

On the Brain Pattern of *Heterodontus zebra*

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In a previous report this author (MASAI, 1962) described the external form of the brain of a archaic shark, *Heterodontus japonicus*, of which the direct ancestry is thought to be an extinct species, *Hybodus*. Concerning the brain of primitive sharks, this paper presents the brain pattern of *Heterodontus zebra* belonging to the same genus as *Heterodontus japonicus*. The natural history of *Heterodontus zebra* resembles that of *Heterodontus japonicus* (SMITH, 1942). *Heterodontus zebra* shows more numerous and distinct stripes than *Heterodontus japonicus*. As for the range, *Heterodontus zebra* is taken from China to the East Indies and from southern Japanese waters, but *Heterodontus japonicus* is found only along the coasts of the Japanese islands.

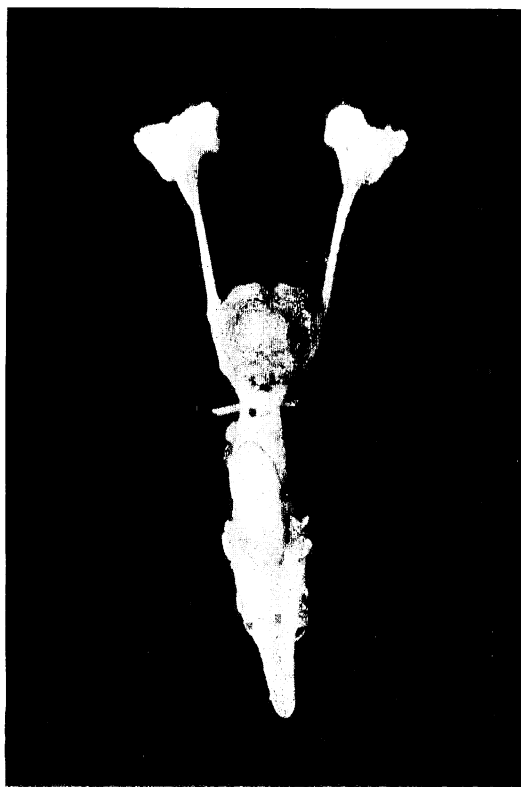


Fig. 1. Dorsal view (x1)

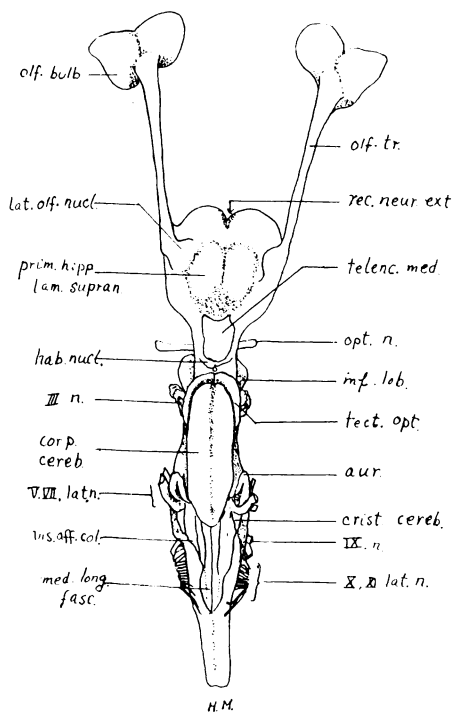


Fig. 2. Dorsal view



Fig. 3. Ventral view (x1)

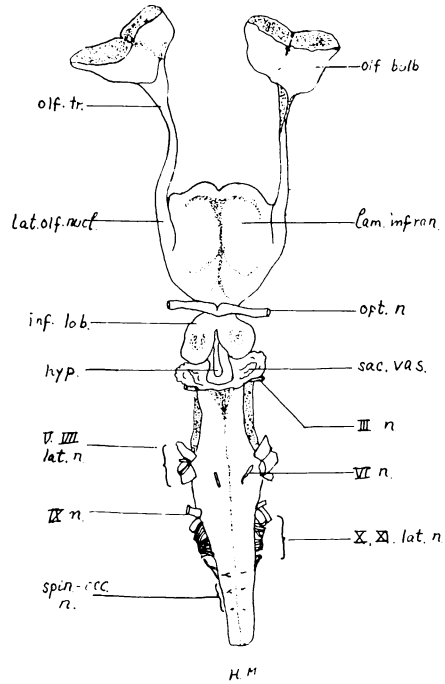


Fig. 4. Ventral view

Material: This material was given by Dr. T. ABE, to whom the author expresses here his sincere thanks. *Heterodontus zebra* observed measures about 60 cm. in body length, and was fished from western Kyushu and has been preserved in formalin.

Observation: (figs. 1-6) The brain of this shark is slender in general, and there is a large space between the brain and the cranium. The olfactory bulb is slightly separated into two lobes and situated close to the nasal sac. The olfactory tract is depressed and slender. The terminal nerve runs along the olfactory tract, but it was taken out in preparation. The telencephalon separates itself into the lateral lobes of both sides, and the recessus neuroporicus is deepened. The lamina supra-neuroporica and infraneuroporica become more thickened and the lateral olfactory nucleus appears distinctly. The telencephalon medium forms a long stalk, of which the roof remains membranous.

The diencephalon is short and occupied by the much developed inferior lobe, hypophysis and saccus vasculosus. The asymmetrical habenular nucleus is visible from the surface. The optic nerves cross at about 180°. The tectum opticum is elevated.

The corpus cerebelli is symmetrical and elongated ovoid in shape, has only a

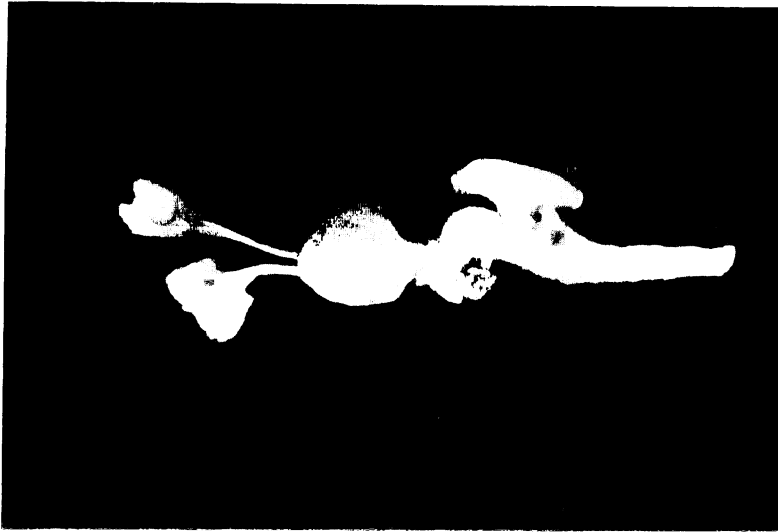


Fig. 5. Lateral view (x1)

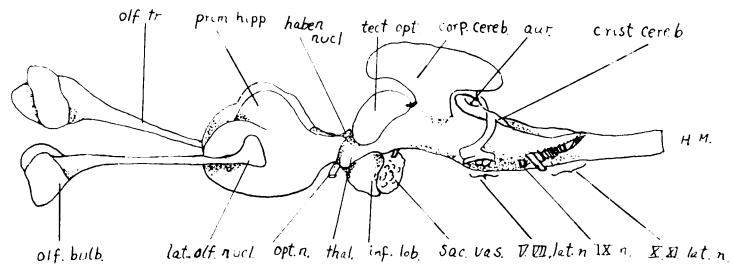


Fig. 6. Lateral view



Fig. 7. Vestigial sixth branchial arch
 a: sixth branchial arch b: fifth branchial arch

shallow median sulcus as to the sulci and almost covers the tectum opticum. Moreover, the auricle is little developed.

The medulla oblongata is generally flattened and slender. The crista cerebellaris is small. Each column is bordered by parallel sulci. Differing from *Heterodontus japonicus*, the accessory nerve leaves with rootlets, and the afferent visceral column does not reveal the lobulation.

Summing up, the brain pattern of *Heterodontus zebra* is similar to that of *Heterodontus japonicus* which was reported previously. *Heterodontus zebra* has a rudimentary sixth branchial arch (fig. 7) and shows type of brain pattern intermediate between *Chalamydoselachus* and recent sharks.

References

- MASAI, H. 1962. On the external form of the brain of *Heterodontus japonicus*. Yokohama Med. Bull., xiii, 249-257.
- SMITH, B.G. 1942. The heterodontid sharks, their natural history and the external development of *Heterodontus japonicus* based on notes and drawings by Bashford Dean. The Bashford Dean Memorial Volume, Archaic Fishes. Article 8, 647-784.