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A CASE OF HYPERTROPHY OF *TUBERCULUM MUSCULARE* IN *BISON BONASUS* (L I N N A E U S, 1758)

PRZYPADEK PRZEROSTU *TUBERCULUM MUSCULARE* U *BISON BONASUS* (L I N N A E U S, 1758)

Although it would seem that fairly extensive knowledge has been obtained of the morphological changes in the skull accompanying aging processes during the various stages of postnatal development of the European bison (E m p e l, 1962), no mention has been encountered of age

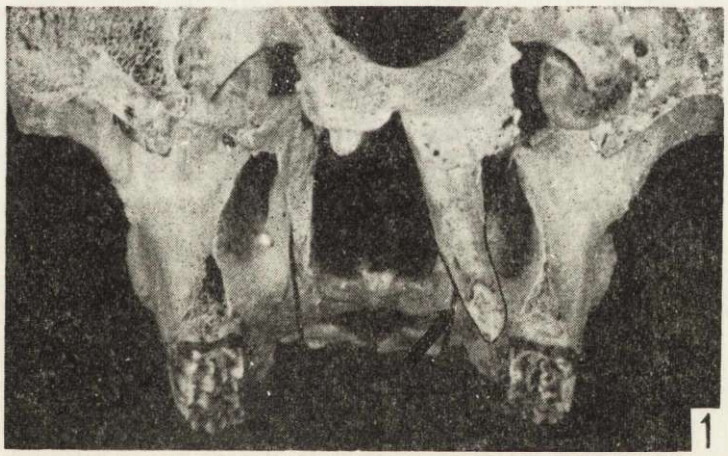

Fig. 1. Skull of male *Bison bonasus*, no. coll. 95499 — *norma caudalis*. S. Buszko phot.

changes in the *tubercula muscularia* localized on *pars basilaris ossis occipitalis*. P o p l e w s k i (1948) distinguishes them by the name of *tubercula muscularia* which, in the form of paired protuberances, are situated to the rear of *synchondrosis sphenooccipitalis*. These tubercula are exceptionally well formed in *Artiodactyla* and *Rodentia*. E m p e l

Table 1

Range of variations in skull measurements (in mm.) of male European bison living in reserves, aged from 4—22 years (according to data of Empel, 1962), compared with skull dimensions of 4 male bison from the free-living herd at Białowieża.

Measurements	n	min—max	$\bar{x} \pm SD$	C. v.	Name/col. no. (age, yrs)			
					Polel[1] (18.5)	87939 (≈ 6)	95499 (≈ 14)	95589[2] (≈ 6)
Profile length (*Op-P*)	16	509 —558	532.0 ± 16.8	3.15	555	541	565	530
Length of base of skull (*B-P*)	15	462 —503	478.8 ± 14.1	2.94	494	473[3]	507[3]	487
Greatest breadth of skull on bony cares	11	572 —770	656.5 ± 50.0	7.63	800[4]	753	720	635
Breadth of forehead (*Ect-Ect*)	16	291 —347	315.7 ± 17.5	5.54	336	331	342	316
Smallest breadth of forehead (*Fs-Fs*)	16	236 —270	251.0 ± 11.9	4.75	270	270	276	265
Index — *Ect-Ect* × 100: *B-P*	15	60.9 — 70.2	65.6 ± 3.75	5.71	68.0	69.9	67.0	64.9

[1]Cb. — 524 mm, [2]Cb — 517 mm [3] Skull partially destroyed, [4] Measurement made with horn sheaths.

(1962) considers that they are more strongly developed in male than in female bison and that they often extend to *corpus ossis sphenoidalis.*

The skull of a male bison (no. coll., Mammals Res. Inst., 95499, the age of which was originally assessed during the autopsy as 7—8 years), killed by a train on Dec. 7th 1970 near Białowieża, is distinguished *inter alia* by massive structure and considerable dimensions (Table 1), and also by the presence of strongly developed *tubercula muscularia* (Fig. 1). These tubercula are similar in shape to *proc. paroccipitalis (sic!),* particularly the right one, which is 80 mm in height, while the left is 22 mm high. Similar changes in *tubercula muscularia,* although not so marked, were also found in the skull of a male about 6 years old (no. coll. 87939) which died under free-living conditions on October 9th 1969 at Białowieża. The height of the left *tuberculum musculare* in this specimen was 30 mm.

It is a remarkable fact that the majority of craniometric values for the specimen studied (no. coll. 95499) are high, exceeding the ranges of variation for analogical skull measurements of adult and old male European bison living in the reserve of the Białowieża Primeval Forest. Similarly the skull dimensions of other bison at our disposal are high in comparison with average values for the skulls of animals living in reserve (Table 1). In addition to the absolute values of measurements the breadth-length index of the skull for animals from the free-living herd is higher than the corresponding values for skulls from bison living in the reserve. The skulls of free-living bison would appear to be distinguished by their shape, which is a broader rhomb.

These facts might possibly form an indication of the unfavourable effect of reserve conditions on growth and development processes in the European bison. It is not impossible that this influence may exert an inhibiting effect on many of the changes taking place in the skeleton of this animal (for instance — slower degree of wear with age of the crowns of the canine and incisor teeth in bison living in reserve — Wasilewski, 1967).

In the light of the foregoing assumptions it would appear that the age of the European bison (no. coll. 95499) was greater than at first estimated, and that the marked hypertrophy of *tuberculum musculare* is due in this case to the start of senile changes. Confirmation of this assumption would appear to be provided by other morphological characters of the skull also, such as: advanced degree of obliteration of skull sutures in the region of *fossa temporalis,* the orbits and facial surface of the *splanchnocranium.* These characters, in addition to the presence of distinct bony ridges on the pericentral surface of *rumus mandibulae* and the prominent tuber *faciale,* suggest that the animal was about 14 years old. The calculated value of the skull index — Ect-Ect $\times$ 100 : B-P = 67.0%, is appropriate to one of the oldest male bison (cf. Empel, 1962).

The genesis of the hypertrophy of *tuberculum musculare* is probably functional. The insertions of *M. longus capitis* and *M. rectus capitis ventralis* are located on the surface of *tubercula muscularia.* Injury on one side only of these muscles might cause more intensive action of the uninjured muscles of the opposite side at the site of their insertion and as a result lead to excessive lengthening of *tuberculum musculare.* It

would therefore appear that in this particular case hypertrophy of *tuberculum musculare* is connected with both the animal's age and also the effect of mechanical injury, and is a change of a secondary character.

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CHROMOSOMES OF THE SIBERIAN MOLE (*TALPA ALTAICA* NIKOLSKY, 1883)

CHROMOSOMY SYBERYJSKIEGO KRETA (*TALPA ALTAICA* NIKOLSKY, 1883)

The range of the Siberian mole (*Talpa altaica* Nikolsky, 1883) extends to the east from the River Irtysh, and occupies West and Central Siberia as far as Trans-Baikal. *T. altaica* is larger than *T. europaea*. It is most likely that the geographical ranges of these two forms are separated from one another by the River Irtysh (Yudin, 1971).

Three females Siberian moles caught in the Bakchar area (Tomsk region) were used for studies of chromosomes, the chromosome preparations being made from the bone marrow by the usual method after Ford & Hamerton (1956), and stained with Giemsa stain.

A total of 48 metaphase plates were studied from the three animals. In 36 of the plates a modal number of chromosomes $2N = 34$ were found, while the number of chromosomes in the remaining 12 plates varied within limits of 31—33. Analysis of plates with 34 chromosomes revealed the presence of one pair of markers with a paracentric gap on the short arm (p.g.: Figs 1, 2). In addition to this pair of markers 13 pairs of metacentric and submetacentric chromosomes of gradually decreasing dimensions occur in the karyotype of *T. altaica*, among which there is a pair of heterochromosomes (XX) and three pairs of subtelocentric chromosomes (Fig. 1, Plate IX). The fundamental number (*NF*) is 68.

Comparison of the karyotype of *T. altaica* studied with that described earlier for *T. europaea* (Gropp, 1969) shows that there are considerable similarities between the chromosomes of these two species, in both of which markers are present (p.g.). The presence of this marker was also shown in *Talpa mizura hercegovinensis* (cf. Todorović & Soldatović, 1969). In addition comparison of length of chromosomes and