the Braziliano-Panafrican orogenic-thermotectonic event 450 to 750 m.y. ago.

Large Paleozoic basins are superposed both over the Amazonic craton (Amazon basin) and over the Atlantic craton (Maranhao and Parana basins). They were subjected to regional cratonic subsidence and broad regional arches separate several subbasins. The architectural framework and shape of the basins (saucer or elongated trough) allow them to be classified either as remote interior basins (Middle and Lower Amazon, Maranhao, and Parana) or as near interior basins (Upper Amazon), the latter being affected by the Hercynian orogeny.

In westernmost Brazil, the Acre basin forms part of the mobile subandean belt and displays intense deep-focus (500 to 700 km) seismic activity. Its architecture and tectonic behavior are that of a typical intracontinental cratonic composite basin.

In Early Cretaceous time, intense faulting marked the breakup of the Gondwana supercontinent. A series of rifts opened along the present Atlantic coast, with characteristic horst-and-graben system. Some rifts remained aborted "aulacogens" (Takutu, Marajo, Reconcavo-Tucano) whereas others developed into the pull-apart basins of the widening South Atlantic Ocean.

The Cenozoic basins can be divided into two groups: (1) those of southeastern Brazil along the Serra do Mar and the Serra da Mantiqueira where half-grabens formed through vertical reactivation of faults following Precambrian lines of weakness, and (2) those of central Brazil (Pantanal and Bananal) where large interior basins are being formed through slow cratonic subsidence.

POWERS, R. B., U.S. Geol. Survey, Denver, CO

Geology of Willow Creek Foreland Thrust Play, Moffat County, Colorado

Exploration for potential oil and gas traps in subthrust zones along the thrusted forelands of a number of Rocky Mountain uplifts has gained renewed interest by the oil industry. In the past, two drawbacks to identifying and drilling these traps were: (1) they are obscured by burial beneath overthrust Precambrian crystalline or metasedimentary rocks, and (2) drilling through an appreciable thickness of these Precambrian rocks is expensive, time-consuming, but necessary to reach younger rocks in the subthrust zone.

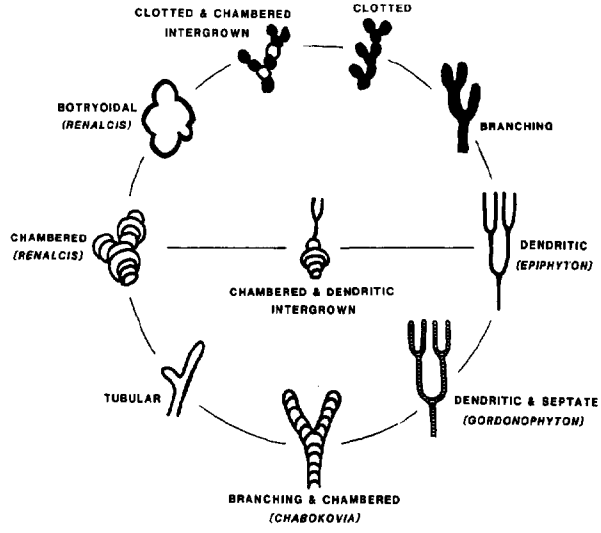
The Willow Creek thrust is an example of this type of foreland subthrust exploration play. It is about 7 mi (11.3 km) north of the giant Rangely oil field (production from the Permian-Pennsylvanian Weber Sandstone), and forms the south flank of the Blue Mountain anticline, south of the Uinta Mountains, in northwestern Colorado. This foreland subthrust play was drilled in 1960 by Tennessee Gas and Oil Co. (now Tenneco), and was also studied through a combination of surface and photogeologic mapping, minimum subsurface well control and pre-multichannel seismic data. Structural closure was mapped on subthrust Weber Sandstone in fault contact with overthrust Precambrian rocks. Drilling of more than 2,000 ft (600 m) of Precambrian was required to penetrate the Weber Sandstone. Although the test had good oil shows in Triassic and Permian rocks, it was a dry hole. However, it confirmed the overall original structural interpretation, identified the presence and angle of the main thrust fault, and successfully penetrated an appreciable thickness of Precambrian rocks to reach the Weber.

The Willow Creek thrust may well be a type model of a foreland thrust play, and some of the geologic concepts involved in this study could be used as additional exploration tools to help find these elusive, prospective subthrust traps.

PRATT, BRIAN R., and NOEL P. JAMES, Memorial Univ., St. John's, Newfoundland, Canada

Epiphyton and *Renalcis*—Diagenetic Microfossils from Calcification of Coccoid Blue-Green Algae

Epiphyton and *Renalcis*, and related microfossil genera, are very important but enigmatic framebuilding and encrusting components of many Paleozoic reefs. Study of numerous North American occurrences of various ages (Early Cambrian to Late Devonian) suggests that *Epiphyton* and *Renalcis* are end members of a continuous spectrum of diverse morphologies that commonly occur adjacent to or intergrown with each other. Salient morphotypes include (1) dendritic forms (typified by *Epiphyton)*, (2) dendritic forms with finely septate branches (*Gordonophyton*), (3) robust branching forms with chambers (*Chabokovia*), (4) large unchambered branching tubes, (5) chambered and botryoidal aggregates (typified by *Renalcis*), and (6) arborescent grapelike clots which often lengthen into stubby branches. Particularly noteworthy among common intergrowths and co-occurrences are *Epiphyton* branches attached to (sprouting from?) *Renalcis* chambers. Many well-preserved micrite walls, branches, and clots exhibit a faint dense peloidal microstructure.



The continuum of shapes and intergrowths indicates that these microfossils were likely not genetically distinct organisms. It is proposed that these fossils represent precipitation of high-Mg calcite around and within clumps of coccoid blue-green algal cells soon after death of the algae and in the environment of growth. Inferred rates of chamber addition and growth of branch tips suggest that many cells grew, died, and rotted away between successive times when biogeochemical conditions were right to promote calcite precipitation. The various forms, genera, and species resulted from environmentally related size variation of cells and cell clumps and whether or not calcification was episodic. These microfossils are therefore "diagenetic taxa" and, in a sense, can be considered "microstromatolites."

PRICE, LEIGH C., U.S. Geol. Survey, Denver, CO

Time as Factor in Organic Metamorphism and Use of Vitrinite Reflectance as an Absolute Paleogeothermometer

The only evidence that time is a factor in organic metamorphism lies in the works of Karweil, Lopatin, and Connan. All three attributed the high degree of organic diagenesis in geologically older areas to today's presently low geothermal gra-