in its upper sector a major, pre-Pliocene, NNW-SSE-trending fault. Its floor is 3-4 km wide at the head and 25 km wide near the base of the rise; at present, the upper valley serves as a funnel for sediment moving downslope. The lower valley, filled by thick (about 700 m) sediment, indicates that the valley served as a sediment trap during most of Quaternary time.

The steep (to 15°), straight, northeast-southwest-trending Emile Baudot escarpment is a young, possibly still active, fault plane to which the main foundering of the rise is related. The down-dropping is so recent that pre-Pliocene bedrock on the rise remains partly exposed. The unconsolidated material on the rise is Quaternary sand and mud, turbidites, and hemipelagites, as well as older sediment reworked from the upper Balearic platform. Some of these sediments presumably originated at the proto-Ebro River system on the northwest and were deposited in deltaic and nearshore environments in an area which now lies between Mallorca and Menorca. The Ebro sediment source was cut off as a result of the separation of the Balearic block from the Iberian Peninsula before the deposition of the Miocene evaporites.

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PHYTOPLANKTON ABUNDANCE AND DIVERSITY DURING THE LATE DEVONIAN AND EARLY MISSISSIPPIAN OF OHIO

The Upper Devonian Chagrin and Cleveland Shales contain a diverse and abundant organic-walled microplankton assemblage of acritarchs and leiospheres with associated spores, whereas the Lower Mississippian Bedford Shale phytoplankton assemblage is greatly reduced. Ten-gram samples were examined at intervals of 10 ft or less for the entire 573 cores through the 3 formations, to determine microplankton abundance and diversity.

In these samples, spores are the most abundant element, followed by leiospheres and then acritarchs. More than 50 species of acritarchs and leiospheres, mostly new, have been identified in 62 samples of the Upper Devonian section, whereas one *Gorgonosphaeridium* species occurs abundantly in all Upper Devonian samples and is present in most Lower Mississippian samples.

General acritarch diversity decreases slightly up-section in the Chagrin Shale, and increases slightly in the basal Cleveland Shale; the decrease is more marked in the upper Cleveland Shale, and is most notable in the Bedford Shale. Acritarch abundance also lessens up-section through the Upper Devonian formations, with minima in the upper fourth of the Chagrin Shale and the upper half of the Cleveland Shale. Acritarchs are very scarce in the Bedford Shale.

As total phytoplankton abundance shows a marked decrease up-section, from the middle of the Chagrin Shale to the top of the Bedford Shale, a drop in net primary productivity is indicated for the Late Devonian and Early Mississippian of Ohio.

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CARBONATE PETROLOGY OF GREEN RIVER FORMATION (EOCENE), UINTA BASIN, UTAH

The Green River Formation contains a diverse suite of lacustrine carbonate rocks comparable to that of carbonate formations of marine origin. Fossils (calcareous algae, ostracodes, gastropods, pelecypods), coated grains, microcrystalline carbonate aggregates, sparry carbonate, microcrystalline carbonate, and terrigenous grains are the main rock-forming components of the lacustrine carbonates. The most abundant allochemical constituents are polygenetic microcrystalline carbonate aggregates (intraclasts, pelletoids) and fragmental algal "plates." Coated grains (ooliths, pisoliths, circumcrusts) are less common and probably are biochemical (algal?) precipitates. Microcrystalline carbonate is the most abundant orthochemical constituent, but neomorphic and pore-filling sparry calcite are present. Dolomicrite is ubiquitous and probably formed as a replacement product of calcium carbonate before lithification. Terrigenous constituents are present in nearly all carbonate rocks; they constitute as much as 50% of some carbonates. The similarity of lacustrine and marine carbonate rocks indicates that the 2 types can not be differentiated solely on the basis of petrographic relations.

Sedimentary structures, stratification, color, and lithologic associations and variations within the Green River Formation indicate that the carbonates were deposited in a wide range of lacustrine environments. Recognized depositional environments include mudflat, lagoonal, shoal, reef, and offshore.

Preliminary $\delta\ ^{18}O$ and $\delta\ ^{13}C$ analyses of carbonate rocks from the Green River Formation indicate a biogenic fractionation for the microcrystalline carbonate of ooliths, pisoliths, and certain microcrystalline carbonate aggregates, and an early diagenetic replacement origin for dolomicrite.

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COMPARISON OF GEOLOGIC CYCLES OF EARTH, MOON, AND MARS

The geologic cycle of a planet depicts the interaction of impact, surface, and internal tectonic processes on the planetary surface. The earth has a "closed-loop" geologic cycle in which source rocks are eroded but are continuously recycled. In contrast, the moon apparently has an "open-loop" geologic cycle in which the primitive crust is irreversibly destroyed. On the earth, impact plays a minor role and surface and tectonic processes are approximately equally active. That is, if averaged over the globe through geologic history, the rate of uplift equals the rate of erosion. On the moon, impact processes are dominant and there are only minor surface and tectonic effects. Preliminary interpretations of the rock cycle and the "ice cycle" of Mars are presented as sources of questions for future analysis. Apparently, the geologic cycle of Mars involves surface and tectonic phenomena as well as impact phenomena.

Surface processes active on Mars include eolian erosion and deposition. The "channels" in the equatorial regions are evidence of intermittent stream erosion. The tectonic processes of Mars have been investigated by mapping regional stress patterns from analysis of observed lineament (fracture) systems.

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FINANCIAL PROBLEMS ASSOCIATED WITH ENERGY CRUNCH

The satisfaction of virtually every human need for goods and services involves the use of energy. Two-thirds of all energy consumed in the United States is for business-related purposes and a third serves private needs. Both business and private sectors utilize energy primarily for essential purposes and there is very little scope for reduced consumption without harm to the nation's economy and its standard of living.

Obviously, an energy shortage would create a critical situation for the United States, and that is precisely the kind of predicament the nation now is in. All primary sources of energy—oil, natural gas, coal, water power, and nuclear power—currently are in short supply. The shortage has not evolved because the United States lacks sufficient energy resources, but rather because of economic and environmental restraints. These energy resources cannot be developed sufficiently under the system of price regulation that has existed for the last 2 decades and without a more realistic approach to the solution of environmental problems. Consequently, the nation will be forced to rely much more heavily on foreign sources of energy in the future. Most imported energy will be petroleum and there are various reasons for believing that the inflow would be subject to