

VOLUME I

A FIELD APPRAISAL OF THE ROLE OF
PLANT OPAL IN THE
AUSTRALIAN ENVIRONMENT

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ABSTRACT

When plants die the plant opal they contain is subjected to processes both before and after it enters the soil. To date the use of plant opal has been largely confined to paleoenvironmental and archaeological research, where its relationship to the plant or plant community and its shape characteristics are of primary importance in the erection of assemblages of plant opal diagnostic of a particular environment.

A comparison was made of the plant opal assemblages from the topsoil beneath several vegetation communities. Similar vegetation communities did not produce similar plant opal assemblages in the soil. Widely differing vegetation communities produced soil plant opal assemblages which differed very little. Once the plant opal has become separated from the host plant its botanical links become attenuated and its role as a mineral within the sediment assumes primacy.

Periodic fire in the Australian environment exposes the plant opal to the effects of wind and running water which remove much of it while it is still in the litter layer. Large, platey sheets of plant opal are preferentially removed in this manner. In the litter layer, both the plant remains and the opal it contains are comminuted by the fauna. Soil fauna may selectively remove and store plant material containing a range of plant opal shapes which are then not found in representative amounts in the topsoil. The opal removed can vary from site to site and through time.

These results suggest that plant opal could be used as a marker in pedological and geomorphic studies. This thesis presents a new view of plant opal as a constituent of sediments in its own right.

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Many others have helped along the way. The survey of the field area was undertaken jointly by Paul Hesse, Liz Norris and myself. Some of this work has been used to supply the topographic information contained in Appendix A, Figure A1. Historical research into the Pilliga Forests was undertaken jointly by Peter Mitchell, Liz Norris and myself and the joint publication arising from this work is appended (Appendix H).

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