

Permian Fusulinid Foraminifera from the North Auckland Peninsula, New Zealand

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IN March, 1950, Mr. R. F. Hay, New Zealand Geological Survey district geologist, collected fossiliferous rocks from a locality near the entrance of Whangaroa Harbour on the east coast of the North Auckland Peninsula, and sent them in for examination. After having ground and studied fifty thin sections, the writer was able to recognise three species of neoschwagerinid fusulines, two of which are widely known in the Permian of the Orient.

As this is the first record of fusulines in New Zealand and also the first record of Palaeozoic fossils in the North Island, this paper is offered as a preliminary announcement of the discovery, leaving the more detailed account until a later date.

Accompanying the fusulines are smaller calcareous and arenaceous Foraminifera, Ostracoda, Polyzoa and (personal communication from Miss H. Leed, N.Z. Geological Survey) corals of the Subfamily Waagenophyllinae.

These fossils were found in blocks of limestone composed largely of fusulines and fragments of spilite and associated with spilitic pillow lavas.

Locality: No. 505 of collectors R. F. Hay and A. A. Sommerville (G.S.5074). Prov. Mile Sheet ref. N 8/301888, Whangaroa S.D., near the east end of Marble Bay.

The following species of fusulines were identified (hypotypes are kept in the New Zealand Geological Survey collections):

Genus VERBEEKINA Staff
1909. *Neues Jahrb., Beil.*, 27: 476
Haplotype: *Fusulina verbeeki* Geinitz

Verbeekina sp. Plate 50, fig. 4

There are several rather obscure specimens, apparently juveniles, which can be identified as the genus *Verbeekina*. The figured specimen is from slide T1000/f1012.

Genus NEOSCHWAGERINA Yabe
1903. *Jour. Geol. Soc. Tokyo*, 10 (113): 5
Orthotype: *Schwagerina craticulifera* Schwager

Neoschwagerina margaritae Deprat. Plate 50, fig. 5

1913. *Neoschwagerina margaritae* Deprat, *Mém. Serv. Géol. d'Indochine*, 2 (1): 58, pl. 8, fig. 10; pl. 9, figs. 1-3.

Several specimens of this distinctive *Neoschwagerina* are present. The sagittal growth rate corresponds very closely with the growth rate of Deprat's specimens and the minute proloculum (0.06 mm.) makes

the resemblance almost complete. The figured specimen is from slide T1000/f1046.

Genus *YABEINA* Deprat

1914. *Mém. Serv. Géol. d'Indochine*, 3 (1): 30

Orthotype: *Neoschwagerina (Yabeina) inoueyi* Deprat = *Neoschwagerina globosa* Yabe = *Yabeina globosa* (Yabe)

Yabeina multiseptata (Deprat). Plate 50, figs. 1, 2

1914. *Neoschwagerina (Sumatrina) multiseptata* Deprat, *Mém. Serv. Géol. d'Indochine*. 1 (3): 53, pl. 3, figs. 2-8.

This species is extremely abundant, comprising the greater part of the rock, and agreeing well with Deprat's descriptions in the large proloculum (0.43 mm.-0.53 mm.) and slow rate of uncoiling and in the intermediate Yabeinid-Sumatrine characteristics. The keriotheca is thin and sometimes absent between the septula, but alveolar canals are present in every specimen, even if reduced in number. The axial septula are narrowly compressed and are often swollen at the distal ends, numbering as many as ten in a single chamber. The ratio of length to diameter varies considerably (from 1.24 : 1 to 2.39 : 1) but the variations in axial and sagittal growth rates fall fairly well within those given by Colani (1924, graph 22, fig. 3, graph 9, fig. 3). The figured specimens are from slides T1000/f1026 (axial section) and T1000/f1006 (sagittal section)

Yabeina sp. Plate 50, fig. 3

There are a few sagittal sections of a fusuline which is very similar to the figures of the species identified by Deprat (1912, Pl. 4, fig. 4) and Colani (1924, Pl. 23, figs. 31, 33) as *Neoschwagerina globosa* Yabe and later renamed *N. douvillei* by Ozawa (1925, p. 55). However, the single unre-crystallized sagittal section has six axial septula between each septum in later whorls and the primary axial septula are distally swollen, solid and non-alveolar as in typical *Yabeina*. The keriotheca is thicker than that of *Y. multiseptata* and is well supplied with canals. Because of inadequate material it seems inadvisable to attempt a specific identification at this stage. The figured specimen is from slide T1000/f1009.

Since the discovery at Marble Bay, further Permian fossils have been found in a specimen of chert presented to the old Colonial Museum in 1872 by "Mr. Barstow, R.M." and labelled "Fossiliferous chert, Russell, Bay of Islands." Although this rock is unsuitable for thin sectioning, fusulines and smaller Foraminifera and corals are well exposed on the weathered surfaces. The fusulines belong to the Neoschwagerininae and although specific identification seems hardly possible, the presence of secondary spiral septula between the primary ones makes possible the recognition of axial sections of *Yabeina*.

The North Auckland fusulines are contained in rocks which were included by Bell and Clarke (1909) in their Waipapa Series, a series of argillites, cherts, quartzites, greywackes and contemporaneous igneous rocks, excessively jointed, fractured and faulted, running along the east coast of the North Auckland Peninsula. Bell and Clarke's assumption, on purely lithological grounds, that these rocks were late Palaeozoic or early Mesozoic can now be confirmed as they are certainly, in part, Permian.

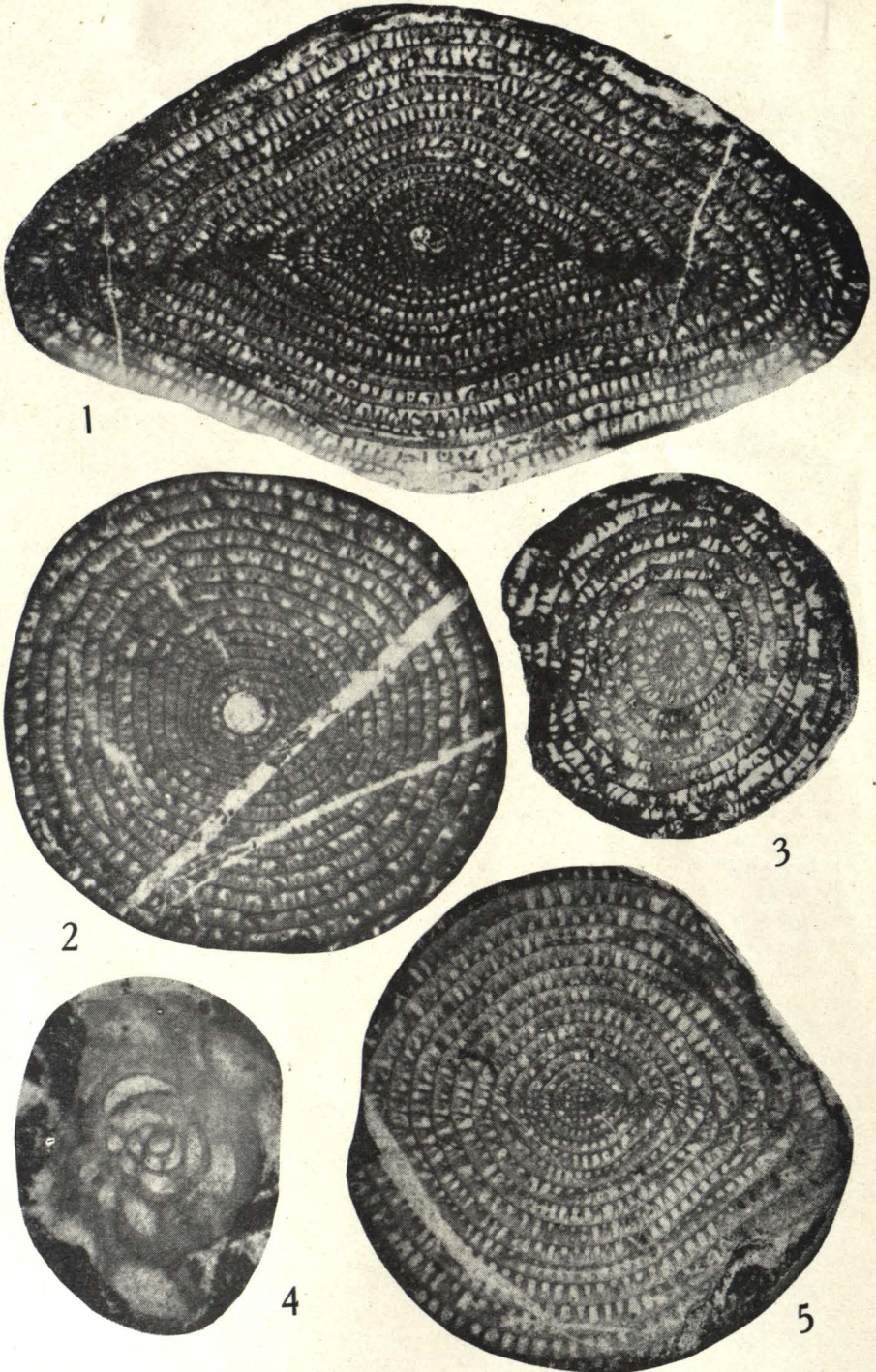


FIG. 1—*Yabeina multiseptata* (Deprat), 1914. Axial section, $\times 10$.
 FIG. 2—*Y. multiseptata*. Sagittal section, $\times 10$.
 FIG. 3—*Yabeina* sp. Sagittal excentric section, slightly oblique, $\times 10$.
 FIG. 4—*Verbeckina* sp. Oblique sagittal section, $\times 40$.
 FIG. 5—*Neoschwagerina margaritae* Deprat, 1913. Excentric axial section, $\times 10$.



The Neoschwagerinidae are an exclusively Permian family, confined mainly to the Orient and Tethyan regions, but also known from West Australia and British Columbia. The implication of a connection between the Permian seas of the North Auckland area and the warm Tethyan-Oriental seas of that period is clear and confirms the south-eastern extension of the Permian Tethyan sea postulated by Benson (1923, p. 31) in his palaeogeographic map of the Permian of the Australasian Region.

Deprat and Colani, in their work on the fusulines of the Orient, reported *Yabeina multiseptata* and "*Neoschwagerina globosa*" (= *N. douvillei*) in the highest fusuline zones of Southern China, Indo-China, Yunnan and Japan and believed them to be Upper Permian. *Neoschwagerina margaritae* was characteristic of a horizon which they classed as Middle Permian. Later workers, however, have thrown doubt on the Upper Permian ages assigned to many fusuline rocks of the Orient, and Hanzawa (1944) correlates the *Yabeina*-zone of Japan, containing *Parafusulina* and *Codonofusiella*, and the Maokou Limestone of South China, containing *Sumatrina*, *Yabeina* and *Neoschwagerina*, with the Word of Texas which he regards as the equivalent of the Artinskian. Hanzawa notes, however (p. 2), that *Yabeina* and *Sumatrina* may possibly extend to the Capitan, as they are associated with *Codonofusiella*, which is confined to the Capitan in Texas.

The Word is generally regarded by American workers as post-Artinskian and of Mid-Permian age (accepting a pre-Sakmarian, pre-Wolcampian Permo-Carboniferous boundary). Sherlock (1947) argues for a two-fold division of the Permian and places the Word in the upper part of the Lower Permian.

As the North Auckland fusulines have reached the same advanced stage of development as the yabeinid forms of Japan and South China, there seem good grounds for regarding them as Wordian or possibly Capitanian in age.

The writer wishes to acknowledge his indebtedness to Professor W. N. Benson, who was most helpful in making available much of the literature necessary for this study.

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