

## ON A NEW STEGOSAURIA FROM SZECHUAN, CHINA

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In 1957, a field party of the Geological Survey of the Bureau of Petroleum of Szechuan headed by Mr. Y. W. Kuan had collected some very interesting specimens which represent apparently the first sure and best record of the presence of Stegosauria in China. Traces of them were repeatedly reported (Wiman, 1929; Bohlin, 1953 and Young, 1958), but they were only known by a few vertebrae and the spine and in addition many localities are less sure. On the other hand, the present collection was obtained by field geologists and done *in situ* and the material at disposal is rich enough for getting a satisfactory conclusion of the animal.

The writer is deeply indebted and thankful to the authorities of the Bureau of Petroleum for gifting this valuable material to our Institute and for allowing him to make the following description.

## DESCRIPTION

## Order Stegosauria

## Family Stegosauridae

Genus *Chialingosaurus* gen. nov.

With the diagnosis of the type species *Chialingosaurus kuani* described below:—

*Chialingosaurus kuani* sp. nov.

**Material:** Six vertebrae, a typical spine, and probably another two spines, middle part of a left scapula, both coracoids, both humeri, a right radius, a distal part of right ischium, a left femur and metatarsal III and a few fragments of limb bones. All the enumerated specimens belong apparently to a single individual. It is also evident that the right side of the animal is much better preserved than the left side V. 2300.

**Horizon and locality:** Middle or lowest Upper Jurassic from Taipingtsai, Pinganhsiang, Yunghsing, Chuhsien<sup>1)</sup>, some 200 kilometers N. of Chungking, Szechuan. Field number: 57—1—F04.

**Diagnosis:** Stegosauridae with slenderly built skeleton. The plate-like spine rather small. Anterior limb relatively long. Ratio between Humerus and Femur 1.62 and

1) 渠县湧兴区平安乡,太平寨。

takes an intermediate position of *Scelidosaurus* and *Kentrurosaurus* but more close to the latter form. Beam of humerus well developed. Femur straight and slender without fourth trochanter.

**Description:** According to the information given by the discoverers of the specimens they were found from the beds of purplish mudstone so commonly distributed in the Red Basin of Szechuan but nothing can be added about their stratigraphical relationship. Although they were found quite disorderly in the beds, it is evident that all the bones were certainly belonging to one individual. Instead of the slenderness of the bone, we have to deal with an adult individual as shown by the structure and size of the vertebrae and the limbs.

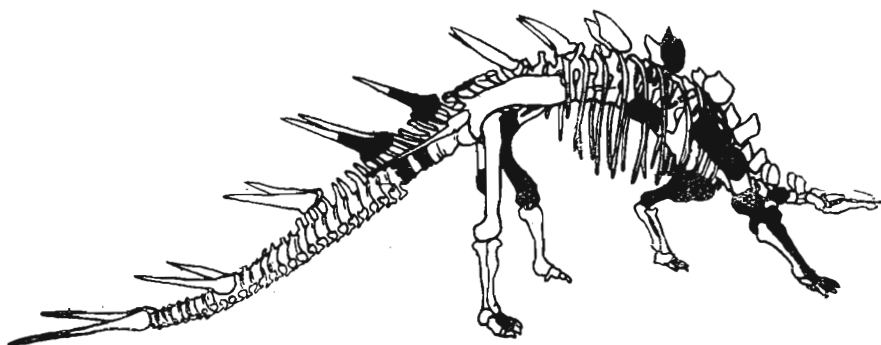


Fig. 1. Skeleton of *Kentrurosaurus aethiopicus* Hennig. The inked part showing the specimens of *Chialingosaurus* described in this paper.

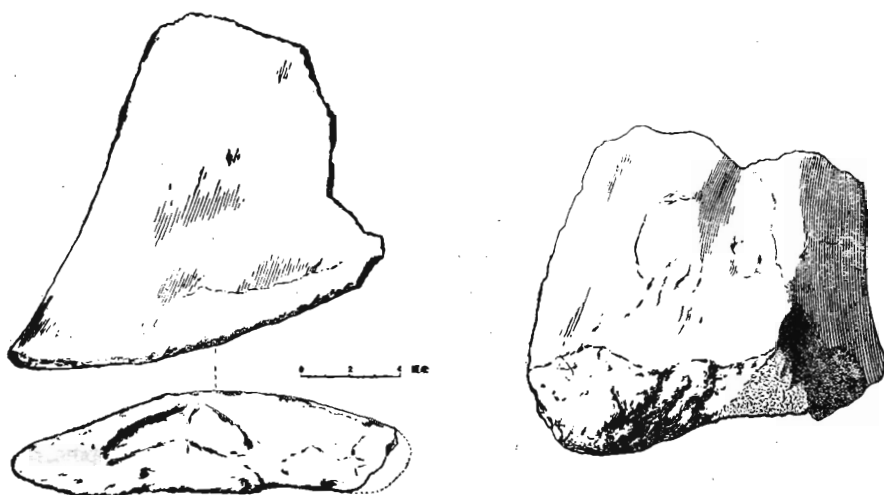


Fig. 2. *Chialingosaurus kuani* gen. et sp. nov. Two spines in lateral views. (Scale: in cms.).

**Vertebrae:** There are six more or less fragmentary vertebrae at my disposal. They are two posterior cervical, two posterior dorsal, one anterior caudal and one posterior caudal. Only one of the cervical vertebra with the neural arch incompletely preserved (but distorted) while the others are represented by the broken centrum only. On the whole, the structure of the vertebrae is much the same as those of the typical stegosaurs. The neck and the dorsal vertebrae are amphicoelous while the caudal ones are amphiplatyan. The laterally compressed and upwards extending nature of the dorsal vertebra shows that the neural spine must be very high as in stegosaurs.

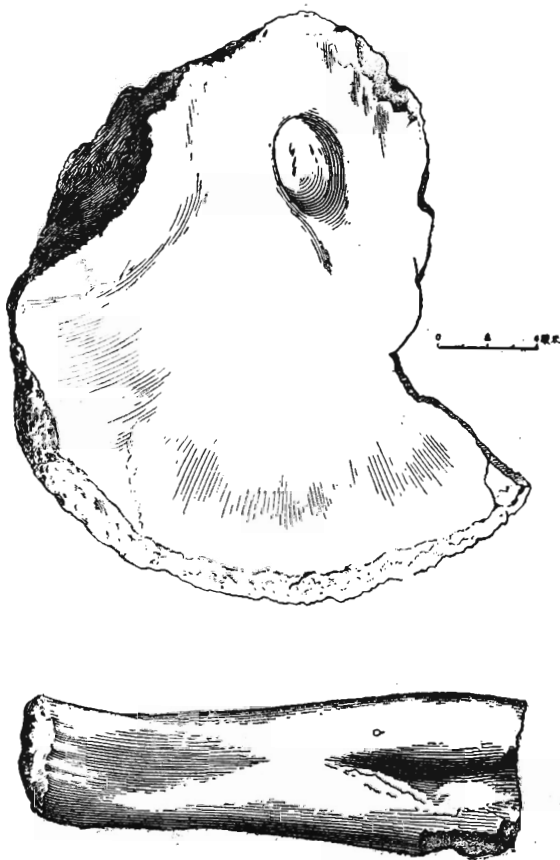


Fig. 3. *Chialingosaurus kuani*, gen. et sp. nov. Right coracoid in external view (upper) and distal part of pischium in external view. (Scale: in cms.)

Some fragments of ribs are present.

**The dorsal spine:** The better preserved single dorsal spine is present with the superior and posterior part broken. It belongs to the left side of the dorsal region. The base of the spine is deeply grooved. The outline of it is straight along the inner side

and weakly convex along the outer side. The anterior angle at the base is rather acute, forming ca. 55 degrees. It seems that the spine is also rather slender as compared with *Stegosaurus* and *Kentrurosaurus*.

The other two curious bones are most probably spines too, as they are certainly neither limbs nor pectoral or pelvic girdles. On the contrary, the rugged surface of the base and the sharply narrowed constriction towards the tip indicate that they are spines. On both specimens only the basal part are preserved. The better preserved one shows a thick (?posterior) and sharp (?anterior) border. The bone is also asymmetrical with one side (external) slightly convex while the other side weakly concave (inner). This structure is also showing at the broken part of the bone. In general appearance it shows some similarities with that of *Hoplitosaurus*. It is of course difficult to distinguish a fragmentary spine of stegosaurs and that of nodosaurs. Both the spines belong probably to the anterior caudal part.

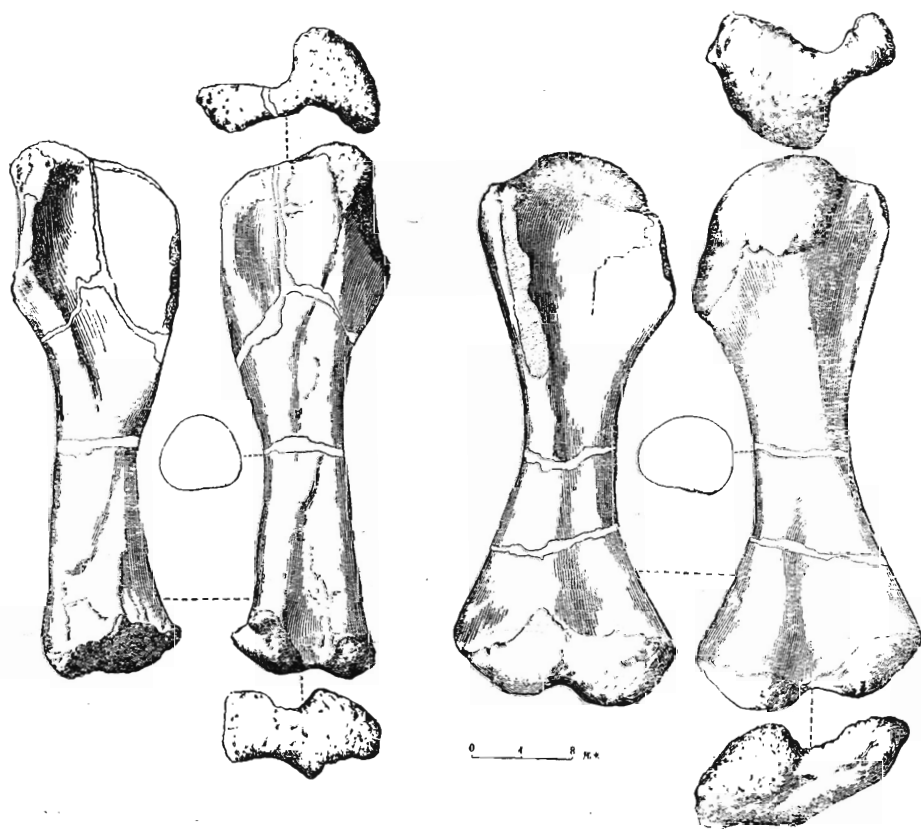


Fig. 4. *Chialingosaurus kuani* gen. sp. nov. Left and right humerus in anterior and posterior views with the outlines of the proximal and distal ends, (Scale: in cms.).

**The pectoral girdle:** The scapula is only represented by the part of the beam. The distal expansion is fairly recognizable. The faint ridge at the external side is well developed as in *Kentrurosaurus*. It is a right scapula. Breadth at the proximal broaden part, 77 mm.

Both *coracoids* are present. The right one is better preserved, only the anterior border is partly broken. A third fragment may belong to the left side but we failed to find the

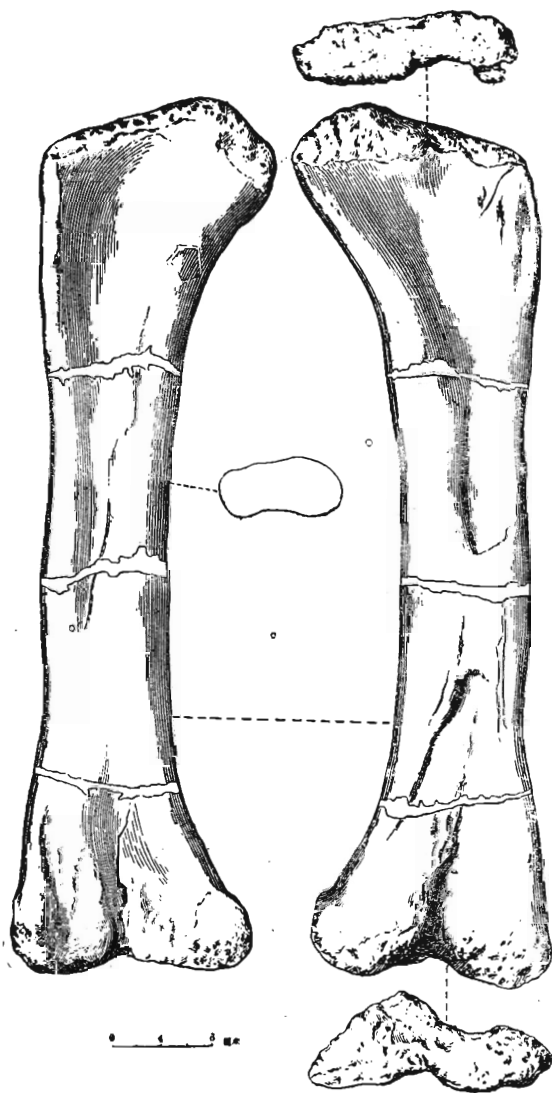


Fig. 5. *Chialingosaurus kuani* gen. et sp. nov. Left femur in posterior and anterior views with the outlines of the proximal, distal and the middle cross-section. (Scale: in cms.).

proper position. The coracoid looks very similar to that of *Kentrurosaurus* but more rounded in outline. The coracoid foramen is fairly large and is quite apart from the scapula border at the external side.

**The anterior limbs:** Both *humeri* are present, the right one is better preserved. The part near the condyle and along the margin of deltoid crest of the left one are damaged while the right one is intact. (The deltoid crest is also a little damaged.) The humerus is a short and massive bone as in stegosaurs. But in our form it is comparatively longer. The both ends are also less expanded, especially the proximal end. Consequently our humerus looks more long stretched than both the genera *Stegosaurus* and *Kentrurosaurus* and so to speak a real beam about 100 mm long recognizable. Such features indicate that our form is more primitive and somewhat similar to *Scelidosaurus*. Its length ratio with the femur is 1.62, intermediating that of *Scelidosaurus* (1.42) and *Kentrurosaurus* (1.65) but more close to the latter. In any way our form is far apart from the true *Stegosaurus* (2—2.3).

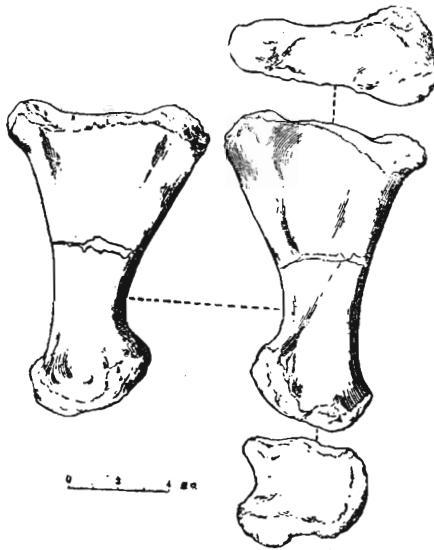


Fig. 6. *Chialingosaurus kuani* gen. et. sp. nov. Mt. III in lateral views with the outlines of both ends. (Scale: in cms.).

The lower arm is only represented by the right *radius*, the distal end of which is broken. It is also more slender as compared with that of *Kentrurosaurus*, especially by the less expansion of the distal part of the bone.

**The posterior limb:** A broken bone may represent the distal part of a right ischium. Preserved length 195 mm. The upwards gradual expansion and the general configuration confirm this determination. The distal end is rather thick with a half moon shaped distal end the straight side of which is for connecting with the left one.

The femur is represented by the left side only. It is long stretched and slender. It is straight and without clear trace of the fourth trochanter. All these features are typical for stegosaurs. Comparing with *Stegosaurus* and *Kentrurosaurus* the condyle is feebly developed. Our bone is also comparatively flat. Its ratio with the humerus is already stated above.

Only one piece of bone is referred to metatarsals. It is probably the Mt. III. This bone is so sharply laterally compressed that I hesitate to refer it to the present form. But since there is no trace of the presence of a second form in the present fauna and furthermore its slenderness agrees also with the general characters of the other limb bones, it is quite probable that this very bone belongs actually to the new form.

#### Measurements (in millimeters)

<i>Vertebrae</i> : Length of the neck vertebra .....	70
"    "    "    caudal vertebra .....	50
<i>Spines</i> : Length of the base of the spine .....	160
<i>Coracoid</i> : Length perpendicular to the scapula border .....	225
<i>Humerus</i> : Length .....	423 (left); 425 (right).
<i>Radius</i> : Estimated length .....	250
<i>Femur</i> : Length .....	690
<i>Metatarsus</i> III: Length .....	120

#### Determination and Discussion

The spines are so characteristic for stegosaurs that it is superfluous to discuss anymore about its belonging to this suborder. Although the specimens from Chuhsien show many primitive characters, it is still out of question to consider them as true member of the family Scelidosauridae. The spines are too strongly developed and the limbs are too stout for this family.

On the other hand, most of the features described above are justified to refer the present form to the family Stegosauridae. In this family the genus *Stegosaurus* of N. America is too specialized for being considered closely. The ratio between the humerus and the femur of this genus is 2—2.3. That means the humerus is very short as compared with the femur. In this point our form is very close to the genus *Kentrurosaurus* of Africa.

The ratio between the humerus and the femur is quite near to that of the African form but the limbs are more slender. Phylogenetically our form may represent the so far most primitive type of Stegosauridae. It is therefore clear that we have to deal with a new member of this family. I like to name the Chuhsien specimen as *Chialingosaurus kuani*, new genus and new species. The generic name refers to one of the four main rivers in Szechuan, the Chialingchiang. The specific name is dedicated to Mr. Y. W. Kuan who was responsible for this interesting discovery.

Nearly all the known vertebrate fossils, especially the dinosaurian remains found from the Red Basin of Szechuan indicate the upper Jurassic age instead of Lower Cretaceous. But the find of Chuhsien leads me to hesitate that some older strata may occur as indicated by the vertebrate remains. Of course, both *Stegosaurus* and *Kentrurosaurus* are Upper Jurassic in age and our form seems to be standing very close to the latter genus as judged by the ratio of humerus and femur. Nevertheless, the low number of the ratio, the well developed beam of the humerus, the unusual slenderness of the femur and the relative light structure of the spines etc. indicate that our form differs from the African form in many respects, all of which point to the direction of primitiveness and not to progressive side. Unfortunately, no other geological documents available to support our idea. I thus tentatively regard the *Chialingosaurus kuani* as Upper Jurassic and with the possibility reserved that the Middle Jurassic age of the find is not excluded.

The so far known stegosaurs known in China may be listed as follows.—

<i>Stegosauridae</i> indet.	Single spine	Ningchiakou, Mengyin	Wiman.
"    "	"    "	Hsichuefu,    "	Young.
"    "	"    "	Locality unknown, Laiyang,	Young.
<i>Stegosaurides excavatus</i>	A couple of vertebrae	Huihuipu,	Bohlin.
	and base of a spine	Kansu.	
<i>Chialingosaurus kuani</i> .	Vertebrae and spines	Chuehsien.	Young.

The above list shows that the remains of stegosaurs are known from widely distributed places in China. Unfortunately, most of them are poorly known. The Mengyin specimens are probably Upper Jurassic or Lower Cretaceous. The Laiyang specimen is probably Upper Cretaceous as judged by the hadrosaurus so well known from the Laiyang area. *Stegosaurides excavatus* is Upper Cretaceous according to Bohlin. In this case, the stegosaurs are stratigraphically also well represented. It is beyond doubt that many new stegosaurs will be recorded if only more thorough work is going to make.

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