32. The Zone of *Millerella* in Japan.

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Very recently the writer found a few remains of foraminifera in several thin sections of the coral limestone of the Upper Visean Onimaru formation, the *Dibunophyllum* limestone of M. Minato, in the southern Kitakami mountainland which are indistinguishable from *Millerella*, as illustrated below. According to M. L. Thompson¹⁾ the genus *Millerella*, the oldest type of fusulinids has a geological range from the late Mississippian to the Upper Pennsylvanian in North America, and is predominant in the Lower and lower Middle Pennsylvanian; it is also known from the Huanglung limestone of South China, and is found in a well-sample of Samara Bend, U.S.S.R.; in the latter case, *Profusulinella* and *Pseudostaffella* in its association indicate the lower Middle Pennsylvanian age of the material.

The present find of a species of *Millerella* in the coral limestone of the Onimaru formation is very interesting in two ways, first giving an evidence of the geographical extension of the genus to Japan as early as the late Lower Carboniferous, and secondly serving for confirmation of the Upper Visean age of the *Dibunophyllum* limestone claimed by M. Minato on his study of corals.

The Onimaru formation is a representant of Thompson's Zone of *Millerella*²⁾, especially of its earliest part, in the Far East.

Description

Genus *Millerella*, Thompson, 1942

Genotype : *Millerella marblensis* Thompson

Millerella sp.

Figs. 1—5.

All the specimens shown by the accompanying figures 1—5 in

1) M. L. Thompson : Studies of American Fusulinids. Univ. Kansas Pal. Contrib., Protozoa, Art. I, 1948.

2) It is unfortunate to the students of fusulinid foraminifera and of Carboniferous-Permian geology, that in North America, fusulinid zones are used in two different senses. Thompson's zones of *Fusulina*, etc. are stratigraphical units characterized by prevailing *Fusulina*, etc., and hence one zone does not overlap the other. Dunbar and Henbest's zones of *Fusulina*, etc., on the other hand, are stratigraphical divisions related to the geological range of the respective genus, hence there being cases in which one overlaps the other. Thompson sometimes divides a zone into subzones, then of definite numbers, whereas Dunbar and Henbest distinguish some particular subzones in a zone. The zones and subzones in the Dunbar and Henbest's sense may better be called bio-zone or life-zone respectively subzone. In the present paper, as well as in the earlier one (Neoschwagerininae Dunbar and Condra; this Proceedings, Vol. XXIV, No. 9, 1948) and the succeeding one (Fusulinid Zones in the Carboniferous of Japan, this number of the Proceedings), the writer uses fusulinid zones in the sense of Thompson.

a fifty times magnification are thought to belong to one and the same species on their general resemblance, which has a discoidal and evolute shell, with many slowly expanding volutions partitioned by many septa almost as thick as or but slightly thinner than the shell-wall. The septa are disposed almost radially or somewhat forward and nearly plane; the tunnel is relatively high and the chomata rather prominent. The preservation is not sufficiently good for detailed examination of the shell-wall.

Fig. 1 is a nearly transverse section of an individuum. It is elongated in one direction, measuring 0.8 mm in longer diameter and 0.5 mm in the shorter. There are more than 4 volutions slowly enlarging and divided by nearly plane septa into many chambers in the outermost volution and 13 or 14 in the next inner; the chambers are more or less quadratic and spacious.

Fig. 2 represents the second specimen in a more excentric section than the former; it shows the straight course of the septa in the polar region. Fig. 3 represents the third, smaller specimen.

1.

2.

3.

4.

5

Figs. 4 and 5 are the sections of two other specimens parallel to the axis cut near the centre in one and excentrically in the other. Both show axially flattened shells, with rounded periphery ; the outermost volution in Fig. 4 has the periphery apparently acute, a feature probably due to deformation. The lunular tunnel and prominent chomata are well visible in the outermost volution of Fig. 4. The specimen of Fig. 4 is the largest one having the transverse diameter of 1 mm and the axial diameter of 0.4mm.

This species is larger than *M. marblensis* Thompson, the genotype, but their resemblance is very close. The material at disposal being too scanty, the writer for a while refrains from applying a new specific name to it.

Localities : There are now known three localities of this species, all in the Hikoroiti-mura, Kesen-gun, Iwate Prefecture, namely :

Sakamotozawa, in a limestone with *Diphyphyllum flexuosum*.

Higutizawa, Kawauti, in a limestone with *Hexaphyllia kitakamiensis*.

Taziroyasiki in a limestone with *Diphyphyllum*.

Geological occurrence : Onimaru formation (*Dibunophyllum* limestone) ; Upper Viséan.

Text-figures 1—5.

Millerella sp. x 50

Figs. 1, 4, 5, Locality : Sakamotozawa, Hikoroiti-mura

Fig. 2, Locality : Higutizawa, Hikoroiti-mura

Fig. 3, Locality : Taziroyasiki, Hikoroiti-mura