

## Note of the Occurrence of Radiolarian Limestone Among the Older Rocks of South-eastern Otago.

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ALONG the coast of Otago from the mouth of the Tokomairiro River northwards to Brighton there are exposed a succession of the older formations of the province, which show a gradual northward increase in the degree of metamorphism from slightly altered greywackes and argillites to the sericitic and chloritic quartz-albite schists of the Brighton-Dunedin district, which are comparable with those making up most of Central Otago. The sequence of metamorphic changes is comparable with that studied by Dr. Marshall in the rocks occurring along a nearly parallel line from Balclutha to Waipori, some ten to fifteen miles inland (Marshall, 1917, pp. 28-34; Ongley, 1932). Up to the present no trace of organic remains has been noted in even the least altered of the rocks within these two lines of traverse. Recently, however, one of us (W. N. B.) observed a small lens of grey limestone lying in phyllite interbedded with very slightly schistose greywacke nearly two miles south of the Akatore River mouth, approximately nine miles north-east of the mouth of the Tokomairiro River, and twenty miles south-west of the schists nearest to Dunedin. In this limestone a small microfauna was found, which, though obscurely preserved and indecisive as to age, is so novel a feature in New Zealand geology as to be worthy of record.

The material was obtained by the shore in portion 1 (or possibly portion 44) Akatore Survey District. The only lens of limestone noted was about three by two feet in length and breadth and three inches in thickness, pale grey, slightly ferruginous, with a large insoluble residue consisting of sericite and quartz, minerals which are rarely recognisable in thin section of the rocks (O.U. Geol. Dept, No. 4406). The enclosing phyllite (4405) is extremely fine grained and shows but little evidence of recrystallisation. It would fall into the lowest or Chl 1 grade of metamorphic rocks in Otago according to Turner's (1936) scheme. The associated greywacke (4407) similarly shows evidence of only the earliest stages of metamorphism.

The preservation of the organisms in the limestone is poor, but Mr. Chapman was able to make generic determinations of forms in

each of the nine slides examined. The following forms have been recorded:—

Radiolaria:

(a) Spunellarians:

*Coenosphaera* spp., the most abundant type. One example closely resembles *C. hispida* Hinde from the (?) Triassic of Celebes.

*Carposphaera* sp. rather like *C. jejuna* Rüst, from the Carboniferous of Germany.

*Porodiscus* sp. and *Acanthosphaera* sp.

(b) Nasselarians:

*Dictyomitra* sp. like *D. cincta* Hinde of the Trias of Savu, East Indies.

Foraminifera:

Small indeterminate globigerinids.

Coelenterata (?):

Sinuuous strings of spherical chambers recalling *Acervularia*. The radiolaria mostly belong to genera which range back into Lower Palaeozoic times and do not therefore afford definite evidence of age, though the specific comparisons suggest a later date.

LITERATURE.

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