changes within the Madera and Sangre de Cristo Formations, overlap of the Crestone Conglomerate onto Precambrian rocks, and the presence of unconformities within the late Paleozoic section indicate that several faults in the Crestone (Sangre de Cristo Range) and southern Wet Mountain areas were displaced significantly in the late Paleozoic.

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DISPLACEMENTS ACROSS, AND STRAIN IN, OROGENIC BELTS

The production of accurate palinspastic maps demands knowledge of displacements across orogenic belts. Traditionally this has involved attempts to measure linear crustal strains (ϵ) across orogenic belts by fabric studies, unraveling folds, unscrambling thrusted superposed facies, *etc.* The inherent problems of this approach (*e.g.*, distinguishing between stratal and crustal shortening) and the consequent difficulties of making meaningful strain measurements are minor compared with the complexities imposed by relating orogenic strain to displacements across consuming plate boundaries. It is possible in a general way to convert relative plate displacements (D) and displacement rates ($\dot{D}$) directly into gross shortening and shortening rate values across a particular Mesozoic Tertiary orogen (*e.g.*, Mediterranean fold belt). This has little meaning, however, for ϵ and $\dot{\epsilon}$ values in orogens for the following reasons. 1. Relative plate displacement vectors change with time. 2. Most of D is not converted into orogenic crustal strain, but is lost by subduction. Only where continental collision has occurred is there a chance that ϵ and $\dot{\epsilon}$ are direct functions of D and $\dot{D}$. 3. ϵ and $\dot{\epsilon}$ may be related to second-order consequences of plate motion; for example, high-level spreading and gliding of marginal nappes. 4. Mechanically significant rates depend upon determining instantaneous $\dot{\epsilon}$ and this in turn depends on the width of a zone deforming homogeneously at an instant of time. Using Le Pichon's $\dot{D}$ values across the Alpine Himalayan fold belt, $\dot{\epsilon}$ values vary from 1.27×10 [illegible] (ϵ concentrated in Indus suture) to 1.59×10 [illegible] (ϵ across 900 km wide seismic belt from the Zagros crush zone to the Caspian Sea). These rates are far slower than rates (5×10^{-2} — 10 [illegible]) at which ductile strains have been achieved in laboratory experiments. Brittle and semi-brittle structural behavior is common in orogenic belts and suggests that natural instantaneous $\dot{\epsilon}$ values are much higher than those calculated from $\dot{D}$. This may be a function of ϵ being concentrated instantaneously in narrow fault zones or, by incremental strain propagation, across a particular zone. Even these factors, though, do not seem to modify $\dot{\epsilon}$ enough (*e.g.*, in a 1-cm wide thrust zone in the Himalayas where $\dot{D} = 5.6$ cm/yr., $\dot{\epsilon} = 1.8 \times 10$ [illegible]). Yet, brittle deformation is evidenced by shallow earthquakes suggesting either that ϵ is concentrated along hairline fractures or that large strain accumulations precede rupture. Orogenic strains, however, are small compared with displacements across orogenic belts. The displacements can only be calculated from oceanic magnetic anomaly fitting and, less accurately, from paleomagnetic data from stable forelands and cratons.

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INJECTION WELLS AND OPERATIONS TODAY

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CONICAL-COLUMNAR STROMATOLITES AND SUBTIDAL ENVIRONMENT

Several distinct varieties of stromatolites are present in dolostones of the Proterozoic Dismal Lakes Group, Great Bear Lake region, Northwest Territories. Comparison of the stromatolite types with respect to abundance of associated sedimentary structures (cross-laminations, ripple marks, oolites, desiccation cracks, evaporite casts, intraformational conglomerates) supports the concept that stromatolite morphology is closely related to environment. As in modern analogues, water turbulence appears to be a particularly significant determinant of morphology.

On the basis of textures, associated sedimentary structures, and comparison with modern algal stromatolites, most stromatolites of the Dismal Lakes Group appear to have formed in either supratidal or intertidal environments. However, conical-columnar stromatolites ("Conophyton"), for which a modern analogue is lacking, are confined largely to a prominent dolostone unit in which sedimentary structures indicative of turbulence are almost totally absent. The paucity of such structures, coupled with consideration of the stromatolite morphology during growth, suggests that conical-columnar stromatolites may be characteristic of a subtidal environment. Maintenance of a vast field of conical surfaces in an intertidal or supratidal environment without reduction or fragmentation of the apices seems unlikely.

The relation of the conical-columnar stromatolites to flat-bedded subjacent strata renders interpretation of origin by deformation untenable, and continuity of lamination within and between the columns refutes a diagenetic origin. The Dismal Lakes dolostone unit consisting mainly of conical-columnar stromatolites is interpreted as a Proterozoic subtidal algal reef of unusual persistence in space and time.

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MODEL OF CRETACEOUS PALEOGEOGRAPHY AND ITS CONSEQUENCES

Growing acceptance of continental drift as expressed in the plate tectonics model leads to consideration of its use as a basis for investigating certain aspects of paleogeography and paleobiogeography. As a first step the geophysical, stratigraphic, and paleontologic data for the Cretaceous, with particular reference to mid-Cretaceous events were examined.

The final separation of South America and South Africa dates from about Aptian Albian time, which implies that the Mid-Atlantic Ridge as a relief feature dates from about that time. Unless there was compensating downwarping a change in the volume of the oceanic basins would occur. The stratigraphic records of Africa, North America, and Western Europe show that the major transgressive and regressive movements are synchronous and that a major transgression began about that time, perhaps reflecting the ridge activity.

Major changes can be seen in the biogeography of mollusks, forams, and other groups between the Early and Late Cretaceous. Pre-Albian marine faunas in the Pacific regions are linked by a large number of taxa with faunas in the Atlantic-Mediterranean region. After the mid-Cretaceous there is a reduction in the cos-