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From our reporters at the annual meeting of the American Association for the Advancement of Science in San Francisco

New evidence for dilatancy

Ever since a group of Russian scientists noticed a change in the velocities of seismic waves in a region adjoining a fault, just before the region experienced several earthquakes, geologists have sought an explanation for the phenomenon and wondered whether it could be used to predict quakes. The most popular theory has been that prequake stresses dilate tiny fissures in rocks, slowing the velocity of compressional waves relative to transverse or shear waves. When this dilation of fissures and pores in rocks reaches a critical stage, groundwater is thought to rush in, increasing compression-wave velocity, and presumably "lubricating" the fault for a quake-causing slippage. The dilatancy theory thus predicts a gradual rise in the ratio of compressional to shear-wave velocities followed by a sudden drop, just before a quake.

Unfortunately, retrospective analysis of past earthquakes for preceding velocity changes has given ambiguous results and left the reality of the dilatancy theory unresolved. Now a Stanford geophysicist, Amos Nur, reports that work by several researchers in the United States and Japan has provided the first direct evidence for the physical changes expected by the theory. Data taken just before a swarm of earthquakes near Matsushiro, Japan, have shown the exact surface deformations and transient flows of groundwater predicted by dilatancy. The next step, he says, is to find the difference between conditions that lead to swarms of quakes and those that lead to one great quake. Then, perhaps, dilatancy can produce a reliable means of predicting, and even moderating, earthquakes.

Parallel evolution on islands

Most organisms are fairly conservative in an evolutionary sense: They tend to remain within their ecological niches. Yet the fossil record shows many cases of evolutionary innovation—breakthroughs to a new mode of life.

One curious case of innovation involves three species of *Drosophila* flies. Most species of *Drosophila* breed in decaying plant materials. But these three particular species breed as parasites on tropical land crabs. This would be no more than an interesting aberration were it not for the fact that these three flies are not closely related; they represent three different lines of the family tree, and these three parallel innovative evolutions have occurred on three separated islands. Two are in the Caribbean and one in the Indian Ocean.

Hampton L. Carson, a University of Hawaii geneticist, proposes that the genetic systems of many conservative groups of organisms carry genetic variability that would permit them to evolve in a novel direction. But the realization of this capacity, he concludes, is possible only under special environmental conditions.

Crustal shifts change earth's rotation

Occasional shifts in the movements of the earth's crustal plates and the giant earthquakes that accompany them change the rotational rate of the earth. So reports Don L. Anderson, director of the Seismological Laboratory at the California Institute of Technology.

Anderson has found a correlation between an increase in major seismic activity around the world, changes in the rotation rate of the earth and wanderings of the poles. He studied three periods since 1800 when giant earthquakes were prevalent and the general level of seismic activity worldwide was high—1835-1847, 1896-1911 and 1933-1942. During these periods the earth's rotation rate was abnormally slow, reports Anderson, meaning that the days were slightly longer. During the 1896-1911 period the rotation rate slowed about four one-thousandths of a second a year.

"It is not yet known whether the earthquakes slow the earth's rotation rate or the slowdown in rate activates giant earthquakes," says Anderson. But he says shifts of the earth's crustal plates are probably responsible for both. He believes the rotation rate is affected by the jerky motions as the edge of the Pacific crustal plate dives under the Aleutians or Japan and breaks off.

Hypocrisy and academic freedom

Teachers that don't teach. Instructors that give their students all A's as a protest again "irrelevant" rating systems. Students who ransack college buildings. Faculty members who, in the name of moral justice, prohibit a speaker holding unpopular ideas from appearing on campus. Scholars who distort the truth for what they consider a higher political purpose.

These are some of the ways in which hypocritical members of the academic community are themselves threatening academic freedom, says Boston University President John R. Silber. Silber calls such abuses contrary to all that universities have traditionally stood for and urges academics to free themselves from such "enslavement by ideological license."

A new key to infant emotions

University of Denver psychologist Joseph H. Campos described a new tool he and his colleagues are using to measure infant emotional response. For some time psychologists have known that the heart rate of infants increases during pain but decreases in states of concentrated attention to the surroundings. Campos and his associates have now begun to take advantage of this finding by measuring heart rates of babies placed in situations that arouse fear or agitation in older, more expressive youngsters.

A child of nine months, for example, is terrified at having to crawl across a piece of glass held high above the floor. The Denver experiments indicate that the newborn infant seems to have no such fear—as evidenced by a lowered "attentive" heart rate. Even though baby monkeys show fearful behavior in such situations just after birth, heart rate acceleration in children did not begin until the fifth month.

Campos says further experiments may help confirm or change various theories of early childhood cognitive development, including those of J. Piaget, by offering a new bridge between the experimenter and a child too young to talk.