

The relative weight of the walls of the alimentary tract is greatest in roebucks, smaller in hinds and smallest in stags, and therefore would appear connected with body size, and not systematic appurtenance.

Total length of the intestines is characterized by strikingly great individual variation (Table 2). Individuals differing by about 6 body lengths in respect of intestinal length were found in a relatively small group of male roe-deer, and such differences, less striking but very distinct, occur in red deer. Differences, in proportions between the various parts of the alimentary tract are not as great, but even here individual variation is clearly marked for instance the *caecum* in male roe-deer may form from 1.8 to 3.4% of the whole intestinal length (Table 2).

Generally speaking it may be said that the method of splanchnological measurements would appear insufficiently accurate for comparisons of different regional populations of the same species, although it may be of use for describing distant systematic groups occupying clearly different biotopes.

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BISONIANA LIV

PSEUDOARTHROSIS IN THE EUROPEAN BISON

STAW RZEKOMY (PSEUDOARTHROSIS) U ŻUBRA

An unusual specimen was encountered in the osteological collection of the European Bison Anatomical Research Centre of the Veterinary Department of the Agricultural Academy in Warsaw, which has recently increased to include the bones of 120 individuals of different age of both sexes. Post mortem examination of the macerated skeleton of a 10-year old male European bison — »Posusz« (Bison Pedigree book No. 984, born 8.8.1955, died 30.9.1965) revealed abnormality in the structure of the seventh cervical vertebra, exhibiting characters of pseudoarthrosis.

The seventh cervical vertebra had undergone division into two parts — the upper and lower (Fig. 1). *Processus transversi* and *processus articulares craniales* had remained with the lower part, while *proc. articularis caud-*

alis sinister had remained with the lower part only for half its height; the second, upper part of it and the whole of *proc. articularis caudalis dexter* had joined with the upper part. As a result part of *arcus vertebrae* and the above *proc. articularis caudalis dexter*, the upper part of *proc. articularis caudalis* and also the spinous process had remained with the upper part. It is clear from the foregoing that the dividing line does not run horizontally in relation to the ground, but takes a diagonal course.

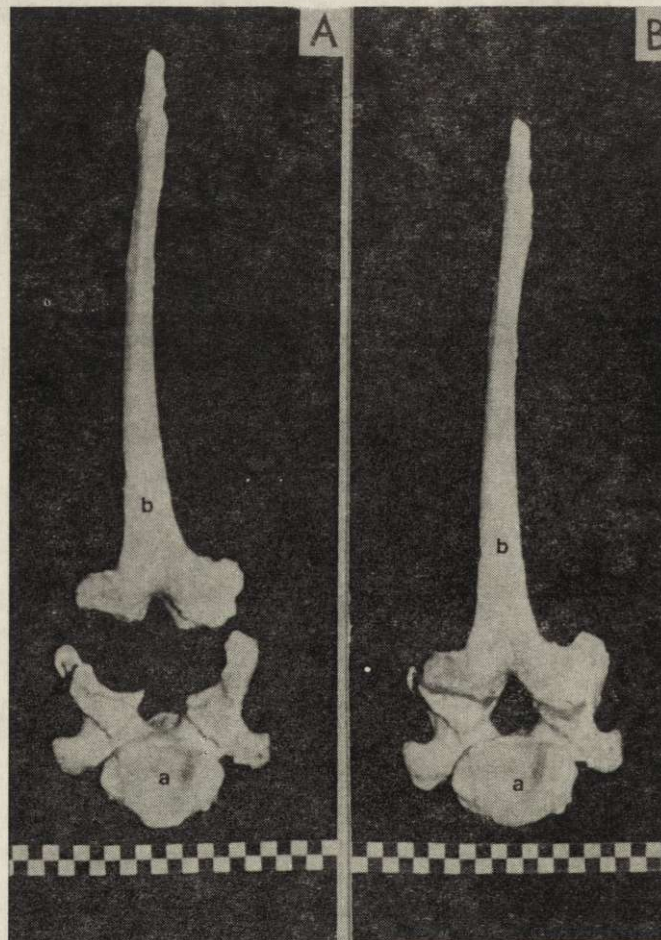


Fig. 1. Pseudoarthrosis in seventh cervical vertebra of the European bison (A). Lower part (a) and upper part (b) have been connected by plasticene (B). Fot. H. Kobryń.

Both parts of the vertebra (upper and lower) are connected by means of two irregular and of course asymmetrical rough articular surfaces, which are approximately flat, suggesting that the movability of the pseudoarthrosis formed in this way was inconsiderable. It must also be emphasised that the newly formed articulation remained connected with the cavities of the symmetrical joints between *juncturae zygapophyseales*

C VI, and C VII and also C VII and T I: this is borne out by the existence of continuity of the articular surfaces of the above connections.

The trauma which caused fracture of the seventh cervical vertebra within its arch simultaneously caused bursting of the articular capsules in the joints connecting *processus articulares* with the corresponding joints of the neighbouring vertebra. As synovia escaped from the capsules it moistened the margins of the fractured arch and facilitated the formation of the false joint.

Changes of this type must obviously have affected the formation of the articular surfaces of the above connections, for instance, the articular surfaces on the articular processes posterior of the seventh cervical vertebra in »Posusz« were almost three times greater in area than similar surfaces in another European bison of the same age, and they are also concave and their margins irregular and ragged. The surfaces corresponding to them on the *proc. articularis posterior* of C VI form their exact negatives, and therefore also deviate from the normal. Similarly the *proc. articularis posterior* of the seventh cervical vertebra in »Posusz« have articular surfaces with irregular margins, and (particularly on the right side) are larger and situated more vertically than is normal. Their negatives — *processus articulares craniales T I*, have changed in a similar way.

Additional fairly smooth articular surfaces have formed on the sixth cervical vertebra above the posterior margin of the arch, in the vicinity of the basis of the spinous process and, analogically, on the seventh cervical vertebra, but in the vicinity of the anterior margin of the arch. Together they form independent, but not very extensive connecting cavities.

The formation of a false joint, *pseudoarthrosis*, is in this case a complication following fracture of the seventh cervical vertebra, which might have taken place when the animal was young, although its occurrence at a later age cannot be ruled out. A contributory factor to fracture taking place in this particular place is undoubtedly the fact that the vertebra is relatively thin in the region of the connection between its body and arch, and is thus less resistant from a physical point of view.

This is of course only conjecture, as the cause may well have been a serious mechanical injury inflicted from the side on the apex of the spinous process, either by another bison (for instance a rogue male) or, which is less likely, caused while the animal was rolling its »hump« in a sand bath. Wróblewski (1927), who described the habits of this species in his monograph, states that such baths not infrequently end tragically for the animal, which in its desire to rub its »hump« thoroughly chooses a depression to »bath« in and in rolling energetically on its back may hit against an obstacle, such as a nearby stump or protruding root, resulting in injury, sometimes as serious as a bone fracture. A situation of this kind may well have taken place, since »Posusz«, as the European Bison Pedigree Book (Żabiński, 1965) and breeding records, lived for a certain period in a free-living herd in its natural habitat, and only the last part of its life was spent in an enclosed area. The operations required to catch and transport the animal in a cage may also have led to the injury described. Then again impossibility of immobilizing fractured bones is also considered as one of the most frequent causes of formation of a false joint (Olivkov, 1958), this applying

primarily to all animals with large body mass. Thus the chief reason why the process of fracture ended in this way was the natural mobility of the base of the neck in relation to the only limited mobility of the thorax. It is also known (Świeżyński, 1962) that the spinous process of the seventh cervical vertebra, like the analogical processes of the neighbouring vertebrae, is the site of insertions of powerful muscles, which must be particularly active when the animal lives in its natural habitat. This state of affairs most certainly prevented the fractured elements of the vertebra from coming together, and even more so their immobilization, and consequently all conditions were present for formation of a false joint in the neighbourhood of the body and arch of the vertebra. Breeding records of this individual indicate that it remained fully mobile up to the end of its life and did not exhibit visible external deviations from the normal. Our report thus forms confirmation of earlier observations (Pilariski, 1956; Radomski & Kobryń, 1969), showing that mechanical injuries in European bison probably occur more often than is generally supposed, and that these animals are characterized by a considerable capacity for compensating for the changes taking place as the result of such injuries.

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