping fin bases; predorsal scales extending anteriorly to point ranging from anterior AIO pores to posterior nasal pores; opercle with 4-7 relatively small, indistinct serrations; teeth of outer ceratobranchial-1 gill rakers well developed , arranged in two rows running most of length of rakers; anterior dorsal-fin pterygiophore formula S/S/S + 3/1 + 1/1/1/1/1/1/1 + 1/1/1, S/S/S + 3/1 + 1/1/1/1/1/1/1/1 + 1/1 or S/S/S + 3/1 + 1/1/1/1/1/1/1/1 + 1 (S/S/S + 3/1 + 1/1/1/1/1/1/1/1 + 1); dorsal- fin spines moderately stout and pungent; anterior anal-fin pterygiophore formula 3/1/1 + 1/1/1 + 1, 3/1/1/1 + 1/1 or 3/1 + 1/1/1/1 + 1 (3/1 + 1/1/1/1 + 1); anal fin spines stout and pungent, second spine stouter than third; pelvic-fin spine moderately stout and pungent; second segmented pelvic-fin ray longest; caudal fin truncate to slightly emarginate; vertebrae 10+ 16; epineurals 12-13 (13); epurals 3.

Upper jaw with 2-3 (2) pairs of curved, enlarged caniniform teeth anteriorly, and 4-5 (at symphysis)

Fig. 2. Underwater photographs comparing *Pictichromis caitlinae* (upper) from Cenderawasih Bay, Papua Barat Province with *P. aurifrons* (lower) from Bootless Bay, Papua New Guinea. Both fishes approximately 50 mm TL. Photos by G. R. Allen.

Table I. Comparison of colour-pattern features of *Pictichromis aurifrons* and *P. caitlinae*.

Character	*P. aurifrons*	*P. caitlinae*
General ground colour	light purple to bluish grey	magenta
Occipital region	brighter yellow	same intensity yellow
Light/dark colour demarcation	gradual	abrupt
Cheek	pink to whitish	magenta
Pectoral base	pale pinkish	magenta
Pigmented caudal-fin marking	truncate	rounded
Scale margins	paler or darker than centres	uniform
Ventral midline area	pale purple to blue-grey	whitish
Anterior lateral-line scales	yellowish	pale magenta
Colour in alcohol	brown	yellowish tan

Table II. Frequency distribution of counts of caudal-fin rays of *Pictichromis aurifrons* and *P. caitlinae*.

	Upper procurrent		Lower procurrent		Total		
	6	7	6	7	29	30	31
P. aurifrons	1	6	6	1	1	5	1
P. caitlinae	7	-	8	–	7	–	–

to 1-3 (on sides of jaw) inner rows of small conical teeth, outermost row of conical teeth much larger and more curved than inner rows; lower jaw with 2-4 (2) pairs of curved, enlarged caniniform teeth anteriorly, 3-4 (at symphysis) to 1 (on sides of jaw) inner rows of small conical teeth, teeth on middle of jaw larger and curved slightly posteriorly; vomer with 1-2 rows of small conical teeth, forming chevron; palatine with 1-4 rows of small conical teeth arranged in elongate, suboval patch, anterior part of tooth patch more-or-less continuous with posterolateral arm of vomerine tooth patch; ectopterygoid edentate; tongue moderately pointed and edentate.

As percentage of SL: head length 24.9-27.9 (24.9); orbit diameter 8.3-11.2 (8.3); snout length 6.0-7.0 (6.0); fleshy interorbital width 6.0-7.1 (6.0); bony interorbital width 4.3-5.2 (4.4); body width 11.3-13.4 (11.3); snout tip to posterior tip of retroarticular bone 14.5-16.3 (14.5); predorsal length 32.7-37.1 (32.7); prepelvic length 28.3-34.2 (28.3); posterior tip of retroarticular bone to pelvic-fin origin 15.3-20.9 (17.7); dorsal-fin origin to pelvic-fin origin 28.6-32.2(30.4); dorsal-fin origin to middle dorsal-fin ray 30.8-34.3 (31.3); dorsal-fin origin to anal-fin origin 40.0-42.5 (42.2); pelvic-fin origin to anal-fin origin 28.3-34.6 (34.6); middle dorsal-fin ray to dorsal-fin termination 23.0-24.3(23.3); middle dorsal-fin to anal-fin origin 25.8-28.3 (27.9); anal-fin origin to dorsal-fin termination 29.8-33.2 (32.5); anal-fin base length 21.1-24.3 (23.5); dorsal-fin termination to anal-fin termination 15.7-17.3 (17.3); dorsal-fin termination to caudal peduncle dorsal edge 13.8-15.0 (15.0); dorsal-fin termination to caudal peduncle ventral edge 20.7-22.4 (21.9); anal-fin termination to caudal peduncle dorsal edge 22.7-24.7 (24.7); anal-fin termination to caudal peduncle ventral edge 15.2-17.1 (17.1); first dorsal-fin spine 1.4-2.6 (1.4); second dorsal-fin spine 5.5-7.4 (5.5); third dorsal-fin spine 7.0-10.6(8.8); first segmented dorsal-fin ray 11.5-13.8 (11.5); fourth last segmented dorsal-fin ray 15.9-17.7(15.9); first anal-fin spine 1.4-2.3 (1.4); second anal-fin spine 4.8-7.1 (4.8); third anal-fin spine 8.2-10.9 (8.5); first segmented anal-fin ray 11.0-14.0 (12.4); fourth last segmented anal-fin ray 13.6-15.6 (15.0); third pectoral-fin ray 14.5-16.9 (14.5); pelvic-fin spine 11.5-14.0 (12.2); pelvic-fin length 20.5-23.6 (23.0); caudal-fin length 21.7-24.9 (22.8).

Live coloration (from underwater photographs, Figs 2-3): lips, snout, interorbital and usually forehead/nape region bright orange-yellow; bright yellow coloration varying in extent posteriorly from area above anterior edge of eye to beneath base of posterior dorsal-fin rays; remainder of head and body magenta, except for abrupt white to pale grey area along mid-ventral region; iris bright yellow, sometimes magenta posteriorly, with blue suboval ring around white-rimmed pupil; bright yellow and

magenta areas on head and body sometimes separated by narrow pale pink to white line or irregular series of spots; anterior lateral-line scales each with pale pink central spot; dorsal fin pinkish hyaline, with basal quarter of fin pale pink, magenta or bright yellow; dorsal- and anal-fin spines sometimes edged anteriorly with pale pink to magenta; segmented dorsal- and anal-fin rays yellow or pink; anal fin pinkish to whitish hyaline, caudal fin magenta on central, basal portion (giving rounded appearance to fin), hyaline posteriorly, and pinkish hyaline on dorsal and ventral margins; pectoral and pelvic fins pinkish to whitish hyaline, sometimes with pelvic-fin spine pale pink to mauve.

Preserved coloration (Fig. 4): after two months in preservative head and body uniformly whitish tan without obvious markings; fins generally hyaline. Numerous brown pepper-like melanophores are evident on the sides under magnification. These markings essentially trace the pattern of myomeres along the side of the body.

Remarks: The new species is similar in general appearance to *P. aurifrons* as mentioned in the introductory paragraphs. Both species are characterised by a yellow snout/forehead region and darker body region. However, there are a number of colour pattern differences summarised in Table I. Perhaps the most obvious is the general hue of the body, which is bright magenta in *P. caitlinae* and light purple to bluish grey in *P. aurifrons*. In addition, the gradation between the two basic colours is relatively gradual in *P. aurifrons* in contrast to the abrupt transition in *P. caitlinae.* The scale pattern on the side of the body is easily detected in *P. aurifrons,* but difficult to discern in *P. caitlinae*. In addition, the midventral body region of *P. caitlinae* is marked with a broad whitish stripe, a feature lacking in *P. aurifrons*, which is generally light blue-grey ventrally. Moreover, there is a pronounced difference in the preserved coloration of the two species (Fig. 4). After several months in alcohol the specimens of *P caitlinae* are essentially uniform yellow-tan in comparison to the much darker, brown specimens of *P. aurifrons.*

Fig. 3. Colour variation in *Pictichromis caitlinae*, approximately 50 mm TL, Cenderawasih Bay, Papua Barat Province, Indonesia. Photos by G. R. Allen.

Table III. Frequency distribution of predorsal scale counts and positions of anterior most predorsal scale for *Pictichromis aurifrons* and *P. caitlinae*. Pore terminology for scale positions follows Gill (2004: fig. 1): A – anterior AIO pores; B – midway between anterior AIO and posterior nasal pores; C – posterior nasal pores; D – midway between posterior nasal pores and posterior nares; E – posterior nares.

Predorsal scale counts								
	17	18	19	20	21	22	23	24
P. aurifrons	–	–	2	–	–	2	2	1
P. caitlinae	1	4	3	–	–	–	–	–
Anterior predorsal scale position								
	A	B	C	D	E			
P. aurifrons	–	–	1	3	3			
P. caitlinae	1	4	3	–	–			

Most morphometric and meristic features are overlapping between the two species. However, *P. aurifrons* usually has one more upper procurrent caudal-fin ray than *P. caitlinae* (Table II). There is a slight difference in the extent of the predorsal scalation, which extends further forward in *P. aurifrons*. This difference is also reflected in the predorsal scale counts (Table III).

There is also a difference in general behaviour. *Pictichromis caitlinae* is relatively bold and easy to approach with a camera in comparison to *P. aurifrons*, which is shy and difficult to photograph. Moreover, the habitat of *P. caitlinae* consists of isolated rocky outcrops on gradual slopes in contrast to that of *P. aurifrons*, which is generally associated with dark crevices and ledges on vertical cliffs.

Distribution and Habitat: *Pictichromis caitlinae* is apparently restricted to Cenderawasih Bay. It was common in the inner portion of the bay, being observed at 16 of 27 inner bay sites during the 2006 survey. It is replaced by *P. porphyrea* (Lubbock & Goldman, 1974) in the outer portion of the bay, for example in the vicinity of Biak. It occurs on relatively silty, turbid reefs at depths between about 10 and 55 m, generally around rocky outcrops.

Etymology: The new species is named *caitlinae* for Ms. Caitlin Elizabeth Samuel, a young Canadian leader, on the occasion of her sixteenth birthday. This name honours the request of her mother, Kim Samuel Johnson, who successfully bid to conserve this species at the Blue Auction in Monaco on 20 September 2007 in support of Conservation International's Bird's Head Seascape marine conservation initiative.

Redescription of *Pictichromis aurifrons* (Lubbock, 1980)

Pictichromis aurifrons was previously known only from the holotype (BMNH 1979.1.9.12), which is lodged at the Natural History Museum, London. It was collected in 1979 by the late Roger Lubbock at Basilisk Passage near Port Moresby. Gill (2004) provided a detailed description of this specimen in his revision of pseudochromine fishes. The following redescription utilizes Gill's original format and his data for the holotype, but incorporates six additional specimens (WAM P.32868-001, 6 specimens. 41.4-45.3 mm SL, Lion Island, Bootless Bay, 13 km southeast of Port Moresby, Papua New Guinea, 19-20 March 2007) that were recently collected by the first author.

Pictichromis aurifrons (Lubbock, 1980)

Pseudochromis aurifrons Lubbock, 1980: 824, fig. 2 (type locality: Basilisk Passage, Papua New Guinea).

Diagnosis: *Pictichromis aurifrons* is distinguished from congeneric species by having a bright yellow snout/ forehead that grades into a light purple to bluish-grey coloration over the remainder of the head and body.

Description (based on seven specimens, 41.4-46.2 mm SL; minimum and maximum value ranges given first for all specimens, followed, where different, by values for holotype enclosed in parentheses): dorsal-fin rays III,22, all segmented rays branched; anal-fin rays III,10-12 (III,12), all segmented rays branched; pectoral-fin rays 16-17 (17/17); upper procurrent caudal-fin rays 6-7 (7); lower procurrent caudal-fin rays 6-7 (6) total caudal-fin rays 29-31 (30); scales in lateral series 33-36 (36/36); anterior lateral-line scales 19-25 (24/24); anterior lateral line terminating beneath segmented dorsal-fin ray 11-15 (15/15); posterior lateral-line scales 5-10 + 0-1 (7 + 0/10 + 0); scales between lateral lines 3-4 (3/4); horizontal scale rows above anal fin origin 12-13 + 1 + 2 = 15-16 (12 +1 + 2/12 + 1 + 2); circumpeduncular scales 16; predorsal scales 19-24 (19); scales behind eye 2-4 (3/2); scales to preopercular angle 4-6 (4/4); gill rakers 5-6 + 14-15 = 19-21 (6 + 15); pseudobranch filaments 8-10 (9); circumorbital pores 16-23 (20/21); preopercular pores 8-9 (10/8); dentary pores 4; posterior interorbital pores 1.

Lower lip incomplete (interrupted at symphysis); dorsal and anal fins without scale sheaths, although sometimes with intermittent scales overlapping fin

bases; predorsal scales extending anteriorly to point ranging from vicinity of posterior nasal pores to posterior nostrils; opercle with 5-7 relatively small to moderate-sized serrations; teeth of outer ceratobranchial-1 gill rakers well developed, arranged in two rows running most of length of rakers; anterior dorsal-fin pterygiophore formula S/S/S + 3/1 + 1/1/1/1/1/1/1/1 + 1*/1 (S/S/S + 3/1 + 1/1/1/1/1/1/1/1 + 1/1); dorsal spines stout and pungent; anal-fin spines stout and pungent, second spine stouter than third; pelvic-fin spine moderately stout and pungent; second segmented pelvic-fin ray longest; caudal fin truncate to slightly emarginate; vertebrae 10 + 16; epineurals 11-13 (12); epurals 3.

Upper jaw with 2-4 (2) pairs of curved, enlarged caniniform teeth anteriorly, and 4-6 (5-6) (at symphysis) to 1-3 (1-2) (on sides of jaw) inner rows of small conical teeth, outermost row of conical teeth much larger and more curved than inner rows; lower jaw with 2-4 (2) pairs of curved, enlarged caniniform teeth anteriorly, 3-4 (at symphysis) to 1 (on sides of jaw) inner rows of small conical teeth, teeth on middle of jaw larger and curved slightly posteriorly; one member of each pair of enlarged canines at front of upper and lower jaw sometimes missing or with extra canine present; vomer with 1-2 rows of small conical teeth, forming chevron; palatine with 2-3 rows of small conical teeth arranged in elongate, suboval patch, anterior part of tooth patch more-or-less continuous with posterolateral arm of vomerine tooth patch; ectopterygoid edentate; tongue moderately pointed and edentate.

As percentage of SL: head length 24.2-27.6 (24.2); orbit diameter 9.7-11.4 (9.7); snout length 6.5-7.7 (6.5); fleshy interorbital width 6.0-7.1 (6.5); bony interorbital width 4.4-5.2 (5.0); body width 11.8-13.2 (13.2); snout tip to posterior tip of retroarticular bone 14.1-16.7 (14.1); predorsal length 33.8-37.0 (35.1); prepelvic length 32.1-33.8 (32.1); posterior tip of retroarticular bone to pelvic-fin origin 17.9-20.5 (20.3); dorsal-fin origin to pelvic-fin origin 27.8-30.2 (27.9); dorsal-fin origin to middle dorsal-fin ray 30.6-32.5 (30.7); dorsal-fin origin to anal-fin origin 40.7-42.8 (40.7); pelvic-fin origin to anal-fin origin 28.1-33.6 (28.1); middle dorsal-fin ray to dorsal-fin termination 21.6-23.8 (23.8); middle dorsal-fin to anal-fin origin 25.8-27.9(25.8); anal-fin origin to dorsal-fin termination 29.6-32.5 (32.3); anal-fin base length 20.8-23.4 (22.7); dorsal-fin termination to anal-fin termination 14.6-17.1 (17.1); dorsal-fin termination to caudal peduncle dorsal edge 13.9-15.8 (15.8); dorsal-fin termination to cau-

Fig. 4. Preserved specimens of *Pictichromis caitlinae* (left) from Cenderawasih Bay, Papua Barat Province and *P. aurifrons* from Bootless Bay, Papua New Guinea. Holotype of *P. caitlinae* is uppermost specimen. Photo by G. R. Allen.

dal peduncle ventral edge 19.9-22.8 (22.5); anal-fin termination to caudal peduncle dorsal edge 21.5-24.0 (24.0); anal-fin termination to caudal peduncle ventral edge 14.6-17.0 (16.7); first dorsal-fin spine 1.4-3.1 (1.5); second dorsal-fin spine 5.8-7.3 (5.8); third dorsal-fin spine 9.5-11.3 (9.5); first segmented dorsal-fin ray 13.4-15.7 (13.4); fourth last segmented dorsal-fin ray 15.6-18.3(18.2); first anal-fin spine 1.5-2.4 (1.5); second anal-fin spine 5.2-8.0 (5.2); third anal-fin spine 8.7-10.8 (8.7); first segmented anal-fin ray 12.8-14.5 (12.8); fourth last segmented anal-fin ray 15.7-17.0 (16.5); third pectoral-fin ray 15.4-16.0 (15.4); pelvic-fin spine 12.3-15.0 (12.3); pelvic-fin length 20.8-22.5 (21.6); caudal-fin length 23.9-26.6 (24.0).

Live coloration (from available underwater photographs and description provided by Lubbock 1980, Fig. 2): lips, snout, interorbital and forehead/nape region yellowish brown to yellow, brighter on occiput, this coloration extending from behind middle of eye to point ranging from base of first segmented dorsal-fin ray to base of about tenth segmented dorsal-fin ray; scales within yellow region sometimes with pink to purple edges; lower part of head pale pink to pale yellow; remainder of head pinkish blue, grading to light purple to blue-grey on body, paler ventrally; scales within light purple to blue-grey region either markedly paler or darker than scale centres; iris yellow, with blue suboval ring (sometimes interrupted) around white-rimmed pupil; anterior lateral-line scales each with small pale yellow basal spot; spinous part of dorsal fin varying from bright yellow to purple, sometimes with distal margin magenta; basal quarter of soft dorsal fin grey to dark purple, remainder hyaline to purplish or pinkish hyaline; segmented dorsal-fin rays rays purple, sometimes with anterior rays yellow; anal, pelvic and pectoral-fin rays pinkish hyaline; caudal fin bluish grey to purple on basal half (giving truncate appearance to fin), hyaline posteriorly, and pinkish hyaline on upper and lower margins.

Preserved coloration (Fig. 4): after several months in alcohol head and body generally brown without obvious markings; fins generally hyaline to slightly dusky.

Habitat observations: The original description of *P. aurifrons* by Lubbock (1980) contained minimal habitat information. The following general observations were recorded by the first author during a one-week visit to Loloata Island Resort near Port Moresby in March 2007. Although generally not common, a few individuals were seen on 16 of 17 dives, including several sites around Lion Island in Bootless Bay and four sites on the outer barrier reef. The habitat consisted of silty dead coral reef, near the base of steep slopes in depths between 13 and 29 m. These reefs are characterised by numerous small caverns/overhangs and fish were usually seen adjacent to vertical surfaces. They appear to occupy territories or home ranges of about two square metres and are usually encountered solitarily, occasionally in loosely associated pairs. Dik Knight, owner of Loloata Island Resort, who has extensive dive experience at New Guinea, has only seen the fish in the region between Port Moresby and about 150 km eastward along the south coast of eastern Papua New Guinea.

Discussion: The genus *Pictichromis* contains seven known species: *P. aurifrons*, southeastern Papua New Guinea; *P. coralensis* Gill, 2004, Coral Sea; *P. diadema* (Lubbock & Randall, 1978), eastern Malaysia to Philippines; *P. ephippiata* (Gill, Pyle & Earle, 1996), northern Sulawesi and eastern Papua New Guinea; *P. caitlinae* n. sp., Cenderawasih Bay, western New Guinea; *P. paccagnellae* (Axelrod, 1973), eastern Indonesia to Solomon Islands; and *P. porphyrea*, Ryukyu Islands to Samoa. *Pictichromis porphyrea* is common in the outer portion of Cenderawasih Bay, but replaced in the inner bay by *P. caitlinae*. The latter species apparently evolved as a result of the almost complete closure of the inner portion of Triton Bay during the past five million years. During this period the Australian and Pacific plates collided with a resultant westerly drift of the latter, along with large island fragments, including the South Caroline Arc that eventually accreted along the northern margin of New Guinea. Although details are sketchy at best, it appears that the Tosem Block of the South Caroline Arc slid across the entrance of Cenderawasih Bay between about 3 to 5 million years ago before finally docking along the northern edge of the Bird's Head Peninsula. This formidable barrier apparently provided an isolating mechanism responsible for the occurrence of several endemic fishes, corals, and stomatopods, as well as geographic colour variation and unusual depth zonation for several reef fishes (Allen & Erdmann 2006).

Key to the species of *Pictichromis*
(adapted from Gill 2004)

1a. Posterior part of body blue grey or reddish purple to magenta in life (not noticeably paler than anterior or dorsoanterior part of body in preservative) 2

1b. Posterior part of body entirely or partly bright yellow in life (yellow area usually noticeably paler than anterior or dorsoanterior part of body in preservative) 4

2a. Head and body reddish purple to magenta in life, pale brown to purplish grey or brown in preservative (Japan, eastern Philippines, northeastern Indonesia, Palau, eastern Melanesia, Samoa, Marshall Islands, and Kiribati) ..... *P. porphyrea*

2b. Snout, forehead region, and sometimes dorsal contour of body to beneath posterior part of dorsal fin yellow in life, yellowish tan to brown in preservative 3

3a. Body purple in life with gradual transition between yellow of head and purple or blue grey of head/body; cheek pink to whitish in life; scale margins easily discernable in live/fresh specimens; ventral midline light purple or blue-grey in life; preserved specimens brownish; upper procurrent caudal-fin rays usually 7 (southeastern Papua New Guinea) .. .. *P. aurifrons*

3b. Body magenta in life with abrupt transition between yellow of head and magenta of head/body; cheek magenta in life; scale margins uniform magenta and not easily discernable in live/fresh specimens; ventral midline area abruptly whitish in life; preserved specimens yellowish tan; upper procurrent caudal-fin rays usually 6 (northwestern New Guinea) ..... *P. caitlinae* n. sp.

4a. Snout, forehead, and dorsal contour of body magenta in life, greyish brown in preservative, the remainder of head and body bright yellow in life pale brown in preservative (Peninsular Malaysia to Sabah, northeastern Kalimantan, and western Philippines) ..... *P. diadema*

4b. Head entirely magenta in life, dorsal contour of head and body not noticeably darker than remainder of head and body in preservative 5

5a. Posterior part of body bright purple, pinkish grey in preservative, with bright yellow, pale yellowish in preservative, saddle-like marking extending from dorsal-fin base to upper caudal-fin rays (southeastern Papua New Guinea and northern Sulawesi, Indonesia) .... *P. ephippiata*

5b. Head and anterior part of body, forward of about anal fin origin, magenta in life, greyish brown to brown or grey in preservative, remainder of body bright yellow, pale brown to brown or pale greyish brown in preservative 6

6a. Scales in lateral series 36-43, usually 38-42 (Great Barrier Reef, New Caledonia, and western Coral Sea)..... *P. coralensis*

6b. Scales in lateral series 33-39, usually 33-38 (Indonesia, Timor Sea, Palau, Papua New Guinea, Solomon Islands, and Vanuatu) .... *P. paccagnellae*

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A new species of *Pseudochromis* (Pisces: Pseudochromidae) from Papua Barat Province, Indonesia

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Abstract

Pseudochromis jace is described from three specimens, 37.9-62.5 mm SL, collected in the vicinity of Triton Bay, Papua Barat Province (western New Guinea), Indonesia. It is most similar to *P. pictus* from the Indonesian island of Alor, which lies about 1130 km southwest of Triton Bay, and to *P. reticulatus* from off north-western Australia. The three species are easily separated on the basis of colour pattern, particularly dorsal coloration, and degree of development of a dark stripe on the upper body. The new species is also similar in coloration to *P. perspicillatus* from the Indo-Malayan region, although the latter fish has prominent dark spots on the nape area and has a different palatine tooth patch structure.

Zusammenfassung

Pseudochromis jace wird auf der Grundlage von drei Exemplaren beschrieben, die mit 37.9-62.5 mm SL in der Nähe der Triton-Bucht an der Provinz Papua Barat (westliches Neuguinea), Indonesien, gefangen wurden. Diese neue Art ähnelt stark *P. pictus* von der indonesischen Insel Alor, die etwa 1130 km südwestlich der Triton-Bucht liegt, sowie *P. reticulatus* mit einem Verbreitungsgebiet nordwestlich von Australien. Die drei Arten lassen sich leicht am Farbmuster unterscheiden, besonders an der Rückenfarbe, sowie am Grad der Ausprägung eines dunklen Streifens in der oberen Körperhälfte. Die neue Art ähnelt in der Farbgebung auch *P. perspicillatus* aus der indo-malaiischen Region, deren Vertreter allerdings auffällige dunkle Flecken im Nackenbereich und eine andersartige Bezahnung am Gaumenbein zeigen.

Résumé

Pseudochromis jace est décrit sur base de trois spécimens, de 37,9 à 62,5 mm de LS, collectés au voisinage de Triton Bay, province de Papua Barat (Nouvelle-Guinée occidentale), Indonésie. L'espèce ressemble le plus à *P. pictus*, de l'île indonésienne d'Alor, qui se trouve à environ 1.130 km au soud-ouest de Triton Bay, et à *P. reticulatus* qu'on trouve au large du nord-ouest de l'Australie. Les trois espèces sont faciles à distinguer par leur coloration, surtout celle du dos, et par le développement relatif d'une ligne sombre sur le haut du corps. La nouvelle espèce évoque aussi la couleur de *P. perspicillatus* de la région indo-malaise, même si ce dernier a des taches foncées marquées sur la région dorsale de la tête et présente une structure différente des dents palatines.

Sommario

Pseudochromis jace è descritto sulla base di tre esemplari di 37.9-62.5 mm SL raccolti in prossimità della baia del Tritone, provincia di Papua Barat (Nuova Guinea occidentale), Indonesia. È molto simile a *P. pictus* dell'isola indonesiana di Alor, che si trova a circa 1130 km sudovest della baia del Tritone, e a *P. reticulatus* delle coste nordoccidentali dell'Australia. Le tre specie sono facilmente distinguibili sulla base della colorazione, specialmente della regione dorsale, e per il grado di sviluppo di una banda scura sulla parte superiore del corpo. La nuova specie è simile per la colorazione anche a *P. perspicillatus* che abita la regione Indo-Malese, sebbene quest'ultima abbia una distinta macchia scura sulla nuca e una diversa struttura della placca dei denti palatini.

INTRODUCTION

Dottybacks of the family Pseudochromidae are common inhabitants of coral reefs throughout the tropical Indo-West Pacific. The subfamily Pseudochrominae was reviewed by Gill (2004), who recognized 80 valid species belonging to 10 genera. *Pseudochromis* Rüppell, 1835 is by far the largest genus in the family. Gill provided a comprehensive key to the 57 species in this genus, which ranges widely in the Indo-Pacific from the Persian Gulf, Red Sea, and East African coast to Tonga and the islands of Micronesia. Gill & Allen (2004) subsequently described two additional *Pseudochromis* species from Indonesia and Papua

New Guinea, and additional recently discovered new species await description. Despite the relatively good species-level knowledge within *Pseudochromis*, phylogenetic relationships are yet to be established satisfactorily.

The present paper describes a new *Pseudochromis* that was observed and collected by G. R. Allen and M. V. Erdmann during a brief visit to the Triton Bay region of western New Guinea (Papua Barat Province, Indonesia) during January 2007. The new species was observed on two occasions at depths between 38 and 52 m. We had previously conducted a biological survey for Conservation International (CI) in this area during April-May 2006, but failed to record the species despite extensive diving.

MATERIALS AND METHODS

Type specimens are deposited in the National Museum of Natural History, Washington, D.C. (USNM), Pusat Penelitian dan Pengembangan Oseanologi, Jakarta, Indonesia (NCIP), and Western Australian Museum, Perth (WAM). The descriptive format, terminology, and methods of counting and measuring follow those of Gill (2004). Standard length (SL) is the straight-line distance from the front of the upper lip to the base of the caudal fin (posterior end of the hypural plate). AIO refers to the anterior interorbital pores. Minimum and maximum value ranges are given first for all type specimens, followed, where different, by values for the holotype enclosed in parentheses.

Pseudochromis jace n. sp.

(Figs 1-2; Table I)

Holotype: NCIP 6320, 62.5 mm SL, northwest entrance to Selat Iris, 03°53.757'S 134°06.638'E, Triton Bay, Papua Barat Province, Indonesia, 52 m depth, clove oil, M. V. Erdmann, 30 January 2007. Paratypes: USNM 390773, 37.9 mm SL, off southeast side of Aiduma Island, 04°00.846'S 134°09.522'E, Papua Barat Province, Indonesia, 38 m depth, clove oil, M. V. Erdmann, 27 January 2007; WAM P.32891-001, 45.6 mm SL, collected with USNM 390773.

Diagnosis: *Pseudochromis jace* is distinguished from congeneric species by the following combination of characters: dorsal-fin rays III,26, all segmented rays branched; anal-fin rays III,15; scales in lateral series 30-34; circumpeduncular scales 18-20; gill rakers 6 + 13; teeth of outer ceratobranchial-1 gill rakers well developed on raker tips only; caudal fin rounded with pointed tip; and basal one-fifth to one-third of dorsal fin with dark stripe.

Description (based on three specimens, 37.9-62.5 mm SL): dorsal-fin rays III,26, all segmented rays branched; anal-fin rays III,15, all segmented rays branched; pectoral-fin rays 18, all rays branched except uppermost 2 and lowermost 1; upper procurrent rays 6; lower procurrent caudal-fin rays 6; total caudal-fin rays 29; scales in lateral series 30-34 (34/33); anterior lateral-line scales 24-26 (26/25); anterior lateral line terminating beneath segmented

Fig. 1. Underwater photograph of *Pseudochromis jace*, adult approximately 80 mm TL, 45 m depth, Pulau Aiduma, Papua Barat Province, Indonesia. Photo by G. R. Allen.

Table I. Comparison of selected morphometric characters of *P. jace*, *P. pictus* and *P. reticulatus*. With the exception of standard length (SL), which is given in mm, all values are given as percentages of SL.

	P. jace	*P. pictus*	*P. reticulatus*
mm SL (n)	37.9-62.5 (n = 3)	50.3-66.5 (n = 2)	36.0-55.6 (n = 7)
Dorsal-fin origin to pelvic-fin origin	29.1-30.9	30.5-31.2	25.6-27.8
Middle dorsal-fin ray to anal-fin origin	28.1-28.8	28.9-30.9	24.2-27.4
Dorsal-fin origin to middle dorsal-fin ray	35.7-36.9	38.0-38.5	34.3-37.4
Anal-fin origin to dorsal-fin termination	34.9-36.4	37.1-38.0	32.8-34.9
Dorsal-fin termination to anal-fin termination	16.3-17.3	16.7-18.1	14.7-16.2
Anal-fin base length	26.4-28.1	28.9-29.4	25.0-27.5
Bony interorbital width	4.2-4.5	4.2-4.4	3.6-4.0
Fourth last segmented dorsal-fin ray	17.7-18.9	19.8-23.9	17.5-19.5
Fourth last segmented anal-fin ray	16.9-17.4	17.9-20.3	15.2-17.4

dorsal-fin ray 20-22 (20/21); posterior lateral-line scales 8-11 + 0-2 (10 + 2/8 + 2); scales between lateral lines 3-4 (3/4); horizontal scale rows above anal fin origin 13-14 + 1 + 3 = 17-18 (13 + 1 + 3/14 + 1 + 3); circumpeduncular scales 18-20 (19); predorsal scales 19-22 (20); scales behind eye 2-3 (3); scales to preopercular angle 4-5 (4); gill rakers 6 + 13; pseudobranch filaments 11-12 (12); circumorbital pores 27-36 (36/34); preopercular pores 10-15 (14/14); dentary pores 4-5 (4/5); posterior interorbital pores 1-3 (3).

Lower lip incomplete; dorsal and anal fins without scale sheaths, although sometimes with intermittent scales overlapping fin bases; predorsal scales extending anteriorly to point ranging from midway between anterior AIO and posterior nasal pores to posterior nasal pores; opercle with 4 or 5 small to relatively distinct serrations; teeth of outer ceratobranchial-1 gill rakers well developed on tips only; anterior dorsal-fin pterygiophore formula S/S/S + 3/1 + 1/ 1/1/1/1 + 1*/1/1 + 1* (S/S/S + 3/1 + 1/1/1/1/1/1 + 1/1); dorsal-fin spines moderately stout and pungent; anterior anal-fin pterygiophore formula 3/1 + 1/1/1 + 1*/1 + 1* (3/1 + 1/1/1 + 1/1); anal-fin spines moderately stout and pungent, second spine stouter than third; pelvic-fin spine moderately stout and pungent; second segmented pelvic-fin ray longest; caudal fin rounded with pointed tip; vertebrae 10+ 16; epineurals 13-14 (13); epurals 3.

Upper and lower jaws with enlarged caniniform teeth at front of jaws, but arrangement variable in

Fig. 2. *Pseudochromis jace*, freshly collected holotype, 61.8 mm SL, Triton Bay, Papua Barat Province, Indonesia. Photo by G. R. Allen.

each type specimen: upper jaw of holotype and largest paratype with enlarged caniniform tooth at front corner of each side and pair of smaller canines at symphysis, that of smallest paratype with pair of enlarged caniniform teeth at front corner of each side and pair of smaller canines at symphysis (also solitary enlarged canine laterally on right side); all specimens with 6-7 (at symphysis) to 2-3 (on sides of jaw) inner rows of small conical teeth, outermost rows of conical teeth much larger and more curved than inner rows; front of lower jaw of holotype with 3 pairs of curved, enlarged

Fig. 3. Underwater photograph of *Pseudochromis pictus*, adult 50.3 mm SL, 30 m depth, Alor, Indonesia. Photo by J. E. Randall.

Fig. 4. Underwater photograph of *Pseudochromis perspicillatus*, adult approximately 85 mm TL, 15 m depth, Pulau Aiduma, Papua Barat Province, Indonesia. Photo by G. R. Allen.

caniniform teeth, the outer pair more stout and elongate, that of largest paratype with 2 pairs of canines, and that of smallest paratype with single pair of canines; all specimens with 4-5 (at symphysis) to 1 (on sides of jaw) inner rows of small conical teeth, teeth on middle of jaw larger and curved slightly posteriorly; vomer with 1-2 rows of small conical teeth, forming chevron; palatine with 1-4 rows of small conical teeth arranged in elongate, suboval patch, anterior part of tooth patch more-or-less continuous with posterolateral arm of vomerine tooth patch; ectopterygoid edentate; tongue moderately pointed and edentate.

As percentage of SL: head length 24.6-28.0 (24.6); orbit diameter 8.8-10.8 (8.8); snout length 6.4-6.7 (6.7); fleshy interorbital width 5.8-6.1 (6.1); bony interorbital width 4.2-4.5 (4.5); body width 12.2-12.7 (12.2); snout tip to posterior tip of retroarticular bone 14.7-15.6 (14.7); predorsal length 32.5-36.1 (32.5); prepelvic length 31.6-33.5 (31.6); posterior tip of retroarticular bone to pelvic-fin origin 18.6-19.5 (19.5); dorsal-fin origin to pelvic-fin origin 29.1-30.9 (29.1); dorsal-fin origin to middle dorsal-fin ray 35.7-36.9 (35.7); dorsal-fin origin to anal-fin origin 42.8-44.8 (44.6); pelvic-fin origin to anal-fin origin 25.6-30.7 (30.7); middle dorsal-fin ray to dorsal-fin termination 24.0-26.1 (25.8); middle dorsal-fin ray to anal-fin origin 28.1-28.8 (28.5); anal-fin origin to dorsal-fin termination 34.9-36.4 (34.9); anal-fin base length 26.4-28.1 (26.4); dorsal-fin termination to anal-fin termination 16.3-17.3 (16.3); dorsal-fin termination to caudal peduncle dorsal edge 11.1-11.8 (11.8); dorsal-fin termination to caudal peduncle ventral edge 19.5-19.8 (19.5); anal-fin termination to caudal peduncle dorsal edge 20.2-22.2 (20.2); anal-fin termination to caudal peduncle ventral edge 12.5-13.5 (12.6); first dorsal-fin spine 2.7-4.0 (2.7); second dorsal-fin spine 6.4-6.9 (6.4); third dorsal-fin spine 8.6-9.5 (8.6); first segmented dorsal-fin ray 11.8-13.2 (12.3); fourth last segmented dorsal-fin ray 17.7-18.9 (17.9); first

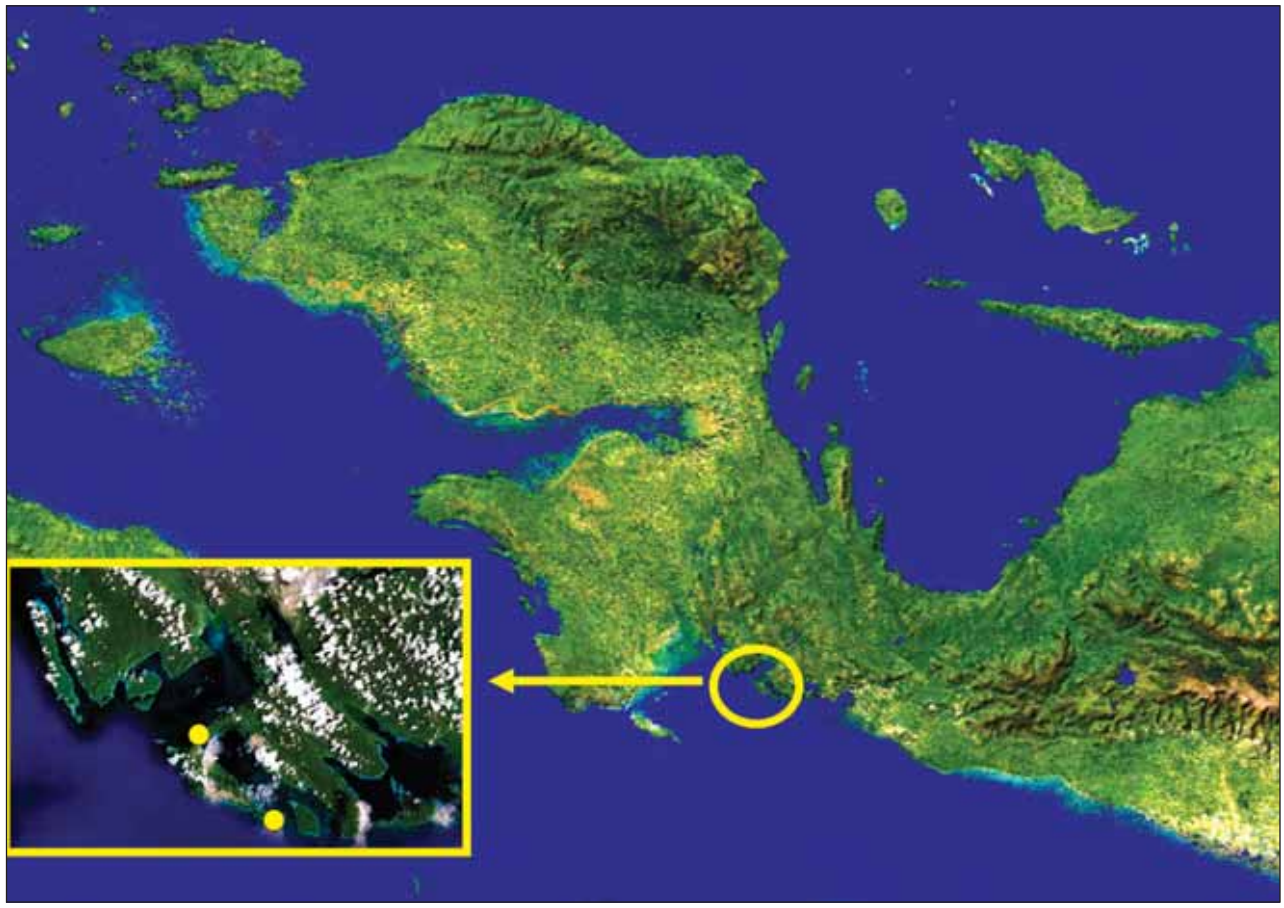

Fig. 5. Satellite map of western New Guinea showing enlargement of Triton Bay (inset at left) with collecting locations indicated by yellow circles.

anal-fin spine 2.1-2.9 (2.1); second anal-fin spine 5.1-6.1 (5.1); third anal-fin spine 7.4-9.0 (7.4); first segmented anal-fin ray 11.2-12.7 (11.4); fourth last segmented anal-fin ray 16.9-17.4 (17.0); third pectoral-fin ray 15.1-16.6 (15.4); pelvic-fin spine 10.4-11.6 (10.4); second segmented pelvic-fin ray 21.9-25.0 (21.9); caudal-fin length 32.2-37.4 (37.4).

Live coloration (from underwater photograph, Fig. 1): generally pinkish-white with broad dark grey to black stripe from snout to anterior edge of eye, continued behind eye to upper back, extending immediately above anterior lateral line to upper edge of caudal peduncle; stripe becoming paler grey-brown and less distinct posteriorly; stripe punctuated by darker spots on scales dorsally; anterior lateral-line scales each with large basal pinkish to brownish white spot, and dark grey-brown to black basal bar, which extends dorsally to dark body stripe and ventrally to prominent black spot on scale row immedately below anterior lateral line; dark stripe and adjacent scale marking combining to give overall "herring-bone" or "zipper" appearance; dorsal surface of snout, interorbital, and nape slightly paler brown; operculum and adjacent pectoral-fin base with pale yellow hue; upper lip mainly brown and lower lip greyish; lower margin of eye pale yellow; iris of eye blue, the pupil edged with orange; anterior part of operculum with several short, grey vermiculate lines on yellowish-white background; basal one-fifth to one-third of dorsal fin with dark grey to black stripe, bordered proximally with narrow yellow stripe; remainder of dorsal fin yellow; anal, pectoral, and pelvic fins translucent whitish; grey-brown stripe on dorsal edge of caudal peduncle extending obliquely onto middle portion of caudal fin; lower half of caudal-fin base broadly greyish, this coloration extending obliquely towards middle portion of fin; dorsal margin of upper caudal lobe broadly translucent whitish, and ventral margin of lower lobe narrowly translucent.

Colour of holotype when fresh (Fig. 2): similar to live coloration except generally more pink and the anal-fin base is grey.

Preserved coloration: generally white or yellowish tan with dark brown area covering snout, interorbital, forehead, and narrow zone along back, above anterior lateral line, that extends on to basal third of dorsal fin and continues on dorsal edge of caudal peduncle, gradually fading onto upper caudal-fin rays; most of scales in lateral row immediately below lateral line with dark brown spot; outer portion of dorsal fin whitish; anal fin dusky pale grey; caudal fin mainly dusky grey except for broad translucent area on dorsal margin; pectoral and pelvic fins whitish.

Comparisons: The new species appears to be closely related to *P. pictus* Gill & Randall, 1998 from the Indonesian island of Alor and *P. reticulatus* Gill & Woodland, 1992 from off the northwest coast of Australia (Gill & Randall 1998, Gill & Woodland 1992). The three species have similar preserved and probably live coloration (unknown for *P. reticulatus)*, similar morphometric and meristic values, and share an unusual rounded caudal fin with a pointed tip. Comparisons between the three species are tentative owing to the small number of available specimens: three for *P. jace*, two for *P. pictus*, and 12 for *P. reticulatus.* However, *P. reticulatus* is distinctive in having only 16 circumpeduncular scales, versus 18-20 in *P. jace* (see Remarks below) and 20 in *P. pictus.* The three species appear to differ in several morphometric details, as summarised in Table I. Generally, *P. reticulatus* is shallower bodied than either *P. pictus* or *P. jace* (Table I, as reflected by values for dorsal-fin origin to pelvic-fin origin, middle dorsal-fin ray to anal-fin origin, and anal-fin origin to dorsal-fin termination). The caudal peduncle of *P. reticulatus* is also shallower than in the other two species, as reflected in dorsal-fin termination to anal-fin termination values (and possibly in the circumpeduncular scale counts noted above). It also has a narrower bony interorbital. *Pseudochromis pictus* differs from the other two species in having a longer anal-fin base, and longer fourth-last dorsal- and anal-fin rays.

The three species also differ in several coloration details, particularly the development of the irregular dark stripe on the upper body and head. This is best developed in *P. jace* where it is relatively intense in coloration – at least anteriorly – and extends from the upper lip to the eye, then from behind the eye to the dorsal part of the caudal peduncle. In *P. reticulatus* the stripe is relatively indistinct, and broadly interrupted by a pale area between the dorsal edge of the gill opening and the anterior part of the dorsal fin. *Pseudochromis pictus* is intermediate between the two species, with a complete, though indistinct stripe. The degree of intensity of the stripe largely reflects the degree of development of pale spots within the stripe. In *P. reticulatus* and *P. pictus* pale spots are present on most scales within the dark stripe, even extending

ventrally beneath the edge of the stripe, and combining with darker markings around the spots to form a reticulate pattern. In contrast, in *P. jace* pale spots are confined to anterior lateral-line scales, combining ventrally with dark scale spots to form a zipper-like edge to the dark body stripe. Dorsal-fin markings also differ between the three species. In *P. jace* the basal one-fifth to one-third of the entire fin is dark grey to black, edged ventrally with yellow, with the remainder of the fin yellow. In *P. pictus* the fin is yellow anteriorly and distally, becoming grey posteriorly on basal two-thirds, with one (anteriorly) to three (posteriorly) large dark grey to black spots (not apparent in Fig. 3) basally on the soft part of the fin, forming a reticulate pattern. Although the live coloration of *P. reticulatus* is unknown, the pattern of pale and dark markings is generally similar to *P. pictus*: the spinous dorsal is entirely pale rather than dark ventrally, and the basal part of the fin has a reticulate pattern of dark markings rather than a uninterrupted dark stripe (although, unlike *P. pictus*, the markings are present as short oblique bars rather than series of spots). Finally, *P. jace* differs from *P. pictus* in having the snout, lips, interorbital and nape brown rather than yellow in life; these areas are pale in preserved specimens of *P. reticulatus* and therefore are probably similar to *P. pictus* in life.

Pseudochromis jace is also similar in general appearance to *P. perspicillatus* Günther, 1862, which is widely distributed in the Indo-Malay and Philippines archipelagoes. They share similar colour patterns although *P. perspicillatus* (Fig. 4) has distinctive dark spots on the nape area and does not possess the "zipper" markings on the upper side. It also has a different palatine tooth structure characterised by a more medial position in relation to the vomerine tooth patch (see Gill 2004: fig. 23). Additionally, the caudal fin is rounded to truncate in small specimens becoming emarginate to lunate in large specimens. It also differs from the new species in various meristic details (e.g., anal-fin rays III,13-14 *versus* III,15; scales in lateral series 38-42 *versus* 30-34; anterior lateral-line scales 28-35 *versus* 24-26). The two species are sympatric in the Triton Bay area, but are separated by depth zonation. *Pseudochromis perspicillatus* is generally found in shallower water at depths between about 3 and 27 m.

Distribution and habitat: *Pseudochromis jace* is known only from the type locality and a nearby location near Triton Bay (Fig. 5) in Papua Barat Province of western New Guinea. About 10 individuals were observed on rubble slopes at depths of 38 to 52 m. The fish were seen solitarily or in pairs around isolated rock-coral outcrops on otherwise low-profile sand/rubble bottoms.

Remarks: The presence of 18 or 19 circumpeduncular scales in the two paratypes of *P. jace* is unusual among pseudochromines in that most large-scaled species consistently have either 16 or 20 scales in the series (see Gill, 2004: Appendix 1j). Typically there are two median scales (one at the dorsal edge and one of the ventral edge of the peduncle), two lateral-line scales (one on each side), and either 3 (for species with 16 circumpeduncular scales) or 4 (for species with 20 circumpeduncular scales) scales separating the lateral-line and median scales. The holotype of *P jace* has the typical arrangement of a species with 20 scales, but in the paratypes the dorsal median scale (for the count of 19) or both median scales (for the count of 18) are missing. Among pseudochromines, only *Assiculoides desmonotus* typically lacks median scales on the caudal peduncle. However, in that case (where the dorsal median scales are missing) this is due to the presence of a low fin membrane connecting the dorsal and caudal fins (Gill & Hutchins 1997). We therefore suspect that the absence of the median scales in *P. jace* may be atypical of the species, and a normal count of 20 circumpeduncular scales should be expected.

Etymology: The new species is named *jace* to honour the request of Lisa and Michael Anderson, who successfully bid to support the conservation of this species at the Blue Auction in Monaco on 20 September 2007 and have given generously to support Conservation International's Bird's Head Seascape marine conservation initiative. The name is composed of the first letter of each of their four children: Jonathan, Alex, Charlie, and Emily. It is treated as a noun in apposition.

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Pterocaesio monikae, a new species of fusilier (Caesionidae) from western New Guinea (Papua and Papua Barat provinces, Indonesia)

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Abstract

A new species of caesionid fish, *Pterocaesio monikae*, is described on the basis of 21 specimens, 51.8-97.5 mm SL, collected at Cenderawasih Bay, Papua and Papua Barat provinces, Indonesia during February 2006 and October 2007. It was observed in large schools containing up to several hundred individuals along the upper edge of seaward reef slopes at depths ranging from the surface to 55 m. It is closely related to *P. lativittata*, which is widely distributed in the Indo-west and central Pacific region. The two species share an unusually slender body shape and colour pattern consisting of a single, relatively broad yellow stripe on the upper side. However, the centre line of the stripe on *P. lativittata* is positioned below the lateral line, whereas in *P. monikae* it is above the lateral line. Moreover, the stripe extends farther forward in *P. lativittata*, usually tapering to a point above the centre of the eye. In *P. monikae*, the stripe terminates well behind the eye, generally above the posterior margin of the operculum. The two species are also readily distinguished on the basis of transverse scale row counts above and below the lateral line: *P. monikae* usually has 7 (rarely 6) rows above and 13 (occasionally 12, rarely 14) rows below compared to 9-11 rows above and 15-19 below for *P. lativittata*. Moreover, there are modal differences in the number of lateral-line scales, circumpeduncular scales, and pectoral-fin rays, with *P. monikae* exhibiting a trend of lower counts. Finally, *P. monikae* is a much smaller fish, attaining a maximum size of about 130 mm total length compared to an approximate total length of 200-250 mm for *P. lativittata*.

Zusammenfassung

Eine neue Art der Caesioniden: *Pterocaesio monikae*, wird auf der Grundlage von 21 Exemplaren mit 51,8-97,5 mm SL beschrieben, die an der Cenderawasih-Bucht bei den Provinzen Papua und Papua Barat, Indonesien, von Februar 2006 bis Oktober 2007 gesammelt wurden. Die Vertreter dieser neuen Art wurden in großen Schulen von bis zu mehreren hundert Einzeltieren am oberen Rand meerseitiger Riffhänge in Tiefen beobachtet, die von der Oberfläche bis zu 55 m hinabreichen. Die Ähnlichkeit zu der Art *P. lativittata* ist groß, die im indo-westlichen und zentralen Pazifik weit verbreitet ist. Gemeinsam ist beiden Arten die ungewöhnlich schlanke Körperform und die hauptsächliche Farbgebung, die durch einen einzelnen, relativ breiten gelben Streifen auf der Oberseite gekennzeichnet ist. Doch liegt bei *P. lativittata* die Mittellinie des Streifens unterhalb der Seitenlinie, bei *P. monikae* hingegen oberhalb. Außerdem erstreckt sich der Streifen bei *P. lativittata* weiter nach vorne, normalerweise läuft er an einem Punkt über der Augenmitte aus. Bei *P. monikae* endet der Streifen hingegen deutlich hinter dem Auge, im allgemeinen oberhalb vom Hinterrand des Kiemendeckels. Leicht lassen sich die beiden Arten auch anhand der Zahl der quer verlaufenden Schuppenreihen ober- und unterhalb der Seitenlinie unterscheiden. *P. monikae* zeigt gewöhnlich 7 (selten 6) Reihen oberhalb und 13 (gelegentlich 12, selten 14) Reihen unterhalb; *P. lativittata* aber 9-11 Reihen oberhalb und 15-19 unterhalb. Weitere Unterschiede betreffen die mittlere Zahl der Seitenlinien-Schuppen, der circumpeduncularen Schuppen und der Brustflossenstrahlen, wobei *P. monikae* zu niedrigeren Zahlen tendiert. Schliesslich ist *P. monikae* insgesamt ein viel kleinerer Fisch mit einer maximalen Länge von rund 130 mm, im Gegensatz zu einer Gesamtlänge von etwa 200 bis 250 mm bei *P. lativittata*.

Résumé

Une nouvelle espèce de Caesionidé, *Pterocaesio monikae*, est décrite sur base de 21 spécimens, de 51,8 à 97,5 mm de LS, collectés à Cenderawasih Bay, provinces de Papua et de Papua Barat, Indonésie, en février 2006 et octobre 2007. Elle a été observée en grands bancs de plusieurs centaines d'individus, le long du bord supérieur de récifs en pente vers la mer, à des profondeurs variant entre la surface et 55 m. Elle est étroitement apparenté à *P. lativittata* qui connaît une vaste distribution dans la région indo-occidentale et centrale du Pacifique. Les deux espèces ont en commun une forme du corps inhabituellement élancée et une coloration consistant en une seule ligne jaune plutôt large sur le haut du corps. Néanmoins, l'axe central de la ligne de *P. lativittata* se situe sous la ligne latérale, alors que *P. monikae* la porte au-dessus de la ligne latérale. En outre, la ligne s'étend plus en avant chez *P. lativittata*, se terminant généralement en pointe en un endroit situé au-dessus du centre de l'oeil. Chez *P. monikae*, la ligne s'arrête bien derrière l'oeil, généralement au-dessus de la marge postérieure de l'opercule. Les deux

espèces se distinguent donc aisément par le nombre de rangées d'écailles transversales au-dessus de et sous la ligne latérale. De plus, *P. monikae* a souvent 7 (rarement 6) rangées au-dessus et 13 (parfois 12, rarement 14) rangées en dessous centre 9-11 rangées au-dessus et 15-19 en dessous pour *P. lativittata.* En outre, il y a des différences modales dans le nombre d'écailles de la ligne latérale, des écailles circumpédonculaies et des rayons de la pectorale, où *P. monikae* présente généralement un nombre inférieur. Enfin, *P. monikae* est un poisson bien plus petit, d'une taille maximale d'environ 130 mm de longueur totale contre une longueur totale d'environ 200-250 mm pour *P. lativittata.*

Sommario

Una nuova specie di cesionide, *Pterocaesio monikae*, è descritto sulla base di 21 esemplari di 51.8-97.5 mm SL raccolti nel febbraio 2006 e in ottobre 2007 nella baia di Cenderawasih, province di Papua e Papua Barat, Indonesia. La specie forma grandi banchi di centinaia di individui che prediligono il margine superiore del pendio di scogliera rivolto al mare aperto a profondità comprese tra la superficie e 55 m. Sembra imparentata con *P. lativittata*, una specie largamente distribuita nell'Indo-Pacifico occidentale e nel Pacifico centrale. Le due specie hanno in comune un eccezionale corpo affusolato marcato da una singola e relativamente ampia stria gialla sulla regione dorsale. Tuttavia, il centro della stria di *P. lativittata* è posizionato sotto la linea laterale, mentre in *P. monikae* è sopra. Inoltre, la stria si estende ben più in avanti in *P. lativittata*, di solito assottigliandosi fino a terminare in un punto sopra il centro dell'occhio. In *P. monikae* la stria termina molto dietro l'occhio, generalmente sopra il margine posteriore dell'opercolo. Le due specie sono anche facilmente distinguibili in base al numero di file di scaglie trasversali sopra e sotto la linea laterale: *P. monikae* ha di solito 7 file sopra (raramente 6) e 13 file sotto (occasionalmente 12, raramente 14) rispetto a 9-11 file sopra e 15-19 sotto per *P. lativittata*. Inoltre, ci sono differenze modali nel numero delle scaglie della linea laterale, delle scaglie circumpeduncolari e dei raggi pettorali, dove *P. monikae* tende a valori più bassi. Infine, *P. monikae* è una specie molto più piccola che raggiunge al massimo 130 mm di lunghezza totale rispetto ai 200-250 mm per *P. lativittata.*

INTRODUCTION

Members of the family Caesionidae, known as fusiliers, are common inhabitants of coral reefs from the western Indian Ocean to the central Pacific. They form conspicuous shoals that feed on zooplankton in both inshore areas and exposed outer-reef habitats that are periodically exposed to strong

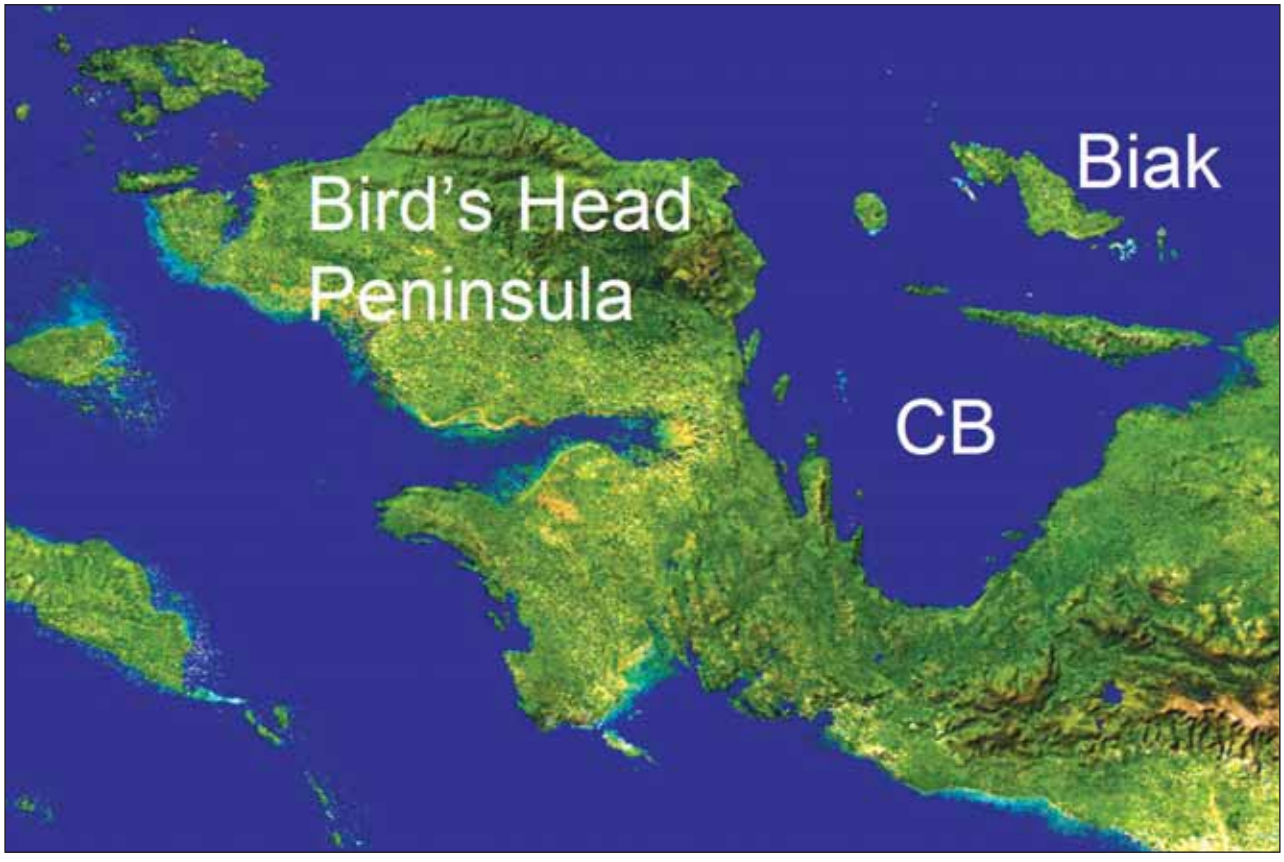

Fig. 1. Map of western New Guinea showing location of Cenderawasih Bay (CB).

currents. The family was revised by Carpenter (1987) and also reviewed by the same author (1988), who recognized 20 species in *Caesio, Dipterygonatus, Gymnocaesio,* and *Pterocaesio*. Allen & Erdmann (2005) described an additional species, *P. flavifasciata*, from western Sumatra.

The present paper describes a new species that superficially resembles *Pterocaesio lativittata* Carpenter, 1987, but is much smaller and exhibits consistent meristic and colour pattern differences. It was first collected by the authors in February 2006 during a Conservation International sponsored marine biological survey of Cenderawasih Bay, western New Guinea (Papua and Papua Barat provinces, Indonesia). This location is situated on the north coast of New Guinea, immediately east of the Bird's Head Peninsula (Fig. 1). It contains a highly diverse reef fish community with unique peculiarities suggesting previous geological isolation. The fauna includes at least seven reef fishes that appear to be endemic to the bay, additional species that occur widely in neighbouring regions, but exhibit unusual colour variation, and several deep-reef species that occur in unusually shallow water. Based on palaeogeographical reconstructions of the southwest Pacific (Hill & Hall 2003), we hypothesized (Allen & Erdmann 2006) that the bay was essentially isolated for a substantial period over the past five million years, and present day geographic/oceanographic conditions continue to provide a degree of isolation. According to reconstruction evidence, the Tosem Block of the South Caroline Arc slid across the entrance of Cenderawasih Bay about 3 to 5 million years ago before finally docking along the northern edge of the Bird's Head Peninsula. This formidable barrier could have provided an isolating mechanism to account for substantial endemism and other faunal peculiarities mentioned above. The case for isolation is further strengthened by approximately 14-20 new corals (including at least one new endemic genus) and 5 new stomatopods discovered during our 2006 expedition.

MATERIALS AND METHODS

Lengths of specimens are given as standard length (SL) measured from the anterior end of the upper lip to the base of the caudal fin (posterior edge of hypural plate); head length (HL) is measured from the same anterior point to the posterior edge of the opercle flap; body depth is the maximum depth taken vertically between the belly and base of the dorsal spines; head depth was measured from a vertical at the posterior median supratemporal band epidermis; body width is the maximum width just posterior to the pectoral fin base; snout length is measured from the anterior end of the upper lip to the anterior edge of the eye; orbit diameter is the horizontal fleshy diameter, and interorbital width the least bony width; upper jaw length is taken from the front of the upper lip to the posterior end of the maxilla; caudal peduncle depth is the least depth, and caudal peduncle length is the horizontal distance between verticals at the rear base of the anal fin and the caudal fin base; caudal fin length is the horizontal length from the posterior edge of the hypural plate to a vertical at the tip of the longest ray; caudal concavity is the horizontal distance between verticals at the tips of the shortest and longest rays; pectoral fin length is the length of the longest ray; pelvic fin length is measured from the base of the pelvic spine to the tip of the longest soft ray; gill raker counts are presented as separate counts for the upper and lower limbs; similarly, the circumpeduncular counts are presented as two separate counts for the dorsal and ventral half of the peduncle (lateral-line scale included in ventral count); the last fin ray element of the dorsal and anal fins is usually split near the base and is counted as a single ray. Methodology related to scale counts is explained in detail by Carpenter (1987).

Type specimens are deposited at the Australian Museum, Sydney (AMS), Bernice P. Bishop Museum, Honolulu (BPBM), Pusat Penelitian dan Pengembangan Oseanologi, Jakarta, Indonesia (NCIP), National Museum of Natural History, Washington, D.C. (USNM), and Western Australian Museum, Perth (WAM). Counts and proportions appearing in parentheses apply to the range for the paratypes if different from the holotype. Proportions for dorsal and anal spines are highly variable due to the damaged condition of most specimens. Proportional measurements expressed as percentage of the standard length are provided in Table I. Counts for *Pterocaesio lativittata* presented in Tables II-V are from Carpenter (1987, 1988), supplemented with data from three specimens (WAM P.32910-001), 82.3-148.5 mm SL, collected at the Raja Ampat Islands, Indonesia.

Pterocaesio monikae n. sp.

(Figs 2-3 and 5; Tables I-V)

Holotype: NCIP 6309, 80.9 mm SL, northeast Mamboor, 3°04.249'S 135°36.160'E, Cenderawasih

Bay, Papua Province, Indonesia, 10 m depth, spear, M.V. Erdmann, 19 February 2006.

Paratypes: AMS I.44180-001, 87.8 mm SL, Tridacna Atoll, 2°29.672'S 134°58.990'E, Cenderawasih Bay, Papua Barat Province, Indonesia, 18 m depth, spear, M.V. Erdmann, 20 February 2006; BPBM 40657, 87.6 mm SL, Pulau Rouw, 2°09.128'S 134°44.016'E, Cenderawasih Bay, Papua Barat Province, Indonesia, 15 m depth, spear, M. V. Erdmann, 21 February 2006; NCIP 6310, 97.5 mm SL, same data as BPBM paratype; USNM 390775, 84.3 mm SL, same data as AMS paratype; WAM P.32892-001, 82.2 mm SL, collected with holotype; WAM P.32909-001, 15 specimens, 51.8-89.9 mm SL, Tridacna Atoll, 2°29.672'S 134°58.990'E, Cenderawasih Bay, Papua Barat Province, Indonesia, 8-35 m, spear, M. V. Erdmann, 22 October, 2007.

Diagnosis: Two post-maxillary processes; dorsal rays X,14-15 (usually 15); anal rays III, 11-12 (usually 12); pectoral rays 20-21(usually 20); lateral-line scales 72-80 (modally 74); scales above lateral line to origin of dorsal fin 6-7 (usually 7); scales below lateral line to origin of anal fin 12-14 (usually 13); anterior circumpeduncular scales modally 12.14, ventral circumpeduncular scales modally 14.71; body fusiform and extremely elongate for the genus, its greatest depth 4.3-5.1 in SL; HL 3.2-3.6 in SL; snout 4.0-5.2 in HL; eye 2.9-3.6 in HL; pectoral-fin length 1.2-1.4 in HL; colour in life: blue, grading to silvery white on belly, with prominent, broad yellow stripe on upper side from dorsal posterior margin of operculum to upper half of caudal peduncle, covering maximum of four scale rows, centred just above lateral line, except entirely above it on caudal peduncle; tip of each caudal-fin lobe with reddish spot (often appearing black underwater), preceded by whitish area.

Description: Dorsal rays X,15 (usually 15, except two paratypes each with 14 and 16); anal rays III,12 (12, except two paratypes with 11); pectoral rays 21 (20-21); gill rakers 8 + 24 (7-8 + 22-25); lateral-line scales 74 (72-80); lateral-line scales anterior to origin of dorsal fin 10 (9-10); lateral-line scales anterior to origin of pelvic fin 7; scales above lateral line to origin of dorsal fin 7 (6-7); scales below lateral line to origin of anal fin 12 (12-14); scales below lateral line to origin of pelvic fin 11 (11-12); circumpeduncular scales 12 + 14 (11-13 +12-16); transverse scale rows on cheek 4 (3-5); transverse supratemporal scales 6 (6-8); longitudinal supratemporal scales 6 (6-8); supatemporal band of scales confluent at dorsal midline; predorsal scales 18 (17-20); dorsal and anal fins scaled over most of their surface.

Body fusiform and elongate, its greatest depth 4.6 (4.3-5.1) in SL; body moderately compressed, its width 1.5 (1.3-1.7) in depth; HL 3.5 (3.2-3.6) in SL; caudal peduncle depth 4.1 (3.5-4.8) in HL; caudal peduncle length 1.5 (1.5-1.9) in HL.

Dorsal and ventral profile of head equally sloping, its greatest depth 1.5 (1.5-1.8) in HL; depth of head at centre of orbit 2.0 (2.0-2.2) in HL; depth of head at anterior nostril 3.6 (3.2-4.1) in HL; snout 4.0 (4.0 -5.2) in HL; cheek width 3.4 (2.8-3.8) in HL; interorbital space convex, its bony width 4.6 (3.9-4.9) in HL; margin of opercle with a dorsoposterior flap.

Anterior nostril with a low membranous rim (slightly elevated posteriorly), closer to orbit than snout tip, the prenostril length 7.1 (6.4-7.5) in HL; distance between anterior and posterior nostrils 5.4

Fig. 2. *Pterocaesio monikae*, freshly collected holotype, 80.9 mm SL, Cenderawasih Bay, Papua Province, Indonesia. Photo by G. R. Allen.

Table I. Proportional measurements of selected type specimens of *Pterocaesio monikae* expressed as percentage of the standard length.

	Holotype NCIP 6309	Paratype WAM P.32892	Paratype USNM 390775	Paratype AMS I.44180	Paratype NCIP 6310	Paratype BPBM 40657	Paratype WAM P.32909	Paratype WAM P.32909
Standard length (mm)	80.9	82.2	84.3	87.8	97.5	87.6	76.9	56.2
Body depth	21.5	22.1	21.4	23.5	20.5	20.9	23.1	22.4
Body width	14.0	14.0	14.0	15.4	13.8	14.3	14.8	14.9
Head length	28.2	29.0	29.4	28.4	28.2	27.5	30.4	31.3
Snout length	7.0	6.2	6.0	5.5	6.4	5.8	6.8	6.9
Eye diameter	8.0	8.9	9.6	9.0	8.0	8.1	10.3	9.4
Interorbital width	6.2	6.0	6.5	6.4	7.3	6.1	7.3	6.8
Depth of caudal peduncle	6.9	6.4	6.4	5.9	6.4	6.2	7.4	8.5
Length of caudal peduncle	18.3	18.0	17.9	18.5	16.2	18.0	16.4	18.1
Predorsal distance	36.2	35.6	36.9	37.4	35.5	33.7	38.1	37.9
Preanal distance	60.6	60.2	60.5	62.3	61.9	59.4	61.5	64.2
Prepelvic distance	32.9	33.1	35.3	36.7	33.3	35.2	36.2	37.7
Length of dorsal fin base	49.9	45.6	48.5	46.7	48.7	48.1	50.2	46.1
1st dorsal spine	2.7	2.7	1.8	1.7	2.3	1.8	2.1	2.3
2nd dorsal spine	11.6	11.3	9.5	11.2	10.5	11.2	10.8	12.3
3rd dorsal spine	14.3	10.6	11.3	13.4	13.6	14.6	13.3	12.5
4th dorsal spine	13.8	10.2	9.8	13.2	13.5	12.1	13.0	13.2
Last dorsal spine	6.1	5.7	5.7	5.7	5.7	6.1	6.5	6.8
1st soft dorsal ray	5.9	6.1	5.9	6.7	5.4	5.6	6.4	6.9
Length of anal fin base	22.2	21.3	21.9	23.7	22.6	21.0	22.8	19.9
1st anal spine	1.5	2.1	1.2	1.5	1.2	1.6	2.6	1.8
2nd anal spine	5.9	9.4	8.5	8.9	8.4	9.4	8.7	9.4
3rd anal spine	5.6	9.6	8.1	8.0	8.0	9.1	9.8	10.1
1st soft anal ray	5.2	7.8	8.1	8.0	6.9	8.0	8.6	10.7
Caudal fin length	19.5	22.5	19.5	20.3	20.3	21.5	19.6	21.7
Caudal concavity	9.0	13.0	12.0	10.1	12.6	11.4	9.5	10.5
Pectoral fin length	22.2	21.0	22.2	22.2	22.3	21.5	24.7	23.3
Pelvic fin spine length	10.5	9.6	10.3	10.8	10.3	11.2	11.7	10.7
Pelvic fin length	15.5	14.4	13.6	15.0	14.2	13.9	15.3	15.1

(3.8-6.1) in eye; posterior nostril without rim or flap, its closest distance to orbit 5.4 (4.4-6.2) in eye.

Mouth oblique, forming an angle of about 40 degrees to the horizontal, the lower jaw projecting slightly; length of upper jaw 3.0 (2.8-3.3) in HL; maxilla extending to below anterior edge of pupil; posterior end of maxilla tapering, its greatest depth anterior to posterior end of premaxilla; ascending premaxillary process long, extending to a vertical about midway between anterior rim of orbit and pupil, its length 3.5 (3.3-3.8) in HL; jaws with minute conical teeth; premaxilla mainly devoid of teeth except a few widely spaced conical teeth towards front of jaw on either side of median symphysis; each side of lower jaw with a single row of teeth; vomer and palatines edentate.

Origin of dorsal fin slightly posterior to origin of pelvic fin; predorsal length 2.8 (2.6-3.0) in SL; dorsal-fin base 2.0 (2.0-2.2) in SL; all fin spines slender and weak; first dorsal spine 10.4 (10.8-16.6) in HL, the second 2.4 (2.4-3.1) in HL, the third usually the longest, although spine tips broken on most types, 2.0 (1.9-2.7) in HL, the fourth 2.0 (2.0-3.0) in HL, remaining dorsal spines gradually shorter, the last 4.7 (4.5-5.2) in HL; first segmented dorsal-fin ray 4.8 (4.1-5.3) in HL, the last segmented dorsal-fin ray longer than penultimate; snout to origin of anal fin 1.7 (1.6-1.7) in SL; anal-fin base 4.5 (4.2-5.0) in SL; length of first anal spine 11.4 (11.9-24.8) in HL, the second (broken in holotype) 4.8 (2.9-3.5) in HL, the third (broken in holotype) 5.1 (2.8-3.6) in HL; first segmented anal-fin ray length 5.4 (2.9-4.1) in HL, the last longer than penultimate; caudal fin deeply forked, its longest ray 1.4 (1.3-1.9) in HL; origin of pectoral fin at a vertical with opercular flap; prepectoral length 3.7 (3.2-4.0) in SL; pectoral fin pointed, its length 1.3 (1.2-1.4) in HL; prepelvic fin length 3.0 (2.7-3.1) in SL; pelvic fin short, 1.8 (1.9-2.2) in HL, the spine 2.7 (2.5-3.0) in HL.

Colour of freshly collected holotype (Fig. 2): body overall reddish, grading to pale pink-

Table II. Comparison of pectoral ray counts for *Pterocaesio lativittata* and *P. monikae*.

Species	20	21	22	23
P. lativittata		21	43	19
P. monikae	16	5		

ish white on ventral portion of head and body; yellow stripe along side from lateral-line origin to upper half of caudal peduncle, covering maximum of four scale rows, centred just above lateral line, except veering above it below posteriormost dorsal-fin rays; head dark red brown dorsally, bluish laterally, grading to silvery pink ventrally; dorsal and caudal fins translucent with pink suffusion, each lobe of caudal fin with a red spot near tip, preceded by narrow whitish area; remaining fins translucent to whitish.

Colour of holotype in alcohol after 17 months in preservative: brown on upper two-thirds of body with paler scale centres, silvery white on lower third; light blue stripe along side from lateral-line origin to upper half of caudal peduncle, covering maximum of four scale rows, centred just above lateral line, except entirely above it on caudal peduncle; dorsal portion of head dark brown, becoming nearly blackish on snout and tip of lower jaw; ascending process of premaxillary also covered with dark brown epithelium; ventral portion of head silvery white; adipose tissue around eye tan; fins mainly whitish and semi-translucent, except caudal with dusky rays and small, brown spot at tip of each lobe. Paratypes exhibit a similar pattern, although there is considerable variation in the intensity of the pale stripe along the upper side.

Table III. Comparison of lateral-line counts for *Pterocaesio lativittata* and *P. monikae* (counted on both sides in four specimens of *P. monikae*, other spear-damaged specimens counted only on one side).

Species	72	73	74	75	76	77	78	79	80	81	82	83	84+
P. lativittata			1	10	8	9	7	9	8	7	5	3	11
P. monikae	1	7	7	1	5	1	1		1				

Colour in life (Fig. 3): body overall sky blue grading to silvery white on ventral portion of head and body; bright yellow stripe along side from lateral-line origin to upper half of caudal peduncle, covering maximum of four scale rows, centred just above lateral line, except entirely above it on caudal peduncle; scales of supratemporal band with yellow centres, giving impression of scattered yellow spots; similar yellow-centred scales forming faint, pale yellow stripe on upper back midway between main yellow stripe on side and dorsal fin base; pearly band from snout tip to lower anterior corner of eye; iris silvery blue; fins translucent to whitish; each lobe of caudal fin with reddish spot (often appearing black underwater), preceded by whitish area at tip.

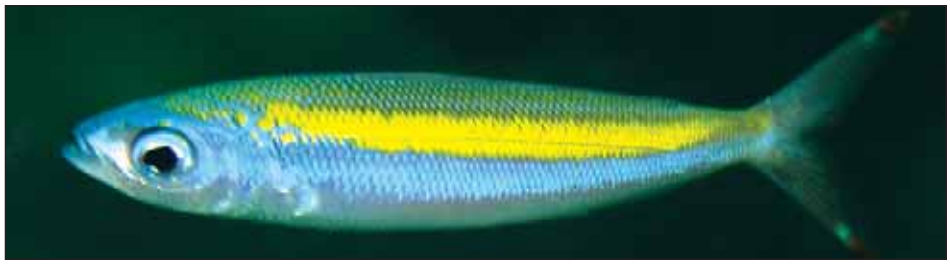

Fig. 3. Underwater photograph of *Pterocaesio monikae*, approximately 110 mm total length, Cenderawasih Bay, Papua Barat Province, Indonesia.
Photo by G. R. Allen.

Fig. 4. Underwater photograph of *Pterocaesio lativittata*, approximately 200 mm total length, Christmas Island, Indian Ocean. Photo by G. R. Allen.

Table IV. Comparison of dorsal and ventral transverse scale row counts for *Pterocaesio lativittata* and *P. monikae*.

Dorsal rows								
Species	6	7	8	9	10	11		
P. lativittata				12	24	2		
P. monikae	1	20						
Ventral rows								
Species	12	13	14	15	16	17	18	19
P. lativittata				4	7	15	8	1
P. monikae	4	16	1					

Table V. Comparison of dorsal and ventral caudal peduncle scale row counts for *Pterocaesio lativittata* and *P. monikae*.

Dorsal rows							
Species	11	12	13	14			
P. lativittata		5	22	8			
P. monikae	5	8	8				
Ventral rows							
Species	12	13	14	15	16	17	
P. lativittata				4	14	17	
P. monikae	1	1	4	12	3		

Remarks: The new species is closely related to *Pterocaesio lativittata*. According to P. Barber (Boston University, unpublished data) there appears to be minimal genetic variation between the two species, based on analysis of tissue samples that were sent to him by the authors. Barber suggests the lack of genetic separation is indicative of relatively recent speciation of the Cenderawasih Bay population.

Both species share an unusually slender body shape and colour pattern consisting of a single, relatively broad yellow stripe on the upper side. However, the centre line of the stripe on *P. lativittata* is positioned below the lateral line, whereas in *P. monikae* it is above the lateral line. Moreover, the stripe extends farther forward in *P. lativittata*, usually tapering to a point above the centre of the eye. In *P. monikae*, the stripe terminates well behind the eye, generally above the posterior margin of the operculum. There is also a difference in the basic shape of the stripe. In *P. lativittata*, it is broadest on the anterior body, then gradually tapers posteriorly where it forms a thin stripe that extends across the upper caudal peduncle to the base of the caudal fin. The stripe of *P. monikae*, by contrast, is more symmetrical, having a more or less uniform width over most of its length, with a relatively abrupt tapering both anteriorly and posteriorly. Furthermore, its posterior termination usually falls well short of the caudal-fin base.

The two species are also readily distinguished on the basis of transverse scale row counts, above and below the lateral line (Table II). *Pterocasesio monikae* usually has 7 (rarely 6) rows above and 13 (occasionally 12, rarely 14) rows below compared to 9-11 rows above and 15-19 below for *P. lativittata*. Moreover, there

Fig. 5. Size comparison of mature adults of *Pterocaesio lativittata* (upper), 148.5 mm SL, Raja Ampat Islands and *P. monikae*, 82.2 mm SL, Cenderawasih Bay. Photo by G. R. Allen.

are modal differences in the number of lateral-line scales, circumpeduncular scales, and pectoral-fin rays (Tables III-V) with *P. monikae* exhibiting a trend of lower counts.

We have also noted a basic behavioural difference in *P. monikae* when pursued while collecting. Unlike other caesionids that typically flee into open water, it seeks refuge in nearby crevices and holes within the reef matrix.

Pterocaesio lativittata (Fig. 4) is a relatively uncommon species, thus far known only from Chagos Archipelago, Maldives (Kuiter 1998), Cocos-Keeling Islands, Christmas Island, Indian Ocean (Allen et al. 2007), Hermit Islands (Papua New Guinea), Palau, Phoenix Islands, and Line Islands (Randall 2005). There is apparently minimal variation in colour pattern despite its extensive geographic range. Fish from the Maldives (Randall & Anderson 1993: plate 4B) in the central Indian Ocean are very similar in appearance to those from the Phoenix Islands, which lie more than 12,000 km eastward. One major exception is the population from the Line Islands illustrated by Randall (2005), which has a relatively narrow yellow stripe that does not extend above the lateral line on the anterior two-thirds of the body. Typically the stripe includes at least two scale rows above the lateral line and five below it for most of its length (Fig. 4). No specimens have been collected and Randall (pers. comm.) now questions its identification as *P. lativittata*.

Pterocaesio monikae is among the smallest members of the family (Fig. 5). The largest of several thousand individuals observed underwater was approximately 100 mm SL. Two paratypes, measuring 87.8 and 97.5 mm SL, are fully mature females with eggs. Only *Dipterygonatus balteatus* (Valenciennes) and *Gymnocaesio gymnoptera* Bleeker are equally diminutive, each reaching a maximum standard length between about 100-135 mm. Although the largest known specimen of *P. lativittata* is only 113.7 mm SL (Carpenter 1987), we have witnessed individuals in the field that were considerably larger, estimated at about 200 to 250 mm total length. The largest specimen we have collected was 148.5 mm SL (WAM P.32910-001, Fig. 5), from the Raja Ampat Islands, which lies 400 km to the west of Cenderawasih Bay.

The new species was commonly encountered in Cenderawasih Bay, occurring in large schools, containing up to several hundred individuals. It was frequently in mixed schools with *Pterocaesio pisang* and *Gymnocaesio gymnopterus*. The usual habitat consists of the upper edge of seaward reef slopes, commonly at depths ranging from the surface to about 15 m, but we also sighted schools as deep as 55 m.

Etymology: The new species is named *monikae* in honour of Lady Monika Bacardi, an avid marine conservationist who successfully bid to support the conservation of this species at the Blue Auction in Monaco on 20 September 2007 and has given generously to support Conservation International's Bird's Head Seascape initiative.

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A new species of damselfish (Pomacentridae: *Chrysiptera)* from western New Guinea and the Togean Islands, Indonesia

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Abstract

Chrysiptera giti is described from nine specimens, 23.4-36.0 mm SL, from the Fak Fak Peninsula of western New Guinea (Papua Barat Province, Indonesia). Underwater photographs also reveal its presence at the Togean Islands off northeastern Sulawesi. A separate genetic study currently in progress indicates it belongs to a monophyletic clade of four species that includes *C. hemicyanea* (southern Sulawesi, Kei Islands, and western New Guinea), *C. parasema* (western Indonesia, Sabah, and the Philippines), and an undescribed species *(Chrysiptera* species B from northern New Guinea and north Sulawesi). The members of this group are characterised by a brilliant blue coloration with variable amounts of yellow on the posterior/ventral portion of the body. It most closely resembles *C. hemicyanea*. Both species have the posterior portion of the body abruptly yellow behind an oblique line extending forward from the upper caudal-fin base. The yellow coloration extends forward to the anal fin origin in *C. giti*, but in *C. hemicyanea* it also embraces the breast and lower one-fourth of the body. A key to the 10 members of the "*hemicyanea* complex" of *Chrysiptera* species is provided as well as comparative underwater photographs of the three species most closely related to *C. giti*.

Zusammenfassung

Beschrieben wird *Chrysiptera giti* anhand von neun Exemplaren mit 23,4-36,0 mm SL, die von der Nähe der Fak-Fak-Halbinsel des westlichen Neuguinea (Provinz Papua Barat, Indonesien) stammen. Unterwasserfotografien belegen außerdem ihr Vorkommen an den Togean-Inseln nordöstlich von Sulawesi. Nach einer genetischen Studie, die an anderer Stelle in Arbeit ist, gehört diese neue Art zu einer monophyletischen Klade von vier Arten, zu denen weiterhin *C. hemicyanea* (Süd-Sulawesi, Kei-Inseln und West-Neuguinea), *C. parasema* (West-Indonesien, Sabah, und Philippinen) sowie eine unbeschriebene Art *(Chrysiptera* species B von Nord-Neuguinea und Nord-Sulawesi) gehören. Kennzeichen der Vertreter dieser Gruppe sind eine leuchtend blaue Farbe mit unterschiedlichen Gelb-Anteilen im hinteren/bauchseitigen Teil des Körpers. Die neue Art ähnelt am stärksten *C. hemicyanea*. Bei diesen beiden Arten beginnt der gelbe hintere Teil des Körpers abrupt hinter einer schrägen Linie, die sich von der oberen Schwanzflossenbasis nach unten/vorne erstreckt. Bei *C. giti* erstreckt sich die gelbe Farbe nach vorne zu bis zum Ursprung der Afterflosse, während sie bei *C. hemicyanea* auch die Brust und und das untere Viertel des Rumpfes umfasst. Abschließend werden ein Bestimmungsschlüssel für die zehn Angehörigen des „*hemicyanea*-Komplexes" von *Chrysiptera* und vergleichende Unterwasserfotos der drei Arten, die am meisten *C. giti* ähneln, zur Verfügung gestellt.

Résumé

Chrysiptera giti est décrit sur base de neuf spécimens, de 23,4-36,0 mm de LT, originaires de la péninsule Fak Fak de Nouvelle-Guinée occidentale (province de Papua Barat, Indonésie). Des photographies sous-marines révèlent aussi sa présence près des îles Togian, au large du nord-est de Sulawesi. Une étude génétique propre, actuellement en cours, indique que l'espèce fait partie d'un clade monophylétique de quatre espèces comprenant *C. hemicyanea* (sud de Sulawesi, îles Kei et Nouvelle-Guinée occidentale), *C. parasema* (ouest de l'Indonésie, Sabah et les Philippines), et une espèce non décrite *(Chrysiptera* species B du nord de la Nouvelle Guinée et du nord de Sulawesi). Les membres de ce groupe se caractérisent par une brillante coloration bleue avec des quantité variables de jaune sur la partie postérieure/abdominale du corps. L'espèce ressemble le plus à *C. hemicyanea*. Les deux espèces ont la partie postérieure du corps abruptement jaune après une ligne oblique qui s'étend en avant de la base du lobe caudal supérieur. La couleur jaune s'étend an avant de la naissance de l'anale chez *C. giti*, mais, chez *C. hemicyanea*, elle s'étend aussi à la poitrine et au quart inférieur du corps. Une clé pour les 10 représentants ou "complexe *hemicyanea*" des espèces de *Chrysiptera* est fourni ainsi que des photos sous-marines, à titre de comparaison, des trois espèces les plus proches de *C. giti*.

Sommario

Chrysiptera giti è descritta sulla base di nove esemplari di 23.4-36.0 mm SL raccolti presso la penisola di Fak Fak

della Nuova Guinea occidentale (provincia di Papua Barat, Indonesia). Fotografie subacquee rivelano la sua presenza anche alle isole Togean, a nord-est di Sulawesi. Uno studio genetico separato attualmente in corso indica che essa appartiene ad una linea monofiletica comprendente altre tre specie, specificamente: *C. hemicyanea* (Sulawesi meridionale, isole Kei e Nuova Guinea occidentale), *C. parasema* (Indonesia occidentale, Sabah e Filippine) e una specie non ancora descritta *(Chrysiptera* specie B della Nuova Guinea settentrionale e Sulawesi settentrionale). I membri di questo gruppo sono caratterizzati da una tinta brillante di colore blu con quantità variabili di giallo nella regione posteriore/ventrale del corpo. La nuova specie somiglia molto a *C. hemicyanea*. Entrambe hanno la regione posteriore del corpo immediatamente gialla oltre una linea obliqua che parte dalla regione superiore della base della pinna caudale. La colorazione gialla si estende anteriormente fino all'origine della pinna anale in *C. giti*, mentre in *C. hemicyanea* abbraccia il petto e il quarto inferiore del corpo. È fornita una chiave per l'identificazione dei 10 membri del "complesso *hemicyanea*" delle specie del genere *Chrysiptera* insieme a fotografie subacquee delle tre specie più vicine a *C. giti*.

INTRODUCTION

Damselfishes (Pomacentridae) are one of the most speciose and conspicuous of all fish groups associated with tropical and subtropical reefs. The family was reviewed by Allen (1991), who recognized 322 species in 28 genera. Since the publication of this work 37 additional species have been described, raising the global total to 362 species (Eschmeyer 2007). Slightly more than 300 species inhabit the species-rich Indo-west and central Pacific region. Particularly prominent are the genera *Pomacentrus* Lacépède, 1802 (68 species) and *Chromis* Cuvier, 1814 (66 species and approximately 15 undescribed species from deep reefs of the western Pacific). The genus *Chrysiptera* Swainson, 1839 is the third largest assemblage with 30 described species. However, our preliminary genetic evidence indicates the genus is polyphyletic and intrageneric relationships need to be reassessed. *Chrysiptera* was most recently treated by Allen (1987, 1999), Allen & Adrim (1992), Randall (1994), Allen & Rajasuriya (1995), and Allen & Bailey (2002), who described several new taxa and discussed relationships.

The present paper describes a new species of *Chrysiptera* that was photographed by the first author at the Togean Islands off northeastern Sulawesi, Indonesia in 1997. It was first thought to be a colour variant of *C. parasema* (Fowler, 1918). However, subsequent collections and underwater observations by us in Indonesia, the Philippines, and at various Melanesian islands revealed consistent colour patterns, indicative of a complex of closely related species. Specimens of the Togean fish were eventually collected by us during a Conservation International sponsored marine biological survey of the Fak Fak Peninsula, western New Guinea (Papua Barat Province, Indonesia) during April and May 2006. Additional collections and underwater photographs were obtained during a subsequent visit to the Fak Fak region in April 2007. We also collected tissue samples for DNA analysis and are currently involved in a collaborative study of *Chrysiptera* phylogeny with Paul Barber of Boston University. Preliminary results indicate that the new species belongs to a group of 10 species and forms a monophyletic clade with three other species including *C. hemicyanea* (Weber, 1913), *C. parasema* and another undescribed species *(Chrysiptera* species B) from northern New Guinea and north Sulawesi. The full results of our genetic investigation of this species complex will be published in a subsequent paper currently in preparation.

MATERIALS AND METHODS

Lengths of specimens are given as standard length (SL) measured from the anterior end of the upper lip to the base of the caudal fin (posterior edge of hypural plate); head length (HL) is measured from the same anterior point to the posterior edge of the opercle flap; body depth is the maximum depth taken vertically between the belly and base of the dorsal spines; body width is the maximum width just posterior to the gill opening; snout length is measured from the anterior end of the upper lip to the anterior edge of the eye; orbit diameter is the horizontal fleshy diameter, and interorbital width the least fleshy width; upper jaw length is taken from the front of the upper lip to the posterior end of the maxilla; caudal peduncle depth is the least depth, and caudal peduncle length is the horizontal distance between verticals at the rear base of the anal fin and the caudal fin base; lengths of fin spines and rays are measured to their extreme bases (i.e., not from the point where the ray or spine emerges from the basal scaly sheath); caudal fin length is the horizontal length from the posterior edge of the hypural plate to a vertical at the tip of the longest ray; caudal concavity is the horizontal distance between verticals at the tips of the shortest and longest rays; pectoral fin length is the length of

the longest ray; pelvic fin length is measured from the base of the pelvic spine to the filamentous tip of the longest soft ray; pectoral ray counts include the small splint-like, uppermost rudimentary ray; only the tube-bearing anterior lateral-line scales are counted; a separate count is given for the deeply pitted scales occurring in a continuous series midlaterally on the caudal peduncle; the decimal figure "1.5" appearing in the scale row count above the lateral line refers to a complete scale (1) and small truncated scale (0.5) at the base of the dorsal fin; gill raker counts include all rudiments and are presented as separate counts for the upper and lower limbs as well as a combined count; the last fin ray element of the dorsal and anal fins is usually branched near the base and is counted as a single ray.

Counts and proportions for the holotype are followed by the range for paratypes in parentheses. Proportional measurements expressed in thousandths of the SL are provided in Table I. Counts for soft dorsal rays, pectoral rays, total gill rakers on first arch, and tubed lateral-line scales are presented in Table II. Type specimens are deposited at Pusat Penelitian dan Pengembangan Oseanologi, Jakarta, Indonesia (NCIP), National Museum of Natural History, Washington, D.C. (USNM), and the Western Australian Museum, Perth (WAM).

Chrysiptera giti n. sp.

(Figs 1-3; Tables I-III)

Holotype: NCIP 6332, male, 36.0 mm SL, Teluk Sebakor, 3°16'58.36"S 132°44'17.16"E, Fak Fak Peninsula, Papua Barat Province, Indonesia, 6-10 m depth, clove oil and hand net, M. V. Erdmann, 26 April 2007.

Paratypes: NCIP 6333, 3 specimens, 23.4-33.8 mm SL, collected with holotype; USNM 391568, 2 specimens, 32.9-33.4 mm SL, Pulau Tuburuasa, 3°25.367'S, 132°44.224'E, Fak Fak Peninsula, Papua Barat Province, Indonesia, 4-8 m, clove oil and hand net, G. R. Allen, 4 May 2006; WAM P.32810-002, 3 specimens, 27.1-29.6 mm SL collected with USNM paratypes.

Diagnosis: A species of the pomacentrid genus *Chrysiptera* with the following combination of characters: dorsal rays XIII,10 or 11; anal rays II,12; pectoral rays 14 or 15; gill rakers on first branchial arch 6-7 + 15-16, total rakers 22-23; tubed lateral-line scales 13-17; colour in life brilliant blue with yellow caudal-fin base and anal fin, the boundary between the blue and yellow colours extending obliquely from upper caudal-fin base to origin of anal fin.

Description: Dorsal rays XIII,11 (XIII,10-11);

Fig. 1. Underwater photograph of *Chrysiptera giti*, approximately 30.0 mm SL, Fak Fak Peninsula, western New Guinea. Photo by G. R. Allen.

Table I. Proportional measurements of selected type specimens of *Chrysiptera giti* as percentage of the standard length.

Character	Holotype NCIP 6332	Paratype USNM 391568	Paratype USNM 391568	Paratype WAM P.32810	Paratype WAM P.32810	Paratype NCIP 6333
Standard length (mm)	36.0	33.4	32.9	29.6	27.1	23.4
Body depth	48.1	47.3	52.0	48.0	47.2	45.3
Body width	18.9	19.5	18.5	17.6	17.7	15.0
Head length	33.3	33.2	33.4	33.4	33.9	35.5
Snout length	8.9	9.0	8.5	9.8	8.9	8.5
Orbit diameter	12.2	13.2	13.4	13.9	13.3	14.5
Interorbital width	9.2	9.6	9.4	9.5	8.9	9.8
Caudal peduncle depth	14.7	15.0	14.9	15.5	14.8	14.5
Caudal peduncle length	16.1	14.7	14.0	13.5	13.7	13.7
Predorsal length	9.4	9.9	10.0	10.1	11.8	10.3
Preanal length	39.7	39.5	39.8	41.9	42.4	40.2
Prepelvic length	65.8	65.9	66.6	67.2	65.3	69.2
Length dorsal fin base	39.4	41.0	40.4	42.2	40.2	41.5
Length anal fin base	61.1	60.8	59.9	60.8	59.4	59.8
Length pectoral fin	28.1	26.3	26.4	25.0	26.9	24.4
Length pelvic fin	30.0	32.0	30.1	33.1	33.2	30.8
Length pelvic spine	27.5	35.0	32.5	35.1	29.9	36.3
Length 1st dorsal spine	17.2	19.5	17.3	18.2	18.1	19.7
Length 2nd dorsal spine	8.3	9.3	8.2	8.8	9.2	9.4
Length 6th dorsal spine	19.7	19.2	18.8	21.3	20.3	21.4
Length longest dorsal ray	16.1	15.0	14.3	14.2	15.5	14.5
Length 1st anal spine	22.8	25.4	17.9	27.4	24.7	24.4
Length 2nd anal spine	10.8	9.0	7.9	8.1	8.5	11.1
Length longest anal ray	21.1	19.8	20.7	19.6	20.3	21.8
Length caudal fin	25.6	26.9	24.0	28.7	29.2	28.2
Caudal concavity	30.3	34.7	32.2	36.1	33.9	33.8

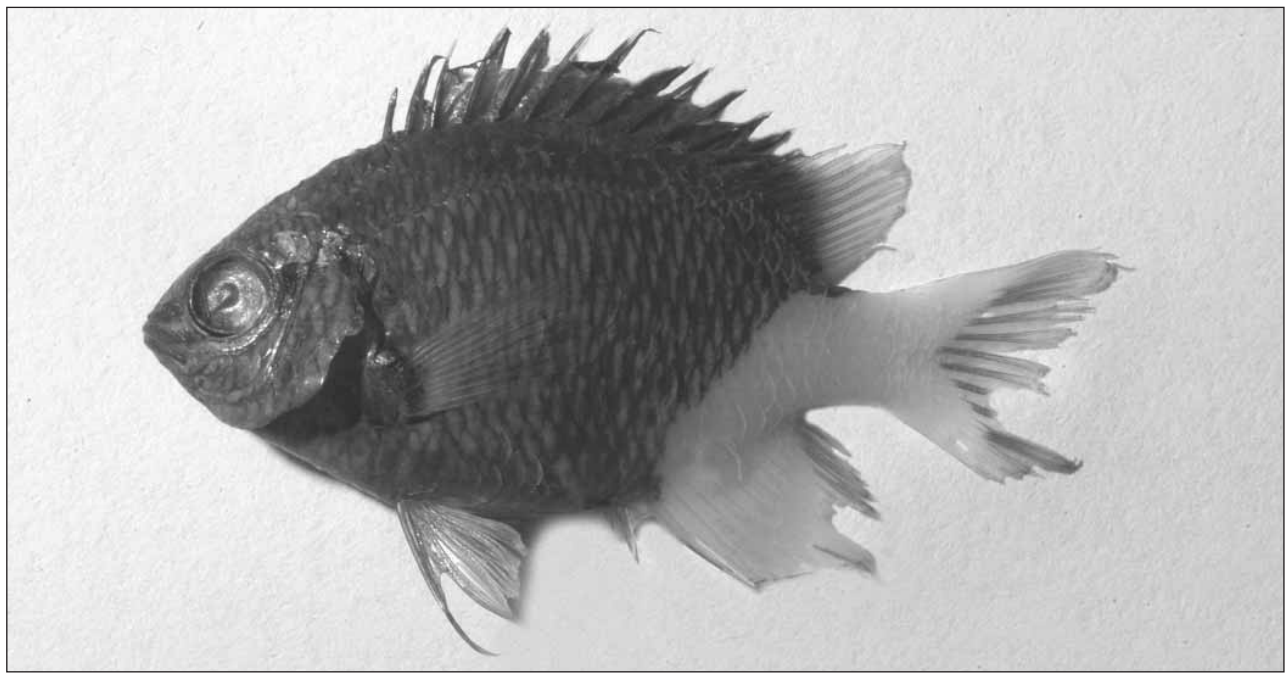

Fig. 2. Holotype of *Chrysiptera giti*, 36.0 mm SL, Fak Fak Peninsula, western New Guinea. Photo by G. R. Allen.

Table II. Summary of soft dorsal rays, pectoral rays, total gill rakers on first arch, and tubed lateral-line scales of *Chrysiptera giti*. Counts for pectoral rays and lateral-line scales were recorded for both sides of each individual.

Dorsal rays		Pectoral rays		Gill rakers	
10	11	14	15	22	23
3	6	4	14	6	2
Lateral-line scales					
12	13	14	15	16	17
1	2	7	4	3	1

anal rays II,12; pectoral rays 14 or 15; gill rakers on first branchial arch 7 + 15 (6-7 + 15-16), total rakers 22 (22-23); lateral-line scales with tubes 16 (13-17); scales in lateral series from upper rear margin of opercle to base of caudal fin 27 (one paratype with 28); scales above lateral-line to base of middle dorsal spines 1.5; scales below lateral line to anus 9.

Body depth 2.1 (1.9-2.2) in SL; maximum body width 2.5 (2.5-3.0) in depth; HL contained 3.0 (2.8-3.1) in SL; snout 3.8 (3.4-4.2), eye 2.7 (2.3-2.6), interorbital space 3.6 (3.5-4.0), least depth of caudal peduncle 2.3 (2.2-2.4), length of caudal peduncle 2.1 (2.2-2.8), all in HL.

Mouth terminal, oblique, jaws forming an angle of about 25° to horizontal axis of head and body; maxillary reaching to a vertical through anterior edge of eye; teeth of jaws biserial, those of outer row more or less incisiform with flattened tips, upper jaw with about 42 (40-44) teeth and lower jaw with about 44 (42-46) teeth in outer rows, the largest about one-third diameter of pupil in height; a secondary row of slender buttress teeth behind those of outer row in the spaces between them; a single nasal opening on each side of snout; nostril with a low fleshy rim; preorbital and suborbital relatively narrow, the greatest depth about one-third eye diameter, ventral margin smooth; margin of preopercle smooth, without any denticulations; margin of opercular series smooth except a blunt, flattened spine on upper portion near angle.

Scales of head and body finely ctenoid; preorbital, suborbital, snout tip, lips, chin, and isthmus naked; a pair of primary transverse scale rows on cheek with row of smaller scales along lower margin; dorsal and anal fins with a basal scaly sheath; basal half of caudal fin covered by scales; pectoral fins covered by scales only at base; axillary scale cluster between base of pelvic fins about two-thirds length of pelvic spine.

Tubed lateral-line scales ending below posterior spines of dorsal fin; pits or pores present on 4 (2-4) scales immediately posterior to last tubed scale; a continuous series of 9 (7-9) pored or pitted scales mid-laterally on caudal peduncle to caudal base.

Table III. Comparison of salient colour pattern differences of members of the "*hemicyanea* complex" of *Chrysiptera* species.

Species	Ground colour	Anal fin colour	Pelvic fin colour
C. cymatilis	blue	blue	blue
C. hemicyanea	blue & yellow	yellow	yellow
C. giti	blue & yellow	yellow	blue
C. oxycephala	pale green	white	white
C. parasema	blue & yellow	blue	blue
C. pricei	blue & white	white	white
C. sinclairi	blue	blue	blue
C. springeri	blue	blue	blue
C. species A	blue	blue	blue
C. species B	blue & yellow	yellow	yellow

Origin of dorsal fin at level of third tubed scale of lateral line; spines of dorsal fin gradually increasing in length to sixth or seventh spine, remaining spines slightly decreasing in length; membrane between spines deeply incised; first dorsal spine 4.0 (3.6-4.7), seventh dorsal spine 1.7 (1.6-1.9), last dorsal spine 2.1 (2.1-3.0), longest soft dorsal ray 1.5 (1.2-1.9), all in HL; length of dorsal fin base 1.6 (1.6-1.7) in SL; first anal spine 3.1 (3.2-4.7), second anal spine 1.6 (1.6-1.8), longest soft anal ray 1.3 (1.2-1.4), all in HL; base of anal fin 2.2 (2.2-2.5) in base of dorsal fin; caudal fin emarginate with rounded lobes, its length 3.3 (2.8-3.5) in SL; pectoral fin reaching a vertical through origin of anal fin, the longest ray 3.3 (3.0-3.3) in SL; filamentous tips of pelvic fins reaching slightly beyond origin of anal fin when undamaged (tips broken off in holotype and most paratypes), the longest ray 3.6 (2.8-3.6) in SL.

Colour in life (Figs 1 and 3): generally brilliant blue with vertical grey streak on each scale, becoming abruptly yellow posterior to an oblique line connecting dorsal edge of caudal-fin base and anal fin origin, including basal half of caudal fin, most of caudal peduncle, and anal fin; a broad black stripe from snout tip to middle of anterior edge of eye and narrower black stripe below from upper lip to lower anterior corner of eye; iris blue with blackish stripe along anterior and ventral margins, also blackish stripe through middle of eye (continuation of upper snout stripe); small (about

one-third pupil size) blackish to dark grey spot on upper opercular edge; spinous portion of dorsal fin brilliant blue; caudal fin yellow basally with translucent outer half; anal fin yellow with blue anterior edge; pelvic fins blue; pectoral fins translucent with small blackish spot at base of uppermost 2-3 rays.

Colour in alcohol (Fig. 2): generally dark bluish grey, abruptly tan to whitish, including caudal and anal fins, posterior to an oblique line connecting dorsal edge of caudal-fin base and anterior origin of anal fin; most scales on dark portion of body with narrow blackish, vertical streak; a broad black stripe from snout tip to middle of anterior edge of eye and narrower black stripe below from upper lip to lower anterior corner of eye (i.e. pair of short black stripes on side of snout to anterior edge of eye); spinous dorsal fin dark bluish grey; soft dorsal fin translucent with dusky grey rays; pelvic fins dusky grey; pectoral fins translucent with a narrow blackish bar across base, darkest at base of uppermost rays.

Remarks: *Chrysiptera* contains at least 30 described species, all from the Indo-west and central Pacific region. Allen (1991) characterised the genus (formerly known as *Glyphidodontops* Bleeker, 1877) as small damselfishes, usually with a relatively elongate body (2.1-2.7 in SL for most species), with smooth preopercular and suborbital margins, and biserial dentition in most species. The group, which appears to be polyphyletic, will likely be divided into several genera as a result of a study of genetic relationships currently in progress by the authors and Paul Barber of Boston University. *Chrysiptera giti* belongs to a complex of 10 closely related species from the Indo-Australian Archipelago that contains *C. cymatilis* Allen, 1999, *C. hemicyanea, C. oxycephala* (Bleeker, 1877), *C. parasema* (Fowler, 1918), *C. pricei* Allen & Adrim, 1992, *C. sinclairi* (Allen, 1987), *C. springeri* (Allen & Lubbock, 1976), and at least two additional undescribed species. The group is primarily restricted to the area which includes Indonesia, Philippines, New Guinea, and the Solomon Islands, ranging southward to offshore reefs of northwestern Australia and northward to Japan.

The members of the complex have a distinctive shape that is relatively deep-bodied (maximum

Fig. 3. Underwater photographs of closely related species of *Chrysiptera* (30-35 mm SL): *C. giti*, Fak Fak Peninsula, western New Guinea (upper left), *C. hemicyanea*, Raja Ampat Islands, western New Guinea (upper right), *C. parasema*, El Nido, Philippines (lower left), and *C.* species B, Madang, Papua New Guinea (lower right). Photos by G. R. Allen.

depth 1.9-2.2 in SL) for the genus, a deeply incised spinous dorsal fin, and bright coloration largely consisting of blue or a combination of blue and yellow. Colour pattern differences (key to species below and Table II) in combination with gill-raker and dorsal spine counts provide the best means of separation. The new species most closely resembles *C. hemicyanea*, *C. parasema*, and an undescribed species *(Chrysiptera* species B) from New Guinea and northern Sulawesi (see Fig. 3). They are generally allopatric over most of the geographic range (Fig. 4), although *C. hemicyanea* co-occurs with the undescribed species at the Raja Ampat Islands off the extreme western end of New Guinea, and the same undescribed species is sympatric with *C. parasema* at eastern Flores in Indonesia. A study of genetic relationships (Barber et al., in preparation) within *Chrysiptera* reveals that the four species form a monophyletic clade and the new species is most closely related to *C. parasema*.

Key to *Chrysiptera* species in the *hemicyanea* complex

1a. Colour pattern mainly brilliant blue in life without yellow or whitish areas..... 2
1b. Colour pattern not primarily blue, either a combination of blue and yellow, blue and white, or mainly pale greenish 5
2a. Dorsal spines usually 12..... 3
2b. Dorsal spines usually 13..... 4
3a. Most of scales immediately below dorsal-fin base, and on upper half of caudal peduncle blackish (Philippines and Sabah)..... ..... *C.* species A
3b. Most of scales immediately below dorsal-fin base, and on upper half of caudal peduncle blue (eastern Indonesia) .... *C. springeri*
4a. Total gill rakers on first arch 22-27 (Bismarck Archipelago and Milne Bay Province of Papua New Guinea and Solomon Is.) .... *C. cymatilis*
4b. Total gill rakers on first arch 31-34 (Bismarck Archipelago of Papua New Guinea) .... *C. sinclairi*

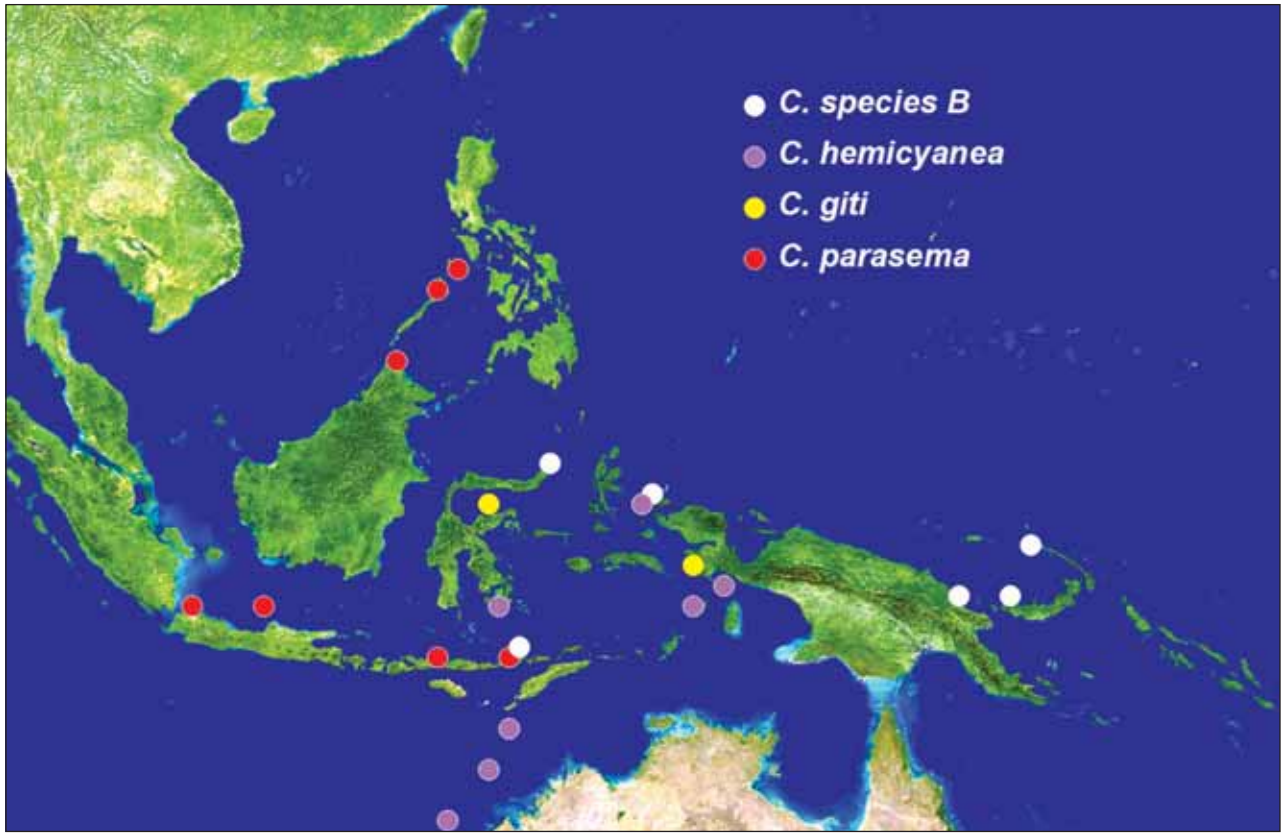

Fig. 4. Map of Indo-Australian Archipelago showing distributional range of *Chrysiptera giti* and other closely related species.

5a. Head and body primarily blue with variable amounts of yellow coloration including caudal fin and peduncle 6
5b. Head and body either blue or light green over most of body, grading to white ventrally 9
6a. Yellow coloration confined to caudal fin and adjacent peduncle; anal fin entirely bluish (W. Indonesia, Sabah, and Philippines) .... *C. parasema*
6b. Yellow coloration not confined to caudal fin and adjacent peduncle; anal fin entirely or partly yellow 7
7a. Breast and lower one-fourth of body yellow (offshore reefs of NW Australia, S. Sulawesi, and W. New Guinea, and Kei Is.) .... *C. hemicyanea*
7b. Breast and lower one-fourth of body blue 8
8a. Pelvic fins yellow, posterior portion of body abruptly yellow behind vertical line extending from last dorsal spines to about anterior fourth of anal fin (N. New Guinea and N. Sulawesi) ..... *C.* species B
8b. Pelvic fins blue, posterior portion of body abruptly yellow behind oblique line extending from upper caudal-fin base to anal fin origin (Fak Fak Peninsula, W. New Guinea and Togean Islands off northeastern Sulawesi) .... *C. giti* n. sp.
9a. Head and body blue on dorsal two thirds, white on lower third and most of caudal peduncle (Cenderawasih Bay, W. New Guinea) ..... *C. pricei*
9b. Head and body mainly pale green, grading to white on lower third and most of caudal peduncle, most of body scales with 2-3 vertically aligned small blue spots (Solomon Islands and Palau to E. Indonesia and Philippines) ..... *C. oxycephala*

Distribution and habitat: *C. giti* is currently known only from two Indonesian locations: the vicinity of Sebakor Bay on the southern coast of the Fak Fak Peninsula of western New Guinea and the Togean Islands off northeastern Sulawesi (Fig. 4). The habitat consists of sheltered fringing reefs, usually in bays at depths between about 3 to 20 m. It generally occurs in small aggregations and is closely associated with branching formations of live coral, particularly *Acropora* spp. and the pocilloporid *Seriatopora hystrix*. The fish hover a short distance above the substratum, presumably feeding on zooplankton. It was common at both the Togean Islands and in Sebakor Bay, but generally replaced by *C. hemicyanea* in other parts of the Fak Fak Peninsula.

Etymology: The new species is named *giti* to honour the request of Enki Tan and Cherie Nursalim, who successfully bid to support the conservation of this species at the Blue Auction in Monaco on 20 September 2007 and have given generously to support Conservation International's Bird's Head Seascape marine conservation initiative. The name is in honour of their family company. It is treated as a noun in apposition.

ACKNOWLEDGEMENTS

We are especially grateful to Conservation International (CI) and the Indonesian Department of Nature Conservation (PHKA) for sponsoring the 2006 expedition and especially to the Walton Family Foundation for their interest and generous support of CI's Bird's Head Seascape marine conservation initiative. We also thank Graham Abbott for assisting with diving activities on both the 2006 and 2007 visits to Triton Bay. The crews of our live-aboard boats, *Citra Pelangi* and *Shakti* provided excellent logistic support during these trips.

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Paracheilinus nursalim, a new species of flasher wrasse (Perciformes: Labridae) from the Bird's Head Peninsula of western New Guinea with a key to the species of *Paracheilinus*

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nAbstract

Paracheilinus nursalim is described from 16 male specimens, 39.4-51.0 mm SL, and three females, 20.9-28.9 mm SL, collected at the Fak Fak Peninsula and Triton Bay area of western New Guinea. It is distinguished from all other members of the genus on the basis of coloration of adult males, particularly the presence of a pair of prominent blackish patches, one below the anterior dorsal fin and another covering the ventral half of the caudal peduncle. Males also possess unusually long caudal fin filaments, which extend for about 50% of the standard length in some individuals. The new species most closely resembles the sympatric *P. cyaneus* (northeast Kalimantan, Sulawesi, and western New Guinea), but is easily distinguished on the basis of the previously mentioned features as well as its predominately orange ground colour compared to the magenta or reddish coloration of *P. cyaneus*. The latter species further differs in having a dark triangular marking on the spinous dorsal fin, red dorsal and ventral margins on the caudal fin, which extend onto the filamentous lobes, and a blue band below the eye that is about twice the width of a similarly-positioned band in *P. nursalim*. A key is provided for distinguishing the 16 species of the genus.

Zusammenfassung

Paracheilinus nursalim wird auf der Grundlage von 16 männlichen Exemplaren mit 39,4-51,0 mm SL und drei Weibchen mit 20,9-28,9 SL beschrieben, die aus der Gegend der Fak-Fak-Halbinsel und der Triton-Bucht am westlichen Neuguinea stammen. Von allen anderen Arten der Gattung unterscheidet sich die neue Art durch die Farbgebung der erwachsenen Männchen, insbesondere das Vorhandensein eines Paares auffallender schwärzlicher Flecken, von denen einer unterhalb der vorderen Rückenflosse liegt, während der andere die ventrale Hälfte des Schwanzstiels einnimmt. Auch besitzen die Männchen ungewöhnlich lange Fadenanhänge an der Schwanzflosse, die bei manchen Einzeltieren 50% der Standardlänge entsprechen. Am meisten ähnelt die neue Art dem sympatrischen *P. cyaneus* (nordöstliches Kalimantan, Sulawesi, und westliches Neuguinea), lässt sich aber anhand der genannten Merkmale leicht unterscheiden und auch durch die überwiegend orange Grundfarbe im Unterschied zu der magentaroten oder rötlichen Färbung von *P. cyaneus.* Diese zuletzt genannte Art unterscheidet sich außerdem durch ein dunkles, dreieckiges Zeichen auf der stachelartigen Rückenflosse, rote dorsale und ventrale Ränder auf der Schwanzflosse, die sich auf die fädigen Lappenanhänge erstrecken, und ein blaues Band unter dem Auge, das etwa doppelt so breit ist wie das Band an entsprechender Stelle bei *P. nursalim.* Den Abschluss bildet ein Bestimmungsschlüssel für die 16 Arten der Gattung.

Résumé

Paracheilinus nursalim est décrit sur bas de 16 spécimens mâles, de 29,4 à 51,0 mm de LS, et de trois femelles, de 20,9 mm de LS, collectés près de la péninsule Fak Fak et dans la région de Triton Bay de la Nouvelle-Guinée occidentale. L'espèce se distingue de tous les autres représentants du genre par la coloration des mâles adultes, surtout par la présence d'une paire de taches noirâtres bien marquées, l'une sous la dorsale antérieure et 'autre couvrant la moitié abdominale du pédoncule caudal. Les mâles disposent aussi de filaments exceptionnellement longs à la caudale qui s'étendent à près de 50% de la longueur standard chez certains individus. La nouvelle espèce ressemble le plus au *P. cyaneus* sympatrique (nord-est de Kalimantan, Sulawesi et Nouvelle-Guinée occidentale), mais se distingue facilement par les donnérs mentionnées ci-dessus ainsi que par sa couleur orange dominante, alos que *P. cyaneus* a une couleur magenta ou rougeâtre. Cette dernière espèce diffère encore par une marque triangulaire sombre sur la dorsale épineuse, des liserés rouges dorsaux et abdominaux sur la caudale qui s'étendent sur les lobes filamenteux, et par une bande bleue sous l'oeil qui a à peu près le double de la largeur de la bande de *P. nursalim* située au même endroit. Une clé est fornie pour la détermination des 16 espèces du genre.

Sommario

Paracheilinus nursalim è descritto in base a 16 esemplari maschi di 39.4-51.0 mm SL e tre femmine di 20.9-28.9 mm SL raccolti presso la penisola Fak Fak e la baia del

Tritone della Nuova Guinea occidentale. Si distingue da tutti gli altri membri del genere sulla base della colorazione del maschio adulto, in particolare per la presenza di un paio di evidenti chiazze nerastre, una sotto la pinna dorsale anteriore e un'altra che copre la metà ventrale del peduncolo caudale. I maschi possiedono anche lobi caudali con filamenti eccezionalmente lunghi, che in alcuni individui si estendono per circa il 50% della lunghezza standard. La nuova specie assomiglia moltissimo alla simpatrica *P. cyaneus* (Kalimantan nordorientale, Sulawesi e Nuova Guinea occidentale), ma è facilmente distinguibile sulla base delle caratteristiche precedentemente menzionate e anche per la sua colorazione di fondo prevalentemente arancione rispetto a quella magenta o rossastra di *P. cyaneus*. Quest'ultima differisce inoltre per avere un'impronta scura triangolare sulla porzione spinosa della pinna dorsale, la pinna dorsale rossa e rossi anche i margini ventrali della pinna caudale che si estendono sui lobi filamentosi, una banda blu sotto l'occhio larga circa due volte l'ampiezza di una banda posizionata in modo simile in *P. nursalim*. Per distinguere le 16 specie che compongono il genere è fornita una chiave dicotomica.

INTRODUCTION

The labrid genus *Paracheilinus* Fourmanoir, 1955 ranges across the Indo-Pacific region from the Red Sea and East Africa to the islands of Micronesia and Melanesia. Members of the genus are commonly referred to as flasher wrasses due to their vivid colours, which are instantaneously "flashed" by adult males during daily courtship episodes. This behaviour is greatly enhanced by bouts of rapid swimming interspersed with stationary displays featuring full erection of the dorsal and anal fins. Moreover, one or more dorsal fin rays have spectacular filamentous extensions in many species.

For many years the genus contained just a single species, *P. octotaenia* Fourmanoir, 1955, from the Red Sea. It remained poorly documented until the widespread use of scuba-diving equipment by scientists. Despite their brilliant colours, they are easily overlooked due to a relatively small size (usually under about 8 cm TL) and affinity for deeper rubble habitats and *Halimeda* algal beds. Moreover,

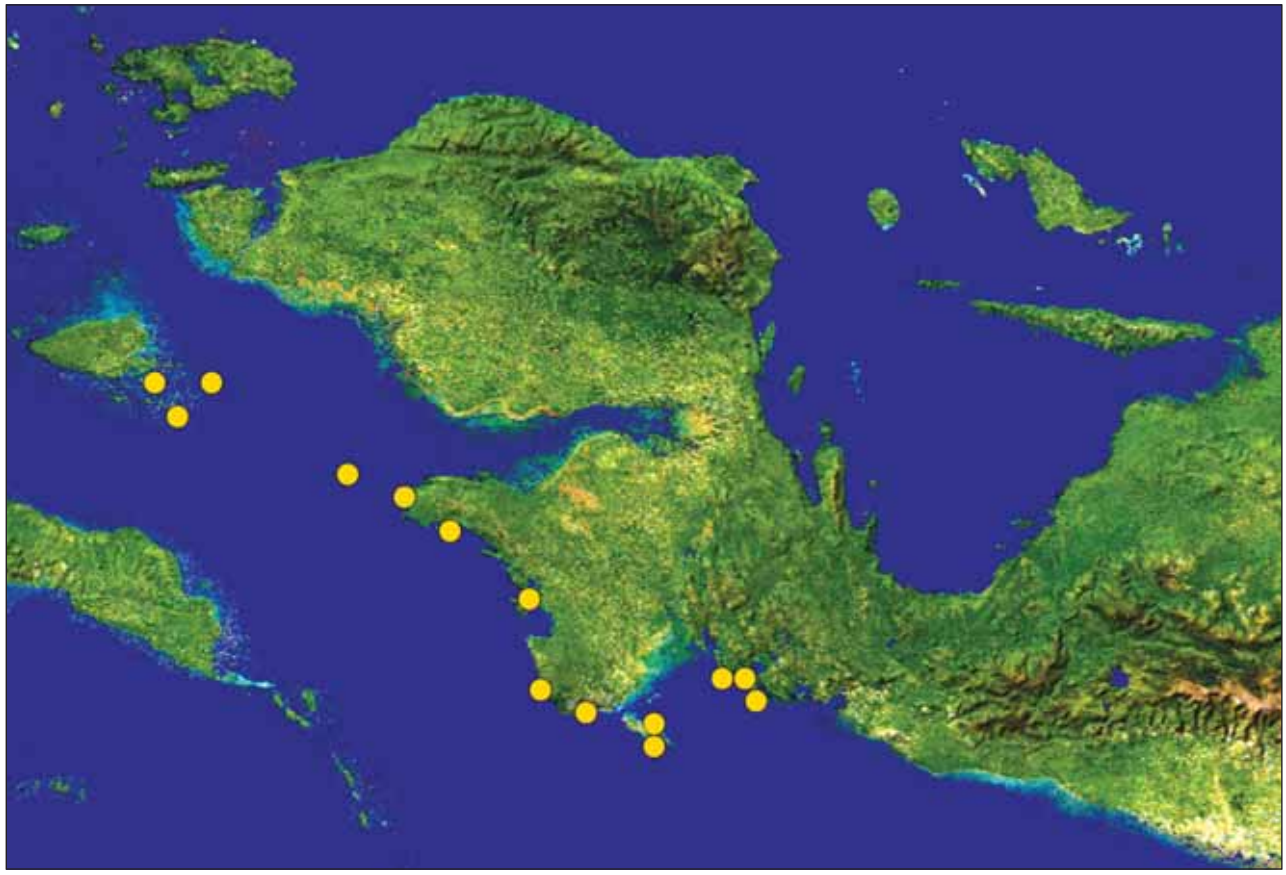

Fig. 1. Satellite map of Bird's Head Peninsula, western New Guinea with distribution of *Paracheilinus nursalim* indicated by yellow circles.

the colours are drastically muted at depth under ambient light conditions. They are most conspicuous during courtship when individual males repeatedly exhibit their seemingly neon-charged display. This behaviour has been observed during most hours of daylight, but appears to be most common about one hour prior to sunset.

There was a 19 year interval between the original account of *P. octotaenia* (Fourmanoir in Roux-Estève & Fourmanoir 1955) and the description of *P. filamentosus* Allen, 1974 from New Guinea. Since that time, there has been a more or less steady progression of new discoveries discoveries (Randall & Harmelin-Vivien 1977; Randall & Lubbock 1981; Cornic 1987; Randall 1988, 1999; Kuiter & Allen 1999; Randall & Allen 2003; Allen & Erdmann 2006) as a result of deliberate targeting of typical *Paracheilinus* habitat at preveiously unsurveyed locations. Most of the currently known species inhabit the mega-diverse Indo-Australian Archipelago, including *P. angulatus* Randall & Lubbock, 1981; *P. carpenteri* Randall & Lubbock, 1981; *P. cyaneus* Kuiter & Allen, 1999; *P. filamentosus*; *P. flavianalis* Kuiter & Allen, 1999; *P. lineopunctatus* Randall & Lubbock, 1981; *P. togeanensis* Kuiter & Allen, 1999; and *P. walton* Allen & Erdmann, 2006. Four species are known from the Red Sea and western Indian Ocean: *P. attenuatus* Randall, 1999; *P. hemitaeniatus* Randall & Harmelin-Vivien, 1977; *P. octotaenia;* and *P. piscilineatus* (Cornic, 1987). *Paracheilinus mccoskeri* Randall & Harmelin-Vivien, 1977 ranges westward across the Indian Ocean from the Persian Gulf and Comoro Islands to the Andaman Sea. The remaining two species, *P. bellae* Randall, 1988, and *P. rubricaudalis* Randall & Allen, 2003 are confined to the islands of western Oceania.

The present paper describes the sixteenth member of the genus, which we discovered during a Conservation International survey of the southern Bird's Head Peninsula of western New Guinea (Papua Barat Province of Indonesia) during April 2006. It was first sighted on coral reefs of the Fak Fak Peninsula (Fig. 1) and was commonly seen on most dives that included rubble habitat.

MATERIALS AND METHODS

Lengths given for specimens are standard length (SL), the straight-line distance from the front of the upper lip to the base of the caudal fin (posterior end of the hypural plate). Head length (HL) is measured from the same median anterior point to the end of the opercular membrane, and snout length from the same point to the fleshy edge of the orbit. Body depth is the maximum depth, and body width the greatest width just posterior to the gill opening. Orbit diameter is the greatest fleshy diameter, and interorbital width the least bony width. Caudal-peduncle depth is the least depth. Caudal-peduncle length is measured horizontally from the rear base of the anal fin to the caudal-fin base. Spines and rays are measured to their extreme base. Pectoral-ray counts include the uppermost rudimentary ray. Gill-raker counts were made on the first gill arch and include rudiments.

Proportional measurements are presented in Table I as percentages of the standard length. Data in parentheses in the description refer to the range for paratypes if different from that of the holotype. Type specimens are deposited at the Australian Museum, Sydney (AMS), Bishop Museum, Honolulu (BPBM), Pusat Penelitian dan Pengembangan Oseanologi, Jakarta, Indonesia (NCIP), Western Australian Museum, Perth (WAM), and United States Natural History Museum, Washington, D.C. (USNM).

Paracheilinus nursalim n. sp.

(Figs 2-4; Table I)

Holotype: NCIP 6327, male, 50.1 mm SL, Pulau Semisarom, 3°51.292'S 134°0.934'E, Triton Bay, Papua Barat Province, Indonesia, 25 m depth, spear, G. R. Allen, 22 April, 2006.

Paratypes: AMS I.44190-001, 2 males, 42.2-46.7, Pulau Panjang, 2°58.560'S 132°17.732'E, Fak Fak Peninsula, Papua Barat Province, Indonesia, 35 m depth, spear, M. V. Erdmann, 18 April 2006; BPBM 40658, 2 males, 44.8-47.2 mm SL, collected with AMS paratypes; NCIP 6328, 3 males, 41.9-46.8 mm SL, collected with AMS paratypes; WAM P.32788-001, 2 males, 42.6-49.2 mm SL, collected with AMS paratypes; WAM P. 32789-004, male, 43.4 mm SL, Teluk Sanggala, 3°56.188'S 132°49.930'E, Fak Fak Peninsula, Papua Barat Province, Indonesia, 25-32 m depth, spear, M. V. Erdmann, 19 April 2006; WAM P. 32792-004, female and male, 27.2 and 42.9 mm SL respectively, patch reef off Pulau Adi, 4°6.796'S 133°28.702'E, Fak Fak Peninsula, Papua Barat Province, Indonesia, 15 m depth, spear, M. V. Erdmann, 20 April 2006; WAM P.32794-001, male, 39.4 mm SL, Pulau Awarawis, 3°51.831'S

Fig. 2. *Paracheilinus nursalim*, freshly collected male holotype, 50.1 mm SL, Triton Bay, Papua Barat Province, Indonesia. Photo by G. R. Allen.

Fig. 3. Underwater photograph of *Paracheilinus nursalim*, male approximately 80 mm TL, in courtship colour, Triton Bay, Papua Barat Province. Photo by G. R. Allen.

Table I. Proportional measurements of type specimens of *Paracheilinus nursalim* expressed as percentage of the standard length.

Character	Holotype NCIP 6327	Paratype WAM P.32788	Paratype AMS I.44190	Paratype WAM P.32792	Paratype USNM 390775	Paratype USNM 390775	Paratype WAM P.32792
Sex	male	male	male	male	male	female	female
Standard length (mm)	50.1	49.2	46.7	42.9	39.4	28.9	27.2
Body depth	34.5	29.5	33.6	31.2	30.2	28.7	33.1
Body width	15.0	13.2	12.2	14.2	12.2	13.5	14.3
Head length	31.3	30.7	31.7	32.2	33.5	34.3	35.7
Snout length	8.2	7.7	7.7	8.2	8.4	8.0	7.4
Eye diameter	8.2	7.3	7.5	7.7	9.1	11.1	11.8
Interorbital width	6.8	7.3	6.2	6.5	6.3	7.3	8.5
Upper jaw	7.4	7.3	7.5	7.7	8.1	8.3	8.1
Caudal peduncle depth	14.6	15.0	13.9	15.9	14.0	13.5	15.4
Caudal peduncle length	20.4	18.7	21.2	19.6	17.3	17.0	15.8
Predorsal length	32.9	30.9	43.7	33.3	32.7	35.3	37.1
Preanal length	54.3	51.0	57.0	55.9	56.1	60.2	59.6
Prepelvic length	32.7	33.1	34.7	35.2	34.0	34.6	35.7
Length dorsal fin base	53.7	56.5	79.2	50.8	53.8	52.6	51.5
Length 1st dorsal spine	6.6	6.1	4.9	4.9	4.6	3.8	4.4
Length last dorsal spine	14.8	16.7	16.1	15.9	15.7	17.3	14.3
Length longest dorsal ray	54.9	53.7	56.5	52.9	47.0	14.2	20.6
Length anal fin base	29.5	30.7	30.2	30.3	26.9	24.6	22.8
Length 1st anal spine	7.6	7.5	8.4	6.5	6.3	4.8	4.4
Length 2nd anal spine	9.4	8.3	9.0	9.1	8.1	7.6	8.1
Length 3rd anal spine	10.0	9.1	10.5	10.3	10.2	8.7	9.6
Length longest anal ray	19.6	18.3	18.4	17.7	17.3	12.5	12.5
Length caudal fin	62.1	43.1	57.4	42.4	43.1	27.3	29.4
Length pectoral fin	22.6	20.7	22.1	21.4	22.8	20.1	22.1
Length pelvic fin spine	10.6	11.4	10.9	11.4	12.7	12.1	11.8

133°58.172'E, Fak Fak Peninsula, Irian Jaya Barat Province, Indonesia, 25-30 m depth, spear, G. R. Allen, 22 April, 2006; WAM P.32795-001, 51.0 mm SL, collected with holotype; USNM 390775, 2 females and 2 males, 20.6-28.9 and 39.4-47.9 respectively, Tanjung Soakasekai, 3°57.629'S 134°21.283'E, Triton Bay, Irian Jaya Barat Province, Indonesia, 45 m depth, spear, M. V. Erdmann, 26 April, 2006.

Diagnosis: Pored lateral-line scales 11-16+3-10, usually 16+5-7; gill rakers usually 12-13 (occasionally 14-15); body depth 2.9-3.5 in SL; usually 4-6 (rarely 3) dorsal soft rays of males prolonged as narrow, tapering filaments that are erected during courtship; caudal fin strongly lunate in males, the length 1.6 (1.7-2.4) in SL and caudal concavity 0.8-1.5 in HL; pelvic fins 1.6-1.8 in males and 2.0-2.2 in females, both in HL; live colour of male differs from all other *Paracheilinus* in having a pair of rectangular blackish patches, one on ventral half of caudal peduncle and adjacent body, and second, often less distinct, on upper back, below middle of spinous dorsal fin.

Description: Dorsal rays VIII,11 (usually IX,11 except two paratypes with VIII,11); anal rays III,9 (usually III,9 except four paratypes with III,10 and one with III,8); pectoral rays (including upper rudimentary ray) 14 (one paratype with 15); lateral-line interrupted, the pored scales 15 + 6, including pored scale on base of caudal fin (11-16 + 3-10, usually 16 + 5-7); scales above lateral line to origin of dorsal fin 2; scales below lateral line to origin of anal fin 6 ; median predorsal scales 4 (5); median preventral scales 5 (5-6); rows of scales on cheek 2; circumpeduncular scales 15 (15-16); gill rakers 12 (usually 12-13 except two paratypes with 14 and one with 15).

Body depth 2.9 (3.0-3.5) in SL; body width 2.3 (2.1-2.8) in body depth; HL 3.2 (2.8-3.3) in SL; snout short, 3.8 (3.9-4.9) in HL; orbit diameter 3.8 (3.0-4.2) in HL; interorbital width 4.6 (4.2-

5.3) in HL; least depth of caudal peduncle 2.2 (2.0-2.5) in HL; caudal-peduncle length 1.5 (1.5-2.3) in HL.

Mouth small, oblique, the maxilla nearly reaching a vertical at front edge of orbit; three pairs of curved canine teeth anteriorly in upper jaw, progressively more laterally projecting, the third (posteriormost) pair much the largest; a single pair of canine teeth anteriorly in lower jaw, very strongly curved laterally; jaws behind anterior canines with a single row of small close-set conical teeth; no canine tooth at corner of mouth; no teeth on palate; a fleshy flap on side of lower lip; gill rakers short, the longest about one-third length of longest gill filaments on first gill arch; posterior nostril an oval opening about 2-3 times size of sensory pores anterior to fleshy upper edge of orbit and on a vertical at anterior bony edge of orbit; anterior nostril small with a short fleshy rim anterior and slightly ventral to posterior nostril and preceded by first sensory pore of supraorbital series; internarial space about 3.3 (3.3-3.5) in orbit diameter; a row of 12 prominent circumorbital pores; four mandibular pores, followed by five preopercular pores.

Head scaled except for interorbital space, snout, and chin; a row of pointed scales on base of dorsal and anal fins; basal half of caudal fin with large scales; axillary scale of pelvic fin slightly shorter than pelvic spine; midventral scaly process of pelvic fins slightly shorter than pelvic spine.

Free ventral margin of preopercle extending to a vertical at center of eye, the vertical margin to level of lower edge of pupil; exposed bony edge of preopercle smooth but with hint of very tiny serrae in smaller individuals.

Origin of dorsal fin above third lateral-line scale, the predorsal length 3.0 (2.7-3.3) in SL; dorsal spines progressively longer, the first 4.8 (5.0-9.0) in HL, the ninth 2.1 (1.8-2.5) in HL; first, third, fifth, and seventh dorsal rays of male holotype filamentous (first, third, fifth, and seventh nearly always filamentous in male paratypes, but sixth, eighth, and ninth also filamentous in several others), the first ray longest 1.8 (1.8-2.1) in males, longest ray of female paratypes 4.9-7.0, both in SL; origin of anal fin below base of last dorsal spine, the preanal length 1.8 (1.7-2.0) in SL; first anal spine 4.1 (3.8-8.1) in HL; second anal spine 3.3 (3.3-4.5) in HL; third anal spine 3.1 (2.8-4.0) in HL; longest (penultimate) soft anal ray 1.8 (1.6-1.9 in males, 2.8-2.9 in females) in HL; caudal fin strongly lunate in males, 1.6 (1.7-2.4) in SL; caudal concavity of males 0.8 (1.0-1.5) in HL; caudal fin truncate in females, 3.4-3.7 in SL; pectoral-fin length 1.4 (1.4-1.7) in HL; pelvic-fin length of males 1.6 (1.6-1.8), of females 2.0-2.2, both in HL.

Colour after 12 months in alcohol: holotype overall yellowish tan with two broad, dusky grey blotches (each about 1-2 scales wide),

Fig. 4. Underwater photograph of *Paracheilinus nursalim*, female approximately 40 mm TL, Triton Bay, Papua Barat Province. Photo by G. R. Allen.

one on upper back immediately below dorsal fin and the other on ventral half of caudal peduncle, extending anteriorly to about base of fourth or fifth soft anal ray; pair of grey stripes on side of snout at levels of middle and lower edge of eye; pair of faint diagonal, grey bands radiating from upper and lower, posterior margin of eye, the upper one joining upper body stripe (see below) and the lower extending across cheek to lower edge of operculum; three faint stripes on upper half of side, the uppermost extending along entire length, but two lower ones reaching level of middle of anal fin or anterior to this point; fins mainly translucent whitish, but two posteriormost rays and basal half of inter-radial membranes of anal fin with dense covering of melanophores. Male paratypes with similar coloration, but intensity of darkened areas along back and on lower half of caudal peduncle highly variable, ranging from a faint trace of duskiness to nearly black (especially on lower caudal peduncle). In addition, some male paratypes have a very narrow black distal margin on the spinous dorsal fin and broader black margin on the anal fin. There is also variation in the number and extent of the dark stripes on the side: the lowermost stripe may extend posteriorly to the upper edge of the dark zone on the lower caudal peduncle and there is sometimes an additional short stripe (total of four) on the middle of the sides. Females overall yellowish tan with 3-4 faint, grey stripes on upper half of side and pair of similar stripes radiating from upper posterior margin of eye across upper half of head; fins translucent whitish or tan.

Colour of holotype when fresh (Fig. 2): body dull reddish grading to yellow on belly; a broad (about one scale wide) dusky dark grey zone on uppermost portion of back and intense black rectangular patch covering lower half of caudal peduncle, extending anteriorly to level of fourth soft anal ray; five thin, red-brown stripes on consecutive lateral scale rows, the lowermost from pectoral region to upper anterior corner of black peduncular patch, the second much shorter and broken into spots, extending to about level of third or fourth soft dorsal ray, the third similar in length but forming continuous line, the fourth similar to second, and the fifth more intense, consisting of horizontally elongate spot on each scale, just below dark zone on upper back; an oblique blue or purplish stripe from anterior tip of upper lip, passing across lower edge of eye to lower operculum; a similar, but less distinct stripe from upper edge of preoperculum to upper pectoral-fin base; iris yellow; dorsal fin reddish orange with pinkish red fin rays, the overlapping scales along base dark brown; anal fin red with yellowish overlapping scales along base, and relatively broad, blue distal margin; cau-

Fig. 5. Aquarium photograph of *Paracheilinus cyaneus*, male approximately 70 mm TL, in courtship colour, eastern Indonesia. Photo by H. Tanaka.

dal fin reddish with translucent central area (except for red fin rays); pelvic fins reddish on anterior two-thirds and yellowish posteriorly.

Live colour of courting males (Fig. 3): overall orange, fading to dull whitish or pink on upper half of caudal peduncle and upper back; a rectangular black patch on ventral half of caudal peduncle and adjacent body with sky blue stripe along its dorsal edge; a second, less distinct blackish blotch on upper back, below middle of spinous dorsal fin; faint red stripes on side as described above under fresh coloration; also several sky blue stripes as follows: one along base of dorsal fin, a second from snout to front of eye and continued from upper rear corner of eye to middle of upper side, a third posteriorly on middle of side, ending near middle of caudal peduncle, and fourth from corner of mouth, passing along lower edge of eye and across cheek to side of breast; spinous dorsal fin dull yellowish with narrow sky blue margin; soft dorsal fin mainly pinkish white with blue margin except where interrupted by filamentous rays; anal fin wine red with broad outer margin of sky blue and orange scales along base; caudal fin translucent, dappled with sky blue, and long, trailing filament of pinkish white on each lobe; pelvic fins wine red with yellowish suffusion; pectoral fins translucent yellowish.

Live colour of females (Fig. 4): overall pinkish red with pale yellowish mottling, particularly along upper back where there is series of about 7 saddle-like blotches just below dorsal fin base; 4-5 bluish or violet stripes on side, usually most pronounced on anterior half of body, with intermediate, irregular rows of small blue or violet spots; a pair of narrow blue or violet stripes radiating from rear edge of eye; light blue band from upper jaw, passing just below eye to side of breast; dorsal and caudal fin yellowish with narrow blue bands and small spots; anal fin red, often with yellow suffusion and 1-2 rows of bluish spots; pelvic fins whitish to slightly pink; pectoral fins translucent with yellow suffusion.

Remarks: The species of *Paracheilinus* are distinguished primarily on the basis of adult male characteristics including colour pattern (particularly during courtship) and shape of the median fins, especially the caudal fin (rounded, truncate, emarginate, lanceolate, or lunate) and number of elongate soft dorsal rays. The new species differs from all other members of the genus with regards to courtship coloration of males. It is the only species that has a prominent, rectangular black marking on the lower half of the caudal peduncle, a feature which also persists, in varying degrees, in preserved specimens. In terms of overall morphology, it belongs to the group of species that includes *P. bellae* (Marshall Islands), *P. cyaneus* (eastern Indonesia), *P. filamentosus* (South China Sea to Solomon Islands), and *P. walton* (Cenderawasih Bay, western New Guinea). Male members of this group are characterised by a strongly lunate caudal fin, with filamentous lobes and the possession of three or more long filamentous soft dorsal rays. The 16 known species of *Paracheilinus* are differentiated in the identification key which appears at the end of this section. The key is based mainly on adult male coloration, which is the best means of separating the various species.

Paracheilinus nursalim is most similar in general appearance to *P. cyaneus* (Fig. 5), which is sympatric with the former species throughout its known range (Misool, Fak Fak Peninsula, and Triton Bay area). The two species are easily distinguished on the basis of male coloration, particularly that associated with courtship displays (compare Figs 3 and 5). *Paracheilinus cyaneus* differs most notably in having a magenta or reddish ground colour compared to the predominately orange colour of *P. nursalim*. It also differs in having a yellowish brown triangular marking on the spinous dorsal fin, red dorsal and ventral margins on the caudal fin which extend onto the filamentous lobes, and it possesses a blue band below the eye that is about twice the width of that present in *P. nursalim*. It also lacks the pair of prominent blackish patches present in *P. nursalim* below the anterior dorsal fin and ventral half of the caudal peduncle. In addition, either one or both of the filamentous caudal-fin lobes of the new species are generally longer than those of *P. cyaneus*, reaching about 50% of the standard length in some individuals. Finally, *P. cyaneus* exhibits a strong turquoise hue over the head, adjacent anterior body, and along the back, extending onto the dorsal fin during the climax of courtship display.

Although the two species exhibit sympatric distributions and are frequently seen in close proximity, *P. nursalim* is considerably more abundant. We have witnessed agonistic encounters between males of the two species on several occasions. The distributional range also overlaps that of *P. flavianalis*, the adult male of which is easily distinguished from *P. nursalim* by its rounded caudal fin, a normal complement of only one to three filamentous dorsal rays, bright yellow anal fin, and lack of dark patches

on the back and tail. The new species is known only from the western Bird's Head Peninsula of New Guinea (Fig. 1). It ranges from southeastern Misool in the Raja Ampat group southeastward to the vicinity of Triton Bay or over a distance spanning approximately 450 km.

The habitat generally consists of semi-sheltered locations that are exposed to periodic strong currents. The species is invariably associated with gradual rubble slopes at depths ranging from about 5 m to at least 50 m, but it is most abundant between about 20 and 35 m. However, large aggregations, containing up to about 30 males and several hundred females, were occasionally encountered in only 6 to 10 m at Triton Bay.

Key to the species of *Paracheilinus* (based on adult males)

1a. Caudal fin strongly rounded or lanceolate.... 2
1b. Caudal fin slightly rounded, truncate, emarginate, or lunate..... 3
2a. Caudal fin strongly rounded, its margin forming more or less continuous profile with adjacent dorsal and anal fins; no dorsal rays prolonged in adults; body depth 2.7-3.0 in SL; adult males with eight narrow dark-edged blue stripes on body (northern Red Sea) ..... *P. octotaenia*
2b. Caudal fin lanceolate; first dorsal soft ray prolonged to a slender filament in adults; body depth 3.2-3.55 in SL; three pale blue to pink stripes on side of body; head with three narrow stripes extending posteriorly from eye, the lower reaching origin of anal fin (Seychelles and Kenya)..... *P. attenuatus*
3a. Caudal fin truncate, emarginate or lunate.... 4
3b. Caudal fin slightly rounded (may be truncate if not spread) 12
4a. Caudal fin truncate to emarginate; no soft rays of dorsal fin filamentous 5
4b. Caudal fin lunate; filamentous soft rays of dorsal fin present or absent 7
5a. Posterior part of dorsal fin pointed, the penultimate or preceding one or two rays longest; longest anal soft ray nearly as long or longer than HL (Philippines and northern Indonesia) ..... *P. angulatus*
5b. Posterior part of dorsal fin rounded, the rays not longer than middle rays; longest anal soft ray much shorter than HL 6
6a. Longest dorsal soft rays about equal to HL; dorsal fin mainly red; anal fin mainly yellow-orange; 5-6 faint magenta to bluish stripes following scale rows on body (Togean Islands)..... *P. togeanensis*
6b. Longest dorsal soft rays much shorter than HL; dorsal fin mainly yellow; anal fin mainly pink; two well separated blue stripes on body, one following anterior lateral line and continuing along upper part of body, the other from pectoral-fin base across abdomen and lower side to caudal-fin base just below lateral line; a blue stripe from snout across cheek to lower abdomen (Mauritius) .... *P. piscilineatus*
7a. No filamentous dorsal soft rays; first dorsal spine contained 2.3-2.4 in length of longest dorsal spine; six longitudinal purple lines on anterior third of body (Madagascar)..... ..... *P. hemitaeniatus*
7b. Adults with 3-9 filamentous dorsal soft rays; first dorsal spine contained 3-6 times in length of last dorsal spine; several narrow coloured stripes continuing full length of body 8
8a. Body slender, the depth 3.6-3.65 in SL (Marshall Islands)..... *P. bellae*
8b. Body less slender, the depth 2.9-3.5 in SL 9
9a. Filamentous dorsal rays usually 3-4; anal fin mainly yellow-orange; maximum SL about 45 mm (Cenderawasih Bay, Papua, Indonesia)..... *P. walton*
9b. Filamentous dorsal ray usually 5-9; anal fin mainly intense red; maximum SL about 50-70 mm..... 10
10a. Prominent rectangular, black patch on ventral half of caudal peduncle (southwestern New Guinea)..... *P. nursalim* n. sp.
10b. No black patch on ventral half of caudal peduncle 11
11a. Tubed peduncular scales usually 5 (not counting one on base of caudal fin); body depth 2.9-3.1 in SL; fine irregular longitudinal lines between principal coloured stripes on body; males in courtship with bright iridescent blue to white over most of head, nape, and dorsal fin except for red filamentous rays (northeast Kalimantan, Sulawesi, and Raja Ampat Islands) ..... *P. cyaneus*
11b. Tubed peduncular scales usually 6 or 7; body depth 3.1-3.3 in SL; no fine irregular longi-

tudinal lines between principal coloured stripes on body; adult males with six or fewer filaments in soft portion of dorsal fin (except Indonesian population which may have as many as nine); blue courtship colour of male confined to basal portion of dorsal fin (South China Sea, Philippines, and Indonesia to Solomon Islands) ..... *P. filamentosus*

12a. Four or more narrow pale blue to pink stripes on side of body; usually 2-5 filamentous dorsal soft rays 13

12b. Three narrow pale blue to pink stripes on side of body, the middle one on anterior half of body and slightly oblique; usually a single filamentous dorsal soft ray (except *flavianalis* with 1-4)..... 14

13a. Four narrow pale blue to pink stripes on side of body, the middle two on anterior half of body and slightly oblique; gill rakers 14-17; 2-4 filamentous dorsal soft rays; forehead more or less uniform without numerous blue lines and spots (southern Ryukyu Islands, Taiwan, South China Sea, Philippines, and Indonesia)..... *P. carpenteri*

13b. About 10-12 pale blue to pink stripes on side of body; gill rakers 12-16; 4-6 filamentous dorsal soft rays; forehead with numerous blue lines and spots (Philippines)..... ..... *P. lineopunctatus*

14a. First dorsal spine 4.2-6.2 in length of last dorsal spine; 1-4 red filamentous dorsal soft rays; anal fin yellow (southern Indonesia and reefs off northwestern Australia)..... ..... *P. flavianalis*

14b. First dorsal spine 2.9-3.5 in length of last dorsal spine; only first dorsal soft ray filamentous, its colour red or yellow; most of anal fin usually red..... 15

15a. Unscaled part of caudal fin mainly yellowish grey; body depth 3.1-3.4 in SL; pelvic fins 2.0-2.2 in HL (Comoro Islands, Persian Gulf, Maldives Islands, Chagos Archipelago, and Andaman Sea) ..... *P. mccoskeri*

15b. Unscaled part of caudal fin mainly red; body depth 3.4-3.6 in SL; pelvic fins 1.8-2.0 in HL (Fiji to Papua New Guinea)..... ..... *P. rubricaudalis*

Etymology: The new species is named *nursalim* to honour the request of Cherie Nursalim and Michelle Liem who successfully bid to support the conservation of this species at the Blue Auction in Monaco on 20 September 2007 and have given generously to support Conservation International's Bird's Head Seascape marine conservation initiative. The name is in honour of their beloved parents Sjamsul and Itjih Nursalim. It is treated as a noun in apposition.

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