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A NOTE ON UPPER PROTEROZOIC SPONGE SPICULES FROM THE NORTHERN TERRITORY OF AUSTRALIA

by

P.R. Dunn

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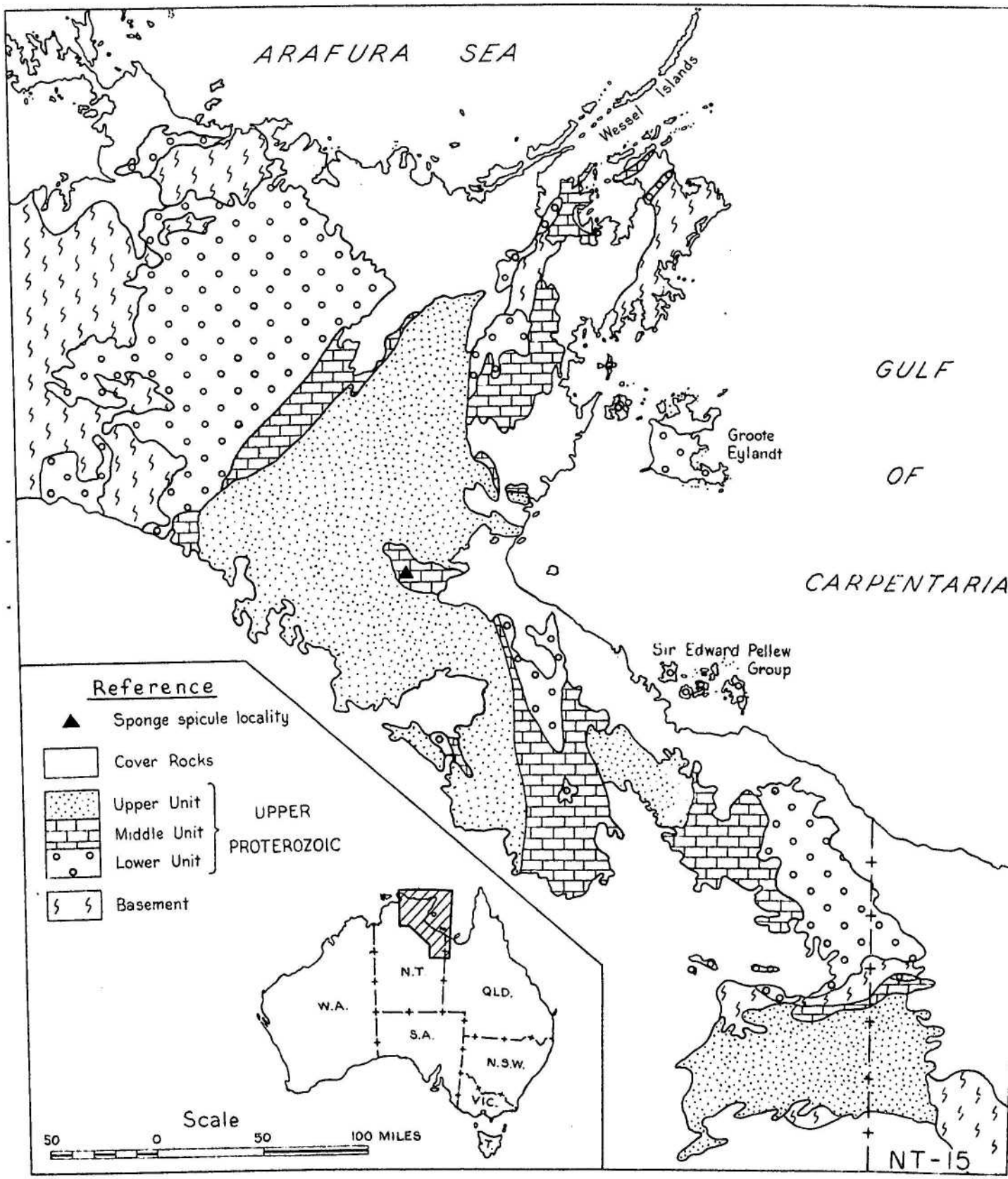

Figure 1 Map showing sponge spicule locality and distribution of Upper Proterozoic Units

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SUMMARY: Triact sponge spicules occur in a siliceous rock found in the Upper Proterozoic succession along the coast of the Gulf of Carpentaria in the Northern Territory of Australia.

The sponge spicules occur in Upper Proterozoic sediments about 50 miles west of the mouth of the Roper River in the Northern Territory of Australia. The possible presence of sponge spicules was first noted by H.W. Fander of the Australian Mineral Development Laboratories while carrying out a routine petrological examination of a sample collected by the Bureau of Mineral Resources. Dr. A.A. Öpik (this Bureau) suggested that the triact spicules be compared with Cayeux's (Cayeux, 1895) and indicated that such spicules are absent in the Cambrian of Australia.

The Precambrian age of the sponge is evident from its position in the sequence. The Upper Proterozoic rocks occupy a single sedimentary province which extends along the coast of the Northern Territory between the Queensland border and the Arafura Sea (Figure 1). Basically the province comprises three main lithological units which are, in part, conformable. The units principally contain:

1. Upper unit - Fine to medium-grained flaggy and blocky sandstone, mostly micaceous; siltstone; shale; oolitic ironstone and minor dolomitic rocks.

2. Middle unit - Dolomitic siltstone and shale; bedded dolomite and algal dolomite (including a major reef structure); chert and siliceous siltstone; quartz sandstone; minor interbeds of basic volcanics.

3. Lower unit - Quartz sandstone and conglomerate; interbedded basic to intermediate volcanics; dolomitic rocks; glauconitic sandstone.

Each unit has a maximum thickness of 15,000 feet and the whole sequence is extensively faulted but only gently folded.

The Upper Proterozoic sequence is unconformably overlain by flat-lying unfossiliferous sandstone and basic volcanics, which are, in turn, disconformably overlain by fossiliferous lower Middle Cambrian limestone (Daly River Group; see Öpik, 1956).

The sponge spicules occur at about the middle of the Middle Unit in fine-grained cherty sediments. Several other forms of life occur in the sequence. Stromatolites of several different forms are common in the cherts and dolomitic rocks of the Middle and Lower Units. Impressions of Beltanella - type jellyfish have also been found in the sandstone at the base of the Upper Unit. Other markings in the Upper Unit suggest the presence of unidentified forms of life.

The spicules are scattered throughout a pink siliceous rock in which they form arcuate, forked, and elongate fragments of mosaic quartz in a matrix of fine-grained quartz; the spicules have a subparallel arrangement. No spicules have been extracted from the rock and study is possibly only in thin section; most are fragmentary and the fragments average 0.1 mm. to 0.2 mm. in length. Several fragments, as illustrated in Plate 1 (Figures 1 and 2) show the triact nature of the spicules.

De Laubenfels (in Moore, 1955) reviews the reports of Precambrian sponge spicules and notes that the only authenticated occurrence was discovered by Cayeux (1895) in Brittany; although described as a sponge with triact spicules probably of the class Hyalosponges, Cayeux's specimens are crooked and lumpy - quite unlike the Northern Territory specimens. De Laubenfels has proposed the name Eospicula cayeux for the Brittany sponge.

Interesting impressions of objects comprising groups of radiating, acicular spines (Plate 1, Figure 3), were discovered in 1952 by B.P. Walpole in other siliceous rocks of the Middle Unit. The impressions do not resemble any known form of fossil organism but bear some resemblance to the trace fossil "Oldhamia" and the pseudofossil "Sewardiella", both described by Hantzschel (1962). Sections through the rock containing the acicular impressions show that the impressions do not extend below the exposed surface of the rock and do not show any other forms or impressions within the rock.

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PLATE 1

Fig. 1. A fragment of a triact spicule. The fragment is about 0.10 mm. long. Other arcuate fragments are less distinct and appear to be partly integrated with the matrix (x100).

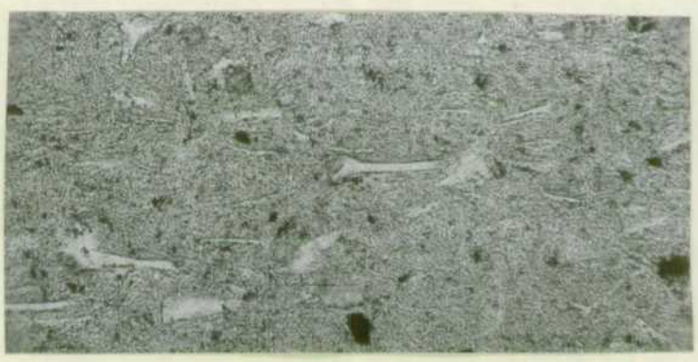

Fig. 2. A larger fragment of a triact spicule (about 0.16 mm.) in a mass of elongate fragments showing sub-parallel arrangement (x80).

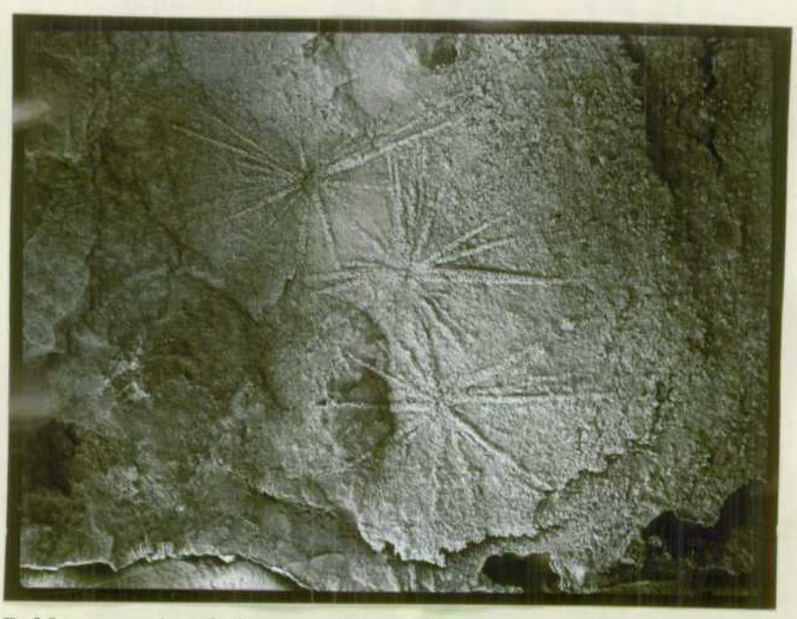

Fig. 3. Rubber cast of impressions of groups of radiating acicular spines on the uneven surface of a cherty rock. The groups are between 15 mm. and 20 mm. in diameter (x2½).