buried relief features, whether formed on land or under water. Geomorphic processes may be divided into constructive and destructive. Constructive forms of interest to petroleum geologists are dunes, barrier beaches, organic reefs, etc. Destructive processes create hills and valleys, underground drainage in carbonates, submarine canyons, etc., and create or destroy porosity by weathering.

The interpretation of buried landscapes presents many problems still unresolved among geomorphologists and also highlights several lesser known geomorphological phenomena. Subsurface data reveal that many landscapes exposed for millions of years were not peneplains but still showed considerable relief. The presence of well-developed slopes favors the theory of scarp retreat. Summit levels may also be related to contemporaneous erosional processes.

The solution of paleogeomorphological problems is greatly aided by applying quantitative geomorphological principles. The geological aspects of paleogeomorphology concern primarily the identification of erosion-resistant and less resistant horizons and the influence of structure (folding and faulting) on ancient drainage systems.

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STUDY OF FOLIATE STRUCTURE IN MOLLUSCAN SHELLS INDICATING SPECIFIC DIFFERENCES ON THE GENERIC LEVEL

A general investigation of the molluscan shell microstructures within the Bivalvia (Pelecypoda) for the purposes of paleontologic and modern taxonomic studies indicated that it might be possible to differentiate skeletal structures on a lower level, generic, than was heretofore considered feasible. Since the crystals are the products of body chemistry secreted in closed systems, the crystals and (or) structures may mirror the difference in body chemistry between genera and perhaps species.

The foliate structure was chosen, and the genera *Crassostrea*, *Anomia*, *Placopecten*, and *Aequipecten* were compared by means of thin sections, peels, and a new technique with single crystals. The shells are disaggregated by removal of the binding organic matrix with EDA reflux and separation in an ultrasonic bath. All material was checked with the optical microscope and studied by carbon-platinum replicas and solid dispersions with Phillips EM 75C and EM 100B electron microscopes.

The foliate structure is produced by the aggregation in layers called folia of calcite crystals elongated along one of the *a* axes and flattened at the *c*. One parallel set of *m* and the 2*c* faces are dominant, resulting in lath-shape crystals. The *c* axis is normal to and the *a* parallel with the flattened folia surface and each of the crystals within one folia is oriented in the same sense.

In the disaggregate preparations, the crystals of *Anomia*, which are wider, longer, curved along the developed *a* axis and taper toward the ends, are easily recognized in the light microscope and differ markedly from *Crassostrea's* needle-like, short, straight crystals whose ends appear blunt. The crystals of the pectinid genera, though differing from both *Crassostrea* and *Anomia*, are similar in appearance and on the criteria used to date can not be differentiated.

The Carbon-Platinum replicas reveal surface features on the crystal surfaces, growth bands, parallel striations, etc. which may, with further investigation, prove of taxonomic value.

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INTERPRETATION OF STRATIFICATION

Ancient environments may be interpreted, at least in part, from primary structures in sedimentary rocks. Because such structures are largely developed during deposition, they provide information on the processes involved and on the general geologic and climatic setting. Unfortunately, many sedimentary structures are poorly understood; numerous data are required from the observation of modern sediments and of controlled experiments before positive conclusions can be drawn concerning rock genesis.

Principal types of stratification and cross stratification include (1) flat or horizontal bedding, (2) low-angle, simple or planar cross-stratification, (3) tabular-planar cross-stratification of intermediate angle, (4) high-angle, wedge-planar cross-stratification, (5) ripple lamination, (6) graded bedding, and other less common varieties. Some of these structures are typical of more than one environment; other structures are represented by two or more varieties in a single environment. Information on natural combinations or associations of these structures is especially valuable for paleoecological interpretations.

Environments of deposition that have been studied, in greater or lesser degree, with respect to the characteristic type or types of stratification are dunes, river channels, river floodplains, alluvial fans, delta cones, tidal flats, foreshore beaches, backshore beaches, and barrier bars. Very little information is yet available concerning primary structures representative of the various offshore marine environments.

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FORAMINIFERS FROM THE EAGLE FORD-AUSTIN CONTACT, NORTHEAST TEXAS

Relations of the Eagle Ford shale and overlying Austin chalk (Turonian-Coniacian) have been of recurrent interest for many years. Since the work of L. W. Stephenson, the formations have been considered more or less disconformable in northeast Texas. This paper reports foraminiferal data that bear upon the question.

Samples were collected across well exposed contacts at thirteen localities that extend from Austin, Texas, in the south to Honey Grove, Texas, in the northeast, an outcrop distance of approximately 400 miles.

Samples from the Eagle Ford shale are marked by a paucity of specimens, a low number of species, extreme rarity of benthonic forms, and consequent dominance of planktonics which consist mainly of *Praeglobotruncana gautierensis*. Exceptions to the foregoing occur at the south in the vicinity of Austin, Texas, where foraminiferal number increases to about 25/gram and benthonic components remain essentially unchanged, and at the extreme north, relatively near-shore position, where benthonics become dominant but foraminiferal number remains very low.

Samples from the Austin chalk are marked by high number of specimens, high number of species, dominance of planktonics, and a quantitatively minor but comparatively striking and diverse benthonic fauna. Exceptions to the foregoing are infrequent and sporadic. *Lenticulina kansasensis* is widely present at the Austin base and can serve as a marker.

From consideration of the foraminifers and regional stratigraphy, it is inferred that uppermost Eagle Ford sediments were deposited on a deeper and somewhat toxic sea floor. Some information suggests that contem-