

sea, and marine deltas. Other classifications may be based on the depth of the water bodies into which they prograde, or on basin structure.

Many delta types have been described previously. Most of these have been related to the vicissitudes of sedimentary processes by which they form. Names were derived largely from the shapes of the delta shorelines. The configuration of the delta shores and many other depositional forms expressed by different sedimentary facies appear to be directly proportional to the relative relationship of the amount or rate of river sediment influx with the nature and energy of the coastal processes. The more common and better understood types, listed in order of decreasing sediment influx and increasing energy of coastal processes (waves, currents, and tides), are: birdfoot, lobate, cusped, arcuate, and estuarine. The subdeltas of the Colorado River in Texas illustrate this relationship. During the first part of this century, the river, transporting approximately the same yearly load, built a birdfoot-lobate type delta in Matagorda Bay, a low-energy water body, and began to form a cusped delta in the Gulf of Mexico, a comparatively high-energy water body. Many deltas are compounded; their subdeltas may be representative of two or more types of deltas, such as birdfoot, lobate, and arcuate. Less-known deltas, such as the Irrawaddy, Ganges, and Mekong, are probably mature estuarine types. Others, located very near major scarps, are referred to the "Gilbert type," which is similar to an alluvial fan.

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ORIGIN AND TECTONIC SIGNIFICANCE OF HIGH FLUID PRESSURES, CENTRAL VALLEY AND COAST RANGE, CALIFORNIA

Abnormally high fluid pressures exist within the Cretaceous sediments of the Sacramento Valley and probably exist within similar sediments of the San Joaquin Valley. The existing fluid potential distribution and chemistry of the pore waters strongly suggest that the abnormally high fluid potentials result from tectonic compaction stemming from continuous uplift of the California Coast Range, at least from late Tertiary into Recent time. This uplift has squeezed, as in a closing vice, the prism of Mesozoic sediments within and between the rising Coast Range and the relatively stable Sierran basement. The distribution of these high fluid potentials, laterally and with depth, suggests that the great majority of the Mesozoic sediments occupying the Coast Range has fluid pressures which approximate those exerted by the lithostatic load. Low-angle thrusting may be an important future structural event of this region as a result thereof. The production of such high fluid potentials by regional tectonic compaction may be a normal occurrence during the regional uplift of a geosynclinal system.

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BASINS OF PERMIAN SEDIMENTARY ROCKS IN SOUTHERN NEVADA

Basinal Permian sedimentary rocks of southern Nevada accumulated west and northwest of the Las Vegas hinge-line in a depocenter east of the Southern Nevada Highland; a substantially thinner contemporaneous shelf or platform facies formed to the east and southeast. Transgressive-regressive sedimentation in Wolfcampian through Early Guadalupian time ac-

counted for variations in facies in the basin, shelf and bank margins, banks, lagoons, and deltas. Organic reefs, back reefs, and fore reefs dominated the sedimentary pattern at some times and places.

Sediments of Wolfcampian and Early to Medial Leonardian age consist of 4,500 feet of fusulinal, coraline, algal, bryalgal, and micritic limestones, and thick bioclastic limestones. This sequence comprises the Spring Mountains Formation, a basinal succession that accumulated in the miogeosyncline.

During Medial to Late Leonardian time, influx of terrigenous material from adjacent uplands accounted for substantial amounts of silty and sandy detritals in the carbonates which were forming on the shelf, hinge-line, and proximal parts of the basin; areally extensive red-colored sandy limestones, dolomitic siltstones and sandstones, and sandy dolomites thus formed in lagoonal, intertidal, bank, bank margin, and epineritic zones. This sequence is 3,000 feet thick, and comprises an unnamed formation; it interfingers across the hinge-line area and onto the platform with deltaic, neritic, and eolian sandstones and red beds of the Queantoweap, Hermit, and Coconino Formations.

Late Leonardian and Early to Medial Guadalupian time saw the filling of the basin; red-bed sedimentation of the Toroweap siltstone-shale-gypsum sequence was followed by carbonate sedimentation of the upper Toroweap and Kaibab. This succession is normally less than 1,000 feet thick in the Spring Mountains, but thickens to the east. The Kaibab Formation is in large measure reefal, and resembles the reef-tract of the West Texas Permian, but differs in that it is stretched out, has greater length, and is substantially thinner. The sponge *Actinocoelia* sp., cf. *A. maeandrina* Finks is characteristic.

The Triassic Moenkopi Formation rests unconformably upon the Kaibab; east of Las Vegas the formation is dominated by red beds, but in the Blue Diamond Mountain area it contains more than 700 feet of micritic, oolitic, pelletal, and algal limestones (= Virgin Limestone Member) near its base.

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DIAPIRS IN THE WESTERN PYRENEES AND THEIR FORELAND (SPAIN)

The diapirs of the western Pyrenees and their foreland have cores mainly of salt and evaporites of Triassic (Keuper) age. Their shapes and tectonic positions differ. They are surrounded or overlain mainly by Cretaceous and Tertiary sediments. Groups of diapirs demonstrate distinct alignments. The distribution of the diapirs is believed to be controlled by variation in the thickness of the Upper and Lower Cretaceous sediments. These sediments, which reach a maximum thickness of at least 8,000 m., exerted the necessary pressure to start the movement of the saliferous beds towards the flanks of the trough. Shifting of the trough axis in Upper Cretaceous time separated the salt accumulation into two distinct welts. Diapirism started in early Cretaceous time and must have reached its maximum activity during the late Cretaceous because most of the diapirs had reached the surface prior to late Tertiary time.

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