ON THE OCCURRENCE OF THE ROUGH-TAIL STING-RAY *DASYATIS CENTROURA* (MITCHILL) IN INDIAN WATERS

E. G. SILAS AND G. S. D. SELVARAJ
Central Marine Fisheries Research Institute, Cochin.

ABSTRACT

The Rough-tail sting-ray, *Dasyatis centroura* (Mitchill), is recorded for the first time from Indian waters. A description of the species based on a male measuring 242 cm in length, obtained during an exploratory trawling by M. V. Bluefin from the upper continental slope off the west coast of India, is given with illustrations, and its variations from the species from the Atlantic and the Mediterranean, as has been noted from their descriptions, are detailed.

INTRODUCTION

During exploratory trawlings from the upper contential slope off the west coast of India, carried out by R. V. Varuna, M. V. Bluefin and other Government of India fishing vessels, several interesting elasmobranch fishes hitherto unknown from Indian seas have been brought to light (Silas et al 1969, Silas 1969, Silas and Prasad 1969, Talwar 1972). One of these interesting finds is the Rough tail sting-ray, *Dasyatis centroura* (Mitchill) (Dasyatidae). Specimens of *D. centroura* have hitherto been collected only from the Atlantic and Mediterranean. Fowler (1936) has given a brief account of this species based on the collection of the American Museum—Congo Expedition (New Jersey). Soljan (1948) has given an illustrated description of this species from the Adriatic Sea and Leim and Scott (1966) have mentioned briefly the body proportions of the Canadian sample.

The present account, recording for the first time the occurrence of *Dasyatis centroura* in Indian waters, gives a detailed description of the species based on a male measuring 242 cm in length obtained during an exploratory trawling off Quilon (square 8.76.5.A) from a depth of 250 metres.

DASYATIS CENTROURA (MITCHILL, 1815)
(Pl. I A-F; Figs. 1 and 2)

Synonyms

Raja centroura Mitchill, 1815. *Trans. Lit. Philos. Soc. New York.* I, p. 479. (Long Island), New York.

Hemitrygon ukpam J. A. Smith, 1859. *Proc. Roy. Phys. Soc. Edinburgh*, p. 69. (Old Calabar River).

Trygon ukpam Gunther, 1870. *Cat. Fish. Brit. Mus.*, VIII. p. 480.

Trygon spinosissima Dumeril, 1865. *Hist. Nat. Poiss.*, I p. 598. No locality. (Based on large thorny tail) - Rochebrune, 1883. *'Faune Senegambie', Poiss.*, p. 30 (Senegal, Bakel, Gambia).

Trygon thalassia Gunther, 1870. *op. cit.*, p. 477. (Madeira) - Rochebrune, 1883. *'Faune Senegambia', Poiss.*, p. 30. (Senegal, Bakel).

Dasybatus thalassia Monod, 1927. *'Faune Colon. francaises'*, p. 652. (Souelaba, Cameroon).

Material

One male, 242 cm in length, wt. 46 kg, (Fig. 1a), obtained from 250 m off Quilon (square 8.76.5.A) on 30-3-1972, during an exploratory fishing cruise by M. V. Bluefin. Morphometric measurements were taken and important portions such as mouth, skin with tubercular spines, pelvic fin with clasper, stomach and tail of the fish were preserved.

Diagnosis

Head not elevated; disc wider than long; head region armed with few flattened tubercular dermal scutes with hard stellate basal shield; spiracles close behind eyes and larger than the latter; teeth similar in both jaws; tail black, fairly thick at base, cylinderical, tapering, armed closely with tubercular spines of different sizes and with a narrow fold of skin ventrally from exactly below origin of tail spine and extending posteriorly to about 2/3 of total length of the tail; dorsal fold and median fins absent.

Description

The body measurements of the specimen, the actuals as well as percentages in both the total length and the disc length, are:

Parameters	mm	% in Total length	% in Disc length|Body length
Total length	2420	100.0	268.9
Body length|Disc length (Snout to caudal origin)	900	37.2	100.0
Disc width	1230	50.8	136.7

Parameters	mm	% in Total length	% in Disc length|Body length
Distance from snout tip to:			
Outer angle of disc	725	30.0	80.6
Tip of pelvic fin	980	40.5	108.9
Tail spine origin	1205	49.8	133.9
1st mid-dorsal spine	385	15.9	42.8
Vent (cloaca)	780	32.2	86.7
Eye: Snout tip to eye	242	10.0	26.9
Interorbital distance	170	7.0	18.9
Spiracle: Snout to spiracle	260	10.7	28.9
Length	88	3.6	9.8
Greatest width	55	2.3	6.1
Mouth: Snout tip to mouth	220	9.1	24.4
Width	85	3.5	9.4
Gill-slits: Snout to 1st gill-slit	320	13.2	35.6
Snout to 5th gill-slit	433	18.7	50.3
Width of 1st gill-slit	45	1.9	5.0
Width of 5th gill-slit	35	1.5	3.9
Between inner ends of 1st pair	242	10.0	26.9
Between inner ends of 5th pair	160	6.6	17.8
Nostrils: Inner narial distance: Minimum	103	4.3	11.4
Pelvic fin: Length of outer margin	162	6.7	18.0
Width	125	5.2	13.9
Length of clasper	85	3.5	9.4
Tail: Length of tail	1520	62.8	168.9
Length of tail spine	166	6.9	18.4
Length of lower caudal fold	700	28.9	77.8
Base of tail to tail spine	305	12.6	33.9
Base of tail to ventral fold	305	12.6	33.9
Lower fold-end to tip of tail	515	21.3	57.2

Disc partly quadrangular, 1¼ times as broad as length to tip of pelvics; snout angle very obtuse (120°); anterior margin of pectorals nearly straight, but broadly rounded towards outer corner; snout length in front of eye 1 1/3 in head measured to first gill opening, 3¾ in disc length and 4 in snout to tip of pelvics. A row of depressed dermal denticles along mid-dorsal line of body present; dorsal surface with few broad flattened tubercular plates dispersed irregularly near head region (Fig. 1a) and with numerous minute dermal denticles of same origin near snout, head and along edges of disc; other than these, skin smooth. Spiracles situated close behind and larger than eyes. Pelvic fins relatively small, devoid of tubercles and partly covered by hind limits of pectorals.

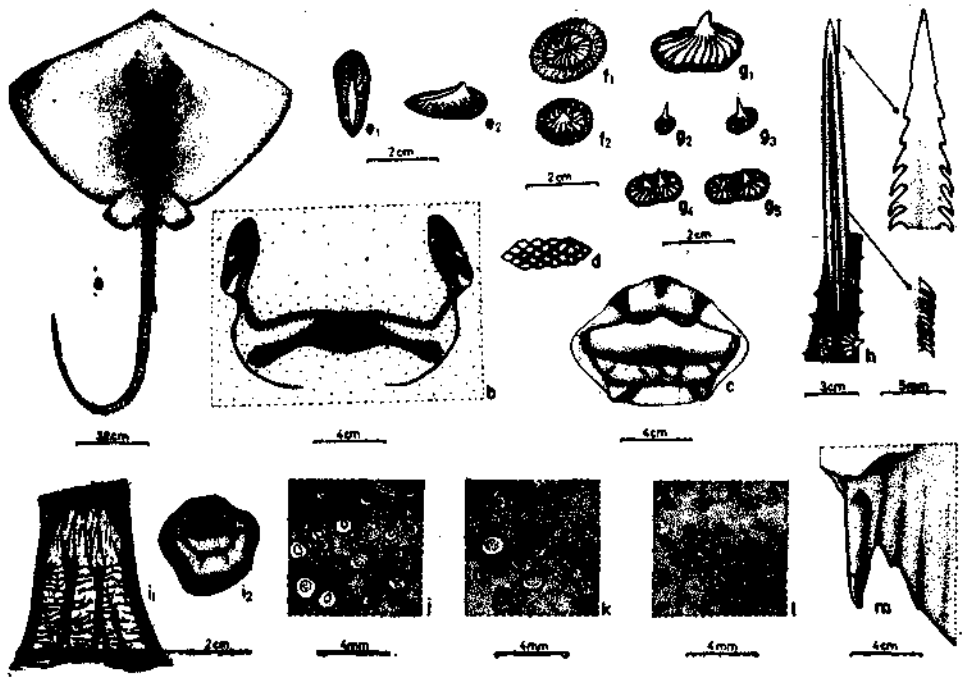

FIG. 1. *Dasyatis centroura* (Mitchill), adult male of 242 cm in total length. a. Dorsal view; b. Outer view of mouth; c. Inner view of mouth; d. Teeth enlarged; e1 and e2. Dorsal and lateral view of median dorsal denticle; f1 and f2. Broad dermal tubercular plates or scutes partly covered by skin; g1-g5. Tubercles of tail; h. Tail spine; i1. Portion of stomach showing internal lining; i2. Cross section of posterior part of pyloric stomach; j. Portion of skin from snout tip showing minute dermal denticles or scutes and mucous pores; k. Portion of skin from spiracular region; l. Portion of skin from outer angle of disc; and m. Dorsal view of clasper.

Mouth ventral, with 5 fleshy oral papillae on its floor (Pl. I E; Fig. 1 c); teeth in many series and arranged in quincunx rows (Pl. I B, Fig. 1 d); Mouth width 3¾, interorbital 1 9/10 and inter-nasal, measured to first gill opening 3

in head. Nostrils connected to mouth by a deep groove; the labial furrow present at angle of mouth, originates from nostrils and extending along lower jaw (Pl. I A, Fig. 1 b); nasal valves of both sides are coalescent with each other forming more or less a quadrangular flap, reaching to mouth (Pl. I E, A; Fig. 1 b). Sensory pores present near snout on dorsal side (Fig. 1 j) and are more on ventral side around notrils and mouth (Fig. 1 b). Gillslits smaller in size, 5th pair being smallest; distance between inner ends of 5th pair of gills is 2/3 distance between that of 1st pair. Ventral side of body and fins smooth.

Tail slender and whip-like, with a spear-like, sharp serrated spine, situated on dorsal side at about twice length of its own from root of tail; tail thickly mailed with small flattened tubercular spines with larger ones interspersed (Pl. 1D, Fig. g1-g3). Tail about 1.7 times disc length, with a narrow fold of skin ventrally from below origin of tail spine and extending posteriorly to about 2/3 of total length of tail; length from centre of vent (cloaca) to tip of tail 2 times length from snout to vent.

Dermal armature

Body covered with mucus; skin smooth except for numerous tuberculated scutes on dorsal side; each tubercle with a radiating basal shield of varying size, but generally oval to round in shape with a blunt or sharp spine in centre; sharpness of the spine decreases as size of basal shield increases (Fig. 1 f, f2, g1-g3). Six broad flattened tubercular plates present on head region (Pl. 1C, 3 & 4, Fig. 1a) each with a hard, flattened, stellate basal shield and a blunt, conical spine at summit (dermal denticles or tubercles by some authors); periphery of basal shield embedded beneath skin (Pl. 1C 3, Fig. 1, f1 & f2). Apart from these, there are numerous minute denticles on dorsal surface near snout, head and along edges of disc, each provided with sharp spine in centre. Their basic structure is same as larger tubercles, with a small stellate basal shield and a spine at summit (Fig. 1, j-1).

Depressed dermal denticles present along mid-dorsal line are 21 in number, arranged at equal intervals except for a small gap in between 14th and 15th, probably indicating a missing denticle. A pair of small denticles present on each side of shoulder, arranged symmetrically along sides of 6th and 7th median tubercles. Each of these has a hard oval basal shield with a blunt summit, and is embedded in the skin, with summit exposed (Pl. 1C, & C2, Fig. 1 e1 & e2).

Tail fully strewn with very hard stellate tubercles of different shapes and sizes along its whole length from its origin. Tubercles present at base up to tail spine are broader (Pl. 1D) but becoming smaller to look like thorns towards the tapering end. Occasionally, two or three tubercles are found fused on tail region (Fig. 1 g4 & g1). A single tail spine present is 16.5 cm long, sharp, with serrated edges and with a shallow median groove on its dorsal side, originating

from base and extending to about 7/8 of its length; serrations on spine pointing towards base and serrated edges reach nearly base of spine. Serrations start a short distance posterior to tip of spine and increase gradually in size to half length of spine and then decrease in size and at the same time increase in numbers towards spine base. Serrations are sharp, pointed, curved downwards and their sides are smooth (Fig. 1h).

Teeth alike in both jaws; in $\frac{49\text{-}50}{57\text{-}60}$ vertical rows with $\frac{9\text{-}13}{9\text{-}15}$ teeth, arranged in quincunx rows, the number and size of teeth gradually decreasing towards corners in both jaws. Upper tooth plate is longer than lower and is curved outwards; lower one is broader than upper and having more rows in middle (Pl. I B); middle portion of lower tooth plate is curved outwards and protrudes out a little beyond general outline of plate (Pl. E, A, Fig. 1 b).

Pelvic fin smooth, relatively small and anterior portion partly covered by hind limits of pectorals, distal margin not rounded, but its inner angle is broadly rounded. Claspers considerably shorter with deep groove on dorsal side, tip of which is slightly curved outwards (Pl. I F; Fig. 1 m).

Alimentary tract

Mouth leads into a dorso-ventrally depressed buccopharyngeal cavity. Roof and floor of buccal cavity are fleshy and somewhat rough by the presence of a few scattered small knob-like protruberances. Lining of roof is thrown anteriorly into a thick fold, the maxillary valve, hanging from the roof and covering the non-functional posterior series of teeth in upper jaw. Its free margin is fringed into three elevated muscular ridges, one median and two lateral (Fig. 1c). All three ridges end posteriorly at beginning of pharyngeal cavity where spiracle open inwards. Lateral ridge on each side extends anteriorly and join together in the middle just posterior to maxillary valve. Median ridge is almost straight and does not join with lateral ridges. Lining of the floor of buccal cavity extends anteriorly forming lower fold, the mandibular valve (Pl. 1, Fig. 1c), the anterior margin of which is directed upwards covering the non-functional mandibular teeth. Posterior to this valve, there are four fleshy oral papillae arranged in a row and another small papilla in the middle, just anterior to the row on the floor. Lateral one on each side is smaller than the other (Pl. 1 E, Fig. 1c). Followed by these, posteriorly arise the elevated muscular ridges on the floor which extends posteriorly up to the pharyngeal region, and lateral ridges are connected anteriorly by a series of minute knob-like protuberances. Liver is considerably small, 1350 g in weight and oily. Meat is edible. Cardiac stomach is larger than the pyloric part. Cardiac region is less mascular and pronounced into several longitudinal highly convoluted folds (Fig. 1i). Towards pyloric stomach, folds gradually become less convoluted and then straight,

ending posteriorly in a thick elevated knob (Figs. 1i & 1ii). Pyloric part is slender and highly muscular. Stomach contained digested remains of paralepids and some crustaceans.

Colour

Dorsal side uniform dark-brown to dusky with stellate tubercles (dermal dentcles) dispersed irregularly. Ventral side smooth, and white in colour with few irregular dusky patches near last pair of gill opening and all along posteriolateral border of disc and pelvics. Anterior margin of pectorals except the outer angle is whitish. Tail black except for its numerous spines.

Distribution

This species has been so far known only from the coastal waters of the Atlantic and from the Mediterranean. The present description is from the Arabian Sea, based on a male 242 cm in length obtained from a depth of 250 m. This is the first record of this species from the Indian waters.

Remarks

As may be expected, *D. centroura* shows some geographical variations in the number and disposition of tuberculated scales, number of caudal spines, length of tail and its caudal fold, and in the shape of pelvic fin.

Leim and Scott (1966) have mentioned in their description of Atlantic specimens that 1-20 tubercles are dispersed irrregulaly on the central 1/3 of the body and pectorals. In Soljan's (1948) illustration (from Adriatic Sea), there are only 4 broad-based stellate tubercles in the head region, apart from the numerous minute dermal denticles, near the snout. In our specimen, there are only 6 broad flattened stellate tubercles dispersed irregularly in the head region (Fig. 1a), apart from the numerous minute dermal denticles of same origin present near the head, snout and along the edges of the disc (Fig. 1 j-e). From the available descriptions, it would appear that the number and disposition of the tuberculated scales differ from specimen to specimen and with age. An interesting thing noted here is the presence of fused tubercles more along the tail region (Fig. 1 g4 & g5). It is seen that when two or more tubercles occur close together their shields get fused with the adjacent ones.

Leim and Scott (1966) have recorded 1-3 tail spines in the Atlantic specimens, and their tail length from centre of vent is 2¼ times length from snout to vent, with the ventral caudal fold extending rearwards about 1/5 length of tail. But our specimen has a single serrated spine and its tail length 2 times only with its ventral fold extending posteriorly to about 2/3 of the total length of tail. From Fowler's (1936) description also it is clear that the Atlantic specimens have longer tail with one or more barbed spines. Another point of

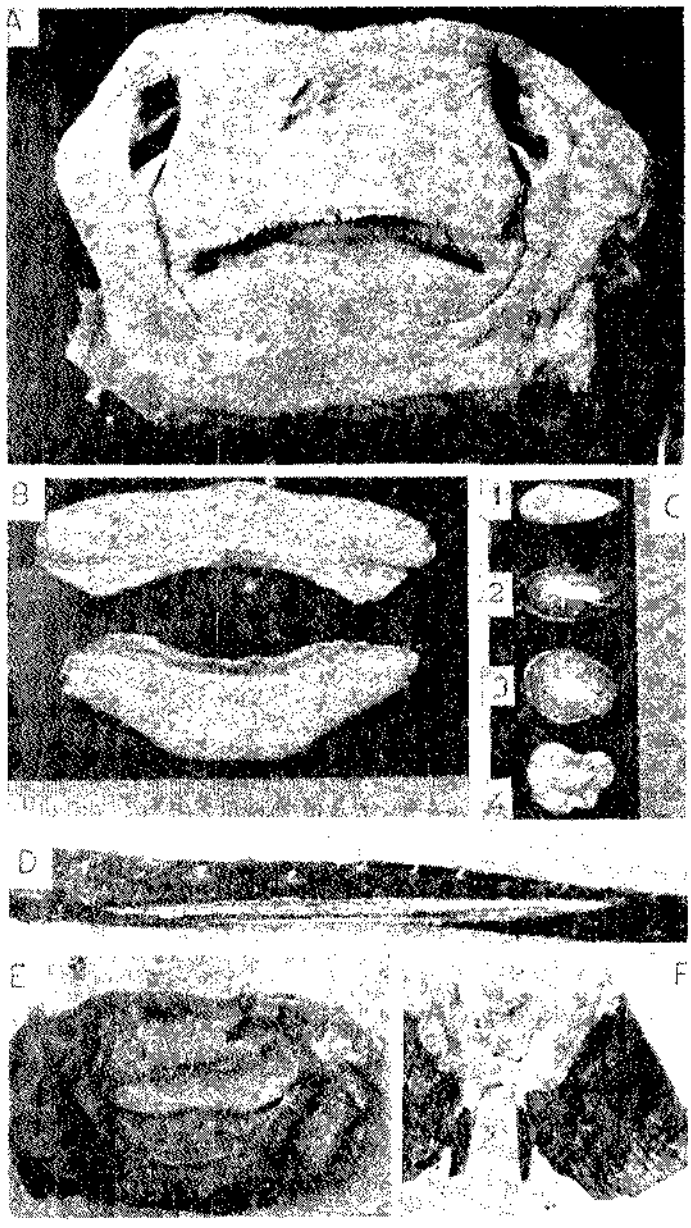

PLATE I. *Dasyatis centroura* (Mitchill). A. Outer view of mouth; B. Upper and lower tooth plates; C. Median dorsal denticle and broad tubercular plates of disc (C1. Median dorsal denticle - skin removed; C2. Median dorsal denticle - covered by skin; C3. Tubercular plate - partly covered by skin; and C4. Tubercular plate - skin removed); D. Portion of tail showing tail spine and tubercles; E. Inner view of mouth; and F. Dorsal view of pelvic fins with claspers.

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difference we have noted is in the shape of the pelvic fin: while it is convex along the outer margin in the Atlantic specimens, in our specimen it is not so but more resembles that of the Adriatic specimen.

D. centroura resembles *D. uarnak* in the arrangement of teeth and in the number of oral papillae, but differs in the shape of tooth plates and also in the disposition of the mid-oral papilla, which is situated posteriorly to the other four papillae (Gohar and Mazhar 1964), whereas it is located anteriorly in *D. centroura*. The tail spine resembles that of *D. sephen* and the internal lining of the stomach is more or less similar to that of *Taeniura lymma* (Gohar and Mazhar 1964). Soljan (1948) remarked that this species could be adult of *D. pastinacus*. But *D. centroura* differs from *D. pastinacus* by the absence of dorsal cutaneous fold, presence of stellate tuberculated spines on tail, width of disc, number of teeth and tail length.

Very little information is available on the breeding behaviour of this species. Leim and Scoft (1966) have mentioned that the young are born alive and resemble the adults when born. The occurrence of *D. centroura* also in Indian waters shows the possibility of their being available in all tropical as well as temperature seas. There is a strong indication of geographical variations in this species, but a critical examination of materials from different geographical areas is nevertheless called for to determine whether or not the variations in the Indian material justify sufficiently for it to be considered as a distinct species.

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