

NOTE ON THE FIRST CYNODONT FROM THE SINOKAN- NEMEYERIA-FAUNAS IN SHANSI, CHINA

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Introduction

From the Triassic formations of China there has been no true cynodont reported although both in Sinkiang and in Shansi the lower Triassic fossils show remarkable affinities with those of Karroo formation of South Africa. This gap, however, is filled up by the following described specimen. It is represented by a remarkably well preserved skull with the lower jaws still in natural position. It is in fact the only member other than the rich therapsids mainly represented by numerous dicynodonts.

The so far described forms of the Shansi Triassic fossils are:

Labyrinthodont (scutes only), Huene, 1958.

Neoprocolophon asiaticus Young

Chasmatosaurus yuani Young

Since the present described specimen is, so far, only recorded from one single level and the fossil itself is very conclusive, it may serve as a good indicator regarding the determination of the age of the formation from where it was derived.

DESCRIPTION

Sub-order Cynodontia

Family Cynosuchidae

Genus *Sinognathus* gen. nov.

With the diagnosis of the type species *Sinognathus gracilis*.

***Sinognathus gracilis*. sp. nov.**

Holotype: A skull with the lower jaws in natural position. Field number: 5523; Cat. No. of the Institute of Vertebrate Paleontology, V2339.

Diagnosis: Cynodont of median size. Temporal openings enormously large. Parietal part sharply compressed and forming a distinct crest. Parietal foramen apparently absent or very faint. Snout very short, only about one third of the total length of the skull. It is pointed with weak constriction near the base. Orbits direct more

anteriorly. Nasals sharply constricted at the middle with doubtful transversal suture. Jugals robust. Dental large without any protuberance along the margin. Tooth number probably $I \frac{4}{2}$; $C \frac{1}{1}$; $PC \frac{7}{7}$. All teeth single rooted. The middle postmolars are larger with distinct middle cusp and some faint cusp or cusps.

Horizon and locality: Comparable with the forms of the *Cynognathus* zone A of South Africa. In China it may be considered as the upper part of the Lower Trias or the lower-most part of the Middle Trias. Locality, Peipanting, Shippi, Wuhsiang, Shansi.⁽¹⁾ This site is closely situated to the locality where the type of *Sinokannemeyeria pearsoni* Young has been found.

Detailed description:

The specimen is remarkably well preserved. In many cases the sutures between various bones are clearly traceable. Nevertheless, some places are more or less damaged, such as the minor part of the sagittal crest, tip of the snout, all the teeth, the upper margin of the coronoid process of the lower jaws, and so on. With the exception of the teeth, which effect a precise determination about their structures, the other damages do not seem to reduce the value of an exact study of the specimen. The specimen is almost intact in preservation although a slight distortion is observable, the left side of the specimen pushed somewhat laterally and anteriorly.

The *foramen magnum* is clearly shown, a little broader than the height with divided condyles well developed at its side. The *temporal openings* are very large and almost square in outline due to mainly the sharp bending near the lateral posterior corner of the orbit and the straightness of outer border. The *orbits* are almost circular in outline and rather small as compared with the size of the skull. They are posteriorly strongly separated by the jugal and the postorbital. Less satisfactory is the condition of the *nasal openings* which are damaged, they are probably similarly constructed as the other cynodonts.

In *dorsal aspect* the skull is characterized by largeness of the temporal openings, the sharply compressed parietal crest, the more anterior direction of the orbits and the shortness of the snout with its posterior constriction. An interparietal is probably developed but its sutures with the adjacent bones are not clear. At least part of the sutures of the parietal with the prootic and the ectopterygoid are shown. Posterior and lateral to the parietal, the squamosal is comparatively weakly developed. The sutures between them are obscure. There is no clear presence of the foramen parietal, although a faint indication of it may be interpreted as such immediately behind the posterior tip of the frontals. Even so, the position seems to be much anteriorly situated and I would prefer to conclude that the foramen parietal is actually missing. Both the *frontals* form a small triangular outline with the acute angle pointed posteriorly. They are well separated

(1) 山西、武乡、石壁、北盘顶。

from the temporal opening as in other closely related forms. Their outline is more similar to that of *Thrinaxodon liorhinus* than to that of *Sysphinctostoma smithi*.

The S-shaped *postorbital* is much larger than the frontal. The main area of the upper part of the snout is occupied by the *nasals*. It is very much constricted at the anterior middle part much the same way as that of *Cistecynodon* and *Belesodon*. There is, however, a transversally oriented suture-like zigzag line which divides the nasals into two parts. It is probably a fracture only that the bones were broken at narrowest and weak part. The *prefrontal* is small while the *lacrymal* is a little larger. Both form the inner border of the orbit and prevent the nasals and the frontals widely apart from the orbit. The *premaxilla* and the *septomaxilla* are not clearly indicated. The former is damaged and the latter is only partly preserved between the nasal and the maxilla.

In *ventral aspect* the details of the skull are less satisfactorily preserved. The lower jaws cover partly the skull and most of the sutures between various bones are hard to trace. Yet their relative positions are shown in Fig. 2 with confidence. Comparing with the *Thrinaxodon*, the basisphenoid is relatively small. The palatine is surely developed although its boundary with maxilla is not clear.

In *lateral aspect* the skull looks very similar to that of *Thrinaxodon*. It is low and long-stretched. The considerable part is made of lateral border of the temporal opening composed of *squamosal* and *jugal*. It broadens considerably posteriorly. The upper summit of the maxilla extends almost to upper border of the skull.

In *posterior aspect* the angle made of interparietal and tabular is much acute as compared with other related forms. As stated above, the foramen magnum is transversally expanded. The *fenestra posttemporalis* is situated a little higher above the level of the center of the foramen magnum as in the case of *Thrinaxodon*.

In *anterior aspect* there is little to say. Its outline is given in Fig. 4 (the upper figure). The lower and the median part of the *premaxilla* is well preserved below the damaged nasal opening.

The *Lower jaw*: Both lower jaws adhere still to the skull in natural position. They are so firmly interlocked with the skull that the removal of them would take a great risk. As typically in all cynodonts the large part of the lower jaw is made of the dental and the angular can be seen faintly from the lateral side. The lower border of the jaw is rather straight and there is no process-like development at the posterior part of the dental. In inner side the spenial is shown clearly but differs in no way from the other cynodonts. The coronoid process extends very high, the border of which is partly damaged.

The *teeth*: Instead of the good preservation of the skull, the teeth are badly damaged. The part of the incisors is much worn. The left side part of the teeth is broken so that only the median section can be seen. In the right side the post canine teeth are so firmly interlocked that it is hard to make sure of each single tooth. Of

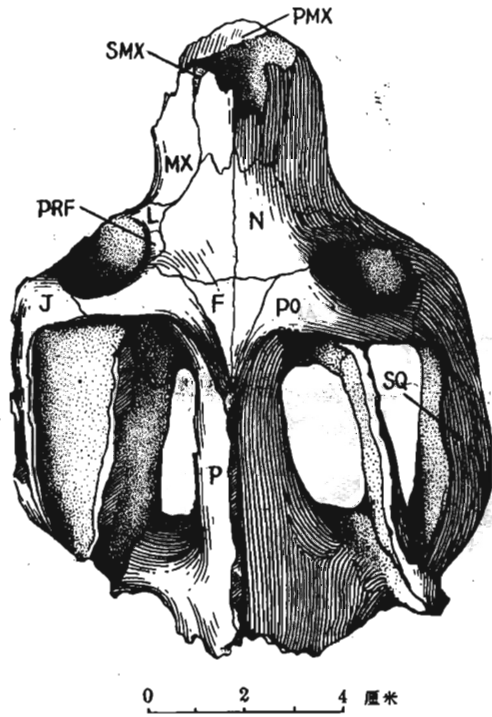


Fig. 1. *Sinognathus gracilis* Young. (gen. et sp. nov.) Skull in dorsal view, V2339. Abbreviations from figs. 1—4 as usually adopted. 2/3 nat. size.

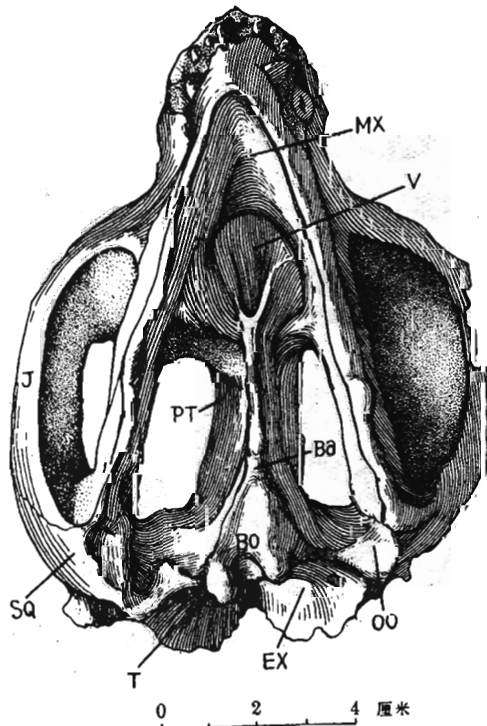


Fig. 2. *Sinognathus gracilis* Young (gen. et sp. nov.) Skull in ventral view. 2/3 nat. size.

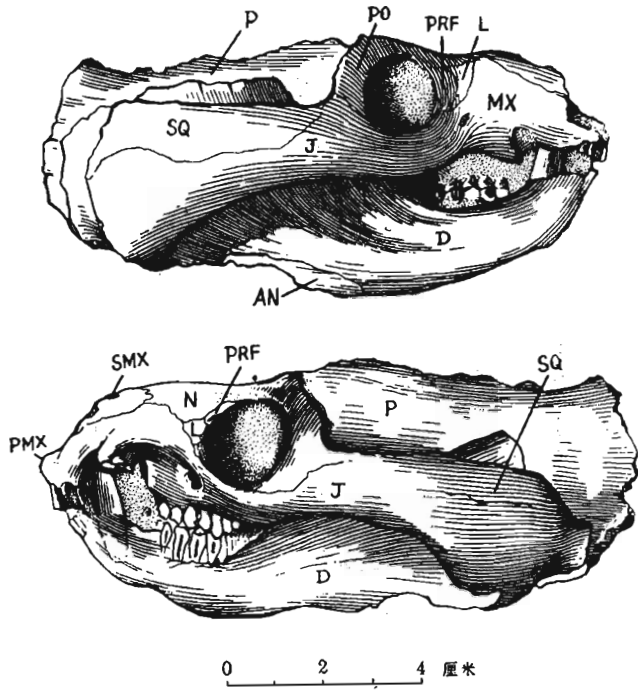


Fig. 3. *Sinognathus gracilis* Young (gen. et sp. nov.) Skull in right side (upper figure) and in left side (lower figure) views. 2/3 nat. size.

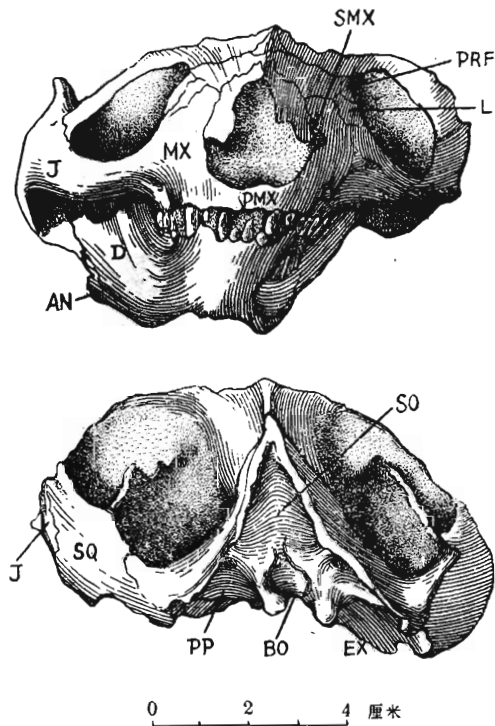


Fig. 4. *Sinognathus gracilis* Young (gen. et sp. nov.) Skull in anterior (upper figure) and posterior views. 2/3 nat. size.

course no crown part of all teeth are visible. The tooth number is probably $I \frac{4}{2}, C \frac{1}{1}, Pc \frac{7}{7}$. Judging by the preserved part of the incisors they are subequal in size. The canines are strongly built. Seven teeth can be seen actually in both upper and lower ones, but it is probable that one more may be concealed by the jaws. The middle ones are larger than those of both ends of tooth row. In some of the middle teeth the middle main cusp can be clearly observed. All the teeth are apparently single-rooted.

Measurements (in millimeters)

Maximum length from the tip of the skull to the posterior margin of the interparietal ..	119
Length from the tip of the skull to the posterior margin of the foramen magnum ..	113
Length of the skull from the tip to the posterior margin of the postorbital ..	64
Length from the tip of the skull to the anterior margin of the orbit ..	43
Length of the skull from the posterior margin of the postorbital to the posterior margin of the squamosal ..	61
Breadth of the skull across the jugals ..	93
Minimum breadth of the skull before the orbits ..	35
Breadth across the parietals ..	18
Interorbital breadth ..	32
Length and the breadth of the temporal opening ..	44 × 41 (right side)
Length and breadth of the orbit ..	19 × 23 (right side)
Length of the lower jaw ..	108
Height of the lower jaw (right) at the middle of the tooth row ..	14

Determination and Discussion

In the foregoing description, I have made use of several genera of South Africa and South America of the nearly same age. The related Russian genera are apparently too old in age for being considered seriously. It is obvious that the here described form belongs to the family Cynosuchidae as the both similar genera *Thrinaxodon* and *Sysphinctostoma* belong to this very family. But our form differs from the both not only by its much larger size but also by many other anatomical details. Our form is at once strikingly characterized by the relative shortness of the prepostorbital part and consequently the short snout, the weakly constriction of the snout, the peculiar shape of the nasals, the triangular and the smallness of the frontals and the robustness of the jugal and the large and almost square shape of the supratemporal openings. The sharp edged parietal crest and the apparently absence of the parietal opening are features worth to note. Some of the characters may be noticed in other genera, as for instance the shape of the frontals and the robustness of the posterior part of the skull look very similar to those *Belesodon*. But consider all the characters as a whole the Shansi form distinguishes from those remarkably. It is thus quite obvious that we have to deal with a new form for which the name *Sinognathus*, gen. nov. is proposed. The specimen at my disposal represents the type species of this new genera with the name *Sinognathus gracilis* sp. nov. introduced to the literature, the diagnosis of which is already stated

above.

Our form is evidently less primitive than the *Thrinaxodon* which is characterized by the long stretched snout and slenderness of the general architecture of the skull. But the Shansi species is by no means more specialized than *Sysphinctostom*. The jugal of our form for instance is quite normally built.

The robustness of the posterior part of the skull resembles the latter genera of the family Diademodontidae especially *Gomphognathus*. It would be not impossible that the Chinese form represents one of the earlier cynodonts from which may bear some relationship with such omnivorous forms. Unfortunately the structure of the teeth of our form is not clearly known, so that it is premature to make a definite conclusion.

The present form represents the first record of Cynodontia in China and added also an interesting member of the *Sinokannemyeria* faunas of Shansi. Stratigraphically it was found higher above the level with *Neoprocolophon* and *Chasmatosaurus*. Together with this the pseudosuchian, *Shansisuchus*⁽¹⁾ makes also its first appearance. It is thus very probable that, as in South Africa, we have both *Neoprocolophon* zone and *Sinognathus* zone developed in China which correspond with the *Procolophon* zone and *Cynognathus* zone of S. Africa respectively. The *Lystrosaurus* zone is so far not recorded in Shansi, although we have trace of *Chasmatosaurus* there which may extend higher to upper part of lower Triassic. As already known this zone is well represented in Sinkiang.

The level with *Sinognathus* represents very probably the upper most lower Triassic or the lower part of the Middle Triassic.

(1) To be described later.

References

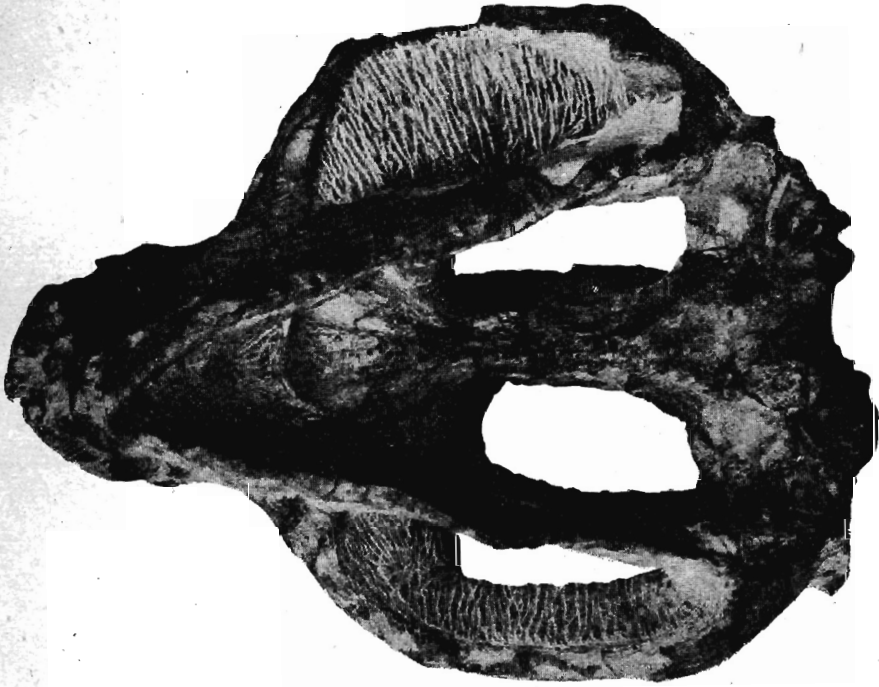
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EXPLANATION OF PLATES I—III.

- Plate I. *Sinognathus gracilis* Young (gen. et sp. nov.) Skull and lower jaws in dorsal and ventral views. Nat. size.
- Plate II. *Sinognathus gracilis* Young (gen. et sp. nov.) Skull and lower jaws in right and left side views. Nat. size.
- Plate III. *Sinognathus gracilis* Young (gen. et sp. nov.) Skull and lower jaws in posterior and anterior views. Nat. size.

Young: Cynodont of China

Plate I

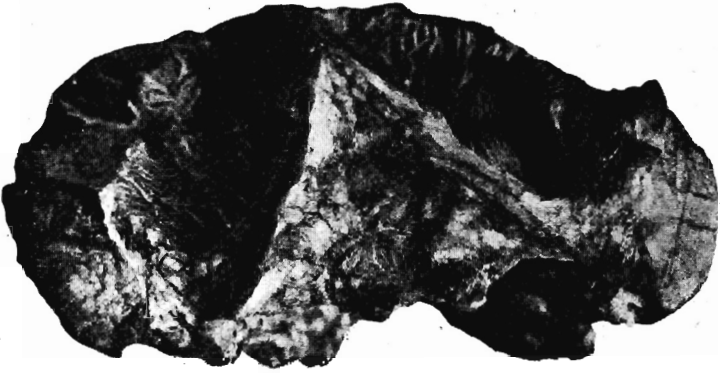


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