muds covered the bioherms. Upon regression of the sea, the shoal environment moved basinward over the bioherms, terrigenous quartz sands were washed into the channels, and finally, evaporites were precipitated from the waters trapped in the basin.

By considering the Paradox basin as a vast lagoon, marginal to the open waters of the Cordilleran miogeosyncline, we may visualize the *Ivanovia* bioherms as algal masses or banks growing on lagoonal shoals comparable with the current habitat of the green algae *Halimeda*.

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CONODONTS FROM TRANS-PECOS PALEOZOIC OF TEXAS

This is a preliminary summary of the distribution of conodonts in Lower to Upper Ordovician, Middle and Upper Devonian, Mississippian, Pennsylvanian, and Permian strata in the Trans-Pecos area of West Texas. Conodonts are now known to occur in the following formations: El Paso (Lower Ordovician), Montoya (Upper Ordovician), Canutillo (Middle Devonian), Helms (Upper Mississippian), Rancheria (Lower Mississippian), Tesnus (in part Mississippian), Magdalena and Gaptank (both Pennsylvanian), and Wolfcamp (Lower Permian) Formations. In addition, previously described faunas from the Marathon (Lower Ordovician), Fort Pena and Woods Hollow (Middle Ordovician), Maravillas (Upper Ordovician), Caballos (Devonian) and Dimple (Lower Pennsylvanian) Formations have been re-studied. Comparisons of these conodont faunas have been made with similar conodont faunas in central and eastern United States, and in western Europe. Detailed biozones like those proposed by other workers for the Illinois basin and for western Europe have not yet been established in West Texas. Furthermore, the abundance of conodonts in the stratigraphic column in West Texas is considerably less than that of the central United States and Europe.

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GEOLOGY AND TECTONICS OF TRINIDAD MOUNTAINS, LAS VILLAS PROVINCE, CUBA

The Trinidad Mountains in south-central Cuba include the San Juan, Trinidad, and Banao-Sancti Spiritus Mountains. The mountain system has steep south and west slopes and gentle north and east slopes. Karst topography characterizes the areas which are underlain by limestone.

The oldest rocks are Middle Jurassic (pre-Oxfordian) metasediments with micaschists at the base of the section and carbonate rocks above. Tentative correlation suggests the presence of a geosyncline during Middle Jurassic time. The metasediments are overlain unconformably by Middle to lower Upper Cretaceous sediments and pyroclastics (Albian to Santonian). Both are intruded by basic and acidic plutonics of middle Upper Cretaceous (pre-Maestrichtian) age. Sediments of younger Cretaceous and Tertiary age cover the margins of the mountain system.

At the close of the Lower Cretaceous, compressive forces oriented north-south, produced isoclinal folds and elevated the original Trinidad Mountains. Renewed orogenic activity during the middle Upper Cretaceous was accompanied by additional folding, cross-faulting, and jointing. Later intrusion of pyroxenites and periodotites was followed by acidic differentiates. At the end of the lower Eocene, tangential forces oriented southward produced a series of major overthrusts on the north coast of Las Villas Province and reverse structures in the Trinidad Mountains. Left-lateral strike-slip normal faults on the southwest margin of the mountains were developed during early Miocene time. They are part of a shear zone crossing Cuba in a northwest-southeast trend from the Bay of Cardenas to Cienfuegos.

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DINOFLAGELLATES AND THEIR USE IN PETROLEUM GEOLOGY

Dinoflagellates are a group of chiefly planktonic one-celled organisms abundant in modern seas and lakes. Their fossil organic shells range from 15 to 150 microns or more and are commonly found in Jurassic and younger marine sediments by the same techniques as those currently more widely used for spores and pollen. Commonly they occur in the same samples. Being surface-dwellers, dinoflagellates are relatively independent of the type of bottom sediment, although most abundantly found in marine shales; fresh-water fossil types are very rare. Rapid evolutionary changes, combined with wide geographic distribution of many species, make them excellent fossils for zonation and correlation. This is exemplified by successions of distinctive assemblages in the late Mesozoic and Cenozoic of Australia, by two assemblages containing many identical species in the Upper Jurassic of Utah and France, and by the world-wide distribution of a particularly distinctive form in the Upper Cretaceous. The value of dinoflagellates for environmental interpretation is as yet largely unexplored.

Two major types of dinoflagellate fossils occur. One is the resistant shell, or theca, of the free-swimming organisms. This is commonly divided into polygonal plates and may contain a thick-walled and much ornamented protective structure, the cyst. The second type consists of isolated cysts, freed of their surrounding thecae. The latter type includes many of the minute spiny objects that have been called hystrichospheres. In fact, the majority of (but by no means all) post-Paleozoic hystrichospheres appear to be dinoflagellate cysts. Important criteria for distinguishing dinoflagellate genera and species include: the over-all shape, the number and arrangement of plates or of spine-like projections, the type of cyst, and the character of a special opening, the archeopyle, by which the protoplasm left the theca or cyst.

The literature on fossil dinoflagellates and the number of described genera and species are still small, but now explosively expanding as interest in the group increases. Although fossil dinoflagellates are already useful tools of the applied paleontologist, our understanding of them and the full development of their potentialities for applied paleontology are in early stages.

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APPLICATION OF DIGITAL COMPUTERS TO EXPLORATION OPERATIONS

The use of digital computers in exploration is oriented toward furnishing the geologist an additional tool. Two types of operations are performed by digital computer installations. Data processing involves filing, sorting, and comparing a large volume of data that require a small number of arithmetical calculations for each of many data entries. Computing involves the solution of mathematical formulas and includes problems requiring relatively few data but many arithmetical calculations.

Data processing is often merely a system for rapid recall of information and as such is being investigated