

巴山酋龙的颌骨

曹幼枢¹⁾ 尤海鲁^{2), 3)}

1) 重庆自然博物馆 重庆北碚 400700; 2) 中国科学院古脊椎动物与古人类研究所 北京 100044;

3) 宾夕法尼亚大学地球与环境科学系 美国费城 19104)

提要 巴山酋龙 (*Datousaurus bashanensis* Dong and Tang, 1984) 是四川盆地大山铺中侏罗世蜥脚类恐龙, 亦称大头龙。其主要特征之一为硕壮的头骨。文中对保存于重庆自然博物馆的酋龙上下颌骨新材料进行较详细的记述。保存的前上颌骨长、高(前端)、厚分别为 120mm, 125mm 和 40mm; 上颌骨长为 280mm; 下颌齿骨高为 145mm。估计每侧上、下颌齿数分别为 14 和 12 枚。牙齿粗大, 勺状, 排列紧密。推测头骨长可达 67cm, 是已知蜥脚类恐龙中最硕大的。与大山铺同一地点其它蜥脚类相比, 巴山酋龙的颌骨也不尽相同, 这为进一步探讨其食性及古环境提供新的线索。

关键词 蜥脚类恐龙 中侏罗世 四川盆地

THE JAW OF *DATOUSAURUS BASHANENSIS* DONG AND TANG, 1984

CAO You-Shu¹⁾ and YOU Hai-Lu^{2), 3)}

1) Chongqing Natural History Museum, Beipei 400700, Chongqing, P. R. C.; 2) Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing 100044; 3) University of Pennsylvania, Department of Earth and

Environmental Science, Philadelphia, PA 19104, USA

Key words: Sauropod dinosaur, Middle Jurassic, Sichuan Basin

Datousaurus bashanensis Dong and Tang 1984 is one of the four sauropod dinosaurs from the Middle Jurassic Dashanpu quarry of Zigong City, Sichuan Province, China. The major characteristic of this species is the robust skull as indicated by the name (“Datou” means “big head” in Chinese). Based on new jaw material from the same quarry, a more detailed description of this species is given here.

The new material (CV 00740) includes an upper jaw (articulated left and right premaxillae and maxillae), a lower jaw (left and right dentaries), and associated teeth; and these probably belong to one individual. They were collected from the Dashanpu quarry in 1980 by the Chongqing Natural History Museum, and are housed in that museum.

DESCRIPTION

Only the main portion of the premaxillae and the maxillae (Text-figure 1; Plate I, fig. 1) and the rostral part of the lower jaw (Text-figure 2; Plate I, figs. 2, 3) are preserved. The sutural contacts are difficult to discern, suggesting this is maybe an adult individual. In general, the jaw is very robust, and is probably the most massive among all sauropod dinosaurs. In dorsal view, the two premaxillae form a wide V-shaped curvature. The teeth are spoon-shaped, and are also very large.

The premaxilla is massive. In lateral view, it is roughly square, with the height of 125 mm at the

rostral margin, and 105 mm at the maxillary articular surface. Consequently, it gradually increases in height toward the tip. The width of the premaxilla is 120 mm. The ventral margin of the premaxilla is depressed relative to the ventral margin of the maxilla, and this makes the premaxilla more robust than the maxilla. The transverse thickness of the ventral surface of the premaxilla is 40 mm. The rostral margin of the premaxilla curves slightly caudodorsally, and the nasal process of the premaxilla probably also directs caudodorsally, although it is not preserved. There are vertical striations and shallow grooves on the lateral surface. The medial surfaces of the premaxillae are still embedded in matrix. It is difficult to see the articular surface between the premaxilla and the maxilla.

The maxilla is less robust than the premaxilla, but still massive compared to other sauropods. The height of the maxilla is less than that of the premaxilla, and decreases slightly caudally. The length of the maxilla at its ventral surface is 280 mm. The lateral surface of the maxilla is also not as smooth as that of the premaxilla. Caudal to the articulation with the premaxilla, there is a broad process on the dorsal surface. This receives the base of the nasal process of the maxilla. The distal end of the maxilla tightly articulates with the jugal and quadratojugal, and the suture is difficult to discern.

Only the rostral part of the lower jaw is preserved. The preserved portion consists mainly of the dentary. Parts of the angular, surangular and splenial may also be preserved, but they are fused to the dentary, and sutural contacts are difficult to discern. The dentary is rather broad and high, and also robust compared to other sauropods. The height at the symphysis is 145 mm. The transverse thickness is 33 mm at the ventral symphyseal surface, and 25 mm at the dorsal symphyseal surface. The rostral margin of the dentary curves caudoventrally slightly.

In the left premaxilla, complete second and third teeth are preserved, as well as the roots of the first and fourth teeth. The right premaxilla preserves the root of the first tooth and the complete second tooth. Another premaxillary tooth crown is attached to the right dentary by matrix, and its lingual surface is visible. All the teeth are large and spatulate. The

crown is 65 mm high and 33 mm wide. There are vertical striations on its lateral surface, and there is a medial ridge on its inner surface. The mesial and distal edges are roughly symmetrical, and serrations are not developed. The root is round in cross section.

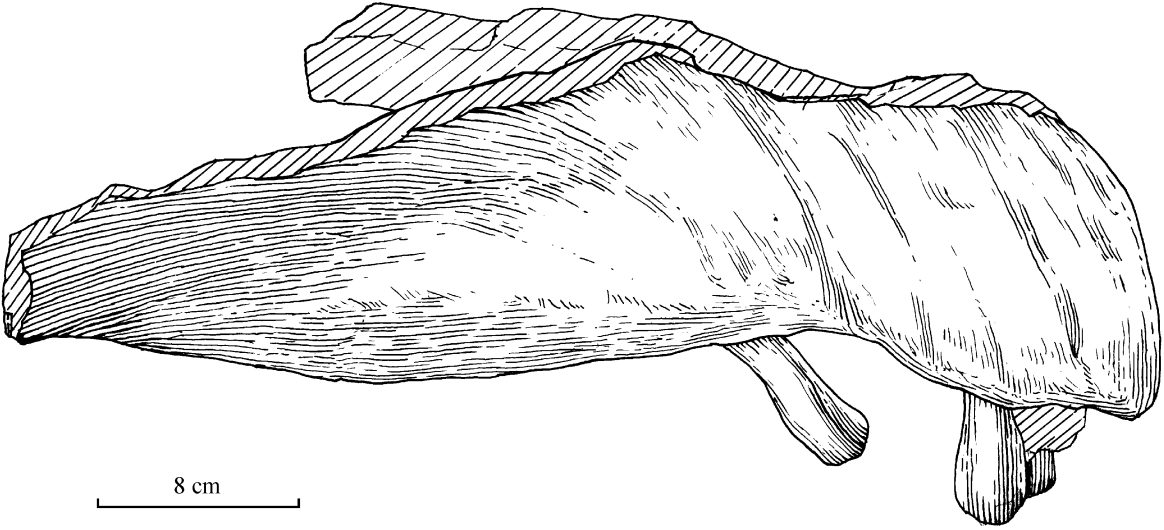
There is one tooth associated with the right maxilla, and a set of six crowns of the left maxillary teeth are preserved in matrix above the left lower jaw. The maxillary teeth are slightly smaller than that of the premaxillary, and become gradually smaller caudally. The labial and lingual surfaces become increasingly convex and concave, respectively caudally along the tooth row. The ratio of the height to the width of the crowns becomes gradually lower, lowest in the last maxillary tooth. The apex of the mesial edge is more expanded than that of the distal's, causing the top of the crown to be asymmetrical and to point caudodorsally. The teeth overlap slightly, with the mesial edges more lateral. We estimate that 10 maxillary teeth would have been present.

The dentary teeth are not well preserved. Their general shape is similar to premaxillary and maxillary teeth. They appear to be slightly more robust than the corresponding upper teeth. Dong and Tang (1984) showed a lower jaw in plate IV⁻¹ of their original description of *Datousaurus*. This specimen is stored at the Zigong Dinosaur Museum now under the catalog number of ZDM 5004. It is slightly larger than CM 00740. Reexamination of this specimen indicates *Datousaurus bashanensis* probably has 12 dentary teeth.

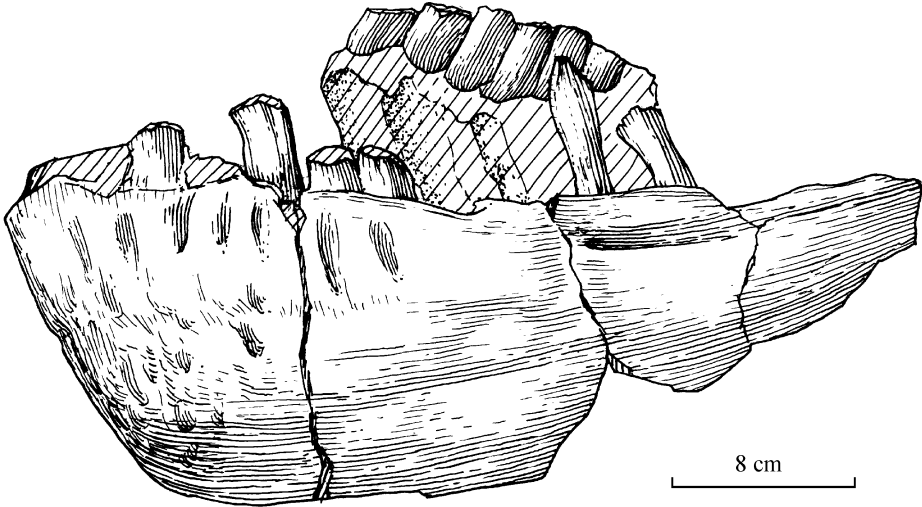
DISCUSSION

Datousaurus bashanensis is established on specimens V 7262 (post-cranial materials), and V 7263 (3 isolated teeth, and a portion of right premaxilla). Two of the three teeth are maxillary, and the other one is dentary. These teeth and the right premaxilla are very similar to the corresponding parts of CM 00740. As a result, it is likely that they belong to the same species. Obvious features of *Datousaurus bashanensis* are its big, heavy jaws and large teeth. If the jaw is about three-fifths of the length of the skull, the skull of *Datousaurus* may reach 67 cm long.

Three other sauropod dinosaurs are also found in



Text-fig. 1 Lateral view of right upper jaw of *Datousaurus bashanensis* (CV00740)



Text-fig. 2 Lateral view of left lower jaw of *Datousaurus bashanensis* (CV00740) with a set of six left maxillary teeth above

the Dashanpu quarry. They are *Shunosaurus lii*, *Omeisaurus tianfuensis*, and *Protognathosaurus oxyodon*. *Protognathosaurus oxyodon* is known only from a dentary, and is dorsoventrally enlarged at the symphyses. The dentary has at least 19 teeth (Zhang, 1988). The jaw and teeth of *Shunosaurus lii* are also very different from those of *Datousaurus bashanensis*. The jaw of *Shunosaurus* is longer and narrower than that of *Datousaurus*. The teeth of *Shunosaurus* are smaller and more slender than those of *Datousaurus*. *Shunosaurus* has the highest number of teeth among sauropod dinosaurs, with the dental formula Pm 4–5, M 19–21/ D 25–26 (Zhang, 1988; Zheng, 1991, 1996). The jaw and teeth of *Omeisaurus tianfuensis* are similar to those of *Da-*

tousaurus bashanensis. However, the skull is smaller than *Datousaurus*, and the dentary has more teeth (He *et al.*, 1988). In recent years, many skulls and other cranial materials including teeth have been found for *Mamenchisaurus*, another sauropod from the Sichuan Basin; its skull is very fragile, and the dental formula includes more teeth than those of *Datousaurus* in both the upper and lower jaws (Zhang *et al.*, 1998; He *et al.*, 1996; Pi *et al.*, 1996). The recently published works on sauropod phylogeny (Russell and Zheng, 1993; Zheng, 1996; Upchurch, 1998; Wilson and Sereno, 1998) considered that all sauropod dinosaurs from Sichuan Basin, including *Shunosaurus*, *Omeisaurus* and *Mamenchisaurus*, form a monophyletic group. Unfortunately

ly, no analysis included *Datousaurus bashanensis*. This species may have affinities to *Omeisaurus tianfuensis*, as suggested by McIntosh (1990).

The new material of *Datousaurus bashanensis* provides more information on the early evolution of sauropod dinosaurs. By the Middle Jurassic, sauropods were already very diverse, with four different taxa of sauropods coexisting in the same area. They probably utilized different food, as their dissimilar jaws tell us. The long neck *Omeisaurus* could use the upper leaves in the trees, while *Shunosaurus* and *Datousaurus* share the lower resources. Because *Datousaurus* has a heavy head and robust jaw, it can use relatively tuff stuffs than *Shunosaurus*.

Acknowledgements: Thanks are given to Hou Lian-hai, Dong Zhi-ming, and Zhang Fu-cheng of Institute of Vertebrate Paleontology and Paleoanthropology of the Chinese Academy of Sciences, and Peter Dodson, Neil Shubin and Matthew Lamanna of University of Pennsylvania for their kindly help to support this study.

REFERENCES

- Dong Z M, Tang Z L, 1984. Note on a new Mid-Jurassic sauropod (*Datousaurus bashanensis* gen. et sp. nov.) from Sichuan Basin, China. *Vertebrata Palasiatica*, **22**(1): 69–75. (in Chinese).
- He X L, Young S H, Cai K J, Li K, Liu Z W, 1996. New discovery of *Mamenchisaurus* (Dinosauria; Sauropoda). In: *Papers of Geological Science Research*. China Economy Press, Beijing. 83–86. (in Chinese).
- He X L, Li C, Cai K J, 1988. The Middle Jurassic dinosaur fauna from Dashanpu, Zigong, Sichuan, Vol. 4: sauropod dinosaurs (2)

Omeisaurus tianfuensis. Sichuan Publishing House of Science and Technology, Chengdu. 1–143. (in Chinese).

- McIntosh J S, 1990. Sauropoda. In: Weishampel, D. B., Dodson, P., and Osmolska, H., (eds), *The Dinosauria*. Berkeley and Los Angeles: University of California Press, California. 345–401.
- Pi X Z, Ouyang H, Ye Y, 1996. A new sauropod dinosaur from Zigong, Sichuan Province. In: *Papers of Geological Science Research*. China Economy Press, Beijing. 87–91. (in Chinese).
- Russell D A, Zheng Z, 1993. A large mamenchisaurid from the Junggar Basin, Xinjiang, People's Republic of China. *Can. J. Earth Sci.*, **30**(10–11): 2082–2095.
- Upchurch P, 1998. The phylogenetic relationships of sauropod dinosaurs. *Zool. J. Linn. Soc.*, **124**: 43–103.
- Wilson J A, Sereno P C, 1998. Early evolution and higher-level phylogeny of sauropod dinosaurs. *Society of Vertebrate Paleontology Memoir* 5: i–vi, 1–68; supplement to *Journal of Vertebrate Paleontology*, **18**(2).
- Zhang Y H, Li K, Zeng Q H, 1998. A new species of sauropod dinosaur from the Upper Jurassic of Sichuan Basin, China. *J. Chengdu Univ. Technol.*, **25**(1): 61–70. (in Chinese).
- Zhang Y H, 1988. The Middle Jurassic dinosaurian fauna from Dashanpu, Zigong, Sichuan, Vol. 3: sauropod dinosaur (1) *Shunosaurus*. Sichuan Publishing House of Science and Technology, Chengdu. 1–89. (in Chinese).
- Zheng Z, 1991. Morphology of the braincase of *Shunosaurus*. *Vertebrata Palasiatica*, **29**(2): 108–118. (in Chinese).
- Zheng Z, 1996. Cranial anatomy of *Shunosaurus* and *Camarasaurus* (Dinosauria; Sauropoda) and the phylogeny of the Sauropoda. Ph.D. dissertation, Texas Tech. University.

EXPLANATIONS OF PLATE I

1. Lateral view of right upper Jaw of *Datousaurus bashanensis* (CV 00740).
2. Lateral view of left lower jaw of *Datousaurus bashanensis* (CV 00740), with a set of six left maxillary teeth above.
3. Lateral view of right lower jaw of *Datousaurus bashanensis* (CV 00740).