

## Fragmenta Theriologica

BISONIANA LIX

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## MORPHOLOGY OF THE THYMUS IN THE EUROPEAN BISON

MORFOLOGIA GRASICY ŻUBRA

Macroscopic structure and situation of the thymus was described in 10 fresh corpses of European bisons in different age. The dimensions as well as absolute and relative weight of the organ were determined. The relative thymus weight is in the bison similar to that in the cattle. On the other hand, involution of this organ occurs in bisons at a much older age than in the cattle.

The available literature is lacking even a short paper concerning morphology of the bison thymus. The present short communication is aimed at the preliminary description of macroscopic observations of this organ.

The investigations were carried out on fresh corpses of 10 European bisons, *Bison bonasus* (Linnaeus, 1758) (7 males and 3 females) of different age which died in the rearing reserves in Poland (Table 1). Anatomic preparation of the thymus was made and its position was estimated. The length, width and thickness of particular parts of the organ were determined, while its fresh weight was compared with total body weight of the animal before anatomical preparation.

In mature foetuses, newborns and juvenile bisons the thymus consists usually of a single thoracic lobe, *lobus thoracicus*, and two almost symmetrical cervical lobes: *lobus cervicalis sinister* and *dexter* (Fig. 1—A). In two cases in male bisons (Pub, Pudzik), apart from the thoracic lobe only the right cervical lobe was present (Fig. 1—B).

The thoracic lobe is situated under the trachea reaching its posterior to the wall of *saccus pericardii*. At the level of *a. subclavia sinistra* the thoracic lobe adjoins to the cervical lobes. In one case (female foetus) the thoracic lobe did not reach the mediastinum but was situated on the ventral surface of the trachea in lower part of the neck. The posterior boundary of the lobe was on the level of a transverse line drawn through the anterior edge of the first rib. Such situation of the thymus was exceptional and never encountered in other ruminants.

The junction between the thoracic and cervical lobes may have two different appearances. In most cases a distinct boundary is lacking (Fig.

Table 1

The thymus size (mm) and weight (g) of the European bison. A — length; B — breadth; C — thickness. Age is indicated in years, months, and days.

Bisons' name, pedigree no.	Age	Thoracic lobe			Cervical lobes						Thymus wt., g	Bison wt., kg	Relative thymus wt. %
		A	B	C	Left			Right					
					A	B	C	A	B	C			
					Males								
Plód	0, 0, 0	50	11	27	52	3	4	47	6	5	154	22.4	0.69
Pub	0, 1	61	13	24	—	—	—	96	3	5	196	31.8	0.62
Pom, 1364	0, 0, 7	49	23	21	128	3	11	110	3	9	240	42.0	0.57
Pudzik, 1872	1, 9, 24	111	21	43	—	—	—	267	4	6	634	206.0	0.31
Pustal, 1691	2, 11, 2	120	51	34	340	5	16	135	2	11	610	232.0	0.26
Pokorny, 1077	9, 3, 2	70	82	27	372	7	6	365	4	6	140	670.0	0.02
Polas, 985	11, 7, 13	—	—	—	—	—	—	—	—	—	—	740.0	—
					Females								
Plód	0, 0, 0	58	12	21	43	2	5	72	3	10	89	21.5	0.41
Potraca, 2110	0, 0, 1	58	14	25	50	3	5	64	4	8	169	28.5	0.59
Purena, 1152	0, 2, 22	65	28	29	135	4	15	62	3	9	149	63.0	0.24

1—A, B). In two cases, however, there was no direct junction between the thoracic and cervical lobes (female foetus, Pub.; Fig. 1—C, D).

The cervical lobes, left and right, are situated along the trachea and to the front they reach the posterior border of the thyroid gland. Blood vessels and nerves (*a. carotis communis, v. jugularis interna, truncus vagosympaticus, n. laryngeus caudalis*) run in their vicinity.

Dimensions of the thymus show considerable individual variations. In males the left cervical lobe is always longer than the right one (Table 1). A similar situation was noted in one out of three examined females, while the remaining two females showed the reverse proportions.

The weight of the thymus shows individual and age-dependent variations (Table 1). The changes in the relative weight of the bison thymus (expressed in per cent of body weight) indicate the process of involution

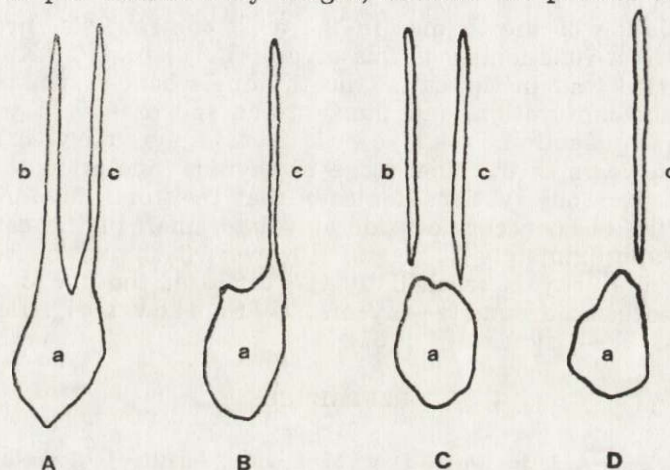


Fig. 1. Scheme of variations in the morphological appearance of the bison thymus. A, B, C, D — particular variants; a — thoracic lobe, *lobus thoracicus*; b — left cervical lobe, *lobus cervicalis sinister*; c — right cervical lobe, *lobus cervicalis dexter*.

with age starting already in almost two-year-old male Pudzik (Table 1). In 9-year-old Pokorny this organ was still encountered but in 12-year-old Polas cervical lobes disappeared without leaving any traces, while in the place of thoracic lobe a small agglomeration of the lipid tissue was observed. However, the collected material is too small to permit an accurate evaluation of the thymus involution in the European bison.

The observed division of the bison thymus into lobes resembles the relationship occurring in the farm cattle (Šumkina, 1957) or sheep (Arnautović & Bevandić, 1966).

The literature is lacking any suggestion concerning the occurrence of only one cervical lobe, while this phenomenon was observed in two cases in the bison. During embryonal development the thymus is a paired organ (Bell, 1905). At a later stage the independent initial parts join and form the thoracic lobe, while cervical lobes preserve always their paired character. Perhaps in the two described cases the organ develop-

ment was based on just one initial part, or more likely, one of the cervical lobes underwent earlier involution.

The lack of junction between thoracic and cervical lobes was also observed in the sheep thymus (Arnautović & Bevanđić, 1966). This situation should be treated as a secondary effect caused by early thymus involution, perhaps already during the prenatal development.

The examined bisons did not possess a separate parotid part of the organ, *pars parotidica*, which was described in the thymus of the sheep (Arnautović & Bevanđić, 1966).

The weight of the thymus in a 3-year-old male of the cattle amounts to 24.39 g (Mishra *et al.*, 1966), or to 0.02% in relation to body weight. This value is close to that found for the bison male Pustal of similar age (Table 1).

The involution of the thymus in the most controversial process, since this must affect functioning of this organ. Ivanov & Kovalskij (1969) reported that in the cattle the thymus reaches its maximum size during sexual maturation, and then, in the age of 4 to 5 years it undergoes final reduction. Akajevskij & Lebedev (1971) regard the age of 6 years as the final stage of thymus involution in the cattle.

The described observations indicate that the total involution of the thymus in the bison occurs considerably later than in the cattle, *i.e.*, in the age of approximately 12 years. However, it should be remembered that sexual maturity is reached by the cattle at the age of two years, while by the bison around 3—4 years (Wróblewski, 1927; Krasiński & Raczyński, 1967).

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