

Studies on New Zealand Elasmobranchii. Part II.
A Description of *Dasyatis brevicaudatus* (Hutton), Batoidei,
With a Review of Records of the Species Outside
New Zealand

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[Read before the Wellington Branch, October 28, 1953, received by the Editor, October 29, 1953.]

Abstract

Dasyatis brevicaudatus (Hutton, 1875) is a stingray characterised by a smooth rhomboidal disc broader than long, and a tail closely subequal to the length of the disc and bearing a strong ventral fold and one or more dorsal serrated spines. *D. brevicaudatus* is known from New Zealand, Australia and South Africa, but records from these countries indicate confusion with a concealed second species having a slightly longer tail and possibly sharply spined teeth.

THE short-tailed species of stingray in New Zealand waters was first described by Hutton in 1875 as *Trygon brevicaudata*, from a female specimen taken in Dunedin Harbour and measuring 76 inches in overall length but showing signs of having lost a portion of the extremity of the tail. It was obvious that only a small part of the latter was missing, for in Hutton's words, "the end of the tail of this specimen is broken off; but it is evident that it could only have extended a few inches further." The specimen was generally similar to the larger stingrays which we now recognise as belonging to the g. *Dasyatis*, but was characterised by having a smooth disc broader than long, with an obtuse anterior angle; the tail subequal to the length of the disc and with a prominent keel below but no upper ridge; and the tail armed "with two serrated spines, the anterior one the smaller, and in front of these a row of large ossifications; sides of the tail with smaller stellate ossifications."

Hutton (1872) had earlier provisionally identified a species of stingray from New Zealand waters, as *Trygon thalassia*, from a dried tail, 22 inches in length, in the Colonial Museum. But in 1876, in a repetition of the description of *Trygon brevicaudata*, Hutton states further that the tail which he provisionally identified as that of a specimen of *T. thalassia*, "may probably belong to a male of this (*T. brevicaudata*) species."

Since then, there has been no adequate description published of a complete specimen of *D. brevicaudatus* from New Zealand material. Waite (1909) describes a female specimen taken by the New Zealand Government Trawling Expedition of 1907, but this specimen lacks the greater part of the tail; and Graham (1953) gives a general account of the species but uses an illustration (after McCulloch) of an Australian specimen. Some of the features described by Waite do not agree with the material used in this study, and these will be discussed later in this paper following a description of *D. brevicaudatus* from New Zealand material.

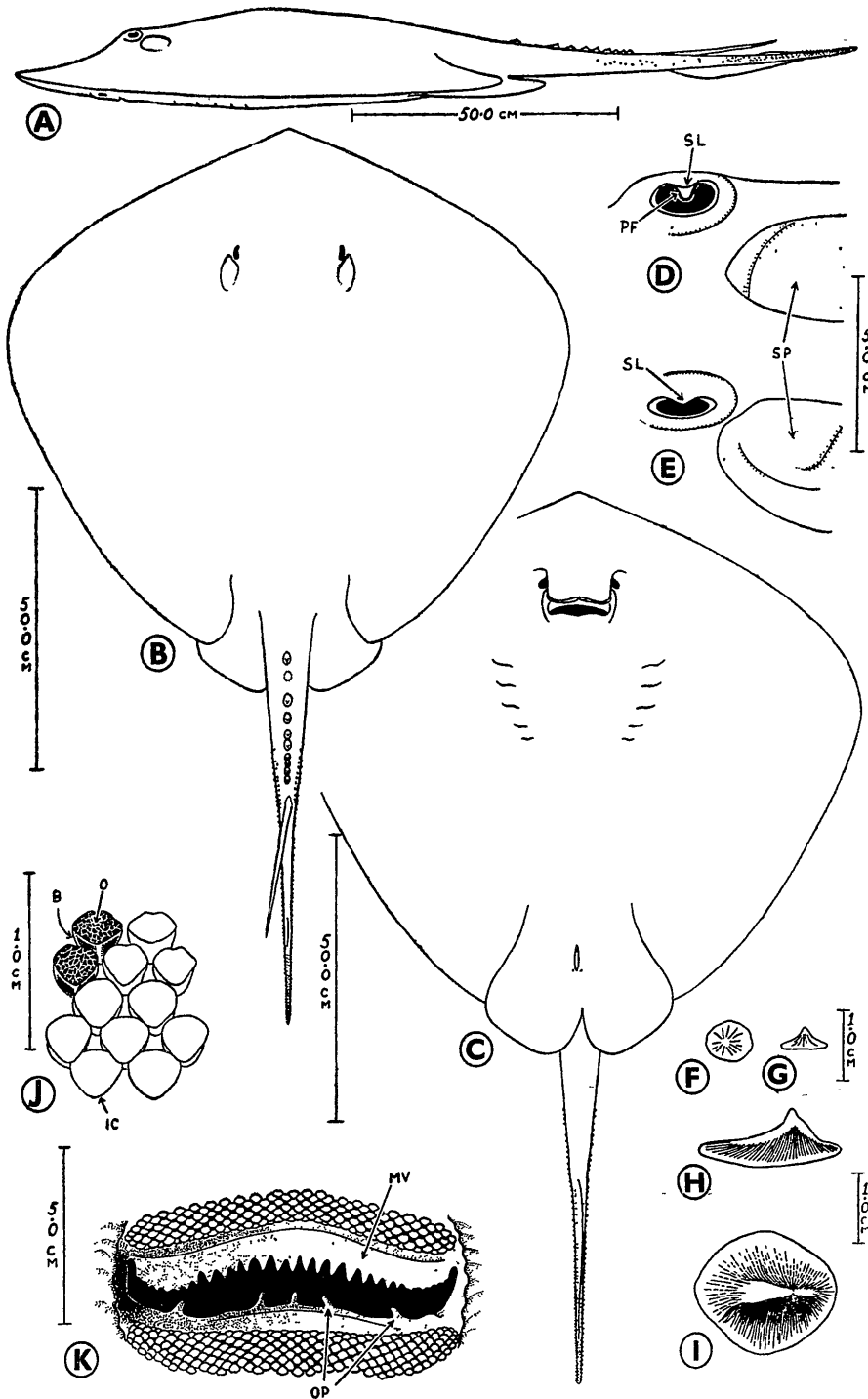
McCulloch (1915, 1921, 1922), Waite (1921), and Whitley (1940), give accounts of *D. brevicaudatus* from Australian waters, and Smith (1949) lists the species from South Africa, but it is obvious from some of these accounts and from the illustrations that not all of the specimens described by these authors can be assigned to *D. brevicaudatus*. Fowler (1941) lists the complete synonymy of *D. brevicaudatus*.

The material used in this study includes the type specimen, at present lodged in the Otago Museum, and comprising a stuffed mount of the dorsal surface only; a female of 64 inches total length trawled from 40 fathoms off Cape Campbell by the steam trawler "Maimai" in November, 1952, complete except for a damaged nasal flap; and three dried tails from the Dominion Museum collection, the first of which is 22 inches long, labelled *Col. Mus. N.Z. 186. Tail of the Sting Ray. Pres. by Rev. Mr. Stock*, and is obviously the same tail as that identified by Hutton (1872) as *T. thalassia*; the second 28 inches long (dried skin only) and labelled *J. Bollons. 18th June, 1932*; and the third 11½ inches long and labelled *Black Stingaree, Awanui. F. M. Begley Oct. 8th, 1941. No 822*. A description of the species *D. brevicaudatus* from the "Maimai" specimen is as follows:

***Dasyatis brevicaudatus* (Hutton) 1875.** Text-fig 1, Figs. A-K. Text-fig. 2, Figs. A, B, C

Body depressed, thick, rhomboid; anterior angle of disc obtuse and tip of snout bluntly pointed so that it scarcely breaks the outline. Head wide but not greatly distinct dorsally from disc. Snout profile concave above in lateral view. Tail stout and tapered, its length less than the length of the disc. Disc smooth, tail tuberculate and bearing a serrated spine. Length of disc (including pelvics) 1 6 in the total length, and 1 1 in its width. Greatest width of disc at level of third gill-slit and 1 5 in the total length. Greatest depth of body at pectoral symphysis, 9·0 in the total length.

Snout greater than the depth of body and 1 4 in the head as measured to the first gill slit. Interorbital 1 6 in the head and 6 0 in the width of the disc. Eyes small, lateral, partly covered dorsally by a bluntly pointed, fleshy, supra-orbital lobe, and provided with a frilled pupillary flap. Length of eye 9 4 in the snout and 8·3 in the interorbital. Spiracles partly lateral, large and ovoidal, placed posterolateral to the eyes. Length of spiracles 3 0 in the snout, and 2 7 in the interorbital. Head 5·2 in the total length and 3 6 in the width of the disc. Gill-slits small, sinuous, the first slit twice the width of the 5th. Distance between the first and second slits equal to that between second and third, and slightly greater than that between third and fourth, which latter is also greater than that between fourth and fifth. Transverse distance between first slits 1·5 times that between the fifth slits and 1·3 in the head. Nostrils ovoidal, transverse, the internarial width 1 3 in the distance from anterior edge of disc to the nostrils and 2·6 in the head. Nostrils separated by a wide rectangular nasal flap, its length 2 2 in its width which is greatest anteriorly. Posterolateral corners of the flap rounded, while medially it is secured by a stout frenulum. Posterior edge of the flap just anterior to the mouth, slightly concave and with a well-demarcated, finely fimbriated margin. Mouth almost transverse, its width 3 0 in the head. Upper lip with coarse, transverse pleats laterally, lower lip irregularly and coarsely papillose. Both lips laterally bounded by incurving nasoral grooves.

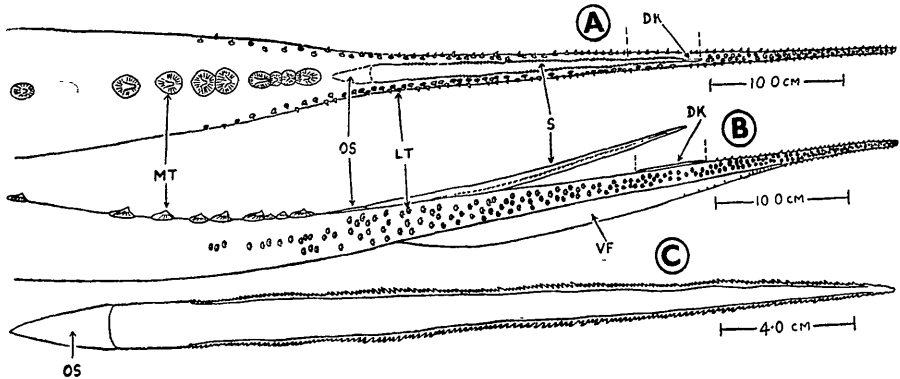


TEXT-FIG. 1.—*D. brevicaudatus*, female, 64 inches total length. FIGS. A, B, C—Lateral, dorsal and ventral views. FIGS. D, E—Lateral and dorsal views of left eye and spiracle. FIGS. F, G—Dorsal and lateral view of small, circular tubercle from side of tail. FIGS. H, I—Lateral and dorsal views of middorsal tubercle from anterior of tail. FIG. J—Teeth from median region of upper tooth plate. FIG. K—Ventral view of mouth and jaws, showing maxillary velum and oral papillae.

B, base of tooth; IC, incipient cusp; MV, maxillary velum; O, rugose occlusal surface; OP, oral papillae; PF, pupillary flap; SL, fleshy supraorbital lobe; SP, spiracular valve.

Teeth arranged in pavement, the rows prominently oblique. Dental formula $\frac{22-1-22}{24-1-25}$, the tooth plates broad, extending across the whole width of the mouth, with 10 to 11 anterior rows of teeth functional. Teeth in both jaws similar, rhomboidal in outline, those in the posterior rows with a broadly rounded incipient cusp. Teeth in the anterior rows with the cusp eroded. The occlusal surface of all the teeth finely and superficially rugose. Immediately internal to the upper tooth-plate is a pendant, transverse, maxillary velum, its width little less than the width of the mouth and its height 7 0 in its width. Its lower free edge shallowly concave and coarsely serrated with the largest serrations medial. On the floor of the mouth, behind the lower tooth-plate, are five oral papillae in a transverse series, three medial and slightly advanced, and one lateral papilla on each side.

Pectorals wide, the anterior margin of each almost straight, though convex distally where the lateral angle is a smooth steady curve. Posterior margin convex and deeply notched at the posterior insertion, the posterior angle bluntly pointed. Distance between the two pectoral insertions slightly more than the interorbital width. Origin of the pelvis slightly anterior to the insertion of the pectorals. Pelvis extend a short distance behind the pectorals, their anterior margin concave, the lateral margins almost straight, and the lateral and posterior angles smoothly and sharply curved. The insertion of each pelvic acutely and deeply notched.



TEXT-FIG. 2.—*D. brevicaudatus*, female. 64 inches total length. A, dorsal view tail, B, lateral view tail, C, dorsal view serrated spine.

DK, dorsal keel, LT, lateral tubercle, MT, middorsal tubercle; OS, origin serrated spine, S, serrated spine, VF, ventral fold.

Tail stout, tapered, its length less than the length of the disc and 2 2 in the total length. The anterior half depressed, the posterior half compressed. Midway along its length there arises dorsally a single, posteriorly directed, stout, tapered, serrated spine, the serrations numerous, lateral, and directed anteriorly. The serrated spine is inset for the proximal one-third to one-half of its length, in a shallow naked groove, but distally it is upraised from the tail. Length of the spine about 3.0 in the length of the tail and width at its origin 2.4 in the depth of the tail at the same level. A ventral keel originates below and slightly posterior to the origin of the serrated spine and extends posteriorly to beyond the tip of the spine but falls far short of the tip of the tail. Length of the keel 2.5 in the

length of the tail, and its greatest height at a level one-third back from its origin and equal to or less than the depth of the tail at the same level. A minute dorsal keel arises just anterior to the tip of the serrated spine and extends beyond the spine but does not reach the level of the insertion of the ventral keel. Anterior to the serrated spine, forming a middorsal row, there are nine large spinous tubercles with a scar between the first and second indicating a tenth. Each tubercle consists of a large ovoidal base, longer than wide, its length approximating half the depth of the tail at the origin of the serrated spine, from which arises a longitudinal ridge with a flattened anterior face terminating in an erect spine over the posterior half of the base. Both base and spine bear fine radial striations. The most anterior tubercle is above the insertion of the pelvic fins, and the succeeding tubercles are at first spaced such that the distance between them approximates to, or is less than the length of their bases, while the posterior ones are more crowded and finally contiguous. The lateral surfaces of the distal two-thirds of the tail are armed with small circular tubercles with coarsely ridged bases from which arise erect, conical spines. The tubercles are not arranged in a linear fashion, but scattered irregularly, and are everywhere well spaced. Anteriorly they form a sparse band along the side of the tail, but from the level of the origin of the serrated spine they cover more and more of the dorsal and ventral aspects, so that distally they are uniformly numerous on all surfaces of the tail. A few of them, smaller than the others, are placed along the lower surfaces of the posterior third of the ventral keel. Colour (in formalin) greyish brown dorsally, with supraorbital region and tip of tail black. Inside of spiracles and rims of lateral line pores white. Ventral surface creamy white, though margin of disc and the peduncle grey.

VARIATION IN THE NEW ZEALAND MATERIAL

As there is considerable variation in the specimens used in this study, it merits description before proceeding with a discussion of records of the species by other authors.

The type specimen of *D brevicaudatus* is lodged in the Otago Museum and comprises a stuffed mount of the dorsal surface, labelled "*Dasybatus brevicaudatus* Hutton (= *Trygon brevicaudatus*) Dunedin, 1875. Mr. Jewett" It agrees with Hutton's (1875) description and the "Maimai" specimen, and is readily recognised as the type by the small oval tubercle on the centre of the back, as described by Hutton. The shape of the disc varies from the "Maimai" specimen in that the tip of the snout is more acute and extended, and the lateral angles of the pectorals are more pointed. The interorbital width is 6.9 in the width of the disc, the same ratio being 6.0 in the "Maimai" specimen. The tail bears eight middorsal tubercles in front of the serrated spine, the first originating just anterior to the hind edge of the pelvics. In addition there is the small oval tubercle on the centre of the back. In the "Maimai" specimen, as mentioned above, there are nine middorsal tubercles on the tail, with an indication of a tenth, while in J. Bollon's specimen there are seven. The Rev. Stock's specimen has only one large tubercle just anterior to the serrated spine, and similarly there is only one on F. M. Begley's specimen, though in the latter case it is evident that only part of the tail is present. Hutton describes two serrated spines on the tail of the type specimen, but of these only a 3-inch fragment of the larger and

posterior spine remains, the site of the smaller anterior spine being marked by a scar. A similar arrangement of a small spine preceding a large spine occurs on the Rev. Stock's specimen, while on J. Bollon's and the "Maimai" specimens there is a single spine, and on F. M. Begley's specimen there are three spines, of which the second is largest. There is no evident dorsal keel on the type specimen, as is present on the "Maimai" specimen, but a bare patch $7\frac{1}{2}$ inches from the tip of the tail and $3\frac{1}{4}$ inches long, just posterior to the naked groove underlying the serrated spine, indicates a similar structure. None of the other tails used in this study show a comparable feature, except that of F. M. Begley, which resembles the type specimen.

DISCUSSION

The description of *D. brevicaudatus* by Waite (1909) from a specimen taken by the New Zealand Government Trawling Expedition of 1907, and with a mutilated tail, does not agree completely with the "Maimai" specimen. Waite states that his specimen (an adult female with a disc length of $31\frac{1}{2}$ inches) has three oral papillae; two maxillary vela, the anterior fimbriate, the posterior fleshy; 25 series of teeth in each jaw, arranged quincuncially; and each tooth with a shallow transverse groove. In contrast the "Maimai" specimen has five oral papillae; a single serrate maxillary velum, 45 and 50 rows of teeth across the jaw, arranged obliquely; and each tooth with a flat to convex occlusal surface. Teeth identical to those of the "Maimai" specimen are present, arranged in more than 50 oblique rows, in a glycerine-gelatine skeletal preparation of *D. brevicaudatus* in the Otago Museum. The specimen is labelled "Skeleton of *Dasybatis brevicaudatus*," and was prepared by E. Jennings under the direction of T. J. Parker. The entire skeleton is present, and is of a fish with a disc at least 40 inches wide. The tail is subequal to the length of the disc, thus establishing its identity as *D. brevicaudatus*. Unfortunately the photographic illustrations of Waite's specimen do not show much detail, and little more can be gained from them other than that it is a fish generally similar to *D. brevicaudatus*. The portion of tail remaining on Waite's specimen appears to be armed with five or six middorsal tubercles, the first apparently placed level with the posterior edge of the pelvic fin.

In Australia, *D. brevicaudatus* was first recognised by McCulloch (1915) who describes a male specimen with a disc width of 43 inches, trawled from 60 fathoms in Bass Strait by the F.I.S. "Endeavour" in 1914. McCulloch's description is of a fish in all important respects identical with my material, differing only in lacking middorsal tubercles on the tail in front of the serrated spine, though McCulloch mentions that a larger specimen in the Australian Museum, from Port Jackson, labelled *D. pastinaca* but almost certainly *D. brevicaudatus*, has "two enlarged tubercles with upstanding spines on the median line of the back of the tail between the ventral fins and the spine." Other minor differences between McCulloch's specimen and the "Maimai" specimen are that the former has a more prominent snout, but in this respect is similar to the type specimen; the spiracles are slightly longer; the nasal flap has acute, outer posterior angles, though this latter character could not be accurately compared with my material because of damage to the flap in the "Maimai" specimen; and there is no mention of a minute dorsal keel. Important points of agreement between the two specimens, other than general body shape and proportions, are the presence in each

of them of five oral papillae, "the outer pair smaller than and remote from the other three" in McCulloch's specimen, and hence similar to those in the "Maimai" specimen, and a single fimbriate maxillary velum. McCulloch describes the lateral teeth in his specimen as tubercular, the inner ones each developing an angular cusp which is longest in the median line. He does not, however, give any indication of the number of teeth.

Waite (1921) in his "Illustrated Catalogue of the Fishes of South Australia," under the title of *D. breviceaudatus*, figures a stingray with a disc broader than long; an anterior profile that is very much more obtuse than in either McCulloch's or the "Maimai" specimens; and a tail that is one and one-third times the length of the disc. There can be little doubt that this specimen is not *D. breviceaudatus*, for in both McCulloch's and the "Maimai" specimens the anterior profile is less obtuse, and the length of the tail is subequal to the disc, a feature described by Hutton (1875). McCulloch (1921) notes the discrepancy and remarks that "Mr. Waite informs me it was not an Australian specimen". In the same paper McCulloch figures a tail of *D. breviceaudatus*, and mentions that in three specimens from New South Wales, one had six large spine-bearing tubercles middorsally on the tail and anterior to the serrated spine, the second had one, while the third had none. A specimen from South Australia, loaned to McCulloch by Waite, had five of these tubercles.

Whitley (1940) gives a general account of *D. breviceaudatus* and illustrates the species with dorsal and ventral views (after McCulloch, 1915); with dorso-lateral and ventral views of a very large specimen taken off Adelaide in 1935 (after Gudger, 1937); and with a photograph of part of one jaw (after Waite). The latter illustration shows the medial part of a jaw-plate with 23 rows of teeth in pavement. The arrangement of the teeth is not markedly oblique, or quincuncial, but tending to be anteroposterior. Each tooth has a symmetrical triangular base with the apex of the triangle bluntly rounded and directed anteriorly. The base of the triangle is produced posteriorly into a sharp, median, elongate cusp. Such teeth have no parallel in the "Maimai" specimen, where the base of each tooth is rhomboidal, and the cusps present are little developed and bluntly pointed. Moreover, the teeth in the "Maimai" specimen are in oblique rows, and not arranged anteroposteriorly. The teeth of the New Zealand specimen of *D. breviceaudatus* described by Waite (1909) were stated to be in 25 series, arranged quincuncially, and each tooth with a shallow transverse groove, but obviously this description does not fit the teeth figured in Whitley's account. Apart from the arrangement of the teeth, and the nature of each tooth, it is clearly apparent that Waite's figure in Whitley shows only a median portion of the jaw, and as 23 rows of teeth can be counted in this portion, the total number of rows must far exceed the 25 rows which Waite (1909) states are present in the New Zealand specimen of stingray he identified as *D. breviceaudatus*. These facts lead to the conclusion that neither the New Zealand specimen identified by Waite (1909), nor the teeth figured in Whitley (after Waite) can belong to the species *D. breviceaudatus*.

Whitley also identifies as *D. breviceaudatus* a large female stingray (9 feet 11 inches total length) caught off Kawau, New Zealand, by Seymour George in 1880. But in George's (1881) account, the length of the tail is stated to be 6 feet, thus making the disc length approximately 4 feet and hence considerably shorter than the tail. In *D. breviceaudatus* the tail is subequal to the disc. Obviously

George's specimen cannot be placed in this species, but was more likely a specimen of *D. thetidis* Waite, 1899, which has the tail one and one-half times the length of the disc, and which has since been recorded from New Zealand (Richardson and Garrick 1953, A & B).

Barnard (1925) in his monograph of the marine fishes of South Africa, recognises five species of *Dasyatis* from his area, but of these, he believes that only *D. schreineri* (Gilchrist, 1913) is allied to or possibly synonymous with *D. brevicaudatus*. The description he gives of a 6 feet long specimen agrees closely with that of Hutton, McCulloch and the "Maimai" specimens. The disc is smooth, broader than long; the tail tuberculate, subequal to the length of body, with a cutaneous fold below not reaching to the tip of the tail and deepest anteriorly where it is three-quarters the height of the tail at the same level; a series of middorsal spines on the tail; and the teeth with transverse ridges and in about 48 rows. A young male 3 feet long has the "tail slightly longer than the disc, with one large spine preceded by a small one, 5 cutaneous flaps on the floor of the mouth, teeth in 33 rows". Barnard retains the distinction of *D. schreineri* from *D. brevicaudatus* because his specimens of the former have from 33 to 48 rows of teeth, whereas Waite (1909) states that *D. brevicaudatus* has 25 rows of teeth. But, as has been shown above, there is good evidence to doubt the validity of Waite's specimen as *D. brevicaudatus*, and in addition there are 45 to 50 rows of teeth in the "Maimai" specimen, this number agreeing with the number present in the larger specimen of *D. schreineri*. The fewer rows of teeth (33) in the smaller specimen is in all probability a juvenile feature. As the original description of *D. schreineri* by Gilchrist (Trans. Roy. Soc. S. Afr. III, 1913: 33, text-fig.) is not available to me, it is not possible to compare Gilchrist's illustration of the species with the "Maimai" specimen, but the characters noted in Barnard's description (disc shape and proportions; armature; the nature of the tail and ventral fold; the presence of five oral papillae; and the teeth number) all suggest *D. brevicaudatus*.

Smith (1949) illustrates and diagnoses *D. brevicaudatus* from Southern Africa. His illustrations of the species comprise a dorsal view of a complete specimen and an anterior view of a set of jaws. The dorsal view of the complete specimen agrees generally in outline and proportions with the "Maimai" specimen. The length of the tail is, however, slightly longer than the length of the body. There appear to be several middorsal tubercles in front of the serrated spine. The view of the jaws, though on a very small scale, shows teeth arranged primarily in longitudinal rows, and each tooth definitely long-cusped, in this respect resembling the teeth figured by Whitley (1940—after Waite), but in no way being similar to the teeth of the "Maimai" specimen. There appear to be about 40 rows of teeth in the upper jaw and something more than 30 in the lower jaw. In the synonymy of *D. brevicaudatus*, Smith lists *D. agulhensis* Barnard, 1925, as well as *D. schreineri* (Gilchrist, 1913). But from Barnard's description of *D. agulhensis* it is seen that this species, although agreeing with *D. brevicaudatus* in general disc shape, and presence of a ventral fold on the tail, differs in the following features: the presence of spinate tubercles on the point of the snout, in front of the orbits and on the middle of the back; the tail one and one-third times the length of the body; the ventral cutaneous fold extending to or almost to the tip of the tail, its depth about one-third the depth of the tail; and nine oral papillae present (three median, and one submedian and two lateral on each side). There

can be no doubt that these features are of sufficient importance to separate *D. agulhensis* from *D. breviceaudatus*.

SUMMARY

(1) *Dasyatis breviceaudatus* is described from New Zealand specimens. The species is characterised as follows.—Disc smooth, rhomboidal, and wider than long; the anterior angle of the disc obtuse and occasionally with a protruding snout tip; the tail subequal to the length of the disc and provided with one or more serrated spines dorsally and a cutaneous fold ventrally, the latter originating just posterior to the origin of the serrated spine and terminating well before the tip of the tail (in some specimens there is also a minute dorsal keel at the level of the tip of the serrated spine); the tail with or without a row of mid-dorsal tubercles anterior to the serrated spine; the posterior two-thirds of the tail armed laterally with small circular tubercles, which become more numerous posteriorly where they cover all aspects of the tail and extend on to the ventral fold; the mouth provided with five oral papillae (three median, and one lateral on each side) and a single, serrated maxillary velum; the teeth numerous, arranged obliquely in 45 to 55 rows, each tooth rhomboidal in outline and lacking prominent cusps.

(2) *D. breviceaudatus* is recorded from Australia and South Africa, as well as from New Zealand. Waite's (1909) account of a New Zealand specimen is doubtfully *D. breviceaudatus*, while his later record (1921), published as an Australian species, but not from an Australian specimen, is definitely not *D. breviceaudatus*. Whitley's (1940) illustration (after Waite) of the teeth of *D. breviceaudatus* is invalid, as is apparently that of Smith (1949) of the teeth of a South African specimen. *D. schreineri* (Gilchrist, 1913) of Southern Africa, is probably synonymous with *D. breviceaudatus*, as noted by Barnard (1925) and Smith (1949), but the latter author's inclusion of *D. agulhensis* Barnard, 1925, cannot be accepted.

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