

古生物誌新丙種第十二號

總號第一三三二冊

楊鍾健著

巨型祿豐龍(新種)及許氏祿豐龍之新加材料



中華民國三十六年五月

經濟部中央地質調查所印行

(學術研究與國立中央研究院  
國立北京大學湖南地質調查所合作)

(北平新記印書館承印)

# 巨型祿豐龍(新種)及許氏祿豐龍之新加材料 (中文節要)

楊鍾健著

自許氏祿豐龍一書發表以後，已歷三年。由祿豐所採之蜥龍化石，適均修理完畢。因材料尚多，特先擇祿豐龍加以研究，其他材料，只有俟之異日。

當作者發表祿豐蜥龍化石簡目時，曾以盤骨為代表之 V29，作為主型，而創立巨型祿豐龍一名。以後續修出之 V82，保存完整，代表全身之大部，故今以 V82 作為巨型祿豐龍之主型，加以詳盡記述，而以 V29 及其他較完全者，附之于後，作為副型。二者比許氏祿豐龍均約大三分之一，而骨格上之構造則相近似，然本書之主要部分即為 V82 之詳細描述。

巨型祿豐龍之特性，可得而言者如次：脊椎骨碩大，其脊心大而短，肩架骨甚灣曲。上臂骨與尺骨等均短而粗。手亦短，盤骨粗大。坐骨長，胸骨較小，恥骨細長，其末端較粗，下腿骨較長，為中趾骨之兩倍。前後足之構造與許氏祿豐龍相近。前肢較後肢特短。

上述之巨型祿豐龍，產自祿豐大冲之(沙灣東北)下祿豐系之深紫色層，與許氏祿豐龍同層。經詳細比較，知 V82 實為祿豐龍之另一種，比許氏祿豐龍約大三分之一，故名曰巨型祿豐龍，亦可與歐洲之數種板龍相比，備見英文原文。

本書于主要紀述 V82 之巨型祿豐龍主型之外，尚有以下之紀載。  
保存較佳之巨型祿豐龍如 V29, V98 1 者，雖材料不如前者之全，然依其盤骨之性質，均歸

于此類。

其次曾簡要記述其他較破碎之巨型祿豐龍，雖甚破碎然以其相當部分與主型相比，亦均無大謬。

其次為新修理之許氏祿豐龍之記述，大部材料片段，為前所著許氏祿豐之補充而已。

其次為關於祿豐龍屬牙齒之研究，許氏祿豐龍具有頭骨下顎及牙齒，而巨型祿豐龍則無，惟由同一地點所發現之若干上下顎比許氏祿豐龍之牙為大，而構造相近，故以之歸于巨型祿豐龍，當甚合宜。且其產地甚近，或有同為一個體之可能。此外尚有若干較大之牙，亦歸此種。至歸于許氏祿豐龍者，僅一標本而已。

由以上之研究，所有由中央地質調查所脊椎動物化石研究室所採集自祿豐之祿豐龍，（至現在為止）均已包括無遺。如以其所代表之個體計，許氏祿豐龍共十，而巨型祿豐龍則有二十二之多，共為三十二。上述之標本大部份產于下祿豐系下部之深紫色層，然亦有少數自上部之深紅層者。其地點主要為沙灣與大冲二地，然黃家田二鎖山，高家後頭，黑龍潭等地亦有之，除 V15, V82, V29, V98 等以外，餘均較破碎或只由趾骨或牙齒為之代表，牙齒之類，為數極少，當由于不易保存或採集困難之故。大多數標本為二十七年所採者，其一部僅為山坡所檢拾者，故實際個體之數不易確定，其彼此連繫或亦有問題，但無論如何，對於一般結論當不生影響。

三十三年三月十五日北碚

# On *Lufengosaurus magnus* Young (sp. nov.) and Additional Finds of *Lufengosaurus* *huenei* Young

BY

C. C. YOUNG

(Laboratory of Vertebrate Palaeontology, Geological Survey of China)

With 14 Textfigures

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## INTRODUCTION

Three years have elapsed, since the writer's manuscript on the *Lufengosaurus* was sent to publication (Young, 1941). In the mean time, the preparation of the Lufeng Saurischian fauna has been completed in the late summer of 1943. When the present writer made the preliminary list on the Lufeng vertebrate fossils, the name *Lufengosaurus magnus* Young (sp. nov.) was introduced (Young, 1942, p. 238), based on a part of early prepared skeleton including the complete pelvic girdle with sacrum II and III and the first caudal vertebra. This skeleton is at least one third larger than the type of *Lufengosaurus huenei*. Subsequently, however, a much better skeleton of apparently the same type has been prepared. It consists of a series of vertebrae, nearly complete pectoral and pelvic girdles and most part of the fore and hind limbs (Cat. No. V82). In order to give a most satisfactory diagnosis of this new species, the latter now is considered as the type, while the former as co-type. Both are described in the present paper.

In addition to the above mentioned two individuals, there are a series of skeletons, mostly fragmentary, but some of them are better preserved such as V98, V267 etc.... which can be referred to this species with more or less confidence. They are also described in this occasion.

Since the writer's monograph on *Lufengosaurus huenei* has been published, a series of additional finds of the same form were prepared, but mostly in fragmentary state of preservation, they were also described here as a supplementary part of the mentioned species.

Regarding the jaws and isolated teeth, only those referred to *Lufengosaurus huenei* are sure, owing to a possible comparison with the type, of which the connection of the skull and the skeleton is beyond doubt. Since there are no teeth found in association with the skeleton of V82, those referred to *Lufengosaurus magnus* are only a suggestive one.

With the present paper, all the finds of *Lufengosaurus* with its two species discovered in 1938 and 1939 are included.

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#### DESCRIPTION *LUFENGOSAURUS MAGNUS* YOUNG (SP. NOV.)

Genus *Lufengosaurus* Young

*Lufengosaurus magnus* Young (sp. nov.)

**Material:** Three posterior neck vertebrae, six anterior dorsal vertebrae, one posterior dorsal vertebra, three sacral vertebrae and eight anterior caudal vertebrae with chevron bones and nearly complete pectoral and pelvic girdles and fore and hind limbs. Cat. No. V82.

**Diagnosis:** Size one third larger than *Lufengosaurus huenei*. Vertebrae robust. Centrum large and short. Scapula strongly bent. Humerus and radius extremely short and massive. Hand shortens. Pelvic girdle massive, ilium long. Ischium comparatively weakly built. Pubis long and slender with thickened distal end. Tibia relatively long as compared with the femur. Mtc. I one half the length of the tibia. Both the hand and the foot are built in the same way as in the case of *Lufengosaurus huenei*. Anterior leg much shorter as compared with the whole posterior leg.

**Horizon and locality:** Dull purplish beds of the lower Lufeng Series, same level as *Lufengosaurus huenei* from Tachung., ca. one kilometer N. E. of Shawan, Lufeng, Yunnan.

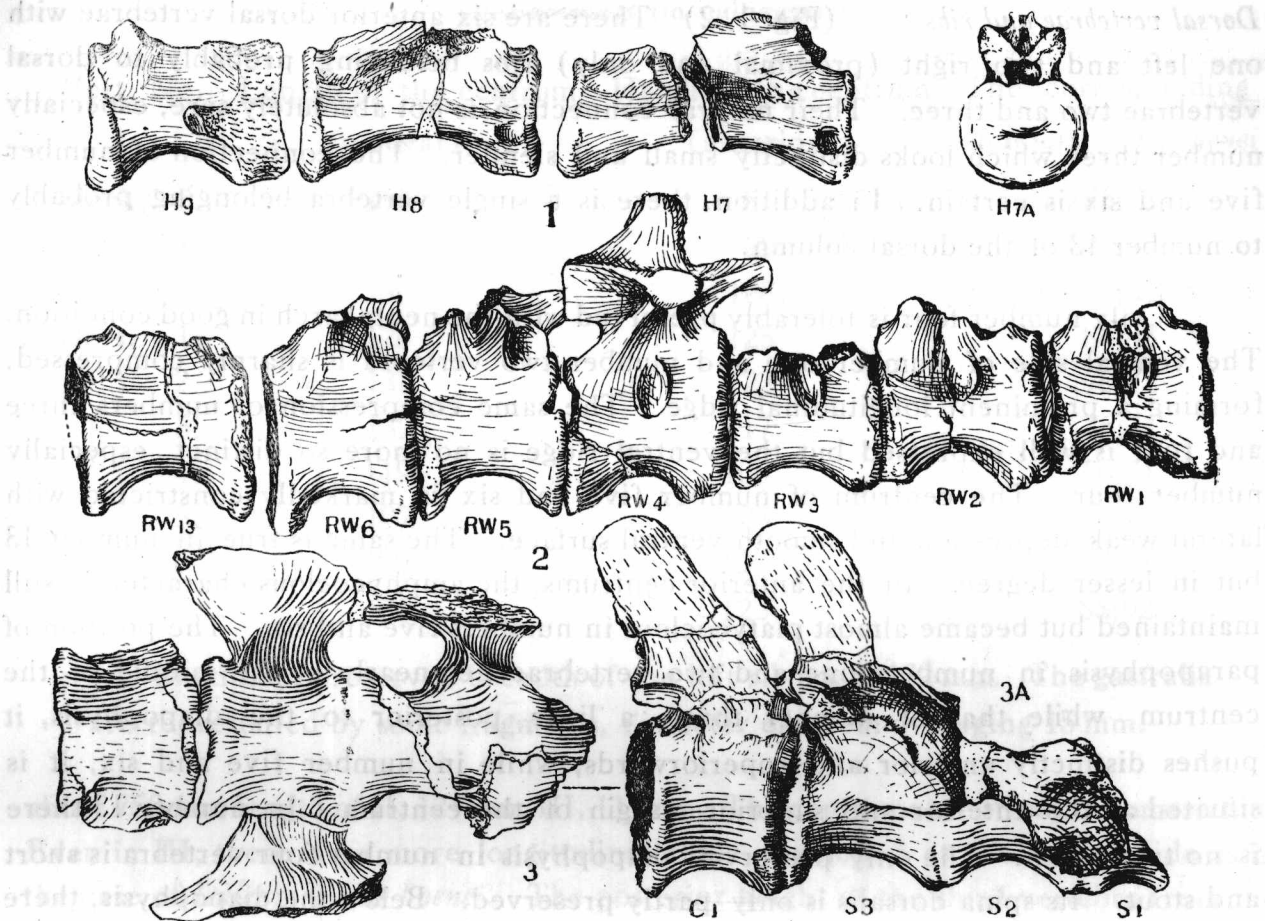


Fig. 1

DESCRIPTION

Vertebrae, ribs and chevron bones. (Figs. 1—2)

*Neck vertebrae:* (Fig. 1, 1) Three preserved neck vertebrae belonging to the posterior part of the neck, probably representing 7th to 9th one. The first one (No. 7) is broken at the middle constriction of the centrum. All the elements above the centroms are broken. The trace of diapophysis can be observed in the first two ones. They are massive and long stretched with both typical amphicoelous ends. The distinct ventral longitudinal ridge as in the case of *Lufengosaurus huenei* is well developed. The last one represents the shortest vertebra of the three neck vertebrae.

*Dorsal vertebrae and ribs* : (Fig. 1, 2) There are six anterior dorsal vertebrae with one left and two right (proximal end only) ribs belonging probably to dorsal vertebrae two and three. Their natural connection is not absolutely sure, especially number three which looks distinctly small and slender. The connection of number five and six is certain. In addition, there is a single vertebra belonging probably to number 13 of the dorsal column.

Only number four is tolerably preserved with the neural arch in good condition. The ventral side of number one and number two vertebra is sharply compressed, forming a prominent longitudinal ridge. The same compression of numbers three and four is well expressed but the ventral ridge is no more so distinct, especially number four. The centrum of number five and six is markedly constricted with lateral weak depression and smooth ventral surface. The same is true in number 13 but in lesser degree. In the anterior centrams, the amphicoelous character is still maintained but became almost platycoelous in numbers five and six. The position of parapophysis in numbers one and two vertebrae lies nearly at the middle of the centrum, while that of number three, a little posterior to the diapophysis, it pushes distinctly anterior and superiorwards, while in number five and six, it is situated at the anterior and superior margin of the centrum. In number 13 there is no trace of it. The only preserved diapophysis in number four vertebra is short and stout. Its spina dorsalis is only partly preserved. Below the diapophysis, there develop two bony lamella, one directs straight downwards, and the other more posteriorly as support of the diapophysis.

The ribs marked as 3 belong probably to number three vertebra, while the other right one with the tuberculum broken belongs to the following vertebra. The size fits well with their corresponding vertebrae.

All the neck and dorsal vertebrae are much bigger than the corresponding ones of *Lufengosaurus huenei* and look stout and robust.

*Sacrum and post sacral vertebrae* : (Fig. 1, 3) The three still connected sacral vertebrae have the first one badly damaged, being only indicated by the posterior part of the centrum. Even the sacral III is only represented by the damaged centrum. The sacral I is in tolerable preservation with the neural arch and the sacral ribs preserved, they are strongly confused. Total length of the three sacral is estimated

## Measurements (in millimeters)

Vert. No.	Length of the centrum (ventral)	Height of the centrum (anterior)	The corresponding numbers of <i>L. huenei</i>
Neck, 7.	?192	81	125;72
“ 8.	194	99	107;76
“ 9.	156	108	105;81
Dors. 1.	128	125	84;88
“ 2.	137	122	70;71
“ 3.	132	117	76;71
“ 4.	119	106	76;71
“ 5.	107	128	76;72
“ 6.	109	127	77;71
“ 13.	132	122	88;92

Maximum preserved breadth of the left rib no. 3, 132 mm. The gastralia are represented by some fragments, diameter of them averaging 15 mm.

about 750mm; length of II, 124mm; III, 117mm. The centra are strongly constricted. Even in III, there is no more longitudinal ridge developed at the ventral side as in the case of *Lufengosaurus huenei*. The posterior height of the third vertebra from the lower posterior margin to the tip of the spina dorsalis is 300 mm. The latter shows a distinct distal thickening. Only the postzygapophysis of third sacral is preserved, the facet of which is very steep, being almost in vertical position. The sacral rib of II and III is well preserved, especially in the right side. There is formed a large hole between the centrum and the ilium, if looked from the top or below. The diapophysis and the parapophysis are in co-ossified state with the sacral ribs.

There are eight surely consecutive (only the small portion of the damaged nos. 3 and 4 is rather doubtful.) *post sacral vertebrae*, with seven chevron bones (Fig. 1, 3, C<sub>1</sub>; Fig. 2, 1). In none of them, the vertebra is completely preserved, the spina dorsalis of nos. 3, 4, and 6 are gone. The diapophysis is only shown in nos. 2, 5, 7, and 8. Comparing the corresponding part of the anterior tail of *Lufengosaurus huenei*, there is no essential difference worth mentioning, excepting that the total length of the eight vertebrae of our form is about one third longer than the same

anterior ones of the former, consequently, they look very massive. First in the number six the height is subequal to the length of the centrum. In the number eight vertebra, the length exceeds distinctly the height. The ventral furrow becomes first distinct in number 3 vertebra. In the posteriorwards directed spina dorsalis, the distal thickening can still be observed in the last preserved vertebra, of course rather faint. The basal part of the right diapophysis of the number 8 vertebra shows an abnormal swelling which is probably pathological.

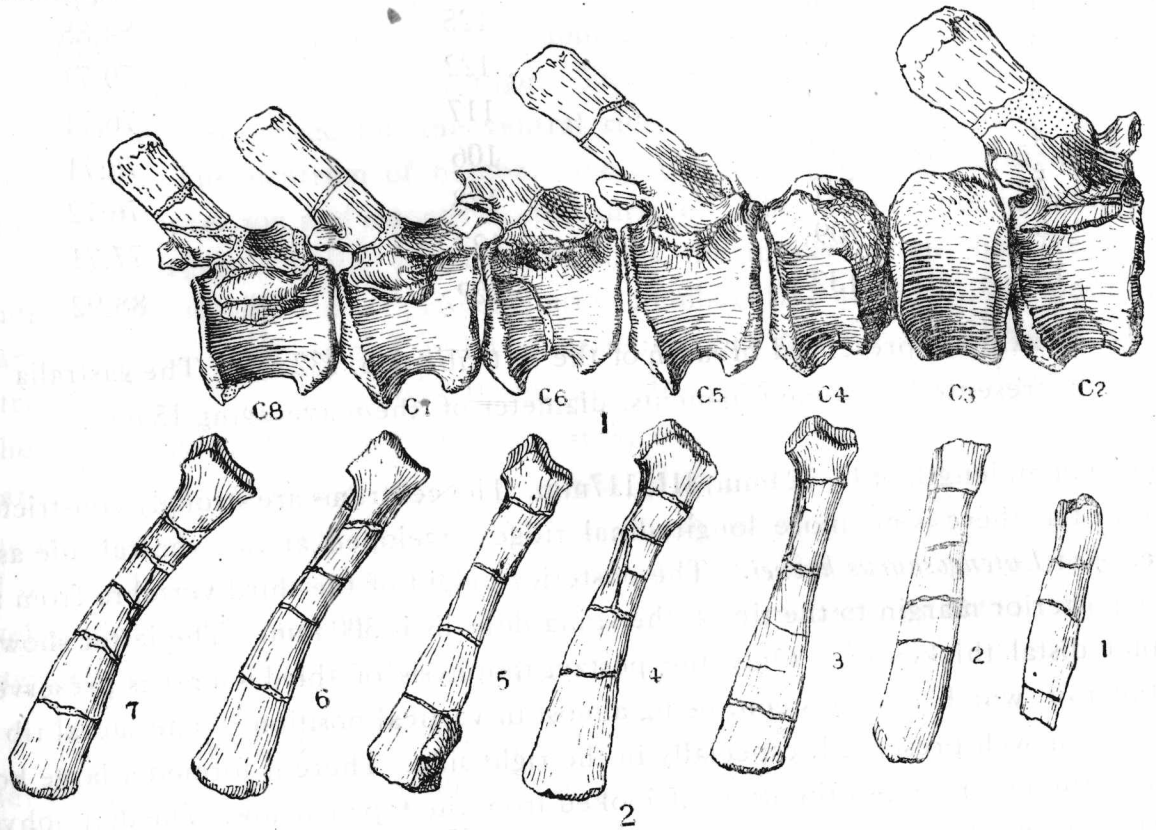


Fig. 2

Corresponding to the big anterior caudal vertebrae, the *chevron bones* (Fig. 2, 2) are also much stout. Probably they start from the intercentral space of the first and second caudal vertebrae. As in the case of *Lufengosaurus huenei*, it seems to be no trace of any appendage structure between the last sacral and the first caudal vertebra. As usual, the first chevron bone is small and slender, both ends of it (as well as the proximal end of the second one) are broken. The order of the following ones tentatively arranged as shown in Fig. 2, 2.

## Measurements (in millimeters)

Vertebrae No.	Length	Anterior height of the centrum	Total posterior height	Length of the haemapophysis
1.	102	141	310	?210
2.	97	139	290	?280
3.	?91	?135	—	285
4.	290	?121	—	300
5.	100	118	280	290
6.	100	128	—	310
7.	107	95	250	310
8.	106	94	220	

To give a general feature of the vertebrae of the present form, the following characteristics seem to be very important: Bigger size, posterior position of the parapophysis of the anterior dorsal vertebrae, and the coossification of the sacrum. Otherwise they agree essentially with those of *Lufengosaurus huenei*.

## Pectoral girdle and fore limb. (Figs. 3—4)

The *pectoral girdle* is nearly completely represented. Only the distal part of the right scapula is broken. Both coracoids are only slightly damaged. The most interesting feature of the pectoral girdle is the presence of both sterna.

The *left scapula* (Figs. 3,1) is complete and can be used as the diagnostic one. It looks short and broad as compared with that of *Lufengosaurus huenei* (Young, 1942, p. 81.), mainly due to the subequal breadth of the maximum expansion of the proximal and distal end. The maximum constriction lies nearly at the middle portion of the beam. It is strongly bent immediately above the proximal expansion. The lower posterior angle of the distal end is acute. The coracoid border is almost straight. The glenoid surface forms oval depressed surface with a projecting ridge. The right scapula duplicates all the characteristics of the left one.

The *left coracoid* is separated from the scapula, while in right one, part of the scapula sticks still in a fest way showing that both bones tend to be coossified in adult stage. The upper anterior margin of both coracoids is slightly

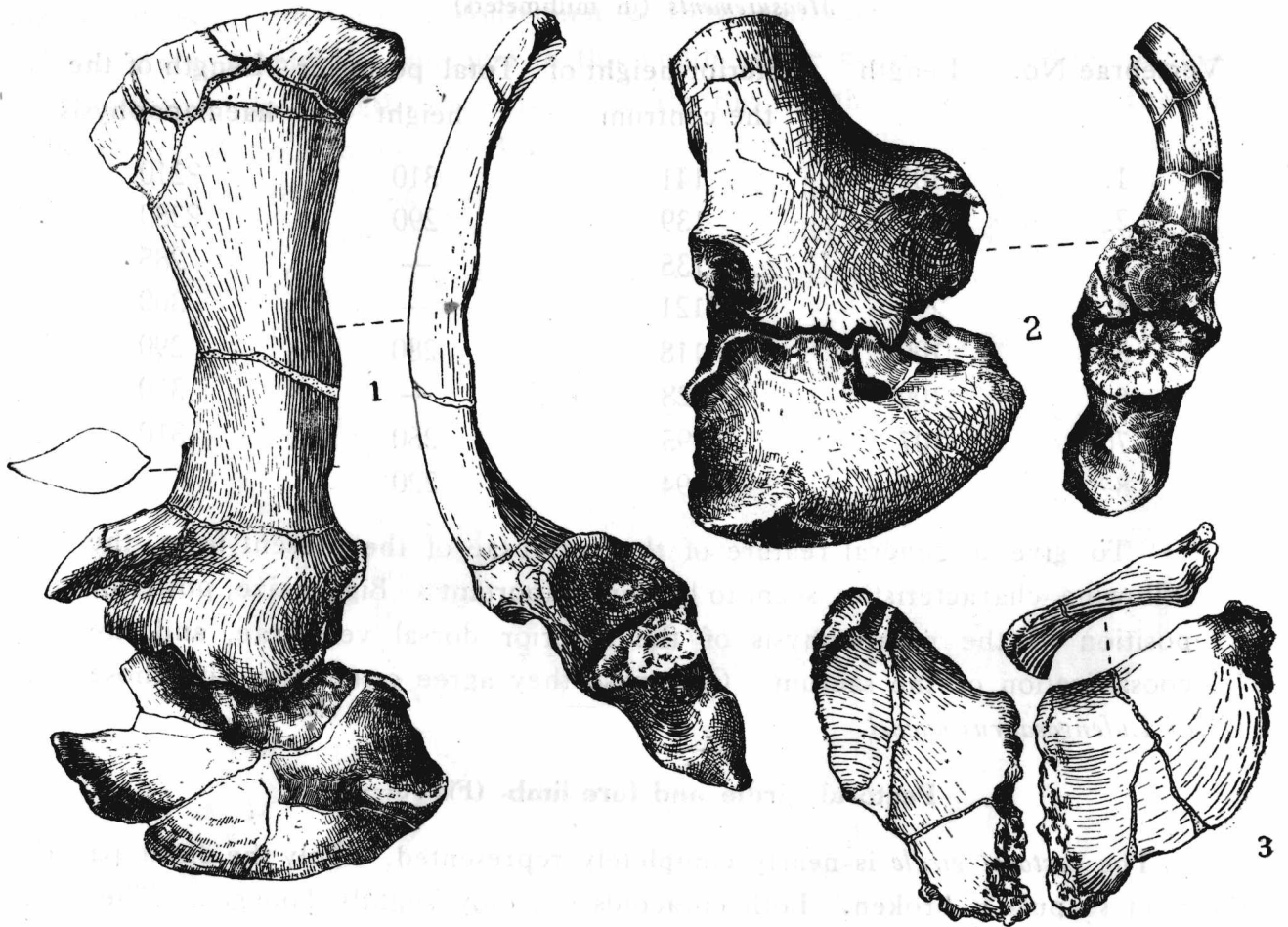


Fig. 3

damaged. (The adjacent part of the left scapula is partly broken too). The coracoid is strongly convex externally. It is relatively broader (compared with that of *Lufengosaurus huensi*).

Both *sterna* (Fig. 3, 3) are complete. They differ remarkably from the sterna of *Lufengosaurus huenei* not only by the much bigger size but also by their peculiar shape, due chiefly to the pointed extension of the anterior medial part. The shape of the bone shows thus a rhomboidal outline with the anterior external angle more obtuse. In the present orientation of the bone, the thicker end has to be regarded as the external posterior side, while the less thicker end is posteriorly and medially. The median suture forms a rough straight line, ornamented by irregular tubercles.

## Measurements (in millimeters)

	Left	right
<i>Scapula</i> :		
Maximum length .....	580	—
Maximum breadth (distal).....	260	—
Minimum breadth (middle).....	112	?112
Maximum breadth (height at the articulation).....	265	260
Thickness at the glenoid surface.....	91	91
<i>Coracoid</i> :		
Maximum height parallel to the scapula border.....	290	290
Maximum breadth perpendicular to the scapula border .....	175	195
Maximum thickness at the lower end.....	92	92
Distance from the coracoid foramen to the lower border of the glenoid surface.....	136	144
Distance from the coracoid foramen to the scapula border .....	36	36
Diameter of the coracoid foramen.....	17	17
<i>Sterna</i> :		
Maximum length (medial posterior border).....	185	185
Maximum medial length.....	188	188
Maximum length along the anterior lateral border....	285	285
Thickness (proximal).....	50	50
Thickness (distal).....	31	31

Both *humeri* (Fig. 4, 1—2) are complete. In essential, the humerus agrees in many respects with that of *Lufengosaurus huenei*. Only in our form, it is much larger, robuster and shorter. The deltoid crest bends more strongly anteriorly, forming a nearly right angle with the proximal expansion. The mentioned crest extends to the point more than one half of the entire length of the bone. At the posterior lateral side, ca. 70 mm from the margin of the deltoid crest, a ridge-like rough surface for muscle attachment is prominently developed. The beam is constricted at the point immediately below the lower end of the deltoid crest. The distal expansion approaches that of the proximal end. The ulna articular surfaces are only slightly differentiated. The depression above the condyli in both anterior and posterior side

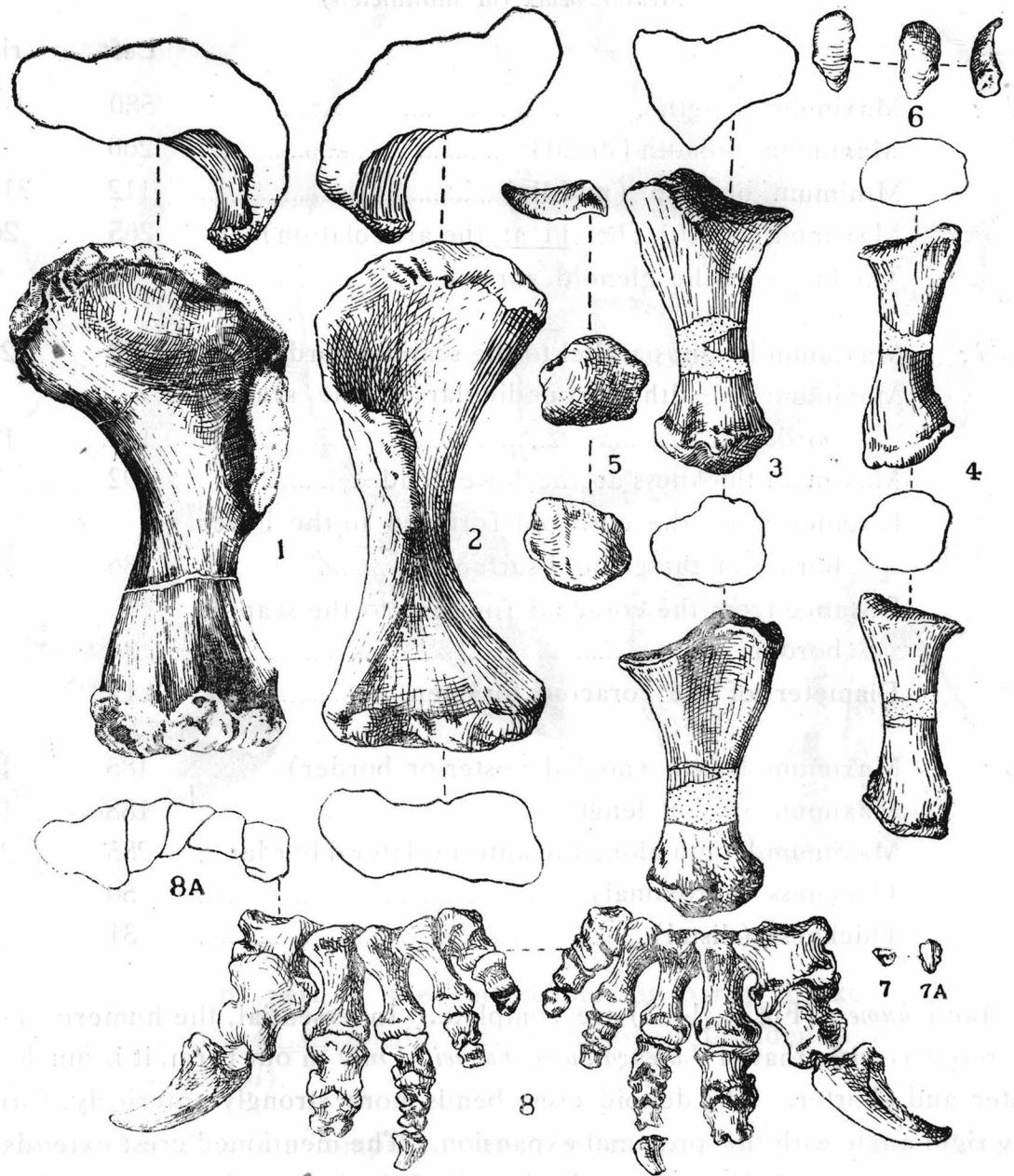


Fig. 4

is distinct and separated by narrow crest between the condyli. The stout appearance of the bone is especially expressed by the massiveness of all the articulated facets in proximal and distal ends.

Measurements (in millimeters)

	Left	right
Length .....	430	420
Proximal breadth.....	250	247
Minimum thickness below the middle of the beam (transversal)....	75	75
Distal breadth.....	175	175
Distance from the lower angle of the processus lateralis to the proximal end.....	230	210
The same to distal end.....	190	200
Sagittal length of the processus lateralis.....	107	107

The *radius* and the *ulna* (Fig. 4, 3-4) are only represented by the right side. They seem to represent the characteristic part of the skeleton. The *radius* is nearly one half the length of the humerus, while that of the *ulna* is slightly longer than the same bone. Furthermore, they are characterized by the unusual shortness of both ends, so that the constricted part of the beam looks very expressive. The upper posterior edge of the proximal end is especially thick. Contrary to the doubtful presence of the crests for muscle attachment on the medial posterior surface and the weakness of the long crest behind the proximal end at the posterior side, the other crests or protuberances are well developed. The distal end is weakly concave. The *ulna* has an unusual massive proximal part. A rough surface for muscular attachment is developed at the external side ca. 20mm below the proximal end. The distal end is strongly convex. Above it, a number of rough muscular attachments are well developed.

Measurements (in millimeters)

	Right radius	Right ulna
Maximum length.....	213	215
Diameters of the proximal end.....	90×58	133×108
Diameters at the middle of the length.....	14×37	60× 45
Diameters at the distal end.....	85×72	98× 76

The *carpals* and *hand* (Fig. 4, 6-8) are also represented only by the right side. A few bones of them are, however, missing. From the *carpus*, only the carpal I, II and probably the sesam bone are represented. All are separated from the metacarpals. The carpal I is a flat bone with roughly irregular five-sided polygonal outline.

The anterior thin point directs straight anteriorly and a medially. The thickest part lies posteriorly and laterally. The truncated posterior edge is marked by a number of depressions (a big one and a few small ones.) One similar hole is observed also at the lateral anterior side immediately above the edge. On the proximal side, a big flat surface is for the articulation with the radius. On the whole, the entire proximal surface is convex. Below the anterior medial side, the bone is curved as if for the reception of a sesam bone which is described below. The distal side is distinctly marked by a faint sagittal ridge which separates the contact surface of Mtc. I and Mtc. II. The lateral small but distinctly concave surface is for Mtc. II while the nearly flat middle part for Mtc. I. The medial border is for the sesam bone. In this way, our form differs remarkably from other known Saurischia by its lateral overlapping covering almost the entire proximal end of Mtc. II.

The carpal II is a proximally convexed and distally concaved elongated bone with the anterior part thin and the posterior border thick and truncated. It lies almost entirely on the proximal end of Mtc. III, with only a little part in connection with Mtc. II. The axis of the bone lies in an oblique direction with the transversal axis of the proximal end of Mtc. I—Mtc. V.

The supposed sesam bone is distinctly three-edged as described by v. Huene for *Pachysaurus ajax* (Huene, 1932, p. 103.) with a pointed end and truncated irregular surface which directs probably posteriorly. This bone is not only too small for the carpal III but out of consideration on account of structural reasons. It is too much edged for being the fourth carpal and other elements of the carpal bones. We thus determine it as the sesam bone. If it is correctly determined, the difference between our form and the other known Saurischians is rather evident. The bone is also rarely known in other Saurischians so far recorded.

*Measurements* (in millimeters)

<i>First carpal:</i>	Maximum anterior posterior length.....	77
	Maximum transversal breadth.....	29
	Thickness at the posterior side.....	33
	Thickness at the anterior side.....	8

<i>Second carpal :</i>	Maximum length.....	66
	Breadth .....	35
	Posterior thickness.....	21
	Anterior thickness.....	7
<i>Seasam bone (?) :</i>	Length .....	24
	Breadth .....	16
	Maximum posterior thickness (?).....	17

From the *right hand*, the following elements are present: Mtc. I-V, Fingers I<sub>1</sub>, II<sub>1,2</sub>, III<sub>1,3</sub>, IV<sub>1,2</sub>, V<sub>1,2</sub>; Claws, I and III. The end phalanges of IV and V and the second claw are missing. The number of the phalanges of the hand thus is: 1, 2, 3, 2, 2.

The *metacarpals* I-V are very characteristic. All are short, broad and robust. In Mtc. I the lateral length is considerably longer than its proximal breadth. The proximal end is transversally elongated, triangular in outline, but its middle part is weakly constricted. The distal end is obliquely divided. Mtc. II-IV decreases in length gradually, but also in size. Comparing with Mtc. I, they are rather short. Their proximal end is convex instead of weakly concave as in the case of Mtc. I. The distal end of Mtc. II shows faint indication of division by its weakly concaved appearance, while the same of the other two is more convex. Mtc. V is especially massive. Its proximal part is even bigger than Mtc. IV. The middle part is distinctly constricted. The proximal contact surface lies obliquely at the medial side in connection with the lateral smooth surface of Mtc. IV. A prominent oblique and transversal ridge is developed at the upper part in the dorsal side. The distal end is not so much ball-shaped but similar to that of the preceding one. The lateral part is broader than the medial side.

In accordance with the metacarpals, all the fingers are also characterized by the short and broad appearance. Nearly in all the represented fingers, the length is shorter than its corresponding proximal breadth. In this way, the entire hand looks especially short and broad. As a consequence of this characteristic, the proximal part is broad and deep. The proximal end of the first finger of Mtc. V has the lateral side broader than the medial side in order to fit the character of Mtc. V mentioned above. The end phalanx of Mtc. VI is reduced with a distal hook-like

tip. It is probably the same structure in the lost end phalanx of Mtc. IV. If we put the finger of Mtc. V in a correct manner, it is pointed medially. This shows that the fifth finger moves only in a restricted way and not so free as in the case of other known forms.

The claw of Mtc. I is complete. It is strongly curved. The proximal end is especially high, almost equal to its basal length. It is sharply compressed and almost symmetrically constructed. The furrow on both sides lies from ca. 20 mm from the base and dying out ca. 40 mm to the tip. The other claw has the tip broken. It belongs probably to the third finger, because of its smallness as compared with the first claw. It is about one third in size of the first claw.

Measurements (in millimeters)

	Anterior breadth	prox. prox.	Depth lateral	Length med. lat.	Distal breadth Upper	lower	Minimum breadth at the midd. measured from above
Mtc. I	85		72	66 80	77	79	61
				Anterior			
" II	35		46	96	41	56	26
" III	38		52	95	33	42	19
" IV	32		39	92	33	34	22
" V	40		46	58	31	34	32
				Length of the axis at the middle (medial in I <sub>1</sub> )	Maximum proximal breadth		Distal breadth (lower)
Phal. I <sub>1</sub>			64		72		55
" II <sub>1</sub>			42		50		46
" II <sub>2</sub>			42		43		34
" III <sub>1</sub>			30		39		33
" III <sub>2</sub>			28		32		27
" III <sub>3</sub>			24		25		26
" IV <sub>1</sub>			25		30		24
" IV <sub>2</sub>			18		20		17
" IV <sub>3</sub>			—		—		—
" V <sub>1</sub>			32 (lateral)		35		23
" V <sub>2</sub>			22		22		—