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RIEDEL, WILLIAM R., Scripps Inst. Oceanography, La Jolla, Calif.

Recent and Potential Advances in DSDP Biostratigraphy

The Deep Sea Drilling Project core collection offers unique opportunities for advances in pelagic biostratigraphy because (1) it represents a rather thorough sampling of the Cenozoic column in the oceans, (2) standard lithologic descriptions and preliminary stratigraphic interpretations of the cores are published routinely, and (3) samples and guides to investigations accomplished and under way are readily available.

A few DSDP sites with long sequences of well-preserved microfossils are being investigated by many workers, thus becoming reference sections through which pelagic stratigraphy is becoming consolidated. Quantitative methods are improving both the consistency of identifications of taxa and the meaningfulness of records of their occurrence. Investigations on the distortion of assemblages by dissolution and paleoenvironmental controls on the distribution of species and subspecies are providing information essential for improved biostratigraphic correlations. Sequences of events in each microfossil group are inevitably tied to those in other groups because all are investigated in the same set of cores. Paleomagnetic and isotopic investigations (mostly on non-DSDP cores) are linking these with the absolute age scale to permit determination of rates of changes and recognition of diachronous events. The sheer volume of DSDP data is encouraging the development of new methods, such as the application of probabilistic statistics to correlation.

We can expect future emphasis on quantitative procedures as the qualitative ones become inadequate for the increasingly rigorous requirements of biostratigraphy. Concurrently, we will obtain a clearer picture of the phylogenetic changes which form the basis for natural taxonomic systems and for biostratigraphic interpretations.

RIGBY, J. KEITH, Brigham Young Univ., Provo, Utah; NORMAN D. NEWELL, Am. Mus. Nat. History, New York, N.Y., and DONALD W. BOYD, Univ. Wyoming, Laramie, Wyo.

Marine Permian Rocks of Tunisia

The only marine Permian rocks in northern Africa are exposed in the Djebel Tebaga area of southern Tunisia. Fault-duplicated sections of approximately 850 m of marine shale, limestone, and dolomite, are exposed over a distance of approximately 15 km, in the mountains 25 km northwest of Medenine.

The sections grade upward from moderately deep marine shale and carbonate rocks, through a dolomitic, shallow marine section, to interbedded red and green terrigenous clastic and minor carbonate beds deposited in a littoral environment. The upper section is red beds, at and above the Permian-Triassic boundary. The apparently conformable sequence of Permian and Triassic rocks document a quiet termination of Tethyan marine

deposition and suggest that the northern margin of the African plate was not involved in significant forward motion.

Marine Permian rocks near Medenine represent reef complexes that accumulated in relatively low-energy environments, interrupted only by short high-energy pulses of deposition. Reef talus is rare. The reefs are composed principally of algae with some sponges and limited bryozoans and brachiopods. Sponges are particularly abundant around the shaly margins of the carbonate masses. Echinoderms, gastropods, brachiopods, and bivalves are relatively minor interbioherm elements and are scattered through the abundant sponges. Fusulinaceans of the *Neoschwagerina-Yabeina* assemblage occur throughout the marine part of the sequence. Post-Jurassic faulting and possible intra-Permian folding interrupt the section.

RIGGS, KARL A., Mississippi State Univ., Mississippi State, Miss.

Lignites of Tombigbee and Holly Springs National Forests, Mississippi

Individual lignite bodies have been mapped using over 2,700 water-well records, more than 100 electric logs, literature references, and unpublished well bores of the Forest Service. Petrographic, proximate, ultimate, and fusibility analyses have been determined.

The lignite occurs as scattered pods with overburden ranging from 25 to 200 ft (7 to 60 m). All of the lignite is of Tertiary age. Most of it is in the undifferentiated Wilcox Group and the rest is in the Midway Group.

The lignite bodies vary widely in their properties, but most are low grade. The average heat content is 7,849 BTU (8,280,695 J), but individual samples cover the entire range of heat values for lignite. The volatile content and ash content tend to be high. Sulfur averages 0.82% but ranges up to 3%. The fixed carbon content is low. In thin section, the samples appear to be typical lignites.

Most of the lignite pods contain less than 3 million tons in place, but three deposits range between 25 million and 50 million tons in place.

RITCHIE, SUSAN H., Koninklijke/Shell Exploratie en Productie Laboratorium, Rijswijk, Netherlands

Facies Recognition from Well Logs to Predict Permeability of Eocene Deltaic Sandstones, Lake Maracaibo, Venezuela

Secondary oil recovery by gas and water drive is taking place in Maraven's Block V concession in Lake Maracaibo, where the Eocene sandstone reservoirs have produced 531 million bbl of oil. Geologic core studies have been undertaken to explain and quantify reservoir inhomogeneities which affect the injection of fluid and control its distribution. Core interpretations were also used to calibrate subsurface logs. The upper "C" sands were deposited in a river-dominated delta-front environment, and two cores from this unit have been divided into three principal lithofacies, which are further divisible into several subfacies based on grain size, sandstone:shale ratio, and sedimentary structures.

The large variations that occur in reservoir quality in