

LATE JURASSIC AND EARLY CRETACEOUS AMMONITES FROM THE WEIMEI FORMATION IN GYANGZE, SOUTHERN TIBET

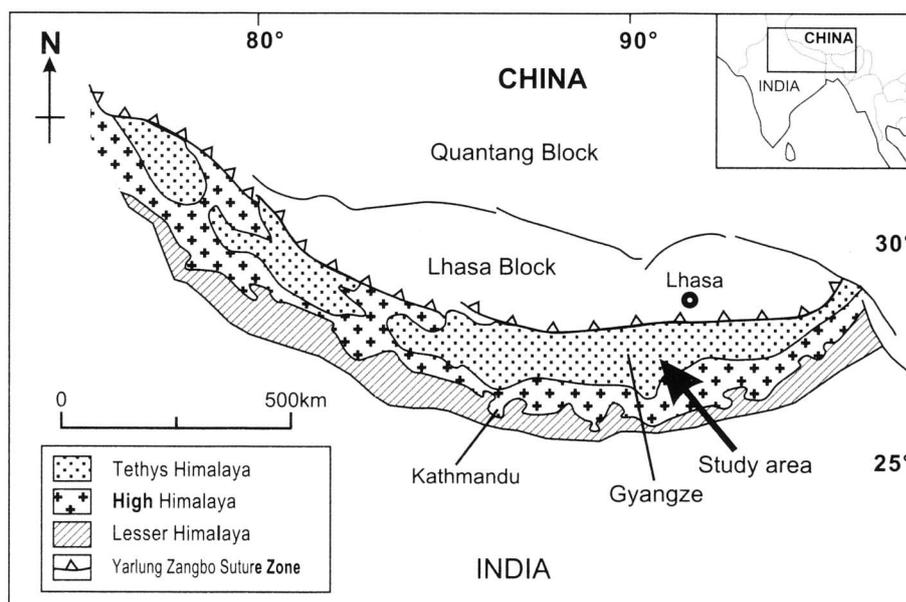
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Abstract. The Weimei Formation in southern Tibet is a shallow marine sequence accumulated in the northern margin of the Indian subcontinent. It has been dated as Tithonian based on ammonites such as *Haplophylloceras strigile* (Blanford), *Berriasella* sp. and *Himalayites* sp.. Six ammonite specimens were found in the type locality of the Weimei Formation. They include *Spiticeras* (*Spiticeras*) *spitiense* (Blanford), *Berriasella* sp. and *Phylloceras* sp.. The occurrence of *S. spitiense* indicates that the ammonite-bearing portion is assignable to the Berriasian stage. The Jurassic/Cretaceous boundary possibly exists within the Weimei Formation.

Riassunto. La Formazione Weimei nel Tibet meridionale è una sequenza di mare poco profondo accumulata sul margine settentrionale del subcontinente indiano. È stata datata al Titoniano, basandosi su ammoniti come *Haplophylloceras strigile* (Blanford), *Berriasella* sp. ed *Himalayites* sp.. Nella località tipo della Formazione Weimei sono stati trovati sei esemplari di ammoniti. Essi includono *Spiticeras* (*Spiticeras*) *spitiense* (Blanford), *Berriasella* sp. e *Phylloceras* sp.. Il ritrovamento di *S. spitiense* indica che la porzione contenente ammoniti è attribuibile al piano Berriasiano. All'interno della Formazione Weimei forse esiste il limite Giurassico/Cretaceo.



Introduction

Palaeozoic-Mesozoic shallow marine deposits crop out in the south of the Yarlung Zangbo suture zone, southern Tibet. They represent shelf facies accumulated in the northern margin of the Indian subcontinent. Wu (1984) defined the Weimei Formation as ammonite-bearing up-

Fig. 1 - Index map of the study area.

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permost Jurassic clastic sequences in the Gyangze area. It has been dated as Tithonian based on the occurrence of *Haplophylloceras strigile* (Blanford), *Berriasella* sp. and *Himalayites* sp. (Wu 1984). No illustrations, however,

have been presented so far.

During our 1998 and 1999 surveys in the type area of the Weimei Formation, six ammonite specimens were found. The ammonite-bearing strata consist mainly of alternating beds of sandstone and mudstone. Some ammonites were found in mudstone or sandstone beds and others were included in calcareous nodules in a mudstone matrix. Identified ammonites include *Spiticeras* (*Spiticeras*) *spitiense* (Blanford), *Berriasella* sp. and *Phylloceras* sp. *Spiticeras spitiense* and *Phylloceras* sp. are newly reported from the Weimei Formation. This paper describes the mode of occurrence of these ammonites with illustrations and discusses the age of the Weimei Formation. The described specimens are kept in the Nanjing Institute of Geology and Palaeontology, Academia Sinica, China.

Weimei Formation

The Weimei Formation has its type locality near the village of Weimei some 10 km northeast of Gyangze, southern Tibet (Fig. 1). The lower limit is not exposed in the type locality. It is conformably overlain by the lower Cretaceous Jiabula Formation (Wu et al. 1977). The Weimei Formation is composed of a 600 m flysch-like sequence of quartz-rich sandstone and dark gray mudstone with limestone lenses and calcareous nodules. This formation is regarded as a fore slope-outer shelf deposit based on the sedimentary facies analysis (Liu 1992). Wu (1984) divided the Weimei Formation into six units, 1 to 6 in upward sequence in the type section.

The ammonite-bearing portion we examined probably corresponds to Unit 3 of Wu (1984) based on lithological features. This unit consists mainly of mudstone-rich alternating beds of sandstone and mudstone (Fig. 2-A). Calcareous nodules and grayish green sandy nodules occur in several horizons (Fig. 2-B). These nodules range from 10 to 50 cm in diameter. Sandstone layers are grayish green and calcareous with sedimentary structures such as parallel and convolute laminations. Mudstone is gray to dark gray with pencil cleavage. Beds generally strike N70° to 80° E and dip north steeply.

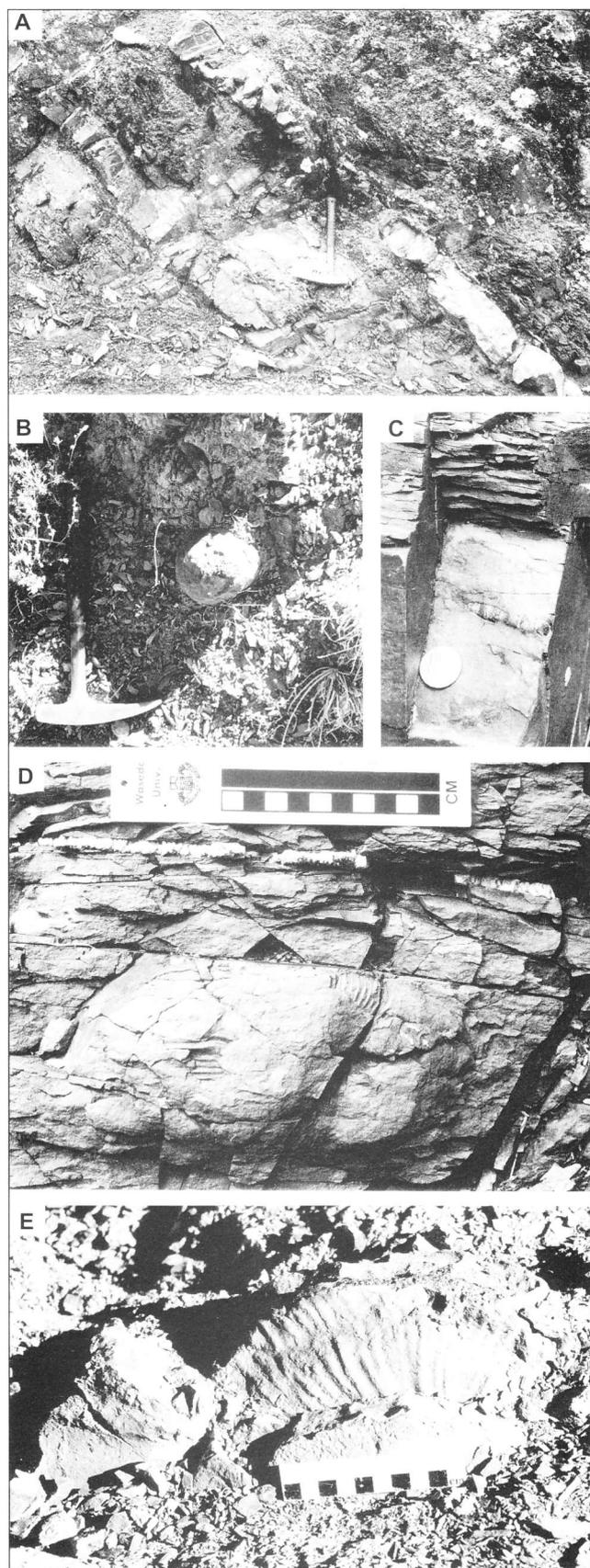


Fig. 2 - A - An exposure of the Weimei Formation in the type locality. Alternating beds of mudstone and sandstone. The hammer is 32.5 cm in length. B - A calcareous nodule in a mudstone matrix. C - A cephalopod (probably coleoid) shell is included in mudstone. This specimen is oriented parallel to the bedding plane. The coin is 2.2 cm in diameter. D - The mode of occurrence of *Spiticeras* (*Spiticeras*) *spitiense* (Blanford) (Fig. 3-1). This specimen is on the lower surface of a sandstone layer. E - The mode of occurrence of *Berriasella* sp. (Fig. 3-2) which is included in an oblate calcareous sandy concretion in a mudstone matrix.

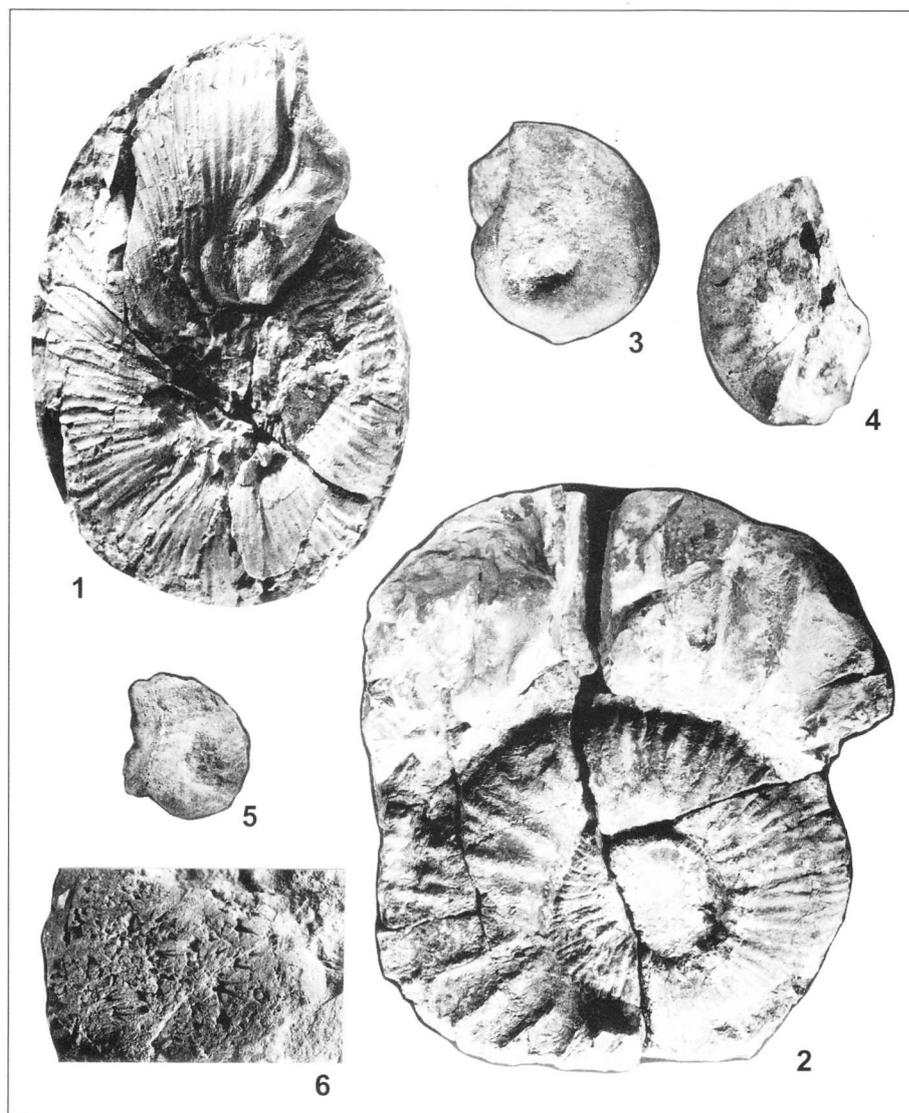


Fig. 3 - Ammonites from the type locality of the Weimei Formation, southern Tibet.

1 - *Spiticeras (Spiticeras) spitiense* (Blanford). Lateral view. x0.6. 2 - *Berriasella* sp. Lateral view. x0.2. 3 - *Phylloceras* sp. Lateral view. x2.0. 4 - *Phylloceras?* sp. Fragment of body chamber. x1.3. 5 - *Phylloceras?* sp. Fragment of body chamber. x1.3. 6 - Ammonoid gen. et sp. indet. A part of phragmocone with suture lines. x1.3.

Ammonite assemblage and its mode of occurrence

Six ammonite specimens, four from outcrops and two from a calcareous nodule float, were found from the Weimei Formation. Besides these ammonites, four other cephalopod specimens were also encountered. One of them (probably coleoid), 9 cm in length with a diameter of about 8 mm, was found in a massive mudstone layer (Fig. 2-C). The mode of occurrence of the ammonite specimens is as follows.

Spiticeras (Spiticeras) spitiense (Blanford)

Fig. 3-1

This specimen was obtained from the lower surface of a fine-grained sandstone layer intercalated with mudstone layers. It was included in the sandstone layer with its discoidal form parallel to the bedding plane (Fig. 2-D). Although the specimen is slightly flattened due to compaction, preservation is generally good. This specimen also shows well-preserved external shell features including the ornamentation and the lappet, except for the umbilical part.

Berriasella sp.

Fig. 3-2

This specimen was contained in a calcareous sandy concretion with a diameter of about 55 cm in a mudstone-rich horizon (Fig. 2-E). The concretion was oblate and was enclosed in parallel to the general stratification. A surrounding mudstone is grayish green and cleaved. Only the ventral part of the ammonite was exposed in the outcrop. Although the body chamber is partly missing, the specimen is about 42 cm in diameter.

Phylloceras sp.

Fig. 3-3

This specimen was obtained from a calcareous nodule of 10 cm in diameter, which occurred as an inclusion in a mudstone matrix. Preservation is good. This specimen is small, 1.5 cm in diameter.

Phylloceras? sp.

Figs. 3-4,5

Two fragmented specimens questionably identified as *Phylloceras?* sp. were obtained from a calcareous nodule float in the river gravels.

Ammonoid gen. et sp. indet.

Fig. 3-6

A fragment of phragmocone with suture lines was found in the same bedding plane where *Spiticeras* (*Spiticeras*) *spitiense* (Blanford) was obtained (Fig. 2D). Taxonomic identification is difficult due to its poor preservation.

Age assignment of the Weimei Formation

Wu (1984) reported *Berriasella* sp. and *Haplophylloceras* sp. from Unit 3 of the Weimei Formation and *Himalayites* sp. and *Haplophylloceras strigile* from Units 4 and 5. The Weimei Formation was dated as Tithonian based on the occurrence of *Himalayites* sp. (Wu 1984). Of the six ammonite specimens reported herein, *Spiticeras* (*Spiticeras*) *spitiense* (Blanford) is the most important biochronologically. *Spiticeras* is regarded as a good indicator for Berriasian age in the Tibetan-Himalayan area (Enay & Cariou 1997). Liu (1988a, b) reported *Spiticeras*

from the Nyalan Gucuo and Yamzho Yumco areas in the southern part of Xizang (Tibet) and assigned its age as early Berriasian. In addition, *Berriasella* is considered to be indicative of Tithonian-Berriasian (Arkell et al. 1957). On the basis of the newly found ammonites, the ammonite-bearing portion of the Weimei Formation, probably corresponding to Unit 3 of Wu (1984), is referable to the Berriasian stage. The Jurassic/Cretaceous boundary possibly exists within the Weimei Formation.

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