

i zatopiono w parafinie. Rdzenie przedłużone krojono na skrawki o grubości 12 μm . Do badań mikroskopowych pobrano co 2 skrawek. Materiał ten barwiono fioletem krezyłu wg metody Klüvera-Barrery.

Jądro przywspółczulne nerwu IX i X gęsi stanowi grupa komórek nerwowych położonych na terenie środkowej oraz tylnej części rdzenia przedłużonego. Jądro zbudowane jest z komórek owalnych, okrągłych oraz miejscami wielobiegunowych średniej i małej wielkości.

Nucleus ambiguus w swojej 1/3 długości położone jest w części pozakomorowej rdzenia przedłużonego, pozostałe 2/3 znajduje się w części otwartej rdzenia. Jądro zbudowane jest z komórek owalnych, okrągłych, wielobiegunowych oraz wrzecionowatych małej i średniej wielkości.

Uzyskane wyniki badań jąder przywspółczulnego oraz dwuznacznego u gęsi ujawniły ich bardzo duże podobieństwo w stosunku do analogicznych ośrodków nerwowych innych, uprzednio opisanych, gatunków ptaków domowych (kura domowa oraz gołąb).

Key words: medulla oblongata, vagus nerve, goose.

List of abbreviations: Cc — *canalis centralis*, Na — *nucleus ambiguus*, IV — *ventriculus IV*, Np — *nucleus parasympatheticus* n. IX and X.

INTRODUCTION

Over the last decades, many specialists in neuroanatomy have dealt with the research of the structure and localization of the most important nerve centers of the central and peripheral nervous system. A vital step in that field have been, especially, the studies devoted to the autonomic nervous system. The main centers of this system and their essential functions (e. g.: parasympathetic and ambiguous nuclei of nerve IX and X) are vividly discussed. This interest is revealed in the great number of literature data, mainly concerned with domestic animals (2, 3, 4, 13–15) (2–4, 13–15) as well as wild animals (5, 8, 10–12). Analogical studies have been conducted recently on birds (1, 6, 7, 9) and the results of these studies pointed to some substantial differences as compared to the results of mammals study. That is why it is necessary to carry on the classical morphological and comparative research on the above-mentioned structures of the autonomic nervous system in a greater number of animals.

The results obtained in the study will enable a complex look upon the whole spectrum of subjects concerned with this "important commanding centre" of the organism.

MATERIAL AND METHODS

Five sexually mature geese (*Anser anser*) constituted the study material. The medullas, after fixing in 10% formalin were dehydrated in alcohol and embedded in paraffin. Next, they were cut into 12 μm scrapes. Every second scrape was taken for microscopic examination. The material was stained with cresyl violet according to Klüver and Barrera's method.

RESULTS

Parasympathetic nucleus of vagus and glossopharyngeal nerves (*nucleus parasympatheticus nervi vagi et glossopharyngei*)

Parasympathetic nucleus of the of nerve IX and X in the goose consists of a group of cells situated in the medial and posterior part of the medulla. The

posterior end of the nucleus is located in the extraventricular part of the medulla at the level of the surface crossing the posterior pole of the nucleus of nerve XII. The middle part of the nucleus is marked by the transition of the peripheral canal into ventricle IV (*obex*). Intracranially from *obex*, there extends a frontal part of the nucleus whose frontal pole lies in the bottom of ventricle IV. In the examined birds, the length of *nucleus parasympatheticus nervi vagi et glossopharyngei*, counted on the serial scrapes was 2.36 ± 0.07 mm (the mean value \pm SD). These results are presented in Figure 5.

Fig. 5. Length of Np and Na in 5 examined geese

On the consecutive transverse cross-sections, parasympathetic nucleus of nerve IX and Xth in goose, in the extraventricular part of the medulla (intracaudally from *obex*), takes the shape of the circular group of nerve cells localized dorso-laterally in relation to the central canal. On the either side of the canal, abdominally from the already discussed structure there extends *nucleus nervi XII*. At this section, the nucleus is composed of small (from 35 to 45 μ m) and medium (from 35 to 45 μ m) circular and oval nerve cells with the prevalence of small cells

(75%). The cells creating the center are characterized by a well-formed nucleus, nucleolus, and granular tigroid evenly distributed in the cytoplasm.

The middle part of the nucleus (*obex* level) presents itself as the oval and circular group of uniform cells situated laterally in relation to ventricle IV. In the transverse cross-sections, one can observe that the nucleus is situated abdomino-medially in relation to the nucleus of the hypoglossal nerve (n XII). The number of the nerve cells creating the nucleus, their shape and size are not different as compared to the section in the closed part of the medulla. However, there is an increase of 50% of the number of the medium size cells creating the nucleus.

In the series scrapes with the transverse cross-sections of the anterior part of *nucleus parasympatheticus nervi vagi et glossopharyngei*, it is well visible that it lies intra-caudally from *obex* and on the bottom of ventricle IV, on its either side (Fig. 1). The shape of the nucleus is unchanged as compared with its medium part. The number of medium (from 35 to 45 μm) cells reaches 65%, the remaining part being: small cells of varied shape; oval, circular, and multipolar cells (Fig. 3). Similarly, as in other cases, one can observe a nucleus with a nucleolus and the tigroid evenly placed in the cytoplasm.

Nucleus ambiguous of vagus and glossopharyngeal nerves
(*nucleus ambiguus nervi vagi et glossopharyngei*)

In its one third, *nucleus ambiguus nervi vagi et glossopharyngei*, is situated in the extraventricular part of the medulla, while the rest is situated in the open part of the medulla (intracranially from *obex*). In the examined geese, the length of the nucleus was from 0.99 ± 0.03 mm (medium length \pm SD) — Figure 5.

In the point of transition of the central canal into ventricle IV, the nucleus is situated in the 2/3rd of the section length conducted abdomino-laterally from *nucleus parasympatheticus nervi IX et X* to the lateral edge of the medulla (Fig. 2), and in the open part of the medulla, it is situated in the 3/4th of the formerly conducted section. Both in the open as well as in closed sections of the medulla, *nucleus ambiguus nervi vagi et glossopharyngei* occurs as the symmetrically situated group of circular nerve cells. Numerous, characteristic constrictions in the nucleus are due to the diversified number of the cells creating it. About 95% of the nucleus is formed by circular, multipolar, and fusiform (Fig. 4) cells of a small and medium size (from 25 μm to 45 μm). The remaining 5% are the oval cells of medium size (from 20 to 40 μm). In the observed nerve cells, one can spot a well-formed nucleus with a nucleolus with a granular tigroid.

DISCUSSION

In its positioning in relation to *obex*, *nucleus parasympatheticus n IX et X* clearly reflects analogical structures of the nucleus in the previously described domestic birds: hen (1) and pigeon (6) in which it is situated in the extraventricular part of the medulla, dorso-laterally in relation to the central canal, and at the height of *obex* and in the open part of the medulla-laterally at the bottom of brain ventricle IV. Similarly, the localization of *nucleus ambiguus* in the goose (abdomino-laterally in relation to *nucleus parasympatheticus n IX et X*) reminds the structure observed in hen or pigeon (1, 6). In all the birds, the posterior part of the nucleus lies intracaudally in its 1/3 and intracranially in its 2/3.

Nucleus parasympatheticus n IX et X in goose has a characteristic of birds, circular or oval shape (1, 6). The difference, in relation to analogical structures of hen and pigeon, lies in its circular shape in the extraventricular part of the medulla (in other birds it is the oval group of cells). In the nucleus in goose there was no division into secondary groups of cells. The structure and localization of *nucleus parasympatheticus n IX et X* is not substantially different from the nuclei in hen and pigeon (1, 6).

Also the cellular structure of *nucleus parasympatheticus n IX et X* and *nucleus ambiguus* in hen is comparable to the similar structures of the nuclei of hen and pigeon (1,6). Similarly, the *nucleus parasympatheticus n IX et X* in goose consists of circular, oval and fusiform cells of small and medium size, with no big cells reported (above 45 μm). Fusiform and multipolar nerve cells of small and medium size characteristic of *nucleus ambiguus* of goose were also reported in other species of domestic animals (1, 6). In the majority of the described cells one can see a granular tigroid surrounding a well-formed nucleus with its nucleolus.

Taking into consideration the above data concerning *nucleus parasympatheticus n IX et X* and *nucleus ambiguus* in goose, one should emphasize their great similarity to the analogical structures in the domestic hen and pigeon.

REFERENCES

1. Arciszewski M. B., Flieger S. (in press) Localization and structure of parasympathetic and ambiguus nuclei of vagal and glossopharyngeal nerves in hen (*Gallus domesticus*). Folia Morphol. (Warsz.)
2. Bujak A. 1959. Jądra ruchowe rdzenia przedłużonego u owcy. Ann. UMCS, DD 14: 189–205.
3. Chomiak M. 1951. Jądra ruchowe rdzenia przedłużonego krowy, świni i konia. Ann. UMCS, C 5: 373–416.

4. Chomiak M. 1953. Topografia i budowa jąder ruchowych rdzenia przedłużonego kozy. Ann. UMCS, DD 8: 181–219.
5. Fiedoruk J. 1974. Jądra rdzenia przedłużonego i mostu jelenia i sarny. Część I. Jądra tylnego odcinka rdzenia przedłużonego. Pol. Arch. Wet. 17: 55–70.
6. Flieger S., Arciszewski M. B. 2000. Cytoarchitektonika i topografia jądra przywspółczulnego oraz jądra dwuznacznego nerwów językowo-gardłowego i błędnego u gołębia (*Columba livia*). Ann. UMCS s. DD 55: 24–31.
7. Goller H. 1969. Topographical demonstration of nuclei in the medulla oblongata of the fowl (*Gallus domesticus*), Zentralbl Veterinarmed (A), 16: 257–270.
8. Jastrzębski M., Zacharko A., Krakowska I., Arciszewski M. B. 2000. The structure and topography of the parasympathetic nucleus of the glossopharyngeal and vagus nerves and of the ambiguous nucleus in medulla oblongata (*Rengifer tarandus L.*). Ann. UMCS, C 55: 19–24.
9. Jungherr E. 1969. The neuroanatomy of the domestic fowl (*Gallus domesticus*) Avian Dis. 1–126
10. Strzałka B., Boratyński Z., Flieger S. 1987. Budowa i rozmieszczenie przywspółczulnego oraz dwuznacznego jądra nerwu językowo-gardłowego i błędnego u bizona (*Bison bison L.*). Pol. Arch. Wet. 25: 162–167.
11. Strzałka B., Flieger S., Boratyński Z., Jastrzębski M. 1982. Budowa i rozmieszczenie przywspółczulnego oraz dwuznacznego jądra nerwu językowo-gardłowego i błędnego u łosia (*Alces alces L.*). Ann. UMCS s. DD 37: 11–20.
12. Strzałka B., Flieger S. 1979. Budowa i rozmieszczenie przywspółczulnego oraz dwuznacznego jądra nerwu językowo-gardłowego i błędnego u wielbłąda (*Camelus dromedarius L.*). Ann. UMCS, s. DD 34: 25–33.
13. Welento J., Bobkiewicz A. 1955. Rozwój jąder ruchowych rdzenia przedłużonego krowy. Ann. UMCS, s. DD 9: 235–267.
14. Welento J., Flieger S. 1974. Distribution of the nerve centres in the *nucleus dorsalis nervi vagi* and *nucleus ambiguus* in the sheep. Pol. Arch. Wet. 17: 7–24.
15. Ziolo I. 1959. Rozwój jąder ruchowych rdzenia przedłużonego świni. Ann. UMCS, DD 12: 75–99.

PHOTOGRAPHS

Fig. 1. Transverse section of the posterior part of the *nucleus parasympatheticus* n. IX and X. Magn. 30×

Fig. 2. Transverse section of the *nucleus ambiguus* on the level of its 1/2 length. Magn. 30×

Fig. 3. Nervous cells of the *nucleus parasympatheticus* n. IX and X. Magn. 400×

Fig. 4. Nervous cell of the *nucleus ambiguus*. Magn. 400×