ABSTRACTS OF PAPERS

ADDICOTT, WARREN O., U.S. Geol. Survey, Menlo Park, Calif., and Geology Dept., Stanford Univ., Stanford, Calif.

GIANT NEOGENE PECTINIDS OF EASTERN NORTH PACIFIC—CHRONOSTRATIGRAPHIC AND ZOOGEOGRAPHIC SIGNIFICANCE

Giant pectinids—taxa that regularly attain more than 90 mm in diameter—appear at or near the base of the "Vaqueros Stage" and coeval units of the Pacific coast megainvertebrate chronology. Similar giant forms appear in lower Miocene strata in Europe (Aquitanian Stage). Recognition of this evolutionary event in these widely separated provincial sequences, together with diversity trends in the Pectinidae as a whole and certain foraminiferal correlations, argues for placement of the Paleogene/Neogene boundary at the base of the "Vaqueros Stage" of the Pacific coast sequence.

The early Miocene of Pacific coast basins is characterized by abundance and taxonomic diversity of giant pectinids (*Amussiopecten, Lyropecten, Macrochlamis,* and *Vertipecten*). Of these, only *Vertipecten* is present in underlying Oligocene strata, and the few Oligocene species are only of medium size. Taxonomic diversity was greatest during the middle Miocene (*Amusium, Amussiopecten, Lyropecten, Patinopecten,* and *Vertipecten*), but decreased sharply during the late Miocene (*Fortipecten, Lyropecten,* and *Patinopecten*) and Pliocene (*Leopecten, Lyropecten,* and *Patinopecten*).

The giant pectinids can be separated into a southern group (*Amusium, Amussiopecten, Leopecten, Lyropecten, Macrochlamis,* and *Nodipecten*) and a northern group (*Patinopecten* s.s., *Parionopecten* [*Lituyapecten*], and *Fortipecten*). The survivors of these two groups, *Nodipecten* and *Patinopecten*, have mutually exclusive modern geographic ranges and are restricted, respectively, to warm-water and temperate- to cool-water molluscan provinces along the Pacific coast.

Taxonomic diversity trends and migrational patterns of these pectinids reflect climatic amelioration during the early and middle Miocene, followed by cooling during the late Miocene and Pliocene.

ALBRECHT, P., Institut de Chimie, Univ. Louis Pasteur, 67 Strasbourg, France

POLYCYCLIC HYDROCARBONS IN OIL SHALE—ORIGIN AND GEOCHEMICAL FATE

A series of pentacyclic triterpenes of the hopane type is present as the main components of the polycyclic hydrocarbon fraction of the Messel oil shale, a terrestrial sediment of Eocene age, from near Darmstadt, Germany. The series ranges from C_{27} to C_{32}, and the members differ only by the length of the side chain on the 5-membered ring. The C_{27}, C_{31}, C_{32} compounds, which have never been detected in nature, probably arise from geomicrobiological degradation and alkylation reactions of a C_{30} precursor taking place in the first stages of sedimentation. Pentacyclic triterpenes usually have been considered as paleoecologic makers indicating a higher plant origin of part of the organic matter of sediments and petroleum. Recent studies, however, on the chemistry of bacteria and blue-green algae have shown that these sources do contain pentacyclic triterpenes, commonly in significant amounts, and that these triterpenes are of the hopane type. These results, combined with analysis of the olefinic and oxygenated polycyclic fractions of the shale, seem to indicate a prokaryotic origin of the triterpenes isolated from the Messel oil shale. Moreover, analysis of the polycyclic hydrocarbons isolated from several recent and ancient sediments, as well as from crude oils, shows that triterpenes of the hopane type are widely present in these sources, and suggests that a significant proportion of the triterpenes found in sediments and oil in general could be of prokaryotic origin.

ALLEN, DENNIS R., Dept. Oil Properties, City of Long Beach, Long Beach, Calif.

OIL FIELD SUBSIDENCE—SUSCEPTIBILITY AND MONITORING TECHNIQUES

The possibility of oil-field subsidence is an important environmental consideration in both urban and rural areas. Current policies of various agencies require a subsidence-susceptibility appraisal prior to drilling operations. A hostile environment for oil-field operations can mean the Los Angeles and Santa Barbara areas as well as north of the Arctic Circle. Estimations of subsidence susceptibility are divided into two basic methods—the comparative-empirical and the analytic. The comparative-empirical method is considered best when undeveloped areas are examined. In this method, the geologic history, structure, and competency, of the area are compared with known subsiding areas. In the analytic method, core compressibility data, estimated stress changes, and sometimes, structural configuration, are applied mathematically to the estimation of reservoir compaction and subsidence. Many of the necessary data are not available until field development is well under way. Some combination of these methods should be used wherever possible.

Monitoring techniques include precision leveling, horizontal movement measurement, in-zone compaction measurements by collar logging, mechanical extensometers for shallow zones, tide gages, and special seismograph installations. Operational monitoring of casing derangements might also be important to locate compacting intervals.

Application of these and other techniques pertaining to the geologic aspects of environment will be increasingly important in the future.

ALLIGER, JERALD, and VERNON N. JACKSON, Geophoto Services, Dallas, Tex., and HAROLD C. McILRATH, Geophysical Services, Dallas, Tex.

DATA COLLECTION AND PROCESSING TECHNIQUES FOR INCREASED SIGNIFICANCE OF AIRBORNE GAMMA-RAY SPECTROMETRY

Although relations between radioactive elements and both mineral deposits and petroleum accumulations are indicated by many published investigations, the exploration effectiveness of the gamma-ray survey generally remains in doubt. Increased effectiveness of gamma-ray surveys is possible through increased accuracy of collected data and improved data interpretation. Increased data accuracy is accomplished through adequate detector capacity and the correction for environmental variables. Improved data interpretation involves the use of the geologist-statistician-programmer team to reduce a vast amount of data to a manageable number of geologically significant values.

To attain geologic significance, gamma-ray spectrometer data must be integrated with other types of geologic and geophysical data. To test this premise, a set of gamma-ray data covering complex metamorphic and igneous geology of the Duchess area, Queensland, Australia, was processed as a function of mapped surface geology, and statistical methods were used to identify statistically significant anomalous records relative to the background of each rock type, rather than for the entire survey area. Design of the data-presentation format allowed quick screening of anomalous values from the large total number of records. Examination of statistical parameters indicated the possibility of using the gamma-ray data to map surface geology without the aid of photogeology or field mapping. Stacked profiles of U, Th, K, and their ratios were analyzed for obvious "breaks," and the units thus defined were correlated by computer processing. Results indicated that surface mapping by this procedure is feasible.

AMSDEN, THOMAS W., Oklahoma Geol. Survey, Norman, Okla.