remarkable variety of calibration and depth scales. Visual analysis with well-to-well continuity is almost impossible with the logs in their original form. Fortunately, the hard-copy logs can be digitized and computer-processed to produce standardized logs that are amenable to accurate analysis for contained hydrocarbons and the spatial mapping of potential reservoirs.

The process does require the services of a petroleum geologist to determine the log response to clean formations within each well. However, once the individual curve parameters are determined, the computer can carry out the detailed computations for the display and isolation of all potential reservoirs. Examples of logs from New York state indicate that many gas-bearing reservoirs remain to be exploited.

ROBISON, VAUGHN D., Univ. Oklahoma, Norman, OK and UWE TRÖEGER, Technical Univ. Berlin, Federal Republic of Germany

Geology and Organic Geochemistry of Dakla Shale, Egypt

The Dakla Formation is late Campanian to Paleocene in age and, in eastern Egypt, is overlain by the Nubian Sandstone and underlain by the phosphate-bearing Duwi Formation. Lithologically, samples of the Dakla shale member collected in the Red Sea area consist of marls to marly clays, range from brown to black in color, and are bounded at the top and bottom by phosphate-bearing strata. Organic carbon and extractable C_{15+} hydrocarbon concentrations for samples from Quseir, Hamrawein, and Safaga ranged from 3.8 to 5.9% C_{org} and 550 to 2,400 ppm HC, and may be petroleum source rocks in areas where burial and thermal conditions are adequate. Shale samples from the Quseir region yielded Fischer assay results of 40 gal/ton, and thus have considerable potential as oil shales.

Samples from the Sibaiya region in the Nile Valley are light to dark gray shale and average 0.2% C_{org}. In this area, the phosphate deposits associated with the Dakla Formation are presently being exploited.

The Dakla shale samples from the Abu Tartur region, in the Western Desert, contain organic carbon concentrations in excess of 4.0%. Such values are considered suitable for potential petroleum source rocks where other conditions are satisfied. Recent exploration activity in the Western Desert region may make petroleum source rock studies of the Dakla shales increasingly important.

RODRIGUEZ, ARGENIS, Univ. Toronto, Toronto, Ontario, Canada

Coal Occurrence and Characteristics as Related to Environment of Deposition in Cerro Negro Area of Orinoco Tar Sands, Venezuela

Sedimentological analysis of cores taken in the Cerro Negro area of the Orinoco Tar Sands have provided lithological, textural, mineralogical, and paleontological data which have enabled facies identification. These facies have been interpreted as belonging from an upper delta plain to a semi-restricted shallow marine environment of deposition. Coal beds occur in all the wells analyzed. These occurrences are closely associated with specific facies, such as the back-barrier lagoonal facies of the semi-restricted environment of deposition and the backswamp facies of the delta plain. More importantly these coal beds present very distinguishable characteristics, such as variation in thickness from few inches in the back-barrier facies to 5 ft (1.5 m) in the delta plain facies. Their organic composition also ranges from micrite/atrinite to vitrinite and exinite in different proportions. Therefore, it is believed that variations in thickness and perhaps in organic composition are related to facies changes.

ROEDER, DIETRICH, Anschutz Corp., Denver, CO

Style Zonation in Fold-Thrust Belts

All orogens have thick-skinned and thin-skinned-style provinces. Thick-skinned belts form in a variety of crustal settings common in upper plates of Andean-type orogens and in both plates of aging collisional orogens. Thin-skinned belts specifically require transport at one transcrustal sole thrust. In collision belts, the sole thrust is the suture. In belts antithetic to Andean-type subduction, the sole thrust departs upward from the point of the asthenospheric wedge.

Arrays of strike belts with different styles signal the thin-skinned scenario and its distortion in thick-skinned settings. A proposed zonation includes the following. (1) Detached fold belt with 1 to 5 km (0.6 to 3 mi) deep sole sloping at 0 to 2°, without topographic slope, and with strain increasing coreward to 80%. (2) Imbricate belt with 3 to 10 km (1.8 to 6 mi) deep sole sloping at 1.5 to 3.5°, and with bulk strain increasing to 100% or more. (3) Allochthonous belt consisting of polyphase (typical: thick-skinned pre-transport strain) crust and cover rocks above a subthrust sediment complex showing 100 to 500% strain. Base of subthrust complex is 5 to 20 km (3 to 12 mi) deep and slopes at 3 to 15°. (4) Root zone with polyphase and progressive strain, steep dips, retrocharriage, and late shallow detachment. (5) Late stage thick-skinned structures including foreland upthrusts, massifs (Helvetic and Penninic), and core complexes (cordilleran) occur anywhere between root zone and foreland. Their detachment, rise, and transport distort the thin-skinned features but cause more thin-skinned detachment in the external belts.

Presence and width of strike belts and their style elements (e.g. folds, ramps, imbrications, back thrusts) can be explained as interplay between gravity spreading and thrust loading of an elastic foreland crust. Style-determining factors include (1) time spent within thrust wedge, (2) rigidity of foreland crust, (3) topographic slope, and (4) distribution of competent and incompetent rock units.

Polyphase kinematic sequences reflect the numerical divergence between the elastic foreland wedge and the transport requirement of "optimum taper;" we distinguish polyphase wedge thickening and fold-discordant wedge transport.

Seismic work and drilling in all five zones provide the data base for the zonation. Hydrocarbons are produced from all zones except zone 3. Conventional production comes from zones 1, 2, and 5. Most ongoing overthrust plays are made in zone 2. Zone 3 has potential where the allochthon is thin (such as ophiolites or detached shelf sediments), where the foreland sediment series is complete (as in collision belts), and where collision is too recent for thermal stabilization.

ROSS, CHARLES A., Gulf Oil Exploration and Production, Houston, TX

Late Paleozoic Foraminifera as Depth Indicators

Many late Paleozoic foraminifera consistently occur in particular rock types for which depths of deposition may be inferred. A few genera appear randomly in many different rock types and were possibly pelagic.

Textulariina: In the Ammodiscacea, most genera of Hippocrepininae (Astrorhizidae) and Ammodiscidae are widespread and