Dilation breccia is a distinct form of nondepositional breccia. It probably occurs in many tectonic provinces.

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Laboratory Simulation of Organic Diagenesis Leading to Oil and Gas Formation

Simulated maturation experiments involving sediments of different source environments give quantitative and kinetic information about generation of petroleum and natural gas. Starting material, temperature, and heating time all play critical roles in determining quantity and type of reaction products. Samples from recent peaty lacustrine and algal mat lagoonal deposits were heated separately in closed systems for 1 to 15,000 hours at temperatures ranging from 35 to 550°C. Reaction products were monitored for both quantity and isotope data. Low molecular weight volatile compounds (C_1-C_5+, H_2, CO_2) and petroleum-range (C_{15}+) hydrocarbons were products.

Petroleum product formation occurs in three stages. A premature stage is characterized by production of volatile hydrocarbons and carbon dioxide but little change in C_{15}+ components. The volatile products are a result of kerogen and humic rearrangements and display marked kinetic isotope effects. In the mature stage, the original biologically related C_{15}+ hydrocarbon fraction is diluted by catagenetically derived products. Methane formed in this stage is derived from C_{15}+ components and is characterized by stable carbon isotopes 15 ppt lighter than the starting material. A postmature stage displays C_2-C_5+ and CO_2 reduction, forming isotopically heavy methane.

Temperature affected the rate of product formation but not the kinetic order governing the reaction or the ultimate production potential for petroleum-like hydrocarbons. Organic source affected both rate of hydrocarbon formation and specific intermediary products of thermal alteration. Peaty organic matter matures more quickly than algal material given the same thermal stress.

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Future Success Factors for Petroleum Geologists or What They Don't Teach in Departments

Educationally, today's graduates in geology are relatively well equipped. Yet, the post-academic success of these geologists relates to factors not in geology curricula or stressed by advisors. Although most supervisors consider technical competence, they base promotions and raises more on qualities of writing, oral presentation, work habits, creativity, initiative, logic, problem analysis, personality, and even appearance, rather than on geologic skills. Management selection often depends on impressions at conferences and brief contacts rather than on geologic aptitude. The formal evaluation system of companies often stresses non-geologic skills. Typical appraisal forms rate quality and quantity of work, initiative, creativity, judgment, relations with people, work habits, effectiveness of supervision, and other performance factors. Frustrations with paperwork and organizational procedures, and the resulting dislike for administrative activities, result from poor non-geologic management skills as much as the problems themselves. Success in pure staff geologic jobs depends on logic, creativity, writing, and speaking ability. In addition to teaching geologic skills, a professor's success depends on his ability to relate to, communicate with, and inspire students.

Solutions to these problems are difficult. Students and young geologists must become aware of these important factors. Curricula should be broadened and strengthened in these areas. Report writing and presentation should be emphasized in geologic course work. Course success should depend more on aptitudes in grammar, organization, logic, and spelling. Companies should include non-geologic factors in their training programs. Societies should include these critical factors, governing future success of members, in their short courses.

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Boundary Problems Between Carboniferous and Permian Systems

Defining the perplexing systemic boundary between the Carboniferous and Permian Systems may be an unresolvable problem. In northwestern Europe, the type Upper Carboniferous rocks are represented by a nonmarine facies, the Permian rocks are represented incompletely by shallow-water, evaporitic, and dolomitic beds. The type Permian sections along the western flank of the Ural Mountains also have shallow-water, evaporitic, and dolomitic beds and red beds. There, Permian beds overlie a series of marine limestone facies comprising abundant and diverse marine faunas, but whose age relations to the nonmarine Upper Carboniferous beds of northwestern Europe are equivocal. During the last 100 years, Soviet geologists have proposed lowering the base of the Permian to various positions in these marine limestones and have tried to locate a natural boundary, as defined by faunal changes. However, any boundary established within this succession will be arbitrary because major evolutionary changes in the different marine fossil groups are not synchronous.

In other parts of the world, Upper Carboniferous and Lower Permian rocks and faunas reflect strong influences of depositional conditions and faunal provinciality. The faunal provinces comprise cold water faunas for much of Gondwanan continents, warm water to tropical water faunas for the Tethys and western Panthalassa, and tropical water faunas for eastern Panthalassa.

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Bed Forms, Facies Association, and Tectono-Stratigraphic Setting of Proterozoic Eolianites, Hornby Bay Group, Northwest Territories, Canada

The Hornby Bay Group is a middle Proterozoic (1.8 to 1.2 b.y. ago), 2.5 km thick succession of terrestrial siliciclastics overlain by marine siliciclastics and carbonates. Deposition initially occurred in isolated intracratonic depocenters. Infilling of rugged basement topography by alluvial fans and braided rivers was followed by deposition of more than 500 m of mature quartzarenite on a low-energy braidplain. Three facies assemblages within this sequence are interpreted as eolian.

Facies A (80 to 200 m thick) interfingers with alluvial fan deposits. It displays low-angle tabular-planar cross-bed sets with wedge-shaped intrasets, ripple cross-lamination perpendicular to foreset dips, and climbing ripples proximal to the fan deposits and large trough cross-beds with wedge intrasets in distal parts of the basin. This facies records deposition in complex transverse bed forms. Facies B consists of lenses up to 40 m thick interlayered with low-energy fluvial deposits. Composed of 3 to 4 single low-angle trough cross-beds with numerous smaller intrasets, it is inferred to represent bar-