

sands are, in places, considerably better sorted than graded-bedded deep-sea sands which were supposedly deposited by turbidity currents; (3) cross-laminated sands, in places, contain a rich deep-sea benthonic fauna, suggesting a rate of deposition slow enough for the establishment of this fauna; (4) presence of parallel ripples and interference ripples on top of some such cross-laminated sediments; (5) the direction of transport shown by cross-lamination is, in places, quite different from that shown by bottom markings which were supposedly scoured by turbidity currents.

The question whether turbidity currents could deposit cross-laminated sediments remains unsolved. The writer points out, however, that an indiscriminate assumption of turbidity current deposition of all deep-marine sandy sediments has led to confusion, inconsistencies, and controversies. The postulate of bottom-current redeposition helps to resolve this paradox.

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#### EVIDENCE FOR A COUNTERCURRENT BENEATH THE FLORIDA CURRENT

About 60 per cent of the area shown in photographs taken at the axis of Florida Straits exhibit well defined current ripple marks. These ripples indicate a flow of water of at least .23 to .59 kts. from the north. This current is in the opposite direction from the surface currents of 2 to 4 or more knots.

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#### PALEOECOLOGIC, SEDIMENTARY, AND STRUCTURAL HISTORY OF THE LATE TERTIARY CAPISTRANO EMBAYMENT, CALIFORNIA

The Capistrano Embayment comprises a distinct geologic unit of the southern California area. Paleobathymetry, sediments, and microfaunas within the embayment indicate that it has had a different structural history, different from the Los Angeles Basin on the north. Marine invasion of the trough began in the Paleocene and ceased in the Pleistocene. This report develops a detailed history of the embayment from middle Miocene to late Pliocene time using data from two well exposed sections within the boundaries of the embayment.

Analogy between ecologic niches of living benthonic Foraminifera and fossil forms encountered indicates that middle bathyal depths were attained by the middle Miocene. By late Pliocene the trough was filled to shelf depths. Repetitive changes in morphology of benthonic species provides additional evidence of varying paleobathymetry.

Variation in abundance of cool and warm-water planktonic Foraminifera indicates three periods of distinctly cool surface temperature between late Miocene and late Pliocene time. Increase in radiolarian diameter provides evidence for surface temperatures in sediments barren of Foraminifera.

Peak radiolarian abundance suggests that the deepest point in basinal evolution existed in the early Pliocene at which time water depth neared 1,750 meters.

Correlation of the two sections is based on: (a) a Mohnian horizon of *Globigerina pachyderma* which coil sinistrally, (b) the uppermost point of abundant radiolarian tests, (c) the uppermost point of the radiolarian *Prunopyle titan*, and (d) the horizon of peak radiolarian number. These mutually corroborative planktonic criteria demonstrate the time transgressive relationship of existing stages based on benthonic Foraminifera.

Repetitive faunas, for example, appear much earlier in the rapidly filling southern end of the embayment than in the northern deeper area.

A restricted, oxygen-deficient, closed-basin system, characterized by laminated diatomaceous sediments, originated during a period of early Miocene diastrophism. Closed-basin conditions allowed only a marginal benthonic foraminiferous fauna to exist, analogous to the existing fauna of the oxygen deficient Santa Barbara basin. Restricted basin plain conditions prevailed until the end of the Miocene.

Instantaneously deposited coarse sediments (turbidites) emphasize pulses of structural activity in the middle Miocene, late Miocene, and middle Pliocene. Sediments provide evidence of a landmass to the west of the embayment. Turbidites are recognized on the basis of displaced Foraminifera, plant material, and sedimentary structures.

Paleoecologic and sedimentary analyses delineate a characteristic basin-filling sequence in the Capistrano Embayment, similar to events taking place today in the Gulf of California and off southern California.

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#### LOWER DEVONIAN ALGAE AND ENCrustING FORAMINIFERA FROM NEW SOUTH WALES

An algal florule of 13 species, belonging to 11 genera, is described from New South Wales, Australia. Of these, one genus and 7 species are new. The majority are green algae mixed with a few attributed to the blue-green. Five of these genera have been previously known only from the Kasbas region of the U.S.S.R.

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#### SEDIMENTARY FACIES AND PALAEOCURRENTS IN THE BOSS POINT FORMATION, SOUTHEASTERN NEW BRUNSWICK

The Pennsylvanian Boss Point Formation was examined in gently folded coast sections on the Bay of Fundy and Petitcodiac estuary, including the type section north of Joggins, Nova Scotia, more than 3,130 feet thick.

Two main intergrading facies are present. At Hope-wall, Dorchester, and Aulac, cross-bedded sandstones and quartz-pebble conglomerates are greatly dominant; to the south and southwest, mainly cross-bedded sandstones alternate with siltstone and thin sandstone sequences. The coarser beds are interpreted as river channel and levee deposits, and the interbedded siltstone sequences, with root beds, represent flood-plain deposits. Mud-pellet conglomerates and marl-nodule conglomerates are common in the sandstones, the latter usually filling channels near the base of each sequence; probably these are the result of redistribution of the more tenacious flood-plain deposits during major changes of river course. Bituminous shales with non-marine pelecypods (*Carbonicola* and others) and nodular argillaceous limestones occur sparingly. Plant fragments, including transported *Calamites* and *Lepidodendron* logs, are abundant, especially in lenses of irregularly bedded sandstone thought to represent crevasse fillings in levees. Quicksand slump structures were identified in conglomeratic sandstones. No marine beds were found.

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