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CAROLINIDAE, A NEW FAMILY OF XENOSAURID-LIKE LIZARDS FROM THE UPPER CRETACEOUS OF MONGOLIA

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Two lizards, *Carolina intermedia* gen. et sp. n. and *Shinisauroides latipalatum* gen. et sp. n. from the Late Cretaceous (? Middle Campanian) of the Gobi Desert are assigned to the new family Carolinidae. A hypothesis of a scincomorphan affiliation of this family is supported by two synapomorphies: the dentary overlap on the lateral surface of the coronoid, and the finger-like descensus parietalis, as well as by some other characters which best correspond with this affiliation. Xenosaurid characters displayed by the described lizards: the hour-glass shaped frontals and the diffuse osteodermal skull covering, are considered as homoplasy.

Key words: Cladistics, Reptilia, Sauria, Cretaceous, Mongolia.

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INTRODUCTION

The material described herein has been collected by the 1963—1971 Polish-Mongolian Palaeontological Expeditions to the Gobi Desert. It comes from the Upper Cretaceous red beds of Khermeen Tsav locality and from the Barun Goyot Formation (localities: Khulsan and Nemegt — Red Walls; Gradziński *et al.* 1968). The age of all these sediments estimated as? Middle Campanian by Gradziński *et al.* 1968, Gradziński and Jerzykiewicz 1972 and Gradziński *et al.* (1977) was considered slightly older by Karczewska and Ziembińska-Tworzydło (1983) on paleobotanical data.

Two new genera and species described in the present paper: *Carolina intermedia* and *Shinisauroides latipalatum*, closely related to each other, are assigned to the new family Carolinidae. Some features of this family, and particularly so, constricted frontals and diffuse osteodermal skull covering, as well as absolute size of the animals, suggest relationships with the extant lizard family Xenosauridae. Including a living Central American genus *Xenosaurus* and two fossil North American genera *Exostinus* and *Restes*, this family has been extended by McDowell and Bogert (1954) to include a monotypic Asiatic family Shinisauridae. This view has been accepted by all subsequent authors dealing with this problem (Haas 1960, Hecht and Costelli 1969, Costelli and Hecht 1971, Rieppel 1980, Gauthier 1982, Estes 1983, Estes *et al.* 1985) as a most parsimonious hypothesis. Founded by Ahl (1930) for the living lizard *Shinisaurus crocodilurus* endemic for Yaoshan (eastern Kwangsi, southern China) (Fan 1931), the family Shinisauridae became, thus, a subfamily of the Xenosauridae and the geographic range of the latter greatly increased and became disjunct. Implied by this distribution the common ancestor (if recognizible as a relative only) of both American and Asiatic xenosaurid stems should have existed in the past time somewhere between the present areas occupied by the family, and perhaps in Asia. The relatives of *Shinisaurus* are, thus, much expected in Asia. In this connection, my attention has been focused on the possibility of the xenosaurid relationship of the newly described xenosaurid-like forms and namely on their relationships to *Shinisaurus* with which they share a short and vaulted snout. The present studies have shown that the new genera are not related to the Xenosauridae but are rather scincomorphans subjected to evolution parallel to this anguimorphan group.

The morphological terms used herein follow Oelrich (1956) and Rieppel (1980). The methods employed in the analysis are derived from those of Hennig (1965) as applied to paleontology by Schaeffer *et al.* (1972) and Hecht (1976). The out-group analysis is used to determine morphocline polarity (Hecht and Edwards 1977).

Abbreviations used:

MCZ — Museum of Comparative Zoology, Harvard University, Cambrdige, USA. ZPAL — Polish Academy of Sciences, Institute of Paleobiology, Warsaw, Poland.

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DESCRIPTIONS

Infraorder? **Scincomorpha**

Family **Carolinidae** nov.

Type genus: *Carolina* gen. n.

Stratigraphic and geographic range. — Late Cretaceous, Gobi Desert, Mongolia.

Diagnosis. — Autarchoglossan lizards with large eyes and short and vaulted snout. They differ from all scincomorphans by small element pattern of the osteodermal skull covering, and from all anguimorphans by paired premaxillae, long, fingerlike descensus parietalis, lack of alary process of prootic, large vomeropalatine contact, poorly individualized vomerine process of palatine, largely open mandibular fossa and by presence of a lateral overlap of dentary on coronoid.

Assigned genera: *Carolina* gen. n., *Shinisauroides* gen. n.

Genus *Carolina* gen.n.

Type species: *Carolina intermedia* sp.n.

Etymology: Genus devoted to my daughter Carolina.

Stratigraphic and geographic range: Late Cretaceous Red Beds of Khermeen Tsav (? Middle Campanian), Gobi Desert, Mongolia.

Diagnosis. — Differs from *Shinisauroides* by more slender skull bones, and, particularly so, the palate, snout, jugal and mandible, by less steeply ascending jugal and by life position of mandible, manifested by its lateral surface subperpendicular to the ventral surface of the skull.

Species included — The genus is monotypic.

Discussion. — Two characters: the hour-glass shaped frontals and a small element pattern of the osteodermal skull covering give *Carolina* its xenosaurid appearance. Well developed subolfactory processes of the frontals is the third character shared by *Carolina* and *Xenosaurus* but not unique to the xenosaurids. Apart from them, no other xenosaurid characters (as listed by Estes 1983) can positively be stated in this genus but there are some important differences instead. A widely open mandibular fossa of teiid type, paired premaxillae, lack of the alar process of the prootic, presence of the carotid fossa and two scincoid characters: a lateral overlap of the dentary on the coronoid and a long finger-like parietal descensus, as well as shorter and vaulted snout discriminate *Carolina* from the type genus of the Xenosauridae — *Xenosaurus*. All the above characters, both xenosaurid and non-xenosaurid are shared with the second late Cretaceous genus described herein — *Shinisauroides*. In spite of a plesiomorphic nature (see p. 169) of the three of four non-xenosaurid characters of the above list, I consider the whole complex as a strong case for close relationship of *Carolina* and *Shinisauroides*, the two genera of almost the same stratigraphic and geographic distribution. The structure of palate in *Carolina* and, particularly so, a broad vomero-palatine connection supports this conclusion in spite of some differences. Compared to *Shinisauroides*, *Carolina* has narrower palatine (but still broader than in *Xenosaurus*, (see p. 156) and more oblique maxillopalatine suture (fig. 2). The differences in the course of the maxillopalatine suture are tentatively ascribed to differences in skull kinesis. Functional significance of this character is not understood as yet.

Compared to the genus *Shinisauroides*, the genus *Carolina* has a more slender skull, more suitable for kinetic mobility, with larger orbits and a probably less intimate contact between the postfrontal and frontoparietal angle and between the jugal and the supratemporal arcade.

In spite of *Xenosaurus*-like appearance of the parietal, adductor mandibulae muscle are lateral relative to these bones rather than ventral in *Carolina*. Still they do not extend over the dorsal surface of the parietal.

Carolina intermedia sp.n.

(pls. 1: 1; 2: 1; 3: 5; 4: 2; figs. 1*B*; 2*B*; 3*A*,*A'*; 4*A*; 5*C*; **6*L***)

Holotype: ZPAL MgR-III/34. pl. 1: 1, pl. 2: 1, pl. 3: 5, pl. 4: 2.

Type horizon: Red Beds of Khermeen Tsav (Middle Campanian).

Type locality: Khermeen Tsav, Gobi Desert Mongolia.

Etymology: Latin *intermedia* — intermediate. Refers to morhologically intermediate position of this species between *Xenosaurus grandis* and the shinisaurids.

Material: ZPAL Mg-R-III/34, the holotype is the only specimen of this species. It consists of an almost complete skull with mandibles. Brain case and palate damaged, supratemporal arcade missing. From Khermeen Tsav.

Measurements: See Tables 1 and 2.

Description. — *Skull as a whole*: The skull of the holotype is about 31 mm long. The snout is short in comparison with huge, anteroposteriorly elongated orbits separated by narrow hour-glass shaped frontals. The supratemporal arcade is not preserved. Adductor mandibulae muscle attached on the lateral margin of the parietal and on the parietal descensus, without entering on the dorsal surface of the parietal. Frontoparietal suture is loose. Frontomaxillary bridge separates the prefrontal from the nasal at a very short distance. Fine tuberculate sculpturing is present on the frontals, parietals and maxillae. External nares are rounded and face forwards.

Dermocranial roofing elements: Premaxilla is paired. The body of each premaxilla bears five pleurodont teeth. The short nasal processes ascend dorsally rather than posteriorly. They did not evidently reach the frontals. The gap is bridged by the nasals overlapping both the premaxillae and the frontals. The frontals are completely fused, with a strongly constricted middle part, slightly broadened anterior part bordered by the prefrontals and a strongly broadened triangular posterior part (see Table 1). Frontoparietal suture is straight. The posterolateral corner of the frontal is very thin. A flattening of the supraorbital border just anterior to this corner, to be seen on the right side of the holotype (pl. 4: 2*c*), may be a surface for the postfrontal. Extending medioventrally the subolfactory processes of the frontals fuse in the midline. They extend over the middle and anterior parts of the frontals. Their depth is about equal to the minimum breadth of the frontals but they extend down to the palatines anteriorly. The parietal is an almost flat bone strongly constricted about the midlength. The supratemporal processes extend more posteriorly than laterally, so that the distance between their tips is less than the maximum width of the bone at the frontoparietal suture (see Table 1). The lateral surface of each supratemporal process is distally flattened for the contact with the supratemporal which is not preserved. Anteriorly it becomes a huge triangular descensus parietalis situated just anterior to the strongest constriction of the bone and recalling that of the Scincidae (*Tiliqua* etc.). Both lateral surface of the supratemporal process (supratemporal included) and descending process were sites of attachment of the adductor mandibulae muscles. Sloping ventromedially from the flattened dorsal surface of the supratemporal process is a smooth shelf for the neck musculature. A small rounded parietal foramen is situated anterior to the midlength of the main body of the parietal.

The premaxillary process of the maxilla is short and pointed in lateral aspect. Posterior to it the anterior border of the maxilla is subvertical. The posterior process is very long and extends beneath the orbit to about 2/3 its length. Extending only to about 1/2 the length of the orbit the tooth row consists of about 25 pleurodont teeth. The nasal process is subrectangular. Its outline is irregular and its outer surface is roughened with sculpture. Ventral to the line uniting the ventral border of the external naris and that of the orbit, the surface of the maxilla is not sculptured but instead bears numerous superior labial foramina. The palatal shelf is a broad triangle, the maxillopalatine suture and the maxilloectopterygoid suture lying in one line and constituting the posterior side of the triangle. The maxillopalatine sutures strongly converge anteriorly. The triangular dorsal surface of the prefrontal is broadly overlaid by the nasal process of the maxilla, the suture extending transversally about the level of the anterior reach of the frontals. The orbital border produces an acute ridge situated slightly ventral to the main dorsal surface which is covered with a tubercular sculpturing. The palatal process is medially bordered by the descending process of the frontal down to the contact with the palatine. The anteroventral rim of the orbit is separated from the palatine process of the prefrontal by a deep slit-like fossa pierced by the lacrimal foramen. The contribution of the lacrimal is doubtful.

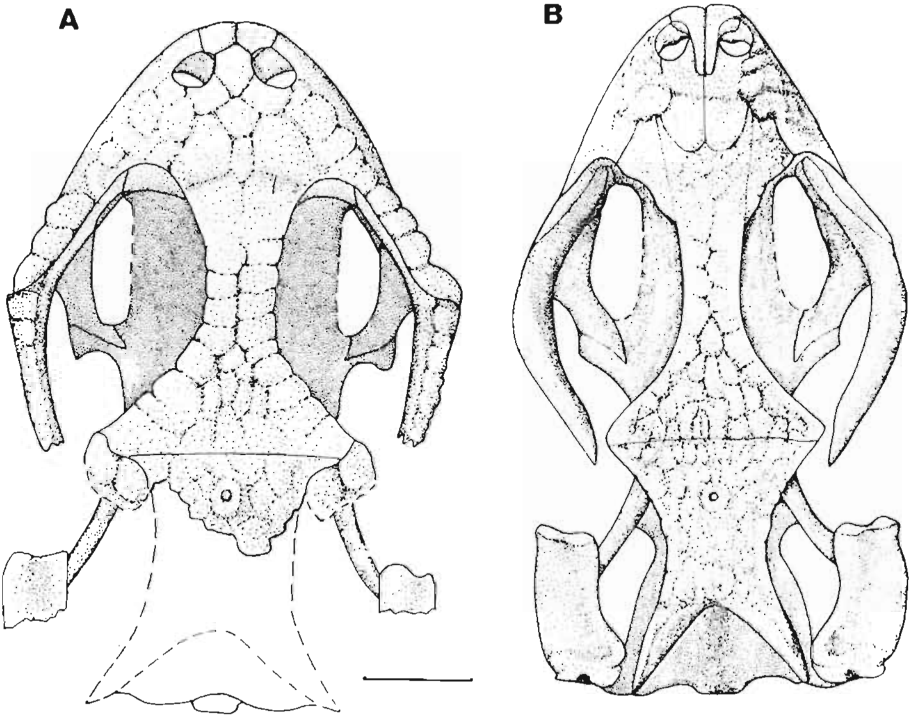

Fig. 1. Reconstructed skull of *A Shinisauroides latipalatum* gen. et sp.n. and *B Carolina intermedia* gen. et sp.n. in dorsal view. Scale bar 5 mm.

The jugal arches are broadly expanded laterally to produce the maximum width of the head. The jugal contributes the posterior one third to the suborbital margin and is medioventral to this margin in the anterior part of the orbit. Posterior to the maxilla the horizontal ramus is rather deep and produces a pronounced angle but abruptly narrows while turning into the ascending ramus at an angle of about 30° to the horizontal line. A medially-facing flattening of the end of the jugal implies the existence of the postorbital or postorbitofrontal or two bones, which have not been preserved in the material. However, the extremely weak development of the postfrontal surface on the frontal border and lack of such a surface on the parietal border indicate that the missing bone or bones were much reduced. The squamosal is not preserved.

Sculpture: The anterior part of the frontal surface, the nasals and prefrontals are just uneven, the pattern of sculpture being hardly recognizable. The surface of the middle and posterior part of the frontals is sculptured with osteodermal bone thickenings irregular but tending to subdivide the surface into small polygonal fields. Extending along the suborbital borders two rows of such fields are particularly distinct. They meet in sagittal line of the central 1/3 of the frontal and produce a sinuous suture, while diverging posteriorly. The space between them is packed with more irregular fields. The surface of the fields is tubercular. Hardly any fields may be recognized on the surface of the parietal except for the supratemporal margins which are produced into segmented ridges. The surface is strongly uneven. The maxilla is covered with the osteodermal crust beginning dorsal to the line uniting a ventral margin of the external naris and that of the orbit. The crust is subdivided into rounded irregular fields displaying tubercular and pitted surface.

The shaft of the quadrate is straight in lateral aspect and the longitudinal axes of both articular surfaces, the proximal and the distal, are almost perpendicular to it. The proximal condyle is roughly triangular with the attachment of the paroccipital process medially. Anterior to the proximal condyle is a slightly projecting muscular part. Its lateral part is not separated from the condyle by any incision, only a shallow pit being present in that region on the dorsal surface of the proximal condyle. Beginning with the anterolateral corner of the dorsal condyle, the tympanic crest extends straight to the ventral condyle without any arching. The anterior surface of the quadrate is almost flat. Posterior crest extends from the medial side of the proximal extremity to the lateral part of the ventral condyle which projects ventrally more than the medial part. Lateral to it and bordered by the tympanic crest is a deep concavity tapering ventrally. Medial to the posterior crest the part of the quadrate is just a small triangular bone blade. It bears an oblique furrow for the pterygoid just above the medial part of the distal condyle and a shallow triangular fossa above the posterior part of the furrow separating the medial and lateral parts of the condyle. This fossa probably served for a ligament binding the pterygoid to the quadrate. The parts of the condyle are subequal and rounded in outline. The axes of the condylar parts and that of the furrow are directed anteromedially. No epipterygoid is preserved. Only a rounded fossette on the dorsal surface of the pterygoid indicates to its existence.

Palate: The vomers are broad plates with strongly arched lateral borders. The two are sutured in the midline except for triangular posterior parts overlapping the palatines. Separated from this triangular part by an incision and lateral to it is still another part of the vomer contacting the palatine but the suture is obscure. Posterior to the broad premaxillovomeral contact is a deep incision for the fenestra vomeronasalis separated from the fenestra exochoanalis by lateral broadening of the bone. Lateral borders of the vomers are bent dorsally, which gives a generally convex shape to the ventral surface of the two bones. Each vomer bears a longitudinal furrow pierced by what is called vomerine foramen by Oelrich (1956). Only the right palatine seriously damaged and partly disarticulated, is preserved. Most of the pterygoid process is missing. The maxillary process is connected with the vomerine process by a wide concave bone blade extending anteriorly as far as do both processes. It turns into a very wide pterygoid process without any abrupt bending. The maxillopalatine suture is directed anteromedially. The palatine process of the pterygoid is broken off at the base. Judging by the width of the preserved part it was rather wide. The transverse process is wedged in between two processes of the ectopterygoid. The palatine process of the pterygoid passes gently into the quadrate process, without producing any medial projection, which usually delimits ventrally the pterygoid notch for the basipterygoid process in lizards. Neither is the pterygoid notch developed. The quadrate process is very weak. It extends to the quadrate and fits to the furrow on its posterior side. Almost none of the concavity for the protractor pterygoideus muscle is developed on its medial surface. The maxillary process of the ectopterygoid extends far anteriad. It probably reached the maxillary process of the palatine, thus excluding the maxilla from the lateral border of the suborbital fenestra. This process does not extend far posteriorly; its posterior angle is about 90°. Dorsally it sutures with the jugal. The medial part of the ectopterygoid is forked. The ventral process extends posteroventrally down to the top of the process for the pterygoideus muscle. The dorsal one extends very far posterior in a horizontal plane.

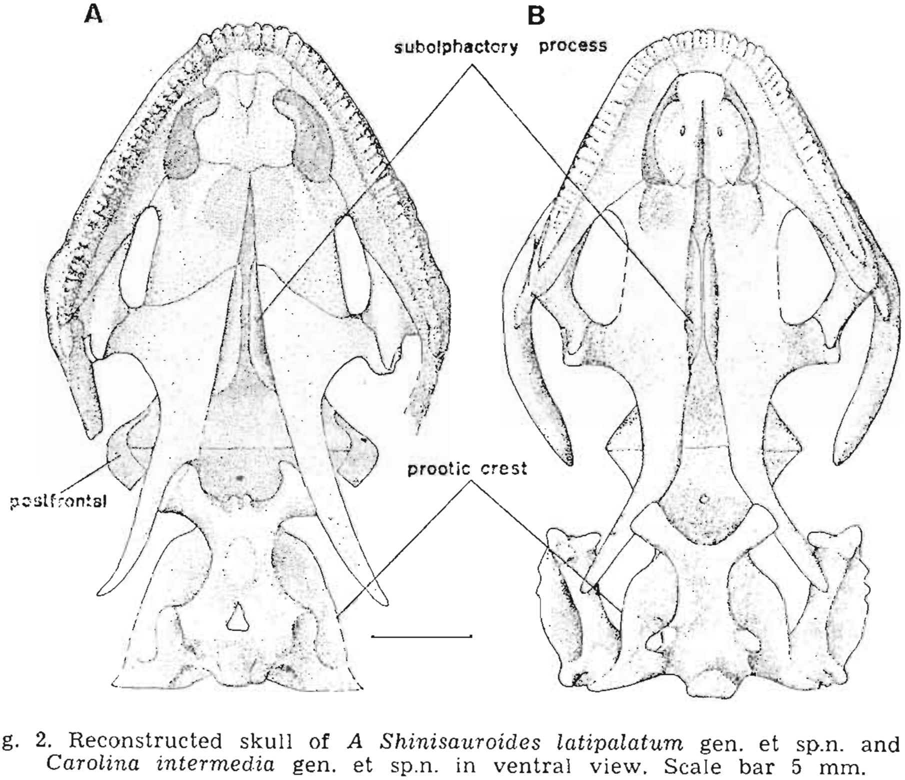

Fig. 2. Reconstructed skull of *A Shinisauroides latipalatum* gen. et sp.n. and *B Carolina intermedia* gen. et sp.n. in ventral view. Scale bar 5 mm.

The brain case: A large opening piercing the brain case floor is presumed to be a fontanelle enlarged by weathering, because its posterior border, at least, seems to be natural. Lateral to it long parasphenoid processes extend down to the tops of the sphenoccipital tubercles. A distinct epiphysis contributes to the lateral part of the top of the preserved right tubercle. A flattened posterior surface of the tubercle destined for the rectus capitis anterior muscle is produced by both bassioccipital and exoccipital. A sphenoccipital torus makes up its medial border and a distinct tuberal crest delimits the surface from the lateral side and turns into the ventral margin of the paroccipital process. The jugular fossa is very broad and strongly swollen anterior to the foramen ovale. The ventrolateral crests are not present probably owing to damage. The basipterygoid processes have rather thick stalks rounded in transverse section and medium-sized distal ends. They project anteroventrolaterally. The prootic crest overhangs the jugular fossa and joins the dorsal border of the basipterygoid stalk to produce a deep carotid fossa. At the level of the oval foramen it is directed posterodorsally but turns to the ventral corner of the paroccipital process at the end, thus producing a triangular part of the jugular fossa facing ventrally. The dorsal part of the brain-case is not preserved.

The mandible: The long axis of the mandible is almost straight with but a slight medial curving at both ends. The adductor crest extends from the anterolateral part of the articular surface to the coronoid almost at the level of the dorsal border of the dentary. The mandibular fossa is widely open to the lingual side. Its dorsal border is a sharp crest extending from the central part of the articular condyle towards the coronoid parallel to the adductor crest. The both crests delimit a flat surface destined for the adductor mandibulae muscle. This surface faces dorsolaterally in a natural position of the jaw. At the suture with the coronoid the surface bears the anterior supra-angular foramen. The posterior supra-angular foramen pierces the same surface directly anterior to the articular condyle.

The dentary is laterally convex in transverse section but the line of bending extends at a more ventral level than that of the adductor crest. Ventral to the adductor crest the surface of the mandible faces laterally. It only turns ventrolaterally in the posteroventral corner of the mandible where the pterygoideus muscle inserts but there is no distinct pterygoideus crest. The traces left by muscle insertion prove that the pterygoideus muscle was separated from the adductor mandibulae muscle mass. Produced of the articular, which is completely fused with the prearticular and the supra-angular, the articular condyle consists of two concavities separated by a crest. Posteriorly this crest turns into a lateral border of the retroarticular process and the medial condyle turns into the dorsal surface of this process. The articular condyle faces posterodorsally. The retroarticular process is subquadrangular in outline and directed posteromedially. It faces dorsoventrally. The articular and supra-angular produce a tubercle at the anterior end of the intracondylar crest. The dentary widely overlaps the lateral surface of the coronoid but its exact extent is uncertain. Some four mental foramina are identified in the anterior 1/5 of the dentary. The labial border of the dental gutter is high above the lingual one and the gutter is so shallow that the term dental shelf is more applicable. The dental shelf is rather wide, so that the teeth are wide aparat from the ventral ridge. The exact anterior extent of the splenial is not known. The bone is broken off about the 11th tooth position but is rather thin at this level and probably did not reach to the anterior end of the Meckelian groove. The Meckelian groove turns to the ventral side of the mandible at about 1/3 of dental length. The posterior extent of the splenial is unknown.

A large oval anterior inferior alveolar foramen form a notch in the splenial border below the 14th through 17th tooth position. Posterior to it is a smaller oval anterior mylohyoid foramen. No determined traces of the splenial overlap can be recognized on the anterior ramus of the coronoid but it probably occurred.

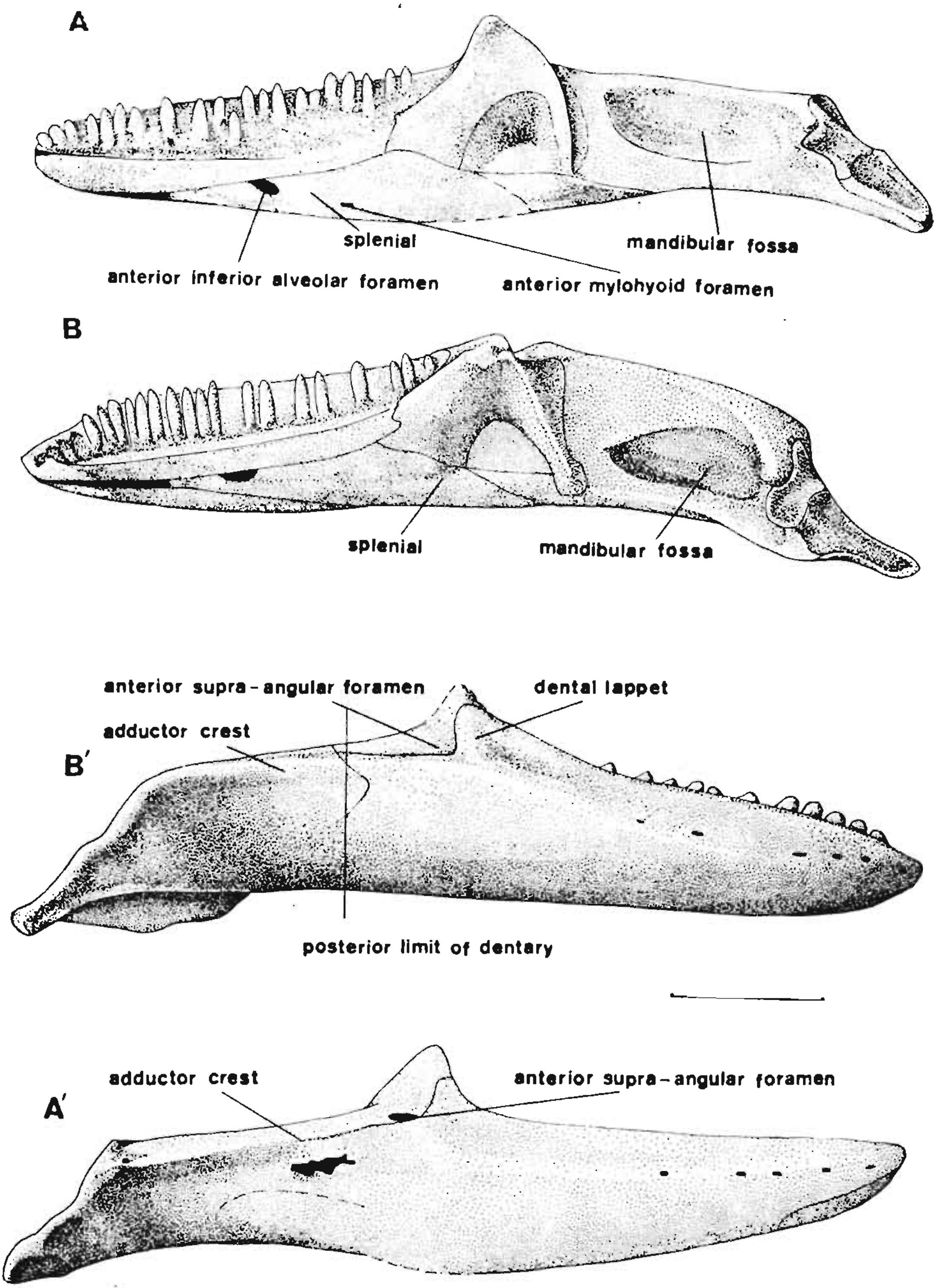

Fig. 3. Mandibles of *Carolina intermedia* gen. et sp.n. in *A* lingual view, *A'* labial view, and *Shinisauroides latipalatum* gen. et sp.n. in *B* lingual view, *B'* labial view. Scale bar 5 mm.

The medial surface of the coronoid is strongly concave, the posterior ramus being produced lingually perpendicular to the sagittal plane. The lateral wall of this concavity is produced by the supra-angular exposed between the rami and the ventral wall by the prearticular. Apart from this region the suture between prearticular and supra-angular is completely fused. The apex of the coronoid is situated about the mid-length of the coronoid and is shifted to the medial side. A thick crest descends from the coronoid apex ventrally, producing the anterior limitation of the adductor mandibulae insertion. It cuts the lateral surface of the bone into two subequal parts and makes this surface very convex. The angular is widely exposed on the lateral surface of the mandible. It probably extended far posterior on this side. Its medial part is damaged.

Dentition: As evidenced by the left side the premaxilla bears 5 teeth, the maxilla 27 teeth and tooth positions, and the dentary 25—26 teeth or tooth positions. The teeth are columnar in shape and have directly successional growth. The crowns are damaged.

Genus *Shinisauroides* gen.n.

Type species: *Shinisauroides latipalatus* sp.n.

Etymology: *Shinisauroides* means similar to the genus *Shinisaurus*; greek *eidos* — similar.

Stratigraphic and geographic range: Late Cretaceous Barun Gojot Formation Middle Campanian), Gobi Desert, Mongolia.

Diagnosis. — Differs from *Carolina* in having more robust bones and more distinct sculpture; the palate broader and flatter than in *Carolina*; vomers completely fused; the postfrontal strongly articulated with the frontoparietal angle; more oblique life position of the mandible with its labial surface facing ventrolaterally and associated twist of the coronoid apex to the lingual side.

Species included. — The genus is monotypic.

Discussion. — With its extremely shortened and high vaulted snout *Shinisauroides* recalls *Shinisaurus*, an extant xenosaurid genus endemic for a small area in Southern Chine. Shared also by *Carolina*, this character (fig. 5) is suggestive of mutual relationships of the three genera, but a long list of differences separating the Late Cretaceous genera from the anguimorphans (p. 167) precludes their assignement to the Shinisauridae. From that list three character states demand some comments. A long parietal descensus of the type present in *Carolina* (p. 154) occurs in the specimen ZPAL MgR-I/54 of *Shinisauroides latipalatum*, the only one with parietals preserved, and in the holotype, in form of mold. This character may be considered either synapomorphic for *Shinisauroides* and *Carolina* or for a more inclusive group (see p. 169). Shared by the both genera, the paired premaxillae tend to fuse in older specimens of *S. latipalatum*. This may be related to a progressive development of the osteodermal covering with the increasing individual age, a tendency particularly strong in this robust lizard. The most outstanding feature of *Shinisauroides* is an extremely large palate. Although some features of this palate (broad vomeropalatine connection, poorly individualized vomerine process of the palatine) shared with *Carolina* may be symplesiomorphic for these genera, the extreme enlargement of the palate is probably an apomorphic character state unique for *Shinisauroides* only. This may be associated with the overall compact build of the skull and mandible of the latter genus. The mandible of *Shinisaurus* is exactly like that of *Carolina* in all details except for being more robust and twisted in such a way that the lateral wall of the postcoronoid part faces ventral rather than ventrolaterad, whereas its medial surface is largely exposed to the insertions of the adductor mandibulae muscles. In contrast, the postcoronoid ramus is subperpendicular in *Carolina*.

Shinisauroides latipalatum sp.n.

(pls. 2: 3, 4; 3: 1—4; 4: 1; figs. 1*A*; 2*A*; 3*B*, *B'*; 4*B*; 5*A*; 6*K*; 7*A*)

Holotype: ZPAL MgR-I/58; pl. 3: 1—4, pl. 4: 1.
Type horizon: Barun Gojot Formation (? Middle Campanian).
Type locality: Nemegt, Gobi Desert, Mongolia. (? Middle Campanian).
Etymology: Latin *latus* — wide and *palatum* — palate.

Material: ZPAL MgR-I/58. Incomplete skull without frontals, parietals, supratemporal arcades, quadrates. Mandibles almost complete. Dorsal part of brain case preserved as a mold. Two first vertebra are preserved ventrally except for the first intercentrum. From Nemegt.

ZPAL MgR-I/56. Snout part of a skull from Khulsan with frontals, anterior part of parietal and fragmentary postfrontal. No palate.

ZPAL MgR-I/59. Snout part of a skull from Nemegt with both precoronoid parts of mandibles. Only the anterior part of the palate is preserved.

ZPAL MgR-I/55. Strongly crashed anterior part of the skull and mandibles from Khulsan. Preserved are dislocated parietal and postfrontal. Young individual.

ZPAL MgR-I/57. Anterior part of snout with vomers preserved. From Khulsan.

Measurements: See Tables 1 and 2.

Description. — Skull as a whole: The skull of the holotype is 31 mm long. The snout is very short. Its maximum length to the length of the remaining part of the skull is 7 to 25. The orbits are very large and separated by narrow hour-glass shaped frontals. The external nares are rounded and face forward. Bone surface of the roofing elements and dorsal parts of the maxillae is covered with osteoderms displaying a tuberculate and pitted surface.

Dermocranial roofing elements: The premaxillae fuse in the midline with increasing age. They are paired in the juvenile skull ZPAL MgR-I/59. There is just a trace of a sagittal suture in the holotype, ventral to the nasal processes covered with a single osteoderm and the suture is completely obliterated in ZPAL Mg-I/56. The palatal shelf bears robust paired incisive processes. The vomeropremaxillary contact is broad. Absent from the holotype but preserved in the ZPAL MgR-I/56 the frontals are completely fused and strongly constricted in the middle with a slightly broadened anterior part, bordered with the prefrontals, and a strongly broadened, triangular posterior part. The frontoparietal suture is straight. Directly anterior to it the lateral border of the frontal bears a distinct furrow for the prefrontal with a small fragment of this bone sticking in it on the left of the ZPAL MgR-I/56. Extending medioventrally the subolfactory processes of the frontals fuse in the midline. They extend over the middle and anterior parts of the frontals. Their depth is about equal to the minimum breadth of the frontals but they extend down to the palatine anteriorly (ZPAL MgR-I/59). Parietals are preserved but fragmentary in two specimens ZPAL MgR-I/56 and ZPAL MgR-I/54, and are absent from the holotype. ZPAL MgR-I/54 has a huge triangular descending process situated well behind the frontoparietal suture. ZPAL MgR-I/56 demonstrates the parietal foramen situated close to this suture. The length of the parietal is unknown.

Table 1

Skull measurements in mm

Species	*Carolina intermedia*	*Shinisauroides latipalatum*	*Shinisauroides latipalatum*	*Xenosaurus grandis*
Cat. nos.	ZPAL MgR-III/34	ZPAL MgR-I/58	ZPAL MgR-I/56	MCZ 46785
Premaxilla — occipital condyle length	30.5	30.5	—	26
Premaxilla — frontoparietal suture length	20	—	18.5	16.5
Snout length: anterior margin of orbit — premaxilla	7.5	7.2	7	7.5
Width at postfrontals	11.5	13	14	9.5
Maximum width at jugal arches	18	*app.* 20	22	17
Minimum orbit — naris distance	4.5	4	4	4.1
Frontal: length	12.5	—	*app.* 14.8	*app.* 11.5
anterior width	3.8	—	4.9	2.7
max constriction	2	—	3.5	2.5
posterior width	9.6	—	*e.* 14	10.2
Parietal: maximum length	11.4	—	—	10.8
sagittal length	7	—	—	7.5
anterior width	9	—	—	10.4
max constriction	4.5	—	—	6.2
posterior width	*e.* 8	—	—	10
Orbit: length	*l* 11.5 *r* 12.4	—	*l* 13 *r* 13	*l* 8.8 *r* 9
width	*l* 7 *r* 8.2	—	*l* 11.1 *r* 10	*l* 6.1 *r* 6.1
Quadrate shaft: length	7.8	—	—	5.5
Snout depth: in prefrontal region to ventral margin of maxilla	7	8.8	8.8	5
Ratio: Snout length/depth	1.07	—	0.8	1.5
Snout length/frontal length	0.58	—	0.47	0.65

e. estimated; app. approximately; l left; r right

The premaxillary process of the maxilla is deep and subquadrangular in lateral aspect, the posterior process is stout and long. Its posterior extent along the ventral border of the orbit is difficult to determine. The tooth row consists of 24 tooth positions in the holotype. The nasal process is very broad dorsally. The maxillo-prefrontal suture is completely obscured by the osteodermal covering. The osteodermal covering extends down to the level of the premaxillary process of the maxilla and continues along the suborbital margin. Ventral to this line the surface is smooth and bears numerous superior labial foramina. Palatine shelf is very narrow and, particularly so lateral to the common opening of the Jacobson's organ and the internal naris (palaeochoanate type). The maxillopalatine sutures are but slightly convergent anteriorly. The palatal process of the prefrontal is medially bordered by the descending process of the frontal down to the contact with the palatine. Laterally it borderd a slit-like fossa pierced by the lacrimal foramen. The lateral border of this foramen is probably produced by the lacrimal, but the outline of this bone is completely obscured by the sculpture in lateral aspect of the skull. The jugal extends to the anteroventral angle of the orbit overlapping the medial surface of the maxilla. It contributes a medial part to the suborbital border all over its length. Posteriorly its suture with the maxilla is obscured by the sculpture. As demonstrated by the specimen ZPAL MgR-I/56 the ascending part of the jugal is very narrow and slopes steeply (at an angle about 70° to a horizontal line) towards the postfrontal, but its postfrontal end is not preserved.

Sculpture: In the holotype the nasal process, the nasals, prefrontals and the preserved part of the frontals are covered with a heavy armour bearing traces of epidermal scales. The nasal process of the maxilla display the same type of solid armour. The armour extends down to the level of the ventral border of the external naris. The row of tubera overhangs the underlying smooth part of the maxilla. The tubera continue onto the suborbital part of the maxilla and on the jugal. The sculpture of the middle and posterior parts of the frontals is rather of the small plate pattern than a solid armour of the anguid type. It consists of two series of osteoderms arranged along the supraorbital borders and meeting each other in the midline to produce a sinuous suture. They diverge posteriad leaving but a small space for some irregular osteodermal thickenings. The surface is sculptured by tubercles and ridges separated by furrows and pits.

The quadrate is known only from the distal parts, left and right, preserved in the holotype. The medial and the lateral part of the condyle are subequal. The furrow between them is parasagittal. The articular surface is, as a whole, shifted from the perpendicular position posteriorly and is separated from the anterior surface by an acute ridge. The anterior surface is very flat in the preserved part of the shaft. Directly superior to the medial part of the condyle the posterior surface bears a furrow to accommodate the extremity of the pterygoid. The epipterygoid is not preserved in any specimen.

Palate: The vomers are very broad plates with strongly arched lateral borders. The two are fused in the midline. Posterior to the broad premaxillovomeral contact there is a deep incision for the fenestra vomeronasalis. It is separated from the fenestra exochonalis by lateral broadening of the bone only, the palate being essentially of the palaeochoanate type (Lakjer 1927). Lateral borders of the vomers are bent dorsally but the surface of the bones is almost flat except for a horse-shoe shaped swelling around the fenestra exochoanalis. The posterior part of the vomer broadly overlaps the vomerine process of the palatine. The suture is posteriorly concave as demonstrated by ZPAL MgR-I/57. The extremely broad blade of the palatine is produced by a fusion of the palatine proper with the hemipterygoid as well as by lateral increase of ossification at the expanse of the suborbital fossa. The latter becomes very narrow and the maxillary process of the palatine is correspondingly short. A longitudinal furrow marks the boundary between the palatine and the hemipterygoid. The vomerine processes of the palatines are broad and partly sutured in the midline. They are situated in the same plane as the vomers but are ventrally bent with respect to the remaining part of the palatine. The palate displays, thus, a concavity at the level of the fenestra exochoanalis or at the base of the vomerine processes. The furrow for the fenestra exochoanalis is very shallow and directed vertically, separating both processes of the palatine. It continues for a short distance on the horizontal blade of the palate. The palatal blade or the pterygoid process of the palatine is overlapped by the pterygoid, the suture extending anteromedially. The transition between the palatine and the quadrate processes of the pterygoid is very gentle. The medial projection, which usually delimits ventrally the pterygoid notch for the basipterygoid process in lizards, was probably absent which cannot be definitly determined because of the damage. The quadrate process is rather stout, roughly triangular in section. Its end adjoins the posteromedial surface of the quadrate. The transverse process of the pterygoid is wedged in between two medial processes of the ectopterygoid. The ventral one slopes steeply posteroventrally and contributes an important part to the process for the pterygoideus muscle. The dorsal process overlaps the pterygoid dorsally and extends in almost transverse direction.

Table 2

Measurements of right mandibles in mm

Species	*Carolina intermedia*	*Shinisauroides latipalatum*	*Xenosaurus grandis*
Cat. nos.	ZPAL MgR/III-34	ZPAL MgR/I-58	MCZ 46785
Total length (in projection)	29.3	29.3	27.4
Length to mandibular joint	24.9	25.7	23.1
Labial length of dentary	?18.3	18.6	15.6
Length of tooth row	14	13.6	13
Length of postcoronoid part to mandibular joint	7.7	8.9	7.9
Maximum precoronoid depth	4.5	5	4

The brain case of the holotype: The suture between the parabasisphenoid, and basioccipital is obscure but probably roughly transversal in the middle part and oblique in the lateral parts corresponding to the joint between the posterolateral processes of the parasphenoid and the basioccipital. These processes are not preserved but probably reached the sphenoccipital tubercles as judged by the traces left. They covered the prooticobasisphenoid sutures. The acute ventrolateral crests separate the ventral surface of the brain case from the jugular fossae. They turn into the posterior borders of the basipterygoid processes. The latters project ventroanterolaterally. Their much broadened articular surfaces face laterally rather than anterolaterally. A subquadrangular fontanelle pierces the anterior part of the basioccipital. It extends from the suture between the basisphenoid and basioccipital down to the sphenoccipital torus (Borsuk-Białynicka 1984), which is the anterior limit of attachment of the rectus capitis anterior muscles. The muscles have inserted on the posterior surface of the sphenoccipital tubercles and on both ventrolateral walls of the occipital condyle. Extending from the condyle toward the sphenoccipital tubercles the sutures between the basioccipital and both exoccipitals cut the muscle attachment surfaces. The exoccipital part of the surface is damaged distally, which is probably a reason for the lack of both the tuberal crest and the exoccipital part of the sphenoccipital tubercle. The presence of the epiphyses is not ascertained. The preserved part of the border of the occipital recess is horse-shoe shaped and posteriorly open. It is produced by only the basioccipital and the intertuberal crest of the exoccipital. The jugular fossa is very broad and strongly swollen anterior to the foramen ovale. The main part of the prootic slopes dorsolaterally. It forms an acute angle with an extensive ventrally directed prootic crest. The distal part of the jugular fossa is unknown because the paroccipital process is missing. The dorsal aspect of the brain case is known partly from the preserved pieces of bones and partly from natural casts. The anterior semicircular canals converge at an angle of about 70° and produce the anterior border of the brain case not only in the dorsal part of the brain case but also laterally. The alar process is not developed. Covered mainly by the supraoccipital, the otic part of the brain case is strongly swollen between the semicircular canals. The crura communis almost touch each other in the midline. The length of the supraoccipital is less than half of the brain case length and it is more oblique than in the anguids but less oblique than in agamids.

The mandible of the holotype: The long axis of the mandible is medially curved and particularly so at both ends. The adductor crest is situated very high on the mandible but ventral to the dorsal border of the dentary. The adductor surface is much broadened directly behind the coronoid. It is not separated by an acute crest from the medial surface of the mandible, which suggests that the fibers of the adductor mandibulae muscle descended down this surface until they reached the dorsal margin of the mandibular fossa. On the other hand, the adductor surface continues onto the lateral surface of the dentary

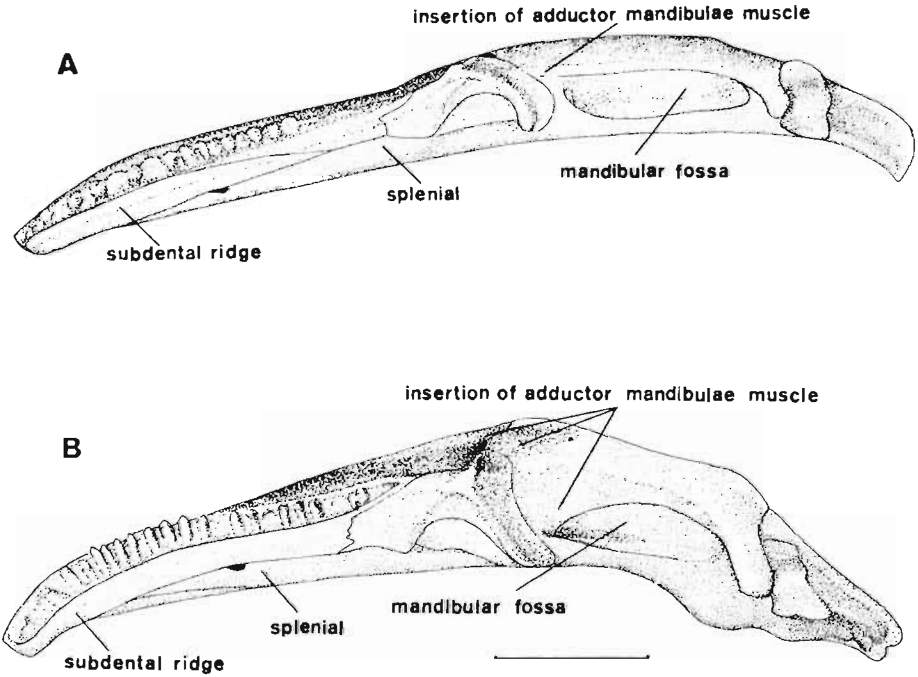

Fig. 4. Mandibles in occlusal view. *A Carolina intermedia* gen. et sp.n.; *B Shinisauroides latipalatum* gen. et sp.n. Scale bar 5 mm.

but only just ventral to the teeth which is apparent in the dorsal aspect of the mandible (see fig. 4*B* and pl. 4: 1*a*). The adductor surface faces dorsolaterally and dorsomedially in the directly postcoronoid part and dorsally in the posterior part. The anterior supra-angular foramen pierces this surface at the coronoid suture. The supra-angular and the mandibular fossa are well exposed in the dorsal (occlusal) view of the mandible. The adductor crest is in continuation with the line of maximum transversal bent of the precoronoid ramus. Ventral to this level the lateral surface of the mandible turns ventrally and, particularly so, posterior to the coronoid. The retroarticular process faces ventrally too. Its other surface faces dorsally. The articular condyle consists of two concavities separated by a crest. It turns info a hudge tubercle produced by articular. The articular condyle faces almost directly posteriorly.

The dentary widely overlaps the lateral surface of the coronoid and extends posterior of the coronoid at the surface ventral to the adductor crest but its extent is unknown. Produced by the dentary a thick vertical crest makes up the anterior limitation of the adductor surface of the coronoid, which faces posteriorly. Eight mental foramina are preserved. The labial border of the dental gutter is high above the lingual one and the gutter is very shallow. The splenial extends to the level of the 8th tooth position. Anterior to its apex the Meckelian fossa turns to the ventral side of the mandible. Posteriorly the splenial almost reaches the posterior ramus of the coronoid but its posterior border is damaged. The dorsal border of the splenial is notched for the anterior inferior alveolar foramen about the level of the 12th to 15th tooth position, which is within the middle one third of the medial dental length. The medial surface of the coronoid is concave the posterior ramus being produced lingually perpendicular to the sagittal plane. Exposed within the incision between the coronoid rami is a perpendicular wall made of both the supra-angular and the prearticular. The suture between these bones is obliterated. The apex of the coronoid is situated about the midlength of the bone. The angular is not preserved.

Dentition: Each premaxilla bears 4 teeth, the maxilla 25 teeth and the dentary 26 teeth. The teeth are columnar, transversely broadened about, at the mid-height but pointed distally. The crowns bear traces of wear.

Vertebrae: Atlas. The ventral parts of paired neural arches of atlas are provided with heavy rounded tubera (diapophyses) projecting laterad. The first intercentrum (h_1) is lost.

Axis. Rather long centrum with a completely fused second intercentrum (h_2) and a peduncle for articulation with the third one (h_3) represents type B of cervical vertebra according to Hoffstetter and Gasc (1969).

GENERAL CONSIDERATIONS

Characters used in the following text are numbered as follows: (1) shape of frontals; (2) pattern of osteodermal skull covering; (3) presence or absence of subolfactory processes of frontals; (4) snout shape; (5) presence or absence of dental overlap on the laterall surface of coronoid; (6) shape of mandibular fossa; (7) a state of alary process of prootic; (8) fusion of premaxillae; (9) type of vomeropalatine connection; (10) condition of subdental shelf; (11) presence or absence of parietal descensus.

In the following text and in clodograms (fig. 8) character states are given the same numbers as the respective characters. For the sake of brevity the word "characters" is usually used instead of "character states".

Relationships between *Carolina* and *Shinisauroides*

The assignement of *Carolina* and *Shinisauroides* to the same family is based on a long list of characters in common. These are: (1) hour-glass shaped frontals, (2) small skull osteoderms, (3) strongly developed subolfactory processes, (4) short and vaulted snout, (5) posterior shift of dentary to overlap the lateral surface of the coronoid, (6) widely open mandibular fossa, (7) lack of alary process of the prootic, (8) paired premaxillae, (9) poorly individualized vomerine process of the palatine, (10) presence of subdental shelf, (11) long, fingerlike parietal descensus. At least four of these characters (1, 4, 5, 11) are considered derived in lizards (Estes *et al.* 1985). They may well be synapomorphic for the Carolinidae or for some more inclusive lizard groups, thus indicating a relationship of the new family to other lizards. This problem will be discussed below.

Possibility of xenosaurid relationships of the Carolinidae

In view of the strikingly xenosaurid appearence of *Carolina* and *Shinisauroides* the xenosaurid affinity of these genera seems most probable at the first sight and will first be considered.

From nine characters considered synapomorphic for the Xenosauridae (Estes *et al.* 1985) following four are shared by the Carolinidae: frontals strongly constricted between orbits; dermal rugosities with vermiculate sculpture present; cephalic osteodermal crust divided into conical mounds; cephalic scales relatively small. These characters may actually be reduced to two: constricted frontals (1) and diffuse osteodermal crust (2), which, along with size, make for the similarity with the xenosaurids. Suggestive of the shinisaurid relationships (fig. 5), a strongly shortened and vaulted snout (4) completes this short array of arguments supporting the xenosaurid affinity of *Carolina* and *Shinisauroides*. Other character of this diagnosis are either poorly known in the carolinids, as those of skull cross-section and supratemporal arch, or slightly different, as the postorbital branch of the jugal, which has a more squere cross-section in the carolinids than the jugal said diagnostic of the Xenosauridae. Reduced in the xenosaurids, the carotid fossa is fully developed in the carolinids, which is probably a plesiomorphic state of this character in the lizards (McDowell and Bogert 1954 and Gauthier 1982). A possible, but not quite determined, exposure of the ectopterygoid in the lateral wall of the skull is inconclusive with respect to the xenosaurid affinity, mainly because not unique for the xenosaurids. Apart from the Chineese *Ophisaurus* (*Dorpasia*) *harti* and *Anniella* (McDowell and Bogert 1954) it has been encountered in the lacertids and cordylids (*Lacerta ocellata*, *Gerrhosaurus robustus* pers. observ.) and probably occurs in many other scincomorphans, which are obviously predisposed to this exposure by having the ectopterygoid very close to the lateral skull surface, at the jugal-maxillary suture (Borsuk-Białynicka in prep).

In contrast to the character supporting the xenosaurid affinity of the carolinids, the characters discordant with this affinity are numerous and conclusive.

Possibility of scincomorphan relationship of the Carolinidae

Both *Carolina* and *Shinisauroides* differ from the xenosaurids, and, in fact, from all the anguimorphans, by following characters, while

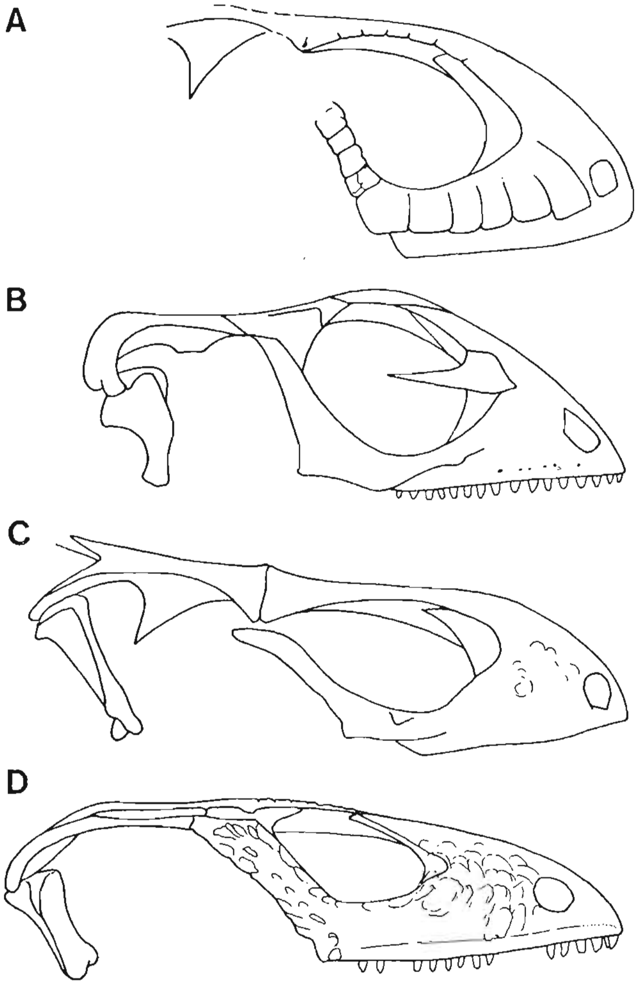

Fig. 5. Skulls in lateral view. *A Shinisauroides latipalatum* gen. et sp.n.; *B Shinisaurus crocodilurus* Ahl, 1930 (based on McDowell and Bogert 1954: fig. 4); *C Carolina intermedia* gen. et sp.n.; *D Xenosaurus grandis* (Gray). Out of scale.

sharing some derived characters with the scincomorphans: (5) Extension of the dentary past the coronoid and the dentary overlap on the coronoid by means of one process directly lateral of the coronoid. This type of overlap is considered synapomorphic for the Scincomorpha (Estes *et al.* 1985). In the Anguimorpha the dentary never reaches posterior to the coronoid apex. If present, the dentary overlap of the coronoid occurs by means of two processes, the anterior and the ventral to coronoid, that tend to invade its lateral surface without loosing their individuality (pers. observ.). (6) Widely open mandibular fossa (fig. 6J-L), according to Estes *et al.* (1985) a synapomorphy of the Lacertoidea, which also occurs in some agamids (Priscagamidae Borsuk-Białynicka and Moody 1984). In contrast, the mandibular fossa is consistently narrow and slit-like in the anguimorphans (fig. 6A-I), which is probably another derived state of this character. (7) Lack of the alary process of the prootic, plesiomorphic for lizards (Borsuk-Białynicka 1983). A long, anteriorly directed alary process is synapomorphic for the Anguimorpha with no reversals known (Borsuk-Białynicka 1984) within this infraorder. (8) Paired premaxillae, most probably a result of character reversal. Occuring consistently in the anguimorphans, fused condition is regarded as synapomorphic for the Squamata with independent cases of reversal occuring in some gekkonids and some scincids (Estes *et al.* 1985). (9) Large vomeropalatine contact associated with a poorly individualized vomerine process of the palatine (fig. 7A) known in the iguanians (Borsuk -Białynicka and Moody 1984) and in numerous scincomorphans is here considered as plesiomorphic for lizards. For the lack of certainty as to the direct sister-group of the lizards, *Sphenodon*, *Youngina* and *Gephyrosaurus* (Gow 1975, Evans 1980) with their large vomeropalatine contacts are used as an out-group of lizards. In contrast, the elongated vomer sutured with a slender vomerine process of the palatine, which strongly protrudes from the main palatine body (fig. 7B) is probably synapomorphic for the anguimorphans. (10) Subdental shelf of the mandible, a probable synapomorphy of the Scleroglossa (see diagnosis in Estes *et al.* 1985) with a reversal in the Anguimorpha which always lack this structure (pers. observ., in contrast, according to Estes *et al.* 1985, only varanids lack it). (11) Finger-like descensus parietalis considered as a synapomorphy of the Scincomorpha with some reversals in this infraorder (Estes *et al.* 1985). The anguimorphans always lack any parietal descensus of this type. However, the differences between this structure and a long crest-like descending processes of parietal present in the anguids is but quantitative and, thus, a homoplasy may sometimes be involved. In taxonomic terms the above characters (5—11) suggest at least familial difference between the carolinids and the xenosaurids, which is the interpretation followed herein. The phylogenetic implications of these characters are presented in fig. 8 and discussed in the next section.

Comparing the alternative hypotheses

Affiliation of the carolinids on the xenosaurid stem of the anguimorpha (fig. 8A) requires that all characters differing in both groups (5—11) have plesiomorphic states in the common ancestor of the Agui-

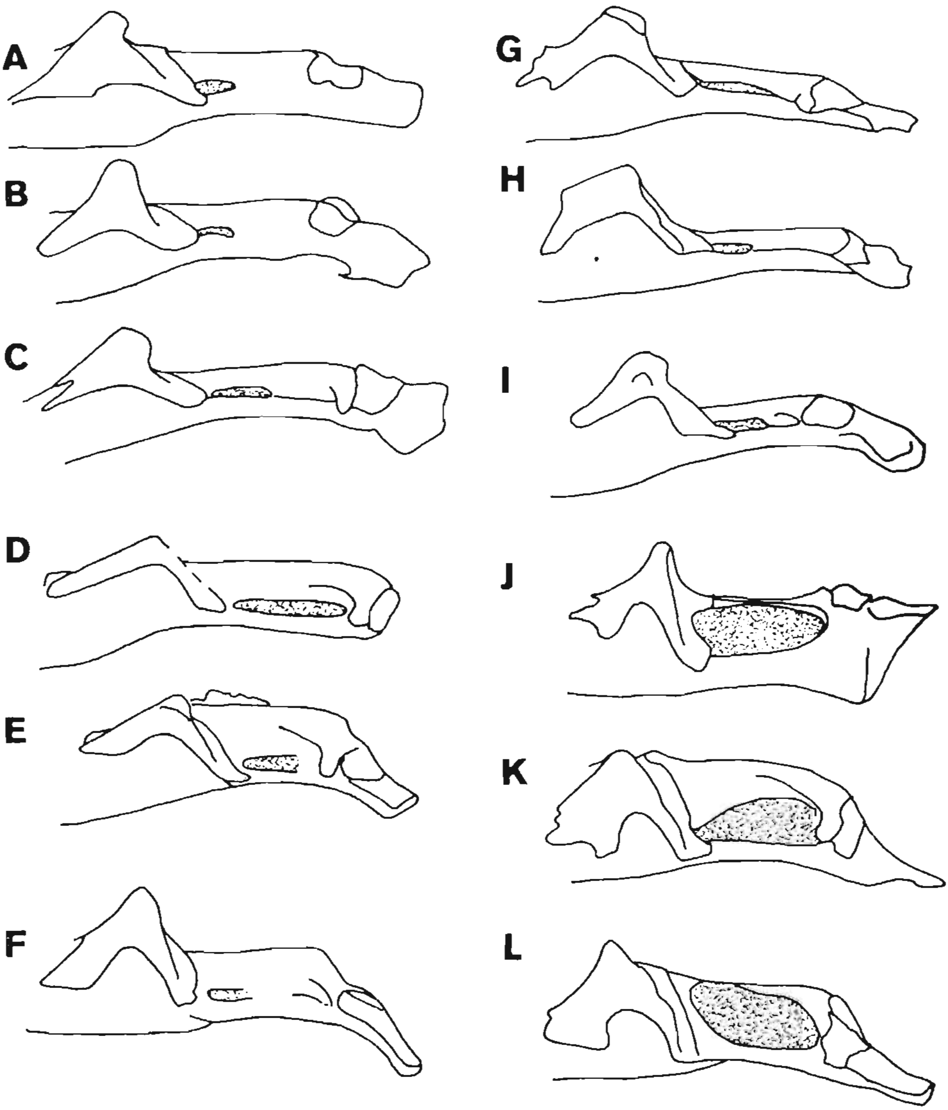

Fig. 6. Postcoronoid parts of mandibles showing form and dimensions of mandibular fossa (shaded) in: *A Ophisaurus apodus* (the same in *Diploglossus lessonae* according to Rieppel 1980: fig. 18); *B Gerhonotus leiocephalus* and *G. multicarinatus*; *C Anguis fragilis* (the same in *Anniella pulchra* according to Rieppel *l.c.*; fig. 22); *D Parviderma inexacta* and *Proplatynotia longistrata*; *E Gobiderma pulchra*; *F Xenosaurus grandis*; *G Heloderma suspectum*; *H Lathanotus borneensis* and *Cherminotus longifrons*; I *Varanus niloticus* and V. *griseus*; *J Ameiva ameiva* (teiid type according to Estes 1964); *K Shinisauroides latipalatum* gen. et. sp.n.; *L Carolina intermedia* gen. et. sp.n. Out of scale.

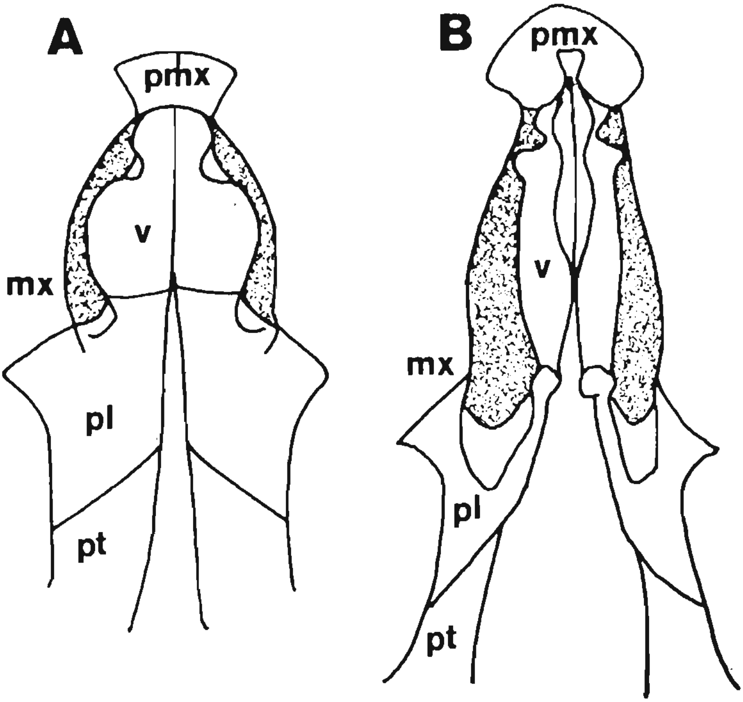

Fig. 7. Two types of palate in lizards based on *A Shinisauroides latipalatum* gen. et sp.n. and *B Xenosaurus grandis* (Gray). Main difference consists in character of vomeropalatine connection. Out of scale. *mx* maxilla; *pl* palatine; *pmx* premaxilla; *pt* pterygoid; *v* vomer.

morpha and turn independently into the derived states either in the Xenosauridae and the Anguidae + Platynota or in the Carolinidae. All derived characters shared by the xenosaurids and anguids + platynotans (6, 7, 9, 10) are thus, considered as homoplasies and so are the derived characters shared by the carolinids and the scincomorphans (5, 6, 8, 11). The number of the homoplasies amounts to about nine in the first hypothesis (fig. 8A) while being three (1, 2, 4) in the alternative hypothesis (fig. 8B). As implied by the latter, best supported hypothesis (fig. 8B), the slit-like mandibular fossa (6), the large anteriorly extended alar process (7), the narrow vomeropalatine contact (9) and the lack of subdental shelf (10) are synapomorphic for the anguimorphans. The preferred hypothesis also implies that four characters: the presence of lateral dentry overlap on the coronoid, (5), the widely open mandibular fossa (6), paired premaxillae (8) and the finger-like descensus parietalis (11) are synapomorphic for the Scincomorpha. With respect to the characters (5) and (11) this implication is consistent with the morphocline polarities of the squamatan characters hypothesised by Estes *et al.* (1985) based on other premises, and, thus, supports their view.

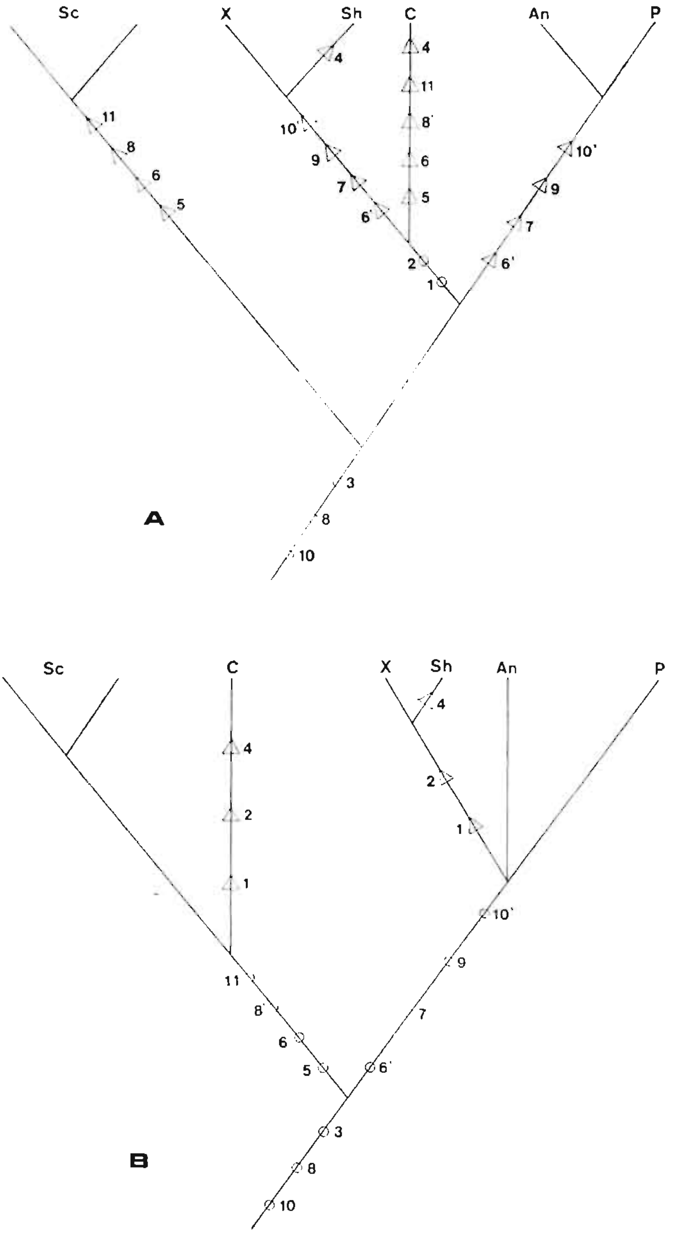

Fig. 8. Cladograms illustrating two hypothetic affiliations of the Carolinidae numbers denote following character states: (1) hour-glass shaped frontals; (2) small skull osteoderms; (3) well developed subolfactory processes of frontals; (4) short and vaulted snout; (5) dentary overlap on the lateral surface of the cornoid; (6) widely open mandibular fossa; (6') slit-like mandibular fossa; (7) well developed alary process of the prootic; (8) fused premaxillae; (8') paired premaxillae; (9) narrow vomeropalatine connection; (10) presence of subdental shelf; (10') absence of subdental shelf; (11) finger-like parietal descensus. Circles denote synapomorphies; triangles denote homoplasies. *An* — Anguidae; *C* — Carolinidae; *P* — Platynota; *Sc* — Scincomorpha; *Sh* — Shinisauridae; *X* — Xenosaurinae.

Conclusions

The Carolinidae is certainly a family of nongekkotan scleroglossan i.e. autarchoglossan lizards which do not belong to the Anguimorpha. Their assignement to the Scincomorpha requires some more extensive studies of this infraorder and is only tentative. Suggested by superficial resemblance and zoogeographical premises, the affinity between the Carolinidae and the Shinisauridae is not supported.

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MAGDALENA BORSUK-BIAŁYNICKA

CAROLINIDAE, NOWA RODZINA KSENOZAUROIDALNYCH JASZCZUREK Z GÓRNEJ KREDY MONGOLII

Streszczenie

Materiał do niniejszej pracy pochodzi z osadów g. kredy (? śr. kampan) (Gradziński *et al* 1968, Gradziński and Jerzykiewicz 1972 i Gradziński *et al* 1977) Mongolii. Materiał ten zebrany został przez Polsko-Mongolskie Ekspedycje Paleontologiczne na pustynię Gobi w latach 1963—71 i przechowywany jest w Zakładzie Paleobiologii PAN w Warszawie.

W pracy opisano dwie nowe jaszczurki: *Carolina intermedia* gen. et sp. n. (pl. 1: 1; 2: 1; 3: 5; 4: 2; fig. 1B, 2B, 3A,A'; 4A; 5C; 6L) i *Shinisauroides latipalatum* gen. et sp. n. (pl. 2: 3, 4; 3: 1—4; 4: 1; fig. 1A; 2A; 3B,B'; 4B; 5B; 6K; 7A) ze stanowisk Chermin Caw, Chulsan i Nemegt, podobne na pierwszy rzut oka do *Xenosaurus*, współczesnego, amerykańskiego rodzaju należącego do Xenosauridae (Anguimorpha). Uznano jednak, że cechy, które upodobniają do siebie te rodzaje: przewężone kości czołowe i pokrycie osteodermalne złożone z licznych drobnych elementów, nie wystarczają do zaliczenia ich do Xenosauridae, tym bardziej, że cechy te są przypuszczalnie sprzężone (Borsuk-Białynicka 1984). Zgodnie z preferowaną tu hipotezą są one uznane za homoplazje (fig. 8B: 1, 2). Również krótka i silnie sklepiona część przedoczodołowa czaszki upodobniająca opisane rodzaje do *Shinisaurus crocodilurus* (fig. 5), współczesnego azjatyckiego przedstawiciela Xenosauridae, będącego południowochińskim (Kwangsi) endemitem, uznana została za homoplazję (fig. 8B: 4) wobec głębokich różnic, jakie dzielą nowe rodzaje *Carolina* i *Shinisauroides* od Anguimorpha. Różnice te są następujące: Wydłużenie kości zębowej poza kość koronową i nakładanie się wyrostka kości zębowej na powierzchnię zewnętrzną kości koronowej (5), szeroko otwarty dół żuchwowy (6), brak wyrostka skrzydłowego kości przedusznej puszki mózgowej (7), parzyste kości przedszczękowe (8), szeroki kontakt kości lemieszowych z podniebiennymi (9), występowanie półki podzębowej w żuchwie (10) i długiego, wąskiego wyrostka zstępującego kości ciemieniowych (11). Tak liczne różnice względem rodziny Xenosauridae i całego podrzędu Anguimorpha wskazują na odrębność opisanych rodzajów od tego podrzędu oraz wzajemne bliskie pokrewieństwo, które dodatkowo potwierdzają nieliczne cechy ksenozauridowe obu rodzajów (cechy 1, 2 i 4). Uprawnia to do utworzenia nowej, wspólnej dla *Carolina* i *Shinisauroides* rodziny Carolinidae. Wiele z wymienionych wyżej cech rodziny Carolinidae (5, 6, 8, 9, 10, 11) spotyka się u rozmaitych przedstawicieli Scincomorpha, a niektóre z nich uważane są (Estes *et al* 1985) za synapomorfie tego podrzędu. Są to cechy następujące: nakładanie się kości zębowej na zewnętrzną powierzchnię kości koronowej (5) i obecność długiego, wąskiego wyrostka kości ciemieniowej (11). Szeroko otwarty dół żuchwowy (6) i parzyste kości przedszczękowe (8) to dwie cechy, które mogą również okazać się synapomorfiami Scincomorpha. Szeroki kontakt lemieszowo-podniebienny (9A) i obecność półki podzębowej w żuchwie (10) oraz obecność wyrostków zstępujących kości czołowych (3) i brak wyrostka skrzydłowego kości przedusznej (7) to przypuszczalnie cechy plezjomorficzne dla obu podrzędów Autarchoglossa, które nie stoją w sprzeczności z zaliczeniem Carolinidae do Scincomorpha, gdyż nie były przypuszczalnie zastąpione cechami nowymi u wspólnego przodka jaszczurek scynkomorfowych i trafiają się często w tym podrzędzie. Zaliczenie Carolinidae do Scincomorpha jest tu jednak traktowane jako próbne, gdy wymaga ono gruntowniejszych studiów nad tym podrzędem, co wykracza poza ramy niniejszej pracy.

Terminologia użyta w niniejszej pracy opiera się na opracowaniu Oelricha

(1956) i Rieppla (1980). Metodologia kladystyczna zastosowana w pracy wywodzi się z taksonomii filogenetycznej Henniga (1965), (patrz też Schaeffer *et al* 1972 i Hecht 1976).

Praca została wykonana w ramach problemu MR II. 6.

EXPLANATION OF PLATES 1—4

Plate 1

1. Skull of *Carolina intermedia* gen. et sp.n.: ZPAL MgR-I/34, holotype, stereophotographs, × 2; 1*a* Dorsal view, 1*b* ventral view.
2. Fragments of skull of *Xenosaurus grandis* (Gray): MCZ 46785, stereophotographs, × 2. 2*a* Right palatal view, 2*b* right parietal view.

Plate 2

1. Skull of *Carolina intermedia* gen. et sp.n.: ZPAL MgR-III/34, holotype, right side view, stereophotographs, × 2.
2. Skull of *Xenosaurus grandis* (Gray): MCZ 46785, right side view, stereophotographs, × 2.
3. Snout part of skull of *Shinisauroides latipalatum* gen. et sp.n.: ZPAL MgR-I/56. 3*a* Dorsal view, × 2; 3*b* right side view, stereophotographs, × 1.5; 3*c* ventral view of frontoparietal region, stereophotographs, × 2.
4. Anterior part of skull of *Shinisauroides latipalatum* gen. et sp.n.: ZPAL MgR-I/57, ventral view, × 3.

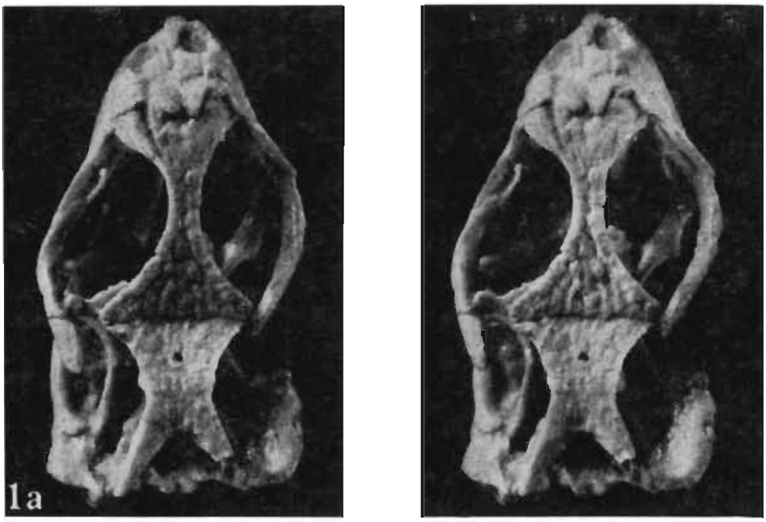
Plate 3

1—4. *Shinisauroides latipalatum* gen. et sp.n.: ZPAL MgR-I/58, holotype. *1* Skull with right mandible removed, ventral view, stereophotographs, × 2. *2* Left half of skull, dorsal view, × 1.9. *3* Right half of skull with right mandible, × 1.9. *4* Right mandible, labial view; stereophotographs, × 2.5.

5. *Carolina intermedia* gen. et sp.n.: ZPAL MgR-III/34, holotype, right mandible, stereophotographs, 5*a* Labial view, × 2.5; 5*b* precoronoid part, lingual view; × 2; 5*c* postcoronoid part, lingual view, × 2.
6. *Xenosaurus grandis* (Gray): MCZ 46785, postcoronoid part of right mandible, dorsal view, × 2.

Plate 4

1. *Shinisauroides latipalatum* gen. et sp.n.: ZPAL MgR-I/58, holotype, stereophotographs. 1*a* Right mandible, occlusal view, × 2; 1*b* right mandible, lingual view; × 2; 1c skull with mandible, lateral view × 2; 1*d* snout part of skull, anterodorsal view, × 2.5.
2. *Carolina intermedia* gen. et sp.n.: ZPAL MgR-III/34, holotype. 2*a* Right mandible, occlusal view, stereophotographs, × 2; 2*b* right mandible, lingual view, × 2; 2*c* frontoparietal region of skull, right side view, × 3.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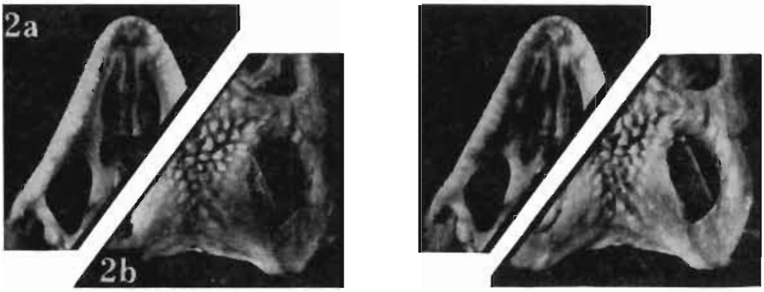
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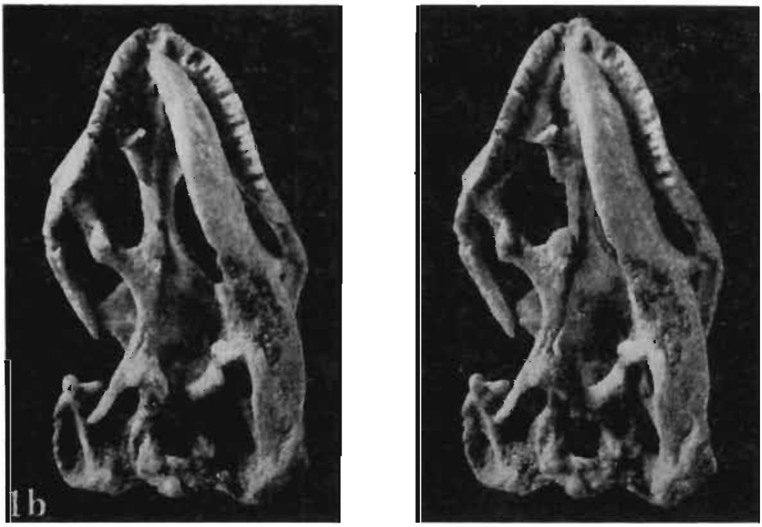
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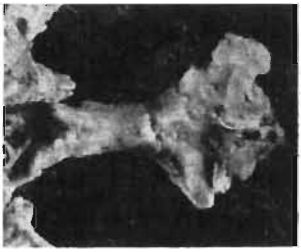

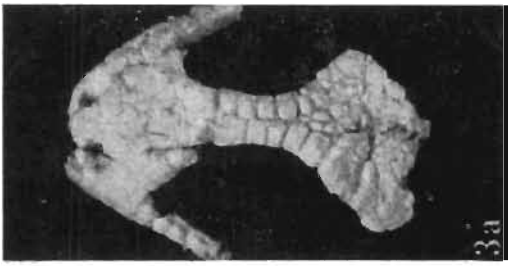

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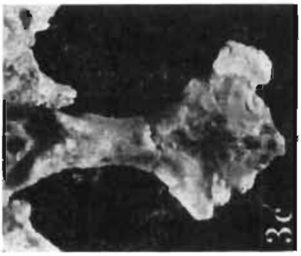

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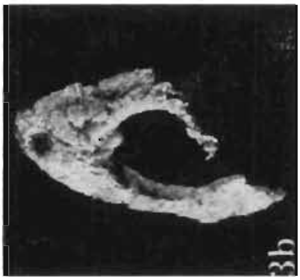


3b

1

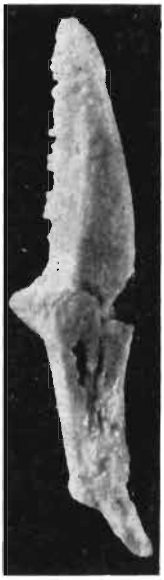

5b


5c


2


4


5a

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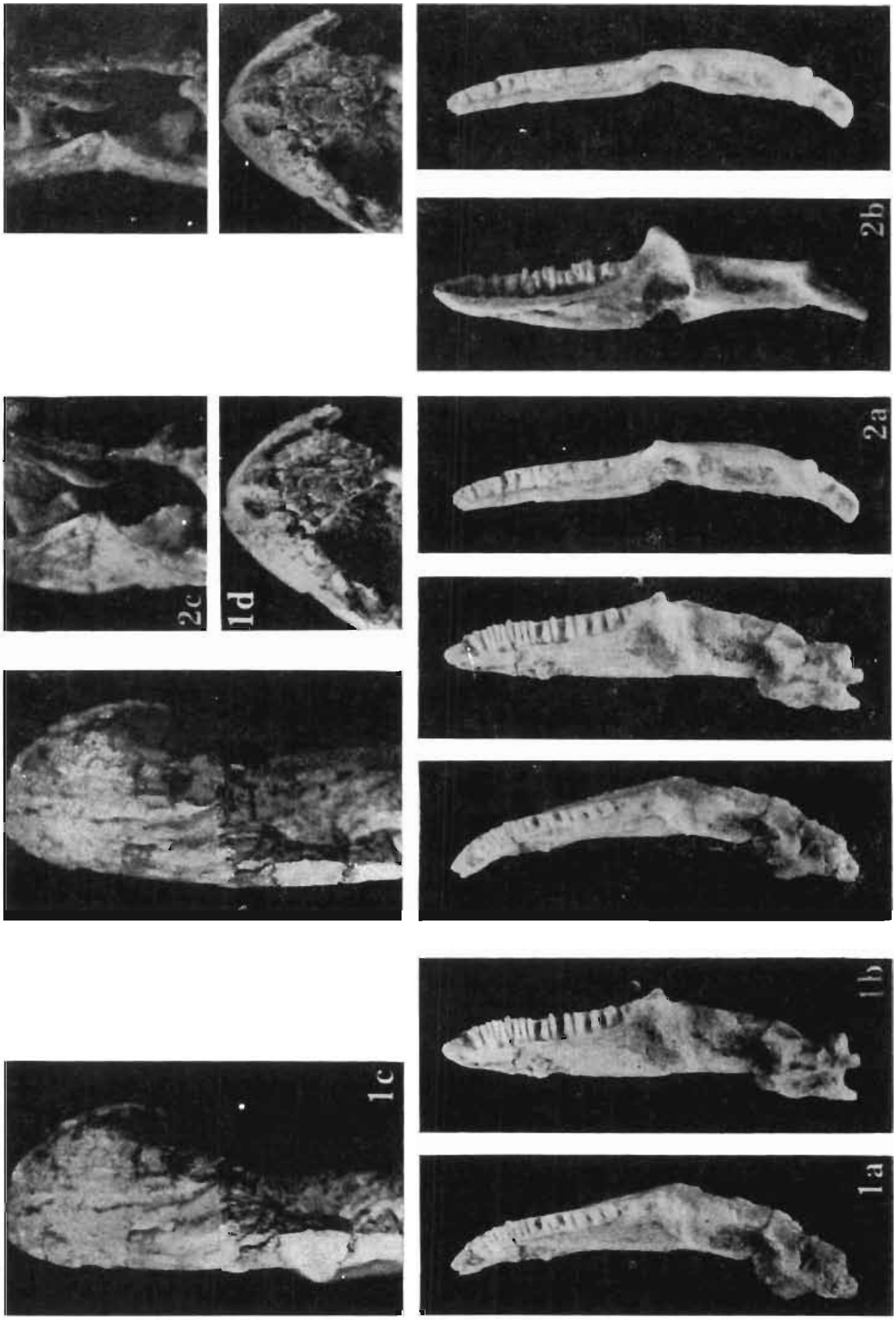
1


3


2b
2a
2c
1d
1b
1c
1a