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## ROUTE 4: WUHE, GUIZHOU PROVINCE

# SINIAN-CAMBRIAN STRATIGRAPHY AT WUHE, TAIJIANG COUNTY, GUIZHOU PROVINCE, CHINA: INTERVAL FROM THE NEOPROTEROZOIC TILLITE TO THE UPPER CAMBRIAN DOLOSTONE

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## INTRODUCTION

The Sinian-Cambrian strata in the Wuhe section, Guizhou Province, are exposed along the Qingshui River from Wuhe to Gedong, Taijiang County (Fig. 1). The section starts in the upper part of the Nantuo Tillite. Succeeding strata consist of, in ascending order, the Toushantuo (Doushantuo) Formation, Liuchapo Formation, Niutitang Formation, Bianmachong Formation, Balang Formation, Tsinghsutung (Qingxudong) Formation, Kaili Formation, Jialao Formation, and the Loushankuan (Loushanguan) Formation (Figs. 2, 3). The section extends about 3.5 km (geographic distance) along the road from Gedong to Wuhe. The starting point is about 5 km north of Gedong Town, which is 22 km from the town of Taijiang.

Paleogeographically, the Sinian-Cambrian strata in the Wuhe section are within the Jiangnan Slope Belt, representing the typical transitional facies between the Yangtze Platform and the Jiangnan Basin. The field excursion to the Wuhe section will be helpful to understand the general stratigraphic and geological background of the Kaili Formation, which contains the Kaili Biota (a Burgess Shale-type biota), and the Duyunian and Taijiangian boundary. The base of the Taijiangian Stage, which is close to the traditional Lower-Middle Cambrian boundary, is a potential global stratotype for the base of a global Cambrian stage and series. Another aim of the excursion to the Wuhe section is to investigate the first occurrence of *Hupeiidiscus* in the upper part of the Niutitang Formation (Fig. 4).

Exposure of strata in the Wuhe section is incomplete. Except for the thicknesses of the Doushantuo and Liuchapo formations, which were measured in the Wuhe section, the thicknesses of Cambrian formations referred to herein were obtained from neighboring sections near Dengzhou Village.

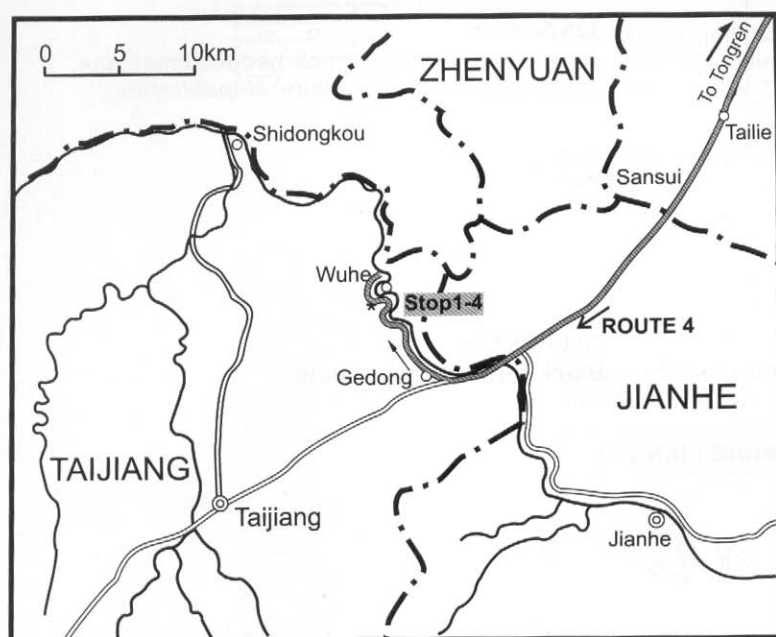


Fig.1. Map showing the route (shaded) to the Wuhe section from Tongren.

### Stop 1

#### Nantuo Tillite, Toushantuo Formation and the Sinian-Cambrian boundary interval across the Liuchapo Formation-Niutitang Formation contact

The purpose of this stop is to examine the upper part of the Nantuo Tillite (Neoproterozoic) and the Sinian (Neoproterozoic)-Cambrian contact, which is expressed as the contact between the Niutitang and Liuchapo formations.

The Toushantuo Formation is about 43 m thick, and consists of two parts. The lower part is dominated by manganiferous dolostone and black, carbonaceous, dolomitic lime mudstone. The upper part is composed of light gray, thick-bedded dolostone. The Toushantuo sequence represents a cycle of sea-level rise and fall.

The Liuchapo Formation is composed predominantly of silicate rocks and phosphatic silicate, with intercalations of silty shale; it contains phosphatic nodules and barite in the upper part. Silicate, phosphorite, and barite indicate that the Liuchapo Formation was deposited during a tectonically active time interval. Qian and Yin (1984) described two small shelly fossil taxa from the upper part of the Liuchapo Formation in the Wuhe section. The occurrence of *Kaiyangites* and *Calcihexactina?* was considered to represent a level close to the base of the Cambrian (Qian, 1999, p. 83-84).

### Stop 2

#### Niutitang Formation and first occurrence of *Hupeiidiscus*

In stops 2 and 3, we will examine strata extending from the Niutitang Formation to the

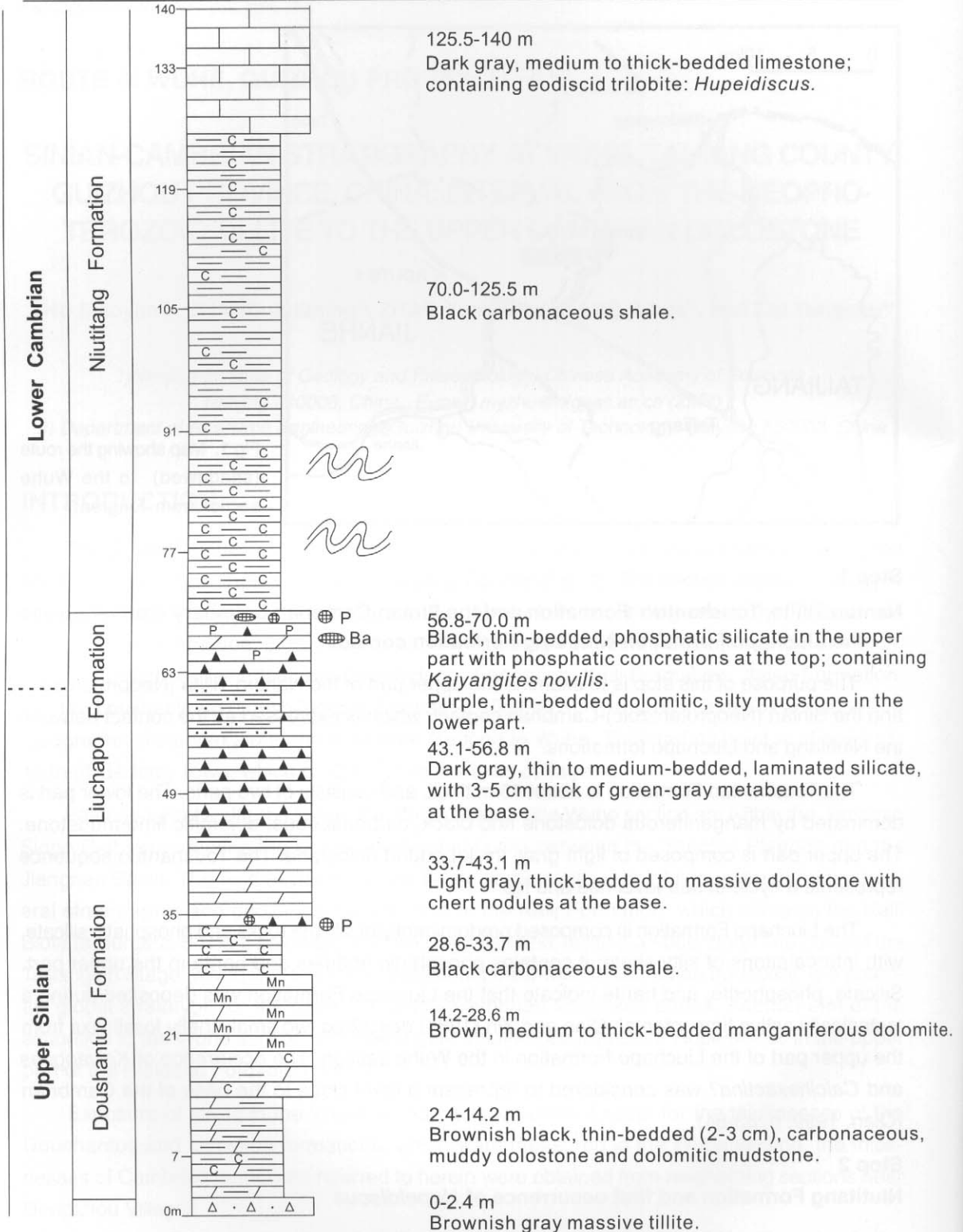


Fig. 2. Lithologic log of the Upper Sinian-lowermost Cambrian section along the Qingshui River, near Wuhe, Taijiang County, Guizhou Province.

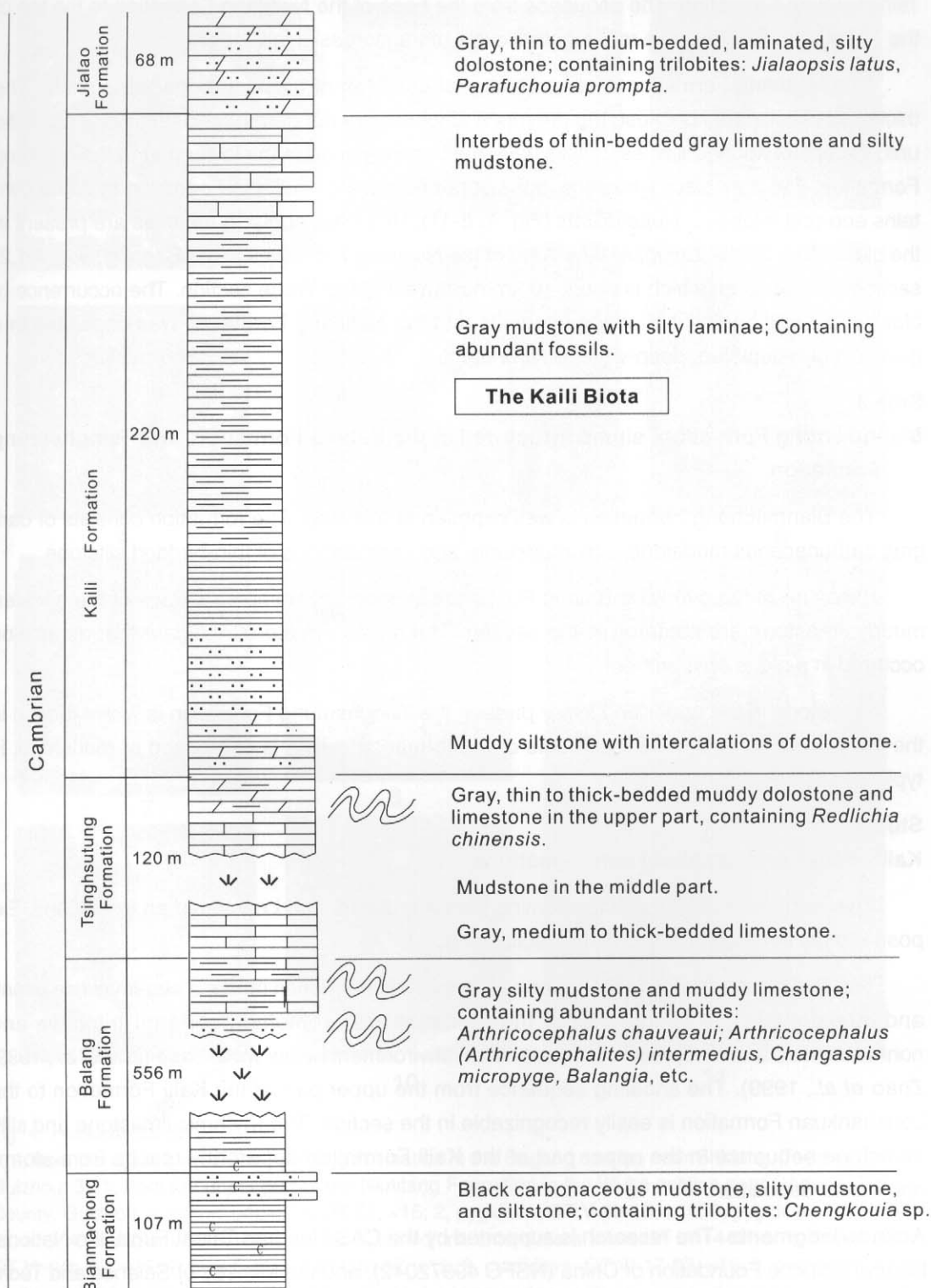


Fig. 3. Lithologic log of the Wuhe section along the Qingshui River, Gedong, Taijiang County.

Tsinghsutung Formation. The sequence from the base of the Niutitang Formation to the top of the Tsinghsutung Formation represents a cycle of transgression and regression.

The Niutitang Formation is composed of about 77 m of black carbonaceous shale. The thickness is estimated because the presence of folds does not permit precise measuring of the unit. Except for sponge spicules, fossils have not been reported in the lower part of the Niutitang Formation. The gray-black limestone in the upper part of the Niutitang Formation at Wuhe contains eodiscid trilobites: *Hupeidiscus* (Fig. 4. 6-11). However, eodiscid trilobites are present in the black shale below the upper limestone of the Niutitang Formation in the Bageng (Fig. 4.1,2) section near Shitong, which is about 10 km northwest of the Wuhe section. The occurrence of black shale and eodiscid trilobites suggests that the Niutitang Formation was deposited in a quiet, oxygen-depleted, deep-water environment.

### Stop 3

#### **Bianmachong Formation, slump structures in the Balang Formation, and Tsinghsutung Formation**

The Bianmachong Formation is well exposed at this stop. The formation consists of dark gray carbonaceous mudstone, silty mudstone, and intercalations of thin-bedded siltstone.

Exposure of the overlying Balang Formation is poor, but slump structures of the nodular, muddy limestone are common in the section. The slump structures indicate that deposition occurred in a slope environment.

Limestone in the upper and lower parts of the Tsinghsutung Formation is well exposed in the Wuhe section. However, the middle of the formation, which is composed of mudstone, is typically not well exposed.

### Stop 4

#### **Kaili, Jialao, and Loushankuan formations**

The purpose of this stop is to examine the Kaili, Jialao, and Loushankuan formations. Exposure of all three units in the Wuhe section is good.

The laminated siltstone in the lower part of the Kaili Formation marks a sea-level rise event, and mudstone in the middle part of the formation that contains abundant trilobites and nonmineralized fossils represents an outer-shelf environment below wave base (Zhu *et al.*, 1999; Zhao *et al.*, 1999). The shoaling sequence from the upper part of the Kaili Formation to the Loushankuan Formation is easily recognizable in the section. The rhythmic limestone and silty mudstone sequence in the upper part of the Kaili Formation apparently results from storm-dominated deposition.

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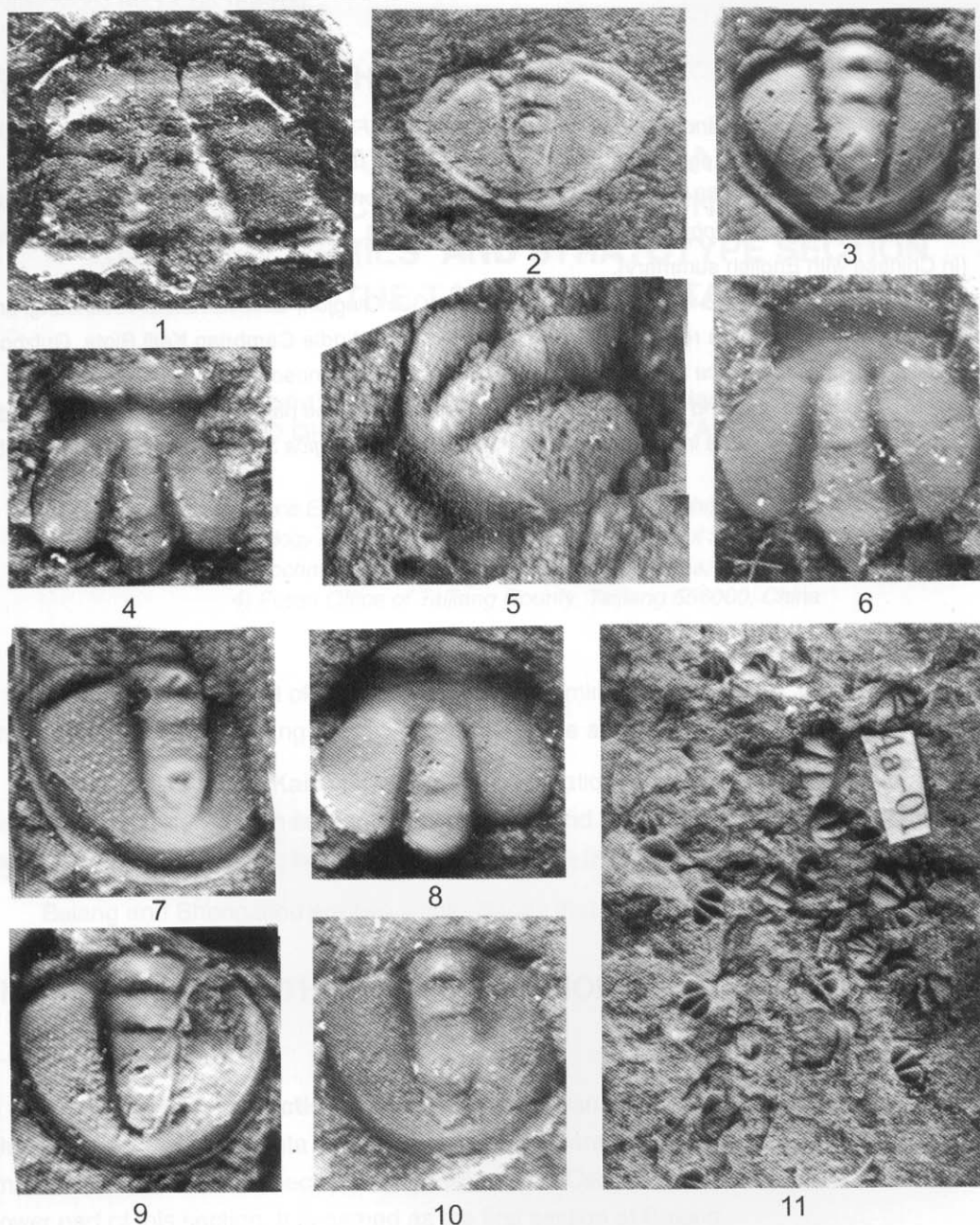


Fig. 4. *Hupeidiscus* sp.

1, 2, from the upper part of the Niutitang Formation in the Bageng section near Shidong, Taijiang County, Guizhou; 3-11, from the upper part of the Niutitang Formation in the Wuhe section near Gedong, Taijiang County, Guizhou. 1, cranium, GT V-08-01,  $\times 15$ ; 2, pygidium, GT V-1b-10,  $\times 15$ ; 3, pygidium, GT VI-04b-01,  $\times 15$ ; 4, cranium, GT VI-05-01,  $\times 15$ ; 5, cranium, anterolateral view, GT VI-14-04,  $\times 15$ ; 6, cranium, GT VI-04b-02,  $\times 15$ ; 7, pygidium, GT VI-04b-07,  $\times 15$ ; 8, cranium, GT VI-17-03,  $\times 15$ ; 9, pygidium, GT VI-14-04,  $\times 15$ ; 10, pygidium, GT VI-17-01,  $\times 15$ ; 11, bedding surface with crania and pygidia, GT VI-4a,  $\times 3$ .

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