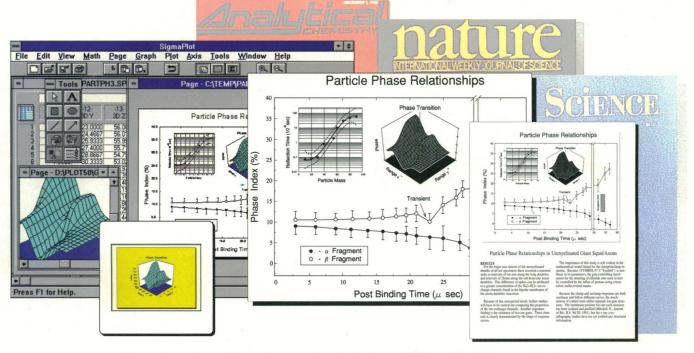
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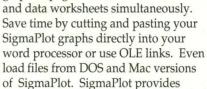
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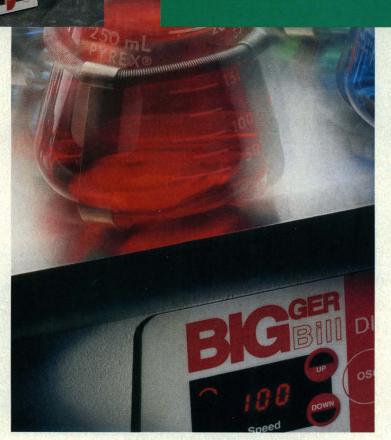
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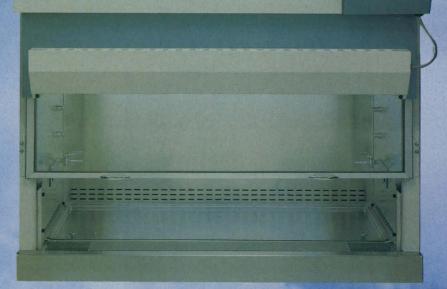
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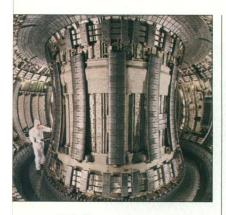
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COVER

Four successive molts of an individual predatory crab, Cancer productus. Because crustaceans can only change form when they molt, their shape was thought unlikely to respond to environmental stimuli received during the preceding intermolt. Nonetheless, C. productus grew relatively larger and stronger claws in

subsequent molts when their prey had harder shells. Therefore, the rigid exoskeleton does not prevent crustaceans from responding morphologically to environmental change. Longest dimension of largest molt is 60 millimeters. See page 710. [Photo: Richard Kozak]



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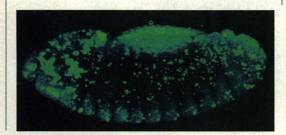
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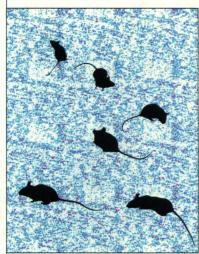
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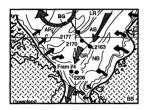


THIS WEEK IN SCIENCE

edited by PHIL SZUROMI

Cold, fresh water

The deglaciation record from the Arctic Ocean, an area that should have been profoundly affected by the formation of ice sheets and should be sensitive to their growth and decay, has been difficult to determine because of a lack of deep-sea cores. Stein et al. (p. 692) now present an analysis of several cores retrieved during the ARCTIC '91 expedition. The oxygen and carbon isotope records and car-



bon-14 dates suggest that both the Barents Sea ice sheet in Europe and the Greenland ice sheet began disintegrating at about the same time, 16,650 years ago. The data also suggest that seasonally open-ice conditions developed in the Arctic Ocean about 6000 years ago.

Cornering cells

A convenient method for physically isolating and controlling the shape of cells has been developed. Singhvi et al. (p. 696) used self-assembly monolayer techniques to construct a substrate with a pattern of regions that adsorb proteins. These regions were then enclosed with a different monolayer that was protein-resistant. Subsequent adsorption of the extracellular matrix protein laminin created defined regions where cells could adsorb and grow. Rat hepatocytes could be grown into arbitrary shapes, such as rectangles. This approach could also prove useful in analyzing the variation of individual cells in drug and toxicology studies.

Cell death and genetic control

Programmed cell death (apoptosis) plays an important role in development. White et al. (p. 677; see the accompanying Perspective by Raff, p. 668) report the isolation of a new gene, reaper, in Drosophila that controls the initiation of cell death. In embryos that carried the reaper mutation, all normal cell death was blocked. The developing embryos ended up with extra cells and died. The reaper locus has been cloned, and the gene encodes a small peptide that is expressed in cells destined to undergo apoptosis.

Sleeping giants

Two regions of North America that are not famous for recent earthquakes, the Pacific Northwest and the southern Appalachian Mountains, are in fact quite seismically active. During the last decade, the eastern Tennessee seismic zone has been more active than any other area east of the Rocky Mountains except for the New Madrid zone. Powell et al. (p. 686) have used 10 years of microearthquake data from a regional monitoring network to develop a tectonic model for this seismic zone. The earthquakes in this region cannot be attributed to known faults; rather, they appear to correspond to a zone where relatively strong and weak basement crustal blocks meet to relieve intraplate stresses. The converging plates of the Cascadian subduction zone are locked and accumulating strain, a situation that could lead to a great earthquake (magnitude 8 or greater). Such quakes would likely cause coastal uplift or subsidence. Mathewes and Clague (p. 688) present microfossil and pollen analysis from two sites in southwestern British Columbia which indicate that rapid sea level changes occurred about 3600 and 1900 years ago. These data, combined with stratigraphic and paleoecological evidence, suggest that the older event was a great plate-boundary earthquake and that the younger event might have also been a

crustal or intraplate earthquake. Such microfossil analysis is especially useful in areas where past earthquakes leave no clear record in the rock stratigraphy.

Adapting to a new diet

In the ongoing battle between predator and prey, the prey often manages to survive by evolving protective mechanisms. How, then, does the predator overcome those mechanisms? Smith and Palmer (p. 710; see cover) have shown that adaptive plasticity allows the crab to compensate for the tough shell of one type of prey, the mussel. Crabs fed on mussels with intact shells developed larger, stronger crushing claws than crabs fed on mussels with already opened shells. This developmental flexibility allows a population of crabs to respond to spatial variations in diet and still conserve physiological resources when possible.

Zebrafish genetics

The zebrafish, with its short 3-month life cycle, is an excellent genetic model system in which to study vertebrate development. Postlethwait *et al.* (p. 699) describe a genetic linkage map for this fish. This map covers 99 percent of the genome and encompasses most of the known zebrafish mutants. The cloning

of genes that are defined by mutation will be greatly facilitated by this map.

Widely recognized

High spontaneous regression rates are seen for melanoma, and cytotoxic T cells (CTLs) that recognize melanoma cells can often be isolated from patients. The CTLs recognize peptide epitopes that are derived from cellular proteins and presented to the T cell in association with major histocompatibility complex (MHC) class I molecules. Cox et al. (p. 716) used highly sensitive tandem mass spectrometry to sequence a nineresidue MHC-association peptides from melanoma-specific CTL cell lines from two patients. The peptide reconstituted recognition in melanoma-specific CTLs from three additional patients. Identification of epitopes recognized by more than one cell line should prove useful for developing immunotherapies.

Like night and day

A gene that underlies the circadian rhythms of the mouse has been identified by Vitaterna et al. (p. 719), who screened heterozygous progeny generated with the mutagen N-ethyl-N-nitrosourea. Mice carrying the semidominant mutation in the Clock gene had dramatic alterations in their circadian rhythms; homozygous Clock mutants had a circadian period about 4 hours longer than normal when kept in constant darkness and in almost all cases lost their circadian rhythm after 2 weeks. The mutant appears to arise in a single gene on mouse chromosome 5 that would correspond to a region on human chromosome 4.

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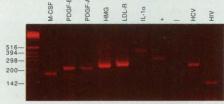
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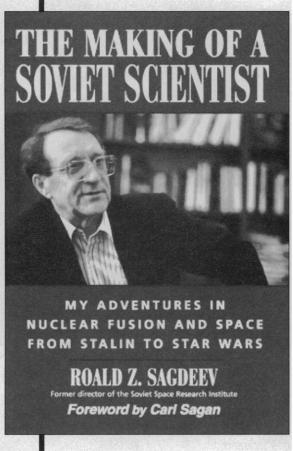
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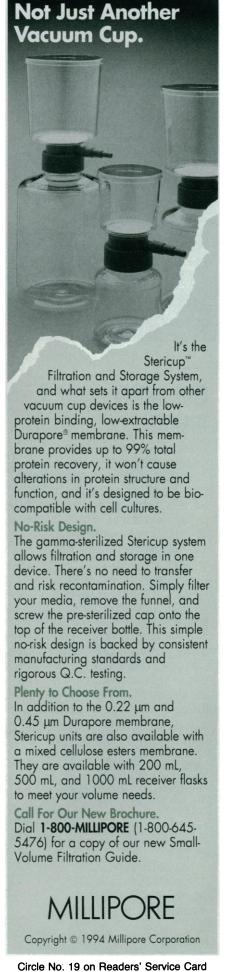
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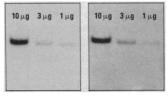




Sensitive touch

The disc-like adhesive pads on the hands and toes of the tree frog enable this nimble creature to perform the most sensitive acrobatic maneuvers. From often perilous heights, the tree frog clings to the most delicate twigs as it leaps from branch to branch in pursuit of insect prey.

The Boehringer Mannheim Genius™ System makes sensitive scientific procedures equally as swift and safe. In hours—not days—probes prepared with the Genius System can detect single copy genes in as little as 1 µg of DNA in a genomic Southern blot, and are guaranteed to detect 0.03 pg of DNA in a direct dot blot.



Parallel human genomic Southern blots demonstrate the high sensitivity and low background provided by the Genius System (right, 12-min. exposure) compared to probes prepared with ²²P (left, 3-day exposure).

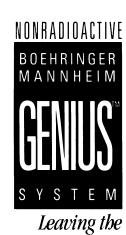
Like traditional radioactive methods, the Genius System provides specific and reliable detection of target sequences. But unlike other nonradioactive methods, the Genius System uses a unique antibody-based protocol that minimizes background interference, maximizes the signal-to-noise ratio, and produces your results faster.

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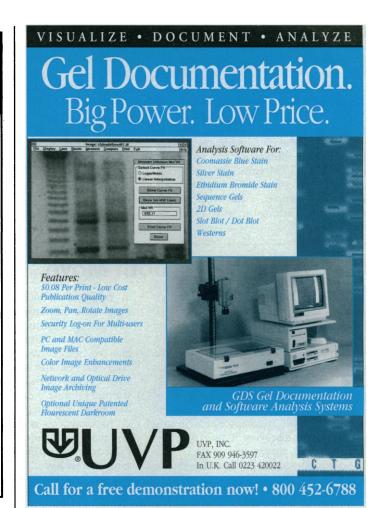
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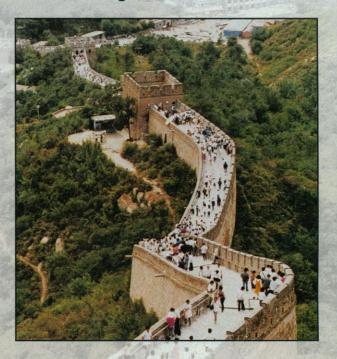
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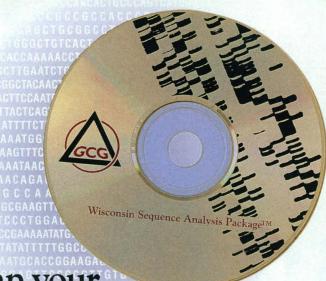
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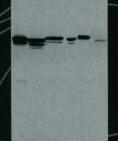




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