

itself cause the entrapment of oil and gas there; rather, irregular porosity development in the Mississippian carbonate rocks and lensing and pinchout of Cretaceous sandstones is primarily responsible for those accumulations.

The largest oil and gas reserves on the arch are found in channel sandstones of the Lower Cretaceous basal Mannville Group, extending from Cutbank field, Montana, northward through the Taber, Hayes, and Bantry fields of Alberta. The middle Mannville glauconitic Moulton zone produces from a series of north-trending sandbars in the Darling area of Montana, in the Taber area, and in scattered trends in the Jenner, Countess, and Hussar fields of Alberta.

Large gas reserves are found in thin blanket sandstones of Late Cretaceous age, principally in the Medicine Hat and Second White Specks zones. A thick deposit of sandy shale in the Milk River Formation probably contains several trillion cubic feet of gas, but the low productivity of early wells kept these reserves off the market until 1970. A small drilling boom is now under way to develop and exploit what will be possibly the largest single gas field in areal extent in Canada.

HERR, S. R., Dept. Geol., Univ. Iowa, Iowa City, Iowa

BIOSTRATIGRAPHY OF GRAPTOLITE-BEARING BEDS OF UPPER ORDOVICIAN MAQUOKETA FORMATION OF NORTHEASTERN IOWA

A graptolite fauna comprised of 3 species is present in the lower Elgin Member of the Maquoketa Formation. Although this fauna has been reported previously, revision and reevaluation of the taxonomy are proposed. The following taxa merit discussion and revision: "*Diplograptus peosta*" (Hall) belongs to the species group *Orthograptus truncatus* Lapworth. Its geographically and chronologically restricted occurrence dictates a subspecific designation. *Climacograptus putillus* (Hall) is a species which is very similar to *C. mississippiensis* Ruedemann. The 2 species differ with regard to the origin of the median septum; however, other strong affinities should be considered in a revision of both species. An unnamed subspecies of *Orthograptus quadrimucronatus* exhibits affinities with 2 subspecies from eastern North America. Its small size and restricted occurrence separate it as a distinct subspecies.

The stratigraphic and geographic distribution of graptoloid species within the Maquoketa Formation suggests that 2 graptolite zones exist and the graptoloid species are provincial within both zones.

Individually the graptoloid species of the Maquoketa Formation are similar to species reported to be late Caradocian, early Ashgillian, Edenian, Maysvillian, and Richmondian in age. Comparison of the Maquoketa graptolites with faunas of eastern and western North America suggests a discrepancy in previous correlations between the Richmond Stage and the *Dicellograptus complanatus* zone of western Texas.

The graptolite fauna as a whole is correlated with the faunas of the Haymeadow Creek Member of northern Michigan as well as the upper Utica Formation of New York and Canada.

HESSE, R., Dept. Geol. Sci., McGill Univ., Montreal, Que.

SELECTIVE SILICIFICATION OF OIDS IN GRAYWACKES OF GAULT FORMATION, EARLY CRETACEOUS, EAST ALPS

Flysch-type graywacke beds of the Gault Formation of 3 Alpine nappes (Falknis, Tasna, and Flysch Nappe of the East Alps) usually contain less than 5% (maximum 19%) of ooids whose aragonite concentric rims are mostly silicified. Other unstable carbonate components, such as echinoderm and bryozoan fragments (high-Mg calcite), are also preferentially silicified. Most of the other carbonate grains are little altered.

The ooids generally consist of a large nucleus (of quartz, feldspar, glauconite, or other grains) covered by a relatively thin oolithic coating. Silicification has nicely preserved the internal structure of the coatings—tiny inclusions of clay particles and iron-stained minerals delineate the original concentric structure.

This kind of selective silicification is a diagenetic process which probably took place after final reposition of the sediment (in an assumed trenchlike environment). It is less likely to have occurred at an early stage of diagenesis immediately after formation of the ooids in a high-energy, near sea-level environment, or during transport on the shelf.

Epigenesis at a transitional stage to very low-grade metamorphism has enlarged the crystal size within the siliceous rims. In the unmetamorphosed Flysch Nappe, the rims are cryptocrystalline. In the Falknis and Tasna Nappes (lower chlorite-schist and stülpnomelane facies), many of the silicified coatings display distinct small quartz crystals.

HESTON, J. E., and R. E. SAMPSON, Cities Service Co., New York, N.Y.

INDUSTRY'S EXPECTATIONS AS TO NATIONAL MINERALS AND MINING POLICY

The recognition by the government of the need for a long term secure source of minerals is subtle acknowledgment that shortages in hard minerals may soon become as prominent as the mineral fuel shortages of today.

The Mining and Minerals Act of 1970 discloses that industry will be encouraged to provide the mineral needs within the constraints of giving appropriate protection to the environment and conserving and reclaiming those resources which otherwise might have been wasted. If industry is to accomplish this goal there are certain things that will be expected from government:

1. Administration and implementation of policy to avoid over regulation and multidepartment regulations which will unduly burden the operator.

2. Implementation of policy and regulations with thorough recognition of long-range supply-demand picture on an international basis and in a manner which will be fair and consistent regarding imports, stockpiling, and mineral development.

3. Design of tax-legislation regulations and incentives to encourage mineral exploration, development, and reclamation.

4. Encouragement of research and educational facilities which will provide the manpower and technology for the wise and efficient use of our mineral resources.

5. Administration of public lands to insure multiple use and to make prospective areas available for mineral exploration.

6. Serving the public's best interest.

The need for cooperation is recognized and the goals of the Act can be achieved if industry and the consumer can depend on a long period of stable government commitment and policy