

The morphology, topography and cytoarchitectonics of the ciliary ganglion in the domestic turkey (*Meleagris gallopavo domesticus*)

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The ciliary ganglion of the domestic turkey (Meleagris gallopavo domesticus) is located between the posterior wall of the eyeball and the optic nerve. It is closely connected with the oculomotor nerve; in particular with its inferior branch. The ganglion has a cask-like shape and is adjacent to the inferior branch of the oculomotor nerve. From this ganglion postganglionic fibres emerge which are arranged in two fasciculi. These are termed the long ciliary nerves and the short ciliary nerves. A cross-section of the ciliary ganglion revealed two populations of cells: small ones — choroid cells and large ones — ciliary cells.

key words: ciliary ganglion, domestic turkey, ciliary cells, choroid cells

INTRODUCTION

The purpose of the research was to add to our knowledge of the parasympathetic head ganglia of birds. The parasympathetic part of the autonomic nervous system is poorly known. The ciliary ganglion is the most frequently investigated of the parasympathetic ganglia of birds. In spite of the fact that the anatomical structure of the ciliary ganglion has been described for over 60 bird species from a dozen or so families [1, 4, 6, 7], a number of issues need to be clarified.

A review of references showed that the parasympathetic head ganglia of the turkey have not yet been described. Some data do exist on the ciliary ganglion [1, 8]. However, these do not describe the anatomical and histological formation in detail. There are, moreover, no available data on the cytoarchitectonics of these ganglia.

MATERIAL AND METHODS

The research was carried out on ten adult domestic turkeys (*Meleagris gallopavo domesticus*), of

both sexes, obtained from private farms. The animals were killed by decapitation under ether anaesthesia. The area around the oculomotor nerve was extracted with the use of a stereoscope. Two research methods were used: the Koelle-Friedenwald thiocholine method, adapted to macromorphological preparations by Gienc [3] and the typical histological research method.

Samples from the area around the oculomotor nerve were obtained for histological research. Tissues were fixed with 4% formaline and Carnoy's fixative. The tissues were then dehydrated, embedded in paraffin and cut on a microtome into 4–5 µm sections. The research material was stained with haematoxylin and eosin and by Nissl's technique.

The histological samples were examined with a Jeneval optical microscope and the photographic documentation prepared with an Automatic 2 photo adapter. The serial cuttings were used for the morphometric analysis. The following measurements were taken using Multiscan software for the picture analysis: the area of the cross-section, number of

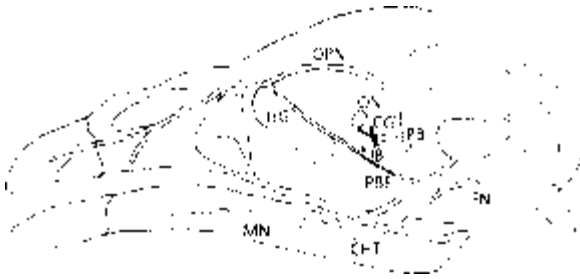


Figure 1. Topography of the ciliary ganglion in the domestic turkey. Right side; CG — ciliary ganglion, IB — inferior branch of oculomotor nerve, HG — harderian gland, PB — posterior branch of oculomotor nerve, PBF — palatine branch of the facial nerve, FN — facial nerve, ON — optic nerve, OPN — ophthalmic nerve, MN — mandibular nerve, CHT — chorda tympani.

neurocytes in succeeding cross-sections, cell diameters, cell area and the density of the ganglion elements. In the subsequent cross-sections the cells with visible nuclei were measured.

RESULTS AND DISCUSSION

The histochemical examination revealed that the ciliary ganglion of the domestic turkey is located between the posterior wall of the eyeball and the optic nerve. The ciliary ganglion is closely connected with the oculomotor nerve, in particular with its inferior branch, which is located between the straight lower muscle and the straight lateral muscle. It is cask-like in shape, 3.5 mm long and 1 mm in diameter, and it adjoins the inferior branch of the oculomotor nerve (Fig. 1).

From this ganglion postganglionic fibres emerge. These are arranged in two fasciculi and are referred to as the long ciliary nerves and the short ciliary nerves (Fig. 2). The long ciliary nerves extend to the smooth muscle of the iris and the ciliary body. The short ciliary nerves equip the vessels of the sclera and the choroid. This finding is supported by data from references to the ciliary ganglion of other bird species, such as the pigeon [5], *Carvidae* [7] and the Japanese quail [6].

The histological research confirms a connection between the ciliary ganglion and the inferior branch of the oculomotor nerve. The cross-section through the ciliary ganglion shows small cells — choroid cells (20–38 μm diameter) and large ones — ciliary cells (40–50 μm diameter) [1, 2, 5–7, 9] (Fig. 3). The research on the turkey revealed the dominance of the choroid cells. About 82 choroid cells and 24 ciliary cells were observed at the cross-section through this ganglion. On the basis of anatomical and histological research, Marwit et al. [5] and Oehme [7] re-

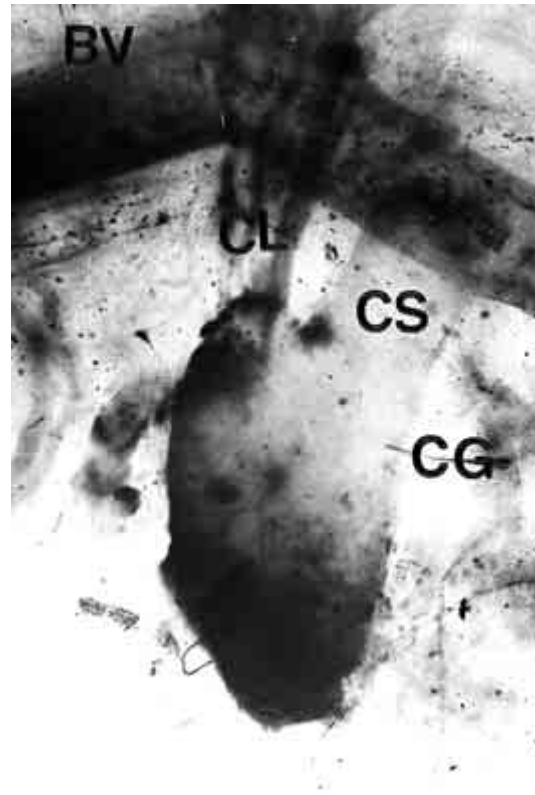


Figure 2. The ciliary ganglion in the domestic turkey. Thiocholine method; BV — blood-vessel, CL — long ciliary nerves, CS — short ciliary nerves, CG — ciliary ganglion.

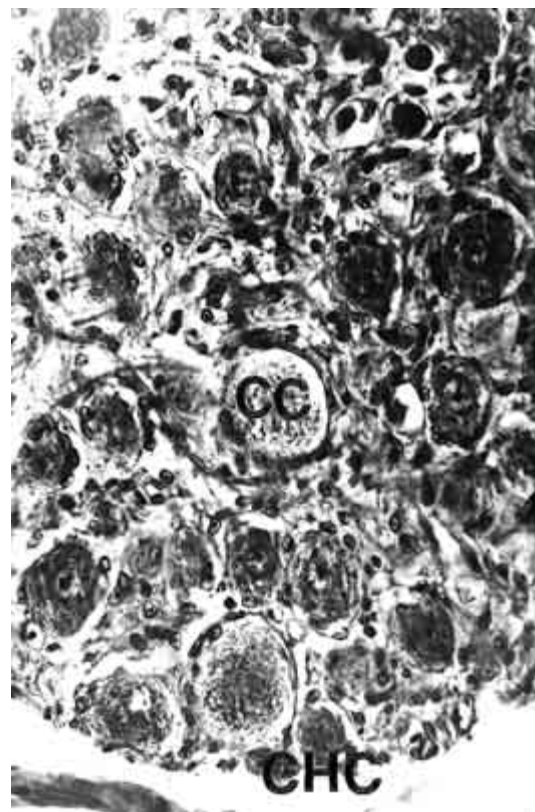


Figure 3. Cross-section through the ciliary ganglion. H&E method; CC — ciliary cells, CHC — choroid cells.

port that neurites of large ciliary cells form long ciliary nerves and neurites of the choroid cells form short ciliary nerves. The ganglion neurocytes are located on the surface of the ganglion under investigation and form a cortex. The neurone fibres are located in the central part of the ganglion — the medulla.

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