

Data from wells recently drilled near the town of Fillmore, Ventura County, California, have shown the flat hade of the San Cayetano fault to persist laterally for a surprisingly long distance.

6. C. E. LEACH and J. C. MAY, Associated Oil Company: Notes on the Santa Susana Thrust Fault, Los Angeles County, California (abstract).

The Santa Susana thrust fault is located on the north front of the San Fernando Valley. A recent well has given data on the nature of this major structural feature.

7. HUBERT G. SCHENCK, Stanford University: Stratigraphy of Northern Iran (abstract). Presented by permission of the president, Seaboard Oil Company.

This report describes a generalized geological column for part of the Amiranian Oil Company concession in northeastern Iran, north of the main road from Teheran to Meched. The column, which is based chiefly on reconnaissance investigations by F. Reeves and B. F. Buie, shows a thickness of $30,000 \pm$ feet of Mesozoic and Cenozoic sedimentary formations and $7,000 \pm$ feet of Paleozoic strata. The formations of widest areal extent are Liassic, Upper Jurassic, Cretaceous, Eocene, and Miocene in age. One of the best control sections for the Cretaceous and adjacent formations is northeast of Meched, where the Cretaceous totals $9,000 \pm$ feet. A marine Middle Eocene (Lutetian) formation, totaling 575 feet thick, rests unconformably on "red beds" of probable Danian age. Upper Senonian rudists and other megafossils occur in a 600-foot member immediately below these "red beds." At the base of the Cretaceous section is the "Red Grit Series," which is unconformably underlain by limestone containing Tithonian fossils. *Orbitolina* is present in oolitic limestones of Aptian age in the lower part of the Cretaceous sequence at many localities. No strictly marine fossils were collected from formations younger than Eocene.

8. FRANCIS P. SHEPARD, Scripps Institution of Oceanography, La Jolla: Structural Trends off the California Coast (abstract).

The sea bottom off the California coast shows a series of steep escarpments with a dominant trend in a north-northwesterly direction. The continental slope escarpment follows this direction and is not influenced by the large change in trend found on shore at Point Conception. Many of the submarine escarpments show offsets with the northerly portions set to the northeast. Also a number of the escarpments show slope reversals along their length. Directly outside the continental slope there are a series of oval mountains with trends in a north-northeasterly direction. These are probably volcanoes and from their trends suggest possible tensional phenomena.

9. JOHN H. MAXSON, California Institute of Technology, Pasadena: Miocene-Pliocene Boundary (abstract).

Geologic time is one of the great definite quantities of natural science. The measurement and subdivision of that quantity, however, introduces human error. Even in the type Tertiary section of Europe the absolute time span represented in a single epoch is difficult to establish. On the Pacific Coast further difficulties are introduced by errors in correlation by means of vertebrate, invertebrate, and micro fossils and by orogenies. Formations lying near

epoch boundaries are necessarily more ambiguous stratigraphically than others.

In California where marine and non-marine formations are intercalated, discrepancy in correlation has sometimes appeared, the vertebrate determination being higher than the invertebrate. The divergence is accentuated in the middle Tertiary by some vertebrate paleontologists who arbitrarily state that the appearance of the horse genus *Hipparion* introduced the Pliocene. Application of this criterion would place the Puente, Mint Canyon, and Modelo in the Pliocene. The writer adheres to his correlation table published in 1930 (*Carnegie Inst. Washington Pub. 404*, p. 85) placing these formations in the Upper Miocene not only on the basis of invertebrate stratigraphy but also because of morphologic and time relationships of *Hipparion* in Europe, Asia, and North America.

10. OLAF P. JENKINS, State Division of Mines, San Francisco: Geomorphic Provinces of California as Outlined on the New State Geologic Map (abstract).

Major geomorphic provinces of California: (1) Great Valley of California, (2) Sierra Nevada, (3) Cascade Range, (4) Modoc Plateau, (5) Klamath Mountains, (6) Coast Ranges, (7) Transverse Ranges, (8) Peninsular Ranges (including Los Angeles Basin), (9) Colorado Desert, (10) Mojave Desert, and (11) Basin Ranges.

11. MASON L. HILL and M. L. NATLAND, Richfield Oil Corporation: An Exposure of the Red Mountain Fault, Ventura County (abstract).

One and a half to six inches of gouge sharply separates Pliocene formations which are 11,300 feet apart in a normal stratigraphic section.

12. ROBERT S. DIETZ and K. O. EMERY: Phosphorite on the Sea Floor Off Southern California (abstract).

Dredging operations on the Scripps Institution vessel during the past year have shown that phosphorite is extensively developed on the sea floor off Southern California. This deposit is found as large nodules or as a coating on other rocks. It is particularly abundant on the numerous banks that lie off this coast and is found also on most of the submarine slopes and on the sides of a few submarine canyons. These environments are characterized by general absence of recent sediments. Some glauconitic and foraminiferal sands are associated. The phosphorite is thought to be of recent origin and the deposition is probably continuing at the present time.

13. R. A. STIRTON, introduced by B. L. Clark, University of California, Berkeley: Significance of Tertiary Mammalian Faunas in Holarctic Correlation (abstract).

The epochs of a period in the Tertiary time scale are, supposedly, convenient terms of expression, and as such, have been altered somewhat from the original designations of Lyell by different authors. Many controversies have arisen in the arbitrary assignment of boundaries to these divisions. This article is concerned with Mio-Pliocene boundary, particularly in California.

From a study of certain living mammals, it is recognized that similar fossil forms realized a wide and rapid dispersal without appreciable evolutionary change and are useful in Holarctic correlation. Furthermore, the evidence shows that different plant associations were not effective barriers to