centages—is developed by examples to show how map patterns are in part controlled by the ways in which the mapped data are expressed.

KVENVOLDEN, KEITH A., Socony Mobil Oil Company, Dallas, Tex.

NORMAL PARAFFIN HYDROCARBONS IN RECENT SEDIMENTS FROM SAN FRANCISCO BAY, CALIFORNIA

Post-Pleistocene sediments of San Francisco Bay, California, have been analyzed for the presence of normal paraffin hydrocarbons. Gas-liquid chromatography was used to examine sediment extracts for normal paraffins containing 8 through 13 carbon atoms per molecule (intermediate molecular weights). Liquid-solid chromatography, infrared and mass spectrometry were used to determine in sediment extracts normal paraffins containing more than 18 carbon atoms per molecule (high molecular weights). Knowledge of normal paraffins in recently deposited sediments may be useful in explaining the origin of crude oils.

The results of analyses of sediments of San Francisco Bay show that normal paraffins containing 8 through 13 carbon atoms are probably absent, or each is present in a concentration less than one part per million dried sediment. Concentrations from 3 to 6 parts per million dried sediment were determined for the normal paraffins containing more than 18 carbon atoms per molecule. Among the normal paraffins containing 23–35 carbon atoms per molecule, the relative number of molecules having an odd number of carbon atoms is greater than the relative number of molecules having an even number of carbon atoms.

Normal paraffins of intermediate and high molecular weights are present in most crude oils, but only normal paraffins of high molecular weights were detected in the sediments of San Francisco Bay. In the sediments the normal paraffins containing 23–35 carbon atoms per molecule show a predominance of odd-carbon-number molecules. In crude oils the normal paraffins in the same weight range are distributed so that odd-carbon-number molecules and even-carbon-number molecules are present in about equal amounts.

If the sediments of San Francisco Bay are to yield crude oil, changes probably should take place in the molecular distribution of the normal paraffins already present. The ratio of odd- to even-numbered normal paraffins should be reduced so that the odd- and even-numbered molecules are about equally abundant. Also, normal paraffins of intermediate molecular weights probably should be added to these sediments. The additional normal paraffins may be derived from other organic materials dispersed in the sediments.

LIAN, HAROLD M., Union Oil Company of California, Anchorage, Alaska
SIMONSON, RUSSELL R., The Ohio Oil Company, Los Angeles, Calif.

COOK INLET BASIN—STRUCTURE, STRATIGRAPHY, EXPLORATION TECHNIQUES, LOGISTICS, DISCOVERIES

Exploratory objectives in the Cook Inlet Basin are confined largely to the Kenai Formation, a 15,000–20,000-foot series of non-marine, coal-bearing sediments of Eocene or younger Tertiary age, underlain by marine Mesozoic sediments. The Kenai Formation on the Kenai Peninsula is divisible into an upper sand member, a middle siltstone and coal member, and a lower sand member. The gas fields on the Kenai Peninsula occur in the upper member; Swanson River oil production is from the lower member. The Kenai beds have been gently to moderately folded and locally faulted.

Exploration techniques consist of surface mapping, gravity and airborne magnetometer surveying, and reflection seismic shooting. Marine reflection shooting and gas exploder-sparker surveys have been used to explore Cook Inlet. Some structural leads can be obtained by field mapping but seismic work is needed to confirm closure. To date only structures defined by seismic methods have been drilled.

The Swanson River oil field is producing in excess of 28,000 barrels per day from the Hemlock zone, a series of sands and conglomerates near the base of the Kenai Formation. The structure is a large, faulted anticline.

Five gas fields have been discovered—the Kenai, Swanson River, West Fork, Falls Creek, and Sterling fields. Gas from the Kenai field is being delivered to Soldotna and Anchorage; the other fields are shut in although some gas from the Swanson River gas field is used in oil-field operations.

The gas consists of 99% methane and is believed to have originated within the Kenai Formation. There is insufficient evidence to determine whether the oil originated in the Kenai Formation or in underlying Mesozoic shales.

Seismic crews cost between $60,000 and $85,000 per month. Costs of deep exploratory wells on the Kenai Peninsula vary between $20 and $50 a foot, exclusive of road costs. Completed oil wells in Swanson River cost nearly $400,000. Road costs range from $10,000 to $50,000 per mile.

An increase in the tempo of exploratory drilling in 1962 is indicated.

LOHMAN, KENNETH E., U. S. Geological Survey, Washington, D. C.

STRATIGRAPHIC AND PALEOECOLOGIC SIGNIFICANCE OF TERTIARY DIATOMS OF CALIFORNIA AND NEVADA

Many areas of both California and the Great Basin contain diatom-bearing sediments which range in age from Late Cretaceous to Recent. The diatom assemblages in these rocks contain both short-ranging species that are useful for stratigraphic correlation and others, still represented in living assemblages elsewhere, that are useful for paleoecologic interpretations. Although thousands of square miles of diatom-bearing sediments have been mapped by petroleum geologists and have been penetrated and cored during drilling operations, the diatoms have been neglected as a stratigraphic and paleoecological tool. Some of the reasons most often presented for this lack of attention are claims that Foraminifera are easier to work with, are better known, and that laboratory manipulation of them is easier and more suited to assembly-line methods. This is true in part only, as assembly-line methods have been developed for handling large numbers of samples of diatomaceous sediments. Furthermore, diatoms are commonly found in sediments that are completely barren of Foraminifera or other fossils.

The present interest in palynology by the oil companies indicates that new techniques are no longer viewed with disfavor. As far as the necessary laboratory preparation and study are concerned, diatom samples can be prepared and significant species identified at least as expeditiously as samples containing pollen and spores.

Distinctive diatom assemblages are known from the Moreno Shale of Late Cretaceous and Paleocene (?) age and from many sedimentary formations in Eocene, Oligocene, Miocene, Pliocene, and Pleistocene rocks in California from the San Francisco Bay area southward. These assemblages from rocks of Cretaceous through Miocene age are virtually all marine. Pliocene rocks in different localities contain either marine or non-marine