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Pliopithecus antiquus (BLAINVILLE, 1839) (*Primates, Mammalia*) from the Miocene of Przeworno in Silesia (Poland)

(Pp. 19—32, pl. I; 1 text-figure)

Pliopithecus antiquus (BLAINVILLE, 1839) (***Primates, Mammalia***) **z miocenu Przeworna na Śląsku (Polska)**

Pliopithecus antiquus (BLAINVILLE, 1839) (***Primates, Mammalia***) **из миоцена Пшеворно в Силезии (Польша)**

Abstract. The maxillary teeth belonging to one specimen of *Pliopithecus* from the fossil fauna of Upper Vindobonian age from Przeworno in Silesia are described. Morphologically the teeth come near to those found at Göriach only that they are somewhat smaller and in measurements correspond to the holotype of this species from Sansan. In this connection the remains have been identified as *Pl.* (*Pliopithecus*) *antiquus* cf. *antiquus*. The material from Przeworno, along with the earlier find from Opole, situated in the vicinity of the present locality, indicates the relatively numerous occurrence of this primate in the northern border zone of its distribution in Europe.

INTRODUCTION

Pliopithecus is the most abundant genus of the Primates in the Tertiary faunae of Europe; nevertheless, its remains belong to rare finds at fossil localities. In Poland the only find of this genus and at the same time the only find of any fossil remains of the Primates were the teeth from the Miocene fauna of Opole (WEGNER, 1913). In 1969 some remains of Miocene vertebrates were found at Przeworno (17°10′40″ E, 50°41′21″ N) in the foreland of the Sudeten Mts. The results of a preliminary geologico-palaeontological investigation (GŁAZEK, OBERC and SULIMSKI, 1971) showed the presence of two sites of Miocene vertebrates in the quarry at Przeworno, which sites, according to

the authors mentioned, differed somewhat in age. The lower-lying site, Przeworno I, including the filling of a horizontal karst channel, contained a fauna referred to the Upper Burdigalian, and the higher site, Przeworno II, was a karst crevice filled with a deposit dating from the Younger Vindobonian.

In 1971 the Institute of Systematic and Experimental Zoology, Polish Academy of Sciences, in Cracow took over the task of palaeontological exploration of the sites at Przeworno. The investigation, being still under way, has provided much new material. In the course of the exploration of the site Przeworno II a few Primate teeth were found, probably the remnant of a cranial fragment destroyed by weathering. The material under description is kept in the collection of the Institute of Systematic and Experimental Zoology, Inventory No. MF/1086.

LOCALITY

Przeworno is situated about 50 km E of Wrocław and about 45 km of Opole. Its geological description is given in the paper by GŁAZEK, OBERC and SULIMSKI (1971). Karst hollows developed here in marbles presumably of proterozoic age. According to those authors, the site Przeworno II contained remains of *Pseudailurus lorteti* GAILLARD, *Hyotherium simorrense* (LARTET) and *Euprox furcatus* (HENSEL). Remains of turtles, birds, mastodons and *Tayassuidae* were collected during a later investigation, but these have not, as yet, been worked out in detail.

GŁAZEK, OBERC and SULIMSKI (1971) refer the site Przeworno II to the Younger Vindobonian and therefore to the Middle Miocene and they are of opinion that in age it approximates to the localities at Sansan, La Grive and Göriach, being somewhat older than the locality at Opole, which according to WEGNER (1913) is of Sarmatian age. This has been confirmed by the results of a study made on the rodents (KOWALSKI, 1967). The stratigraphic position of Przeworno II in the upper part of the Middle Miocene (Badenian in Paratethys stratigraphy) seems to be very probable (cf. CICHA, FAHLBUSCH and FEJFAR, 1972).

DESCRIPTION OF MATERIAL

The teeth of *Pliopithecus* found during the excavation carried out by the Institute of Systematic and Experimental Zoology show a various state of preservation. They were partly crumbled and the fragments had to be glued together laboriously. The material consists of the following detached tooth crowns: complete right P^4, damaged right M^1 and M^2, complete right M^3 and complete left M^1. All these teeth undoubtedly made up the maxillary dentition of one specimen (Pl. I, Figs. 1—5). The fact that they belonged to the genus *Pliopithecus* was recognized at first sight and is unquestionable.

Small fragments of bones found together with the teeth cannot be determined exactly and have not been described here. However, they suggest that originally the find comprised the complete dentition of the maxilla.

The terminology introduced by HÜRZELER (1954, Fig. 3) and ZAPFE (1960, Fig. 3) has been used in the morphological descriptions of the teeth.

M^3

The extant tooth comes from the right maxilla. Its buccal and lingual parts were found separately, but have been glued together and form a complete crown without any losses and defects (Pl. I, Fig. 4). Its wear is moderate and all the details of the crown pattern are distinguishable.

The narrow shape of this tooth, i.e. its small length in relation to the width, reflected by the length-width index (Table I) is its first striking character. In view of the great variability of the last molar the significance ascribed to this character should not be too large. This is also true of the position of its external buccal wall, which is oblique to the distal end. This feature occurs also in some M^3 of *Pliopithecus* from Göriach (HÜRZELER, 1954, Fig. 4). In the pattern of the crown, which is composed chiefly of the trigone, the paracone is higher than the metacone. The ridge running from the protocone to the paracone forks, its mesial branch descending to the edge of the crown. HÜRZELER (1954) thinks that the place of branching is an equivalent of the protoconulus (?). The anterior fovea is very narrow and has the form of a cleft. The crown lacks a well-developed hypocone. Nevertheless, in this region a well-developed ridge extends from the protocone to a small eminence of the crown edge, probably corresponding to the hypocone. A cylindrical cingulum runs from this place up to the middle of the mesial edge of the crown, and short folds go, close to each other, from the cingulum towards the trigone. A narrow sculptured area, the relief of which has for the most part been destroyed by wear, stretches between the crown edge and the trigone from the hypocone to the metacone. The mesostyle is lacking on the buccal side of the crown but the external cingulum is distinct and well-developed.

A comparison of the morphology of this tooth with that of M^3 of *Pliopithecus antiquus* from Göriach (HÜRZLER, 1954, Figs. 4 and 7b) shows their essential conformity. The more distinct development of the cusp here termed „hypocone" and the narrow anterior fovea in the tooth from Przeworno make the only difference. The slimmer shape of this tooth has already been mentioned.

A comparison with *Pl.* (*Epipliopithecus*) *vindobonensis* from Devinska Nova Ves (Neudorf an der March) in Czechoslovakia (ZAPFE and HÜRZELER, 1957; ZAPFE, 1960) reveals bigger differences. The two specimens of this tooth preserved from Nova Ves are more or less square in outline. Compared with *Pl. antiquus*, they exhibit a marked relaxation of the trigonal pattern and, as a result, they are also morphologically remote from the tooth from Przeworno. In *Pl. vindobonensis* they are, in addition, distinctly bigger (cf. Table I) and

Table I

A Comparison of Measurements and Indices of the Teeth of *Pliopithecus* from Different Europaean Localities

	Pl. (*Pliopithecus*) *antiquus* cf. *antiquus*, Przeworno			Pl. (*Pliopithecus*) *antiquus* ssp., Göriach [1]			*Pl.* (*Epipliopithecus*) *vindobonensis*, Nova Ves (Spalte) [2]		
	L	B	$\frac{L \times 100}{B}$	L	B	$\frac{L \times 100}{B}$	L	B	$\frac{L \times 100}{B}$
P^4				4·35—4·8	7·30—8·4		4·2 (II)	7·0 (II)	60
	4·2	6·6	63	4·4	7·7	57	4·2 (II)	7·0 (II)	60
	5·7 (sin.)	7·4 (sin.)	77 (sin.)	6·3—6·85	7·75—9·2	73	5·6 (II)	7·5 (II)	74
M^1	5·6 (dex.)	7·4 (dex.)	75 (dex.)	6·2	8·4		5·9 (III)	8·0 (III)	73
				6·7—7·15	8·3—9·0		6·3 (II)	8·6 (II)	73
M^2	5·8	7·5	77	6·7	8·8	76	6·5 (III)	9·0 (III)	72
				5·5—6·9	7·65—8·25		6·25 (II)	7·5 (II)	83
M^3	5·6	7·7	72	6·3	8·4	75	6·9 (III)	9·0 (III)	76

[1] Variation range after HÜRZELER (1954, p. 13). Measurements from the teeth of the maxilla in the possession of the Naturhistorisches Museum in Vienna, Acq. Nr. 117/1955 = PIA and SICKENBERG (1934) No 3445 = HÜRZELER (1954), Fig. 4.

[2] Figures II and III designate specimens II and III (cf. ZAPFE, 1960). L = Length, B = Breadth.

lack the external cingulum, while the distal portion of their crown relief breaks up into numerous irregular cusps and folds.

Summing up, it may be stated that considering the comparable upper teeth of *Pliopithecus* M^3 from Przeworno comes near to *Pl. antiquus*, from which it differs only in somewhat smaller measurements and slight details concerning morphology and proportions.

M^2

The extant tooth comes from the right maxilla (Pl. I, Fig. 3). It was also broken mesio-distally and lacks a fragment with a part of the hypocone in the region of the posterior fovea.

The moderately worn crown shows the least worn paracone as the highest cusp of the trigone. The almost equally big metacone is worn more heavily. A ridge arises from the mesial border of the funnel of the trigone, extends towards the anterior edge of the crown and limits the relatively large anterior fovea. The broad posterior fovea is smoothened by wear and partly missing owing to the defect of the tooth. Only the lingual part of the hypocone is preserved. It is situated at the edge of the crown and connected to the protocone by means of a crest. The cingulum, which reaches as far as the edge of the anterior fovea, touches the hypocone lingually. Enamel folds and a small isolated enamel cusp lie between the cingulum and the protocone. The external cingulum is distinguishable between the well-developed parastyle and the metastyle on the buccal border.

Except for its smaller size this tooth, too, shows much resemblance to the corresponding tooth of *Pliopithecus antiquus* from Göriach. This is the more conspicuous since M^2 from that locality is noted for variation in small morphological details. For example, the tooth presented by HÜRZELER (1954) in Fig. 4 has hardly any external cingulum, whereas the tooth in Fig. 7a of the same paper resembles the tooth from Przeworno. Practically, the length-width index in our tooth also agrees with that for the specimens from Göriach (Table I).

A comparison with *Pl.* (*Epipliopithecus*) *vindobonensis* shows distinct differences in the crown pattern and proportions (length-width index; cf. Table I) and these are its subsquare contour of the crown and the break-up of the relief into numerous small cusps. In the teeth from Nova Ves the cingulum is well developed on the lingual side but nearly completely lacking on the buccal side. It may therefore be stated that the tooth from Przeworno differs distinctly from that of *Pl. vindobonensis* (cf. ZAPFE, 1960, Fig. 5).

M^1

This tooth is represented by the specimens from both maxillary halves. Apart from the missing roots, the left tooth is undamaged. The right tooth was broken medio-distally and a distal third of the lingual half is lacking. The

description given below is based on the complete tooth of the left side (Pl. I, Fig. 5).

The wear is relatively small, only slightly heavier than in the back molars. In the trigone both the protocone and hypocone show heavier wear. Lack of sculpture in the large posterior fovea is also due to wear. The large funnel-shaped hollow of the trigone is smoothened, as well. The branching of the ridge that extends from the protocone to the metacone and the anterior fovea are conspicuous. The base of the protocone is embraced by the robust cingulum, which goes as far as the hypocone. A vestige of the cingulum is also present on the linqual base of the sturdy hypocone. The para- and metastyle are well developed.

A comparison with *Pl. antiquus* from Göriach shows far-reaching agreement. In addition to the smaller measurements of the teeth from Przeworno, differences could be seen in the somewhat greater development of their cingulum, especially on the buccal side. The absence of minute elements treated by HÜRZELER (1954) as the mesostyle may also be mentioned. These, however, are morphological details that exhibit variation in development also within the teeth from Göriach.

The differences between M^1 from Przeworno and that of *Pl.* (*Epipliopithecus*) *vindobonensis* from Nova Ves both in size, which is larger in the latter, and in crown pattern, distinctly broken up in it, are more conspicuous. Like the remaining molars of the species from Nova Ves M^1 shows a tendency to have its trigonodont structure blurred. Its posterior fovea is broken up more profusely and in contradistinction to the tooth from Przeworno it lacks the buccal cingulum.

From these comparisons it follows that the specimens from Przeworno very much resemble *Pliopithecus* from Göriach in morphology, whereas they differ from *Pl. vindobonensis* in some details of the crown pattern. The differences in proportions expressed by the length-width index (Table I) are of minor importance, because small differences of this kind occur even between the left and the right tooth from Przeworno.

P^4

This tooth is represented by a complete crown belonging to the right row. It bears only small signs of wear and consists of a big paracone with a parastyle and a metacone reduced to the metastyle. The distal edge of the crown, running towards the „metacone", is accompanied by the cingulum, which embraces also the base of the protocone. By the protocone the cingulum shows a marked thickening, which corresponds to the hypocone. Distally the funnel-shaped hollow of the trigone passes without any boundary into the posterior fossa. Traces of a delicate relief are visible in this large depression (Pl. I, Fig. 1).

A comparison of this tooth with that of *Pl. antiquus* from Göriach and its description given by HÜRZELER (1954) shows their considerable similarity. The only difference is the stocky shape of the tooth from Przeworno (length-

width index, Table I). As will be seen from the figures in the paper by HÜRZELER (1964, e. g. Fig. 8), similar proportions occur also in *Pliopithecus* from Göriach.

Pl. (*Epipliopithecus*) *vindobonensis* differs from our specimen, above all, in the presence of a distinct relief in the funnelshaped hollow of its trigone or in the posterior fossa (cf. ZAPFE, 1960, p. 23). Its anterior fossa is, besides, relatively somewhat larger (ZAPFE, 1960, Fig. 5).

Although the morphological elements of this tooth, few in number, provide only limited possibilities of comparison, yet the similarity of the specimens from Przeworno to those from Göriach is greater than it is to the specimens from Neudorf.

SYSTEMATIC POSITION OF *PLIOPITHECUS* FROM PRZEWORNO

Although *Pliopithecus* is the commonest fossil form of the apes in Europe, its remains are too rare and too incomplete to allow us to take a definitive line in the problem of its variation and the systematic significance of different morphological characters of its dentition. With the exception of *Pliopithecus* (*Epipliopithecus*) *vindobonensis* ZAPFE et HÜRZLER (ZAPFE, 1960), nearly all finds consist only of fragments of dentition. This deficiency sets bounds to all the attempts at systematic division made so far. In his paper from 1963, among other ones, SIMONS particularly decidedly expressed his opinion against the excessively far-reaching systematic splitting of the fossil Primates, pointing rightly to their remarkable variation. BERGOUNIOUX and CROUZEL (1965, p. 15 ff.) treat also *Pliopithecus piveteaui* HÜRZELER from the lower part of the Middle Miocene („Helvetian") of France as a subspecies of *Pliopithecus antiquus* only. As has been mentioned by one of the authors of the present paper in another place (ZAPFE, 1969, p. 6), it seems expedient tentatively to maintain the existing division of the group *Pliopithecus* into three subgenera: *Pliopithecus* s. str., *Epipliopithecus* and *Plesiopliopithecus*. There are, however, undoubtedly many finds, which group around the classic form *Pl.* (*Pliopithecus*) *antiquus antiquus* from Sansan, whereas *Epipliopithecus* and *Plesiopliopithecus* are distinct and must be, at least at the level of species, separated from *antiquus*. This is also true of *Limnopithecus*, which SIMONS (1963 and other publications) would like to combine with European *Pliopithecus*.

Closer reference to *Pliopithecus piveteaui* HÜRZELER, 1954, which in respect of some measurements comes near to the teeth from Przeworno, does not seem to be purposeful. *Pl. piveteaui* is noted for the break-up of the relief of its lower molars, which makes us suppose that a similar character occurs in the upper teeth, whereas in the teeth from Przeworno it is lacking. The subspecies *Pl. antiquus auscitanensis* BERGOUNIOUX et CROUZEL (1965), erected by its authors for the materials from Sansan and the race „*chantrei* DEPERET" from La Grive, on account of their close resemblance to *Pl. antiquus*, demand a better justification for their separation. These difficult problems cannot be decided here,

if not for other reasons, because the definitive determination of the subspecific position of the form from Przeworno is impossible in view of the fact that we do not know its mandibular dentition.

The teeth of *Pliopithecus* from Przeworno, as shown by the comparisons presented above, bear no characters that would speak against numbering them in *Pl.* (*Pliopithecus*) *antiquus*. The differences in M^3 in relation to the teeth from Göriach are of no importance for systematics because of the particularly great variability of the last molars. The definitive estimation of the systematic position of the teeth from Przeworno encounters some difficulty, caused by the fact that the typical *Pl. antiquus* from Sansan is represented only by the dentition of the mandible, which inclined also HÜRZELER (1954) to define the find of *Pliopithecus* from Göriach in Styria as „*Pl.* cf. *antiquus*". This determination was, however, influenced, in addition, by the measurements of the teeth from Göriach, somewhat exceeding the average ones. As has been stated elsewhere, *Pliopithecus* from Göriach deserves to be distinguished from the typical form from Sansan at the most as a subspecies. For this reason ZAPFE (1969, p. 7, 9) proposed its determination as *Pl.* (*Pliopithecus*) *antiquus* ssp. indet.

On the one hand, the maxillary teeth from Przeworno show a great morphological conformity to the teeth from Göriach; on the other hand, they are somewhat smaller and in measurements correspond to the holotype from Sansan. In order to examine the conformity of the measurements of the maxillary teeth from Przeworno to the mandibular ones from Sansan quantitatively, the following index was calculated:

$$\frac{\text{length } P^4 - M^2 \times 100}{\text{length } P_4 - M_2}$$

These measurements were chosen in order that the mandible of *Pliopithecus* from Stätzling near Augsburg (ROGER, 1898; STROMER, 1928) could be included in considerations and, on the contrary, variable M3 excluded. In respect of measurements the mandible from Stätzling comes very near to the holotype of *Pl. antiquus*. The measurements and proportions of the skull of *Pl.* (*Epipliopithecus*) *vindobonensis* from Nova Ves in Czechoslovakia, the only locality in which the mandibular and maxillary dentition of one and the same specimen has been found (ZAPFE, 1960), make the basis for these comparisons. Upper and lower tooth rows, possibly corresponding to each other in size, have been chosen from the material from Göriach. As a result, the following data have been obtained:

Sansan	P_4—M_2 = 17·1 mm
Stätzling	P_4—M_2 = 17·0
Neudorf	P_4—M_2 = 19·3
	P^4—M^2 = 17·5
Göriach	P_4—M_2 = 18·4
	P^4—M^2 = 17·2
Przeworno	P^4—M^2 = 16·0

In *Pl. vindobonensis* the above-mentioned index, basic in our considerations, is 90. Its values calculated for the maxillary tooth row from Przeworno and the mandibles of the holotype from Sansan and the specimen from Stötzling are 91. For the specimens from Göriach this index is 93. These figures show that within the genus *Pliopithecus* the length ratio of maxillary and mandibular tooth rows is constant and that in measurements the tooth row from Przeworno corresponds well with the typical mandible from Sansan.

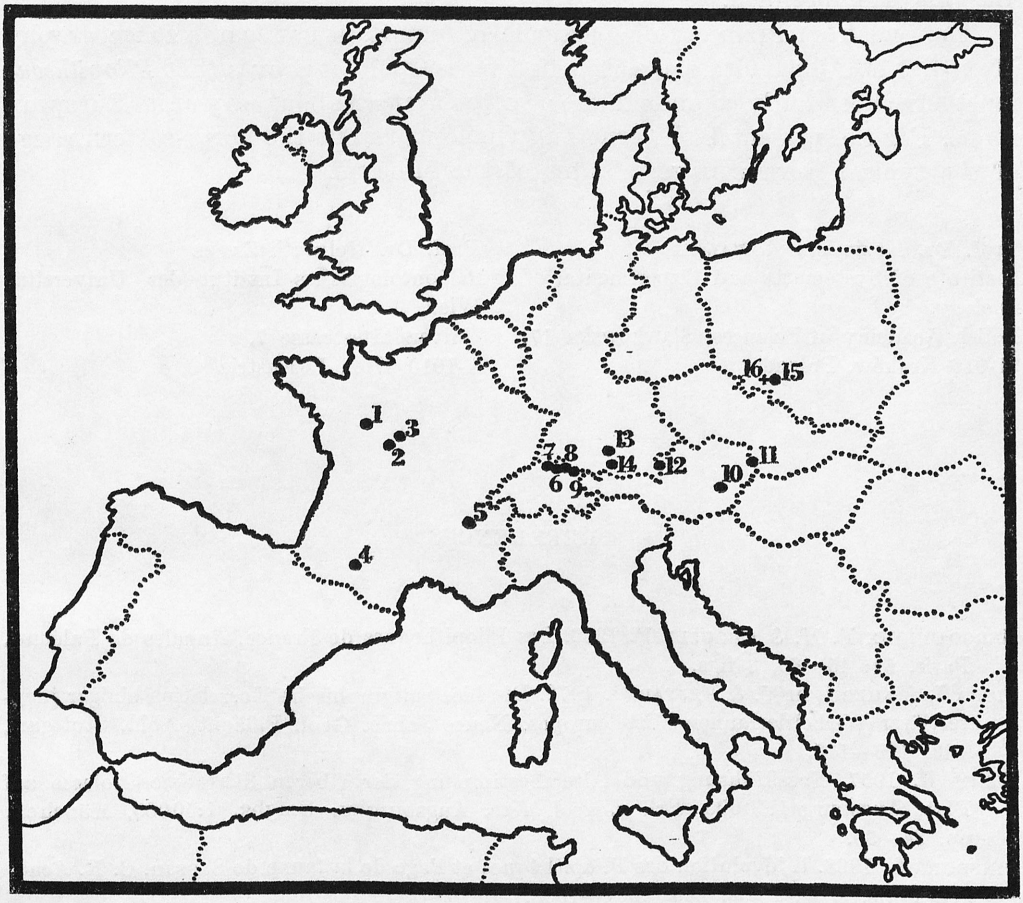

Fig. 1. Distribution of *Pliopithecus* in the Miocene of Europe. 1. Noyant sous le Lude (Maine-et-Loire), 2. Manthelan (Indre-et-Loire), 3. Pontlevoy (Loire-et-Cher), 4. Sansan (Gers), 5. La Grive-Saint-Alban (Isere), 6. Elgg (Switzerland), 7. Rümikon (Switzerland), 8. Stein am Rhein (Switzerland), 9. Kreuzlingen (Switzerland), 10. Göriach (Styria), 11. Dévinská Nová Ves (Neudorf an der March), localities „Sandberg" and „Spalte" (Czechoslovakia), 12. Trimmelkam (Upper Austria), 13. Stätzling (Bavaria), 14. Diessen am Ammersee (Bavaria), 15. Opole (Oppeln) (Poland), 16. Przeworno (Poland). Stratigraphic division: 1—3 and unpublished localities in France: lower part of Middle Miocene („Helvetian"), *Pliopithecus priveteaui*; 4, 6—12, 16: upper part of Middle Miocene („Tortonian", Badenian in Paratethys stratigraphy), *Pliopithecus antiquus* (Blainville) — type (4), *Pl. antiquus* (Blainville) s. l., *Pl.* (*Epipliopithecus*) *vindobonensis* (11, „Neudorf-Spalte"), *Pl.* (*Plesiopliopithecus*) *lockeri* (12); Upper Miocene (Sarmatian), *Pliopithecus antiquus* (Blainville) s. l. (the map used after Hürzeler, 1954, Fig. 38)

On the basis of its morphological characters and the conformity of measurements the find from Przeworno may therefore be defined as *Pliopithecus* (*Pliopithecus*) *antiquus* cf. *antiquus* (BLANVILLE).

The teeth described by WEGNER (1913, Pl. 11) from Opole agree in measurements with the holotype of *P. antiquus*. The left M_1, illustrated in Fig. 10 in his paper, exhibits a small difference in relation to the holotype in the region of the hypoconulid, but this difference cannot be estimated properly without knowing the specimen.

The find from Przeworno is particularly important as regards zoogeography (Text-fig. 1). Along with the earlier find from Opole, it proves that *Pliopithecus* must have been fairly common here, near the northern boundary of its European range. For the present Przeworno and Opole mark out the north-eastern range of the typical European vertebrates of the Miocene.

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STRESZCZENIE

Z wypełnienia krasowej szczeliny w Przewornie II na Śląsku opisano zęby szczęki jednego osobnika *Pliopithecus*. Fauna tego stanowiska, jak wynika z dotychczasowych opracowań (GŁAZEK, OBERC i SULIMSKI, 1971), pochodzi z okresu górnego Vindobonian. Zęby *Pliopithecus* morfologicznie odpowiadają zębom *Pl. antiquus* z Göriach w Austrii, są od nich nieco mniejsze i wielkością odpowiadają rozmiarom holotypu tego gatunku z Sansan we Francji. Na tej podstawie oznaczono szczątki z Przeworna jako *Pliopithecus* (*Pliopithecus*) *antiquus* cf. *antiquus* (BLAINVILLE, 1839). Wraz z dawniejszym znaleziskiem z położonego w sąsiedztwie Opola (WEGNER, 1913), odkrycie w Przewornie wskazuje na dość liczne występowanie tych primatów na północnym kresie ich zasięgu w Europie.

РЕЗЮМЕ

Описаны верхнекоренные зубы одного индивида *Pliopithecus* из отложений, выполняющих карстовую щель местонахождения Пшеворно II в Силезии. Возраст фауны этого местонахождения, судя существующим данным (GŁAZEK, OBERC & SULIMSKI, 1971) можно датировать как поздний виндобон. Морфологически зубы из Пшеворно II соответствуют зубам *Pl. antiquus* из Гёриаха (Австрия), но отличаются от них несколько меньшими размерами. В то же время размеры зубов плиопитека из Пшеворно позволяют ассоциировать их с зубами голотипа этого вида из Сансана (Франция). Следовательно, плиопитек из Пшеворно может быть определен как *Pliopithecus* (*Pliopithecus*) *antiquus* cf. *antiquus* (BLAINVILLE, 1839). Учитывая находки плиопитека в Ополе (WEGNER, 1913), можно считать, что этот примат был довольно многочисленным вблизи северной границы его ареала в Европе.

Plate I

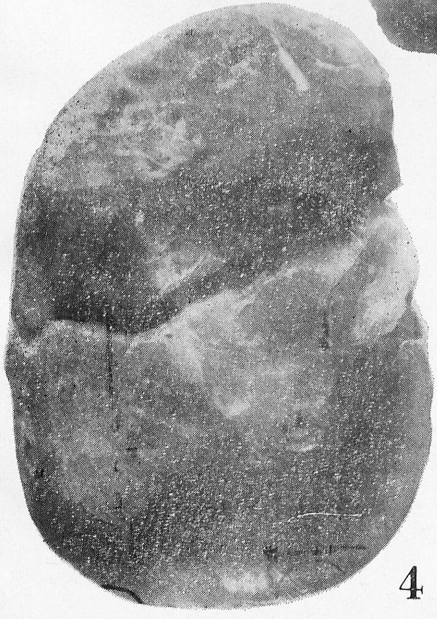
Pliopithecus (*Pliopithecus*) *antiquus* cf. *antiquus* (BLAINVILLE) Miocene, Upper Vindobonian Przeworno II, Silesia, Poland.

Fig. 1. P^4 dex. (MF 1086—1)
Fig. 2. M^1 dex. (MF 1086—2)
Fig. 3. M^2 dex. (MF 1086—3)
Fig. 4. M^3 dex. (MF 1086—4)
Fig. 5. M^1 sin (MF 1086—5)
10/1 natural size

1

2

3



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