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Pomacentrus bellipictus, a new microendemic species of damselfish (Pisces: Pomacentridae) from the Fakfak Peninsula, West Papua, Indonesia

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Abstract

A new species of damselfish, *Pomacentrus bellipictus*, is described from 13 specimens, 37.7–67.9 mm SL, collected at the Kokas area of the Fakfak Peninsula, a portion of the Bird's Head Peninsula of western New Guinea (West Papua Province, Indonesia). It is distinguished from most similar species in the western Pacific Ocean by having 14 instead of 13 dorsal-fin spines. It also possesses a unique facial coloration consisting of highly contrasted blue areas around the mouth and onto the isthmus, below the eye, and along the margin of the preopercle. The only other species of *Pomacentrus* from the region with 14 dorsal spines that are also drab-brown when alive, *P. fakfakensis* and *P. opisthostigma*, are clearly distinguished on the basis of adult and juvenile color patterns and also show different habitat preferences. In addition, *P. opisthostigma* is distinguished from the other two species by fewer lateral-line scales (usually 15–17 vs. usual 18–19) and more gill rakers on the first arch (26–29 vs. 18–21). The three species co-occur in the Kokas area, but occupy different habitats: *Pomacentrus bellipictus* inhabits rocky, wave-washed shorelines in about 1–2 m depth, while the other two species occur in deeper water. The new species is apparently endemic to the small area around the Fakfak Peninsula, where several other microendemic reef fish species have been described.

Key words: taxonomy, systematics, ichthyology, microendemic, coral-reef fishes, Indo-Pacific Ocean, Fakfak, Bird's Head Peninsula.

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Introduction

The damselfishes of the genus *Pomacentrus* Lacepède are common inhabitants of coral reefs throughout the Indo-west and central Pacific Ocean. Allen (1991) recognized 54 species, but since then an additional 23 species have been described (Allen 1992, 1993, 1995, 1999, 2002, 2004, Randall 2002, Allen & Wright 2003, Allen & Randall 2004, 2005, Allen & Drew 2012, Liu *et al*. 2014, Allen *et al*. 2011, 2017). It is the second largest genus in this major reef-fish family that comprises about 400 species. It is surpassed only by *Chromis* Cuvier with about 92 species. The majority of species of *Pomacentrus* (about 80%) are primarily distributed in the western and central Pacific region, with lesser representation in the Indian Ocean. The genus is particularly well represented in the diverse Indo-Malay Archipelago, where at least 44 species are known to occur (Allen & Erdmann 2012).

We describe here a new species of *Pomacentrus* that was collected during a Conservation International (CI) marine-biodiversity survey of the Fakfak Peninsula of western New Guinea (West Papua Province, Indonesia) in March 2018. A total of 13 specimens were collected at Fuum, a tiny islet situated about 4 km from the mainland, near the town of Kokas. This location lies within the Bird's Head Seascape (Fig. 1), an area that has been intensely

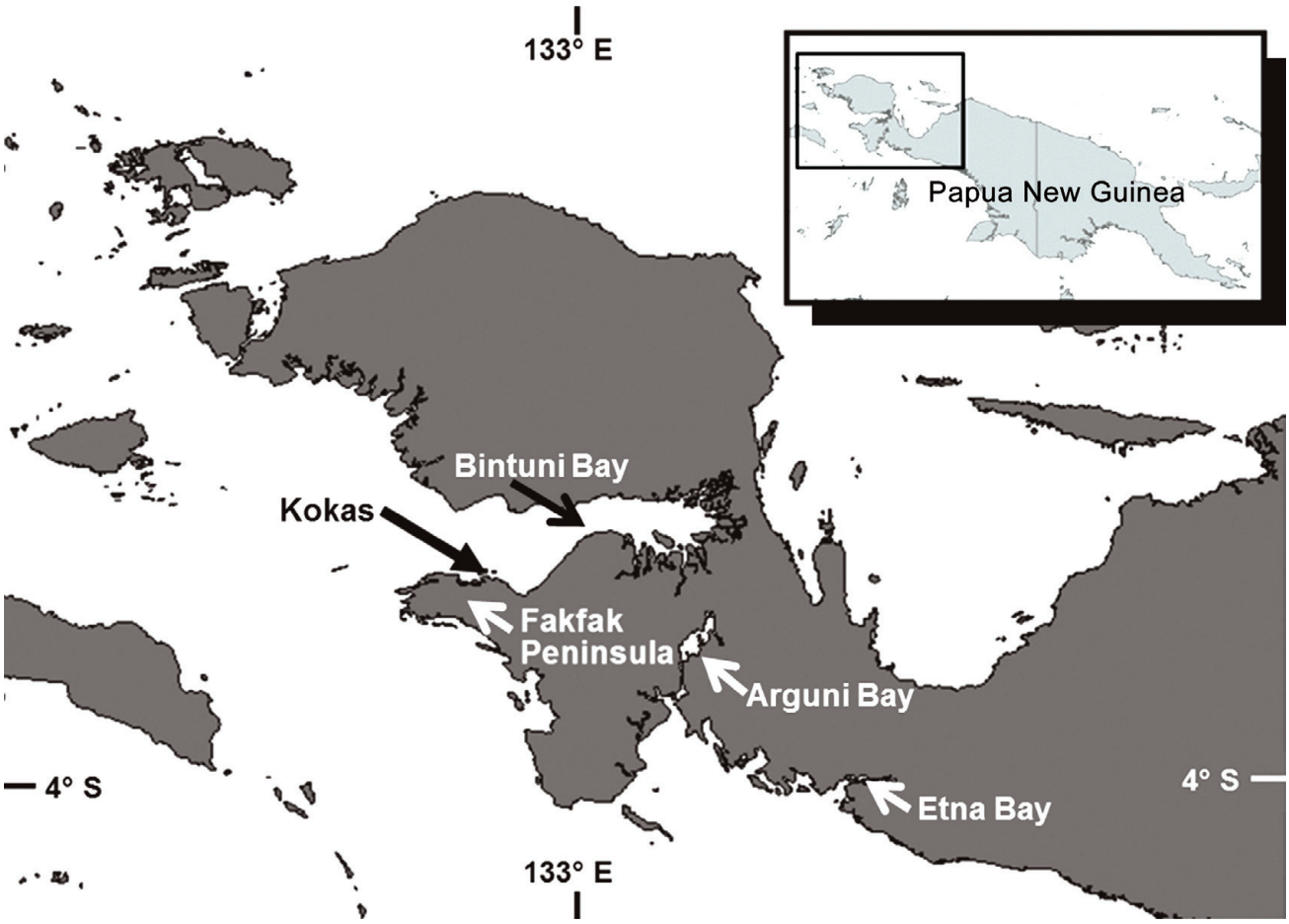

Figure 1. Map of the Bird's Head Seascape region of western New Guinea showing the location of the Kokas area, northern Fakfak Peninsula (large-scale inset map of Papua New Guinea, showing mapped area of Bird's Head Seascape).

surveyed by CI beginning in 2001. Our observations and collections in this region indicate an extraordinary wealth of diversity of reef-associated fishes, with 1,806 species recorded to date.

Although occupying a relatively small portion of the greater Bird's Head Peninsula, the Fakfak Peninsula appears to have several local microendemic fish species that are either entirely or mainly (except for vagrant reports) confined to the Fakfak Peninsula. Species in this category include *Scorpaenodes bathycolus* Allen & Erdmann, 2012 (Scorpaenidae), *Manonichthys jamali* Allen & Erdmann, 2007 (Pseudochromidae), *Chrysiptera giti* Allen & Erdmann, 2008 and *Pomacentrus fakfakensis* Allen & Erdmann, 2009 (Pomacentridae), and *Paracheilinus nursalim* Allen & Erdmann, 2008 (Labridae). The new species of *Pomacentrus* described herein is also likely a member of this group.

The Fakfak region includes perhaps the least-explored reefs of the Bird's Head Seascape, and additional endemism can be expected to be discovered there. It is an apparent "island of evolution", with the local coral reefs isolated from adjacent mainland areas by Bintuni Bay in the north and Arguni and Etna Bays in the south (see Fig. 1). All of these bays are characterized by considerable freshwater runoff and siltation and exceptionally large tidal fluctuations, and hence are generally lacking coral reefs. The unusual physical environment may promote local adaptation and the surrounding bays may serve as an isolating mechanism, perhaps even a barrier to pelagic dispersal of some reef organisms.

Materials and Methods

Type specimens are deposited at the Museum Zoologicum Bogoriense, Cibinong, Java, Indonesia (MZB); the National Museum of Natural History, Smithsonian Institution, Washington DC, USA (USNM); and the Western Australian Museum, Perth, Australia (WAM).

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 the 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-fin 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-fin spine to the filamentous tip of the longest soft ray; pectoral-fin 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 scale-row count above and below the lateral line including .5 refers to a small truncated scale at the bases of the dorsal and anal fins; 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. The terms inner and outer pectoral-fin axil refers to the respective body and fin sides of the axil.

Counts and proportions in parentheses are the range for the paratypes, if different from the holotype, morphometrics in parentheses include range followed by the mean for the paratypes. Proportional measurements (expressed as percentages of the standard length) and counts for soft dorsal-fin rays, soft anal-fin rays, pectoral-fin rays, total gill rakers on the first arch, and the total of tubed lateral-line scales are presented in Tables 1 and 2, respectively.

Pomacentrus bellipictus, n. sp.

Bluemouth Demoiselle

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Figures 2, 3 & 4A; Tables 1 & 2.

Holotype. MZB 24596, 65.1 mm SL, Indonesia, West Papua Province, Kokas District, off Arguni Island, Fuum Islet, –2.6425°, 132.5227°, 1.5–2 m, spear, clove oil & handnet, G.R. Allen & M.V. Erdmann, 10 March 2018.

Paratypes. (collected with holotype) MZB 24597, 5 specimens, 37.7–61.4 mm SL; USNM 443778, 2 specimens, 61.8–65.0 mm SL; WAM P.34829-004, 5 specimens, 53.5–67.9 mm SL.

Diagnosis. Dorsal-fin elements usually XIV (rarely XIII),12–14 (usually XIV,14); anal-fin elements II,12–15 (usually 14–15); pectoral-fin rays 17–19 (rarely 19); tubed lateral-line scales 17–19 (usually 18); total gill rakers on first arch 18–20 (rarely 20); body depth 1.8–2.0 (mean 1.9) in SL; scales absent on preorbital and suborbital; lower margin of suborbital series with 4–12 serrae; color in life mainly dark brown, nearly black, with contrasting blue areas around mouth (including isthmus), below eye, and along margin of preopercle; iris of adult mostly dark gray with a narrow bronze ring around pupil.

Figure 2. *Pomacentrus bellipictus* n. sp., preserved holotype, MZB 24596, 65.1 mm SL, Kokas District, West Papua Province, Indonesia (G.R. Allen).

Description. Dorsal-fin elements XIV,13 (XIV,14, except one paratype with XIII,14); anal-fin elements II,14 (II,12–15); all dorsal and anal-fin soft rays branched, last to base; pectoral-fin rays 17 (17–19), uppermost pair and lowermost ray unbranched; pelvic rays I,5; principal caudal-fin rays 15, median 13 branched; upper and lower procurrent caudal-fin rays 6 (5–6), posterior pair segmented; scales in longitudinal series 27; tubed lateral-line scales 18 (17–19); posterior midlateral scales with a pore or deep pit (in continuous series) 7 (7–8); scales above lateral line to origin of dorsal fin 3; scales above lateral line to base of middle dorsal-fin spine 1.5; scales below lateral line to origin of anal fin 9; gill rakers 6 + 13 (6–7 + 12–14), total rakers 19 (18–20); pseudobranch filaments 15 (14–15); total vertebrae 26 (8 specimens).

Body ovate, depth 1.9 (1.8–2.0, 1.9) in SL, and compressed, width 2.5 (2.3–2.7, 2.5) in body depth; head length 3.2 (3.0–3.2, 3.1) in SL; dorsal profile of head evenly rounded from dorsal-fin origin to snout; snout length 3.4 (3.0–3.4, 3.3) in HL; orbit diameter 3.3 (3.1–3.5, 3.3) in HL; interorbital space convex, its width width 3.1 (3.0–3.4, 3.1) in HL; caudal-peduncle depth 2.0 (2.0–2.2, 2.1) in HL; caudal-peduncle length 3.2 (2.9–3.7, 3.2) in HL.

Mouth terminal, small, and oblique, forming an angle of about 25–30° to horizontal axis of head and body; maxilla reaching a vertical slightly beyond anterior edge of pupil, upper-jaw length 3.5 (3.3–3.6, 3.4) in HL; teeth of jaws uniserial posteriorly, becoming biserial at front of jaws with addition of slender buttress teeth in spaces between main row of larger teeth; teeth incisiform to conical, about 34–40 in main row (excluding buttress teeth) of each jaw of holotype. Tongue triangular with rounded tip, set far back in mouth.

Gill rakers long and slender, longest on lower limb near angle, about two-thirds length of longest gill filaments. Nostril round with slightly raised rim, level with lower edge of pupil and about midway between anterior edge of eye and upper lip.

Opercle ending posteriorly in flat spine, tip obtuse, barely projecting from beneath a large scale; rear margin of preopercle with 20 serrae on left side of holotype (15–25); preorbital with single serra, separated by rounded notch from suborbital series; lower edge of suborbital with 5 (4–12) tiny serrae.

Scales finely ctenoid; head scaled except lips and tip of snout; preorbital (lacrimal) and suborbital naked; scaly sheath at base of dorsal and anal fins, averaging about 80% pupil width at base of dorsal fin and about the same width at base of anterior part of anal fin, tapering in width on anteriormost and posteriormost sections; column of scales on each membrane of dorsal and anal fins, narrowing distally, those on spinous portion of dorsal fin progressively longer, reaching at least three-fourths distance to spine tips on posterior membranes, and covering as much as 63% of soft portion of dorsal fin and 70% of anal fin; small scales on caudal fin extending about 65–75% distance to posterior margin; small scales on basal 30–35% of pectoral fins; a cluster of several scales forming median process, extending posteriorly from between base of pelvic fins, its length 43–61% of pelvic spine; axillary scale above base of pelvic spine, its length 50–68% length of pelvic spine.

Origin of dorsal fin over second or third tubed lateral-line scale, predorsal distance 2.5 (2.4–2.7, 2.5) in SL; base of soft portion of dorsal fin contained about 2.5 (2.2–2.6, 2.4) times in base of spinous portion; dorsal-fin spines gradually increasing in length to last spine; first dorsal-fin spine 4.4 (3.8–4.9, 4.2) in HL; seventh dorsal-fin spine 2.0 (1.9–2.4, 2.1) in HL; last dorsal-fin spine 1.7 (1.6–2.0, 1.8) in HL; membranes of spinous portion of dorsal fin moderately incised between spine tips; seventh dorsal-fin soft ray longest, 1.4 (1.3–1.6, 1.4) in HL; first anal-fin spine 3.9 (3.2–3.9, 3.6) in HL; second anal-fin spine 1.6 (1.7–1.8, 1.7) in HL; longest (seventh) anal-fin soft ray 1.5 (1.4–1.6, 1.5) in HL; caudal fin moderately forked with rounded to moderately angular lobes, its length 3.2 (3.0–3.8, 3.3) in SL; fourth pectoral-fin ray longest, 3.3 (3.0–3.5, 3.2) in HL; pelvic-fin spine 1.9 (1.8–2.1, 1.9) in HL; first soft ray of pelvic fin forming filamentous tip, 2.7 (2.4–3.1, 2.8) in SL.

Color in alcohol. (Fig. 2) Adults generally dark brown, except lighter brown on thorax, abdomen, pelvic fins, and spinous dorsal fin. Freshly preserved adults show a hint of blue facial markings (no doubt disappearing with prolonged storage in alcohol). Preserved juvenile paratype, 37.7 mm SL, overall pale gray with darker median fins and a pale-edged, pupil-sized black spot on middle of soft dorsal fin.

TABLE 1

Proportional measurements of selected type specimens of *Pomacentrus bellipictus*, n. sp. as percentages of the standard length

	holotype	paratypes								
	MZB 24596	WAM P.34829	WAM P.34829	USNM 443778	WAM P.34829	MZB 24597	WAM P.34829	MZB 24597	MZB 24597	MZB 24597
Standard length (mm)	65.1	67.9	65.9	65.0	63.4	61.4	61.0	60.0	57.3	53.5
Body depth	53.8	52.9	49.3	53.8	51.8	53.5	53.0	49.1	53.2	52.9
Body width	21.3	20.9	19.7	21.6	20.1	23.4	22.1	18.5	20.8	19.3
Head length	31.1	33.1	31.4	32.8	32.5	33.8	32.4	31.5	32.4	33.2
Snout length	9.2	10.0	9.6	10.6	10.7	10.9	9.9	9.3	9.4	10.1
Orbit diameter	9.6	9.4	9.7	9.4	10.0	10.7	10.3	10.1	9.9	10.6
Interorbital width	10.2	10.3	10.2	10.7	10.5	9.9	10.6	10.3	10.1	10.6
Caudal-peduncle depth	15.8	15.1	15.4	15.5	16.1	15.9	15.5	15.6	16.0	15.4
Caudal-peduncle length	9.9	9.9	10.7	8.8	11.2	10.6	10.7	9.3	11.0	10.0
Upper-jaw length	8.9	9.2	9.3	9.7	9.3	10.3	9.6	9.4	9.0	9.9
Predorsal length	39.6	38.5	36.6	41.5	38.9	40.8	40.2	40.0	41.2	39.8
Preanal length	68.0	64.5	70.6	68.3	66.9	67.3	67.3	65.1	63.7	70.1
Prepelvic length	40.3	40.6	45.4	41.6	40.7	42.8	40.2	39.6	39.6	41.8
Length dorsal-fin base	66.3	67.9	63.7	66.7	66.0	65.9	66.5	65.8	69.1	66.5
Length anal-fin base	28.5	31.0	28.6	28.5	30.9	28.8	29.7	32.3	32.0	30.0
Length pectoral fin	30.0	31.1	30.7	30.4	31.1	31.1	32.8	32.0	30.8	33.0
Length pelvic fin	36.9	36.0	36.1	36.0	35.2	33.8	32.4	34.8	37.1	38.9
Length pelvic-fin spine	16.4	17.8	15.9	16.2	16.0	17.0	16.6	17.3	17.4	17.9
Length first dorsal spine	7.2	8.1	6.4	8.1	8.5	8.3	7.6	7.6	7.8	8.8
Length seventh dorsal spine	15.9	16.6	14.7	13.4	16.1	17.0	15.4	15.9	17.1	16.3
Length last dorsal ray	17.9	19.1	17.1	17.6	17.4	19.1	20.0	18.0	19.0	20.0
Length longest dorsal ray	21.5	22.4	23.0	20.6	23.0	21.4	25.2	22.4	23.6	25.4
Length first anal spine	7.9	8.7	8.4	8.9	9.3	9.5	10.1	8.6	8.3	9.7
Length second anal spine	19.0	19.3	18.0	17.8	18.3	19.3	19.6	18.9	19.0	19.1
Length longest anal ray	21.4	20.6	20.6	20.4	21.6	20.9	22.6	21.0	23.1	22.5
Length caudal fin	31.1	29.9	31.6	30.5	30.6	28.8	28.3	31.3	26.6	31.9
Caudal concavity	6.6	8.7	10.3	7.7	8.8	7.9	7.3	9.4	7.0	10.0

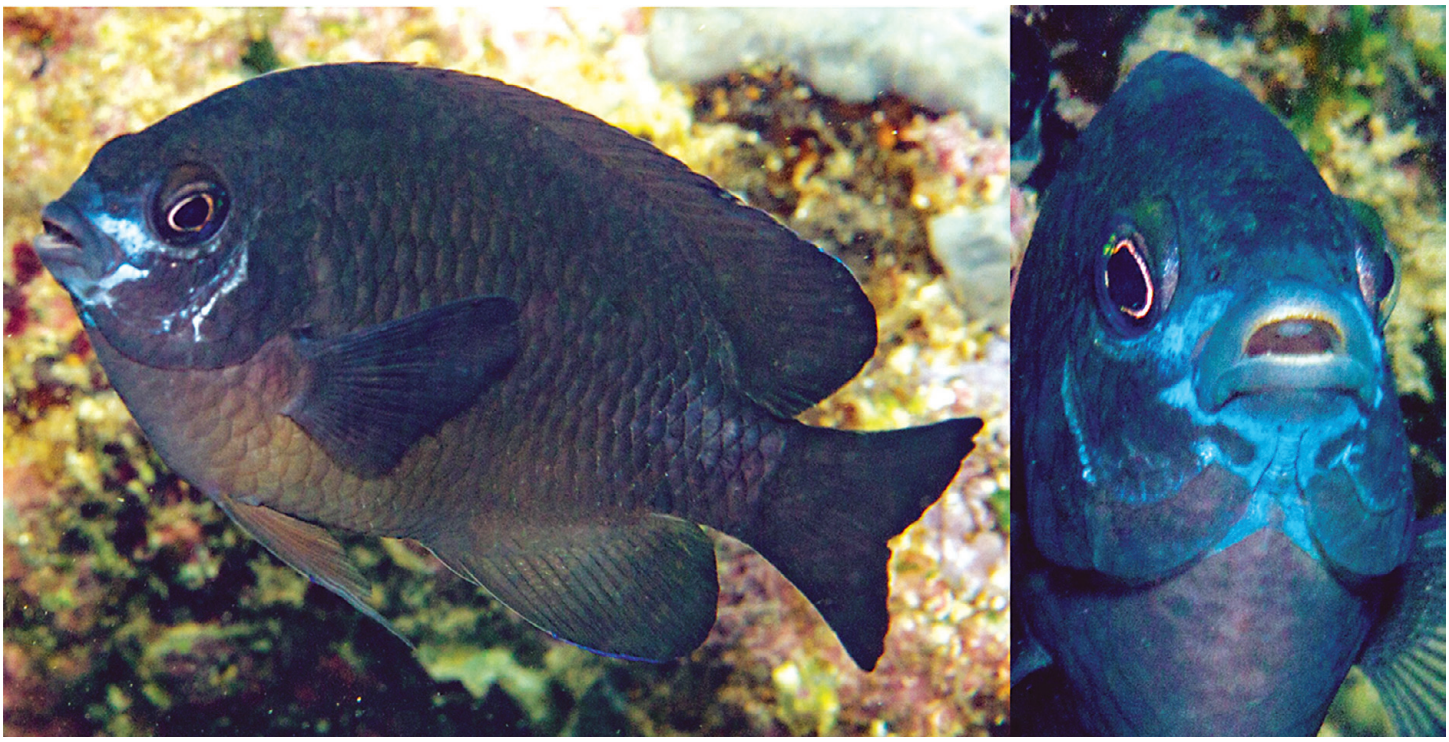

Figure 3. *Pomacentrus bellipictus* n. sp., underwater photographs of adult, approx. 60 mm SL, Kokas District, West Papua Province, Indonesia (M.V. Erdmann).

Color in life. (Figs. 3 & 4A) Adults with body and median fins dark brown, nearly black, with brown thorax and abdomen; head dark brown or blackish with blue facial markings as shown in Fig. 3; pelvic fins brown; pectoral fins translucent with dark brown rays; soft dorsal fin and anterior anal fin with narrow blue margin; iris of adult mostly dark gray with a narrow bronze ring around pupil. Juveniles with a prominent ocellus on soft dorsal fin (Fig. 4A), which gradually disappears with increased growth. It is generally absent in specimens larger than about 45 mm SL.

Etymology. The species is named *bellipictus* (Latin: war-painted) with reference to its facial coloration and belligerent behaviour towards divers. The specific epithet is a masculine compound adjective.

TABLE 2

Frequency distribution of soft dorsal-fin rays, anal-fin rays, pectoral-fin rays, total gill-rakers, and lateral-line scales for *Pomacentrus bellipictus*, n. sp.

(pectoral-fin rays and lateral-line scales recorded for both sides unless damaged)

Dorsal-fin spines		**Soft dorsal-fin rays**			**Soft anal-fin rays**			
XIII	**XIV**	**12**	**13**	**14**	**12**	**13**	**14**	**15**
1	12	1	1	11	1	0	8	4

Pectoral-fin rays			**Total gill rakers**			**Lateral-line scales**		
17	**18**	**19**	**18**	**19**	**20**	**17**	**18**	**19**
9	16	1	4	9	1	4	16	5

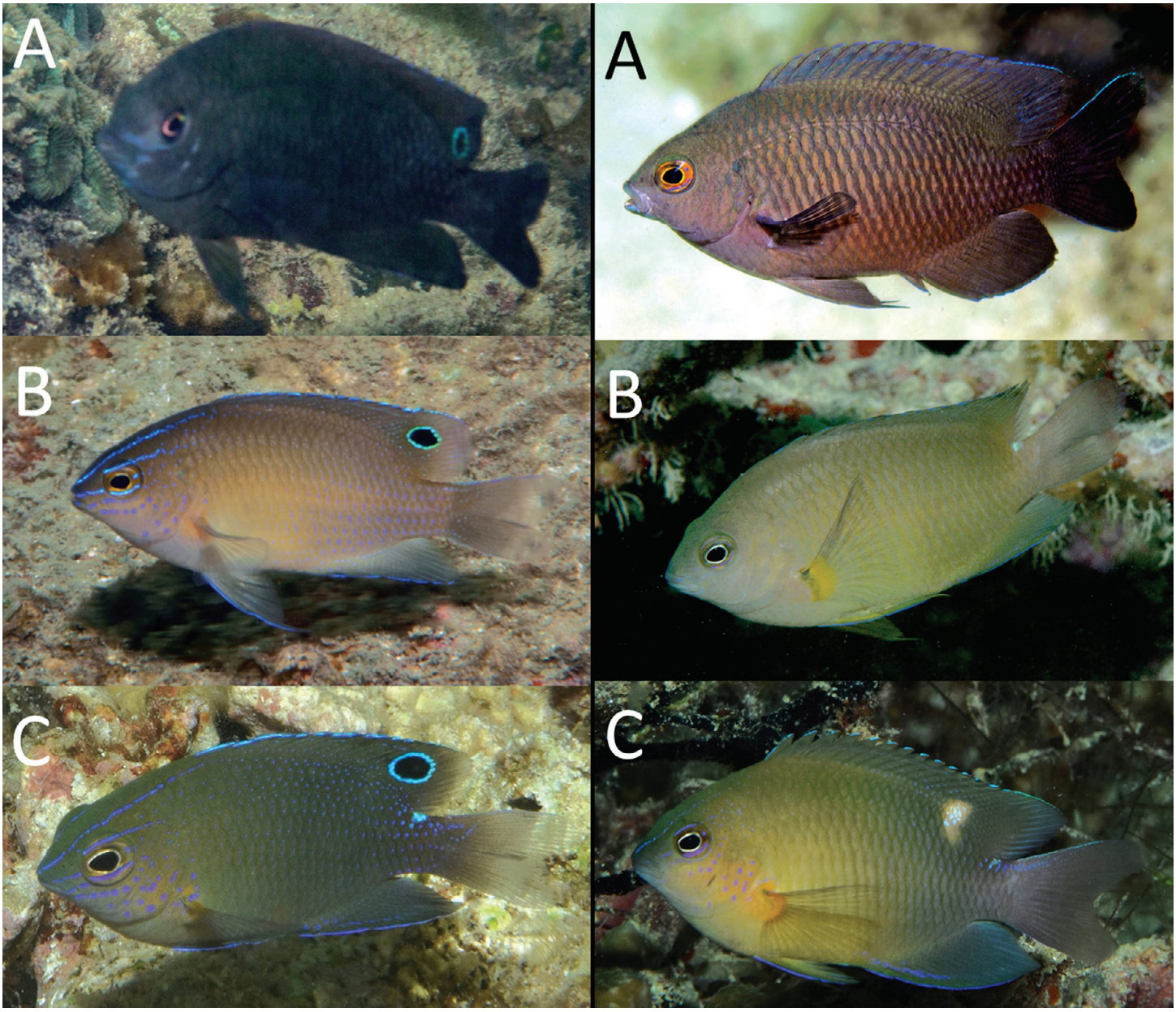

Figure 4 (left) & Figure 5 (right). Figure 4, juveniles of *Pomacentrus* spp., approx. 35 mm SL: A) *Pomacentrus bellipictus*; B) *P. fakfakensis*; C) *P. opisthostigma.* Figure 5, adults of co-occurring *Pomacentrus* spp., approx. 55–65 mm SL: A) *Pomacentrus fakfakensis*; B) *P. opisthostigma*, plain variation; C) *P. opisthostigma*, white-spot variation, all West Papua, Indonesia (G.R. Allen & M.V. Erdmann).

Distribution and habitat. The new species is currently known only from a relatively small area in the Kokas District of West Papua Province, located on the northern coast of the Fakfak Peninsula (Fig. 1). It was relatively common at the type locality, darting among wave-washed rocks and boulders next to shore in about 1–2 m depth (Fig. 6). Importantly, although the shoreline was exposed to significant wave action, the surrounding waters have characteristics more typical of estuarine habitats, i.e. with lowered salinity, high turbidity and sedimentation, and frequently elevated temperatures up to about 31°C. This particularly unusual combination of coastal and offshore conditions may account for the development of the microendemic species limited to this area.

Adults and subadults of the new species exhibited aggressive behavior when approached at close range, charging to within a few cm when confronted with either a camera or small collecting spear.

Comparisons. There are relatively few species of *Pomacentrus* inhabiting shallow inshore reefs that possess 14 dorsal-fin spines. The only others found in Indonesian Seas include *P. fakfakensis* Allen & Erdmann, 2009 and *P. opisthostigma* Fowler, 1918, both of which occur sympatrically with the new species. However, both of these species differ from *P. bellipictus* in coloration of both juveniles (Fig. 4) and adults (Fig. 5). In particular, both lack

Figure 6. Fuum Islet (foreground), the type locality of *Pomacentrus bellipictus*. Type specimens were collected from the mostly shaded area adjacent to the rocky shoreline (M.V. Erdmann).

the characteristic blue facial markings of *P. bellipictus*. *Pomacentrus fakfakensis* further differs in having a mainly yellow-orange iris vs. dark grey for the two other species. Although somewhat variable in color, *P. opisthostigma* can be differentiated from the other two species by possessing a yellowish pectoral-fin base and axil, as well as having blue or violet streaks on the upper and lower iris. It also differs in having fewer lateral-line scales (usually 15–17 vs. usually 18–19) and more gill rakers on the first arch (26–29 vs. 18–21). Although the three species co-occur on sheltered inshore reefs on the Fakfak Peninsula, there are clear differences in habitat selection, with *P. bellipictus* inhabiting the very shallow, wave-affected zone adjacent to the rocky shore at about 1–2 m depth, while *P. fakfakensis* is found on deeper (about 3–8 m) reef flats and the upper edge of fringing-reef slopes, and *P. opisthostigma* is found mostly on deeper parts (about 6–20 m) of the reef slope.

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