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REMAINS OF UPPER CRETACEOUS MOSASAURIDAE (REPTILIA)  
OF CENTRAL POLAND

*Abstract.* — A fragmentary upper jaw with teeth, unattached teeth of the lower jaw from the Maruszów quarry and a single isolated lateral lower tooth from the Nasilów outcrop have been described, all of them belonging to the Upper Cretaceous (uppermost Maastrichtian) marine carnivorous reptiles of the genus *Mosasauros* Conybeare, 1822.

## INTRODUCTION

During my 1960—1962 field studies, I found in the Maruszów quarry (Lipsko District, Kielce Voivodship) (Text-fig. 1, M), a fragment of an upper jaw with large-sized teeth and a few detached incomplete teeth of an upper and, probably, lower jaws of *Mosasauros* sp. A repeatedly renewed search for the rest of the skeleton in the Maruszów quarry did not produce satisfactory results.

An unattached tooth of another mosasaur, I received for description from Dr. T. Maryńska, is complete and well preserved. It comes from Nasilów (Puławy District, Lublin Voivodship) (Text-fig. 1, N). The limestones, in which the remains of mosasaurs have been found, are the deposits of the uppermost Maastrichtian (Pożaryski, 1938; Kongiel, 1962; Pożaryska, 1965; Maryńska, 1968). Fragmentary findings and a lack, except for a few cases only (cf. Romer, 1956, 1966), of more detailed data on the morphology of teeth in literature have not allow me for a more accurate determination of the species that occur at Maruszów and Nasilów. They have only been designated with letters sp. A (Maruszów) and sp. B (Nasilów).

The remains of mosasaurs that have so far been found in Poland, occurred in the form of indeterminable skeletal fragments (vertebrae, teeth, mostly parts of crowns, etc.). The present paper is the first concerning the mosasaurs of Poland.

The fragment of the upper jaw with teeth and the isolated lower teeth from Maruszów are housed at the Palaeozoological Institute of the Polish Academy of Sciences in Warsaw (abbreviation Z.Pal.No.R.I), whereas the tooth from Nasilów is part of collections of the Museum of Earth, Polish Academy of Sciences in Warsaw (abbreviation M.Z. No.VIII/Vr).

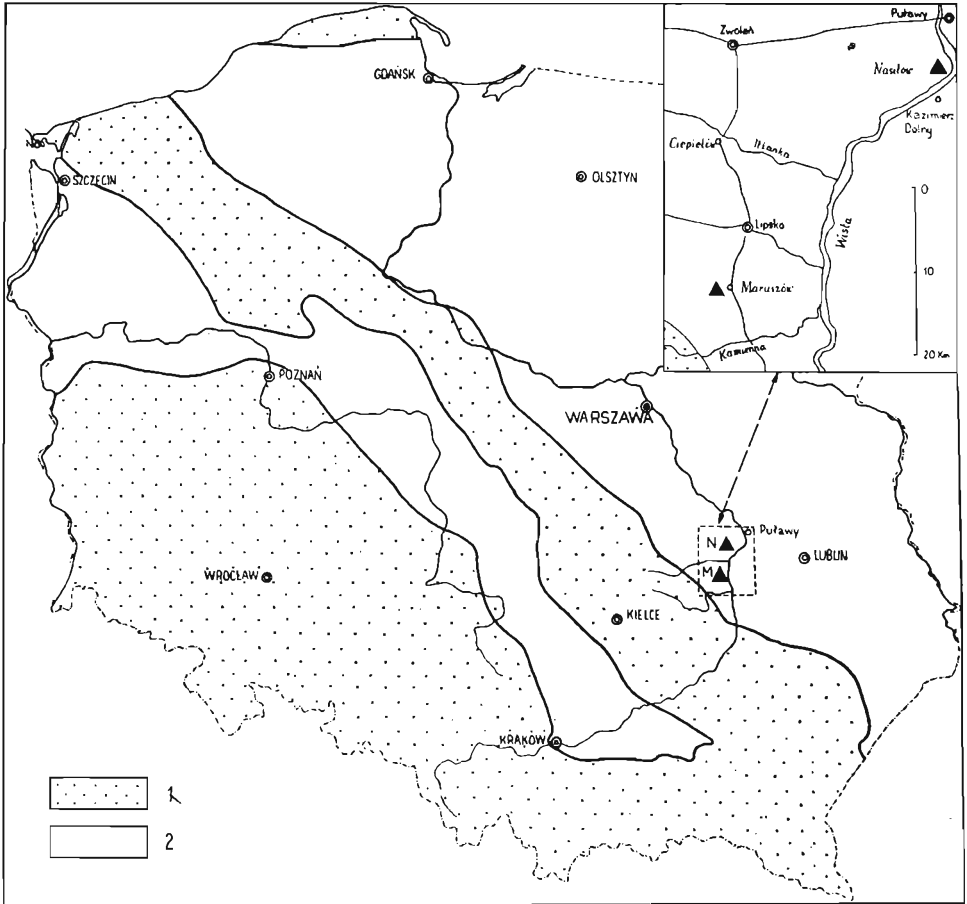


Fig. 1. — A supposed range of the Upper Cretaceous sea (in the uppermost Maast-richtian) on the present territory of Poland. *M* Maruszów quarry, *N* Nasilów outcrop. According to W. Pożaryski's & E. Rühle's "Geological Map of Poland". 1 — older sediments, 2 — Upper Cretaceous sediments.

I would like to express my gratitude to the herpetologists Professor L. I. Khozatski from Leningrad, U.S.S.R., and Dr. R. Estes from Boston, U.S.A., for advice and discussion of Polish mosasaurs, to Dr. T. Maryńska for a tooth of mosasaur I received from her for elaboration, and to Mr. W. Siciński for his aid in the preparation of the material. My thanks are also due to Miss M. Czarnocka and Miss D. Zdražil for taking photographs and working out illustrations.

## SYSTEMATIC DESCRIPTION

Family **Mososauridae** Gervais, 1853  
 Subfamily **Mososaurinae** Williston, 1897  
 Genus *Mosasaurus* Conybeare, 1822  
*Mosasaurus* sp. (sp. A)  
 (Pl. I; Pl. II, Figs. 1-4)

*Material.* — A fragmentary right upper jaw with three teeth (mostly bone bases), three isolated lower teeth (crowns) preserved together with them in the rock, as well as three other fragments of teeth (crowns). All of them seem to belong to the same individual.

*Occurrence.* — Maruszów, uppermost Maastrichtian.

Dimensions of teeth (in mm):

	Z. Pal. No. R.I/1						Z. Pal. No. R.I/2-4		
	dmx-1*	dmx-2	dmx-3	dma-1	dma-2	dma-3	2	3	4
Crown:									
height	—	—	—	ca. 40	ca. 40	—	ca. 35	—	ca. 40
length	—	ca. 25	ca. 22	ca. 22	ca. 22	ca. 18	17	18	ca. 20
width	—	ca. 19	ca. 15	14	—	—	14	14	ca. 16
Bone base:									
length	35	35	—	—	—	—	—	—	—
width	35	35	—	—	—	—	—	—	—

\* dmx-1—3, dma-1—3 = succession of teeth in the specimen.

*Description.* — The bone fragment with teeth most probably comes from the posteromedian part of maxilla (cf. Camp, 1942), which is indicated by a concave bone part, situated above the first two teeth of the jaw (Pl. I, Fig. 1 a). The latter makes up an extension of maxilla who arches towards the axis of the skull and constitutes a lateral part of the bone cover of the narial canal.

The dmx-1 tooth is devoid of crown. A resorptional perforation with a “young” tooth sticking in it (Pl. I, Fig. 1 b) is visible on the posterolingual side of the bone base, which is wide and laterally somewhat compressed, so that its transverse diameter is shorter than the antero-posterior one. The root part of the bone base is deeply embedded in alveolus and strongly fused with jaw.

The bone base of the dmx-2 tooth with a strongly damaged crown is situated, without the diastema, just behind the bone base of dmx-1. Its structure, transverse section and manner of fusing with jaw are identical as those of dmx-1. A very strongly developed resorptional perforation with a “young” tooth inside of it also occurs on the posterolingual side.

Since in this tooth, the root part of the bone base is still only slightly

fused with the jaw bone and the bone gum swelling of the base is not yet in its proper functional position, the dm<sub>x</sub>-3 tooth most likely belongs to the medial dental generation. The crown of dm<sub>x</sub>-3 is strongly damaged, but two cutting edges, the anterior and the posterior ones, are visible on its surface.

The three lower teeth which occur together with the fragment of the upper jaw and which here are designated as dma-1-3, are preserved in the form of crowns. Of these teeth only the crown of dma-1 is well preserved (Pl. II, Fig. 1 a-c). The enamel is smooth, without distinct ornamentation. The anterior cutting edge or keel is pronouncedly directed anteriorly and the posterior one — more towards the posterolabial side of the crown, so that both these edges form an angle of about 150—160°. In addition, the crown is arcuate, mildly bent posteriorly and sharply terminating. Both cutting edges are finely denticulate.

Of the separately found, probably lower, lateral tooth (Pl. II, Fig. 2 a-c), only the crown has been preserved. This crown is laterally compressed and its cross section, at the base, is elliptical. The enamel smooth, devoid of ornamentation. Sharp and denticulate cutting edges are situated at an angle of about 90—100° to each other, the labial side of crown being flatter and narrower than the lingual one which is strongly convex.

The remaining two, probably upper teeth are strongly damaged. One of them contains only a part of the gum swelling of the bone base and has a strongly damaged crown (Pl. II, Fig. 3), whereas the other has a preserved basal part of crown with fairly clearly marked both cutting edges, finely denticulated (Pl. II, Fig. 4).

*Remarks.* — In their dimensions and shape of crowns, the teeth from Maruszów are to the greatest extent similar to those of *Mosasaurus hoffmanni* Mantell, 1828 (Dollo, 1889, who described it as *Mosasaurus camperi* v. Meyer; Hoffstetter, 1955; Zittel, 1932, who also described it as *Mosasaurus camperi* v. Meyer). However, even despite a fairly distinct similarity, the scarcity of the material from Maruszów, does not allow me to take quite a definitive and firm standpoint as to the appurtenance of these specimens to the last-named species.

A comparison of the specimens of *Mosasaurus* sp. (sp. A) with a single tooth from Nasilów, identified as *Mosasaurus* sp. (sp. B) reveals a conformity in dimensions, but differences in the structure of crowns. The tooth from Nasilów has much more distinct longitudinal facettes on the crown than those, observed on the teeth from Maruszów. In addition, a difference has been recorded in the length of the root, which in the specimen from Nasilów is considerably longer than in any of the teeth from Maruszów. Finally, certain differences have also been observed in the curvature of the crown bend. The last-named character seems to be subject to a considerable variability.

*Mosasaurus* sp. (sp. B)

(Pl. II, Fig. 5 a-d)

*Material.* — A single, well-preserved tooth, probably the right lateral lower one.

*Occurrence.* — Nasiłów, uppermost Maastrichtian.

Dimensions of the tooth (M.Z.No.VIII/Vr-66) (in mm):

Crown:	height . . . . .	ca. 40
	length . . . . .	25
	width . . . . .	20
Bone base:	length . . . . .	30
	width . . . . .	25
Root:	length . . . . .	ca. 77

*Description.* — On the basis of the trace of cutting edges and their position in relation to each other on the crown, one may conclude that this tooth is the right lateral lower one. On the lingual side, on the crown there are visible three, not very high pseudo-edges which disappear half-way the height of the crown. These edges bound narrow and longitudinal enamel fields or what is known as facettes. The anterior cutting edge is sharp and finely denticulate. On the labial side, there occurs a distinct, sharp and also denticulate posterolateral cutting edge (Pl. II, Fig. 5 a). A similar system of edges is also observed on the teeth of *Mosasaurus* sp. (sp. A). A distance between the two edges, measured at the crown base, amounts to about 1.5 cm, and an angle they form to ca. 90—100°. On the posterior side of crown, there occur a few fine, disappearing edges similar to those observed on the lingual side. No distinct ornamentation in the form of small striae, sharp angles or tuberosity occurs on the enamel which is smooth except for very delicate creases visible on its surface. The root part of the tooth is long and has a slight gum swelling. The length of root is almost twice as large as the height of the crown. The resorptional perforation is lacking on the posterolingual side. This tooth may be considered as a functional one in the initial stage of its functioning.

*Remarks.* — The specimen from Nasiłów (Pl. II, Fig. 5 a-d) is to the greatest extent similar to *Mosasaurus beaugei* Arambourg & Signeux, 1952 (also Antunes, 1964), described from the phosphatic deposits of Morocco and Angola. This species is fairly well recorded, if only on the basis of its dentition. Due to its similarity to the tooth from Nasiłów, the symphyseal-lateral tooth of this species (Arambourg & Signeux, 1952, Pl. 39, Fig. 13) deserves of particular attention. The same is true of a tooth, described and figured by Antunes (cf. Antunes, 1964, Pl. 26, Figs. 1-1 a). In the text it is described as similar to *M. beaugei* Arambourg & Signeux, but in the plate it is shown as Mosasauridae indet. The remaining lateral teeth of the Moroccan species are clearly smaller,

although very similar to each other in structure. Both in *M. beaugei* Arambourg & Signeux and on the tooth from Nasiłów, the surface enamel has edges rounded at the base, disappearing towards more or less half-way the height of crown, and bounding fairly numerous, narrow, longitudinal facettes. A considerable similarity is also observed in the disposition of cutting edges.

Both the scarcity of the material from Nasiłów and a much too distant region of the occurrence of the species *M. beaugei* Arambourg & Signeux are the reasons why I am incapable of reaching any final and reliable conclusion as to whether or not the specimen from Nasiłów may be assigned to this species.

Other species of mosasaurs, described by different authors, as, for instance, *Mosasaurus horridus* Williston, 1898 (Williston, 1898), *M. iembeensis* Antunes, 1964 (Antunes, 1964), *M. lemonnieri* Dollo, 1889 (Dollo, 1889, 1892). *M. lonzeensis* Dollo, 1904 (Dollo, 1904), *M. missouriensis* (Harlan, 1834) (Camp, 1942) and other forms of the subfamily as *Dollosaurus lutugini* Yakovlev, 1901 (Khozatskii & Jurev, 1964) differ to a considerable extent from the specimen described either in the dimensions of teeth or ornamentation of crowns.

A comparison of the tooth from Nasiłów with teeth from Maruszów is mentioned in the "Remarks" concerning the species *Mosasaurus* sp. (sp. A). Furthermore, it may well be that the tooth from Nasiłów may belong to the species *M. hoffmanni* Mantell, 1828, although the morphology of its crown is slightly different.

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ANDRZEJ SULIMSKI

SZCZĄTKI GÓRNO-KREDOWYCH MOZAZAURIDÓW POLSKI ŚRODKOWEJ  
(MOSASAURIDAE, REPTILIA)

*Streszczenie*

Notatka niniejsza jest pierwszą publikacją w Polsce, dotyczącą górno-kredowych gadów morskich z rodzaju *Mosasaurus* Conybeare, 1822. Szczątki mozazauridów były dotychczas znajdowane przypadkowo w osadach mastrychtu w środkowej Polsce, w postaci nieoznaczalnych często ułamków kostnych (kręgi, fragmenty szkliva lub części koron zębów).

Fragmenty kostne opisane w notatce pochodzą z dwóch niezbyt od siebie oddalonych stanowisk tego samego wieku (najwyższy mastrycht). Część szczęki górnej i luźne zęby znalezione były w kamieniołomie Maruszów, a pojedynczy, dobrze zachowany ząb — w odsłonięciu Nasilów (Text-fig. 1, M-N). Fragment szczęki z Maruszowa wykazuje duże podobieństwo (głównie korony zębów) do typowego przedstawiciela rodzaju, *Mosasaurus hoffmanni* Mantell, 1828. Skąpy jednak materiał z Maruszowa nie pozwala na zaliczenie go do tego gatunku, dlatego też oznaczony został jako *Mosasaurus* sp. (sp. A).

Luźny ząb z Nasilowa, oznaczony jako *Mosasaurus* sp. (sp. B), zdaniem autora, wymiarami i morfologią korony dość dobrze odpowiada zębom lateralnym u gatunku *Mosasaurus beaugei* Arambourg & Signeux, 1952, opisanego z osadów fosfatowych

Maroka i Angoli. Jednakże ubogi materiał również nie pozwolił autorowi wypowiedzieć się definitywnie co do przynależności opisanego zęba do tego gatunku.

Nie jest ponadto wykluczone, że okazy z Maruszowa i ząb z Nasilowa mogą należeć do tego samego gatunku, być może do *Mosasaurus hoffmanni* Mantell, 1828.

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АНДРЖЕЙ СУЛИМСКИ

ОСТАТКИ ВЕРХНЕМЕЛОВЫХ МОЗАЗАВРИДОВ ЦЕНТРАЛЬНОЙ ПОЛЬШИ  
(MOSASAURIDAE, REPTILIA)

Резюме

Настоящая заметка является первой публикацией в Польше, касающейся верхнемеловых морских рептилий из рода *Mosasaurus* Conybeare, 1822. Остатки мозазавридов до сих пор встречались случайно в отложениях маастрихта Польши, часто в виде неопределяемых костных обломков (позвонки, фрагменты зубной эмали или обломки зубных коронок).

Костные фрагменты, описанные в настоящей заметке, происходят из двух недалеко себя расположенных обнажений, одинакового геологического возраста (самый верхний маастрихт). Часть верхней челюсти и отдельные зубы были найдены в каменоломне Марушув, а одиночный зуб хорошей сохранности — в обнажении в Насилове (текст-фиг. 1, M-N). Фрагмент челюсти из Марушова проявляет большое сходство (главным образом зубной коронки) с типичным представителем рода, *Mosasaurus hoffmanni* Mantell, 1828. Скучный материал из Марушова не позволяет однако на причисление его к этому виду, поэтому автор определил его только как *Mosasaurus* sp. (sp. A).

Одиночный зуб из Насилова, определенный как *Mosasaurus* sp. (sp. B), по мнению автора, размерами и морфологией коронки довольно хорошо соответствует латеральным зубам вида *Mosasaurus beaugei* Arambourg & Signeux, 1952, описанного из фосфатных осадков Марокка и Анголы. Скучный однако материал не позволяет автору точно определить видовую принадлежность описанного зуба.

Не исключено тоже, что образцы из Марушова и зуб из Насилова принадлежат к одному виду, быть может к *Mosasaurus hoffmanni* Mantell, 1828.

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## PLATES

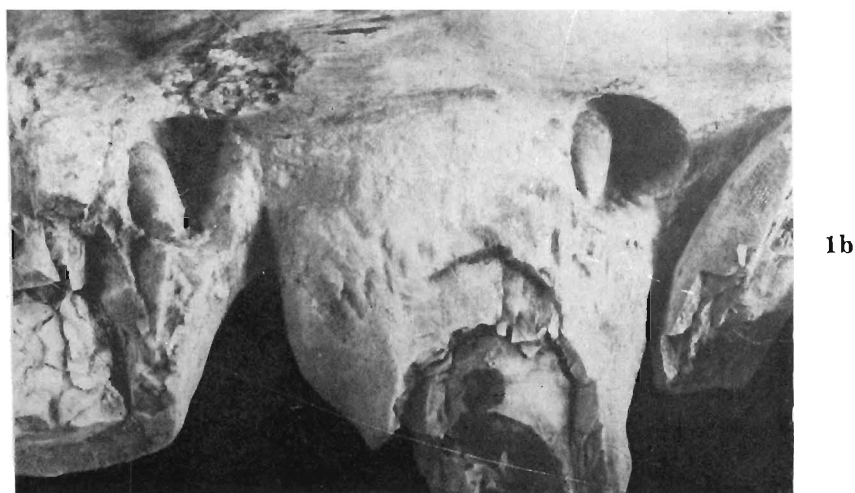
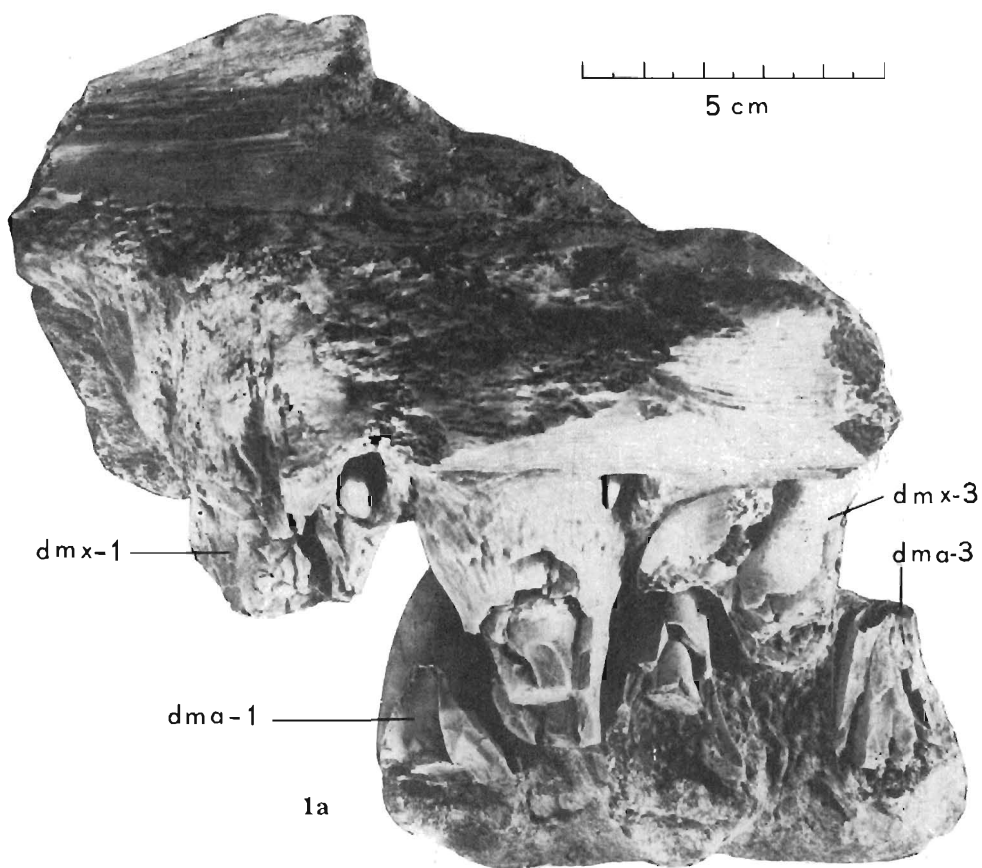
Plate I

*Mosasaurus* sp. (sp. A)

Maruszów quarry, uppermost Maastrichtian (Z. Pal. No. R. I/1)

Fig. 1a. Fragmentary upper jaw with lower teeth, lingual side; size according to scale; *dmx* 1-3 upper teeth, *dma* 1-3 lower teeth.

Fig. 1b. Part of upper jaw with resorptional perforations; ca.  $\times 2$ .



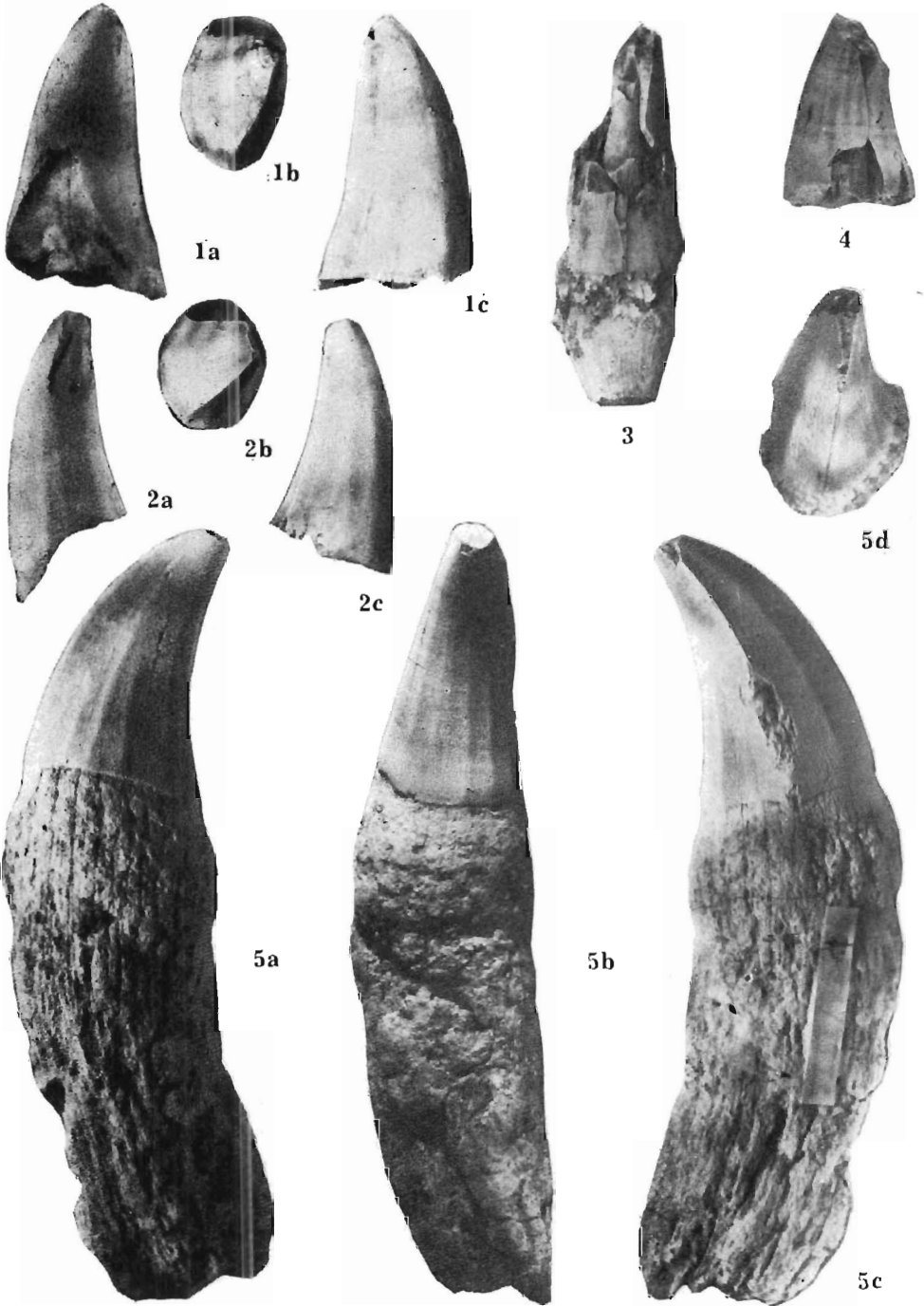


Plate II

*Mosasaurus* sp. (sp. A)  
Maruszów quarry, uppermost Maastrichtian

- Fig. 1. Lower lateral tooth; *a* lingual side, *b* occlusal view, *c* labial side (Z. Pal. No. R. I/1).  
Fig. 2. Lower lateral tooth; *a* lingual side, *b* occlusal view, *c* labial side (Z. Pal. No. R. I/2).  
Figs. 3,4. Two upper(?) teeth; labial side (Z. Pal. No. R. I/3-4).

*Mosasaurus* sp. (sp. B)  
Nasiłów outcrop, uppermost Maastrichtian (M. Z. VIII/Vr-66)

- Fig. 5. Lower lateral tooth; *a* lingual side, *b* posterior side, *c* labial side, *d* occlusal view.

All figures of natural size