

ture to sea and we today have no idea of the limit to which those explorations will carry us. Three maps are presented showing prospective areas of the world: first one, dated 1944, was prepared by the foreign division of P.A.W.; second one is from "Geography of Petroleum," 1950, by Wallace Pratt and Dorothy Good; third one is speaker's own interpretation of the data available today.

The first conclusion from all this is that the exploration of the world has just begun. The second conclusion is that instead of slackening our geological, geophysical, and engineering programs, we shall be wise to increase them and to develop wider and better training programs with particular emphasis on technical excellence.

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LATE MESOZOIC SEDIMENTATION AND OROGENESIS ALONG SOUTHWESTERN OREGON COAST

Mapping, petrology, and paleocurrent investigations by the speaker and students provide new evidence of sedimentation in a continuously active orogenic belt in southwestern Oregon. Formational units have been traced into California, demonstrating that at least the northern part of the "Franciscan terrane" is divisible. Intensely sheared, northerly trending zones up to 3 miles wide have been traced from California for 100 miles north along the Oregon coast. They pass offshore beneath the seismically active northeast Pacific Basin. Paleogeology shows that these were superimposed upon arcuate Klamath Province fold trends from late Mesozoic to the present.

Extrusion of Jurassic rhyolitic to basaltic marine pillow lava and pyroclastics accompanied deposition of graded and non-graded arkosic wacke, mudstone and bedded chert (Dothan and Rogue? Formations). Associated local conglomerates contain granitic boulders, evidencing hitherto unrecognized "pre-Nevadan" granites. Laminated quartz arenite and argillite intruded by diorite contain Late Jurassic? *Foraminifera* (Galice Formation). Over large areas these units all have been metamorphosed to form the Colebrook Schist. Thus Late Jurassic orogeny is recorded by deformation, metamorphism, and ultramafic and dioritic plutons. Latest Jurassic and Early Cretaceous rocks contain excellently graded volcanic wackes, mudstone, and thick chert-volcanic conglomerates (Myrtle Group). Diorite, serpentine and schist clasts together with overlap relationships provide sensitive indicators of diastrophic pulses. Volcanism ceased during Cretaceous.

Later orogeny is recorded by severe deformation (but lack of metamorphism) of the Myrtle Group, emplacement of batholiths inland in the eastern Klamath Province, and unconformable overlap by shallow marine Late Cretaceous (Campanian) quartz arenites, quartz wackes, and mudstone. Major shear zones were developed at least by mid-Cretaceous and have been reactivated intermittently since. Post-Cretaceous warping and erosion recurred prior to widespread Eocene transgression, renewed volcanism, and deposition of graded volcanic wackes, cross-stratified volcanic arenites, and coal. Regression commenced in Late Eocene. Later Cenozoic movements along the major faults apparently formed the north-trending Coos synclinorium and were related to formation of north-trending Cascade volcanoes and plutons and to widespread faulting in eastern Oregon and Nevada.

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PALEOECOLOGY OF PAMLICO FORMATION (LATE PLEISTOCENE), Horry County, SOUTH CAROLINA

Depositional environments and paleogeography of the Late Pleistocene Pamlico Formation in Horry County, South Carolina, indicate that the formation was deposited near shore under non-marine, restricted marine, and shallow, open ocean conditions. Slight fluctuations of sea-level and other factors, such as shifting currents and migration of barriers produced sharp vertical and lateral facies.

From the observed distribution of macrofauna and microfauna, four marine environments are recognized: (1) inside intertidal, (2) shallow shelf, (3) lower bay (inlet influenced), and (4) upper bay (semi-restricted).

Paleoecologic, stratigraphic, lithologic, and paleogeographic observations provide evidence that the Pamlico deposits are related to a low stand of the sea, higher than 10 feet and less than 40 feet above present sea-level. Thus it is suggested that the Pamlico Formation be correlated with the making of the Pamlico shoreline (25-30 feet above present sea-level), which on paleogeographic and subsurface evidence was never located more than 5-7 miles inland from the present shoreline in Horry County.

During deposition of the Pamlico Formation, water depth was probably not more than 40 feet and generally much less; temperature of the water was probably slightly higher than that in the same latitude today; the water was usually slightly turbid and well oxygenated; and the salinity was variable. Inland from the bay and lagoon shores cypress swamps developed so that today non-marine clays and peat beds interfinger with brackish-water deposits.

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AUTOMATIC ACQUISITION, PROCESSING, AND INTERPRETATION OF GEOLOGIC DATA

The study of the abundance and distribution of minerals is in an explosive phase. In the few years that have elapsed since the first interpretations of X-ray analyses of rock composition were made thousands of determinations have been reported in hundreds of published papers. The precision of stratigraphic interpretation, correlation, and determination of environment is improved by using mineral composition but the cost has been high. Utilization of automatic equipment and data processing methods makes it feasible to obtain economically a wide variety of geological information.

Ditch, air-drilled, core, and outcrop samples are ground mechanically and sieved through a 450-mesh screen as the grinding proceeds. After homogenizing, the powder samples are prepared on microscope slides for X-ray analysis. A magazine-type automatic sample-changer holding 60 samples feeds the slides in turn into the X-ray diffractometer for analysis. The resulting data are punched automatically onto IBM cards using electrical control circuits to coordinate the many sequential operations. The suitably coded IBM cards containing digital diffraction intensities taken at each 1/10 degree of scan are processed in the IBM 704 computer using a dictionary-type program to produce a summary card showing the minerals present in a sample and their abundance. The summary cards containing control information and mineralogical composition are