

EDITORS' CHOICE

edited by Gilbert Chin

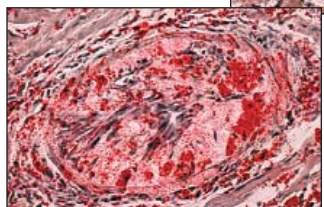
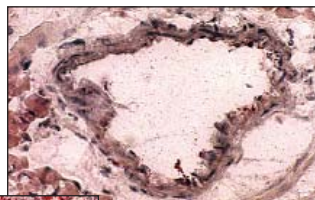
BIOMEDICINE

A Heart Attack Mouse

In the United States alone, nearly one million people die each year from heart disease. Elevated serum cholesterol is a well-established risk factor for coronary artery atherosclerosis, a leading cause of myocardial infarctions (heart attacks). However, the precise role that lipoprotein metabolism defects and atherosclerosis play in the pathogenesis of myocardial infarction remains poorly understood, in part because of the limited availability of small animal models that combine these cardinal features of human cardiovascular disease.

New work by Braun *et al.* indicates that mice doubly deficient in apolipoprotein E (apoE) and the high-density lipoprotein receptor SR-BI may provide such a model. When fed a normal chow diet, these mice exhibited high cholesterol levels, accelerated atherosclerosis, and occlusive lesions in the coronary artery that were remarkably similar to those seen in humans with heart disease. Importantly, the mice spontaneously developed myocardial infarctions and cardiac dysfunction that contributed to their death at a very young age (6 to 8 weeks). In addition to providing new insight into the pathogenesis of heart attacks, these mice may prove to be valuable tools for the testing of new therapies for cardiovascular disease. — PAK

Circulation Res., 10.1161/hh0302.104462.



Sections from the left main coronary arteries of apoE-knockout (above) and apoE/SR-BI-double knockout (left) mice, stained for lipid.

IMMUNOLOGY

Resist and Persist

Hepatitis C virus (HCV) is a pathogen of worldwide importance and a primary cause of liver disease in many of the 170 million infected individuals. How HCV can persist for years in its host is unclear, although it is likely that chronic infection is achieved through a variety of strategies for evading or resisting the immune system. Among these may be the ability of HCV to directly manipulate antiviral immune responses.

Crotta *et al.* and Tseng *et al.* both show that the viral envelope protein HCV-E2 has a direct and potent effect on the activity of natural killer (NK) cells, which are critical for the early innate response to pathogens. Binding of the cell surface protein CD81 by HCV-E2 inhibited activation signals that normally induce killing activity and antiviral cytokine expression by NK cells. Interestingly, these effects were opposite to those seen upon HCV-E2 binding of CD81 on T cells. Both

groups suggest that by suppressing the immediate NK response, HCV may overwhelm and possibly modify subsequent immune responses generated by T and B lymphocytes, allowing an acute infection to become chronic. — SJS

J. Exp. Med., 195, 35; 43 (2002).

ASTRONOMY

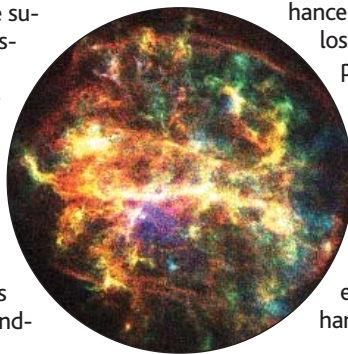
Remnants of an Explosion

Supernovae release intense shock waves that light up the progenitor material and create heavier elements. Studying the remnants of these supernovae allows astronomers to glimpse the structure of the progenitor and to estimate the amount and distribution of heavy elements. This information is useful in understanding the origins of these explosions and how

these energetic processes have mixed heavier elements into space, which can lead to the formation of more chemically exotic structures, such as planets.

Park *et al.* studied the supernova remnant G292.0+1.8 in the Milky Way Galaxy with the Chandra X-ray Observatory. High-resolution x-ray images and spectra reveal a central belt-like region with normal solar-type element abundances. The belt is probably the progenitor's circumstellar disk, energized by the shock waves. This feature provides a way to estimate the amount and enhancement of mass

loss from the progenitor's red supergiant phase as it exploded. Along the periphery of the remnant, regions of ejecta enhanced in O, Ne, and Si are mixed in with thin



Energies of x-rays emitted by G292.0+1.8 (red, low; blue, high).

filaments of normal composition; these filaments may serve as tracers of the stellar winds from the progenitor. — LR

Astrophys. J., 564, L39 (2002).

CLIMATE SCIENCE

A Summary of Glaciation

The EPILOG (Environmental Processes of the Ice Age: Land, Oceans, Glaciers) program originated in 1998, under the aegis of the IMAGES (International Marine Global Change Study) program of IGBP/PAGES (International Geosphere-Biosphere Programme/Past Global Changes). It was charged with developing a comprehensive description of Earth during the last glacial maximum (LGM) 21,000 years ago. A primary goal was to explore the transitions into and out of a full glacial state by updating the pictures of sea surface temperature, glacial ice distribution, and albedo provided in 1981 by the landmark study CLIMAP.

The EPILOG 2000 workshop summarized the current knowledge about continental ice sheets and sea level immediately before, during, and after the LGM. A collection of papers drawn from the workshop addresses four main issues: (i) the extent, volume, and evolution of glaciers and ice sheets; (ii) the magnitude of global sea level change caused by the growth and decay of ice sheets; (iii) the isostatic response to the global redistribution of ice and water; and (iv) the relation between ice sheets and global climate change. These papers discuss geological reconstructions of ice sheet extent, records of sea level change, ice sheet modeling, geophysical models of glacial isostatic adjustment, and geochemical proxies of ice volume.

From this body of work, several important conclusions emerge. First, sea level at the

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LGM was 118 to 135 meters below the modern value, bracketing the lower bound for sea level drop of 127 meters and much less than the maximum value of 163 meters estimated by CLIMAP. Second, although new estimates of the margins of ice sheets agree in most cases with the boundaries drawn by CLIMAP, the amount and distribution of ice were substantially less than the CLIMAP estimates. Finally, some or all of the ice sheets must have been thinner than the minimum value given by CLIMAP. — HJS

Quat. Sci. Rev. **21**, 1 (2002).

CHEMISTRY

White Lights, Broken Molecules

Excitation of molecules with ultrashort laser pulses has revealed many insights into chemical dynamics, but some processes are more readily stimulated with continuum, or white light, pulses that span a broader frequency range. Müller *et al.* fired 80-femtosecond, 800-nanometer-wavelength pulses through a 2-millimeter-thick CaF₂ plate into toluene vapor. Increasing the pulse intensity broadened the pulses through self-phase modulation, and these broadened pulses fragmented the toluene molecules. Higher intensity monochromatic pulses left the molecules intact. The authors conclude that the broadened pulses stimulated Raman-active carbon-carbon bonds to such an extent that the backbone framework shattered. — PDS

Phys. Rev. Lett. **88**, 023001 (2002).

PALEOECOLOGY

Living in Harmony

The sedimentary fossil pollen record has allowed paleoecologists to make detailed reconstructions of the changes in vegetation composition that have taken place across the Northern Hemisphere during the Pleistocene. Frequently, they have found that plant species were grouped into communi-

ties and assemblages with no counterparts in the present day, and they have debated whether these "no-analog" communities

signify vegetation that was at equilibrium with its corresponding climate or instead reflect disequilibrium owing to the effects of rapid climate fluctuations.

Williams *et al.* have analyzed pollen assemblages from North America at intervals since the last glacial maximum and have tested their correspondence with simulated no-analog climates. They find good spatial and temporal relationships with the simulated climates, as well as synchronicity between climate change and vegetational change, supporting the idea that no-analog vegetation was at equilibrium with its surroundings. Thus, not only are fossil pollen assemblages a useful source of information about past climatic conditions, but they show that new idiosyncratic assemblages of plant species will likely develop in response to future climate change. — AMS

Ecology **82**, 3346 (2001).



Some members (top, balsam fir; middle, white ash; bottom, gray birch) of the assemblages.

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Reelin as an Enzyme

Reelin is an extracellular matrix protein that is thought to regulate neuronal migration in the developing mammalian brain through interactions with various cell surface receptors. Quattrocchi *et al.* show that the primary structure of human Reelin is similar to that of serine proteases and demonstrate that purified Reelin is capable of degrading fibronectin, laminin, and collagen *in vitro* in a diisopropylfluorophosphate-sensitive fashion. Furthermore, this activity could be partially inhibited by a Reelin antibody that is known to block Reelin function *in vivo*, and overexpression of Reelin in human embryonic kidney cells caused a decrease in cell adhesion to fibronectin. The authors propose that Reelin may directly modulate cell attachment through proteolysis. — LDC

J. Biol. Chem. **277**, 303 (2002).

Science

Remnants of an Explosion

Linda Rowan

Science **295** (5554), 407.

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