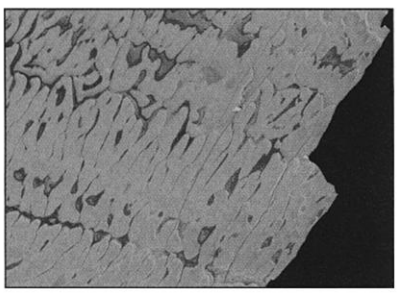
EDITORS' CHOICE

edited by Gilbert Chin

CLIMATOLOGY

Breaking Up Is Easy

Several peripheral ice shelves have disappeared from the northern Antarctic Peninsula during the past few decades, most likely as a result of strong regional warming. The breakup of these shelves has occurred much more quickly, however, than would be expected if it were due simply to a thermal response of the ice. Scambos *et al.* review existing in situ and remote-sensing data in order to identify the characteristics associated with ice-shelf retreat. They conclude that melt pond formation in areas with preexisting crevasses, rather than just warming of the ice, is responsible for most breakup events. They construct a numerical model to evaluate ice flow and the strain field associated with crack propagation by melt water, and find that while melt water does not cause the formation of crevasses, it is extremely effective at deepening those already present. — HJS



Crevasses in Antarctic ice.

J. Glaciol. **46**, 516 (2000).

ANTHROPOLOGY

Dating Nanjing Man

Recently discovered remains of *Homo erectus* at sites in China are providing an opportunity to assess the early migration of hominids out of Africa and their relation to the later populations of *H. sapiens* that emerged there about 500,000 years ago. A major difficulty, however, has been obtaining accurate dates for many of the fossils; this has hampered comparisons across sites and confounded the evolutionary history. The ages of the fossils are well beyond the dating range of radiocarbon, and most of the finds have been in caves lacking volcanic horizons (which can be K-Ar dated).

Zhao *et al.* now have obtained consistent dates for the *H. erectus* fossils known as Nanjing Man (and evidently related to the famous Peking Man) from Tangshan Cave. They dated the cave deposits directly overlying the fossils using the incorporation of uranium and its decay to thorium in calcite-forming flowstone in the caves. The fossils appear to be older than 580,000 years and probably are about 620,000 years old. These ages, along with those from others sites in China, imply that most of the *H. erectus* specimens there are older than previously thought and perhaps do not overlap significantly younger *H. sapiens*. — BH

Geology **29**, 27 (2001).

CHEMISTRY

Sink or Swim

Many potential applications of carbon nanotubes require their manipulation or chemical modification. These tasks would be made easier if the nanotubes could be dissolved readily in common organic solvents without first having to modify their structure. Building on a recent report that highly polar solvents are attractive candidates, Bahr *et al.* have tested the solubility of unpurified nanotube samples produced by a gas-phase catalytic process in a range of organic solvents, some of which have been shown to be advantageous for dissolving fullerenes. Solubility was highest in 1,2-dichlorobenzene, followed by chloroform. The 1,2-dichlorobenzene solution (or suspension) was stable for 3 days. It remains unclear whether the nanotubes are completely separated or are present as small bundles or ropes. — JU

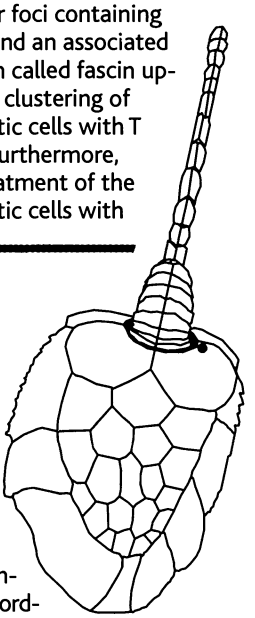
Chem. Commun. **2001**, 193 (2001).

IMMUNOLOGY

Synaptic Cytoskeleton

The specialized point of contact that forms between the membrane of a T cell and that of an antigen presenting cell (APC) has been dubbed the "immunological synapse," because of its role in delivering sustained signals to the T cell. Synapse formation is critically dependent on the reorganization of the actin cytoskeleton in the T cell and results in the intimate gathering of membrane-associated signaling molecules. To date, there has been little evidence that equivalent changes in the cellular framework of the APC are required in synapse formation.

However, when dendritic cells—rather than B cells—were used as APC, Al-Alwan *et al.* observed the formation of cellular foci containing actin and an associated protein called fascin upon the clustering of dendritic cells with T cells. Furthermore, pretreatment of the dendritic cells with



PALEONTOLOGY/EVOLUTION

Prickly Paleozoic Animals

Were the flattened, asymmetric Paleozoic animals known as stylophorans in fact early chordates? This calcichordate hypothesis requires that chordates originally possessed calcite skeletons made of stereom (a microscopic mesh embedded in mesodermal tissues). But, traditionally, stereom has been seen as diagnostic of the echinoderms, and most paleontologists have interpreted stylophorans accordingly. Because they and the other homalozoans lack the fivefold symmetry so characteristic of living echinoderms (such as sea urchins), all four classes of homalozoans usually are placed together near the base of the phylum Echinodermata.

Recently, researchers have combined ontogenetic, embryologic, and molecular evidence to identify body-wall homologies among extant echinoderms. David *et al.* have applied these findings to reinterpret homalozoan morphologies (in particular, the thecal walls, stems, arms, and brachioles). They conclude that homalozoans comprise independently evolved groups of echinoderms, whose asymmetry is derived rather than representative of the phylum's original morphology. Three classes possess brachioles and are placed within the blastozoans (an extinct Paleozoic clade). The controversial stylophorans are most closely releated to crinoids (sea lilies). This new phylogeny is more congruent with the known fossil record. — SJS

Two views of the stylophoran *Chinianocarpos*.

Paleobiology **26**, 529 (2000).

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SOURCE: (LEFT) NASA LANDSAT 7; (RIGHT) B. LEFEBVRE/UNIVERSITE DE BOURGOGNE

inhibitors of actin dynamics profoundly diminished this clustering and the proliferation of T cells in response to antigen. Hence, these data suggest that the dendritic cell cytoskeleton might, after all, influence immune synapse formation and contribute to the unique ability of these cells to activate naïve T cells. — SJS

J. Immunol. **166**, 1452 (2001).

CELL BIOLOGY

Making an Early Exit

Newly synthesized integral membrane and secretory proteins must traverse the endoplasmic reticulum (ER) and then the Golgi complex en route to the cell surface. Transport from the ER to the Golgi complex has been the subject of much scrutiny. Muñiz *et al.* have used a cell free system that reconstitutes budding from the ER of yeast cells to examine the export of proteins that, lacking a transmembrane anchor, are linked by a glycolipid (GPI) to the membrane. Such GPI-anchored proteins were found to leave the ER in vesicles distinct from those used by integral membrane proteins. The sorting and packaging mechanism that recognizes this class of proteins remains unidentified, but these findings require some adjustment to the idea that all proteins leave the ER together to be sorted later in the pathway. — SMH

Cell **104**, 313 (2001).

BIOMEDICINE

Battling Pancreatic Cancer

Adenocarcinomas of the pancreas are among the deadliest cancers because most are diagnosed at an advanced stage and there are no effective therapies. Jaffee *et al.* report early but promising results of a phase I trial of a pancreatic tumor vaccine. The vaccine was composed of pancreatic tumor cell lines genetically engineered to secrete granulocyte-macrophage colony-stimulating factor, a cytokine that stimulates the immune system. There were no serious side effects in the 14 patients treated with the vaccine, and three of the patients showed evidence of an immune response to the tumor cells and enjoyed a longer disease-free survival time.

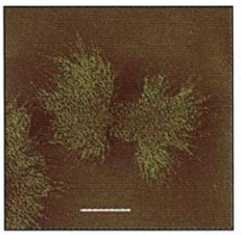
In independent work, Wagner *et al.* address an important problem that has restricted understanding of the pathogenesis of pancreatic cancer—the absence of an animal model that mimics the human disease. These researchers report that mice that overexpress transforming growth factor-alpha (TGF-α) and are deficient in the tumor suppressor protein p53 rapidly develop pancreatic tumors with histologic and molecular genetic features similar to those seen in human tumors. This new model may facilitate identification of the genetic and environmental forces that drive the growth and metastatic spread of human pancreatic tumors. — PAK

J. Clin. Oncol. **19**, 145 (2001); *Genes Dev.* **15**, 286 (2001).

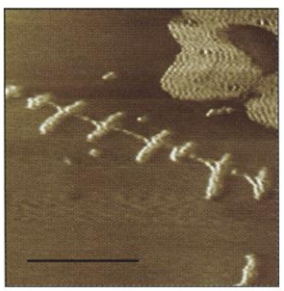
POLYMER SCIENCE

Snapshots of Crystallization

When polymers crystallize, they can adopt a spherulitic morphology, where the lamellae (ribbons of folded chains) grow outward radially, or a shish kabob morphology, which results if the polymer chains are highly oriented. What is unclear from models of polymer crystallization is how growth progresses and how lamellae interact when they come into contact with each other.



Now, two atomic force microscopy (AFM) studies have imaged these processes. Li *et al.* show that secondary lamellae, which give rise to the curvature in a spherulite, form through branching caused by secondary nuclei that originate from leftover chain segments trapped in the parent lamellae (cilia). Upon impingement of two lamellae, crystalline growth does not necessarily halt. Hobbs and Miles tackled a different problem, the influence of processing conditions on polymer morphology. By shearing a polyethylene melt and then cooling it to just below its melt temperature, they observed the formation of the shish kabob morphology and, in particular, the interdigitation of the kabob branches that is believed to play a role in the toughness of oriented structures. — MSL



AFM images of curvature in a spherulite (top, 2 μm scale bar) and the lateral growth of lamellae (kabobs) on a thin, oriented backbone (shish, 300 nm).

Macromolecules **34**, 316 (2001); *Macromolecules* **34**, 353 (2001).

CREDITS: (TOP) HOBBS & MILES, *MACROMOLECULES* **34**, 353 (2001); (BOTTOM) CHAN *ET AL.*, *MACROMOLECULES* **34**, 316 (2001).