on the shallow banks flanking the Gulf has produced relatively well-sorted sand, low in layer silicates and organic matter. Some well-sorted material has also been deposited on the flanks of Georges and Browns Banks and in some coastal areas.

Most winnowed fine detritus has accumulated on the flat floors of the deep basins. The sediment there is silty clay composed dominantly of mica, chlorite, and mixed layered mica-montmorillonite. Kaolinite occurs only as traces in a few samples. The minor amounts of sand-size material are composed predominantly of mica and of foraminiferal tests and other biogenic debris. Organic matter exceeds 4 per cent in some of the basins. The carbon/nitrogen ratio of the deposits tends to increase with distance from shore.

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CRETACEOUS DELTAS IN THE DENVER BASIN AND RELATIONSHIP TO PETROLEUM

Early Cretaceous and early Late Cretaceous deltaic sediments of the Denver basin include the oil-producing "D" and "J" sandstones (upper Dakota Group). The very fine- to coarse-grained quartzose sandstones are in part cross-bedded and ripple marked, in part marine, and in part nonmarine; contain coal and carbonaceous or lignitic beds, mud pellets, siderite concretions, interbedded claystones; and in some areas grade laterally and vertically through siltstone into marine shale.

Within the "J" sandstone there is a well-defined delta extending northwestward into the Denver basin in Colorado. There are smaller deltas in western Nebraska, and, between these two areas, there is a narrow marine embayment. A similar deltaic pattern is developed in the "D" sandstone. Petroleum is concentrated in the parts of the deltas that have the greatest interfingering of marine and deltaic deposits.

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ABYSSAL BASIN SEDIMENTATION

Clastic sands and silts transported and deposited by turbidity currents have created the vast abyssal plains of the ocean basins and have constructed the abyssal cones and natural levee systems of the continental rise. Clastic silts and lutites, largely transported by ocean currents, have created much of the continental rise and the outer ridges which parallel the continental margins. Biogenous sediment, resulting from near-surface productivity, more or less redistributed by currents, has created the rolling abyssal swales of productive mid-oceanic areas and has contributed to the continental rise and marginal trench sediments.

Although turbidity currents are responsible for the leveling of the abyssal plains, turbidites constitute less than one-third of the sediments beneath the plains. Horizontal size grading in turbidites away from source areas is detectable but small. Apparently a much more important control on size is imposed by the lower courses of the major rivers. Turbidity currents originate near the mouths of several major rivers at the rate of 50 per century but in many other likely areas none have occurred for thousands of years.

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SUBSURFACE STRATIGRAPHY OF COASTAL GEORGIA AND SOUTH CAROLINA

Sediments ranging in age from Pleistocene to Early Cretaceous (?) overlie metamorphosed basement rocks in most of coastal Georgia, but in southeastern Charlton County there are Paleozoic strata between the Lower Cretaceous (?) and the basement complex. The thickness of sediments ranges from 2,674 feet in Screven County, in the north, to 4,700 feet in Glynn County at the coast; the section thins somewhat toward Florida.

The Quaternary unit includes the surficial clastics of Recent to Pleistocene age. The Tertiary units include the predominantly clastic section of Miocene age; the Oligocene sandstones and their limestone equivalent, the Ocala Limestone; the Lisbon and Tallahatta clastics and their Avon Park-Lake City Limestone equivalents, the Wilcox clastics and their Oldsmar Limestone equivalent, all of Eocene age; and the Clayton and Tamesi Formations and their Cedar Keys Limestone equivalent of Paleocene age. The Upper Cretaceous units include the Lawson Limestone and the equivalent clastics of Navarro age; beds of Taylor and Austin age, both in clastic and limestone facies; and the clastic Tuscaloosa Formation. The oldest unit consists of clastics of Early Cretaceous(?) age; these sediments overlie metamorphosed basement rocks in the north and Paleozoics in the south. Two sections, one coastal and the other inland, show lithologic and faunal relationships which reflect changing depositional environments. Regionally, facies change from clastics in the north to limestones in the south with corresponding changes in microfossil suites. Tentative correlations of the clastic sections with their limestone equivalents are based on lithologic and fossil evidence.

There are no local geologic structures, but the sedimentary rocks of the area show the collective effects of the Carolina arch, the Southeast Georgia embayment, and the Ocala uplift.

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SEDIMENT DISTRIBUTION ON THE INNER CONTINENTAL SHELF, WEST COAST OF SOUTHERN AFRICA

"Sparker" surveys show that the inner continental shelf along a 400-mile stretch of the west coast of South and South West Africa (Olifants River to Luderitz) consists of large areas of virtually sediment-free bedrock and two well-defined elongate bodies of unconsolidated sediment of probable Late Pleistocene-Holocene age.

The sediment distribution pattern is dominated by a strikingly continuous wedge-like body of silts and clays that averages 7 miles in width. This wedge has a maximum thickness of about 80 feet along its inshore edge which lies approximately 3 miles offshore in 200–300 feet of water. Location of the wedge is controlled by a marked steepening in slope of the bedrock surface which coincides with the contact between the Precambrian basement and a sedimentary section of unknown age which dips gently seaward. At the Orange River, the wedge merges with and is overwhelmed by the river's submerged delta.

A second sediment body of lesser extent is the 1 to $1\frac{1}{2}$-mile-wide inshore lens which lies just seaward of the surf zone along a 90-mile stretch south of Luderitz. This inshore lens averages 20 feet in thickness and consists primarily of silty sand and shell material. Gravels, where present, are generally concentrated near the base of the section, and fill irregularities in the dissected bedrock surface. The inshore lens has accumulated shoreward of a series of low discontinuous ridges, and includes reworked and possibly downwarped Pleistocene shoreline deposits exposed onshore farther south.

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FOUNDERING OF CONTINENTS AND ITS RELATION TO ISOSTASY, CRUSTAL THINNING, AND MANTLE DENSITY CHANGES

Current theories on geosynclinal subsidence and on the disappearance of ancient land masses postulate crustal thinning by subcrustal processes. This idea was a necessary implication of the two premises popular a decade ago, namely: (1) surface elevation is related to crustal thickness according to Airy's model of isostatic compensation; (2) either the crust as defined by the Mohorovicic discontinuity is comparable with the crust envisioned by Airy, who separated a solid crust from a fluid substratum, or there is no significant regional difference in mantle density, and there has been none during the past. Recent geophysical investigations have indicated that isostatic adjustment could result not only from changes in crustal thickness, but also from variation in upper mantle density. This new discovery permits the postulate that thinning of continental crust can be related to removal of surficial sialic material by supracrustal processes, such as erosion, gravity sliding, and overthrusting from elevated regions which owed their surface elevation to an abnormally low mantle density. Subsequent increase in mantle density because of variations in mantle temperature leads to isostatic subsidence of regions of thin crust. Such a combination of crustal thinning by supracrustal processes and isostatic subsidence related to mantle density changes could explain adequately (1) the disappearance of ancient land, (2) the formation of a new geosyncline at the site of an ancient land, and (3) the estimated chemical composition of the earth's crust. The efficacy of supracrustal processes to remove large quantities of sialic materials has been discussed. It is not necessary to postulate subcrustal processes which either must assume lateral transfer of vast quantities of crustal material or that the Mohorovicic discontinuity is a phase change boundary. An isostatic model relating surface elevation, crustal thickness, and mantle density variation during an orogenic cycle is presented.

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LOWER CRETACEOUS ALGAE FROM SOUTH TEXAS

Appreciable numbers of algae occur in the Lower Cretaceous limestones of reef and near reef facies. They include red algae belonging to the families Solenoporaceae, Permocalculus, and Corallinaceae, and numerous green algae of the family Dasycladaceae. The flora is quite similar to the Lower Cretaceous flora of the Mediterranean region, with identical or closely related species. A number of the genera are recorded for the first time in the western hemisphere.

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THE GILBERT-TYPE DELTA

The pioneer work on deltaic sedimentation was done by G. K. Gilbert, and published in 1885, and in 1890. The deltas which he so carefully described were built into Pleistocene Lake Bonneville by rivers and creeks entering the lake from the rugged Wasatch Mountains to the east.

The classic concept of the delta, as described by Gilbert, with distinctive topset, foreset, and bottomset beds, was incorporated into virtually all introductory textbooks in geology as a "typical delta". It has persisted until the present time, in spite of the publication of many papers on such complex deltas as the Mississippi and others quite different from Gilbert's classic, simple delta. The term "Gilbert-type Delta" was introduced by Bates in 1953, who characterized it as a product of homopycnal flow into lakes.

The present paper describes and illustrates some typical Lake Bonneville deltas as "Gilbert-types". The deposits are characterized by:

1. Essentially homopycnal flow by mountain streams of steep gradient into deep water immediately offshore.
2. Occasional turbidity flows (mud-rock flows); hyperpycnal.
3. Coarse gravels dominant in foreset beds.
4. Fine sands and silts in bottomset beds, prograded locally to receding lake levels.

Some of the deltas of Lake Bonneville are true counterparts of alluvial fans.

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REGIONAL ENVIRONMENTAL STUDY OF THE NUGGET AND NAVAJO SANDSTONES

The late Triassic (?) and early Jurassic Nugget and Navajo Sandstones are compositionally and texturally extremely homogeneous, mature, feldspathic quartz arenites extending over vast areas in the western United States. They have long been considered as "classic" eolian sandstones, deposited within great interior, sub-tropical deserts.

Trough-shaped "festoon" cross-bedding predominates and most tabular-planar and irregular sets are modifications of this basic style. Large scale simple, non-erosional, wedge-shaped sets are subordinate and are restricted stratigraphically to the middle part of the Navajo Sandstone. Ripple-marked, wavy-bedded horizons, plane bedded to massive units, and interbedded shale seams associated with horizontal truncation planes are common, particularly in the Nugget Sandstone. Very thin dolomitic carbonate lenses are found in the Navajo. While the sparse fossil evidence is indicative of terrestrial, but not necessarily extremely arid, conditions, these latter characteristics, as well as widespread contortion of inclined laminae, are apparently the result of subaqueous processes.

Sediment volume, grain composition, and textural maturity indicate a predominantly sedimentary provenance. No areal compositional or textural trends are discernible but south- and southeasterly-directed paleocurrents suggest a source along the western margin of the Canadian Shield. Textural parameters derived from recent sediments fail to clearly identify Nugget and Navajo depositional environments.

The weight of all evidence indicates, however, that both formations consist of a complex of shallow-marine, littoral, and coastal dune deposits laid within, and in advance of, an east- and southward-transgressing sea. Although temporary regressive oscillations may have at times exposed large areas of marine sand to the action of the wind, the majority of Nugget and Navajo cross-bedding is aqueous in origin. Preserved eolian structures are remnants of transverse coastal dune belts rather than vast interior dune fields, and paleocurrent directions thus reflect both marine current and coastal on-