phean) of the USSR. The nonrepetitive changes in microstructural assemblages through the Riphean may be understood in terms of the community organization of blue-green algae. The presence of distinctive microstructures which survived for long periods of time implies the presence of very highly biologically accommodated communities of blue-green algae, *i.e.*, of assemblages of algal species with high levels of physiologic and biochemical accommodation among species. The time range of each community and microstructure was determined by the timing of major regressions or of major reorganizations in the distribution of shallow seas. Biologically accommodated communities were broken down during these regressions or reorganizations. Microstructural assemblages had broad areal distributions within the USSR, as well as specific time ranges. Paleogeographic reconstructions of the USSR indicate that areas with similar microstructural assemblages were in open-water contact during the corresponding time period. Open-water connection accounts for the synchroneity of microstructural assemblages in the USSR, but similarity of hydrographic conditions throughout the Precambrian world ocean is improbable. Therefore, time-stratigraphic microstructural units defined in the USSR should not be used for worldwide correlation until paleogeographic relations are established firmly.

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GEOCHEMICAL EFFECTS AND MOVEMENT OF INJECTED INDUSTRIAL WASTE IN A LIMESTONE AQUIFER

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PHYSICAL CONTROLS ON MARINE BIOTIC DISPERSAL IN JURASSIC

Oxygen isotope studies and biogeographic distributions indicate that the Jurassic Period was a time of only moderate latitudinal variation in temperature. Seasonal change was less well marked than at present. On land, vegetation varied geographically, but less so than at other times in earth history. Tetrapods from widely spaced land areas were quite similar. By contrast, marine invertebrates including forams, ammonoids, belemnoids, and pelecypods show distinct provincialism, and the boundaries of the marine invertebrate provinces shift through time. Physical controls that could have produced this provincialism include salinity and temperature differences in the sea, the distribution of shelf seas and deep water areas, and the geographic arrangement of sea and land, or a combination of these. Consideration of likely geographic positions of the continents during the Jurassic (assuming that they have drifted since that time), and of the likely pattern of ocean currents of the time, explains many features of the pattern of biotic dispersal. It suggests that differences in water temperature were a prime physical control on the distribution of marine Jurassic life. In particular, it indicates that the Boreal realm was not a sea area of salinity lower than average as has been suggested previously. Analogy with other Mesozoic times, and certain evidences of bipolarity in biogeographic patterns in the Jurassic, further support the view that temperature difference was a prime physical controlling factor.

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SEDIMENTARY FEATURES AND NEARSHORE PROCESSES OF ARCTIC AND SUB-ARCTIC BEACHES

Arctic beaches show characteristic sedimentary features that readily distinguish them from beaches in more temperate zones. Along the Alaska coastline in the eastern Arctic and subarctic regions of the Bering Sea, many exotic microtopographic structures may persist throughout summer, if spring and summer weather conditions are mild enough. On prograding sections of the coast, similar features might be preserved in the stratigraphic cross section of the beach.

Microrelief features develop in spring and early summer as a result of dynamic processes associated with breakup of sea ice and thawing of kaimoo, permafrost, snow banks, and stranded blocks of ice. On the beach 2 different types of microrelief occur. Along the backshore and the upper foreshore, small streamlets and mud flows fed by melting snow and thawing permafrost produce micro-outwash and microdeltaic deposits. In the swash zone, movement of grounded sea ice by wind and waves produces ice-push ridges; melting of kaimoo ice leaves a kaimoo ridge, and melting of stranded gravel- and sand-rich brash ice creates sea-ice kettles and sea-ice sand and gravel cones. Within the nearshore areas, close to the shoreline, sea ice locally scours the bottom sediment into small randomly oriented ridges and troughs. Farther offshore, small randomly spaced hummocks of coarse sand and gravel form where ice-rafted sediment drops from grounded or stabilized melting sea ice.

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VAN HORN SANDSTONE, WEST TEXAS—EARLY PALEOZOIC ALLUVIAL-FAN SYSTEM

Sediment comprising the Cambrian(?) Van Horn Sandstone was derived from a highland source area of rhyolite, granite, and metamorphic and sedimentary rocks. Detritus ranging from boulders to silt was transported southward through canyons by high-gradient streams under rapid-flow and surge-flow conditions. South of the canyon mouths, the sediment was spread across the fan surface by shallower, less-confined braided streams; mud-flow deposits are absent. Three gradational facies, from north to south, are recognized in the fan deposits.

Proximal facies are deposited in the feeder canyons and near their mouths. This facies consists of massive cobble and boulder beds overlain by thinner, horizontally bedded pebble, cobble, and boulder gravels.

Mid-fan facies consist of gravels and sands. Gravel lenses are interpreted as longitudinal bars (parallel-bedded, convex-upward deposits) and channel fills (convex-downward deposits). Mid-fan sands occur as channel fills, across the tops of gravel bars, and in lows flanking them. Foreset and trough crossbeds are the dominant sedimentary structures in these sands which are interpreted as transverse bars with dunes.

Distal facies is a sand sequence in which three subfacies have been delineated: (1) braided mainstream deposits containing both foreset and trough crossbeds; (2) braided distributary deposits characterized by a relatively high content of muddy sand units, well-preserved channel cross sections, some ripple cross-laminae, and soft-sediment and injection structures; and