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## Characteristics of Heavy Accessory Minerals in a Pre-Cambrian Granite Gneiss

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# OCCURRENCE OF CERTAIN SMALL FOSSIL PLATES IN THE MAQUOKETA SHALE OF IOWA

R. C. SPIVEY

Small calcareous plates, possibly from Asteroidea or other Echinodermata, occur in the Maquoketa shale of Iowa. These plates all have similar characteristics, but vary in their minute structures, and the variations apparently have some stratigraphic significance.

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## PERMIAN AMMONOID ZONES

A. K. MILLER AND W. M. FURNISH

Ammonoids are among the best of index fossils and are particularly useful for intercontinental correlations. Five major ammonoid zones are recognized in the Permian, all of which are of world-wide significance. In Texas and northern Mexico the Permian is particularly well developed and is abundantly fossiliferous, and the section in this area serves well as a standard for the rest of the world.

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## CHARACTERISTICS OF HEAVY ACCESSORY MIN- ERALS IN A PRE-CAMBRIAN GRANITE GNEISS

C. S. GWYNNE

Heavy accessory minerals have been separated from specimens of granite gneiss taken in a traverse across the Beartooth Plateau. Prominent accessories are biotite, magnetite, ilmenite, zircon, apatite, epidote and titanite. Characteristics of zircon, apatite and titanite from these samples are described.

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