RESEARCH NOTE

Further Notes on the Affinities of *Arhynchobatis asperrimus* Waite with Other Rajoids, and Data on a Fourth Specimen

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Arhynchobatis asperrimus is a unique rajoid in that it possesses only one dorsal fin, in addition to a large and complete caudal fin. It is known only from three previous female specimens, all from New Zealand waters, though a dried example of a fourth specimen, also from New Zealand, was reported by Archey (private communication) but is no longer available.

Some uncertainty as to the status of *A. asperrimus* in recent accounts of the Rajoidea by Bigelow and Schroeder (1953, 1954) indicates a need for further information on several morphological features of this species Moreover, in view of the characters put forward in these accounts by Bigelow and Schroeder as of primary importance in rajoid classification, a review of the affinities of *A asperrimus* on this basis is timely.

The original account of *A. asperrimus,* by Waite (1909), based on a single female specimen 640 mm long and trawled from 66–94 fathoms in the Bay of Plenty by the New Zealand Government Trawling Expedition of 1907, and for which Waite established the genus *Arhynchobatis,* was, until 1954, the only information available on it. The apparent lack of definition of certain morphological features in this account resulted in the species receiving various systematic placings by later authors, even though Waite recognised it as belonging to the Rajidae and having affinities with *Psammobatis.* Thus Garman (1913) placed it in the Discobatidae, and Fowler (1941), and Richardson & Garrick (1953) in the Platyrhinidae. Bigelow & Schroeder (1953, 1954) recognised it as belonging to a distinct family, Arhynchobatidae, in the Rajoidea

The capture of two further specimens, both females, and 750 mm and 695 mm long respectively, from 50–60 fathoms off the east coast of the North Island in September, 1953, resulted in an extended account of the species, including a description of the endoskeleton, by Garrick (1954), where it is shown that not only is it definitely a member of the Rajoidea, but apart from the lack of a second dorsal fin and the presence of the complete caudal, the species differs from species of the genus *Raja* only in the short rostral cartilage which protrudes little anterior to the nasal capsules. The reasons for assigning the species to the Rajoidea rather than to the Platyrhinidae need not be repeated here. It is sufficient to say that the external morphological features, together with the nature of the pelvic bar, in which the transverse element is almost straight and bears prominent, pointed, lateral prepelvic processes, conform to the Rajoidea and suggest no other suborder. A further feature of the Rajoidea not previously recorded for *Arhynchobatis* but discussed by Bigelow & Schroeder (1954, p. 3) as a means of separating the members of this suborder from the Myliobatoidea, is the persistence of vestiges of the embryonic gill-filaments on the anterior wall of the spiracle; this feature can now be confirmed for *A. asperrimus.*

The lack of the second dorsal fin, coupled with the presence of a complete caudal fin in *Arhynchobatis,* are unique features for the Rajoidea, and hence there can be no controversy on the distinction of *Arhynchobatis.* The majority of the Rajoidea have two dorsal fins and an incomplete caudal, as in the family Rajidae, while the few others lack a dorsal fin but have a complete caudal and are distributed on other characters between the two remaining families, Anacanthobatidae and Pseudorajidae.

The short rostral cartilage, which in *Arhynchobatis* reaches very much less than half the distance from the neurocranium to the tip of the snout, is a character shared by genera in both the Rajidae and Pseudorajidae Thus in the Rajidae, *Psammobatis* and *Sympterygia* either lack rostral cartilages—the anterior face of the neurocranium being straight or slightly concave—or have them barely produced, while *Breviraja* has a longer rostral cartilage though it fails to

reach the level of the anterior tip of the pectorals, and hence the tip of the snout. *Pseudoraja fischeri,* the only known member of the Pseudorajidae, is also described (Bigelow & Schroeder, 1954, p. 2) as having a short rostral cartilage.

The only other features of the Rajoidea used by Bigelow & Schroeder (1953, 1954) as of primary importance in characterising the families and genera are: the presence or absence of processes interrupting the disc outline, as for example the lateral, spatulate, pectoral processes of the rajid genus *Dactylobatis,* or the anterior, terminal filaments or processes of the Anacanthobatidae; the nature of the pelvic fins which may have a more or less straight outer margin, a concave margin, or be divided into distinct anterior and posterior lobes as in the rajid *Cruriraja* or the anacanthobatid *Springeria* in which there are skeletal modifications involving a lack of radial cartilages on the basipterygium in the area between these lobes; the degree of fusion between the anterior margin of the posterior pelvic lobe and the posterior margin of the pectoral, or between the posterior margin of the posterior pelvic lobe and the margin of the tail; the presence or absence of dermal armature on the upper surface of the disc and the tail, such armature being lacking only in the family Anacanthobatidae; and the presence or absence of an oronasal pit, so far known only in *Pseudoraja.*

In all the above features *Arhynchobatis* is similar to the genus *Raja* and the majority of the Rajidae. The disc outline is rhomboidal, with rather rounded lateral and posterior angles, and lacks either an anterior terminal filament or a lateral pectoral process; the outer margin of the pelvic fin is concave but not divided into distinct anterior and posterior lobes by a lack of radial cartilages on the anterior end of the basipterygium, the anterior and posterior margins of the posterior pelvic lobe are not fused to the pectoral margin or to the margin of the tail to a greater degree than in species of *Raja;* the upper surface of the disc and the tail are heavily armoured with spines and tubercles; and there is no oronasal pit

It can be concluded that *Arhynchobatis asperrimus* is a generalised rajoid, resembling most closely the members of the family Rajidae, and differing from the genus *Raja* only in the short rostral cartilage, although similar to *Psammobatis, Sympterygia* and *Brevirajа* in this feature. The chief distinction of *Arhynchobatis asperrimus* is, then, the presence of only one dorsal fin and a complete caudal; but considering the uniformity of all other rajoids in possessing either two dorsal fins and an incomplete caudal, or lacking dorsals and having a complete caudal, such distinction as is shown by *Arhynchobatis asperrimus* in this respect is sufficient reason not only for the retention of the genus *Arhynchobatis* but also for the family Arhynchobatidae as suggested by Bigelow & Schroeder (1953, p. 132).

The following data are from a specimen of *A. asperrimus* taken off New Zealand and not hitherto reported. I am indebted to Mr. Fred. Abernethy, engineer of the motor trawler "Thomas Currell," for this specimen, which is the second that he has collected of the four now available.

Arhynchobatis asperrimus Waite 1909

Study Material. Female 702 mm long (Harvard Museum of Comparative Zoology, No. 39574), trawled from 30–60 fathoms off Castlepoint (east coast of North Island, New Zealand), July 8, 1955.

Description. *Proportional Dimensions in per cent. of Total Length*:

Disc: Extreme breadth 53.8; length (excluding pelvics) 47.0

Snout Length: In front of orbits 10.5; in front of mouth, 10 5

Spiracles: Length, 2.1; distance between, 6.3.

Mouth: Breadth, 6.0.

Nostrils: Distance between inner ends, 6.0.

Gill-openings: Length, 1st, 1 4; 3rd, 1.6; 5th, 0.9; distance between inner ends—1st, 13.1; 5th, 9.5.

First Dorsal Fin: Vertical height, 1 4; length of base, 2 6.

Pelvics: Anterior margin, 10.6.

Distance: From tip of snout to centre of cloaca, 44.8; from centre of cloaca to 1st dorsal, 44.5; to tip of tail, 55.0.

Interspace Between: 1st dorsal and upper caudal, 2 1; 1st dorsal and tip of tail, 8.1.

Maximum anterior angle in front of spiracles about 140°. The specimen figured by Garrick (1954), also a female and slightly larger, had a maximum anterior angle in front of spiracles of about 125°.

No males of *A. asperrimus* are yet known, so that accounts of the species still remain inadequate in this respect.

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