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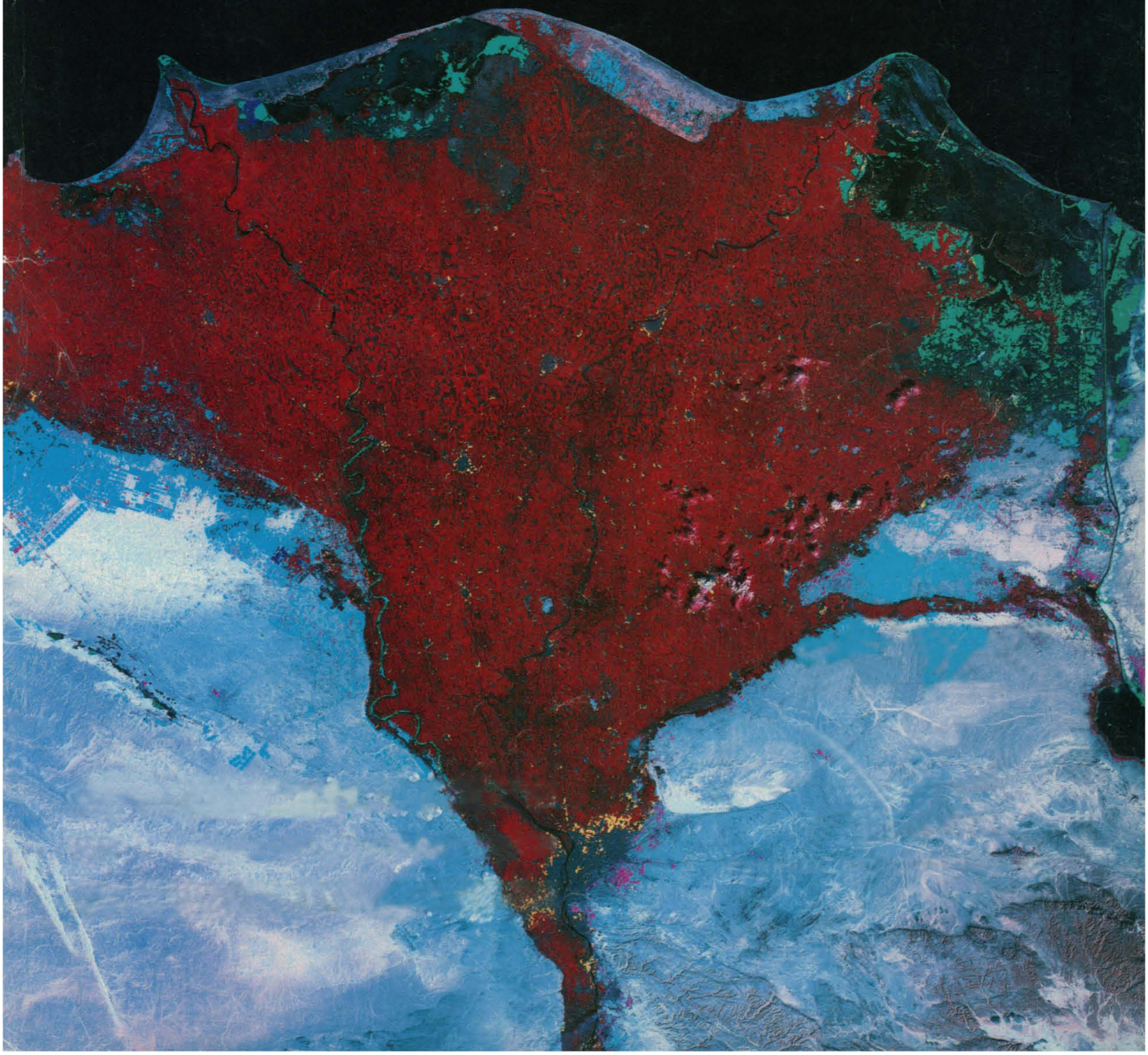

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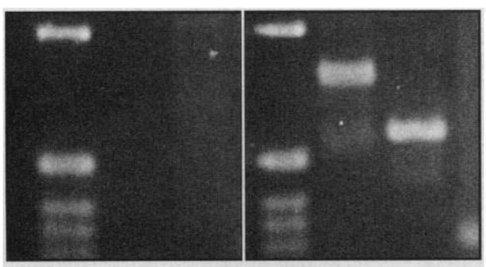

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* PCR is covered by U.S. Patent No. 4,683,202 issued to Cetus Corporation.

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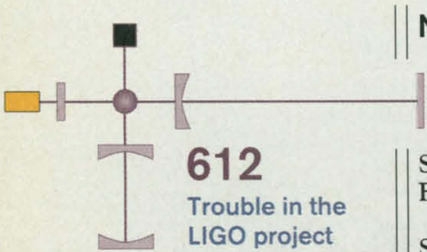
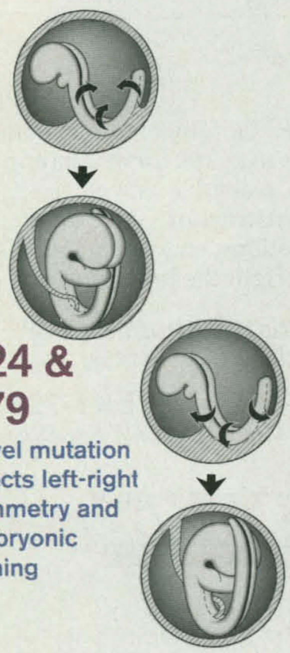


612
Trouble in the LIGO project



624 & 679
Novel mutation affects left-right symmetry and embryonic turning

NEWS & COMMENT

RESEARCH NEWS

PERSPECTIVE

ARTICLES

RESEARCH ARTICLE

REPORTS

DEPARTMENTS

COVER

Satellite mosaic (1972–1990) of the River Nile delta. The geologic record of the delta provides a basis for understanding the impact of population growth and natural factors on land use. Accelerated loss of agriculture (vegetation shown in red) results from urban expansion (yellow), development of large sand dunes (pink), coastal erosion, and formation of salt pans (white, far right). Reclamation projects are draining the remaining lagoons and marshes (green). See page 628. [Image: Earth Satellite Corporation, using Landsat images]

TECHNICAL COMMENTS

661
Convection and rotation on the giant planets

◩ Indicates accompanying feature

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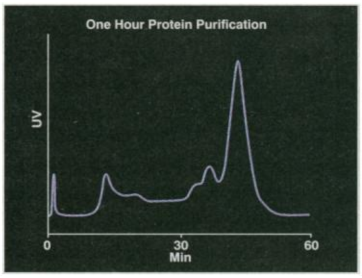
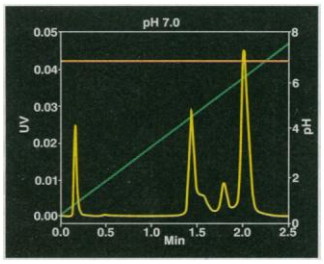
While You Spent One Hour Doing This,

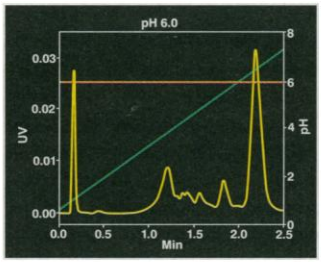


Anion exchange separation of recombinant protein with conventional LC column and instrumentation.

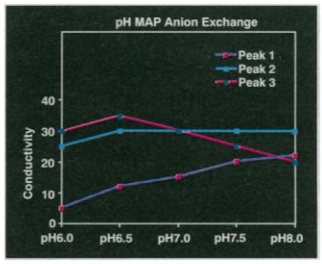
Look At All We've Been Up To.



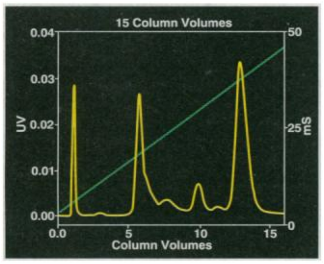
We began by running the separation at several pHs.



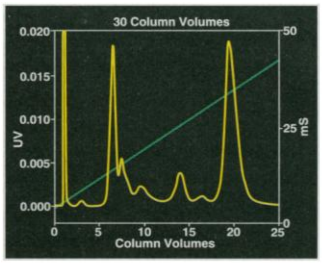
Confirmed the optimum pH at 6.0.



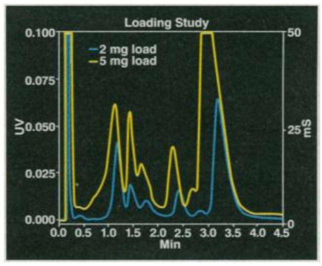
Plotted results from built-in spreadsheet.



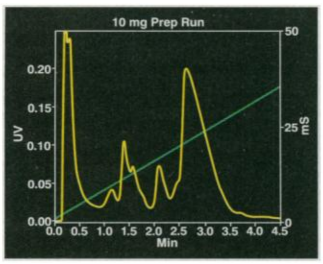
Tested gradient slopes for improved resolution.



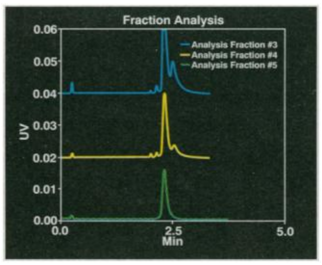
Selected 30 column volume gradient as optimum.



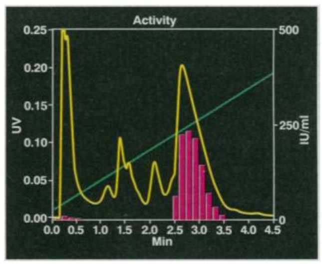
Studied the effect of loading at 2 mg and 5 mg.



Ran a 10 mg prep. Collected fractions.



Analyzed fractions by reversed phase.



Checked biological activity and purity.

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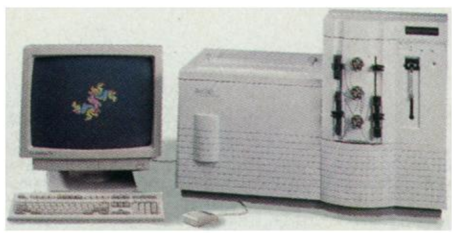

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edited by PHIL SZUROMI

An expanded view of early life

The paleontologic record for the Archean, the time when life originated on Earth, is sparse. Schopf (p. 640) describes a fossil assemblage comprising eleven taxa, eight previously undescribed, from the Apex chert, which was deposited more than 3465 million years ago in what is now Australia. The microscopic cellular fossils are similar to prokaryotes, primarily cyanobacteria, that have been found in rocks that are at least 1300 million years younger than the Apex chert. This fossil assemblage suggests that oxygen-producing photosynthesis may have evolved early in Earth's history.

Hot clusters

When atoms and molecules emit an electron, the process is usually over in less than a femtosecond, but the rate of electron emission from solids (thermal emission) is an activated process that can be described by statistical rate theory. Yeretzian *et al.* (p. 652) studied electron emission from clusters, which lie in between molecules and bulk solids, as a function of temperature. Fullerene anions were heated by impact with a surface. Emission from these clusters is activated but does not follow the rate law for bulk surfaces, implying that new theoretical formulations for incorporating electronic excitation need to be developed.

Tubular boron nitride

A hollow, tubular form of boron nitride, a material that usually assumes a graphitic structure, has been made. Hamilton *et al.* (p. 659) prepared an amorphous form of boron nitride and then annealed it at 1100°C for 1 day. The tubules are as large as 3 micrometers in diameter and 50 to 100 micrometers in length. This phase is turbostratic, in that the layers formed are rotationally disordered.

Ring worlds

In the dense but gaseous outer regions of the giant planets, rotation can be dynamically more important than gravity. For both Jupiter and Saturn, heat flow from the interior is sufficient to drive convective motions, but the planets' rapid rotation makes it difficult for fluid elements to move radially outward against a strong gradient of angular momentum. Instead, convection would tend to occur along cylindrical surfaces parallel to the rotation axis. Following a theoretical suggestion of Busse, Sun *et al.* (p. 661) have performed a supercomputer simulation of a Jupiter-like rotating shell of fluid to show that, at high enough Rayleigh and Taylor numbers, a complex but stable convective structure sets in, characterized by flows along narrow, alternating cylinders. The intersection of these cylinders with the outer spherical surface produces a banded structure resembling the prominent latitudinal stripes of Jupiter and other planets.

A stable ice sheet

The stability of the East Antarctic ice sheet can give clues for understanding climate changes and the causes of past sea level variations. Estimates of when it formed vary from 14 million years ago to as little as 3 million years ago. Marchant *et al.* (p. 667) investigated the duration of cold climates in Arena Valley in the Dry Valleys region of Antarctica. A date on a tuff in the stratigraphy indicates that cold climates persisted there for at least the past 4.3 million years. This age and the lack of evidence for running water implies that the ice sheet should also have remained stable since this time and that the ice sheet may be quite stable to expected climate changes in the future.

Response to pressure

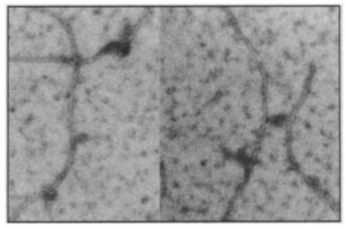
Pressure overloading of the heart results from the flow of a normal volume of blood through restricted vessels and leads to hypertrophy of the myocardium and defects in contraction. Tsutsui *et al.* (p. 682) found that pressure loading increased the amount of microtubules in cells of the myocardium. Treatments that inhibit polymerization of microtubules prevented the contractile dysfunction caused by pressure loading, whereas agents that promote polymerization of microtubules mimicked the effects of pressure loading. The results indicate that changes in the cytoskeleton may lead to abnormalities in contraction, which are thought to contribute to congestive heart failure.

Internal asymmetry

In vertebrates, the structure and position of internal organs such as the heart, spleen, stomach, and liver are asymmetric. The developmental mechanism that determines this left-right asymmetry is unknown, but several mutations alter this process in mice and humans. A new mutation, *inv*, has been isolated by Yokoyama *et al.* (p. 679; see news story by Ewing, p. 624) that causes a mirror image reversal of left-right asymmetry in all of the mutant mice examined.

Filament formation

When yeast cells carrying the *mdm1* mutation are grown at 37°C, they are unable to transfer nuclei and mitochondria into developing daughter buds. McConnell and Yaffe (p. 687) analyzed the mutation and the function of the *mdm1*-encoded protein in vitro. Both the mutant and the wild-type protein, when purified, were able to self-assemble at 4°C in vitro into structures resembling intermediate filaments. However, at 37°C, only the wild-type pro-



tein could assemble into filaments. The *mdm1* phenotype suggests that an intermediate filament network in yeasts may serve similar functions as in higher eukaryotes.

Measures of HIV infectivity

Although the depletion of $CD4^+$ T cells is the most characteristic effect of human immunodeficiency virus (HIV) infection, HIV strains can be isolated from patients with depleted T cells that are not cytopathic toward cultured human $CD4^+$ cells. Mosier *et al.* (p. 689) studied the fate of HIV infection on human peripheral blood mononuclear leukocytes reconstituted in severe combined immunodeficient (SCID) mice. One strain that in vitro assays identified as highly cytopathic showed little effect in the SCID mouse model, and two strains that were noncytopathic in vitro caused extensive $CD4^+$ depletion in the mouse model.

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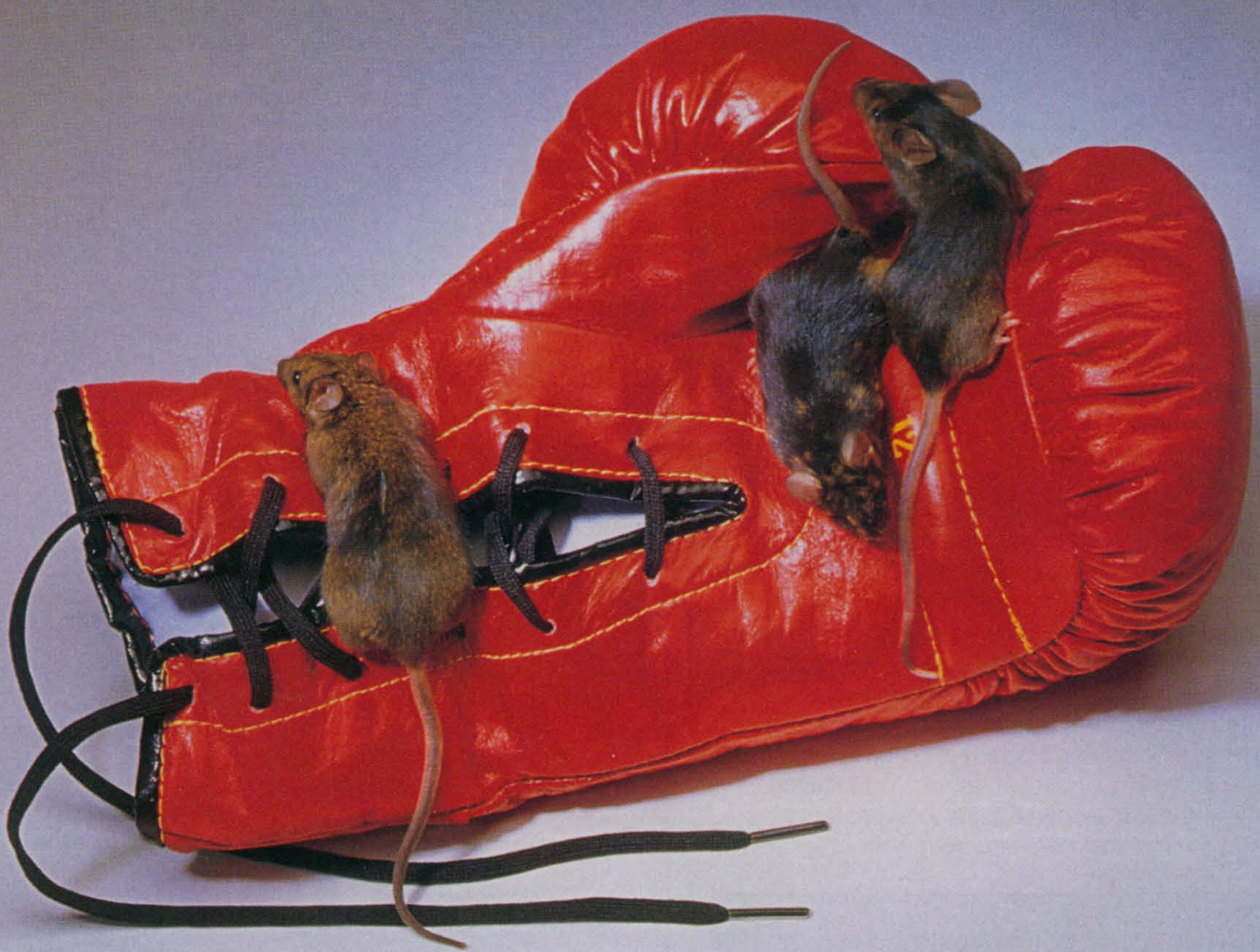

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