A new stingray from South Africa

from Alwyne Wheeler

ICHTHYOLOGISTS are accustomed to the regular description of previously unrecognized species of fishes, which if not a daily event at least happens so frequently as not to cause great comment. Previously undescribed genera are likewise not infrequently published, but higher categories are increasingly less common. The discovery of a new stingray, which is so different from all known rays as to require both a new family and a new suborder to accommodate its distinctive characters, is therefore a remarkable event.

A recent paper by P.C. Heemstra and M.M. Smith (*Ichthyological Bulletin of the J.L.B. Smith Institute of Ichthyology* **43**, 1; 1980) describes this most striking ray as *Hexatrygon bickelli* and discusses its differences from other batoid fishes. Surprisingly, this remarkable fish was not the result of some organized deep-sea fishing programme, but was found lying on the beach at Port Elizabeth. It was fresh but had suffered some loss of skin by sand abrasion on the beach, and the margins of its fins appeared desiccated in places. The way it was discovered leaves a tantalising question as to its normal habitat, but Heemstra and Smith suggest that it may live in moderately deep water of 400–1,000m. This suggestion is supported by its general appearance (small eyes, thin black dorsal skin, flacid snout) and the chemistry of its liver-oil.

Ventral view of *Hexatrygon bickelli*

The classification of *Hexatrygon* presents some problems, the most obvious of which is that it has six pairs of gill openings, whereas all other batoid fishes (sawfishes, rays, skates, stingrays and electric rays) have only five paired gill openings. Another striking feature is that the spiracular openings behind the eyes are closed dorsally by a cartilage-supported flap to form an oblique slit. It seems that *Hexatrygon* may be able to shut its spiracles down externally, something that other batoids cannot do. Internal features are as strikingly different from its relatives, and the shape and structure of the snout are also unique. The snout is elongate, of uniform thickness (16–18mm deep in the fish of 103cm total length) and flaccid. Internally it is supported by lightly calcified rostral cartilages and filled with an acellular jelly, while the underside is richly supplied with well developed ampullae of Lorenzini. These ampullae are known to be electroreceptors and assist in finding buried food organisms in shallow-water rays. The combination of characters persuade Heemstra and Smith to erect a new suborder (Hexatrygonoidei) within the order Myliobatiformes to contain this fish. The order contains the other stingrays, eagle rays and mantas, most of which, like *Hexatrygon*, have one or more serrated dagger-like spines on the back of the tail.

The interest of this fish is not just that it represents a novel group within a well known order, but that all the other myliobatiformes are shallow-water bottom-living species or surface-living fish. *Hexatrygon* seems to be the first deep-water stingray known. Its elongate, jelly-filled snout richly supplied with electroreceptors is similar to the deep-water chimaeroids *Rhinochimaera* and *Harriota*, and there can be little doubt that it is an adaptation for finding food in the soft-bottom ooze of deep water.

One final point that Heemstra and Smith note is the remarkably small brain of *Hexatrygon* (it is about 3% of the cranial volume); in shallow-water stingrays it is about 80%. As they point out the coelacanth, *Latimeria chalumnae*, has a similarly small brain (as does the basking shark, *Cetorhinus maximus*, according to Scott *J. Fish Biol.* **16**, 665; 1980). This may also be an adaptation to deep-water life.

If nothing else the discovery of *Hexatrygon* off South Africa, as with the first coelacanth, reminds one of the tag — *ex Africa semper aliquid novi.*

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sediment (apparent age ~8,000 yr)[15]. For the advective contribution to vent nutrition, however, the appropriate comparison would be with the ^{14}C content of suspended particulate organic matter ordinarily present in near-bottom waters, which ought to be somewhere between these extremes, but again, appropriate measurements are not yet available.

In addition to the uncertainties associated with the two initial hypotheses for vent nutrition considered here, a third hypothesis has now entered the scene. Recent evidence (G.N. Somero and H. Felbeck, personal communication) indicates that significant bacterial chemosynthesis may be taking place *outside* the warm-water vents, by symbiotic microorganisms within the tissues of some of the macro-fauna. Hence, the basic problem of how the hydrothermal-vent fauna gets enough to eat remains an open and challenging question.

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