



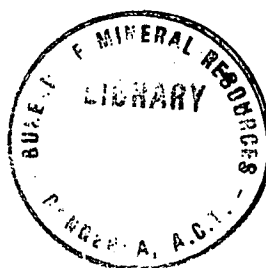
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DEPARTMENT OF NATIONAL DEVELOPMENT.  
BUREAU OF MINERAL RESOURCES  
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UMBRELLA-SHAPED FOSSILS(?) FROM THE LOWER PROTEROZOIC  
OF THE NORTHERN TERRITORY OF AUSTRALIA

by

W.A. Robertson

The information contained in this report has been obtained by the Department of National Development, as part of the policy of the Commonwealth Government, to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

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PLATES

Plate 1. Fig. 1. General view of bedding plane dipping steeply towards observer showing many Radial and Concentric Specimens. George Creek locality.

Fig. 2. Radial Form. Tumbling Waters locality. Vertical section, at right angles to bedding plane, showing 'stem'.

Fig. 3. Radial Forms. George Creek locality. Plan view of single specimen showing radial grooves and central depression.

Plate 2. Fig. 1. Concentric Form. George Creek locality. Vertical section through centre of specimen, showing grainsize grading in 'stem' and annules.

Fig. 2. Concentric Form. George Creek locality. Plan view of same specimen, showing central depression and annular ridge.

Fig. 3. Concentric Form. Tumbling Water locality. Oblique view of two contiguous specimens showing central core and annular ridge.

## SUMMARY

Umbrella-shaped objects, presumably fossils, were collected from the Lower Proterozoic Noltinius Formation at two localities about 80 miles south of Darwin. Morphological descriptions and photographs are contained in this record.

## INTRODUCTION

In 1955 during detailed mapping of the George Creek Uranium Reserve (Robertson 1956) specimens of umbrella-like fossils were found in the Noltinius Formation (Malone 1958).

### LOCALITIES:

The fossils have been found at two localities:- George Creek and Tumbling Waters. The George Creek locality is about a mile west of the 80 mile peg on the Stuart Highway south of Darwin. The air photo reference is; Burnside, Run 2, photo 5116, C, x = 1" y = 2.8" diagonal 2.8". Geographical Coordinates:- Lat. 13°32'S, Long. 131°08'E. The Coordinates on Plate 2 of the George Creek Reserve and Uranium Prospect (Robertson 1956) are 3420W, 1270S. The Tumbling Waters locality is about nine miles north-west of Rum Jungle Mine on the Tumbling Waters one mile Military Sheet D/52/4/46. The Air photo. reference is Tumbling Waters, Run 9E, photo. 45570, A, x = 2.1" y = .4", diagonal .85".

## THE FOSSILS.

### STRATIGRAPHY:

The specimens from both localities occur in micaceous greywackes of the Noltinius Formation. This formation has been described by Malone (1958). It includes much coarse clastic material and in places displays features indicative of turbidity - current deposition. The rock types, in decreasing volume, are:- siltstone, quartz-greywacke, greywacke, greywacke-conglomerate and quartz sandstone. The fossils were found on a bedding plane between a micaceous greywacke and an overlying colour-banded quartz-siltstone. Fossils were found for several hundred yards along the strike at both localities but not in the over and underlying beds. An age of 1650 million years has been determined for a granite intruding the Noltinius Formation.

### MORPHOLOGY:

Two distinct forms were clearly visible:- the Radial Form, or "Beach Umbrella" (Plate 1 figs. 1,2 and 3), the Concentric Form (Plate 2, figs. 1,2 and 3).

The Radial Form consists of a circular mound about one or two inches high and eight to twelve inches in diameter with a central depression of a half to one and a half inches diameter. A number of grooves radiate from the central depression, or core, apparently to the edge of the mound. The grooves range in depth from  $\frac{1}{8}$  to  $\frac{1}{2}$  an inch, and appear from the photos of specimens preserved, to number at least 18. The ridges or lobes between the grooves are two to three times as wide as the grooves. Vertical sections cut across the middle of specimens indicate that a stem protrudes into the rock at right angles to the bedding plane for distances up to twelve

inches (Plate 1, Fig. 2). Polished vertical sections show that the specimens are composed of medium-grained greywacke material, but that the grain-size decreases towards the margin of the 'stem', both on the inside and the outside, and that there is a darkening of colour in the fine-grained material. There is no sign of laminations.

The Concentric Form occurs on the same bedding plane as the Radial Form. It consists in plan of a raised annulus with an outside diameter of 3 to 6 inches, within which is a central depression with a diameter of  $\frac{1}{2}$  to 1 inch. It appears to have a 'stem' which extends downwards from the central depression, but as yet no specimen has been collected which shows the stem for more than an inch below the surface. A vertical section across a specimen (Plate 2, Fig.1) shows a definite grading in grain-size in the stem from fine-grained at the centre to coarser grained near the edge. The section also shows a grading in grain-size in the material of the annulus from coarse to fine going outwards from the 'stem'. There is no sign of lamination.

Both forms show an elongation along the strike, especially noticeable at the Tumbling Waters exposure where the folding is more intense than at George Creek. Elongation is probably due to tectonic deformation.

#### POSSIBLE ORIGIN

The most probable origin is either that they were formed in the processes of sedimentation, or that they represent the remains of primitive animal or plant life.

The 'fossils' described have features in common with sand volcanos (Gill and Kuenan, 1957). However, their small size, absence of concave surface, and the lack of laminations in the 'cone' would seem to preclude this possibility (cf. Plate 2, Fig.1, with Gills Fig. 7, p.452).

The 'Concentric Form' may have been the burrow of a primitive animal. The 'stem' would represent the cavity that has since been filled in, and the dome may be the material excavated by the animal, evidence of the animal's activity in the remote past. Alternatively it may be the impressions formed by some form of seaweed, whose root formed the 'stem'; the mound could have been formed by the retention of material in the foliage of the plant. As the plant rotted the root was replaced by material collapsing in from the mound, causing subsidence at the top of the specimen and forming the central depression.

The formation of the grooves of the 'Radial Form' presents a problem. If the object is a product of plant life it is possible that the lobes represent partial silicification caused by branches of the plant. Alternatively, the grooves might represent the ramifications, partly denuded, of the burrow of an animal.

One factor which cannot be explained is their great abundance at one horizon at two localities only. Hundreds of feet of similar sediments both above and below have not so far yielded a single specimen.

### CONCLUSIONS

More detailed collecting and study is necessary to determine the origin of the 'fossils' described in this Record. The 'fossils' appear to give evidence for life in the Lower Proterozoic.

### REFERENCES

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- MALONE, E.J., (1958) - The Geology of the Darwin - Adelaide River area, Northern Territory. Bur. Min. Resour. Aust. Rec. 96.
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Fig. 1



Fig. 2



Fig. 3





*Fig: 1*



*Fig: 2*



*Fig: 3*