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Distribution of the porcupine ray *Urogymnus asperrimus* (Bloch & Schneider, 1801) in Australian waters, with new records from Queensland

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ABSTRACT

Three specimens of the porcupine ray *Urogymnus asperrimus* (Bloch & Schneider, 1801) are reported from Heron Island on the Great Barrier Reef, Qld. These are the first records from the southern Great Barrier Reef and represent the southernmost records for this species on the east coast of Australia. An immature male with a disc width (DW) of 650 mm and two females measuring 620 mm DW and 545 mm DW were caught on the eastern side of the island using hand or seine nets. The two females were released alive after examination. Some morphometric data from two of the individuals are provided. The distribution, biology and ecology of this species are poorly-known, with only five catalogued Australian specimens held in Australian museums. The majority of these are not whole specimens and are in poor condition. There is further scattered information from photographs and live sightings. All known Australian records of *U. asperrimus* are summarised here. There are records of the species across tropical northern Australia, from Ningaloo Reef, WA (22° 43'S) to Heron Island, Qld (23° 26'S).
□ *Myliobatoidei, Dasyatidae, Urogymnus, southern Great Barrier Reef, Heron Island.*

The porcupine ray *Urogymnus asperrimus* (Bloch & Schneider 1801) is a large dark brown to greyish batoid, identified by an oval-shaped disc covered in plate-like denticles and sharp thorns (Last & Stevens 1994). The tail lacks stinging spines and skin folds (Last & Stevens 1994), the latter separating the genus from the closely-related *Dasyatis* Rafinesque,

1810. *Urogymnus asperrimus* occurs in tropical waters throughout the Indo-West Pacific from east Africa to Fiji, and in the tropical Eastern Central Atlantic off west Africa (Last & Stevens 1994). It attains a maximum disc width (DW) of at least 1470 mm and is found inshore on sand and coral rubble substrate near reefs (Last & Stevens 1994; White et al. 2006). Very little

is known about the biology of *U. asperrimus*, and detailed information on distribution and habitat is lacking.

Despite the wide distribution of *U. asperrimus*, it has not regularly been reported (Compagno 2000). Previous Australian records are limited to only a few specimens with little to no accompanying data, along with anecdotal sightings, photographs and live sightings from Western Australia (WA). The first Australian record of the species appears to be an individual caught in 1770 by the crew of the H.M. Bark *Endeavour* on James Cook's first voyage to the Pacific. This individual was taken off the mouth of the Endeavour River, with a description provided by botanist Daniel Solander, fitting that of *U. asperrimus* (description reprinted in Whitley 1939). There is only one previously catalogued specimen from the east coast of Australia (Queensland Museum, QM I.1112-4), which is registered as the holotype of the subspecies *U. asperrimus solanderi* Whitley, 1939. Whitley (1939) used Solander's description of the Endeavour River specimen, together with limited material (teeth, velum maxillare, buccal processes and skin) to 'give a new subspecific name to distinguish it from the Bombay type of the species', but did not provide an actual description of the subspecies, nor distinguishing features between it and the nominate form. *Urogymnus africanus* (Bloch & Schneider 1801) and *Raja africana* Bloch & Schneider 1801, are both synonyms of *U. asperrimus*, with the only other valid species in the genus being the pincushion ray *U. ukpam* (Smith 1863) of west African freshwater basins.

This paper reports on the location and habitat of three new *U. asperrimus* individuals collected from eastern Australia and summarises the known Australian records of the species.

MATERIALS AND METHODS

The first new specimen was examined at the Heron Island Research Station (HIRS), The University of Queensland, before being

transported to and lodged at the Queensland Museum (QM), Brisbane, where it is preserved in ethanol. The second and third specimens were kept alive overnight in a large seawater tank at HIRS before being measured, photographed and released. Location, date, DW, disc length (DL), total length (TL), weight (for the live individuals only), sex and maturity, where possible, as well as some selected morphometrics for two individuals were recorded from the specimens following Last & Stevens (1994).

Information on Australian records of *U. asperrimus* in museum collections, as well as confirmed live sightings, were gathered in order to provide a summary on the distribution and biology of this species in Australian waters, and to compare this information with the newly recorded individuals presented here. The following abbreviations are used for institutions: AMS, Australian Museum, Sydney; NTM, Museums and Art Galleries of the Northern Territory, Darwin; QM, Queensland Museum, Brisbane; WAM, Western Australia Museum, Perth.

RESULTS

All three *U. asperrimus* specimens were collected from Heron Island (23°26'S, 151°54'E), part of the Capricorn Bunker Group of islands at the southern end of the Great Barrier Reef, 72 km off the coast of Gladstone, Qld.

The first specimen (QM I.31178, immature ♂, 650 mm DW, 665 mm DL, 1375 mm TL) was collected on 9 July 1998 at Shark Bay on the eastern end of Heron Island by seine net at dusk. Other measurements: 120 mm snout length, 290 mm head length, 250 mm trunk length and 835 mm tail length. The second specimen (♀, 620 mm DW, 650 mm DL, 1270 mm TL, 16.04 kg) was collected on 9 July 2006 from the shallows of Shark Bay after sunset by hand net. The third specimen (♀, 545 mm DW, 570 mm DL, 1130 mm TL, 11.70 kg) (Fig. 1A) was collected on 1 February 2008, also from Shark

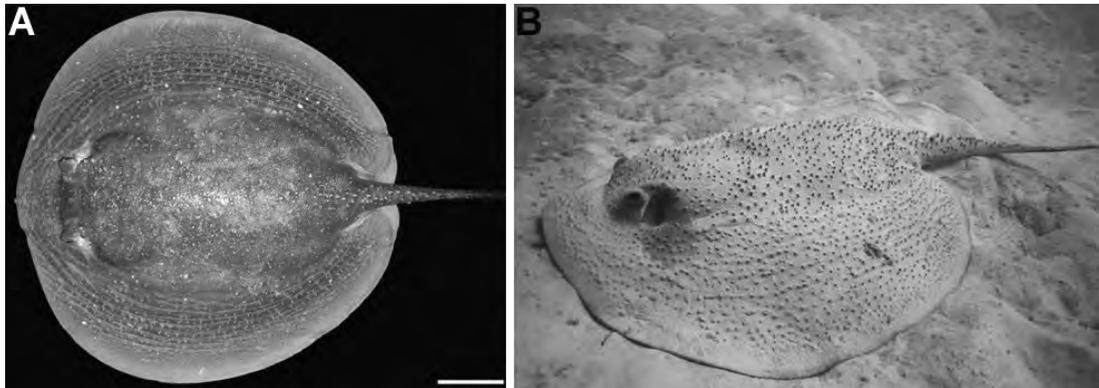


FIG. 1. Photographic records of the porcupine ray, *Urogymnus asperrimus*. A, Dorsal view of a 545 mm DW ♀ *U. asperrimus* collected from Heron Island, Qld and released alive. Scale bar = 10 cm; B, Underwater lateral view of *U. asperrimus* from Fitzroy Reef, Qld. (Photo: Brett Vercoe).

Bay, using a seine net on the incoming tide in the afternoon. Other measurements: 100 mm snout length, 230 mm head length, 235 mm trunk length and 665 mm tail length. This specimen was recaptured two days later with a hand net at high tide, approaching dusk, in nearly the same location within Shark Bay. Photographs of white spots found along the margin of the disc were used to identify the animal as the previously caught specimen. Maturity was not determined as the animals were released alive, but as females mature by 1000 mm DW (White et al., 2006) it is assumed that both specimens were immature. Minor abrasions were noted on the dorsal surface of the disc of the second specimen, but these were unrelated to the method of capture.

There are 25 known records of *U. asperrimus* from Australian waters (Table 1). Including the three new records reported here, there are nine records from Qld, 15 from WA and one from the Northern Territory (NT). A further two registered records held in Australian collections (AMS and QM) are from the Gilbert Islands, part of the Republic of Kiribati in the Western Central Pacific. As these records were not obtained from Australian waters, they are not included in the summary of records

provided here. Of the 25 known records, 10 are live sightings recorded from visual surveys, six are from photographs (Fig. 1), three are dried skins (or parts of), one is small parts of an individual, two are whole specimens preserved in ethanol, one was used for research purposes, and one specimen could not be located. An additional historical account appears to represent the first Australian record from 1770. With the exception of the two ethanol preserved specimens, the catalogued material is generally in a poor state. Accompanying data is limited for many records. Some records have a detailed note of location and most records include a date of capture, but actual specimen data, including size, sex and maturity, are lacking in most instances (see Table 1).

DISCUSSION

Australian records of the porcupine ray are scattered across tropical northern Australia, with the southernmost point of occurrence on the west coast, Ningaloo Reef, WA (22°43'S) and on the east coast, Heron Island, Qld (23°26'S). The new specimens are the only confirmed records of the species from Heron Island and the southern Great Barrier Reef. They also

Museum	Registration number	Location caught	Latitude	Longitude	Date	Collector	Disc Width (mm)	Disc Length (mm)	Total Length (mm)	Sex and maturity	Remarks
-	Historical account	Endeavour River mouth, Qld	15°28'S	145°15'E	1770	Crew of H.M. Bark <i>Endeavour</i>	-	-	-	-	Taken on Cook's first voyage to the Pacific. Description provided by D. Solander (see Whitley, 1939).
AMS	AMS I.1721	Kingsmill Islands, WA	14°11'S	125°47'E	1888	J. Brazier	-	-	-	Female, immature	Dry skin, in Ethnological Collection
QM	QML1112-4	Darney Island, Qld	09°35'S	143°46'E	08/04/1913	J.R. Tosh	-	-	-	-	Buccal flaps in ethanol, dried jaws and tail; holotype of subspecies <i>Urogymnus asperimus solanderi</i> Whitley, 1939
WAM	WAMP.4631-0001	WA	-	-	1959	G.F. Mees	-	-	-	-	No collection data. Specimen location unknown
WAM	Photograph	Dampier, WA	20°39'S	116°42'E	04/08/1978	J.B. Hutchins	-	-	-	Female	Caught in net, released alive
WAM	Photograph	Exmouth Gulf, WA	22°07'S	114°17'E	07/1991	J.B. Hutchins	-	-	-	-	Found dead on beach, not collected
-	Live sighting	Wellesley Islands, Gulf of Carpentaria, Qld	16°33'S	139°24'E	1998	H. Malcolm	-	-	-	-	Based on incidental sighting during underwater visual surveys of reef fish
QM	QML11178 (present manuscript)	Heron Island, Qld	23°26'S	151°54'E	09/07/1998	L.A. Chisholm	650	665	1375	Male, immature	Whole specimen in ethanol
-	Research specimen	Off Weipa, Gulf of Carpentaria, Qld	12°42'S	141°39'E	11/06/2003	L. Squire Jr.	460	490	1000	Female, immature	Healed umbilical scar
-	Photographs (present manuscript)	Heron Island, Qld	23°26'S	151°54'E	09/07/2006	S.M. Theiss	620	650	1270	Female, probably immature	Released alive. Mass 16.04 kg
-	Photograph	Fitzroy Reef, Qld	23°37'S	152°09'E	1/11/2007	B. Vercoe	-	-	-	-	Underwater photograph taken at 10 m depth
-	Photographs	Northern end of Flynn Reef, Qld	16°43'S	146°13'E	16/2/2007	B. Carter	-	-	-	-	Two underwater photographs taken at 5 m depth
-	Live sightings and photograph	Mangrove Bay & Point Cloates, Ningaloo Reef, WA	21°58'S 22°43'S	113°56'E 113°40'E	04/2007	J.D. Stevens	-	-	-	-	Nine confirmed sightings from two locations, with photograph
-	Photographs (present manuscript)	Heron Island, Qld	23°26'S	151°54'E	01/02/2008	S.M. Theiss	545	570	1130	Female, probably immature	Released alive. Recaptured in same location 2 days later. Mass 11.70 kg
NTM	Unregistered	Casuarina Beach, Darwin, NT	12°21'S	130°52'E	-	-	-	-	-	-	Beach-washed specimen, dried skin in poor condition
WAM	WAMP.29410-001	WA	-	-	-	-	617	642	1221	Female, probably immature	Whole specimen in ethanol, tail tip missing. No collection data.
WAM	WAMP.29573-001	Broome, WA	17°58'S	122°14'E	-	-	-	-	-	-	Dried piece of skin only

TABLE 1. Summary of all known Australian records of *Urogymnus asperimus* (Bloch & Schneider, 1801). AMS, Australian Museum, Sydney; NTM, Museums and Art Galleries of the Northern Territory, Darwin; QM, Queensland Museum, Brisbane; WAM, Western Australia Museum, Perth.

represent the known southern distribution limit for the species on the east coast of Australia.

The eastern side of Heron Island is primarily a sandy bottom habitat of the reef lagoon with some coral rubble leading out to the inner reef. Large aggregations of batoids can be found in the lagoon, most commonly the pink whipray *Himantura fai* Jordan & Seale, 1906, the cowtail ray *Pastinachus atrus* (Macleay, 1883) and the giant shovelnose ray *Glaucostegus typus* (Bennett, 1830). All three *U. asperrimus* specimens, however, appeared to be solitary. Heron Island and the southern Great Barrier Reef are well surveyed regions and the low recorded abundance of the porcupine ray is probably an accurate indicator of the rarity of this species locally. Indeed, throughout its Australian range, this species is not regularly recorded and there is a lack of reliable records to confirm distribution, along with basic biological information. Although *U. asperrimus* is rarely encountered, it may be more widely distributed across northern Australia than current records indicate. In this area relatively turbid conditions markedly reduce the effectiveness of underwater visual survey techniques, compared to in clearer Great Barrier Reef and west coast waters. Overall, little biological information can be gathered from the existing Australian records.

Behavioural observations made from live sightings at Ningaloo Marine Park provide some insight into the ecology of this species (J.D. Stevens, pers. comm.). *Urogymnus asperrimus* appears to plough strongly through the substrate when feeding, which is different to the feeding strategies of other large rays, and there seems to be some suggestion that larger individuals are found at greater depths (J.D. Stevens, pers. comm.).

Urogymnus asperrimus is listed as Vulnerable on the IUCN Red List of Threatened Species due to the lack of regular records and an apparent decrease in abundance (Compagno, 2000). Although handling of *U. asperrimus* is difficult

due to its rough dorsal surface, this species is commonly caught in South East Asia and used for its meat, cartilage and skin, which is of particularly high value (White et al., 2006). Basic biological information such as age, growth and reproduction are lacking, making an assessment of the species' resilience to fishing pressure difficult. Its rarity, inshore habitat and large size, however, may imply that it is unlikely to sustain prolonged targeted fishing.

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