ANDRZEJ SULIMSKI

ADAMISAURUS MAGNIDENTATUS N. GEN., N. SP. (SAURIA) FROM THE UPPER CRETACEOUS OF MONGOLIA

(Plate IV)

Abstract. — An account is given of the preliminary studies on the Upper Cretaceous lizards from Mongolia, collected by the Polish-Mongolian Palaeontological Expeditions from the Upper Cretaceous sandstones of two localities in the Gobi Desert — Bayn Dzak (Djadokhta Formation) and Nemegt (Lower Nemegt Beds). The monotypic genus *Adamisaurus* nov., assigned to the infraorder Iguania and, tentatively, to the family Agamidae, has been erected and *Adamisaurus magnidentatus* n. sp. described and figured.

INTRODUCTION

The first Upper Cretaceous lizards from Mongolia were described by GILMORE (1943) on the basis of the materials collected at Bayn Dzak (referred to as Shabarakh Usu) in the Gobi Desert by the Central Asiatic Expeditions of the American Museum of Natural History in 1923 and 1925. The collection he described includes six more or less fragmentary specimens assigned to the following species and genera: *Macrocephalosaurus ferrugenous* GILMORE, 1943 and *Conicodontosaurus djadochtaensis* GILMORE, 1943 of the Agamidae, *Mimeosaurus crassus* GILMORE, 1943 of the Chamaeleonidae, *Telmasaurus grangeri* GILMORE, 1943 of the Varanidae and *Isodontosaurus gracilis* GILMORE, 1943 of the Anguidae.

In addition, GILMORE (*l. c.*, pp. 383-384, Fig. 22) described three unindentified fragmentary jaws and postcranial bone fragments (A.M.N.H.Nos. 6648, 6656, 6521).

During the Polish-Mongolian Palaeontological Expeditions to Mongolia between 1964 and 1970 (KIELAN-JAWOROWSKA & DOVCHIN, 1968/69; KIELAN-JAWOROWSKA & BARSBOLD, 1972) about 100 specimens of lizards were collected from the red sandstone of the Djadokhta Formation at Bayn Dzak (see also GRADZIŃSKI *et al.*, 1968/69). Furthermore during the 1970 and 1971 expeditions, about 250 specimens of the Cretaceous lizards were collected in several new localities the Nemegt Basin from the beds designated by GRADZIŃSKI *et al.* (1968/69) as the Lower Nemegt Beds.

The age of the Cretaceous sandstone in Bayn Dzak has been estimated by KIELAN-JAWOROWSKA (1970), on the basis of the multituberculate fauna, as Coniacian or Santonian. According to this author's opinion (*in* KIELAN-JAWOROWSKA & BARSBOLD, 1972), based on the differentiation of the multituberculate fauna found in the Lower Nemegt Beds, the lower part of these beds seem to be somewhat younger than the Djadokhta Formation and may be of Campanian age.

The present writer started the studies on the lizard collection from Bayn Dzak in 1967. Most of this collection has already been prepared. The specimens from the new localities of Nemegt Basin are now in preparation and will be described later. The collection from Bayn Dzak under study, includes the representatives of almost all lizard families known so far, viz.: Gekkonidae, Agamidae,? Chamaeleonidae, Iguanidae (or new family), Lacertidae, probably Scincidae, Anguidae and Varanidae. In addition, there are also some problematic representatives of snakes.

In the present paper, the writer gives only a preliminary description of *Adamisaurus magnidentatus* n. gen., n. sp. from this collection, assigned tentatively to the family Agamidae.

The nomenclature used in the paper is mostly of that of OELRICH (1956) and partly that of ROMER (1956), MCDOWELL & BOGERT (1954), EDMUND (1969) and HOFFSTETTER (1955, 1958).

The specimens described are housed in the Palaeozoological Institute of the Polish Academy of Sciences in Warsaw.

The abbreviations used:

Z. Pal. — Palaeozoological Institute of the Polish Academy of Sciences, Warsaw.
A.M.N.H. — American Museum of Natural History, New York.

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DESCRIPTIONS

Order SQUAMATA OPPEL, 1811
Suborder SAURIA MCCARTNEY, 1802
Infraorder IGUANIA CUVIER, 1817
Family ?AGAMIDAE GRAY, 1827
Genus **ADAMISAURUS** nov.

Type species: Adamisaurus magnidentatus n. sp.
Derivation of the name: Adamisaurus, after the writer's son's name — Adam, and Gr. *sauros* - lizard.

Diagnosis. — Dentition acrodont and heterodont. Maxillary and dentary teeth considerably increasing in size posteriorly. Premaxillary teeth small, peglike, with pointed tips, somewhat larger than anterior teeth on maxilla. Three or four anterior teeth on the jaws low, conical and with pointed tips. The last teeth robust, high and conical, covered with a thin and smooth enamel to halfway down the crown. All teeth strongly fused with jaw-bones and closely spaced. The lingual perforations at the basis of tooth-crowns in the maxillary and dentary bones present. Premaxilla single, nasals and frontals paired. Prefrontals large, subtriangular. Maxilla high, with long posterior process. Postfrontals present, but small. Pineal foramen in frontoparietal suture. Orbit oval, with the longest diameter antero-posterior. Supratemporal fossa small, extended antero-posteriorly. Postorbital arch complete, with a large, subtriangular postorbital. Lacrimal very small, reduced. Nasal oppenings relatively large. Skull short with an obtuse and rounded rostrum.

Stratigraphic and geographical range. — Known from the Upper Cretaceous sandstone of the Djadokhta Formation at Bayn Dzak and from the Lower Nemegt Beds at Nemegt, Khulsan and Khermeen Tsav II., Gobi Desert.

Discussion. — The monotypic genus *Adamisaurus* nov. is tentatively assigned to the family Agamidae on the basis of its acrodont dentition. It is likely that a new subfamily or family will be erected for this genus when all particulars of the structure of skull, especially of the braincase, as well as the structure of the postcranial skeleton have been described.

Two monotypic genera - *Macrocephalosaurus* GILMORE, 1943 and *Conicodontosaurus* GILMORE, 1943, assigned by GILMORE to the family Agamidae were described by this author (1943) from the Djadokhta Formation at Bayn Dzak. The skull of *Macrocephalosaurus* GILMORE (*l. c.*, pp. 362—364, Fig. 1) is nearly $4^1/_2$ times as large as that of *Adamisaurus magnidentatus* n. sp. (in the former the lenght of skull amounts to about 115 mm and its jugal width to 64 mm, whereas in the latter the skull measures about 25 mm). Furthermore, *Adamisaurus* n. gen. differs from *Macrocephalosaurus* GILMORE in less strongly developed anterior teeth in the upper and lower jaws and large posterior teeth which are not compressed laterally, in the presence of the postorbital, in the position of the pineal foramen and in the profile of the facial part of the skull. The pineal foramen in *Adamisaurus* occurs on a suture between the frontals and parietal bones, while in *Macrocephalosaurus* GILMORE it is situated in the parietal bone itself. *Adamisaurus* n. gen. has no jugal process which in *Macrocephalosaurus* GILMORE is strong and directed posteriorly. The similarity between the two genera is observed only in the acrodont-heterodont type of dentition.

On the other hand, *Adamisaurus* n. gen. is more similar to *Conicodontosaurus* GILMORE (*l. c.*, pp. 364—366, Figs. 3–4). *Adamisaurus* n. gen. differs, however, from the genus *Conicodontosaurus* GILMORE in the number of teeth in its jaws (in the former 8, and in the latter 11 teeth), in having a shorter facial part, a shorter dentary which is strongly narrowed anteriorly and high under the coronoid process, a wide and not very high coronoid process not deflected posteriorly and in the last teeth which are large and conical. In *Adamisaurus* n. gen. the skull is short in the facial part, slightly sloping in profile and, together with an ascending anterior part of the dentary, forms a blunt, bilateral wedge, while in *Conicodontosaurus* GILMORE a horizontal lower jaw, together with a steeply descending profile of the facial part of the skull, takes the shape of a sharp, unilateral wedge. Such a profile of the skull is fairly frequent in the representatives of the family Chamaeleonidae.

The similarity of *Adamisaurus* n. gen. seems, therefore, to be closer to *Conicodontosaurus* GILMORE than to *Macrocephalosaurus* GILMORE. In addition to the acrodont type of dentition, it is manifested by the degree of the differentiation of teeth, lack of additional cusps or denticles on the tooth crowns, conical shape of the teeth strongly fused to the jaw-bones without their being ankylosed to each other at their bases, arrangement of teeth in the jaw (close to each other), presence of the separate postfrontal and postorbital bones and of the anterior process on the outer side of the coronoid process.

A comparison of the skull of *Adamisaurus* n. gen. with those of other, more advanced and younger (in the geological sense), representatives of the family Agamidae, reveals considerable differences in structure of not only the skull but also dentition. In the genus *Agama* DAUDIN, the frontal bones are fused, the postfrontal bone is lacking, the upper jaw strongly developed posteriorly, the jugal bone is situated just below the orbits, the pineal foramen is very poorly developed (in many species of this genus, this element does not occur at all) and the squamosal bone, which is very thin, is subject to reduction in some species of the agamids. Thus, the similarities between *Adamisaurus* and *Agama* DAUDIN concern only the acrodont and heterodont type of dentition.

Several new genera and species were described by GILMORE (1928) and ESTES (1964) from the Late Cretaceous of Wyoming (Lance Formation). All of them were, however, assigned

to the families marked by the pleurodont type of dentition and, therefore, none of these species may be compared with the specimens of *Adamisaurus* n. gen. described from Bayn Dzak.

According to EDMUND (1969, p. 127), no dentition replacement occurs as a rule in any mature individuals representing the agamids (on the whole, forms with the acrodont type of dentition). As revealed by RÖSE (1893, p. 537; *fide* EDMUND, 1969) and the present writer's observations, this phenomenon does occur but in only a low percentage of individuals and, moreover, it is limited to an addition of new teeth by their posterior fusion to the tooth row. This phenomenon has been observed by the writer on the lower jaw of a representative of *Phrynocephalus* KAUP (an indubitable mature individual of *Ph. mystaceus* (Pall.)), which has a basal perforation with a new tooth embedded in it (see also COOPER *et al.* 1970). On the other hand, no such phenomenon has been recorded either in the specimens of *Conicodontosaurus* GILMORE, or in *Adamisaurus* n. gen.

The differentiation of dentition in *Adamisaurus* n. gen. (anterior teeth small, pointed and with their tips deflected slightly posteriorly — prehensile teeth; conical teeth of the middle part of the series — cutting teeth; strongly developed last teeth — crushing teeth; see Fig. 2: 2—5 in text) seems to be indicative of a more predatory nature of the lizard here described. The skull of *Adamisaurus*, shortened, sloping downwards in the frontal part and strongly developed, may also indicate a burrowing mode of life. Large and relatively wide nasals seem to be probably an evidence, for the presence, during the animal life time, of a corneous horny excrescence similar to that in *Moloch horridus* LINNAEUS.

Adamisaurus magnidentatus n. sp.

(Pl. I, Text-figs. 1 and 2)

Type specimen: Z.Pal.No.MgR-II/80. A skull, slightly damaged in the occipital region, with the left and right lower jaw in occlusion.

Type horizon and locality: Upper Cretaceous (Djadokhta Formation), Bayn Dzak (Main Field), Gobi Desert.

Derivation of the name: magnidentatus, Lat. *magnus* — large, *dens* — tooth; large-toothed.

Diagnosis. — As for the genus.

Material. — Z.Pal.No.MgR-II/80: the type specimen, described above, has both lower jaws well-preserved in dentary parts. The articular regions of jaws are damaged.

Z.Pal.No.MgR-II/49: the middle part of a skull with fragmentarily preserved upper and lower jaw. A jugal bone is preserved on the right side of the upper jaw.

Dimensions — see Table 1.

Description. — *Skull*: the skull preserved (type specimen) is short, not very wide, massively developed, on the dorsal side tapering anteriorly, in the jugal part not widened. On the lateral side, skull relatively high, in the facial part somewhat blunted and rounded. Surfaces of skull bones devoid of ornamentation. Premaxilla single. Boundary between the premaxilla and nasal running slightly posteriorly to the outer nares. Nasals paired, relatively large, rather wide, their suture with frontals probably zigzagging on a level with the posterior edge of the prefrontal bone. Frontals relatively narrow, long, not fused. The smallest intraorbital contraction, amounting to about 2.6 mm, is situated along the dorsoventral line of orbits. Postfrontal small, bordering on postorbital bones. A small pineal foramen is situated on a suture between frontals and parietal. Parietal single, wide and short with preserved parietal processes. Maxilla, anteriorly reaching the medial line of outer nares, forms the posterior part of their casing

and dorsally borders on nasal, prefrontal, lacrimal and posteriorly broadly joining with the jugal, descending down beneath the orbits, and terminating in the distinct posterior maxillar process. Prefrontals relatively large, subtriangular, lacrimal very small, situated on the extreme ventral margin of orbits. Jugal not very large, without the posterior process. An arch, formed by jugal and postorbital, joins parietal, enclosing not very large, dorsoventrally compressed orbits posteriorly. Postorbitals large, subtriangular. A fairly long, posteriorly directed squamosal adheres to the latter bone. A small, anteroposteriorly elongated supratemporal fossa occurs between squamosal (laterally), parietal (meddially), parietal processes (posteriorly) and postorbital (antero-laterally). Quadrate situated subperpendicularly to the longer axis of the skull, articulates with the squamosal and parietal process upwards, and with the articular bone downwards.

Table I

Adamisaurus magnidentatus n. sp.
(measurements in mm)

Z.Pal.No.	MgR-II/49	MgR-II/80
Length of the skull preserved	—	ca 25.0
Interorbital space	—	ca 2.6
Width of the skull at jugals	—	ca 14.0
Length of 5 teeth in upper and lower jaws *)	6.2	6.0
Length of tooth row in upper and lower jaws *)	—	ca 8.0
Depth of lower jaw below posterior tooth	3.6	3.6
Length **) of posterior tooth	1.6	1.7
Width of posterior tooth	1.5	1.6
Height of crown	1.8	1.5
Length ***) of anterior tooth	—	0.6
Width of anterior tooth	—	0.4
Height of crown	—	0.6

*) Measured from the posterior tooth (at tooth bases).
**) In upper and lower jaws.
***) Of first maxillary tooth.

Lower jaws: In both specimens, the lower jaw is overall relatively long, but the dental part itself is short and greatly narrowed anteriorly. The height of jaws under the coronoid process exceeds more than 4.0 mm and under the anterior teeth of jaws amounts to a mere 1.0 mm. At the base, the coronoid process is wide anteroposteriorly, fairly high, narrowed dorsally and terminating bluntly. Unlike in most of the agamids, this process is not deflected either

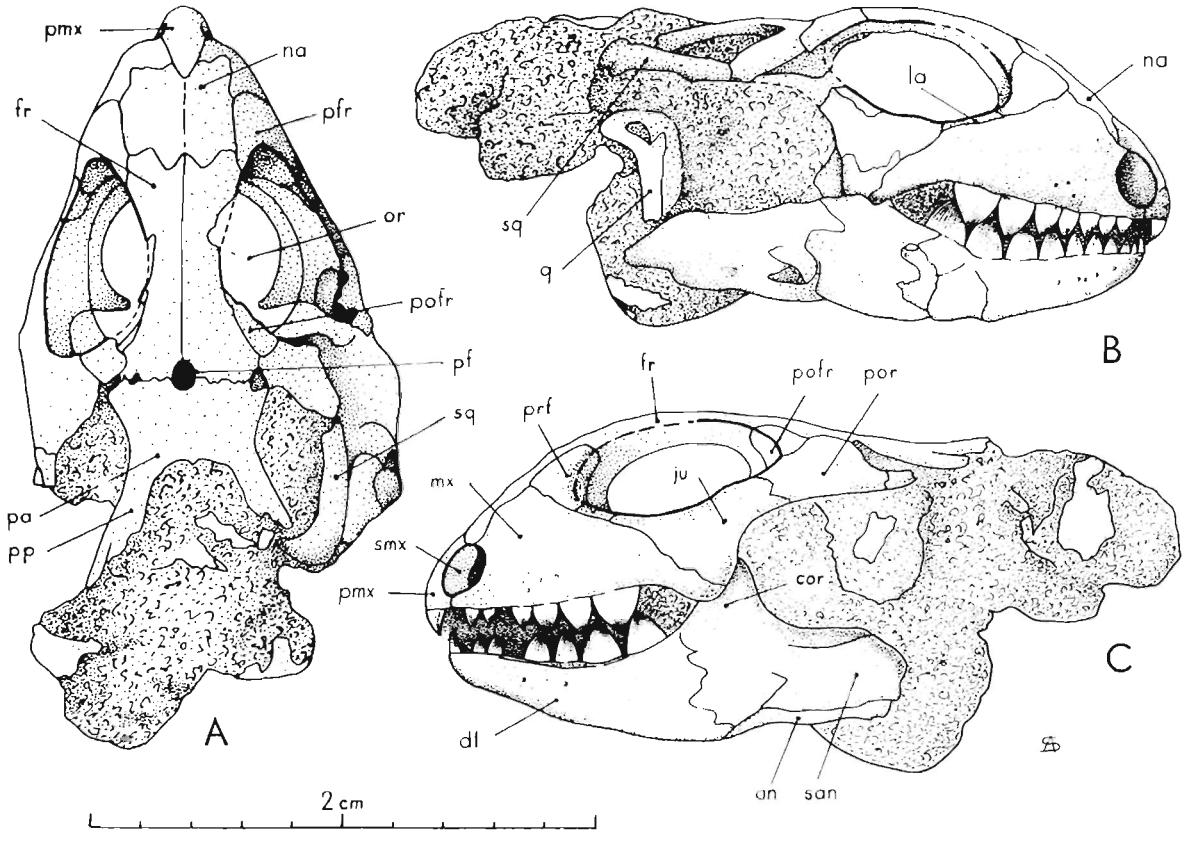

Fig. 1

Adamisaurus magnidentatus n. gen., n. sp.

Z.Pal.No.MgR-II/80 (type specimen), skull: *A* — dorsal side, *B* — right side, *C* — left side. Abbreviations: *pmx* — premaxilla, *mx* — maxilla, *na* — nasal, *prf* — prefrontal, *la* — lacrimal, *smx* — septomaxilla, *fr* — frontal, *pofr* — postfrontal, *ju* — jugal, *pa* — parietal, *por* — postorbital, *or* — orbit, *sq* — squamosal, *q* — quadrate, *pf* — pineal foramen, *pp* — parietal process, *an* — angular, *san* — supra-angular, *dt* — dentary, *cor* — coronoid.

outwards or towards the posterior part of the jaw. The posterior part of the jaw preserved has clearly visible, large supraangular and narrow angular bones. A few mental foramens, varying in number, occur on the dentary of both jaws.

Dentition: Teeth are of the acrodont type, differentiated with regard to their size and morphology, permanently fused with the jaw-bones at their wide bases. They are closely spaced but not fused together at their bases. The size of teeth markedly increases from the anterior part posteriorly and the ratio of the length of the anterior maxillary tooth to that of the posterior one in the jaw amounts to 1:3. The two (or may be three) premaxillary teeth are slightly larger as compared with the first maxillary teeth. Similarly in the lower jaw, the anterior teeth (also two or three of them) tend to increase their size. The anterior teeth referred to above, have pointed tips which are slightly deflected posteriorly or towards the inside of the jaw. The anterior four maxillary teeth and three or four teeth of the lower jaw are still relatively small but markedly conical and have extended bases and pointed tips. The last four teeth of both jaws (Pl. I, Text-figs. 1 and 2) are markedly larger than the anterior ones. The ratio of the height of the anterior to that of the posterior teeth amounts to 1:2 or even less, while

with regard to the volume the last teeth (especially the most distal of them) are greatly increased, massive and having wide bases and teeth pointed dorsally. A thin layer of smooth enamel, reaching from the tip to halfway down of the free part of a tooth, is visible on tooth crowns. All teeth in the jaws are slightly compressed laterally.

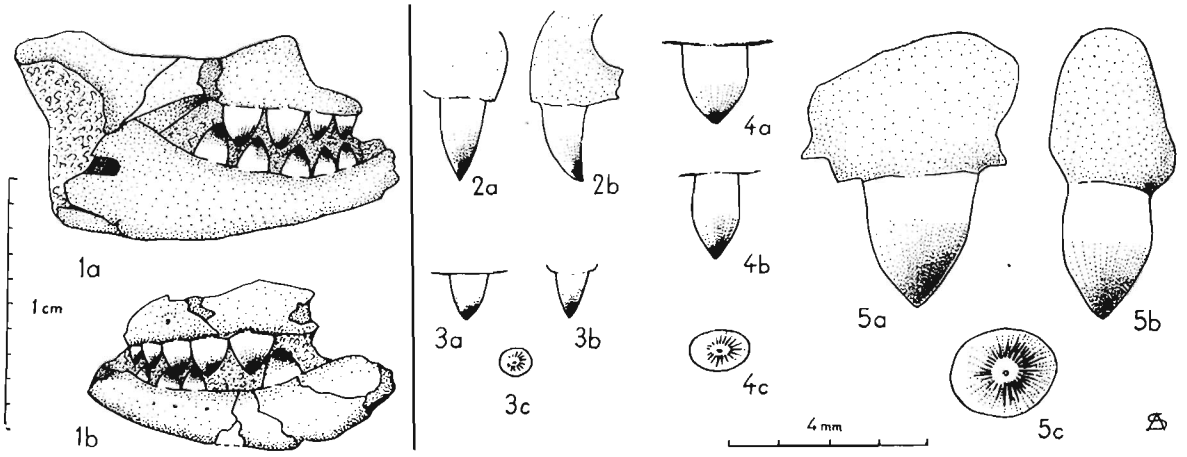

Fig. 2
Adamisaurus magnidentatus n. gen., n. sp.
1. Middle part of skull Z.Pal.No.MgR-II/49: *a* — right side, *b* — left side. 2. Upper prehensile tooth: *a* — labial side, *b* — lateral side. 3. First upper anterior tooth: *a* — lateral side, *b* — distal side, *c* — top view. 4. Upper cutting tooth: *a* — lateral side, *b* — distal side, *c* — top view. 5. Last upper crushing tooth: *a* — lateral side, *b* — distal side, *c* — top view.

In the specimens here described, as well as in the new specimens collected in Nemegt (Red Walls), Khulsan and Khermeen Tsav II, there are distinct perforations on the lingual side of maxillary and dentary bones near the base of each tooth. This mode of tooth replacement is not observed in any known agamid species. Likewise, there are no traces of accretion or growth of a subsequent dentition generation in the posterior part of a tooth row, as is the case in the specimens of some species of the genus *Phrynocephalus* (KAUP).

Finally the teeth are so arranged in the jaws that the tips of both tooth series (of the upper and lower jaw) alternately overlap each other.

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PLATES

A. SULIMSKI: *ADAMISAURUS MAGNIDENTATUS* N. GEN., N. SP.

PLATE IV

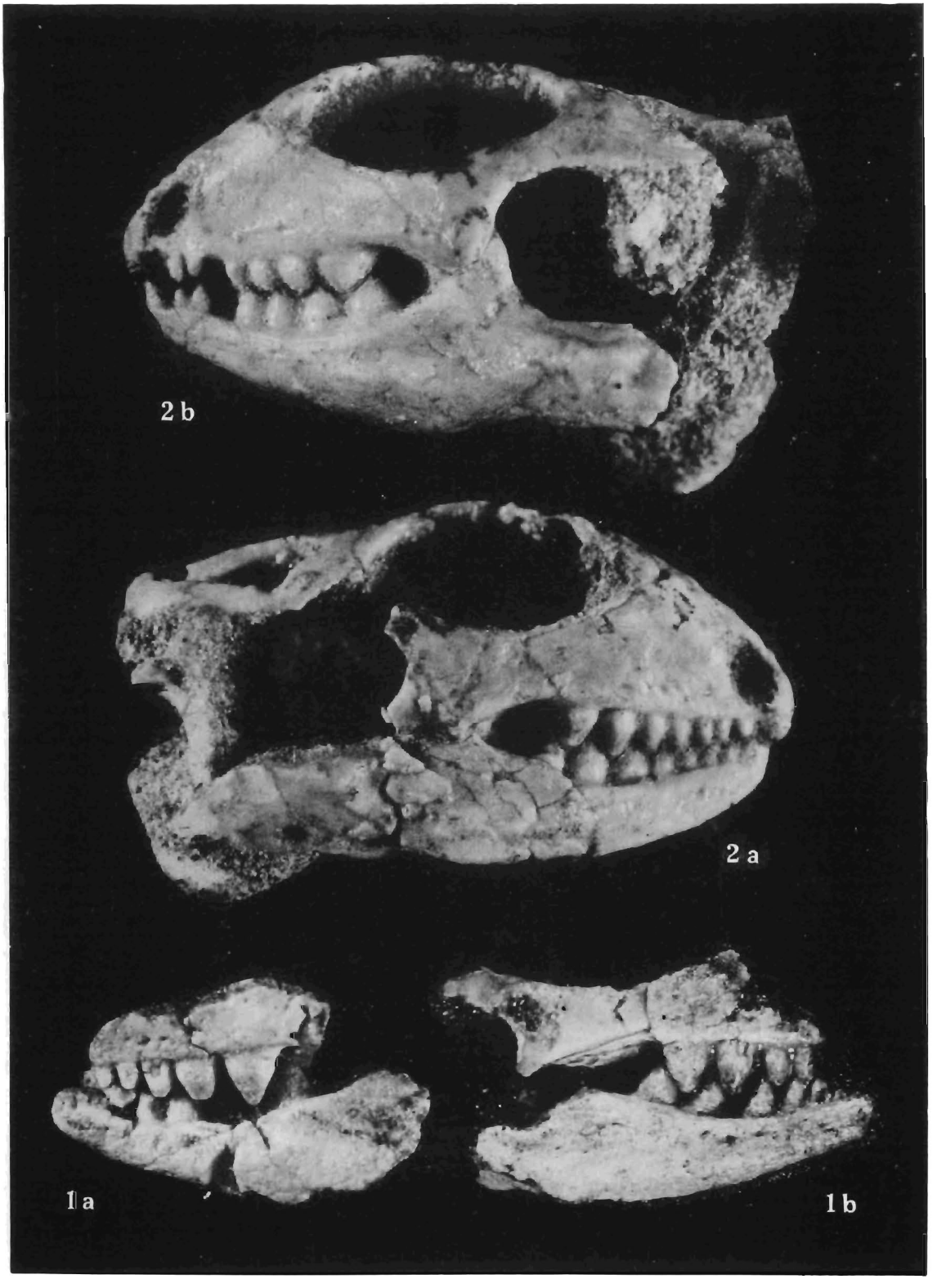
Upper Cretaceous (Djadokhta Formation). Bayn Dzak, Main Field, Gobi Desert

Fig. 1. Anterior part of the skull fragment with both upper and lower jaws: *a* — left side, *b* — right side. Z.Pal.No.MgR-II/49.

Fig. 2. The skull, without occipital region: *a* — right side, *b* — left side. Type specimen — Z.Pal.No.MgR-II/80

All figures about × 5

Photo: M. Czarnocka



A. SULIMSKI: ADAMISAURUS MAGNIDENTATUS N. GEN., N. SP.