logic oozes but are also found in zeolitic clays and volcanic ash deposits. The sediments range in age from Cretaceous to Pleistocene, although diagenetic effects greatly enhance color contrasts so that the richest trace fossil assemblages are seen in lithified Cretaceous to Miocene layers. Commonly several successive generations of burrowing activity are seen in the same sedimentary unit.

EFFECTS OF VOLCANISM ON WATER CHEMISTRY, DECEPTION ISLAND, ANTARCTICA

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Analyses are presented of waters from crater lakes on Deception Island and from coastal sea waters which were collected during a period of intense fumarolic activity and increasing seismic activity prior to the 1969 eruption. Major-component analysis shows all samples to be slightly modified sea waters. However, crater-lake waters are almost saturated with silica and all waters contain high levels of manganese (30 to 2,420 µg/l), suggesting a significant volcanic source for these elements.

ACTIVE LOW-TEMPERATURE ALTERATION OF ARENACEOUS SANDS IN A NEAR-SURFACE GEOTHERMAL ENVIRONMENT IN THE IMPERIAL VALLEY OF CALIFORNIA

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Extensive alteration of sandstones by geothermal brines at shallow depths occurs near the Algodones Dunes at the southeastern margin of the Salton Trough where a positive gravity anomaly is accompanied by very high temperature gradients near the surface (112°C at 114 meters). A 612-meter deep test hole encountered a temperature maximum of 105°C at 290 m, with a negative thermal gradient below this depth.

The rocks recovered are terrigenous detritus of the Colorado River Delta, primarily medium to fine arenaceous sands and silty sands, with pebble, granule, and clay size fractions together comprising about 15% of the section. Four distinct sedimentary facies are present, deltaic sand, channel-fill, beach-dune and lacustrine facies. Below 240 m the sediments are typically deltaic whereas at shallower depths they have been modified by beach and eolian processes.

Post-depositional alteration from unaltered, porous, red sandstone to dense, vitreous appearing gray quartzite is evident in three intervals: 110 to 115 m, 148 to 154 m, and 240 to 300 m. In the incipient stages, this alteration is characterized by syntaxial growth of minute, pyramidal quartz crystals and the reduction of hematite to pyrite. In more advanced stages this is accompanied by epitaxial growth of quartz and by euhedral overgrowths of albite on detrital microcline. The porosity and permeability of these sandstones is reduced almost to zero and the density and seismic velocities are greatly increased. It appears that when hot geothermal brines migrating laterally through the aquifers encounter colder rock, the consequent precipitation of silica renders the rock impermeable. Thus, in porous sandstones, this geothermal system is essentially self-sealing.

...TIONARY MODELS AND BIOSTRATIGRAPHIC STRATEGIES

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...process of evolution accounts for historical changes in the earth's ... Different concepts of evolutionary processes should lead to ...native strategies in studies of biostratigraphic correlation. ...olutionary model chosen will affect profoundly the results of ...study.

Allopatric speciation is the only evolutionary model that we can ...t with confidence. We consider species to be discrete biological ...ties. We claim that such "basic taxa" do not generally exhibit ...ificant directional change throughout their biochrons ("phyletic ...alism"). This suggests that the stratigraphic distributions of ...es are the legitimate raw data of biostratigraphy (as they have ...traditionally), and that the Oppelian strategy of analyzing over-...ng range zones is still the approach most consistent with ...gical reality. It also implies that first occurrences cannot ...e datum planes.

We (1972) have argued that phyletic gradualism, the dominant ...tionary model of paleontologists, does not represent a major ...t of the evolutionary process. All efforts to correlate rocks ..."stage of evolution," either of whole taxa or of selected ...es, are predicated on the acceptance of this model. As a ...tratigraphic strategy, "stage of evolution" seems to rest on weak ...d.

Inferred phylogenies are unimportant in biostratigraphy. They ...in little specific temporal information and do not significantly ...ase biostratigraphic resolution.

...CAMBRIAN POLAR WANDERING AND BEHAVIOR OF EARTH'S MAGNETIC FIELD FROM ...IFIED ROCKS OF THE GRAND CANYON SUPERGROUP, ARIZONA

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...lower and middle parts of the Grand Canyon Supergroup of Precam-...n age consist dominantly of red siltstone and sandstone. Basaltic ...alite flows occur near the middle of the Supergroup and they mark ...top of the Unkar Group. The lava flows are 1.09±.07 b.y. old by ...Rb-Sr method. We infer that most of the Unkar Group, 1700-2240 m ..., was deposited in the interval 1.4-1.1 b.y. ago.

Oriented cores were collected at stratigraphic intervals of 1/3 to ...across most of the Unkar Group, and in overlying Precambrian stra-... Progressive thermal and alternating field demagnetization has ...aled stable magnetization. Loop-like and oscillatory patterns ...n appear nonrandom emerge when stable magnetization directions are ...ected in stratigraphic order. The patterns are evidence that the ...ary magnetization was acquired nearly contemporaneously with deposi-...n of the rocks. The record reveals intervals of time when the ...n's field was fairly stable, for which poles were calculated. The ...ervening unstable intervals are characterized by excursions, and by ...ulations along great circles that occasionally approach positions ...near-reversed polarity. The field was predominantly normal through-