

Redescription of the Rare Boxfish, *Aracana spilonota*, with Comments on Its Taxonomic Position and a Record of Another Rare Boxfish, *Kentrocapros flavofasciatus*, from Southeastern Australia

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Abstract The rare boxfish, *Aracana spilonota* Gilbert, 1905, is redescribed on the basis of examination on the holotype and 11 additional specimens from the vicinity of Laysan Island, Hawaiian Islands. This species is characterized by having 6 ridges on the carapace and hexagonal body shape in cross section, a pair of recurved strong spines on the middle portion of the dorsolateral and ventrolateral ridges. The 6 ridges on the carapace and hexagonal body in cross section indicate that *A. spilonota* should be reassigned to *Kentrocapros*. Another rare boxfish, *Kentrocapros flavofasciatus* (Kamohara, 1938) is recorded for the first time from Australia.

Key words: boxfishes, *Aracana spilonota*, *Kentrocapros*, taxonomy, Hawaii.

Introduction

The deepwater boxfishes of the genus *Kentrocapros* are represented by three species, *K. aculeatus* (Houttuyn, 1782) in Japan and the East China Sea, *K. flavofasciatus* (Kamohara, 1938) in Japan, the East and South China seas and New Caledonia, and *K. rosapinto* (Smith, 1949) in the western Indian Ocean and the southeastern Atlantic (Kamohara, 1938; Smith, 1949; Anonymous, 1962; Matsuura & Yamakawa, 1982; Collette & Parin, 1991; Matsuura & Tyler, 1997; Fricke, 1999; Armesto *et al.*, 2003; Ikeda, 2003). The rare deepwater boxfish, *Aracana spilonota* Gilbert, 1905, has been known only from the two type specimens collected by the R/V *Albatross* from the vicinity of Laysan Island, Hawaiian Islands, at depths of 59 to 163 fathoms (106 to 293 m). During the course of a revisional study on aracanine boxfishes, 11 additional specimens of this rare boxfish were found in the fish collection of the Bishop Museum in Honolulu. Examination of the holotype and 11 additional specimens indicated that this species should be transferred from *Aracana* to *Kentrocapros*. Another rare boxfish, *Kentrocapros flavofasciatus* (Kamohara, 1938), has recently been found in the fish collection of the Australian Museum; it has been known only from the Pacific coast of Japan, the East and South China seas, and New Caledonia (Matsuura & Yamakawa, 1982; Matsuura & Tyler, 1997; Ikeda, 2003). Herein, a detailed redescription of *Aracana spilonota* is provided with comments on its taxonomic position and *K. flavofasciatus* is reported for the first time from Australia.

Methods

Measurements were made in accordance with the manner of Hubbs & Lagler (1958) except for the following: head length, the distance from the tip of the snout to the upper end of the gill opening; body depth, the vertical measurement from the ventral edge of the ventrolateral ridge to the dorsalmost portion of the carapace at the level of the pectoral-fin base; body width, the distance between the left and right dorsolateral ridges at the level of the pectoral-fin base; gill opening length, the distance between the dorsal and ventral edges of the gill opening; postorbital length, the distance from the upper end of the gill opening to the nearest point to the orbit; eye diameter, the greatest width of the orbit, not the eye itself; interorbital width, the least bony interorbital width, measured at the anterior edges of the orbits; caudal peduncle length, the distance from the posterior edge of the structural base of the last anal ray to the mid-caudal-fin base; caudal-fin length, the distance from the mid-caudal-fin base to the tip of the longest ray; tail length, the distance from the posterior edge of the lateral ridge of the carapace to the mid-caudal-fin base; tail depth, the vertical distance between the posterior edges of the structural bases of the last dorsal and anal rays.

Fin ray counts were taken as the total number of elements, regardless of whether the rays are branched or unbranched. Numbers in parentheses following counts show number of individuals with that specific count. Values with an asterisk refer to the count obtained for the holotype.

The following institutional abbreviations are used: AMS, Australian Museum, Sydney; BPBM, Bishop Museum, Honolulu; USNM, National Museum of Natural History, Washington, D.C.

Kentrocapros spilonotus (Gilbert, 1905)

(Fig. 1)

Aracana spilonota Gilbert, 1905: 626, fig. 242.

Materials examined. USNM 51630 (holotype), 73.1 mm SL, *Albatross* station 3939, near Laysan Island, collected by the R/V *Albatross*, 59–163 fms (106 to 293 m), 16 May 1902; BPBM 23838 (11 specimens), 57.4–106.0 mm SL, Hawaiian Islands, Molokai, Penguin Bank, 21°10'N, 157°25'W, 177–188 m depth, collected by shrimp trawl *Townsend Cromwell* cruise 35, station 33, 7 April 1968.

Description. Dorsal-fin rays 9 (1), 10* (8), 11 (3); anal-fin rays 9* (5), 10 (6), 12 (1); pectoral-fin rays 12* (12); caudal-fin rays 11 (12). Body covered with rigid carapace except for caudal peduncle, pectoral, dorsal, and anal-fin bases, and around anus. Carapace with 6 ridges, namely dorsolateral, lateral, and ventrolateral ridges: dorsolateral ridges start dorsal to the eyes and extending posteriorly to the level of the dorsal-fin origin; lateral ridges originate in the region of the posterior edge of each pectoral fin and extend posteriorly to carapace; ventrolateral ridges beginning below the pectoral-fin bases and running posteriorly to the terminus of the carapace. A pair of compressed, strong spines on the middle of the dorsolateral ridges, and a corresponding but smaller pair of spines in the ventrolateral ridges just ventral to the spines on the dorsolateral ridges, these 4 spines slightly curving posteriorly; series of low processes along ventrolateral ridges posterior to the strong spines.

Most plates on dorsal and lateral sides of carapace hexagonal and sutured firmly to one another; each plate with a central bony tubercle from which 6 (typically) low crests radiate out to about the middle of each straight edge of the hexagonal plate. Plates on snout and ventral surface

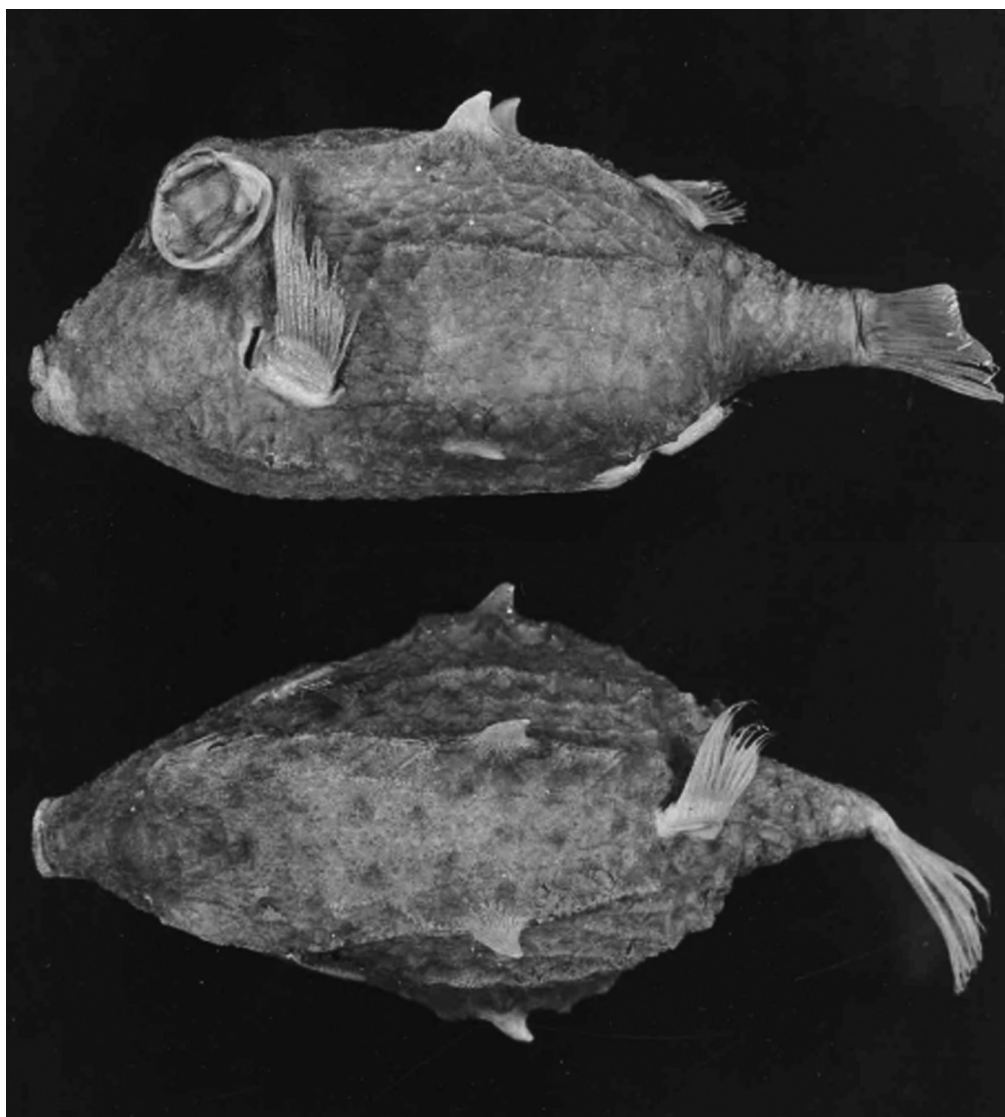


Fig. 1. *Kentrocapros spilonotus*, holotype, USNM 51630, 73.1 mm SL. Top: lateral view; bottom: dorsal view.

of carapace variously shaped and articulating with one another. Many small and closely articulated plates covering the anterior region of caudal peduncle; isolated groups of small plates extending posteriorly on caudal peduncle to caudal-fin base.

Dorsal surface of carapace slightly convex; interorbital space strongly concave; dorsal profile of snout almost straight. Lateral sides of carapace between dorsolateral and lateral ridges slightly concave, and below lateral ridges rather flat or slightly concave. Ventral side of carapace almost flat.

Mouth small, terminal; lips fleshy and plicate. Eight incisiform or bluntly pointed teeth in a single row on each jaw. Two nostrils close together, just anterior to eyes. Eyes large, situated posterodorsally on head. Gill opening small, slightly oblique, ventral to posterior half of eye. Dorsal and anal fins oppositely positioned, slightly rounded. Pectoral fins slightly rounded; the upper 2

rays unbranched; the uppermost ray very short and lowermost ray unbranched. Caudal fin slightly rounded; the uppermost and lowermost rays unbranched.

Proportional measurements: head length 26.3–35.2% SL, snout length 21.0–26.8% SL, eye diameter 11.6–15.9% SL, interorbital width 10.8–13.6% SL, postorbital length 7.3–10.1% SL, gill opening length 3.6–7.3% SL, snout to dorsal fin 57.4–76.3% SL, snout to anal fin 56.7–76.3% SL, body depth 29.9–41.1% SL, body width 19.3–22.4% SL, dorsal-fin height 13.4–20.4% SL, anal-fin height 12.2–17.3% SL, length of dorsal-fin base 7.7–9.5% SL, length of anal-fin base 6.6–9.0% SL, pectoral-fin length 15.7–23.2% SL, caudal-fin length 19.3–27.0% SL, caudal peduncle depth 7.1–9.8% SL, caudal peduncle length 17.3–22.8% SL, tail length 17.7–25.6% SL, and tail depth 18.4–22.7% SL.

Color of specimens in alcohol: body brown with many round dark spots, slightly smaller than pupil, on dorsal surface of carapace. All fins pale.

Remarks. Gilbert (1905) classified his new boxfish, *sylonota*, in the genus *Aracana* which was a catch-all genus for boxfishes in the early 1900s. However, the true *Aracana* is represented by two Australian species, *Aracana aurita* Shaw, 1798 and *A. ornata* Gray, 1838, both confined to the southern waters of Australia. The genus *Aracana* is characterized by having a relatively compressed body, rather pentagonal in cross section with a well-developed ventral ridge that forms a keel on the midline extending from ventral to the eye to the origin of anal fin; a posterolaterally directed spine over each eye; a laterally directed spine on the midlateral side about the level of eye, 2 spines each on the dorsolateral and ventrolateral ridges. Conversely, the genus *Kentrocopros* is characterized by having a carapace with 6 ridges, hexagonal in cross section and lacking a keel on the ventral surface of the carapace. The characters of *Aracana sylonota* clearly indicate that this species should be reassigned to *Kentrocopros*. As in other species of *Kentrocopros*, *K. sylonotus* has been collected from deep waters at depths from 106 m to 293 m.

Kentrocopros flavofasciatus (Kamohara, 1938)

Materials examined. AMS I.29310-001 (1 specimen), New South Wales, off Moruya, 35°46'S, 150°34'E–35°44'S, 150°36'E, 155–160 m depth, collected by FRV *Kapala*, 16 February 1989; AMS I.29734-012 (1 specimen), 122.0 mm SL, Queensland, NE of Coolangatta, 28°02'S, 153°53'E–28°05'S, 153°52'E, collected by FRV *Kapala*, 229 m depth, 16 August 1978; AMS I.31338-001 (3 specimens), 77.5–112.0 mm SL, New South Wales, off Sawtell, 30°22'S, 153°24'E–30°24'S, 153°23'E, 137–150 m depth, collected by FRV *Kapala*, 5 September 1990; AMS I.32119-004 (1 specimen), 126.7 mm SL, New South Wales, Yamba-Iluka, 28°24'S, 153°46'E–29°21'S, 153°47'E, 153–175 m depth, collected by FRV *Kapala*, 22 May 1991; AMS I.32136-001 (1 specimen), 92.9 mm SL, New South Wales, off Sydney, 33°33'S, 151°54'E–33°31'S, 151°56'E, 162–165 m depth, collected FRV *Kapala*, 1 March 1991; AMS I.32146-001 (1 specimen), 87.3 mm SL, New South Wales, off New Castle, 33°00'S, 152°12'E–32°59'S, 152°11'E, 133–135 m depth, collected by FRV *Kapala*, 4 April 1990.

Description. Because Matsuura & Yamakawa (1982) provided the detailed description of *K. flavofasciatus* and the Australian specimens do not show significant differences from the previous specimens reported by Matsuura & Yamakawa (1982) and Matsuura & Tyler (1997), the description of this species is not repeated here except for counts and proportional measurements below.

Dorsal-fin rays 11 (10 in one specimen), anal-fin rays 10, pectoral-fin rays 12 (13 in one specimen), caudal-fin rays 11.

Proportional measurements: head length 28.4–36.7% SL, snout length 23.0–28.8% SL, eye diameter 12.9–17.9% SL, interorbital width 13.9–16.8% SL, postorbital length 7.2–10.1% SL, gill opening length 8.0–11.6% SL, snout to dorsal fin 72.3–82.9% SL, snout to anal fin 71.6–80.5% SL, body depth 41.6–54.8% SL, body width 24.1–35.2% SL, dorsal-fin height 17.1–22.7% SL, anal-fin height 15.8–21.3% SL, length of dorsal-fin base 10.1–13.1% SL, length of anal-fin base 8.6–11.5% SL, pectoral-fin length 18.6–26.9% SL, caudal-fin length 20.1–28.7% SL, caudal peduncle depth 8.2–11.1% SL, caudal peduncle length 19.1–25.8% SL, tail length 17.0–24.6% SL, tail depth 24.3–30.3% SL.

Remarks. *Kentrocapros flavofasciatus* has been recorded from the Pacific coast of southern Japan, the East and South China seas, and New Caledonia in depths of 80–360 m. Matsuura & Tyler (1997) suggested that this species is antitropical in distribution, and the Australian specimens provide a support to their statements.

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