more of oceanic sediments in tropical and temperate zones. These planktonic algal remains have a long geologic record, as well as a high degree of evolutionary plasticity, and have been used, with some success, as stratigraphic tools. To date, however, no attempt has been made to determine their ecologic usefulness.

During investigation of the Coccolithophoridae in the Atlantic and Antarctic Oceans, the writers found several temperature-dependent species. To test the usefulness of these forms, their contemporary, postglacial and Wisconsin-glacial distribution in the North Atlantic was examined. Twelve cores, representing a range of conditions from present subarctic to tropical, were chosen from those described by Ericson, Ewing, and Wollin as representing an unbroken sequence of sediments ranging from Recent through Wisconsin in age.

The colder-water fauna is defined by the presence of *Coccolithus pelagicus* and large numbers of *Coccolithus huxleyi, Gephyrocapsa oceanica,* and *Coccolithus leptoporus.* The warmer-water fauna is typified by *Umbellosphaera tenuis, Umbellosphaera irregularis* (erroneously called *Discoaster murrayi* by some workers), and in lower concentrations, *Coccolithus annulus* and *Discolithus antillarum.* In addition, the faunal diversity increases in such a way that non-placolith coccoliths constitute an increasingly significant percentage of the fauna as the temperature increases. It is from these forms that more sophisticated ecologic inferences will be drawn.

Comparison of Recent with glacial sediments indicates a faunal shift of about 10° latitude. During the Wisconsin, the *C. pelagicus* fauna occurred as far south as 25° North latitude, whereas today it is restricted to areas north of 35° North latitude.

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Silica-Bicarbonate Balance in Oceans and Early Diagenesis

If present stream discharge and dissolved load are assumed to be representative of the geologic past, and if the volume of the oceans has remained essentially constant, many problems arise concerning the disposal of the constituents brought into the oceans by streams. Two of these problems relate to silica and bicarbonate.

The amount of dissolved silica delivered to the oceans in 10^9 years, if precipitated chemically or biochemically as SiO_2, would produce a much greater volume of sediment than is observed in the geologic column. The bicarbonate ion transported to the oceans either must be recycled through the atmosphere as CO_2, or removed in calcareous sediments. Yet the precipitation of carbonate minerals, with concomitant loss of CO_2 to the atmosphere, leaves about 40 per cent of the HCO_3^- unaccounted for.

These two problems can be solved by assuming that a small but significant fraction of the suspended load of streams consists of weathered aluminosilicates, probably poorly crystalline, that react with silica and bicarbonate prior to deposition, by reactions of the type: Al-silicate + SiO_2 + HCO_3^- + cations = cation-Al-silicate + CO_2 + H_2O.

Reactions of this type can be considered "reverse weathering," and are representative of chemical changes commonly considered to take place *after* deposition.

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Habitat of Oil in Carbonate Rocks

The Kemnitz field in Lea County, New Mexico, is a typical example of stratigraphic entrapment of oil in a carbonate reservoir rock. To understand the reason for entrapment of oil in fields such as Kemnitz, one should analyze geological factors in terms of depositional environment, diagenetic history, and structural history.

Environments favorable to deposition of reservoir-type carbonate formations include reefs, bioherms, oölite bars, and porous skeletal calcarenites. Production of organic material in such environments (with the exception of oölite bars) is prolific; however, under normal conditions most of the organic soft parts are destroyed by bacteria and scavengers, so that only skeletal parts are preserved.

Hydrocarbons are found in cyclic carbonates which were deposited on unstable shelves which were subject to recurrent sea-level fluctuations and periodic influxes of terrigenous clastic sediments. A reef bank or oölite bar can be covered by transgression of basin sediments, suffocated by regressive evaporites, or smothered by influx of terrigenous clastic sediments. Biogenic carbonates which are overlain by evaporites, black sapropelic shale, or basin sediments reflect an early diagenetic history which was favorable for the preservation of animal and plant remains. Early diagenesis is also important in dolomitization and modification of primary porosity of limestone.

Petrologic studies of the Kemnitz reef indicate that this stratigraphic trap is caused by a barrier reef crossing a plunging structural nose. The lower Wolfcamp (Permian) is slightly transgressive and the reef top is covered by basin sediments. Thus this reef retained its porosity and organic source material.

In the North Anderson Ranch field, Lea County, New Mexico, the upper Cisco (Pennsylvanian) is a reef-type porous carbonate but is non-productive because of unfavorable diagenetic history. The younger lower Wolfcamp also is of reefoid nature and occupies a position along the flank of the structure lower than the porous Cisco reef at the crest. The Wolfcamp had a favorable early diagenetic history and therefore contains commercial accumulations of oil.

Elusive stratigraphic traps in carbonate rocks can be explored effectively only after thorough subsurface and structural analyses are supplemented with studies of the environment and diagenetic history of prospective carbonate beds.

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Distribution of Interstitial Salts in Drill Cores from Atlantic Ocean Floor off Florida

Interstitial water from five Paleocene to Recent core series, taken on the J.O.I.D.E.S. offshore drilling project, has been analyzed for chloride and major cations. The cores were obtained at depths to 300 meters below the sea bottom on the continental shelf, the Florida-Hatteras slope, and the Blake plateau.

Samples from several holes show a marked downward increase in chloride concentrations, with maximum Cl^- greater than 26 ‰, equivalent to a salinity greater than 47 ‰. It appears that forces