

By late 1978 the first-phase, 7-well exploratory program was completed. Two of the six basins had been tested. Individual wildcat costs using an anchored semi-submersible rig are in the \$10 million to \$20 million range.

Despite adverse factors of extreme weather conditions, deep water, remoteness, and high drilling costs, more exploratory drilling will be necessary for final evaluation. The Sea Hunt Group is presently considering its second-stage drilling program for the area.

SCHAFERSMAN, STEVEN D., Rice Univ., Houston, Tex., and STANLEY H. FROST, Gulf Research and Development Co., Houston, Tex.

#### Tropical Cenozoic Paleo-oceanography and Correlated Events in Phylogeny and Biogeography of Scleractinian Corals

Modern understanding of the speciation process emphasizes the considerable interaction between phylogeny and biogeography. New methods of historical biogeographic analysis, such as vicariance theory, refuge theory, and equilibrium theory, have greatly complemented but not supplanted classical dispersal theory. Vicariance theory is a method which infers the existence of ancestral biotas by analyzing the distributions of numerous living organisms and which then interprets historical biogeographic relations by emphasizing the splitting of the ancestral biotas after range extension by dispersal. The application of vicariance theory to the distribution of fossils, rather than extant organisms, is problematical, because the time element associated with paleontologic data provides both additional information and additional complexities for biogeographic interpretations. A historical biogeographic analysis should give equal consideration to numerous interrelated factors, including inferred ancestral distributions, chronologies of speciation, distributional changes related to paleoenvironmental, paleo-oceanographic, and paleotectonic events, dispersal routes, mechanisms, barriers, and ecologic relations with associated taxa. The acknowledged danger of such a method, of course, is that one may end up with an untestable narrative explanation.

To illustrate these concepts, we consider the Cenozoic biogeographic history and phylogeny of tropical Scleractinian corals. It has been known since the early part of this century that the major evolutionary features and distributional patterns of these corals can be explained by a pan-tropical Tethyan biota which has been subsequently modified by paleo-oceanographic events. Paleontologic, biologic, and geologic data strongly support the following conclusions. (1) Breakup and subsequent disjunction by vicariance of the Oligocene pan-Tethyan coral fauna resulted from changes in marine climate and circulation caused by creation of the Antarctic Convergence and closure of the seaway between the eastern and western Tethys (early Miocene), great restriction and closure of the Panama seaway (middle Miocene), eustatic sea-level fall and other oceanic phenomena associated with the Mediterranean salinity crisis (late Miocene), and closure of the Bolivar seaway (early Pliocene). (2) Both the Indo-Pacific and the Car-

ibbean faunal provinces served as centers of origin for coral genera and species. (3) The Gulf of California Pliocene disjunct fauna is a result of either the extension of the relict western range of the vicariating Caribbean fauna or long-distance dispersal from a previously differentiated Caribbean fauna into a refuge which ultimately failed. (4) The modern eastern Pacific coral fauna is a mixture of both the pan-Tethyan fauna and long-distance dispersal from the Indo-Pacific fauna as controlled by marine climate and barriers.

SCHAMEL, STEVEN, Lafayette College, Easton, Pa.

#### Structure of Tunisian Atlas

The Tunisian Atlas is a foldbelt of unusual complexity developed in a stratigraphic succession of Mesozoic and Tertiary age. The folds range in style from simple, narrow-crested box folds separated by broad relatively flat synclines to complex growth folds flanked by numerous unconformities. Many of the anticlines are cored by highly deformed Triassic-Liassic evaporites. Locally the structures are cut by high-angle reverse faults and late-orogenic normal faults. Fold trends are both variable and intersecting and the folds tend to die out abruptly along strike.

A model is proposed in which three successive and contrasting tectonic regimes have operated since the early Mesozoic to produce the structural complexity of the Tunisian Atlas: (1) block faulting associated with rifting of the North African continental margin, which in Tunisia began by, at least, the early Jurassic; (2) diapiric emplacement of the Triassic-Liassic evaporites into the overlying strata beginning in the early Cretaceous; and (3) folding of the cover strata in response to regional compression in the early Miocene through Pleistocene. Structures formed during the Neogene compressional phase were controlled by mechanical anisotropies in the cover, principally thickness and facies variations, caused by the early block faulting and diapirism. Although detachment and decollement glide of the cover strata on the Triassic-Liassic evaporites appear to have operated locally, regional shortening of the pre-Mesozoic basement is considered to be the principal driving mechanism for folding in the Tunisian Atlas.

SCHLAEFER, JILL T., Amoco Production Co., Denver, Colo.

#### Soil Regimes of Tazirbu Region of Central Libya Determined from LANDSAT Imagery

A preliminary study of the Tazirbu region of Libya using color-processed, LANDSAT 1:250,000-scale imagery has produced a practical and potentially useful map of soils in a 10,000-sq km tract. Soil types were mapped by tonal differentiation and substantiated by ground samples where available. The map may help delineate changes in the clay/silt fraction of the sandy soils that dominate the surface of the area. Anomalous color keys characterize vegetation of sufficient density to be registered by imagery. Wind direction represents a prime investigative and interpretive tool. Land-use planning, now being undertaken by the Libyan government, can be simplified by restricting the initial recon-