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A new species of damselfish (*Chrysiptera*: Pomacentridae) from coral reefs of the Solomon Islands

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Abstract

A sixth member of the *Chrysiptera oxycephala* group of Pomacentridae, *Chrysiptera burtjonesi* n. sp., is described on the basis of 24 specimens, 20.5–48.2 mm SL, collected at the Solomon Islands in the western Pacific Ocean. It differs from other members of the group, including *C. ellenae* (Raja Ampat Islands, West Papua Province in Indonesia), *C. maurineae* (Cenderawasih Bay, West Papua Province), *C. oxycephala* (central Indonesia, Philippines, and Palau), *C. papuensis* (northeastern Papua New Guinea), and *C. sinclairi* (Bismarck Archipelago and islands off northeastern Papua New Guinea), on the basis of its distinctive color pattern and a 6.9% divergence in the sequence of the mitochondrial control region from its closest relative (*C. maurineae*). Adults are primarily grayish brown to greenish except bright yellow on the ventralmost head and body, including the adjacent pelvic and anal fins. Juveniles are mostly neon blue to dark blue with bright yellow pelvic and anal fins. In addition, it is the only species besides *C. sinclairi* that usually lacks embedded scales on the preorbital and suborbital bones.

Key words: coral reef fishes, taxonomy, systematics, ichthyology, Indo-Pacific Ocean, mitochondrial DNA

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Introduction

The phenomenon of cryptic speciation is well-documented among coral-reef-dwelling damselfishes of the family Pomacentridae. Typically, a species that was formerly considered to be widely distributed, either across the Indo-Pacific region or in a more localized area such as the East Indian Archipelago, is found to consist of two or more closely related species. The discovery of divergent mtDNA lineages can instigate a closer examination of the markings, meristics, and morphology which indicate new species if sufficiently distinctive (Allen *et al*. 2008, Drew *et al*. 2008, Drew & Barber 2009, Allen & Drew 2012, Liu *et al*. 2012, Liu *et al*. 2014, Allen *et al*. 2015a, 2015b, Victor 2015). The development of cryptic speciation, especially geographic complexes of parapatric lineages, appears to be correlated with reduced dispersal, either by benthic eggs in conjunction with a short larval stage or extreme distances between populations (Victor 2015).

Allen *et al*. (2015a) confirmed cryptic speciation in one complex of the pomacentrid genus *Chrysiptera* Swainson, 1839. They divided *Chrysiptera oxycephala* (Bleeker, 1877) of the western Pacific into five species, i.e. nominal *C. oxycephala*, the previously described *C. sinclairi* Allen, 1987, and three new species, *C. ellenae*, *C. maurineae*, and *C. papuensis*. The evolution of the *C. oxycephala* species complex appears to be associated with the zone of tectonic activity along the boundary of the Pacific and Australian plates: a highly active area of subduction with associated vulcanism and migrating island arcs (Hill & Hall 2003, Polhemus 2007). The species other than *C. oxycephala* are endemic to portions of the dispersal corridor that Allen *et al*. (2015a) referred to as the Solomons-North Sulawesi conduit (Fig. 1). The conduit area appears to have promoted a wide dispersal of ancestral lineages, but subsequent local isolation events have facilitated the speciation process, not only in the *C. oxycephala* group, but in numerous other fish lineages. Indeed, there are at least 94 species (G.R. Allen, unpub. data), which are endemic to portions of the Solomons-North Sulawesi conduit.

The present paper describes a sixth member of the *C. oxycephala* group from the Solomon Islands. Allen *et al*. (2015a) included underwater photographs of both juvenile and adult stages, concluding it was likely an undescribed species based on its unusual color pattern. However, the lack of specimens and tissue samples for DNA analysis prevented a determination of its taxonomic status. Fortunately, the first two authors had a subsequent opportunity to obtain the necessary specimens during a visit to the Solomon Islands during October 2016. Morphological examination of the new material confirmed our initial suspicion that it represents the sixth member of the *C. oxycephala* grouping and a genetic analysis confirms its close relationship to other members of the complex.

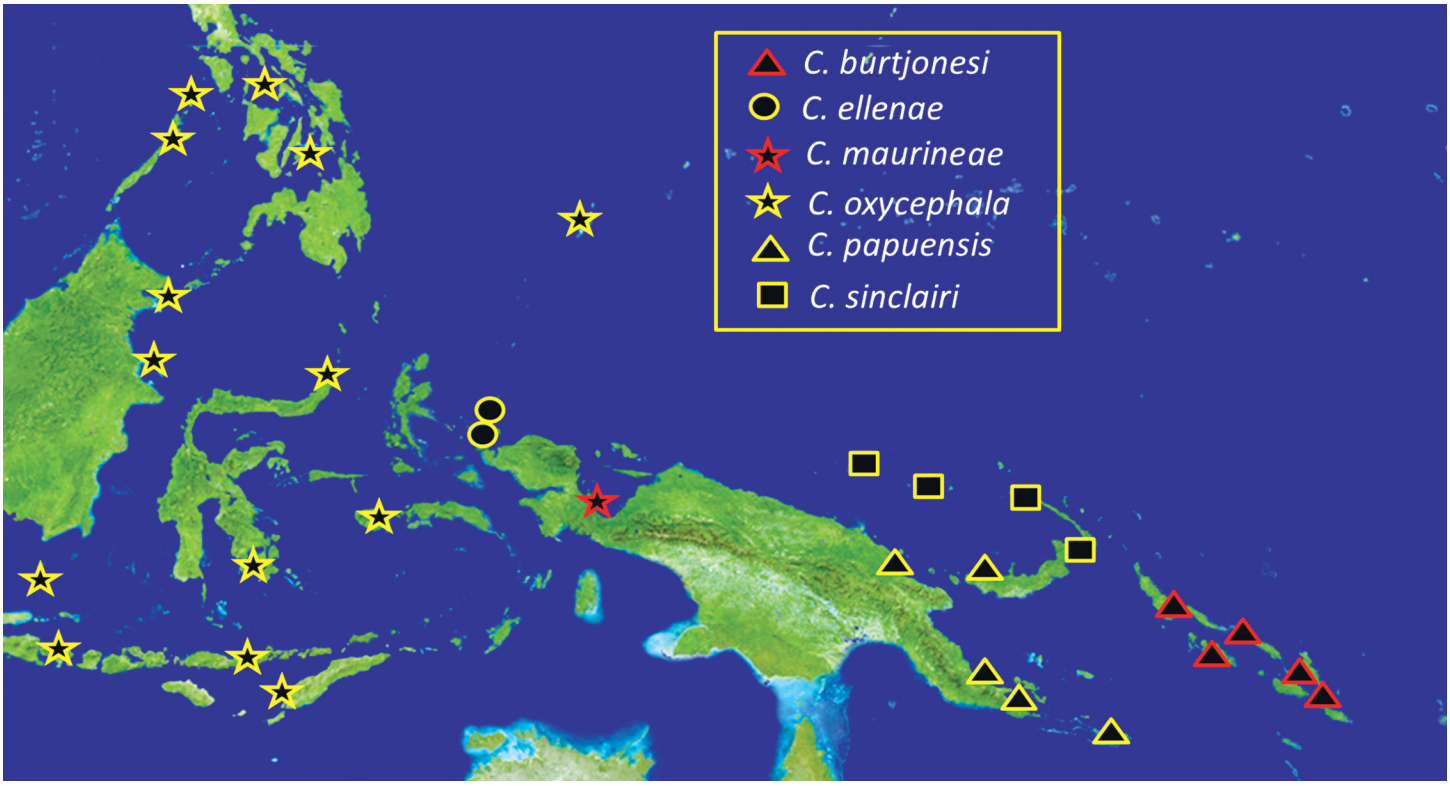

Figure 1. Map of the eastern portion of the East Indian Archipelago with distributions of the C. *oxycephala* species complex.

Materials and Methods

Type specimens are deposited at the National Museum of Natural History, Washington, D.C. (USNM) and Western Australian Museum, Perth (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 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; depth of the preopercle-suborbital is the greatest depth measured at the "bulge" near the level of the posterior extent of the maxilla; 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 decimal figure ".5" appearing in the scale row count above the lateral line refers to a small truncated scale at the base of the dorsal fin; preorbital+suborbital scales include all scales on the combined preorbital and suborbital bones, these are frequently embedded and difficult to discern without probing with a dissecting needle; circumpeduncular scales were counted in a vertical "zigzag" row around the caudal peduncle, immediately anterior to the caudal fin base; 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 appearing in parentheses apply to the paratypes when different from the holotype. Proportional measurements for the new species, expressed as percentage of the standard length, are provided in Table 1. A summary of fin-ray and lateral-line scale counts for members of the *C. oxycephala* species complex is presented in Table 2.

Genetic sequence data for the 5 species in the *C. oxycephala* group, as well as for outgroup species *C. giti*, *C. rollandi*, and *C. hemicyanea* (details in Allen *et al*. [2015a]), were utilized in the present study for comparison with 6 specimens of the new species. The specimens were fixed in 95% EtOH and stored at room temperature until tissues were processed for DNA extraction. Mitochondrial DNA was extracted using a 10% Chelex solution (Walsh *et al*. 1991). A portion of the control region was amplified via PCR using the primers CRE and CRK (Lee *et al*. 1995). The PCR reaction was carried out in 25 µL volumes, using 1 µL of template. Each reaction included 4 µL 10x PCR buffer (Applied Biosystems), 2.5 µL 10 mM dNTPs, 1.25 µL of each primer at 10 mM, 2 µL 25 mM $MgCl_2$ solution, 0.125 µL AmplyTaq Gold™ (Applied Biosystems), and 14.5 µL ddH_2O. The thermocycling profile included an initial denaturation of 94°C for 3 min, 35 cycles of 94°C for 30s, 53°C for 30s, and 72°C for 60s, with a final extension of 72° C for 2 min. The PCR reactions were checked on 1% agarose gels stained with ethidium bromide. The PCR product was sequenced at the UC Berkeley sequencing facility. Forward and reverse sequences were proofread using MEGA7 then aligned using ClustalW (Kumar *et al*. 2016). Two methods were used to generate phylogenetic reconstructions: neighbor joining and maximum likelihood using MEGA7. The NJ analysis was conducted in MEGA7 with the Kimura 2-Parameter model using 1000 bootstrap replicates to assess clade support. Maximum likelihood analysis assessed the model of best fit for the nucleotide substitutions. The Bayesian Information Criterion (BIC) tool ranked the Tamura 3-parameter (T92) model with a discrete Gamma distribution (T92+G) as having the best fit to the data. Bootstrap support was determined using 1000 bootstrap replicates in MEGA7. Analysis of polymorphic sites was conducted by DNAsp (Librado & Rozas 2009).

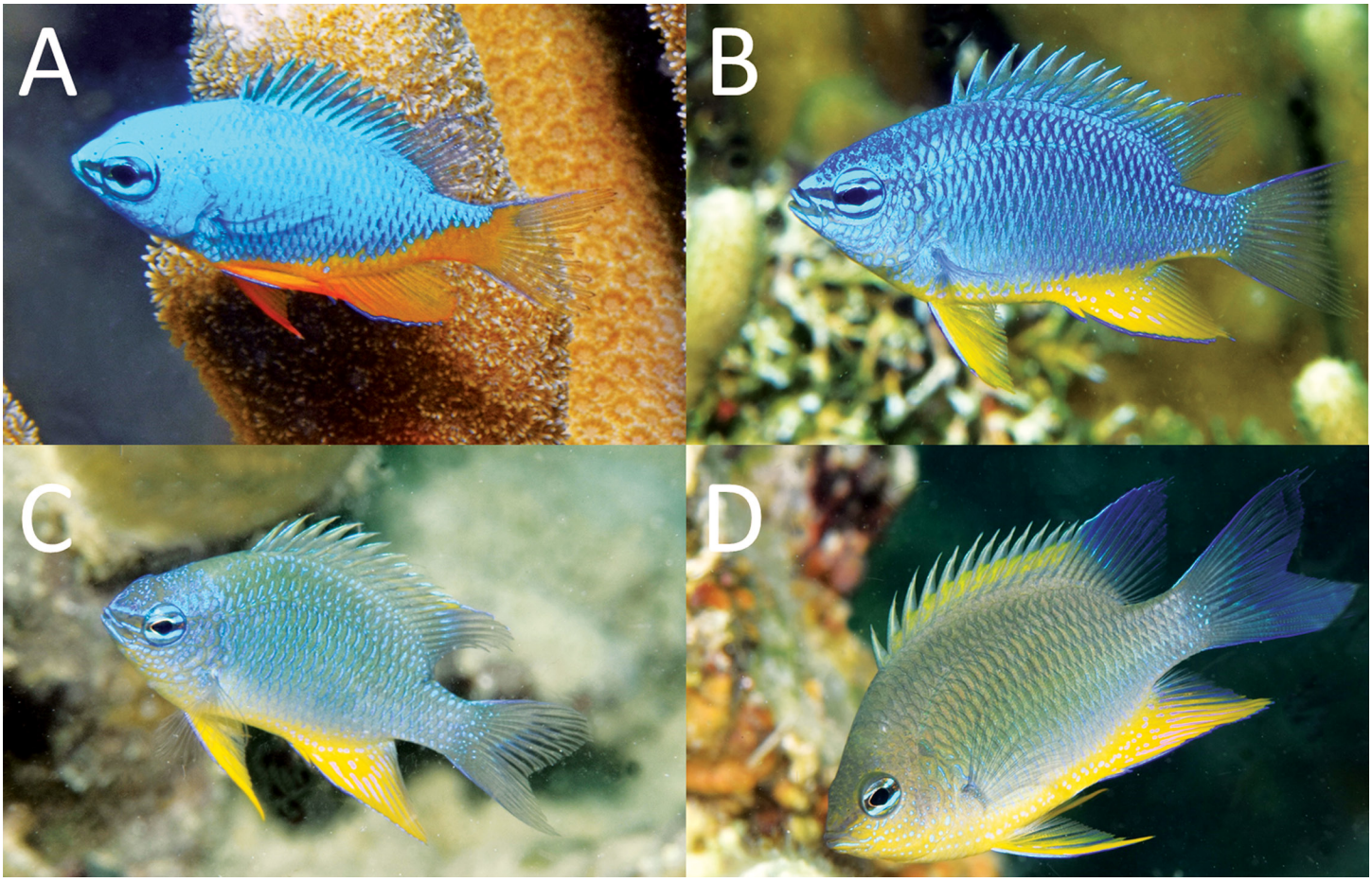

Figure 2. *Chrysiptera burtjonesi*, Solomon Islands, underwater photographs: A) juvenile, approx. 12 mm SL, B) juvenile, approx. 20 mm SL, C) subadult, approx. 35 mm SL, D) adult, approx. 45 mm SL (G.R. Allen).

***Chrysiptera burtjonesi*, n. sp.**

Burt's Damselfish

urn:lsid:zoobank.org:act:F3C3A451-0A98-4B73-BB38-B3A591246D6C

Figures 2–4, 5A & 6A; Tables 1–4.

Chrysiptera oxycephala [*non* Bleeker] Allen & Erdmann 2012: 593 (Solomon Islands, upper left photograph only); Allen *et al*. 2015a: 71, Fig. 9 (Solomon Islands).

Holotype. WAM P.34622-001, 47.7 mm SL, Solomon Islands, Florida Group, Nggela Island, Avi Avi, 09° 07.308' S, 160° 12.832' E, 2–8 m, spear, G.R. Allen, 11 October 2016.

Paratypes. USNM 432549, 5 specimens, 36.0–47.6 mm SL, collected with holotype; WAM P.25136-001, 2 specimens, 23.7–28.8 mm SL, Solomon Islands, off Malaita Island, Alite Reef, 08° 52.131' S, 160° 36.415' E, 3–12 m, clove oil and spear, G.R. Allen, J.E. Randall, and B. Goldman, 25 July 1973; WAM P.34618-001, 12 specimens, 20.5–40.6 mm SL, Solomon Islands, Russell Group, Yandina Island, 09° 05.030' S, 159° 12.348' E, 2–5 m, clove oil, G. Allen & C. Erdmann, 5 October 2016; WAM P.34622-002, 4 specimens, 44.6–48.2 mm SL, collected with holotype.

Diagnosis. A species of the pomacentrid genus *Chrysiptera* with the following combination of characters: dorsal-fin rays XIII,11 (rarely 10 or 12); anal-fin rays II,12 (rarely 13); pectoral-fin rays 15 (14–16); gill rakers on first branchial arch 9–11+20–22, total gill rakers 29–32; tubed lateral-line scales 13–16 (usually 14–15);

Figure 3. *Chrysiptera burtjonesi*, underwater photograph, approx. 40 mm SL, Russell Group, Solomon Islands (G.R. Allen).

preorbital+suborbital scales usually absent, occasionally 1–3 embedded scales present; color of adult overall grayish brown to greenish (sometimes with neon blue/green transverse streak on each scale) with translucent to pale greenish fins, except bright yellow ventrally on head, body, and adjacent anal and pelvic fins, a broad yellow band from base of first few dorsal-fin spines to outer edge of last dorsal-fin spine; juvenile neon blue on head, most of body (above diagonal line from pelvic-fin base to base of uppermost caudal-fin ray), and dorsal fin, remainder of body and adjacent fins bright yellow.

Description. Dorsal-fin rays XIII,11 (except one 10 and one 12); anal-fin rays II,12 (two with 13); pectoral-fin rays 15 (14–16, usually 15); branched caudal rays 13; principal caudal rays 15; upper procurrent caudal rays 6 (4–6); lower procurrent caudal rays 5 (4–5); gill rakers on first branchial arch 10+21 (9–11+20–22), total gill rakers 31 (30–32), pseudobranchs 14 (12–14); tubed lateral-line scales 15 (13–16); scales in lateral series from upper rear margin of opercle to base of caudal fin 27; scales above lateral line to base of middle dorsal-fin spines 1.5; scales below lateral line to anus 9; preorbital+suborbital scales usually absent, but 1–3 embedded scales present in 6 paratypes; total vertebrae 26 (25–26).

Body depth 2.0 (1.9–2.0) in SL; maximum body width 2.7 (2.7–3.1) in depth; HL contained 3.2 (3.0–3.2) in SL; snout 3.5 (3.0–3.8), eye 3.3 (2.7–3.2), interorbital width 3.3 (3.1–3.5), least depth of caudal peduncle 1.9 (1.9–2.2), length of caudal peduncle 2.1 (2.1–2.7), all in HL.

Mouth terminal, oblique, jaws forming an angle of about 35–40° to horizontal axis of head and body; maxillary reaching to 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 44 (44–52) teeth and lower jaw with about 46 (38–48) teeth in outer rows, largest about one-third diameter of pupil in height; secondary row of slender buttress teeth behind those of outer row in the spaces between them; single nasal opening on each side of snout; nostril with low fleshy rim; preorbital and suborbital relatively narrow, greatest depth of suborbital 34.5% (23.6%–37.5%) of eye diameter, ventral margin smooth; margin of preopercle smooth, without any denticulations; margin of opercular series smooth except blunt, flattened spine on upper portion near angle.

Scales of head and body finely ctenoid; snout tip, lips, chin, and isthmus naked; pair of primary transverse scale rows on cheek with row of smaller scales along lower margin; preorbital and suborbital naked in holotype and most paratypes, occasionally with 1–3 embedded scales (usually on one side only); 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 52.3% (46.2%–59.7%) length of pelvic-fin spine.

Tubed lateral-line scales ending below posterior spines of dorsal fin; 3 (2–4) pits or pores present on scales immediately posterior to last tubed scale; continuous series of 7 (7–8) pored or pitted scales mid-laterally on caudal peduncle to caudal-fin base. Origin of dorsal fin at level of third tubed scale of lateral line; spines of dorsal fin gradually increasing in length to seventh spine, remaining spines slightly decreasing in length; membrane between spines deeply incised; first dorsal-fin spine 4.1 (3.5–4.5), seventh dorsal-fin spine 1.9 (1.6–2.0), last dorsal-fin spine 1.8 (1.6–2.1), longest soft dorsal-fin ray 1.0 (1.0–1.3), all in HL; length of dorsal-fin base 1.7 (1.6–1.8) in SL; first anal-fin spine 3.9 (3.3–3.9), second anal-fin spine 1.6 (1.5–1.9), longest soft anal-fin ray 1.0 (0.9–1.2), all in HL; base of anal fin 2.1 (2.0–2.3) in base of dorsal fin; caudal fin emarginate with rounded lobes, its length 3.1 (2.5–3.3) in SL; pectoral-fin length 3.5 (3.0–3.3) in SL; filamentous tips of pelvic fins reaching well beyond origin of anal fin, longest ray 2.8 (2.5–3.3) in SL.

Color of adult in life. (Figs. 2D, 3 & 5A) Overall grayish brown with translucent to pale greenish fins, except bright yellow ventrally on head, body, and adjacent anal and pelvic fins, and a broad yellow band from base of first few dorsal spines to outer edge of last dorsal-fin spine; narrow blue margin on soft dorsal fin, upper and lower edges of caudal fin, anal fin, and pelvic spine; usually a few neon-blue spots on anal fin; urogenital papilla blackish. Adults from Russell Group (Fig. 3) similar, but more ornate, showing bright neon blue/green streak along each scale margin on body and similar-colored streaks, spots, and lines on cheek, operculum, and breast.

Color of juvenile in life. Smallest individuals of about 10–20 mm SL (Figs. 2A & 6A) neon blue to dark blue on head, most of body (above diagonal line from pelvic-fin base to base of uppermost caudal-fin ray), and dorsal fin; remainder of body and adjacent fins bright yellow; blackish stripe across middle of neon-blue iris, joining charcoal-gray stripe from front of eye to snout tip and narrower charcoal-gray stripe just below; lips neon blue except where interrupted by dark snout stripes. Larger juveniles and subadults to about 35 mm SL (Figs. 2B & C) generally blue to grayish green, frequently with narrow, neon-blue streak on each scale margin of body and cheek scales; dorsal and caudal fins translucent bluish to greenish; anal and pelvic fins bright yellow.

Color in alcohol. (Fig. 4) Generally brown, paler and slightly yellowish on ventral regions of body including breast and abdomen; fins semi-translucent gray; urogenital papilla blackish.

Etymology. This species is named in honor of photographer and underwater guide *par excellence* Burt Jones of Sequim, Washington, USA. Burt and his partner Maurine Shimlock were pioneers for the promotion of dive tourism at the Solomon Islands and, more recently, have been instrumental in the tremendous popularity of the West Papuan region by means of their excellent underwater guidebook to the area and creation of the highly informative Bird's Head Seascape website (birdsheadseascape.com).

Figure 4. *Chrysiptera burtjonesi*, preserved holotype (WAM P.34622–001), 47.7 mm SL, Florida Group, Solomon Islands (G.R. Allen).

TABLE 1

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

	holotype	paratypes						
	WAM P.34622	WAM P.34622	USNM 432549	WAM P.34622	WAM P.34622	WAM P.34618	USNM 432549	WAM P.34618
Standard length (mm)	47.7	48.2	47.6	45.3	44.6	40.6	36.0	33.5
Body depth	50.1	53.8	52.5	51.9	54.0	51.0	50.4	53.2
Body width	18.3	17.7	16.8	17.7	19.8	18.1	16.3	18.6
Head length	31.4	32.0	32.3	31.2	33.8	31.5	32.6	33.2
Snout length	8.7	8.9	9.0	9.2	9.0	8.3	8.7	8.8
Orbit diameter	9.4	9.9	10.5	10.5	10.7	10.2	12.0	11.6
Interorbital width	9.4	10.1	10.2	9.9	10.1	9.6	10.6	9.6
Caudal-peduncle depth	16.1	16.3	15.8	15.7	16.4	15.9	16.1	16.1
Caudal-peduncle length	14.7	15.1	14.2	14.7	15.3	14.2	13.2	13.4
Upper jaw length	9.7	10.2	10.2	10.7	10.3	10.6	10.2	10.7
Predorsal length	36.8	38.8	39.7	40.3	40.9	38.8	39.9	40.8
Preanal length	63.8	62.2	64.3	63.3	64.2	64.0	63.9	64.2
Prepelvic length	37.8	39.2	38.6	39.3	40.6	38.4	40.3	40.7
Length dorsal-fin base	60.0	61.6	61.5	60.7	61.5	62.1	59.7	62.6
Length anal-fin base	28.1	27.9	26.9	27.1	27.7	27.8	28.2	27.9
Length pectoral fin	28.3	33.2	31.9	32.6	31.2	30.1	31.8	32.2
Length pelvic fin	35.5	34.8	33.3	35.9	35.3	39.6	35.8	35.3
Length pelvic-fin spine	16.0	18.9	19.0	19.0	18.7	18.0	19.2	18.5
Length first dorsal spine	7.5	7.9	7.2	8.4	8.5	7.7	9.2	7.6
Length second dorsal spine	16.2	17.6	17.3	18.3	17.9	18.1	18.4	18.5
Length seventh dorsal spine	16.6	19.9	16.2	18.2	17.3	17.4	17.5	16.9
Length longest dorsal ray	29.3	27.5	26.6	27.4	29.1	27.0	27.9	29.2
Length first anal spine	7.9	8.7	11.0*	8.7	9.1	8.2	9.9	8.7
Length second anal spine	18.8	18.3	20.2	20.9	18.0	18.5	20.7	20.0
Length longest anal ray	32.2	28.5	27.2	28.8	28.3	28.9	27.3	31.1
Length caudal fin	32.6	32.4	30.2	30.0	30.8	32.1	31.6	36.1
Caudal concavity	7.0	8.5	7.8	7.6	8.9	7.4	8.9	10.1

* damaged spine

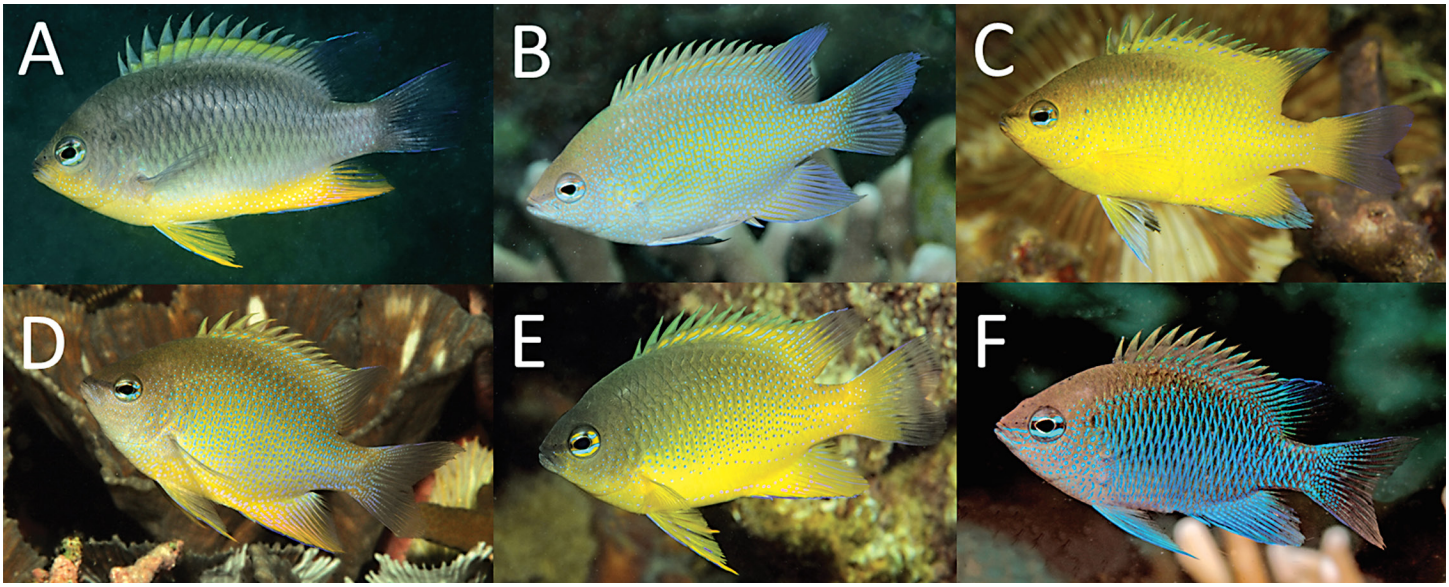

Figure 5. Comparison of adult color patterns of the *C. oxycephala* species complex, approx. 45–50 mm SL: A) *C. burtjonesi*, Solomon Islands, B) *C. ellenae*, Raja Ampat Islands, Indonesia, C) *C. maurineae*, Cenderawasih Bay, Indonesia, D) *C. oxycephala*, North Sulawesi, Indonesia, E) *C. papuensis*, Milne Bay, Papua New Guinea, F) *C. sinclairi*, Hermit Islands, Papua New Guinea (G.R. Allen).

Distribution. The new species is known only from the Solomon Islands. It was collected or observed by the authors at the following islands and reefs: Isabel, Choiseul, Makira, Malaita and nearby Alite Reef, Shortland Islands, New Georgia Group, Russell Group, and the Florida Group.

Comparisons. *Chrysiptera burtjonesi* is most readily distinguished from other members of the *C. oxycephala* species complex on the basis of its distinctive color pattern, which is primarily grayish brown to greenish in adults and neon blue to dark blue in juveniles with the highly contrasted yellow coloration restricted to the ventralmost head and/or side of body, including the adjacent pelvic and anal fins. The adult and juvenile color patterns are compared with that of the other members of the complex in Figs. 5 and 6. The adult patterns of *C. oxycephala* (Fig. 5D) and *C. papuensis* (Fig. 5E) are most similar, but both these species feature 1–3 small, vertically aligned, bluish spots on most of the scales of the cheek, opercle, and body, as well as a much-reduced grayish-brown area in comparison with *C. burtjonesi*. The juvenile stages of *C. burtjonesi* are especially distinctive compared to

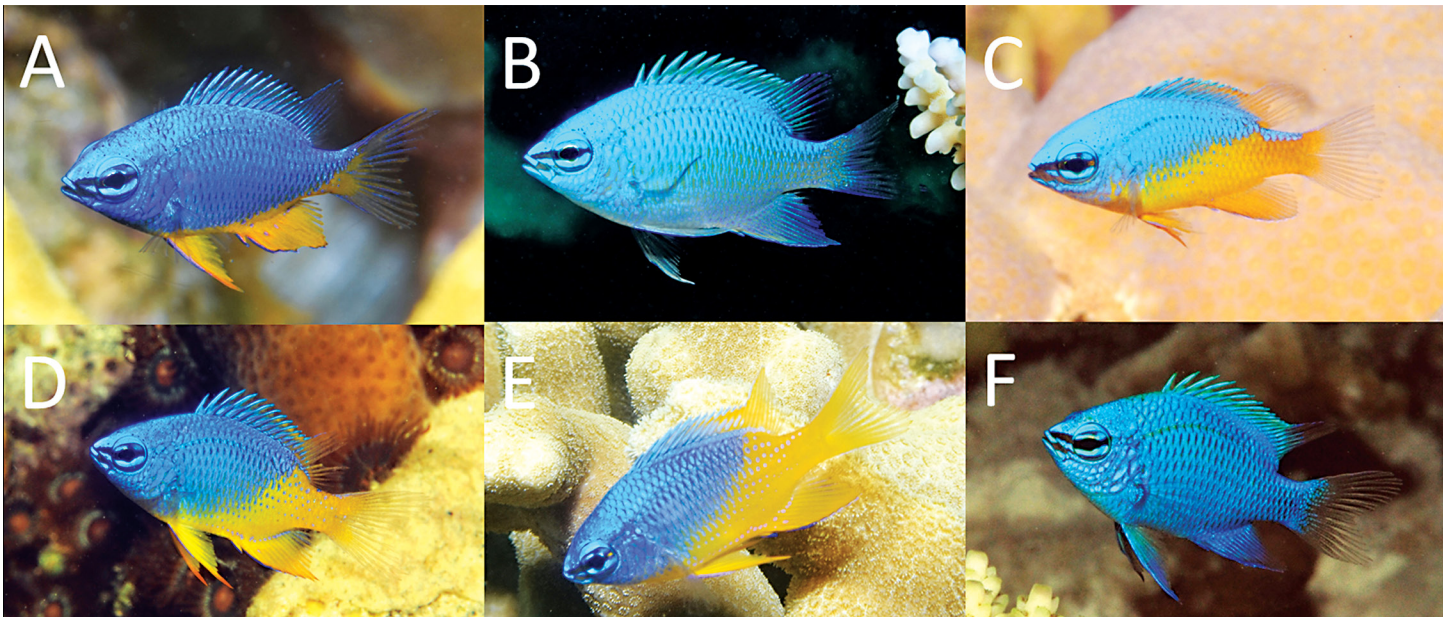

Figure 6. Comparison of juvenile color patterns of the *C. oxycephala* species complex, approx. 10–20 mm SL: A) *C. burtjonesi*, Solomon Islands, B) *C. ellenae*, Raja Ampat Islands, Indonesia, C) *C. maurineae*, Cenderawasih Bay, Indonesia, D) *C. oxycephala*, North Sulawesi, Indonesia, E) *C. papuensis*, Milne Bay, Papua New Guinea, F) *C. sinclairi*, Manus Island, Papua New Guinea (G.R. Allen).

TABLE 2
Color features of the *Chrysiptera oxycephala* species complex

Species	Adult ground color	Juvenile	Special features
C. burtjonesi	gray-brown or greenish	mostly blue	mainly blue to brownish, yellow ventrally
C. ellenae	pale greenish-yellow	entirely light blue	juvenile entirely light blue
C. maurineae	bright yellow	blue and yellow	juvenile: blue streak on dorsal caudal peduncle
C. oxycephala	greenish yellow	blue and yellow	adult: bright yellow only thorax & abdomen
C. papuensis	brown and bright yellow	blue and yellow	adult: brown anterodorsally, bright yellow posteroventrally
C. sinclairi	blue with brown forehead	entirely blue	absence of yellow in all stages, vertical bars prominent on scales

other members of the group, which either have considerably more yellow on the body or lack yellow entirely. The salient color pattern features of the *C. oxycephala* species complex are further compared in Table 2.

Counts for fin rays and tubed lateral-line scales (Table 3) indicate that *C. burtjonesi* is generally similar to other members of the complex except for the frequency found in *C. sinclairi* of 10 & 11 dorsal-fin rays, 11 & 12 anal-fin rays, and 14 & 15 pectoral-fin rays. However, *C. burtjonesi* shares the distinction of seldom having embedded scales on the preorbital and suborbital portion of the circumorbital series with *C. sinclairi* (Table 3).

TABLE 3
Frequency distribution of soft dorsal-fin, anal-fin, and pectoral-fin-ray counts and selected scale counts for members of the *Chrysiptera oxycephala* species complex

Species	Soft dorsal-fin rays			Soft anal-fin rays			Preorbital+suborbital scales		
	10	11	12	11	12	13	range	mean	n
C. burtjonesi	1	22	1		22	2	0–3	0.4	24
C. ellenae	2	28	2	1	31		0–14	5.5	32
C. maurineae	2	8	1		10	1	0–6	2.7	11
C. oxycephala	1	26	3	1	28	1	0-8	2.5	30
C. oxycephala (L)		14	1		15		2-10	5.5	15
C. papuensis	5	28			32	1	0–10	4.1	33
C. sinclairi	11	9		13	7		0–1	0.2	24

Species	Pectoral-fin rays					Lateral-line scales					
	12	13	14	15	16	11	12	13	14	15	16
C. burtjonesi			5	40	1			6	14	10	2
C. ellenae				32			1	9	15	5	2
C. maurineae			1	10			1		1	9	
C. oxycephala		2	4	24			1	4	20	5	
C. oxycephala (Lembeh)			3	12					3	11	1
C. papuensis			6	27				5	21	6	1
C. sinclairi	1	1	9	9		1	4	6	5	4	

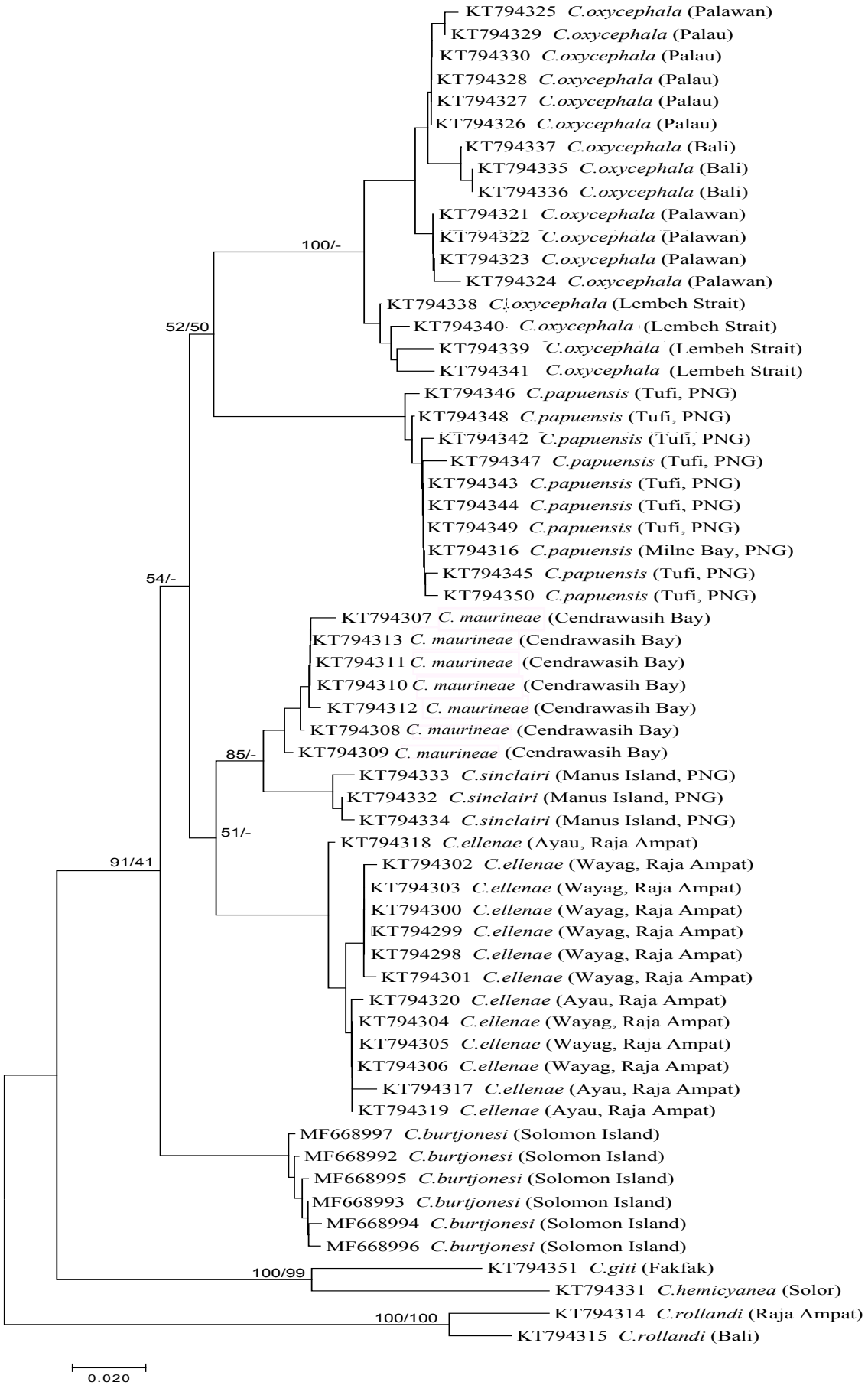

Figure 7. Neighbor Joining (NJ) topology generated from 384-bp of mtDNA control-region sequence data from *Chrysiptera* species. Numbers above the major nodes indicate bootstrap support for 1000 replicates using neighbor-joining, maximum likelihood, and Bayesian posterior probability, respectively. GenBank accession numbers and collection location are listed for each individual. Papua New Guinea is abbreviated as PNG.

TABLE 4

Average interspecific pairwise genetic distance matrix for sequences of the mtDNA control region for the *Chrysiptera oxycephala* species complex and some congeners

	Species	Location	1	2	3	4	5	6	7	8	9	10	11
1	*C. burtjonesi*	Solomon Is.											
2	*C. sinclairi*	Manus Island, PNG	0.082										
3	*C. ellenae*	Raja Ampat Is.	0.097	0.077									
4	*C. maurineae*	Cendrawasih Bay	0.069	0.032	0.067								
5	*C. oxycephala*	Bali, Palau & Philippines	0.126	0.106	0.119	0.105							
6	*C. oxycephala*	Lembeh Strait	0.118	0.101	0.107	0.101	0.033						
7	*C. papuensis*	Tufi, PNG	0.111	0.119	0.112	0.097	0.126	0.110					
8	*C. rollandi*	Raja Ampat	0.226	0.232	0.262	0.238	0.245	0.263	0.254				
9	*C. rollandi*	Bali	0.222	0.228	0.253	0.226	0.241	0.249	0.231	0.044			
10	*C. giti*	Fakfak	0.195	0.206	0.186	0.191	0.223	0.219	0.224	0.289	0.285		
11	*C. hemicyanea*	Solor	0.193	0.220	0.199	0.215	0.248	0.245	0.251	0.285	0.275	0.111	

Genetic analysis. We resolved relationships within the *C. oxycephala* species complex using a 384-base-pair segment of the mtDNA control region, of which 104 bases were parsimony informative. The tree from the NJ topology (Fig. 7) shows the species in the complex form a set of related monophyletic lineages corresponding to the allopatric species. Pairwise genetic distances (Table 4) between *C. burtjonesi* and other species in the *C. oxycephala* complex were in the range of 0.07–0.13, with the minimum distances recorded between *C. burtjonesi* and *C. maurineae* (0.069), and the largest distance observed between *C. burtjonesi* and *C. oxycephala* (0.126).

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