A new species of wedgefish *Rhynchobatus cooki* (Rhinopristiformes, Rhinidae) from the Indo–West Pacific

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Abstract

A new dwarf wedgefish, *Rhynchobatus cooki* sp. nov. is described from a single female from a Jakarta fish market (Indonesia) and 11 specimens collected at Jurong fish market (Singapore). First collected in 1934, the broader ichthyological community have been aware of this distinctive but little known ray since the late 1990's. *Rhynchobatus cooki* is the smallest of the wedgefishes (to 81 cm TL) and has the lowest vertebral count (fewer than 107 centra). It is also distinguishable from its congeners based on its long, hastate snout, very strongly undulate anterior pectoral-fin margin, coloration and aspects of its squamation. The dorsal coloration is mainly dark and distinctively marked with white blotches, spots and streaks, and has a dark cruciate marking on the interorbit and a prominent white border around the body margin. Unlike most other wedgefish species, the snout tip lacks dark blotches and there is no black pectoral-fin marking. It shares well-developed rostral spines with a much larger Atlantic species (*Rhynchobatus luebberti*), but these spines are confined to the snout tip (rather than being more numerous and extending in paired rows along the rostral ridges nearly to the eyes). No additional specimens have been observed since 1996, despite an increased recent effort to survey the chondrichthyan fauna of South-East Asia and collect biological data for species, raising concerns over its conservation status.

Key words: Rhinidae; *Rhynchobatus cooki;* Clown Wedgefish; new species; Western Pacific

Introduction

The genus *Rhynchobatus* Müller & Henle, 1837 belongs to the newly redefined family Rhinidae (order Rhinopristiformes) which now contains seven valid nominal species (Last *et al.*, 2016): *Rhynchobatus australiae* Whitley, 1939, *Rhynchobatus djiddensis* (Forsskål, 1775), *Rhynchobatus immaculatus* Last, Ho & Chen, 2013, *Rhynchobatus laevis* (Bloch & Schneider, 1801), *Rhynchobatus luebberti* Ehrenbaum, 1915, *Rhynchobatus palpebratus* Compagno & Last, 2008 and *Rhynchobatus springeri* Compagno & Last, 2010. The family also includes the widely distributed Indo–Pacific species *Rhina ancylostoma* Bloch & Schneider, 1801 and an undescribed genus and species from western Africa (Séret & Naylor, in press). Members of the family have been treated recently in a guide to rays of the world (Last et al., in press), and this work includes another *Rhynchobatus* recognised about two decades ago but which has remained undescribed. This species, which was first figured and discussed by Compagno & Last (1999), is described herein.

The first specimens of this species were collected from Singapore by Albert W.C.T. Herre in 1934 and 1937. Herre is best known for his contribution to the ichthyology of the Philippines, but was also active in Singapore (e.g. Herre & Myers, 1937). An additional specimen was collected from Jakarta by John E. Randall in 1975. At the time these records were attributed to *Rhynchobatus djiddensis*. The species remained unnoticed until the 1990s when one of us (LC) visited the Jurong fish market in Singapore along with local colleagues (Ng Kee Lin & Lim Kok Peng) and collected the bulk of known material of the species (9 specimens). Later examination of a photograph taken by one of us (PL) at the Muara Angke fish market in Jakarta in 1993 revealed at least 4 and possibly 5 specimens amongst a catch of batoids, however none

of these was collected at the time. Considerable subsequent effort to survey the shark and ray fauna of South-East Asia in the 2000s, including fish markets in the Philippines (Compagno *et al*., 2005), Jakarta (White & Dharmadi 2007) and Borneo (Last *et al.*, 2010), failed to locate any additional specimens (see conservation considerations section).

Materials and methods

Proportional dimensions, expressed as percentages of total length (TL), are given in Table 1. External measurements of *Rhynchobatus* are based on batoid measurements proposed by Bigelow & Schroeder (1953), Hubbs & Ishiyama (1968), Compagno & Roberts (1982), Compagno & Randall (1987) and Randall & Compagno (1995), and the shark measurements of Compagno (1984, 2001). Terminology for enlarged dermal denticles or spines is based on Hubbs & Ishiyama (1968). Vertebral centra, pectoral-fin radials, and crania were examined and meristic details counted from radiographs (see also Compagno & Last, 2008). The vertebral column of *Rhynchobatus* is more differentiated than in sharks and is clarified herein: a group of vertebrae behind the cranium are fused to form a large cervical synarcual element (Garman, 1913; Compagno, 1973, 1988, 1999, 2003) containing from 25–34 segments; the synarcual element has an anterior centrum-free region of 13–21 segments and a posterior region with 11–16 embedded centra. The number of synarcual segments is determined by counting the synarcual centra and the corresponding spinal nerve foramina and canals in the anterior centrum-free region on properly exposed, high-resolution radiographs; it is often not possible to count the centrum-free region in some specimens, particularly newborn and poorly calcified individuals, although synarcual centra are usually visible. Posterior to the synarcual, the vertebral column can be

subdivided into monospondylous precaudal (MP) centra in the trunk, diplospondylous precaudal (DP) centra in the precaudal tail, and diplospondylous caudal (DC) centra in the caudal fin. The MP centra have very long ribs that are reduced posteriorly before the transition to DP centra, in which the centra suddenly become smaller and two per myomere. The DC centra have strongly expanded neural and haemal arches modified as pterygiophores for the caudal fin but, for purposes of consistency, counts are delimited anteriorly at the upper caudal-fin origin as in sharks (Springer & Garrick, 1964). Counts presented here include the numbers of centra in the synarcual element, and the MP centra, DP centra, DC centra, total free centra, and total centra; centrum-free segments and total segments were not included as some of these counts proved difficult to obtain.

In *Rhynchobatus*, as in most modern elasmobranchs or neoselachians, there are three basal cartilages to the pectoral-fin skeleton: the anterior propterygium, intermediate mesopterygium, and posterior metapterygium, which bears most of the pectoral-fin radials (Compagno, 1973, 1977, 1988, 1999, 2003). *Rhynchobatus* (and various other batoids) have a space between the mesopterygium and metapterygium where `neopterygial' radials articulate directly with the synarcual. The propterygium of *Rhynchobatus* is a single, unsegmented cartilage with its front end terminating behind the nasal capsules; anterior to the propterygium are 1–8 free propterygial radials suggesting that a segmented propterygial axis, such as that present in other batoids, may have been lost in *Rhynchobatus*. The propterygium itself has 16–26 radials, the mesopterygium about 5–7 radials, the neopterygial space on the scapulocoracoid about 4–6 radials, and the metapterygium 21–29 radials. Counts presented include free, propterygial, mesopterygial, neopterygial, metapterygial, total basal radials (excluding free radials), and total radials. Cranial morphology of the new *Rhynchobatus* is not considered in

detail here but we note that *Rhynchobatus* species differ in the shape of their rostral appendices, and by the position of the anterior ends of the antorbital cartilages relative to the anterior ends of the nasal capsules.

Material discussed in this manuscript is deposited in ichthyological collections and their acronyms follow Leviton *et al.* (1985): Australian National Fish Collection, Hobart (CSIRO), Bernice P. Bishop Museum, Honolulu (BPBM), Stanford University collection (SU) which was incorporated into the California Academy of Sciences (CAS) in 1969, National University of Singapore (ZRC), and a private collection of Leonard Compagno (LJVC). Morphometric data in the description is based on the holotype (ZRC 41175, measured by PL) and 10 paratypes (SU 13952 (2), SU 35592, BPBM 19673, and LJVC unreg (6); all measured by LC). Meristic data is based on 9 of the 10 paratypes above; data all collected by LC.

***Rhynchobatus cooki* sp. nov.**

(Figs.1–8; Table 1)

Rhynchobatus sp. 1: Compagno & Last, 1999, p 1422, fig.

Holotype. ZRC 41175, adult male 723 mm TL, Jurong fish market, Singapore, 07 Feb 1996.

Paratypes. 11 specimens: BPBM 19673, immature female 609 mm TL, Jakarta fish market, Java, Indonesia, 18 Feb 1975; CAS 13952, immature male 358 mm TL, immature female 415 mm TL, Singapore, March 1934; CAS 35592, male embryo 236 mm TL, Singapore, 22 Feb 1937; SAMC F039829 (5 specimens), immature male 395 mm TL, subadult male 642 mm TL, adult male 705 mm TL, adult male 733 mm TL, adult male 755 mm TL, Jurong fish

market, Singapore, 07 Feb 1996; ZRC 41173, adult male 810 mm TL, Jurong fish market, Singapore, 07 Feb 1996; ZRC 41174, adult male 769 mm TL, Jurong fish market, Singapore, 07 Feb 1996.

Other material. 4 or 5 specimens (none retained). Photographic image, Muara Angke fish market (Jakarta, Indonesia), 22 Nov 1993; LJVC 960207 (missing), male embryo 209 mm TL, Jurong fish market, Singapore, 07 Feb 1996.

Diagnosis. A dwarf species of the genus *Rhynchobatus* (adults to 81 cm TL) with the following combination of characters: a very long, narrowly pointed snout, preoral snout 21–25% TL; eye small, length 5.1–6.6 in preorbital snout; interorbital space 3.2–4.0 in preorbital snout; mouth weakly bowed, with a strong indentation on upper jaw near symphysis and strong protuberance on lower jaw; tooth rows in upper jaw 32–39; two irregular rows of small rostral spines on distal third of snout, almost extending to snout tip but not distinctly paired; supraorbital spines small but well differentiated, discontinuous (present only on preorbit and beside spiracle); mid-dorsal spine row broken but well-developed in adults; only a few small scapular spines on shoulder (often obscure); origin of first dorsal fin slightly posterior to origin of pelvic-fin base; predorsal length 47–51% TL; colour dark greyish green above (when fresh) with variable pattern of white spots (not arranged in rows), juveniles more densely covered with large white blotches; dark cruciate marking on interorbital but no black pectoral marking; anterior pectoral disc and sides of tail with a broad white margin; a few dark transverse bars forward of dorsal fins; 66–72 precaudal free centra, 99–106 total free centra, 112–119 total centra (including synarcual centra); 48–52 total pectoral-fin radials.

Description. Body relatively delicate; snout in front of eyes narrowly pointed to weakly bottle-shaped, angle of about 45° in holotype; lateral margin of anterior half of snout weakly

concave, then becoming strongly convex forward of eye to origin of pectoral fin. Preorbital length about 3.5 in holotype (3.4–4.0 in all paratypes) times interorbital width; preoral length 3.3 (3.2–3.6) times mouth width. Disc width across pectoral-fin apices 77% (73–79% in adults and subadults exceeding 40 cm TL, 70–74% in juveniles smaller than 40 cm TL) of disc length (from snout tip to pectoral-fin free rear tips). Head strongly depressed, disc thickness 1.1 (0.7–1.4) times in interorbital space; ventral head length 3.1 (2.8–3.2) times TL; surface between eyes and spiracles almost flat. Tail moderately depressed; in cross section, strongly rounded both dorsally and ventrally, angular laterally, tapering evenly from pelvic-fin insertions; precloacal length 85% (84–105%) of length of tail from anterior vent to caudal-fin tip; width of tail at first dorsal-fin insertions of holotype 1.8 (1.2–2.0) times interspiracular distance. Lateral keels of tail extended forward as a prominent angular edge along precaudal tail, almost reaching just forward of first dorsal insertion; most strongly differentiated on caudal fin.

Horizontal eye (eyeball) diameter about 49% (48–63%, mainly 54–68%) of interspiracular width, distance from anterior margin of orbit to posterior margin of spiracle less than interspiracular width; greatest dimension of spiracles 53% (51–61%, 32–48%) of horizontal eye diameter; distance between spiracle and eye about half corneal length, membrane of orbit continuous with spiracular opening. Spiracle dorsolateral, anterior margin with a prominent valve, posterior margin with two narrow, spiracular folds, lateral fold slightly larger and directed anteromedially.

Nostrils diagonal, forming angle of ~45° with body axis, anterior ends directed slightly more laterally; internarial width 0.9 (0.9–1.2) times nostril width. Nasal cavity fully exposed, without dividing flaps; aperture straight anterolaterally, recurved slightly posteromedially. Anterior nasal flap narrow, low, anteromedial on nasal aperture, inserted near midlength of nasal

aperture; anterior process short, simple, its base length about twice as long as its width. Posterolateral nasal flap low, narrow and elongated, weakly lobate; originating just behind anterior lateral edge of incurrent aperture, extending posteriorly to beyond midlength of nasal aperture. Posterior nasal flap low, short based; joined to undersurface of posterolateral flap at about anterior third of its length, junction concealed beneath posterolateral nasal flap; inserted beyond midlength of nostril. Mouth opening somewhat arcuate, weakly undulating to nearly straight laterally; strong medial depression on upper jaw corresponding to a very prominent anterior extension at symphysis of lower jaw. Labial folds and furrows short; shallow pockets, deep circumoral grooves, and low folds and depressions, surround jaws laterally to labial folds; depressions most prominent laterally and on lower jaw. Teeth in differentiated serial rows, ~39 (32–39) in upper jaw, ~34 (33–39) in lower jaw. First four gill openings subequal in length, the fifth slightly shorter; third gill opening 2.7 (2.3–3.0, 3.3–4.3) in internarial width, 2.9 (2.5–3.2, 3.4–3.7) times in nostril length, 1.2 (1.2–1.6, 1.0–1.1) times length of fifth gill opening.

Dermal denticles minute (not distinguishable to naked eye), covering all of body surface, varying in shape between different parts of body; dense and compacted to weakly imbricate, no obvious exposed skin patches between them; slightly larger on snout than on interorbit. Dorsal denticles with tall pedicels and flat elevated crowns; crowns on trunk typically flattened, broad, subcircular, irregularly rounded anteriorly, variably unicuspidate or weakly tricuspidate posteriorly, sometimes with low longitudinal ridges. Ventral denticles usually lacking cusps, compacted; similar in size to those of dorsal trunk.

Spines small but prominent on dorsal surface of body and tail; in two variably formed rows on anterior third of snout; rostral spines extending almost to snout tip, somewhat deciduous and sometimes missing (their former presence evident as a naked pocket of skin). In holotype,

rostral spines present at snout tip but becoming more widely spaced posteriorly; 3 (2–3 in paratypes) preorbital spines, short, subconical; no mid-orbital spines; 1–2 (1–2 in paratypes) smaller spiracular spines; single median series commencing on nape, extending posteriorly in broken row almost to first dorsal fin; spines largest and bluntly pointed on mid-scapular region; spines on midline of tail poorly developed, absent in holotype but present in interdorsal space as 4–5 few weak spines (usually nearest second dorsal fin); very small scapular spines present in short rows on each side of disc in holotype, just forward of level of pectoral-fin apices; anterior series obscure in types, with 0–2 very small spines; posterior series more obvious with 2–3 widely spaced spines, well separated from those anteriorly. Sensory pores well developed on ventral snout; also concentrated in two distinct transverse patches (between anterior nostril and just posterior to mid-preoral space).

Dorsal fins similar in shape, raked slightly, shark-like, with strongly convex anterior margins (weakly concave at base), bluntly pointed apices, weakly concave posterior margins, sharply acute free rear tips, and almost straight inner margins. First dorsal fin slightly larger than second, height of second dorsal fin 78% (74–95%) height of first; inner margin of fin 63% (61–74%) of its base length; origin slightly posterior to origins of pelvic fins; free rear tip well posterior to free rear tips of pelvic fin. Interdorsal space 2.0 (1.9–2.1, 1.9–2.3) times length of first dorsal-fin base, ~2.7 (2.2–2.8) of length of second dorsal-fin base. Caudal fin rather short; dorsal caudal margin 6.0 (5.9–6.8) TL, 1.2 (1.1–1.4) times longer than interdorsal space; dorsal caudal margin moderately convex, slightly concave near its origin; caudal-fin tip bluntly pointed; preventral caudal margin moderately convex, less so anteriorly; ventral lobe well developed, strong, angular (relatively shorter and less well-defined in juveniles); lower postventral caudal margin short, almost straight to weakly concave, 3.1 (2.6–3.8) in length of upper margin in

adults; upper postventral margin undulate; caudal axis elevated slightly, forming a narrow angle with horizontal body axis. Pectoral fins short, originating just behind spiracles, margin very deeply concave at origin, becoming weakly convex toward apices; apices broadly pointed; posterior margins convex; free rear tips narrowly rounded to angular, inner margin extending 91% (75–103%) across pectoral–pelvic space; inner margins straight to weakly concave. Pelvic fins small, with weakly convex anterior margins; apices broadly rounded; posterior margins concave (more so anteriorly); free rear tips elongate and very narrowly pointed; inner margins straight to weakly concave, very long, length 1.8 (1.2–1.6) times length of pelvic-fin base; pelvic-fin base 1.0 (0.9–1.3) in pectoral–pelvic space; height of pelvic fins about 2.3 (2.1–2.9) in their length; distance between pelvic-fin insertions exceeding pelvic-fin base length. Vent with well-developed folds laterally; well separated from pelvic-fin inner margins. Clasper very elongate, very slender, weakly expanded distally at glans; their rear tips well short of origin of second dorsal fin.

Vertebral counts: 112–119 total centra in paratypes (n=9); 12–13 synarcual centra, 20–22 monospondylous centra, 66–72 precaudal free centra, 31–37 diplospondylous caudal (free) centra, 99–106 free centra. Total synarcual segments 10.3–11.6%, monospondylous 17.2–20.0%, diplospondylous precaudal centra 37.4–45.2%, and precaudal free centra 57.4–62.6% of total centra count. Pectoral fin: 48–52 total pectoral-fin radials, 0–3 free radials before propterygium, 16–17 propterygials, 4–6 mesopterygials, 3–5 neopterygials, 21–23 metapterygials, 47–50 total basal radials (excluding free radials).

Colour. *Preserved* (based on adult male holotype, ZRC 41175, 723 mm TL): Dorsal surface of body greyish brown with evidence of white spots and dark markings, particularly on head; a prominent dark bar between eyes extends anteriorly and posteriorly on mid-disc to form

a cross-like marking; unpaired fins (more so their bases), margin of head, and posterior margins of pectoral and pelvic fins yellowish (much paler than central body); no dark marking at base of pectoral fins; spines yellowish, much paler than surrounding skin. Ventral surface uniformly whitish, no dark blotches or markings on snout; minute sensory pores demarcated, greyish.

Fresh coloration (based on 6 adult specimens photographed at Jurong fish market): Dorsal surface of body greyish green, dark and pale markings more obvious than on fixed specimens; cross-like marking on interorbit prominent, surrounded by 4 white blotches; two similar dark transverse bars (with white bar between) on mid body between eyes and first dorsal fin; rostrum dark with 1–2 white median blotches; edge of body noticeably white (broadest on head and along tail) when viewed from above; broad outer margin of pelvic fins and unpaired fins very pale (white or pale yellow) and strongly contracted with rest of body; a few bilaterally symmetrical, large whitish spots on pectoral fins and tail.

Embryo (CAS 35592, preserved): Dorsal surface of body brownish with light and dark markings larger and very prominent (more so than in adult); cross-like marking and associated white blotches on interorbit very prominent; white spots, blotches and streaks also much more pronounced on tail; pale fins and dark margin of body also prominent and strongly contrasted with brownish part.

Size. A small species of *Rhynchobatus*, reaching at least 810 mm TL; embryos with yolk sacs were 209 and 236 mm TL, a male 395 mm TL was juvenile, a male 642 mm TL was adolescent, and six males >705 mm TL were adult; females 415 and 609 mm TL were immature.

Distribution. Specimens obtained from the Jurong fish market (Singapore) and a Jakarta fish market (probably Muara Angke) (Indonesia). Also observed at Muara Angke fish market (Jakarta, Indonesia) in the early 1990s. Fishers landing product at these markets operate widely

across the Indo–Malay Archipelago so the providence of specimens are unknown. For example, fish landed at Jurong are unlikely to be from Singaporean waters, but may be from the South China, Java or Andaman Seas.

Etymology. Patronym proposed by one of us (LC) to honour the late Sid Cook, a pioneer in shark conservation who participated in surveys of chondrichthyan fishes in South-East Asia at the time specimens were collected. Vernacular: The name proposed here, Clown Wedgefish in recognition of its clown-like colour pattern, was coined by Lim Kok Peng (alias Kelvin) who participated in the collection of most of the types. Also referred to as the Roughnose Wedgefish (Compagno & Last, 1999).

Comparisons. Shares with the much larger (to ~300 cm TL), Atlantic species *Rhynchobatus luebberti*, well-developed rostral spines, relatively small eyes, nearly straight tooth bands, pelvic fins with rounded apices, disc with a prominent white margin, and a cross-like marking on the interorbit (most obvious in young and subadults). *Rhynchobatus luebberti* differs from *R. cooki* sp. nov. in having a shorter, less hastate snout (preoral length 20–21% TL vs. 21–25% in *R. cooki* sp. nov.); combined lateral margin of head and anterior pectoral fin much less undulate in adults (particularly deeply concave behind eyes in *R. cooki* sp. nov.); rostral spines more numerous and concentrated on rostral ridges, extending nearly to eyes (rather than confined to anterior third of snout); more numerous orbital spines, forming a complete series medial to the eyes (*vs.* patches strongly disjunct); many more spines in median and scapular series, at least 8 prescapular and 7 postscapular spines; both primary and secondary lateral prescapular spines present; interdorsal spines large and strong (otherwise weak); first dorsal-fin more posterior, origin closer to insertions of pelvic-fin bases (rather than slightly behind pectoral-fin origins); a pair of black blotches usually present on back (otherwise absent); a pair

of black pectoral-fin ocelli surrounded by white spots often present (otherwise absent); and white spots on body small, numerous, not extending forward of eyes (some white spots present on snout). None of the other six *Rhynchobatus* species has rostral spines or such a low vertebral count (total free centra 106 or less vs. 117 or more).

Conservation considerations

This small wedgefish is poorly known, having been documented from <20 records, from only two fish landing sites in South-East Asia. Fish landed at these markets are caught widely across the region, including the South China, Java and the Andaman Seas, so the exact range of *R. cooki* sp. nov. remains unknown. However, the overall lack of records suggests that the species is rare with a potentially limited distribution.

Rhynchobatus cooki sp. nov. is assessed as Vulnerable on the IUCN Red List of Threatened Species based on inferred declines as a result of intense and largely unregulated fishing pressure in South-East Asia (Compagno & Marshall, 2006). The fact that *Rhynchobatus cooki* sp. nov. has not been recorded in the past 20 years raises more serious concerns for its conservation status. Since the last specimen was collected (1996), there has been considerable effort employed to survey the shark and ray fauna of South-East Asia, including extensive surveys of landing sites and fish markets of the Philippines (Compagno *et al.*, 2005), eastern Indonesia (White & Dharmadi, 2007) and Borneo (Last *et al.*, 2010). In landing site surveys across eastern Indonesia between 2001 and 2006, from where >28,000 individual batoids were recorded, *R. cooki* sp. nov. was not documented. In contrast, *R. australiae* was frequently recorded in Jakarta fish markets where *R. cooki* sp. nov. has been historically collected (1975)

and photographed (1993).

Net and trawl fisheries in Indonesia (especially the Java Sea) and elsewhere in South-East Asia are very extensive with a continuing decline of demersal fishery resources in this region (Stobutzki *et al*. 2006). Batoids are heavily exploited (White & Dharmadi 2007) with trawl and gillnet fisheries moving further afield in an attempt to sustain catches. For example, in Jakarta the gillnet fishery at Muara Baru now operates in waters around Kalimantan due to a decline in Javan stocks (W.T. White, pers. comm.). Wedgefishes are readily exploited, with high value fins driving retention (although the fins of *R. cooki* sp. nov. are small and subsequently would be lower value than its larger congeners). Tangle net fisheries in Indonesia specifically target *Rhynchobatus* species and the lack of recent records in market landing surveys suggest that *R. cooki* sp. nov. may have had limited resilience to historical and current levels of exploitation.

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Figure legends

FIGURE 1. *Rhynchobatus cooki* sp. nov., adult male holotype (ZRC 41175, 723 mm TL, preserved): (A) dorsal view; (B) ventral view.

FIGURE 2. Fresh specimens (including some paratypes) of *Rhynchobatus cooki* sp. nov., Jurong fish market, 07 Feb 1996. Note the small *Rhynchobatus springeri* at the right side of the image.

FIGURE 3. Snout, head and pectoral fins of *Rhynchobatus cooki* sp. nov., adult male holotype (ZRC 41175, 723 mm TL, preserved).

FIGURE 4. Rostral spines of *Rhynchobatus cooki* sp. nov.: (A) dorsolateral view of adult male holotype (ZRC 41175, 723 mm TL, preserved); (B) dorsal view of adult male paratype (ZRC 41174, 769 mm TL, preserved).

FIGURE 5. Mid-scapular thorns of *Rhynchobatus cooki* sp. nov., adult male holotype (ZRC 41175, 723 mm TL, preserved).

FIGURE 6. Oronasal region of *Rhynchobatus cooki* sp. nov., adult male holotype (ZRC 41175, 723 mm TL, preserved).

FIGURE 7. Fins of *Rhynchobatus cooki* sp. nov., adult male holotype (ZRC 41175, 723 mm TL, preserved): (A) first dorsal fin; (B) second dorsal fin; (C) caudal fin.

FIGURE 8. Dorsal view of *Rhynchobatus cooki* sp. nov.: male embryo (CAS 35592, 236 mm TL, preserved).