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Redescription, Distribution and Food Habits of the Indo-Pacific Dasyatidid Stingray *Himantura granulata*

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Abstract The dasyatidid stingray *Himantura granulata* (Macleay), recorded previously from New Guinea, Caroline Islands, Santa Cruz Islands, and northwestern Australia, is redescribed from the first adult specimens, and the range extended to the Maldive Islands. The stomachs of three of six specimens contained food, mainly small fishes (*Siganus* sp., *Valenciennea* sp., blenniid, pomacentrid, labrid, and gobiid) and sipunculids, but also an octopus and a calappid crab.

The dasyatidid stingray, *Himantura granulata*, was described briefly by Macleay (1883) from a single female specimen of 34 inches (86 cm) in total length (TL) from the Port Moresby, district of Papua New Guinea; he classified it in the genus *Trygon*. Günther (1910) described a small female specimen from Pohnpei, Caroline Islands, as a new species, *Trygon ponapensis*. Curiously, Garman (1913) recognized Günther's species as valid, shifting it to the genus *Dasybatus*, but he relegated *granulata* to the synonymy of *T. gerrardi* Gray. Whitley (1928b) disagreed with Garman, redescribed the holotype of *granulata*, correctly placed it in the genus *Himantura*, and reported a male specimen of 30 1/2 inches (77.5 cm) TL from a reef at Vanikoro, Santa Cruz Islands. Whitley commented that the two specimens appear immature and stated, "it is probable that *Himantura granulata* grows to a large size."

Since Whitley (1928b), there has been only one new record of *Himantura granulata* in the literature (i.e., not a compilation), that of Gloerfelt-Tarp and Kailola (1984) from a specimen (CSIRO CA 1255) taken off northwestern Australia which was identified by Peter Last; only a brief color note was given. The size of the specimen is 28 cm in disc width (DW) and 81 cm TL (pers. comm., P. R. Last).

In 1988 the fourth author photographed an individual of this species underwater on lagoon fringing reef in 2 m in the Maldive Islands (Fig. 1) and then speared it (BPBM 34745, male, 107 cm TL). He also obtained a very large male from Martin van der Knaap who caught it by long-line from 85 m deep in the Maldives (USNM 320017, 195 cm TL).

In 1991-1992 the first three authors conducted a survey of the rays of Pohnpei, Caroline Islands. They collected four specimens of *H. granulata*, two adult males (one shown in Fig. 2) and two adult females at the coordinates 6°46-52′N, 158°10-20′E (Homma et al., 1991).

Since we have obtained the first adult specimens of this stingray, we are redescribing it from our six specimens, with comments on distribution, habitat, and food habits.

Materials and Methods

The four specimens of *Himantura granulata* from Pohnpei have been deposited in the Museum of the Tokyo University of Fisheries (MTUF), the smallest specimen from the Maldives in the Bernice P. Bishop Museum, Honolulu (BPBM), and the largest at the U.S. National Museum of Natural History, Washington, D.C. (USNM).

Methods of taking measurements follow Hubbs and Ishiyama (1968). Table 1 represents the proportional measurements of our six specimens as percent-

ages of the disc width (not total length because the tails of stingrays are often cut due to injury). Distance between spiracles was measured at their anterior ends, and spine length from its extreme base to tip. We follow Stehmann (1981) in the method of counting teeth.

Fig. 1. Underwater photograph of *Himantura granulata*, young male, BPBM 34745, 524 mm disc width, North Malé Atoll, Maldive Islands (J. Randall).

Himantura granulata (Macleay, 1883)
(New English name: Whitetail Stingray)
(New Japanese name: Ojiro-ei)
(Figs. 1, 2; Table 1)

Trygon granulata Macleay, 1883: 598 (descr., locus typicus: New Guinea; without illustr.).

Himantura granulata: Jordan and Seale, 1906: 185 (listed); Whitley, 1928a: 11 (listed, Santa Cruz Archipelago); Whitley, 1928b: 211, figs. 1–2 (re-descr. of holotype; descr. of additional specimen, Vanikoro, Santa Cruz I.); Munro, 1967: 15 (listed, New Guinea); Compagno and Roberts, 1982: 323 (refer. only); Gloerfelt-Tarp and Kailola, 1984: 37 (listed, CSIRO CA 1255,Western Australia); Homma et al., 1991: 4, pl. 3 (descr., Pohnpei I.); Last and Stevens, in press: 22 (compiled).

Dasyatis granulatus: Fowler, 1931: 314 (refer. only); Fowler, 1934: 386 (listed, Oceania); Fowler, 1941: 437 (compiled).

Dasybatus gerrardi (not Gray, 1851): Garman, 1913: 377 (in part).

Dasyatis gerrardi (not Gray, 1851): Fowler, 1928: 24 (in part); Fowler, 1930: 504, (listed, Pacific).

Trygon ponapensis Günther, 1910: 493, pl. 180 (descr., young female, locus typicus: Kubary, Pohnpei).

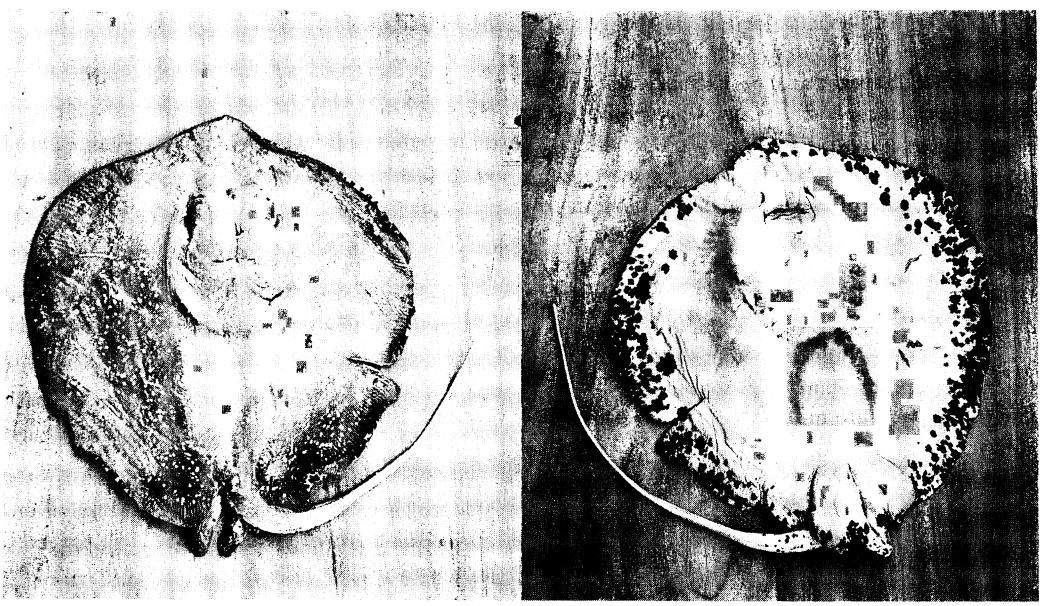

Fig. 2. Dorsal and ventral sides of *Himantura granulata*, adult male, MTUF 26703, 688 mm disc width, Pohnpei Island, Caroline Islands (H. Ishihara).

Dasybatus ponapensis: Garman, 1913: 380 (after Günther, 1910).

Dasyatis ponapensis: Fowler, 1928: 24 (listed); Fowler, 1930: 504 (listed, Pacific); Fowler, 1941: 432 (compiled).

Material examined. Maldive Islands: BPBM 34745, 524 mm disc width (DW); USNM 320017, 970 mm DW. Caroline Islands, Pohnpei: MTUF 26700, 796 mm DW; MTUF 26703, 688 mm DW; MTUF 26705, 789.5 mm DW; MTUF 26719, 709 mm DW.

Description. Disc oval, the greatest disc width in anterior half, at 34.9–45.1% of disc length, the anterior end obtusely angular, the snout with a slightly produced pointed tip; disc length usually slightly greater than DW; disc thick, its depth 12.4–19.7% DW; dorsal head length 35.6–38.2% DW; snout length 62.5–69.4% dorsal head length; eye small, the orbit dimeter 3.6–6.4% DW; interorbital space 30.4–35.0% dorsal head length; preoral snout length nearly equal to interspiracular width and about twice

Table 1. Counts and measurements of *Himantura granulata* under the present study. All measurements are expressed in % of disc width

Specimen	BPBM 34745 (♂)	MTUF 26703 (♂)	MTUF 26719 (♂)	USNM 320017 (♂)	MTUF 26700 (♀)	MTUF 26705 (♀)	Range
Locality	Maldives	Pohnpei	Pohnpei	Maldives	Pohnpei	Pohnpei	
Disc width (mm)	524	688	709	970	796	789.5	524–970
Total length	204.6	—	205.5	200.5	—	—	200.5–205.5
Disc length	102.1	103.2	104.2	106.2	105.0	99.2	99.2–106.2
Disc depth	12.4	19.7	14.8	17.8	17.3	13.0	12.4–19.7
Snout tip to maximum disc width	44.5	43.8	36.4	—	42.3	44.7	36.4–44.7
Snout length	26.3	23.9	23.2	26.2	24.7	22.4	22.4–26.2
Dorsal head length	38.2	38.2	37.1	—	35.6	35.6	35.6–38.2
Eye diameter	6.4	5.0	4.3	3.6	4.9	4.4	3.6–6.4
Interorbital width	12.8	11.6	13.0	14.6	12.1	11.8	11.6–14.6
Spiracle length	6.8	7.3	6.1	—	8.3	8.0	6.1–8.3
Interspiracular width	20.8	21.5	19.2	21.1	22.0	21.7	19.2–21.7
Nasal curtain length	6.1	6.3	6.1	—	6.7	8.3	6.1–8.3
Nostril length	4.8	4.6	4.4	—	5.0	4.8	4.4–5.0
Prenarial snout length	18.4	16.6	15.6	17.9	15.2	14.7	14.7–18.4
Internarial width	10.1	10.3	10.4	10.8	11.6	9.4	9.4–11.6
Preoral snout length	22.3	22.5	20.2	—	20.7	20.2	20.2–22.5
Mouth width	9.4	9.4	10.5	10.3	9.4	9.5	9.4–10.5
Snout tip to 1st gill slits	40.3	35.0	34.0	40.4	34.7	34.5	34.5–40.4
Ventral head length	52.9	48.5	48.1	54.2	49.6	48.0	48.0–54.2
Snout tip to pelvic girdle	79.3	77.2	75.0	—	76.0	82.0	75.0–82.0
Snout tip to anus	85.7	84.3	81.8	88.1	84.2	85.1	81.8–88.1
Tail length	110.3	—	—	105.2	—	—	105.2–110.3
Width of tail at end of pelvics	9.4	5.4	5.7	8.9	5.9	5.8	5.7–9.4
Depth of tail at end of pelvics	6.9	4.4	5.6	7.4	5.7	4.4	4.4–7.4
1st gill slit length	3.6	4.1	3.4	4.5	4.1	3.9	3.4–4.5
5th gill slit length	2.7	3.5	2.8	3.0	3.2	2.9	2.7–3.5
Distance between 1st gill slits	23.5	24.2	24.5	24.4	24.3	23.0	23.0–24.5
Distance between 5th gill slits	15.2	16.3	16.6	17.2	15.5	15.7	15.2–17.2
Pelvic fin:							
Anterior margin	18.1	15.3	16.4	18.3	17.3	17.1	15.3–18.3
Posterior margin	11.5	13.1	10.4	11.3	18.6	17.6	10.4–18.6
Spine length	20.2	19.3	18.3	17.4	—	26.2	17.4–26.2
Clasper length	12.5	22.8	21.6	—	—	—	21.6–22.8
Dental formula	40–38	50–45	43–43	—	41–46	—–50	(40–50)–(38–50)
Number of oral papillae	4	0	—	—	4	4	0–4
Number of caudal spine	2	1	1	1	—	1	1–2

mouth width; internarial width 54.9–76.3% prenarial snout length; distance between first gill slits about half ventral head length; tail whip-shaped without fin folds, broad at base (its width 5.7–9.4% DW), tapering to a slender tip, its length 5–10% longer than DW: width of base of tail 5.7–9.4% disc width; depth of base of tail contained about 1.3 times in its width; a single spine (two on smallest specimen) on antetrior third of tail, the spine length 17.4–26.2% DW.

Teeth quincuncial with 40–50 rows on upper jaw and 38–50 on lower jaw; 0–4 fimbriate oral papillae on floor of mouth.

Dorsal surface of disc with numberous fine denticles, becoming about twice as large on elevated median fourth of disc; one or two irregular rows of still larger denticles on midline of body, beginning about an intetrorbital space behind eye and continuing onto tail to base of caudal spine, the largest on tail (largest denticles on smallest specimen 5 mm in diameter, the vertical central spine 3 mm high); ventral surface of disc and tail smooth.

Dorsal surface of disc and tail anterior to caudal spine dark gray to black with numerous small white spots of variable size; tail posterior to caudal spine whitish; ventral surface of disc white with small dark spots on about outer eighth. The dark color of the dorsal surface in life is due to a coating of black mucus; when this is removed, the dorsal coloration is light orangish gray.

Distribution. This stingray has been reported from Papua New Guinea, Santa Cruz Islands, Caroline Islands, and northwestern Australia. We here extend its range to the Maldive Islands in the western Indian Ocean. Last and Stevens (in press) will report it from Queensland and Western Australia. While at a dive resort in Flores, Indonesia, Charles Anderson (pers. comm.) showed a video tape of this ray taken in Indonesian waters. From the known distribution, its occurrence in Indonesia would be expected.

Habitat. The smaller of the two Maldive specimens was speared by the fourth author on the lagoon fringing reef of Villingili Island, North Malé Atoll; another was seen in a surge channel on the sea side of Villingili in less than 2 m depth. The large Maldives specimen, which weighed 52 kg, was caught by longline in 85 m deep off Tulusdu. Our Pohnpei specimens were taken by spearing in 0.5–1 m deep in the lagoon over sand or sand and rubble, not near the mangroves of Penian and Small Islands, Pohnpei.

Food habits. Three of our six specimens had food in their stomachs. The stomach of MTUF 26700 contained the partly digested remains of two *Siganus* sp. (51–77 mm SL), one blenniid (64 mm SL), one pomacentrid (37 mm SL), and the head of a gobiid. MTUF 26705 had eaten a labrid (probably *Halichoeres* sp., 50 mm SL), *Valenciennea* sp. (70 mm SL), an unidentified small gobiid, two sipunculids (79–86 mm) and a small octopus. The stomach of the large specimen of USNM 320017 contained a very large sipunculid, crushed fragments of a calappid crab, and the well-digested remains of three small fishes (mainly vertebral columns, but one fish intact enough to estimate the SL at about 28 mm).

Remarks. Compagno and Roberts (1982) wrote that the genus *Himantura* is morphologically diverse and may be polyphyletic. They recognized 18 species in the genus: *H. alcocki* (Annandale), *H. bleekeri* (Blyth), *H. fai* Jordan et Seale, *H. fava* (Annandale), *H. fluviatilis* (Hamilton), *H. gerrardi* (Gray), *H. granulata* (Macleay), *H. imbricata* (Bloch et Schneider), *H. jenkinsi* (Annandale), *H. krempfi* (Chabanaud), *H. marginata* (Blyth), *H. microphthalma* (Chen), *H. pacifica* (Beebe et Tee-Van), *H. purpurea* (Smith) [however, Bigelow and Schroeder, 1962, placed this in the synonymy of the pelagic *Dasyatis violacea* (Bonaparte)], *H. schmardae* (Werner), *H. signifer* (Compagno et Roberts), *H. uarnak* (Forsskål), and *H. uylenbergi* (Giltay). Compagno and Heemstra (1984) added another species of the genus when they described *H. draco* from South Africa. Monkolprasit and Roberts (1990) described *H. chaophraya* from the rivers of Thailand. Wallace (1967) recorded *Dasyatis purpureus* from South Africa, but Compagno and Heemstra (1984) and Compagno (1986) noted that it is a species of *Himantura*, possibly *H. fai* (Jordan et Seale). Gloerfelt-Tarp and Kailola (1984) listed three more unidentified species of *Himantura* from southern Indonesia.

Of the valid 18 named species of the genus, *H. schmardae* is an Atlantic ray and *H. pacifica* an eastern Pacific one. *Himantura chaophraya*, *H. krempfi* and *H. signifer* are freshwater stingrays. *Himantura granulata* is easily distinguished from the remaining 12 Indo-Pacific marine species of the genus by its distinctive oval disc shape with broadly angular snout (see fig. 1 in Compagno and Roberts,

1982), its relatively short tail (little more than the disc width), and uniquely different color pattern.

Himantura granulata has been given the common name of Mangrove Stingray because the holotype was collected from a mangrove area. None of our specimens have come from mangrove or other brackish environments, but clear-water roof areas. We propose a more appropriate common name, Whitetail Stingray.

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インド・太平洋産アカエイ科魚類オジロエイ（新称）*Himantura granulata* の再記載，分布，食性

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従来，ニューギニア，カロリン諸島，サンタクルス諸島，そして北西オーストラリアから記録されていたアカエイ科のオジロエイ（新称）を，初めての成魚の標本に基づいて再記載した．分布記録はモルディブ諸島まで広がった．本種は白色の尾部，体盤背面の白色斑点，ならびに体盤腹面縁辺の黒色斑点によって他のオトメエイ属アカエイ類と区別できる．6 個体の標本の 3 個体に胃内容物がみられ，これらは主に小魚（アイゴ属，クロイトハゼ属，イソギンポ科，スズメダイ科，ベラ科，ハゼ科）からなり，他にも星口動物，そしてタコとカラッパ科のカニがみられた．本種の英名 Mangrove Stingray はその生息域からみて妥当でないため，新たに Whitetail Stingray（和名オジロエイ）を提唱する．

（石原：〒215 川崎市麻生区百合ケ丘 1-5-4-302（株）水土舎；本間・竹田：〒060 札幌市中央区南一条西 1 有楽ビル内共和コンクリート工業（株）；Randall：アメリカ合衆国ハワイ州・B.P. ビショップ博物館）