

THE NERVOUS END-CORPUSCLES IN THE POST-BULLAR  
SENSE-ORGAN OF THE HARBOUR PORPOISE *PHOCOENA PHOCOENA*

by

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This is a supplement to the paper on the function of the sense-organs caudal to the tympanic bulla in odontocetes, which appeared earlier in this journal (Behrmann, 1987). A recent analysis of the post-bullar sense-organ of the harbour porpoise *Phocoena phocoena* (L., 1758) using the staining methods of Golgi and improved light microscopy, has led to a better insight into the morphology of the nervous end-corpuses in this organ. The lamellated nervous end-corpuses have a length of nearly 6 mm, and are situated in small vacuoles occupying the space between the bulla and the occipital bone. The nervous end-corpuses are assumed to perceive oscillations of the free-swinging bulla (fig. 1).

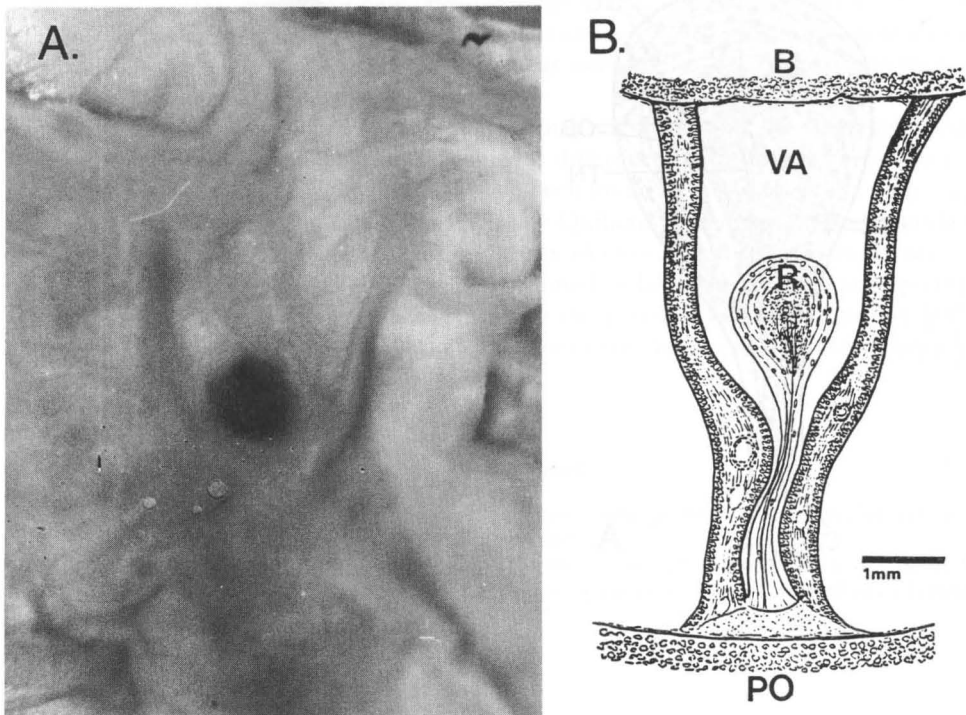


Fig. 1. The post-bullar sense-organ: **A**, a vacuole of the sense-organ fixed in formalin only. **B**, detail of the vacuole: bulla (**B**), occipital bone (**PO**), lamellated nervous end-corpuse (**R**), vacuole (**VA**).

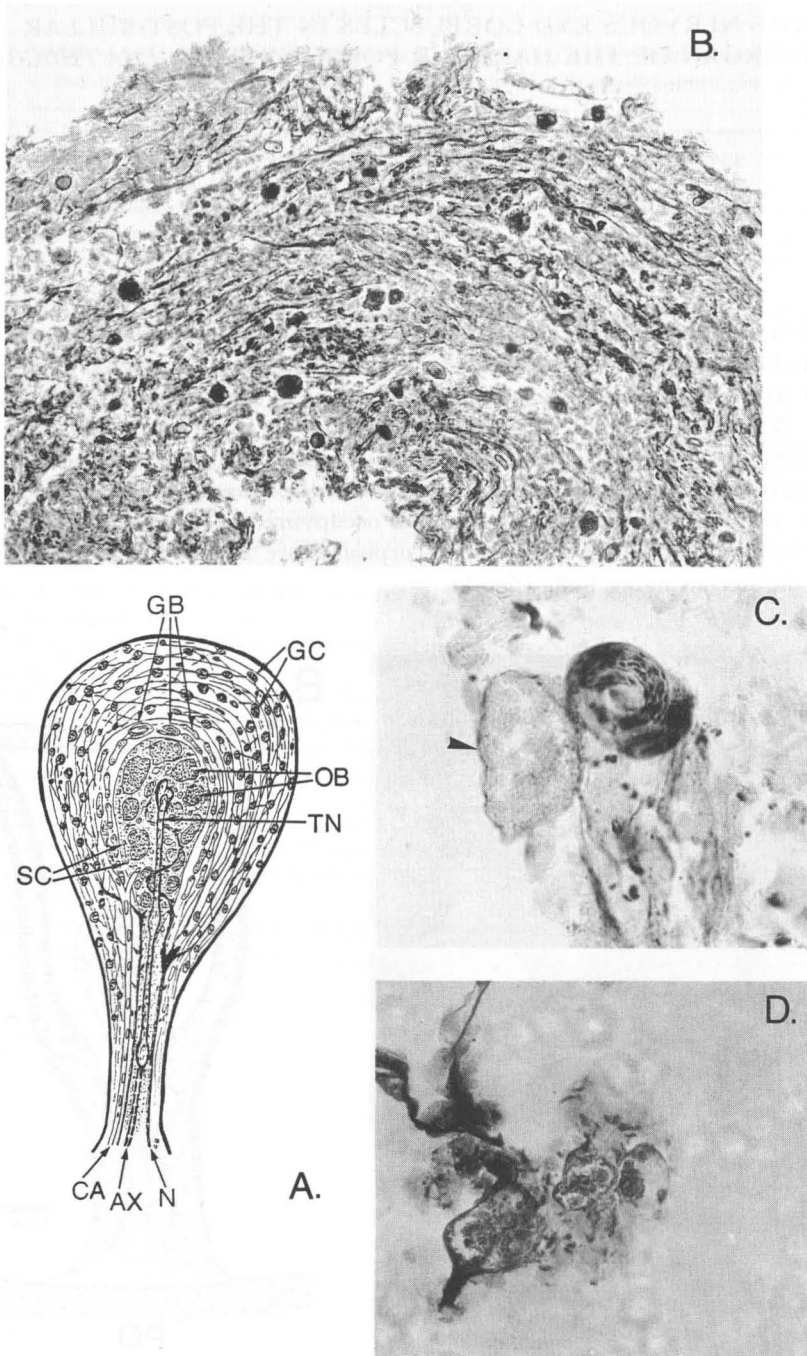


Fig. 2. The post-bullar sense-organ. **A**, detail of the nervous end-carpuscle: axon (AX), nerve terminal (TN), capillary (CA), opaque bodies (OB), granulated spiral nerve-bodies (GB), large granulated nerve cells (GC), small nerve cells (SC), neurite (N). **B**, the perineural network of the lamellated connective tissue. Staining method: Golgi/toluidin, 200  $\times$ . **C**, a spiral nerve body and an opaque body (arrow). Staining method: toluidin/eosin, 1000  $\times$ . **D**, ramification of the neurite. Staining method: Golgi/eosin, 1000  $\times$ .

In the above-mentioned paper the end-corpuses were identified as some variety of Vater-Pacinian corpuses. However, this is not correct and a new description of the corpuses is called for. True Vater-Pacinian corpuses have far more lamellae and are much larger. In the end-corpuses of the post-bullar sense-organ, only seven or eight lamellae are present. This indicates a relationship to Golgi-Mazzonian corpuses, which are smaller and have fewer lamellae. There are, however, significant differences, and therefore the corpuses of the post-bullar sense-organ are to be regarded as a particular form of nervous end-corpuses.

A nerve terminal is situated in the centre of each corpuscle (fig. 2A: TN). An axon (fig. 2A: AX) emerges from the nerve terminal. The corpuscle is entered by a capillary (fig. 2A: CA) and two neurites (fig. 2A: N). The first neurite ramifies (fig. 2D), one branch surrounds the nerve terminal like a spiral, and the nerve fibres of the other branches end in large granulated nerve cells with a diameter of nearly 8  $\mu\text{m}$  (fig. 2A: GC; 2B). From the large nerve cells free-ending axons emerge. The branches of the second neurite end in small nerve cells with a diameter of nearly 3  $\mu\text{m}$  (fig. 2A: SC) or in granulated spiral nerve bodies with a diameter of up to 11  $\mu\text{m}$  (fig. 2A: GB; 2C). The dark colour of the core surrounding the nerve terminal is caused by large opaque bodies (fig. 2A: OB; 2C). Their dark granules are arranged in bands and are embedded in clear cell fluid. The core is covered by a layer of the spiral nerve bodies and small nerve cells. These are again surrounded by lamellae of connective tissue, which are penetrated by the perineural network with large granulated nerve cells (fig. 2A: GC; 2B). The dark colour of the neural network is caused by the chromatin granules accumulated in the spiral nerve bodies and in the nerve cells. The corpuscle is enclosed by a membrane.

The granulated spiral nerve bodies, the opaque bodies, and the large granulated nerve cells with neurites constitute significant differences with all other nervous end-corpuses. More or less similar organs have been found in the snout of the mole *Talpa europaea* L., 1758 (Quilliam, 1966). Originally Quilliam had regarded the granulated spiral nerve-bodies and the opaque bodies as electro-receptors. However, nervous end-corpuses deep inside the body and hemmed in between bones cannot perceive electric waves. The nervous end-corpuses of the post-bullar sense-organ are highly developed tactile receptors to perceive oscillations of the bulla caused by low-frequency waves.

#### REFERENCES

- BEHRMANN, G., 1987. Die Funktion von Sinnesorganen caudal der Ohrkapseln (Bulla tympanica) bei Zahnwalen (Odontoceti). — *Lutra*, 30: 113-122.
- QUILLIAM, T.A., 1966. Structure of receptor organs: 86-116. In: A.V.S. DE REUCK & J. KNIGHT (ed.). *Touch, heat and pain*. Ciba Foundation Symposium. J & A. Churchill Ltd., London.

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