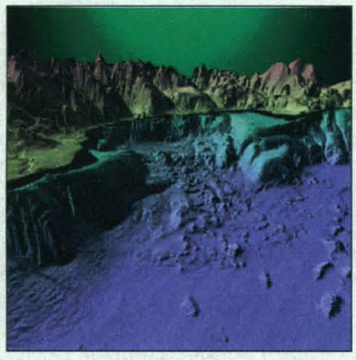
NETWATCH

edited by JOCELYN KAISER

COOL IMAGES

Parting the Waters



Lake Tahoe's rugged floor is laid bare in this image, part of a computer animation made from sonar data collected by a U.S. Geological Survey boat last August.* High-resolution sonar got much more efficient in the 1990s, spurring geophysicists to map the bathymetry of lakes, continental shelves, and oceans. By improving existing maps—often made decades ago—they hope to see the details of features such as earthquake-spawning faults and the underwater peaks and valleys that create pathways for pollutants.

This National Oceanographic and Atmospheric Administration page† offers loads of cool bathymetry images, as well as maps of gravity fields, crustal age, and sediment thickness. Follow the links to zoom through the contours of the Great Lakes, reach gorgeous seafloor maps (computed from sonar and satellite altimetry data), or download a spinning relief map of the globe.

* blt.wr.usgs.gov/tahoe/bathimages.html
† web.ngdc.noaa.gov/mgg/image/images.html

HOT PICKS

Over the volcano. Wondering whether Mexico's Popocatepetl volcano is about to blow? Get a quick fix on activity at 11 volcanoes in the Americas at this site, which posts infrared images from two GOES satellites every 15 minutes. volcano1.pgd.hawaii.edu/goes

Ethical choice. Those studying the ethical quandaries enveloping cloning and stem cell research, for instance, may want to peruse BIOETHICSLINE, a database of 60,000 references that became available for free this fall. guweb.georgetown.edu/nrcbl

Fact or fiction? Curious about why the moon looks bigger on the horizon, where "six degrees of separation" comes from, or whether engineers really use chicken cannons to test aircraft engines? Then try this site that debunks modern-day myths. www.urbanlegends.com/science

NET NEWS

Biomedical Gabfest a Rousing Success

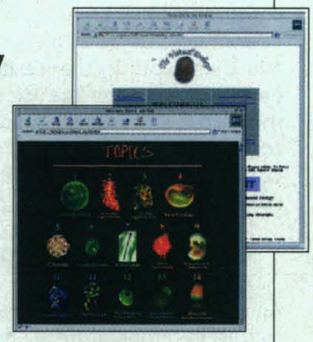
Scientific conclaves in cyberspace appear to have a rosy future, judging from the success of what was probably the largest one ever. Held last month for 10 days on a Web server at McMaster University in Hamilton, Ontario, the Fifth Internet World Congress for Biomedical Sciences (or INABIS '98) brought together over 1800 authors from 51 countries—none of whom had to pay a registration fee or buy a plane ticket.

The all-text affair included a welcome party, plenary lectures, and 44 symposia and poster sessions, each with an e-mail discussion group. The meeting followed four previous annual INABIS conferences, but this year's was far more international. "The striking thing was the willingness, even the hunger of people in a lot of countries to participate"—especially scientists "not in mainstream places" eager to share their work, says conference president Henry Szechtman, a neuroscientist at McMaster. As an example, he cited a poster session on medicine organized by a Canadian, an American, and a Cuban that included a Spanish paper on Turner's syndrome (the condition of having a single X chromosome) and a Kuwaiti paper on trace metal detection.

Szechtman acknowledged some glitches, especially the "complete nightmare" of uploading images in sometimes incompatible formats. But participants seemed to be patient with the growing pains of this new kind of conference and gave it high marks for round-the-clock access, no problems with simultaneous talks, and a format that allowed in-depth questions. "I learned enormously more than is possible at a conventional meeting," says pharmacologist Richard Kostrzewa of East Tennessee State University, a section organizer. And unlike conventional meetings, researchers can still drop by long after INABIS '98 is over—just go to www.mcmaster.ca/inabis98.

SITE VISIT

Web Gives Embryology Texts Room to Grow



"They'll have to rewrite the textbooks," goes the saying whenever a breakthrough overturns prevailing wisdom. That adage may be on the way out—if the Web continues to transform teaching the way that two sites are changing the rules for college developmental biology classes.

A desire to bring important new papers to students' attention was one incentive for creating Zygote,* says Scott Gilbert, a Swarthmore College professor who uses the site to complement his textbook. Written mostly by Gilbert and his students, Zygote is more like a "museum exhibit" than a book, he says: Dozens of one-sentence descriptions lead to summaries from a paragraph to several pages long. Ranging from a 1995 interview with geneticist Salmone Gluecksohn-Waelsch (complete with video clip) to a write-up on limb bud initiation, the site also draws researchers who want to keep up on new studies, Gilbert says.

If Zygote offers tasty hors d'oeuvres, then a full-course meal is served up by the Virtual Embryo,† nurtured by Leon Browder of the University of Calgary in Canada. Browder says he no longer requires that his students buy a textbook, because his site covers the basics from spermatogenesis to apoptosis. These modules are loaded with outside links, including Web tutorials at other universities on everything from chicks to frogs. Virtual Embryo also offers links for researchers, including journals, sites on model organisms, and molecular biology databases.

* zygote.swarthmore.edu
† www.ucalgary.ca/UofC/eduweb/virtualembryo

Science ONLINE

Science Online has launched new options for users who need to see full text but don't subscribe. Using a credit card, for $5 visitors can purchase access to a single article from one computer for a 24-hour period, or get the entire site for $10. Also new in response to popular demand: free online access (with registration) to NetWatch! www.sciencemag.org

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CREDIT: PETER DARTNELL, USGS

OUTER PLANET DYNAMOS

The magnetic fields of Neptune and Uranus may arise through electrical conductivity in thick layers of ice rich in water, methane, and ammonia that are thought to lie below their atmosphere. Cavazzoni *et al.* (p. 44) performed ab initio molecular dynamic simulations to determine the phase diagrams of water and ammonia at the extreme pressures (30 to 300 gigapascals) and temperatures (300 to 7000 kelvin) of these planetary interiors. Their simulations suggest that most of the thick ice layer would be composed of ionic fluids of water and ammonia, requiring a dynamo driven by proton mobility in the liquid. This proton mobility would increase with increasing pressure and thus depth in the ice layer. Near the boundary between the ice layer and the rocky core, water and ammonia transform to metallic liquids whose high electrical conductivity would also contribute strongly to the planetary dynamos.

CREATING SUPERCONDUCTING CONDENSATES

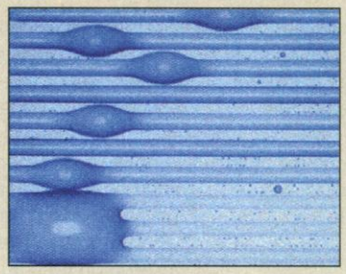
An important issue in understanding high-transition temperature superconductors is the energy scale of the states that form the superconducting condensate. For example, the interlayer tunneling (ILT) theory connects incoherent transport in the direction normal to the copper oxide planes with the formation of the superconducting condensate. Basov *et al.* (p. 49; see the Perspective by Klein and Blumberg) have measured infrared reflectivity for light polarized along the interplane direction of the single-layer cuprate $Tl_2Ba_2CuO_{6+x}$ and compared their results with previous measurements for the multiple-layer materials $La_{2-x}Sr_xCuO_4$, and $YBa_2Cu_3O_{6.6}$. They show that the states making up the condensate extend into the mid-infrared region, energies far greater than the superconducting gap energy. Analysis of the changes in infrared reflection in terms of optical conductivity sum rules can account for only part of the superfluid density formed. The authors suggest that this discrepancy may arise from a change in interlayer kinetic energy.

OZONE DESERTION

Both chlorine and bromine species can catalyze ozone destruction, but whereas most chlorine sources are anthropogenic, most of the sources of bromine are natural. Sources of BrO seem to have been restricted to polar regions, but now Hebestreit *et al.* (p. 55) identify a potentially important source at lower latitudes: salt pans associated with inland lakes and seas. They monitored BrO and ozone concentrations and other atmospheric conditions at the Dead Sea, Israel, in spring 1997. Concentrations of BrO were exceptionally high and those of ozone levels low when winds blew over a large salt pan containing bromine-rich evaporite deposits.

MICROLIQUIDS ON THE MOVE

The development of labs on chips will benefit from a better understanding of the behavior of liquids in microchannels and from new methods of pumping fluids through microchannels (see the Perspective by Grunze). Surfaces patterned with hydrophobic and hydrophilic regions can be used as microscopic channels for liquids. Gau *et al.* (p. 46) investigated the stability of aqueous structures in such microchannels. Beyond a certain adsorbed volume, the liquid structures filling the channels become unstable



and change from a state with a spatially constant cross section to one with a single bulge. These instabilities can be pinned at corners in the channel, and used to form interconnections between the channels. Many approaches for moving fluids through channels, such as electrokinetic pumping, require high electric fields. Gallardo *et al.* (p. 57) show that fields of less than 1 volt can be used to pump fluids and create droplet patterns on nonpatterned surfaces. Electrochemical reactions convert an aqueous compound from a surfactant to a non-surfactant species. Concentration gradients of these molecules lead to local differences in surface tension that can push thin layers of fluids along channels and through T connections or that can selectively wet or dewet electrode surfaces.

VALUING DIVERSITY

Developing CD4 T cells (thymocytes) are equipped with T cell antigen receptors (TCRs) specific to each T cell, but there is an enormous diversity of specificities over the population of thymocytes. How do the "right" T cells get selected to mature fully? Barton and Rudensky (p. 67) evaluated mice that were engineered to have 95% of their thymocytes expressing the same peptide for binding to the major histocompatibility complex (MHC). These mice had normal numbers of mature CD4 T cells, so it appeared that a single peptide could select millions of T cells. However, if the 5% of peptides that were different from the major peptide–MHC complex were not present, the number of mature CD4 T cells dropped. Thus, a diversity of low-abundance peptides is necessary to get a normal population of mature CD4 T cells.

NEURONAL RECEPTOR STRUCTURE

The gene encoding a receptor for γ-aminobutyric acid (GABA) that is important in fine-tuning of synaptic transmission has recently been identified. This gene encodes a protein known as GBR1 ($GABA_B$ receptor 1) that possesses several of the functional properties of $GABA_B$ receptors. Kuner *et al.* (p. 74; see the news story by Wickelgren) have now identified a second receptor subunit, GBR2, that forms a heteromeric receptor with GBR1. The heteromeric receptor can interact with each of the known signal transduction pathways involved in physiological $GABA_B$ receptor function.

LEARNING THE RULES

Is language acquired by training a neural network through trial and error, or are there abstract rules applied to determine what constitutes correct usage? It has been shown that infants can learn transitional probabilities of syllables, that is, how likely "re" will follow "do." Marcus *et al.* (p. 77; see the Perspective by Pinker) present results indicating that infants can also learn rules, for instance, that "do-re-re" falls into the same pattern as "mi-fa-fa," suggesting that language acquisition may rely on both types of capabilities.

FIBROBLASTS AND WOUND HEALING

DNA microarray technology has made it possible to reexamine old questions with a new dimension of genomic information. Iyer *et al.* (p. 83; see the news story by Pennisi) have used a complementary DNA