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Recent Huge Gas Discoveries in Kangan Area, Iran

The Kangan area is located in the Fars Province of Iran and is a part of the Zagros foothills belt. It differs from the northwestern Disful embayment, which holds the main oil reserves of Iran, by its situation on the Fars high which, together with Qatar arch, separated the Mesopotamian basin from the Rub Al Khali basin during Mesozoic times.

The discovery in Kangan was made in 1973 by Societe Francaise des Petroles d'Iran which acted as the operator for a European consortium (Elf Aquitaine, AGIP, Hispanoil, Fina, OEMV) in a service contract for National Iranian Oil Co. Since then, several other discoveries have been made in Fars Province in structures such as Pars, Dalan, Mar, Varavi, and Aghar, among which Pars and Nar are presently undergoing development drilling.

The gas-bearing zones are in the Lower Triassic to Permian Khuff Formation (Kangan and Dalan Formations according to NIOC nomenclature) constituted mainly of heavily fractured dolomitic and oolitic carbonate rocks of intertidal environment. Thin layers of anhydrite form the caprock. Huge east-west elongate anticlines (up to 80 km long, with vertical closure up to 2,500 m) were folded during late Tertiary and Quaternary movements to form traps, some holding more than 18 Tcf of wet gas.

The role of tear faults is important as a cause of possible gas migration. The gas originates either from the organic-rich Permian carbonate rocks or from older Paleozoic source rocks. Most of the traps are full to the spill point, and gas entrapment seems very recent if not in progress.

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Conquista Project; Uranium Mining and Milling in South Texas

Continental Oil Co. and Pioneer Nuclear, Inc., began a geologic and geotechnical evaluation in 1967 on uranium properties in south Texas. Construction of a mining and milling complex began in 1971. Mine planning and design provided the starting point for field operations. Startup operations guided the early development of the mining properties. Stripping equipment began overburden removal following construction of field facilities. The first exposure of ore signaled the conversion of operations to ore control and mining. Environmental and reclamation activities are coincident with stripping and mining operations. The ore produced is shipped to the mill complex for processing. Extraction of the uranium and conversion to a "concentrate" requires crushing, grinding, leaching, solvent extraction, stripping, precipitation, and drying. All activity at the mill and mine sites is monitored by state and federal agencies on a continuing basis.

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Late Triassic–Jurassic Paleogeography and Origin of Gulf of Mexico

The basic structural and stratigraphic framework of the Gulf of Mexico was established by events that occurred during the Late Triassic and the Jurassic. Cretaceous and Tertiary events only accentuated and modified this framework. During the Late Triassic and Early Jurassic, continental conditions prevailed over most of the southern part of the North American plate. Marine deposition was restricted to parts of western and central Mexico that were covered by embayments of the Pacific Ocean. As the North American plate started to separate from the South American and African plates, tensional grabens began to form in the area. They were filled with red beds and volcanic rocks.

It was not until late in the Middle Jurassic (Callovian) that Pacific marine waters began to reach the Gulf of Mexico area across central Mexico. They intermittently flooded the preexisting grabens and, between floods, evaporated to produce extensive salt deposits (Louann Salt). The salt differed markedly in thickness according to the rate of subsidence in the grabens. Little or no salt was formed in the intervening high areas. During the Late Jurassic, Pacific marine waters progressively covered an increasingly large part of the Gulf of Mexico and surrounding areas as a result of continued subsidence, sea-level rise, or both. Connection with the Atlantic, however, was not established until late Kimmeridgian or Tithonian time.

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Exploration Results Offshore South New Zealand

Some significant data are here revealed for the first time, covering the 10-year oil exploration program of New Zealand's vast South Island submerged plateau.

A 250,000-sq mi (650,000 sq ha.), Texas-sized group of licenses was taken by Hunt International Petroleum Co. in 1968 and 1969. About 26,000 line-mi (41,600 line-km) of marine, 12-fold seismic survey, was completed over a 4-year period. Much of the survey extended to 4,500-ft (1,350 m) water depth.

Tectonics are controlled by the separation and splay of New Zealand's backbone Alpine fault system as it swings southeastward across the Campbell Plateau toward Bounty Island and the Antipodes. Basement is of Paleozoic age. Lower Mesozoic sediments resulting from orogenies and plate shifts are relative to Mesozoic Gondwana breakup.

Six previously unknown Tertiary basins, large by basin standards, were discovered. The interpretive mapping revealed 30 to 40 giant to supergiant anticlinal structures and an equal number of normal ones, mostly in water depths exceeding 2,000 ft (600 m). The several prospects drilled indicate nearly 18,000 ft (5,400 m) of Tertiary and Cretaceous sediments, with several thousand feet being mature and hydrocarbon generative. Drill-stem tests recovered oil and gas in one wildcat, and two others had oil and gas shows.

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 semisubmersible 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.

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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 Caribbean 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.

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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.

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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-