14. SALEM J. RICE, California Division of Mines, San Francisco. Reconnaissance Geology of the California Coastal Area North of Eureka.

The area discussed includes the Eureka, Trinidad, Orick, Requa, and Point St. George quadrangles, all 15-minute sheets. Because of the dense redwood forest cover in most of the region, reconnaissance mapping was accomplished largely along roads and well exposed sections of the coast line.

The oldest rocks comprise a sequence of low-grade metamorphic rocks, slate, phyllite, graphite schist, and green schist, which occurs in a northwest-trending belt in the Trinidad and Orick quadrangles. This belt is continuous southeast with the western belt of the Kerr Ranch schist in the Blue Lake Quadrangle. These metamorphic rocks have been thrust toward the southwest over the Jurassic Franciscan formation.

The Jurassic is represented by a thick sequence of metavolcanic rocks which crop out in the eastern part of the Point St. George Quadrangle, and by the Franciscan formation, which underlies most of the area. A large elongate mass of peridotite lies between the Franciscan sediments and the metavolcanics in the Point St. George Quadrangle.

Cenozoic marine and continental sediments, ranging in age from Miocene through Quaternary, are widely distributed. Erosional remnants of the marine Miocene Wymer formation occur on the ridge crests east of the Crescent City platform. Marine Pliocene beds crop out near Patricks Point in the Trinidad quadrangle and in the vicinity of Point St. George. A thick sequence of late Cenozoic floodplain deposits occurs in the central portion of the Orick Quadrangle. The northern extension of the Wildcat group, which was not differentiated, covers most of the Eureka Quadrangle.

15. HARRISON S. BROWN, California Institute of Technology, Pasadena. Modern Methods of the Determination of Geologic Time.

A discussion of methods which have been used for estimating the duration of geologic eras and the age of the earth with emphasis on new techniques which have been recently developed. The new techniques make use of refined methods for the precise determination and isolation of micro quantities of trace elements and will lead eventually, it is hoped, to the formulation of a precisely dated geologic time scale. The analytical techniques known as "isotope-dilution techniques" make use of separate isotopes and mass spectrometry and make possible the precise determination of trace-element concentration at levels of 0.001 part-per-million.

16. ROY L. LAY, The Texas Company, Houston. Our Expanding Horizons.

Exploration assignments to-day are more challenging than ever before. The emphasis is on smaller structures and more accurate and deeper interpretations. Many of the more difficult areas, formerly not considered amenable to geophysical exploration, reveal a similarity of problems in widely separated geological and geographical provinces. Geologists and geophysicists are continually broadening their viewpoints because they realize more and more that few areas are unique.

Geophysics has made and is continuously making substantial contributions to basic geology. Exploration thinking is broadening steadily toward more definite evaluation of the many types of oil-bearing traps.

Explorationists are learning the principles of sound business risk and thereby expanding their horizons by becoming good businessmen as well as higher training specialists. The opportunity to expand our horizons further was never more promising than at the present.

17. PIERRE DE CHAMBRIER (Presented by Charles F. Gallagher), Schlumberger Well Surveying Corporation, Bakersfield. Microlog Continuous Dipmeter.

Some of the methods used at the present time for the determination of the angle and of the azimuth of the dip of the formations traversed by a bore hole are based on the correlations between three curves recording certain electrical characteristics of the formations, such as SP or resistivity, along the wall of the bore hole in three equally spaced azimuths. With the conventional equipment used for the application of these methods, the measurements are made over separate intervals of depth.

In the present paper, a new improved instrument called microlog continuous dipmeter is described, wherein the three curves used for the determination of the dip are obtained with three microlog devices, and wherein these three dipmeter curves,—and furthermore the orientation of the instrument and the inclination of the bore hole—are simultaneously and continuously recorded.

It is shown that, with the help of this instrument, more numerous dip determinations can be made in a given well, with a higher accuracy and a greater recording speed.

The paper is illustrated with field examples.

18. JOHN W. MATHEWS, Richfield Oil Corporation, Bakersfield. Geophysical History of South Cuyama Oil Field, Santa Barbara County, California.

In the course of a regional seismograph survey an anticlinal dip reversal was obtained in the foot-

hill topography on the south side of Cuyama Valley, California. Further investigation of this significant anomaly led to the mapping of an anticline closed on three sides with indications of the presence of faulting on the fourth side to aid in creating a trap. On the basis of this information a test well was drilled which resulted in the discovery of the South Cuyama oil field May 4, 1949. Illustrations are shown on the key seismograph cross sections and some of the difficulties of the work discussed. The original seismograph contour map as well as the map drawn from well data are shown to enable an evaluation of the seismograph prediction. As of June 30, 1953, the field contained 235 producing wells and had a cumulative production of 44,172,749 barrels of oil and 29,312,888 Mcf. of gas

19. WALLACE L. MATJASIC, Honolulu Oil Corporation, Bakersfield. Case History of Wild Goose Gas Field, Butte County, California.

The discovery well of the Wild Goose gas field was drilled and completed in 1951 on a structure located by a reflection seismograph survey conducted in 1950. An additional seismograph survey was made subsequent to discovery to define better the structure for future development. Two seismic cross sections and a contour map based on the original reflection data are shown, along with an aeromagnetic map which was made after the discovery.

The producing sands are in an interval between the Forbes shale of upper Cretaceous age and the overlying Capay shale of Eocene age.

S.E.P.M. ABSTRACTS

1. W. L. NOREM, California Research Corporation, La Habra, California. Classification of Spores and Pollen for Paleontologic Correlation.

One of the more important recent developments in micropaleontology is the use of plant spores and pollen for correlation purposes. These minute bodies are found in many sediments previously considered barren of diagnostic fossils. The classification of spores and pollen presents a complex problem because of the large number of types that represent almost every phylum of the plant kingdom and cover the geological time span from the Paleozoic to the present.

Classification under the International Rules of Botanical Nomenclature is confusing because materials of known affinities are classified according to phylogenetic relationships and those of unknown parentage according to morphological characteristics. No clear-cut distinction is made in the nomenclature between fossils classified in the natural and the artificial systems. A natural system is not necessarily the most satisfactory for the stratigraphic paleontologist because of the vast knowledge of systematic botany required for its application.

If fossil spores and pollen are to be brought quickly into usefulness for paleontologic correlation, a system of classification that is easy to use must be developed. Such a system must have a minimum possibility for confusion in its application. It must be comprehensive enough to cover all spore types from the Paleozoic to the present. It should contain the elements of a key for quick and easy reference. Like the International Rules of Botanical Nomenclature, its use should be universal so as to permit the free interchange of information on spores and pollen.

The classification based on morphological characteristics and proposed by G. Erdtman contains the elements of such a system. It must, however, be expanded in scope before it will be complete.

This artificial system is not intended to replace the natural system under the International Rules in paleobotany but it is intended as a practical substitute for use in stratigraphic paleontology. The fossil spores or pollen can be reclassified under the natural system when and if the affinities are ascertained.

2. K. O. EMERY, University of Southern California. Size Distribution of Gravels.

More than 60 samples of gravel from beaches of Mexico and southern California were mechanically analyzed in the field by use of a new method. Median diameters range between 20 and 800 mm. Trask sorting coefficients are characteristically lower than 1.5 and have a median of 1.25. Comparison with published analyses shows that the marine beach gravels are far better sorted than gravels from streams and alluvial fans. The difference is sufficiently great that sorting may be a useful supplementary means of determining the environment in which ancient conglomerates were deposited.

3. JOSEPH J. GRAHAM, Stanford University. Eocene Foraminifera from the Woodside District, San Mateo County, California.

An Eocene foraminiferal assemblage from the Woodside district near Redwood City, San Mateo County, California, is described and its similarity to Cushman and Siegfus' Canoas siltstone faunule from the type area of the Kreyenhagen shale of California noted.

4. RICHARD STONE, University of Southern California. Recognition of Playa Sediments in the Geologic Column.

Playa sediments are sometimes reported in oil-well cuttings, particularly in sediments whose age