aquifer removed during the formation of the canyon. Accompanying excessive pumping of the aquifer will be the development of a landward slope of the piezometric surface and the intrusion of ocean water into the submarine area of the aquifer. The first water wells abandoned because of ocean water will most likely be in the vicinity of the submarine canyons.

TAKEO SUSUKI, University of California at Los Angeles

Faunal Assemblages from Type Topanga Formation, Santa Monica Mountains, California

The middle Miocene Topanga formation at its type locality in Topanga Canyon, 10 miles northwest of Santa Monica, Los Angeles County, California, consists of more than 8,000 feet of conglomerates, sandstones, and shales with intercalated basalts. An abundant molluscan fauna, obtained from four different horizons within the formation is divisible into two major faunal assemblages separated stratigraphically by 1,200 feet of barren beds. The lower assemblage ranges through approximately 200 feet of strata at the base of the formation and is characterized by the presence of *Turritella ocoyana* s. s. and *Pecten* (*Lyropecten*) *crassicardo* n. var. The upper assemblage ranges through the three upper horizons and is characterized by the presence of numerous specimens of *Turritella ocoyana topangaensis* and *Turritella temblorensis*.

THOMAS CLEMENTS, University of Southern California, Los Angeles

Further Evidence of Wind-Blown Rocks on Playas

Since the report by McAllister and Agnew in 1948 of trails left by rocks on the Racetrack Playa, there has been much speculation as to their origin. Those authors attributed the movement of the rocks to the wind. However, since the Racetrack is at a high elevation, where freezing occurs during the winter, the aid of ice could not be ruled out. The finding of similar trails on Little Bonnie Claire Playa, recently reported by the present writer did not completely eliminate ice as a possible aid since it, too, is at a relatively high elevation.

The same phenomenon has since been observed on a playa at 1,600 feet elevation, and somewhat farther south than either of the previously mentioned ones. The aid of ice seems to be definitely ruled out, as well as possible pushing about by human beings. This leaves the wind as the most likely agent causing the movement of the rocks, as first suggested by McAllister and Agnew.

FRED B. PHLEGER, FRANCES L. PARKER, AND JEAN F. PEIRSON, Scripps Institution of Oceanography, La Jolla

North Atlantic Core Foraminifera Collected by Swedish Deep-Sea Expedition

Foraminifera have been studied from 39 long deep-sea cores and from 53 undisturbed surface sediment samples collected from the North Atlantic. Mid-latitude and low-latitude planktonic assemblages can be differentiated, with at least five different distribution types. The long cores contain faunas normal for their latitude alternating with faunas typical of higher latitudes. These are suggested as representing alternating cold and warm epochs, mostly Pleistocene; correlation of these epochs appears possible in a mid-latitude series of cores.

Several cores contain shallow-water Foraminifera which have been displaced from shallow water. It is suggested that much of the mud in the deep ocean may be the finer fraction of sediments displaced from shallow water. Four cores contain planktonic Foraminifera of Miocene age. There is abundant evidence of solution of calcium carbonate; it is suggested that most of this solution occurred at the sediment surface and is related to the rate of production of Foraminifera.

A mixed high and low latitude planktonic fauna occurring off Africa between 15° and 20° N. Lat. is attributed to mixing at the convergence of the Equatorial Counter Current and the Canaries Current. Mixed planktonic faunas occur in lower sections of cores off Africa between 0° and 7° N. Lat.; this suggests that the convergence area was displaced southward during the past.

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Significance of Insect Remains in Asphalt Deposits

Asphalt deposits at Rancho La Brea, Carpinteria, McKittrick and Sulphur Mountain have been studied for insect remains. An astonishing number of species has been found varying in size from about 1 millimeter to 3 inches.

The four deposits studied present three distinct types: Rancho La Brea and Carpinteria were open pools due to upward surge of asphalt, with consequently constant movement in the liquid asphalt. The McKittrick field was due to chimneys opening on hillsides and the slow flow of the asphalt down the slopes caught many insects and small animals, with the larger animals only caught in the pools formed at the bottom. Sulphur Mountain is an almost vertical flow down a mountain side with small pools caught on ledges. Here as in McKittrick the insects are deposited where they die.

The stratification of the McKittrick field will permit climatic correlations and also studies in the gradual change of insect characters over a long period of time.

The finding of certain carrion insects indicates the time required for complete submersion of the animal. This took up to three months at La Brea, but two to three years at McKittrick.