

The discovery of Late Devonian (Famennian) conodonts in the Bayanhongor area, west Mongolia

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Abstract: The Late Paleozoic Hangai Group which is widely distributed in the Bayanhongor area, west Mongolia, is subdivided into the Erdenetsogt, Tsetserleg, Jargalant and Baidrag Formations. This paper presents the first finding of Late Devonian conodonts in red chert from the Erdenetsogt Formation.

The conodont fauna from the Erdenetsogt Formation consists of *Palmatolepis* cf. *quadrantinodosa inflexa* Müller, *Polygnathus* sp. and compound type elements. The occurrence of *Palmatolepis quadrantinodosa inflexa* is restricted to the Famennian of Late Devonian age, and *Polygnathus* is characteristic of the Devonian age. Therefore, this fauna is assigned to the Famennian.

Previous works regarded the Erdenetsogt Formation as Lower to Middle Devonian, based on coral and brachiopods. But the discovery of Famennian conodonts indicates that the Erdenetsogt Formation ranges up to Late Devonian.

1. Introduction

Mongolia is part of the Central Asian-Mongolian Mobile Belt, which is situated between the Siberian Platform and the Sino-Korean Block (Fig. 1). This mobile belt is composed predominantly of Precambrian rocks of micro-continent affinity and Phanerozoic units.

The authors conducted a geologic survey of the Bayanhongor area in 1996 as part of a JICA (Japan International Cooperation Agency) Project. The study area is located in the southern marginal part of the Hangai Mountains, about 500km west of Ulaanbaatar (Fig. 1).

During the field survey, 40 samples of siliceous shale and chert were collected from the Late Paleozoic Hangai (Khangay) Group for the purpose of extracting microfossils. During the hydrofluoric acid treatment of the rocks, Late Devonian (Famennian) conodonts were discovered from red bedded chert of

the Erdenetsogt Formation, which is the lowest formation of the Hangai Group. This report presents the first finding of Devonian conodonts from the Bayanhongor area.

2. Geologic setting

Tomurtogoo (1996) divided Mongolia into three megablocks; the Northern, Middle and Southern Megablocks. The Bayanhongor area belongs to the Middle Megablock.

The geology of the Bayanhongor area and surrounding regions were mapped at a scale of 1 : 500,000 (Borsbold and Dorjnamjaa, 1993; Borzakovskii, 1990) and 1 : 200,000 (Bayarsaikhan, 1990; Dzabotkin, 1988; Tumurchudur, 1990). Recently, Teraoka *et al.* (1996) reported the geology of the Bayanhongor area, and further subdivided the area from south to north into the Baidrag, Burdgol, Bayanhongor, Zag (Dzag) and Hangai Zones.

Non-metamorphosed sedimentary rocks of the Devonian to Carboniferous Hangai Group are distributed in the Hangai Zone, forming gentle folds (Borsbold and Dorjnamjaa, 1993). Ufland and

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Conodonts from the Erdnetsogt Formation are tabulated in Table 1 and photomicrographs are shown in Fig. 3. The conodont fauna consists of *Palmatolepis* cf. *quadrantnodosa inflexa* Müller, *Polygnathus* sp. and compound type elements. Genus *Palmatolepis* is the most important for age determination in this fauna. *Palmatolepis* from the Erdnetsogt Formation is similar to that of *Palmatolepis quadrantnodosa inflexa* Müller based on an outline of platform, aspect of upper-surface sculpture, position and character of the parapet, and character of the blade-carina. *Palmatolepis quadrantnodosa inflexa* and its related species are restricted to the Famennian of Late Devonian age (Sweet and Bergström, 1981; Sweet, 1988; Ziegler, 1977). In contrast, Genus *Polygnathus* is characteristic

4. Conodonts and geologic age

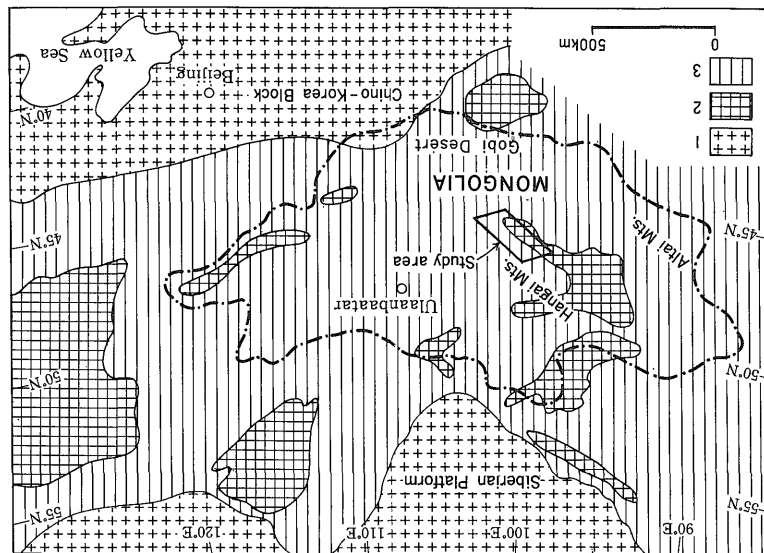
The red chert of Locations 1 and 2 containing conodonts displays a bedded structure and is light red to light green in color. One bed of chert is 2 to 5 cm in thickness and a mud film is very thin. The existence of numerous radiolarians were recognized in the red chert. However, these radiolarians were not useful for age determination because they were poorly preserved due to recrystallization.

Forty samples were collected at 8 localities for the purpose of extracting microfossils (Fig. 2): 19 siliceous shales and 8 red cherts from 5 localities in the Erdnetsogt Formation, 9 siliceous shales from 2 localities in the Tsetsereg Formation, and 4 siliceous shales from one locality in the Jargalant Formation. As a result of treating the rocks with hydrofluoric acid the authors succeeded in extracting conodonts

3. Materials

Filippova (1967) divided the Hanggai Group in ascending order into the Erdnetsogt, Tsetsereg, Jargalant and Baidrag Formations and assigned the Erdnetsogt Formation to the Devonian, the Tsetsereg Formation to the Lower Carboniferous, the Jargalant Formation to the Middle to Upper Devonian, the Tsetsereg with the Middle to Upper Devonian, the Jargalant Formation with the Lower Carboniferous, and the Baidrag Formation as Lower Carboniferous and the Baidrag Formation as Middle to Upper Carboniferous. Bayarsaikhan (1990) reported coral and brachiopods from the Erdnetsogt Formation, and brachiopods and bryozoa from the Jargalant Formation in the region northwest of the Bayanhongor area. Taking the above fossil data into consideration, Bayarsaikhan (1990) and Tumurchudur (1990) correlated the Erdnetsogt Formation with the Lower to Middle Devonian, the Tsetsereg with the Middle to Upper Devonian, the Jargalant Formation with the Lower Carboniferous, and the Baidrag Formation as Lower Carboniferous and the Baidrag Formation as Middle to Upper Carboniferous. Bayarsaikhan (1990) reported coral and brachiopods from the Erdnetsogt Formation, and brachiopods and bryozoa from the Jargalant Formation in the region northwest of the Bayanhongor area. On the basis of flora, Tumurchudur (1990) regarded the Tsetsereg Formation as Middle to Upper Devonian, and Durante (1980) interpreted the Jargalant Formation as Lower Carboniferous and the Baidrag Formation as Middle to Upper Carboniferous. Bayarsaikhan (1990) reported coral and brachiopods from the Erdnetsogt Formation, and brachiopods and bryozoa from the Jargalant Formation in the region northwest of the Bayanhongor area. On the basis of flora, Tumurchudur (1990) regarded the Tsetsereg Formation as Middle to Upper Devonian, and Durante (1980) interpreted the Jargalant Formation as Lower Carboniferous and the Baidrag Formation as Middle to Upper Carboniferous. Bayarsaikhan (1990) reported coral and brachiopods from the Erdnetsogt Formation, and brachiopods and bryozoa from the Jargalant Formation in the region northwest of the Bayanhongor area.

Fig. 1 Index map of the study area (simplified from Wang and Liu, 1991). 1: Archean-Early Proterozoic craton, 2: Precambrian continental block, 3: Late Proterozoic-Phanerozoic rocks.



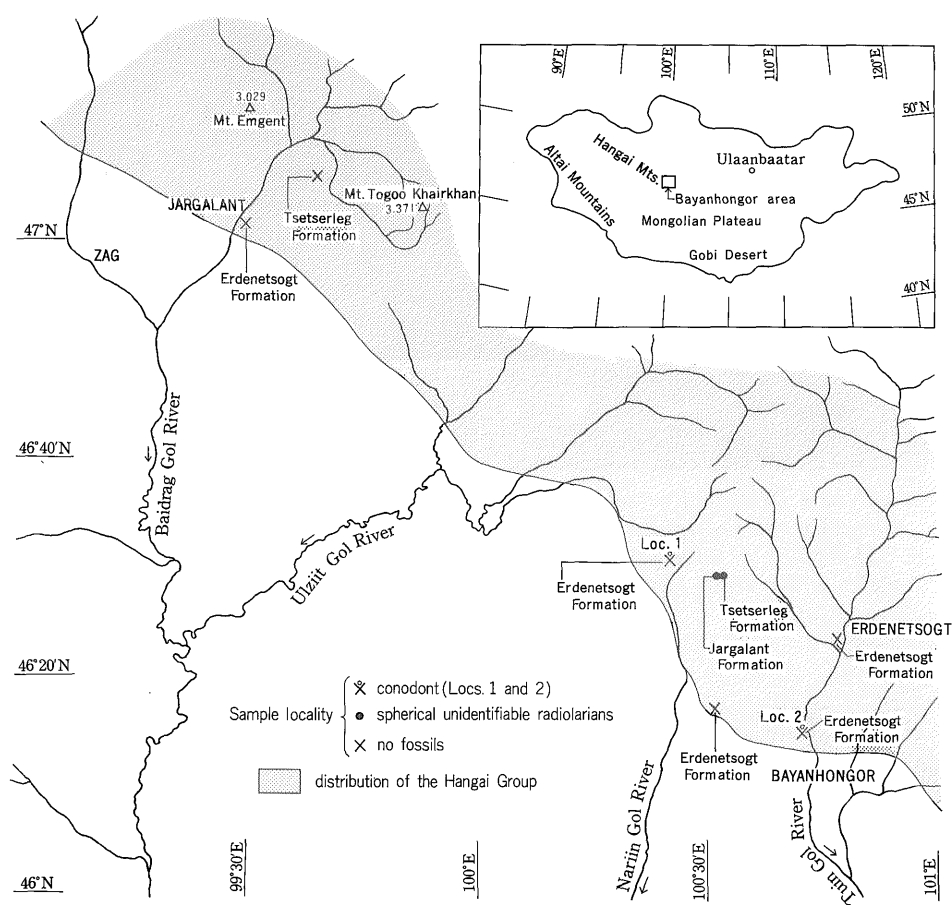


Fig. 2 Map showing fossil localities. Locs. 1 and 2 correspond to those of Table 1. Map is based on the 1 : 500,000-scale topographic map Sheet L-47- (B) published by National Geodesic and Topographic Organization of Mongolia.

Table 1 Conodonts from the Erdenetsogt Formation of the Hangai Group.

Rock Reg. No. (GSJ R)	Loc. 1			Loc. 2	
	R64469	R64470	R64471	R64472	R64473
<i>Palmatolepis</i> cf. <i>quadrantinodosa inflexa</i>		x			
<i>Polygnathus</i> sp.	x	x	x		
compound type	x	x	x	x	x

of the Devonian age (Sweet, 1988). Therefore, the conodont fauna from the Erdenetsogt Formation is assigned to the Famennian.

According to Tumurchudur (1990) and Bayarsaikhan (1990), the Erdenetsogt Formation is correlated with the Lower to Middle Devonian on the basis of coral and brachiopods. However the newly discovered conodonts in the Bayanhongor area are Famennian in age. Therefore, the Erdenetsogt Formation ranges

in age from Early to Late Devonian.

5. Conclusion

Conodonts were discovered in the Erdenetsogt Formation of the Hangai Group in the Bayanhongor area, west Mongolia. The conodont fauna consists of *Palmatolepis* cf. *quadrantinodosa inflexa* Müller and *Polygnathus* sp., and is assigned to the Famennian of

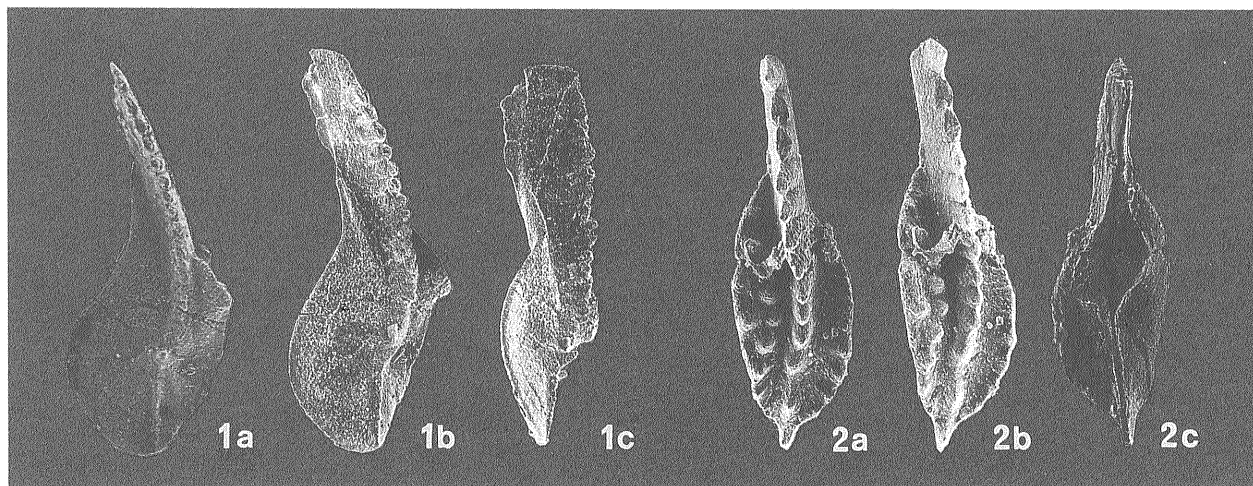


Fig. 3 Famennian (Late Devonian) conodonts from the Erdenetsogt Formation of the Hangai Group, west Mongolia. 1. *Palmatolepis* cf. *quadrantinodosa inflexa* a : oral view; b : oblique lateral view, c : lateral view. x75. Fossil Reg. No. GSJ F15017-20, Rock Reg. No. GSJ R64470. 2. *Polygnathus* sp. a : oral view, b : oblique lateral view, c : aboral view. x100. Fossil Reg. No. GSJ F15017-18, Rock Reg. No. GSJ R64470.

Late Devonian age.

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モンゴル西部, バヤンホンゴル地域から後期デボン紀ファミニアン期のコノドント化石の発見

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要 旨

モンゴル西部のバヤンホンゴル地域に分布する上部古生界のハンガイ層群は主として砂岩, 頁岩及び火山性堆積岩で構成され, 下位よりエルデンツォクト層, ツェツェレグ層, ジャーガラン層及びパイドラッグ層に区分されている。

今回, 最下位のエルデンツォクト層の赤色チャートから, *Palmatolepis* や *Polygnathus* から構成されるコノドント化石群集を得た。特に *Palmatolepis* はプラットフォーム (platform) の輪郭, 表面の装飾, 前方内側に発達する隆起状体 (parapet), ブレードーキャリナ (blade-carina) の形態などが, *Palmatolepis quadrantinodosa inflexa* Müller のそれに類似する。 *Palmatolepis quadrantinodosa inflexa* は後期デボン紀ファミニアン期に限られて産出する。また, *Polygnathus* はデボン紀全期間を通じて特徴的に産出する。したがって, 今回得られたコノドント化石群集は後期デボン紀ファミニアン期を示す。

従来, エルデンツォクト層はサンゴや腕足類の産出に基づいて, 下部-中部デボン系とされていた。しかし, 今回のコノドント化石の産出により, エルデンツォクト層は下部-中部デボン系だけではなく, 上部デボン系も含むことになる。