ZAKŁAD ZOOLOGII SYSTEMATYCZNEJ
POLSKIEJ AKADEMII NAUK

ACTA ZOOLOGICA CRACOVIENSIA

Tom XII Kraków, 15 III 1967 Nr 3

Lucjan SYCH

Fossil Endocranial Cast *of Hypolagus brachygnathus* KORMOS *(Leporidae, Mammalia)*

[Pp. 27—30, pls. IX—X]

Kopalny „mózg" *Hypolagus brachygnatus* KORMOS *(Leporidae, Mammalia)*

Ископаемый „мозг" *Hypolagus brachygnatus* KORMOS *(Leporidae, Mammalia)*

Abstract. Author presents the description of four specimens of fragmentary skulls of *Hypolagus brachygnathus* KORMOS with the fairly well-preserved dorsal surface of the brain. Comparisons between fossil specimens and plaster of Paris casts of the brain case of the wild rabbit *Oryctolagus cuniculus* LINNAEUS and the brown hare *Lepus europaeus* PALLAS were made.

Fossilized brains were for the most part formed owing to the replacement of the organic contents of the brain-case by mineral substances. The mineral material filling the brain case varies in chemical composition and physical structure from specimen to specimen according to the chemical and physical conditions of the environment in which the fossilization of the remains of a dead animal took place. Fossilization of soft parts of an organism, among others, of the cerebral tissue was possible only in quite exceptional cases, where the chemical conditions favoured their preservation soon after the death of the animal. Whatever the mechanism of replacement of the brain in the skull by mineral substances might be, the final effect was always the formation of a hard cast of the inside of the skull.

Numerous such specimens of brains belonging to different groups of vertebrates have been described for at least 70 years. Among the fossil brains of different vertebrate species those of the *Lagomorpha* are rarities. The brains

of two primitive lagomorphs, Upper Miocene *Prolagus meyeri* TSCHUDI, 1900 (EDINGER, 1929) and *?Palaeolagus haydeni* LEIDY, 1856 (MOODIE, 1922; COPE, 1884), have been recorded hitherto. A few fragments of fossilized skulls of *Hypolagus brachygnathus* KORMOS have been found among numerous remains of leporids from the Pliocene breccia at Węże near Działoszyn (SYCH, 1965).

DESCRIPTION OF MATERIAL

The material used for study consists of 4 fragments of skulls of *Hypolagus brachygnathus* with the fairly well-preserved dorsal surface of the brain. The mineral substance with which the brain-cases have been filled in is composed of fine-crystalline calcite and amorphous limestone with a small admixture of phosphoric compounds. In three specimens the bony structure of the skull has partly been preserved, showing a different degree of fossilization from that of the inside.

Remnants of the frontal, parietal and temporal bones can still be seen in specimen No. 31 (pl. IX, 1). In order to manifest the cast of the inside of the skull better, some fragments of the bones have been removed, uncovering the surface of the brain. In this specimen the complete frontal, parietal and temporal regions have been preserved. Noteworthy are the well-preserved olfactory bulbs in the region of the frontal lobe. They are well developed and slightly bulge towards the dorsal surface. A vestige of the sagittal fissure is clearly marked along the long axis, and parallel to it are the vestiges of the lateral fissures on both hemispheres. The casts of great blood vessels extend in these grooves, just as they ran there in the living animal. The marks of the sulci are deep and extend for about one-third of the length of hemisphere.

Specimen No. 30 (pl. IX, 2) is not so well preserved as the previous one. The parieto-occipital region is heavily contaminated with foreign mineral material, which could not be removed for fear lest the specimen should be damaged. The olfactory bulbs are also well seen and well developed here. There is a trace of the lateral fissure on the left hemisphere. Only slight vestiges of the cerebellum in the form of an irregular sculpture of the surface subsist in the occipital region.

Specimen No. 29 (pl. IX, 3) shows only the parieto-occipital region, the rest of the brain being covered by rocky material hard to remove. Both the sulci observed in specimen No. 31, together with blood vessels sited in them, are very well seen in it. Remnants of a connective-tissue, partly ossified, subdural structure, the falx, are present in the depression of the sagittal fissure.

Specimen No. 32 is a fragment of the frontal regions of both hemispheres, lacking the olfactory bulbs, which have been broken away. As a result, the cross-section of the frontal lobes is exposed. The massive structure of this region and the blunt ends of the lobes on the side of the olfactory bulbs are worthy of notice.

COMPARATIVE OBSERVATIONS

The specimens of *Hypolagus brachygnathus* have a strongly developed temporo-occipital region. Plaster of Paris casts of the brain case of the wild rabbit *Oryctolagus cuniculus* LINNAEUS and the brown hare *Lepus europaeus* PALLAS were made in order to make it possible to compare the specimens of *Hypolagus brachygnathus* with the recent species (pl. X).

It is remarkable that the olfactory bulbs are better developed in *Hypolagus brachygnathus* than in the recent species. In comparison with these last species the frontal lobes are somewhat more massive and orally they terminate bluntly. The two lateral fissures running more or less parallel to the plane of the sagittal fissure are very poorly marked both in the cast and in the natural brain (fixed in formalin) of the wild rabbit. In the brown hare they are deep in both cases. The lateral fissures belong to the phylogenetically oldest ones. They are evident in the small specimen of *Prolagus meyeri* (it is hardly a third of the size of the brain in *Hypolagus brachygnathus*), described by EDINGER (1929), but absent from the brain of *?Palaeolagus haydeni*, which is geologically older than *Prolagus* (MOODIE, 1922). However, it is not quite certain whether *Palaeolagus haydeni* really had the surface of its brain completely smooth, because the systematic position of MOODIE'S specimen has not been established decisively, and no conclusions on the lateral fissures can be drawn from the data given by COPE (1884) for another specimen of *Palaeolagus haydeni*.

The olfactory bulbs of *Prolagus meyeri* are strongly elongated and form about 20% of the length of brain. In the recent species mentioned above this value approximates to 10%. It is not possible to determine this proportion in *Hypolagus brachygnathus* because of the incompleteness of the material. Nevertheless, it seems that the relative size of the olfactory bulbs in *Hypolagus brachygnathus* exceeded those in the rabbit and hare. The massiveness of the frontal lobes in the fossil species was probably caused by the shortening of the facial portion of the skull.

Institute of Systematic Zoology
Polish Academy of Sciences
Sławkowska 17, Kraków, Poland

REFERENCES

COPE E. D. 1884. The *Vertebrata* of the Tertiary formations of the West. Rept. U. S. geol. Surv. Terr. III, pp. I—XXXV, 1—1009, pls. I—LXXVa.

EDINGER T. 1929. Die fossilen Gehirne. Z. ges. Anat., Berlin, **28**: 1—221.

MOODIE L. R. 1922. On the endocranial anatomy of some Oligocene and Pleistocene Mammals. J. comp. Neur., Philadelphia, **34** (after EDINGER).

SYCH L. 1965. Fossil *Leporidae* from the Pliocene and Pleistocene of Poland. Acta zool. cracov., Kraków, **10** (1): 1—88, pls. I—VII.

STRESZCZENIE

Autor podaje szczegółowy opis czterech okazów naturalnie sfosylizowanych odlewów wnętrza czaszki kopalnego zającowatego *Hypolagus brachygnathus* KORMOS pochodzącego z pliocenu w miejscowości Węże k. Działoszyna. Na kopalnych okazach zachowały się m. in. bardzo wyraźnie ślady fissura sagittalis i fissura lateralis. Okazy kopalne porównano z sztucznie wykonanymi odlewami wnętrza czaszki współczesnych gatunków: *Lepus europaeus* PALLAS i *Oryctolagus cuniculus* LINNAEUS, a także z opisami okazów: *?Palaeolagus haydeni* LEIDY i *Prolagus meyeri* TSCHUDI. *Hypolagus brachygnathus* przewyższał względną wielkością opuszek węchowych (bulbi olfactorii) zarówno królika, jak i zająca. Prawdopodobne jest, że stwierdzona masywność płatów czołowych u gatunku kopalnego związana jest z wyraźnym skróceniem części twarzowej jego czaszki.

РЕЗЮМЕ

Автор даёт подробное описание 4 экземпляров естественно сфосилизированной отливки внутренности черепа ископаемого представителя зайцев *Hypolagus brachygnathus* KORMOS, найденного в отложениях плиоцена в местности Венжэ, около Дзялошина (Польша). Ископаемые экземпляры сохранили, между прочим, очень выразительные следы fissura sagittalis cerebri и fissura lateralis. Ископаемые экземпляры сравнивались с исскуственно сделанными отливками внутренности черепа современных видов: *Lepus europaeus* PALLAS и *Oryctolagus cuniculus* LINNAEUS, а также с описаниями экземпляров *Palaeolagus haydeni* LEIDY и *Prolagus meyeri* TSCHUDI. *Hypolagus brachygnathus* превышал относительной величиной обонятельных луковиц (bulbi olfactorii) и кролика и зайца. Вероятнее всего, обнаруженная массивность лобных лопастей у ископаемого вида связана с очень чётко выраженным уменьшением (укорочением) лицевого черепа.

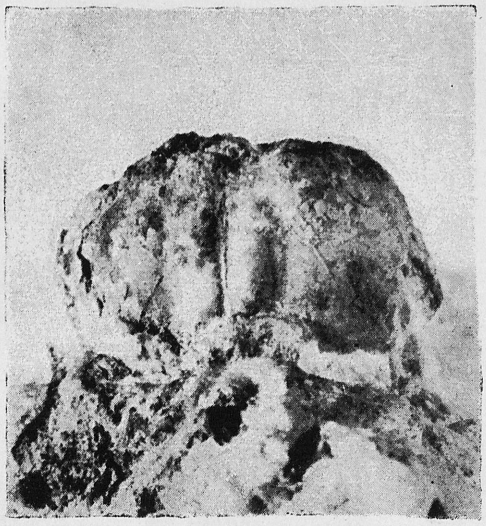
PLATES

Plate IX

1. *Hypolagus brachygnathus* — specimen No. 31.
2. *Hypolagus brachygnathus* — specimen No. 30.
3. *Hypolagus brachygnathus* — specimen No. 29.

1

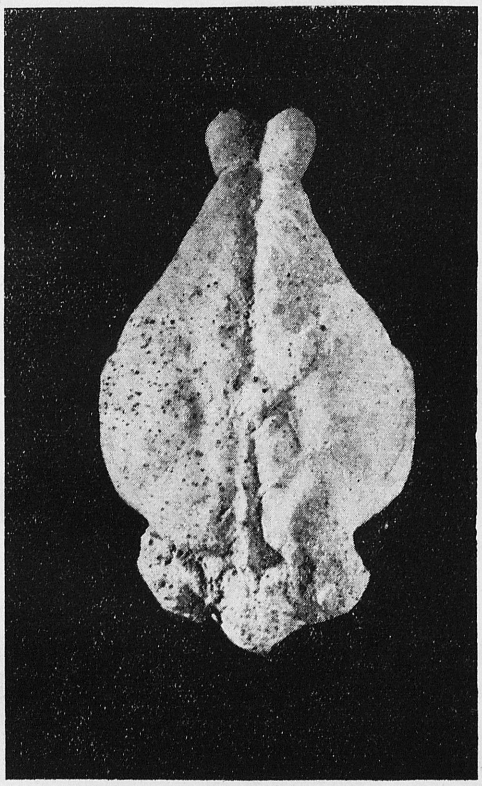
2



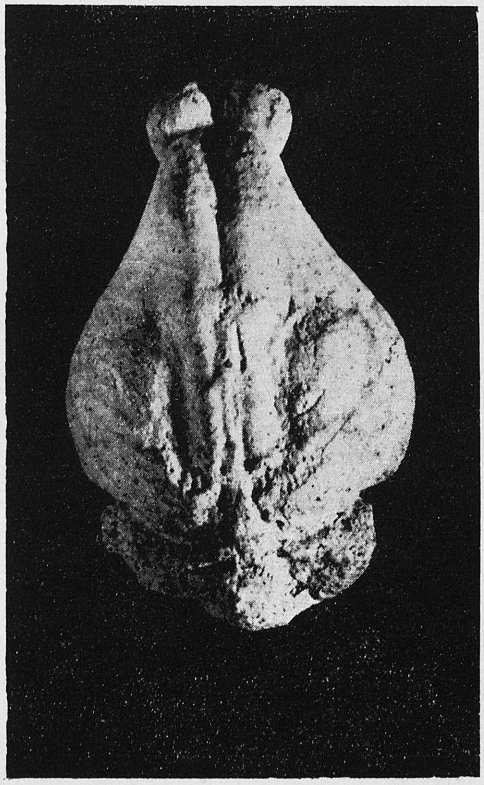
3

Plate X

Plaster of Paris casts of the brain case of *Oryctolagus cuniculus* (1) and *Lepus europaeus* (2)



1



2

L. Sych

Redaktor zeszytu: prof. dr K. Kowalski

PAŃSTWOWE WYDAWNICTWO NAUKOWE — ODDZIAŁ W KRAKOWIE — 1967

Nakład 800+100 egz. — Ark. wyd. 0,5 — Ark. druk. $1^{10}/_{16}$ — Papier ilustr. kl. III 80 g 70×100
Zam. 669/66. Cena zł 6,—

DRUKARNIA UNIWERSYTETU JAGIELLOŃSKIEGO W KRAKOWIE