695. LOWER JURASSIC AMMONITES FROM THE HIGUCHI GROUP, SOUTHWEST JAPAN

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Abstract. MIKAMI and MIYAGAWA studied the geology in and around the Higuchi Group, which has been considered as Jurassic based on the preliminary study on some ammonites obtained from gravels of a river floor, and first succeeded in collecting some ammonites and bivalves from an exposure. We systematically describe these ammonites, Fontanelliceras cfr. fontanellense, Aristiceras sp. and Canavaria sp. They are typical Tethyan ammonites and regarded as representative species in the Fontanelliceras fontanellense Zone of the Domerian Substage in the Mediterranean Region.

Introduction

The southwest part of Shimane Prefecture indicated in Fig. 1 is mainly occupied by the Upper Palaeozoic rocks which are overlain by the Cretaceous Kwanmon Group and volcanic rocks and in part intruded by some Cretaceous igneous rocks. The existence of the Jurassic in this area was first reported by IMAMURA et al. (1966) and the Jurassic was named as the Higuchi Group. The fossils from the group were ammonites and bivalves, and those ammonites were preliminarily considered to indicate a Lower Jurassic age by T. SATO (IMAMURA et al., 1966). The ammonites were, however, obtained from gravels of a river floor. Recently, MIKAMI

* Received Dec. 27, 1977; read Jan. 22, 1977 at Koganei.
of the Higuchi Group and also from gravels of the River Higuchi-zawa. As the ammonites from the Higuchi Group have not been described yet, here we give systematic descriptions on the ammonites collected by Mikami and Miyagawa.

We express our sincere gratitude to Professor Emeritus Tatsuro Matsumoto of Kyushu University for his supervision, to whom we dedicate this paper to commemorate his retirement. We also express our gratitude to members of the Geology Club of Yamaguchi Prefecture who donated Yamaguchi University some additional specimens, although they were not directly quoted in this paper.

Fig. 2. Geological map around the Higuchi Group.
Geological setting

The Higuchi Group is distributed around Muikaichi-cho, Shimane Prefecture (Fig. 1), and its succession is observable along the River Higuchi-zawa and the River Kanoashigochi (Fig. 2). The strata show a general trend of E-W in the southwestern area and that of NW-SE in the northeastern area. They show a homoclinal structure, with a northward or northeastward inclination. The total thickness is about 890 m, and the group is lithostratigraphically divided into two formations. The Lower Formation, 600 m, is composed of conglomerate and sandstone and the Upper, 290 m, is of black sandy shale, shale and fine sandstone (Fig. 3). The locality of the ammonites is in the shaly part of the Upper Formation. The bivalves were obtained from the Upper Formation and also the middle and upper parts of the Lower Formation. The contact between the Higuchi Group and the Palaeozoic Nishiki Group is a fault and that between the Higuchi Group and the Cretaceous Kwanmon Group is an unconformity in some part and a fault in other part.

Systematic descriptions

Superfamily Hildocerataeae Hyatt, 1867

Family Hildoceratidae Hyatt, 1867

Subfamily Arieticeratinae Howarth, 1955

Genus Fontanelliceras Fucini, 1931

Type-species.—Harposceras fontanellense Gemmellaro, 1885 (designated by Vecchia, 1949).

Fontanelliceras cfr. fontanellense
(Gemmellaro)

Pl. 51, Figs. 4-7.

Cfr.


1931 Fontanelliceras juliae (Bonarelli): Fucini, Ibid., vol. 31, p. 111, pl. 8, figs. 28-30.


1956 Fontanellicerias cfr. fontanellense (Gemmellaro): Arkell, Jurassic geology of the world, Oliver & Boyd Ltd., p. 421.


1962 Fontanellicerias sp. b: Sato, Ibid., no. 94, p. 59.


Material.—Eleven specimens, GK. G. 11418-11428.

Description.—The whorls are evolute, enlarging very slowly. All the ribs are simple, rather robust, straight, usually rectiradiate, sometimes somewhat prorsiradiate, and widely interspaced. They spring from the umbilical seam, keeping the strength nearly uniformly and abruptly fade away at the ventral shoulder. The venter has at least a distinct keel, but the details are not observable because of the unfavourable preservation.

Remarks.—All the specimens are embedded in parallel to the bed and compressed not only vertically but also horizontally. Because of this mode of preservation, the mensuration is omitted but figures are shown in natural scale.

Comparison.—The present specimens are closely allied to the hitherto illustrated specimens of F. fontanellense. They have somewhat more numerous ribs than the Toyora and the Italian specimens. The number of ribs is, however, known to show a fairly large variation (Hirano, 1971) and therefore on this occasion the difference is regarded as non-significant. As the specimens before us are too poorly preserved to identify them precisely, we call them F. cfr. fontanellense, although no clear difference is detected in the observable characters.

Fontanellicerias juliae (Bonarelli) is said to be distinguished from F. fontanellense by Fucini (1931, p. 111) in that its ribs are less numerous and somewhat rurisiradiate near the aperture. These differences are minor and perhaps in the extent of variation of F. fontanellense as considered by Cantaluppi and Brambilla (1968). In fact the present specimens are also comparable with the specimens illustrated under the name of F. juliae by Fucini (1931, p. 111, pl. 8, figs. 28-30).

Fontanellicerias retrorsicosta (Oppel) was distinguished from F. fontanellense by its sharp, slightly arcuate forward and rursiradiate ribs by Fucini (1931, p. 111, pl. 3, fig. 27). As the ribs of the present specimens are usually rectiradiate and occasionally prorsiradiate, they are distinguished from F. retrorsicosta.

Locality.—Three specimens, GK. G. 11418-11420, are from the exposure (loc. H 12) of the Upper Formation of the Higuchi Group in the River Higuchi-zawa, Mulkaichi-cho, Shimane Prefecture and eight specimens, GK. G. 11421-11428, are from gravels at a point a few meters downstream from the loc. H 12 (Figs. 2-3).
Genus *Arieticeras* Seguenza, 1885

*Type-species.* — *Ammonites algovianum* Oppel, 1862.

*Arieticeras* sp.

Pl. 51, Figs. 1a-b.

*Material.* — A single fragmentary specimen, GK. G. 11429.

*Description.* — The whorl is somewhat involute, enlarging fairly rapidly. The rib is simple, fairly robust and stronger on the outer part of the flank. It is rursiradiate on the flank and abruptly bent forward at the ventral shoulder. The interspace between the ribs is nearly as wide as to two times as wide as the rib. The rib fades away as it approaches to a strong ventral keel.

*Comparison.* — As the present specimen is fragmentary, the identification at the specific level is very difficult. It resembles the three specimens of *Arieticeras delcampanai* (Fucini) illustrated by Haas (1913, p. 68, pl. 2, figs. 13-15) in the mode of volution and ribbing, but is distinguished in that the latter species has rectiradiate ribs.

It is also similar to the specimens of *Arieticeras algovianum* (Oppel) illustrated by Cantaluppi and Savi (1968, p. 240, pl. 20, figs. 9-11) and by Cantaluppi and Bramilla (1968, p. 294, pl. 27, figs. 2-3) in the mode of ribbing but is distinguished by its tighter volution.

*Locality.* — The specimen was obtained from a gravel of a river floor at a point a few meters downstream from the exposure H 12 in the River Higuchi-zawa, in Muikachi-cho, Shimane Prefecture (Figs. 2-3).

Genus *Canavaria* Gemmellaro, 1886

*Type-species.* — *Harpoceras (Dumortieria) haugi* Gemmellaro, 1885 (subsequently designated by Howarth, 1955).

*Canavaria* sp.

Pl. 51, Figs. 2-3.

*Material.* — Two specimens, GK. G. 11430-11431.

*Description.* — The volution is moderate, with a moderate growth of whorls. The rib is simple and somewhat strong. It starts forward from the umbilical seam, going outward radially and then curves forward again at the ventral shoulder. Thus it is somewhat flexuous on the flank and the interspace is about two or three times as wide as the rib. Some of the ribs are tuberculated at the umbilical shoulder. A keel is discernible on the venter.

*Comparison.* — The present specimens are similar to the specimens of *Canavaria nodosa* (Fucini) (1931, p. 146, pl. 20, figs. 10-17) in the mode of volution and ribbing. It shows a slower growth rate of the whorl-height than *Canavaria japonica* (Matsumoto) (Hirano, 1971, p. 110, pl. 15, figs. 1-6) and *Canavaria cfr. sicula* Fucini (Hirano, 1971, p. 111, pl. 15, fig. 7).

The available specimens are too poorly preserved for a precise specific identification.

*Locality.* — The specimens were obtained from a gravel of a river floor at a point a few meters downstream from the exposure H 12, in the River Higuchi-zawa, Muikachi-cho, Shimane Prefecture (Figs. 2-3).

**Discussion**

Among the described ammonites, three specimens of *Fontanelliceras cfr. fontanellense* were obtained from an exposure (H 12) of the Upper Formation of the Higuchi Group and the others were from the river gravels at the point a few meters downstream from the exposure in the same
Lower Jurassic Ammonites form the Higuchi Group

river. Because all of these three genera are representatives in the Fontanelliceras fontanellense Zone of Domerian, the upper substage of Pliensbachian, at least the upper part of the Upper Formation of the Higuchi Group can be correlated with the F. fontanellense Zone.

The genera described above have also been known from the Toyora Group about 90 km to the west of this area, and as was discussed previously (Hirano, 1973), they are of typical Tethyan elements. Among the three, Canavaria is also known from the Kuruma Group (Sato, 1955, p. 114-117) in the northeast. As one specimen of Amaltheus from the Toyora Group and some more from the Kuruma Group have been reported, it is clear that the Tethyan and the Boreal elements intermingled in the area from Toyora via Higuchi to Kuruma, with a southwestward increasing number of Tethyan elements.

References cited


Higuchi-zawa 横口沢, Kanoashigochi 麗足河内, Muikaichi-cho 六日市町,
椙口層群からの前期ジュラ紀菊石： 山口・広島両県に接する島根県六日市町倉口沢には，今村・他 (1966) によりジュラ紀と思われる地層が分布していることが報告され，倉口層群と命名されている。しかし，これまでジュラ紀の記載とされた菊石は転石しか得られてなく，又記載報告もなかった。最近，三上・宮川は倉口層群の分布とその層序及び周辺層との関係を調べ，新たに地層ならびに転石から菊石と同物を若干得た。これらの菊石は Fontanelliceras cfr. fontanellense, Aristiceras sp., Canavaria sp. と判明した。いずれも西方の豊浦層群から知られている属で，地中海地方のライアス・ドメリアン亜階 Fontanelliceras fontanellense 帯の代表的な属である。

平野弘之・三上貴彦・宮川秀樹

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**Explanation of Plate 51**

*(All in natural size)*

Fig. 1. *Aristiceras* sp.
1a. GK. G. 11429, loc. A few meters downstream from the exposure H 12 in the River Higuchi-zawa, Muikaichi-che, Shimane Prefecture.
1b. Rubber cast of 1a.

Figs. 2-3. *Canavaria*. sp.
2. GK. G. 11430, loc. A few meters downstream from the H 12 in the River Higuchi-zawa.
3. GK. G. 11431, loc. A few meters downstream from the H 12 in the River Higuchi-zawa.

Figs. 4-7. *Fontanelliceras* cfr. *fontanellense* (GEMMELLARO)
5. GK. G. 11418, loc. H 12 in the River Higuchi-zawa.
6. GK. G. 11421, loc. A few meters downstream from the H 12 in the River Higuchi-zawa.
7. GK. G. 11426, loc. Same as above.