

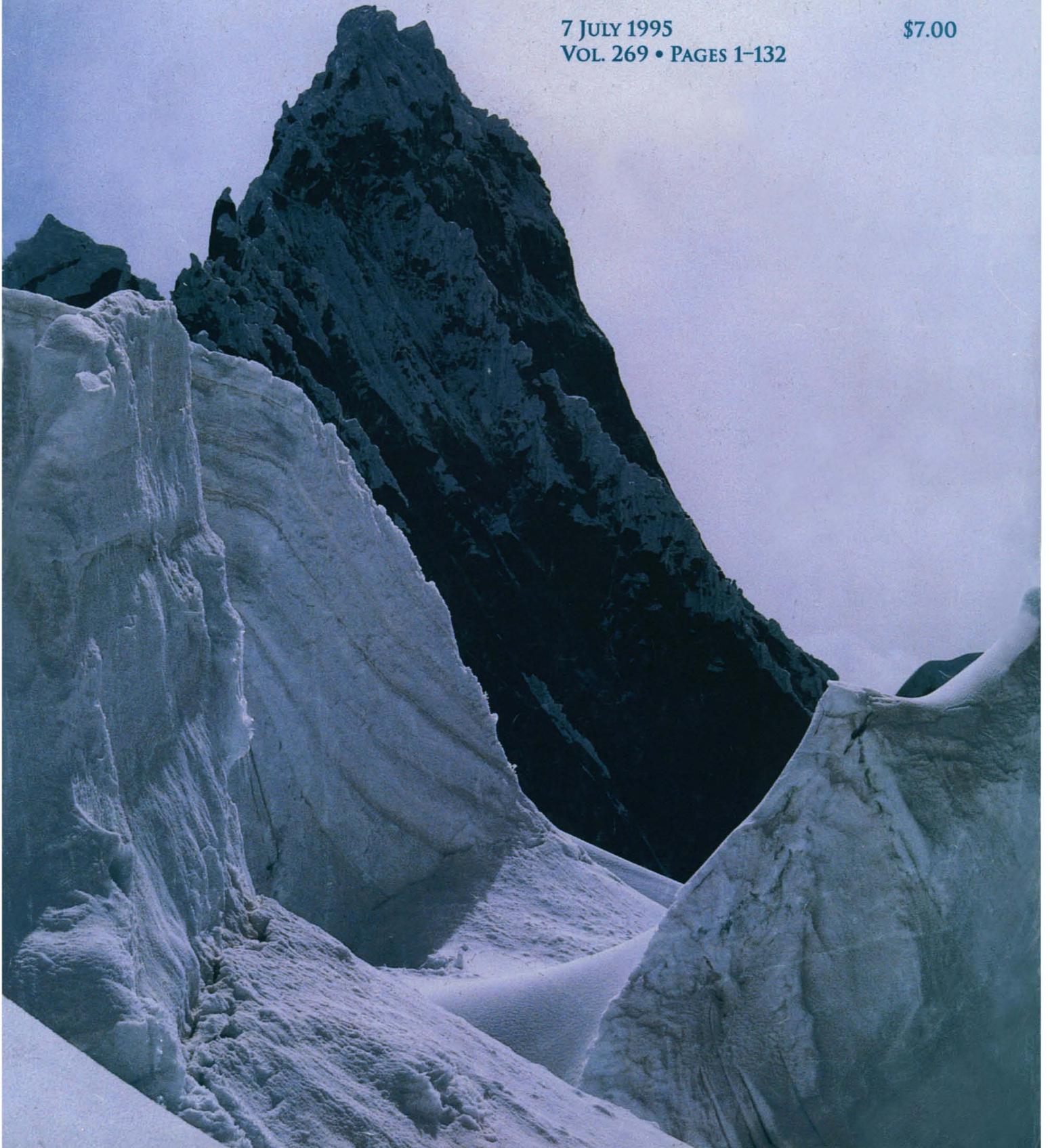


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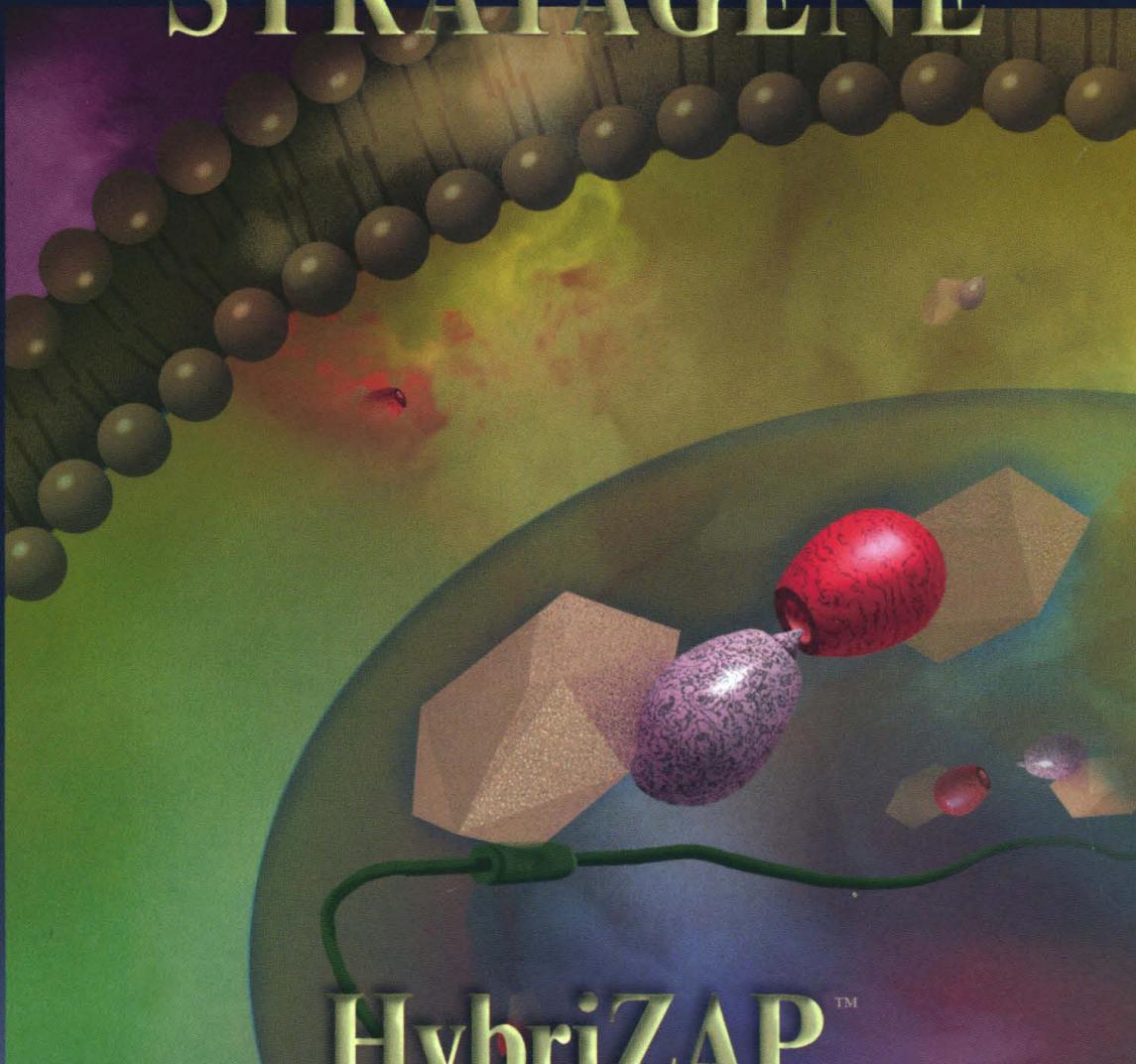
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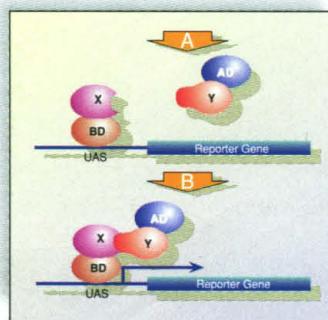


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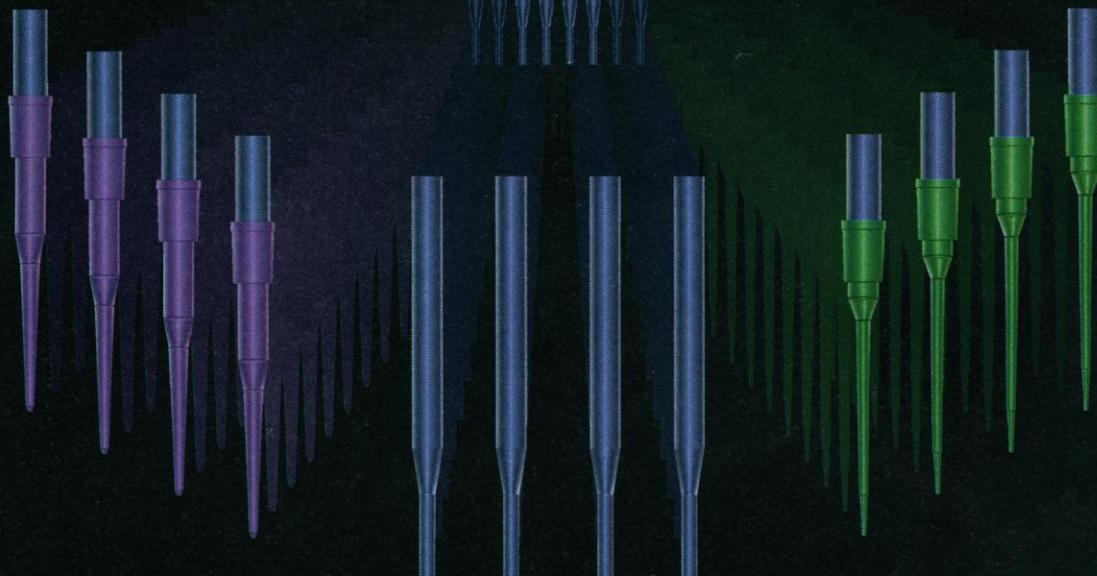
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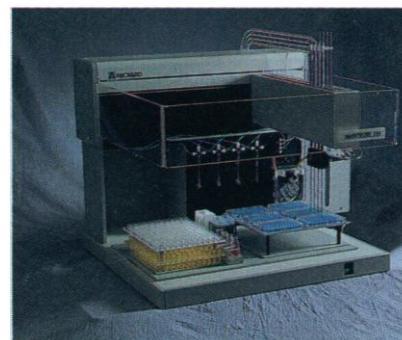
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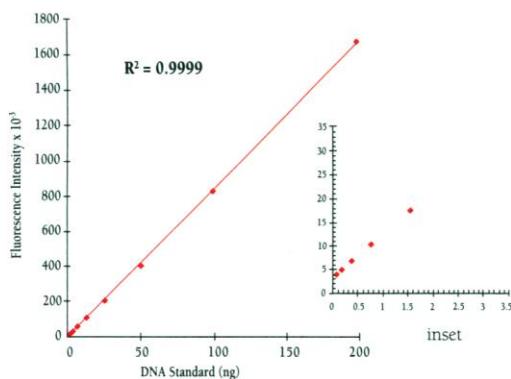
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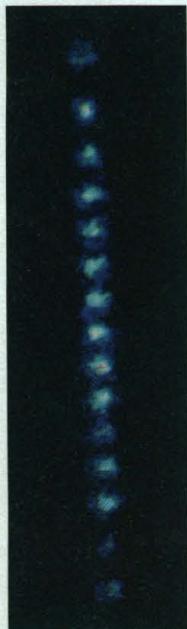
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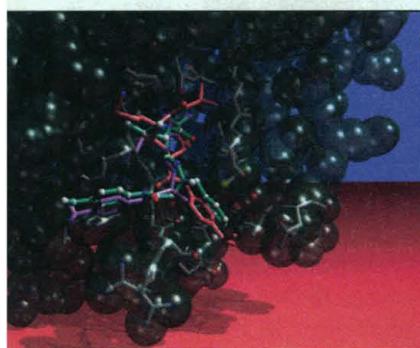
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## COVER

Pinnacles of ice and rock on Nevado Taulliraju (5830 meters above sea level) guarding extensive ice fields in the Cordillera Blanca, Peru. Two ice cores from an ice field on the col of Huascarán provide a perspective of climate and the environment in the tropics back to

glacial times. These frozen archives are disappearing rapidly under the present climate conditions. See page 46 and the News story on page 32. [Photo: Lonnie G. Thompson]



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## Assembly hanger

The ferritin protein contains a large cavity that can contain several thousand iron atoms. Douglas *et al.* (p. 54) have adapted this iron storage system to control the formation of iron sulfide nanoparticles. Particles with 500 or 3000 iron atom clusters could be made; the former exhibit an unusual oxidation state.

## Unscrambling ions

Hydrocarbons can be quite unreactive, but protonation by acid catalysts can create highly reactive carbonium ions. The simplest example,  $\text{CH}_5^+$ , appears to have no stable equilibrium structure; the hydrogen atoms scramble continuously, so much so that vibrational spectroscopy reveals little about this process. Boo *et al.* (p. 57) found that solvating this ion with neutral  $\text{H}_2$  molecules in the gas phase stabilizes the  $\text{CH}_5^+$  core. The vibrational spectra obtained were interpreted in light of molecular dynamics simulations.

## Designer peptides

In addition to the ribosomal peptide synthesis, microorganisms can generate a variety of small peptides by using large, multi-domain peptide synthetases. These enzymes link amino acids that may have been modified previously by acylation or glycosylation into linear, branched, or cyclic peptide structures. Stachelhaus *et al.* (p. 69) re-engineered a synthetase from the bacterium *Bacillus subtilis*, which makes the lipopeptide surfactin, by substituting genes encoding domains from similar synthetases in *Bacillus brevis* and the fungus *Penicillium chrysogenum*.

## Ice records in the tropics

Climate records from the tropics covering warming from the late glacial stage (LGS, more than 15,000 years ago) have been sparse. Most ice caps are small compared to the polar ice sheets and ice cores had extended only back a few thousand years. Thompson *et al.* (p. 46; see cover and news story by Mlot, p. 32) obtained two ice cores from Huascarán, Peru, that extend back to the LGS. The stable isotope variations in the ice imply that the tropical Atlantic was 5 to 6 Celsius degrees cooler during the LGS than today.

## Signals in the water

Sudden slip on faults generating earthquakes may often be facilitated by a build up of fluid pressures in the fault zone; in turn, precursory cracking of the crust can affect local hydrology. Tsunogai and Wakita (p. 61) and Igarashi *et al.* (p. 60; see the Perspective by King *et al.*, p. 38) report that a variety of chemical and physical signals, including increases in chloride, sulfate, and radon concentrations in ground water, preceded the destructive Kobe earthquake of 17 January 1995.

## A start for STATs

Many growth factors and cytokines regulate transcription by activating transcription factors known as STATs. The STATs are activated by phosphorylation on tyrosine by protein kinases called Jaks. Activation of STATs is seen in cells transformed by expression of an oncoprotein or by infection with a virus. Yu *et al.* (p. 81) found that transforming cells with the Src tyrosine kinase oncoprotein activated Stat3. Cells infected with human T cell leukemia virus I (HTLV-I) for some time no longer require interleukin-2 for growth. Migone *et al.* (p. 79) report that the Jak-STAT pathway is constitutively activated in such cells. Activation of this growth-promoting signal in the absence of cytokines appears to

be part of the mechanism by which T cells are transformed by HTLV-I.

## Changing pumps

Bacteriorhodopsin (bR) actively pumps protons outward across the cell membrane when stimulated with light. Halorhodopsin, a member of the same family of proteins, responds to light by pumping chloride ions ( $\text{Cl}^-$ ) inward. Sasaki *et al.* (p. 73) replaced a single aspartate residue (at position 85) with threonine in bR and converted it into a light-driven  $\text{Cl}^-$  transporter. The spectral shifts of the retinal chromophore suggest that the mutant bR and the wild-type halorhodopsin use similar mechanisms for  $\text{Cl}^-$  transport, and that the interaction of the chromophore and residue 85 controls substrate specificity.

## Active partners

The TATA binding protein (TBP) is essential for transcription by all three RNA polymerases (Pols). Stargell and Struhl (p. 75) isolated a mutant TBP that is normal in vivo for transcription by Pol I and Pol III but appears defective in supporting Pol II transcription mediated by the acidic class of activator proteins. This mutant TBP fails to interact properly with a general transcription factor TFIIA, sug-

gesting that the interaction between TFIIA and TBP is necessary for transcriptional activation by acidic activators in vivo.

## Cell-to-cell service

Can proteins move from the membrane of one cell to that of another? Kooyman *et al.* (p. 89) present evidence that this occurs, at least for proteins anchored to the cell membrane through covalently attached glycosyl phosphatidylinositol (GPI). The GPI-anchored proteins expressed in transgenic mice only on blood cells were transferred in functional form to endothelial cells. Whether such transfer serves a physiological function remains unknown, but it could provide a way to transfer therapeutic proteins to the vascular endothelium.

## Knowing where to grow

Developing neuronal axons find their way to distant targets, but the cues that guide their growth are not always clear. Mammalian retinal axons from the eyes



must cross over one another in the optic chiasm to project to the opposite side of the brain. Sretavan *et al.* (p. 98) used immunological methods to specifically ablate embryonic neurons in mouse embryos in the future site of the optic chiasm. This procedure stopped the retinal axons from crossing the brain midline, indicating that these early-generated neurons are necessary for proper development.

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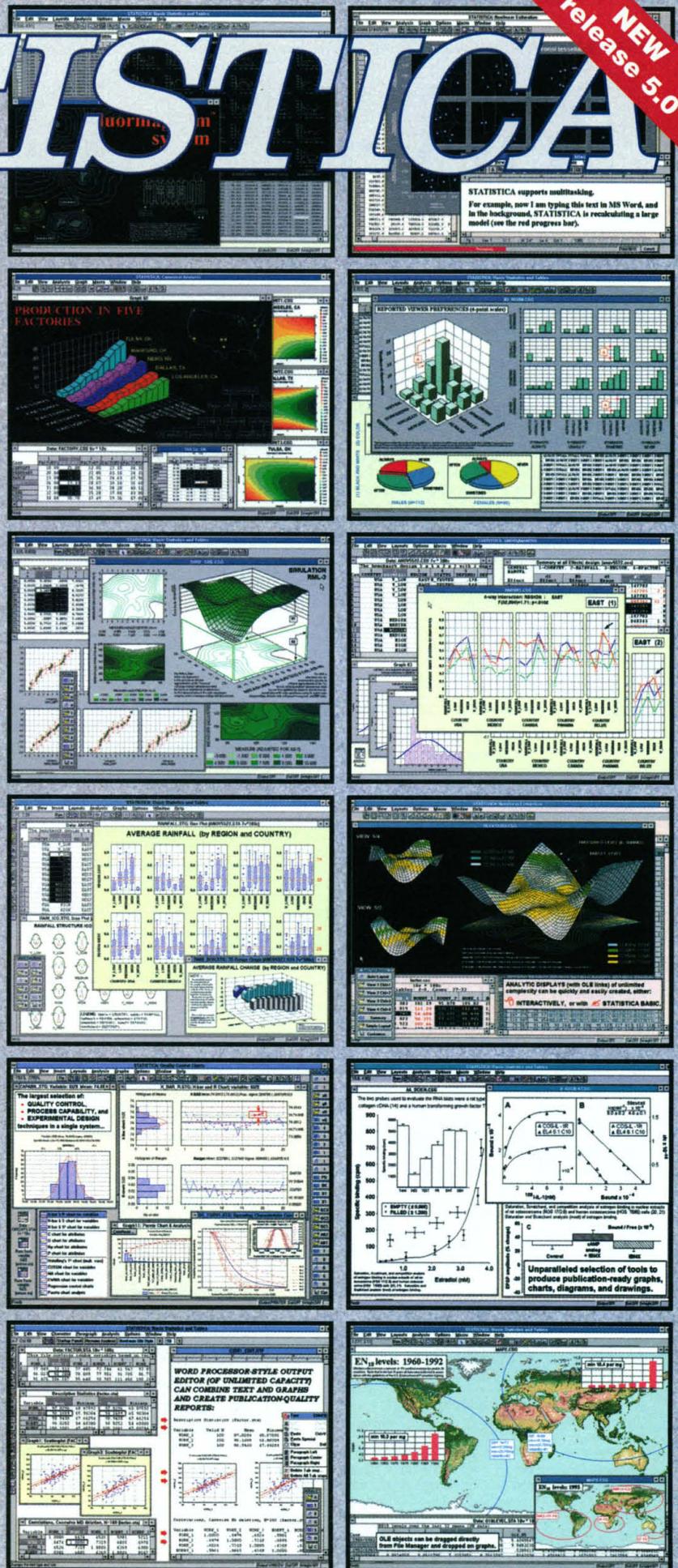


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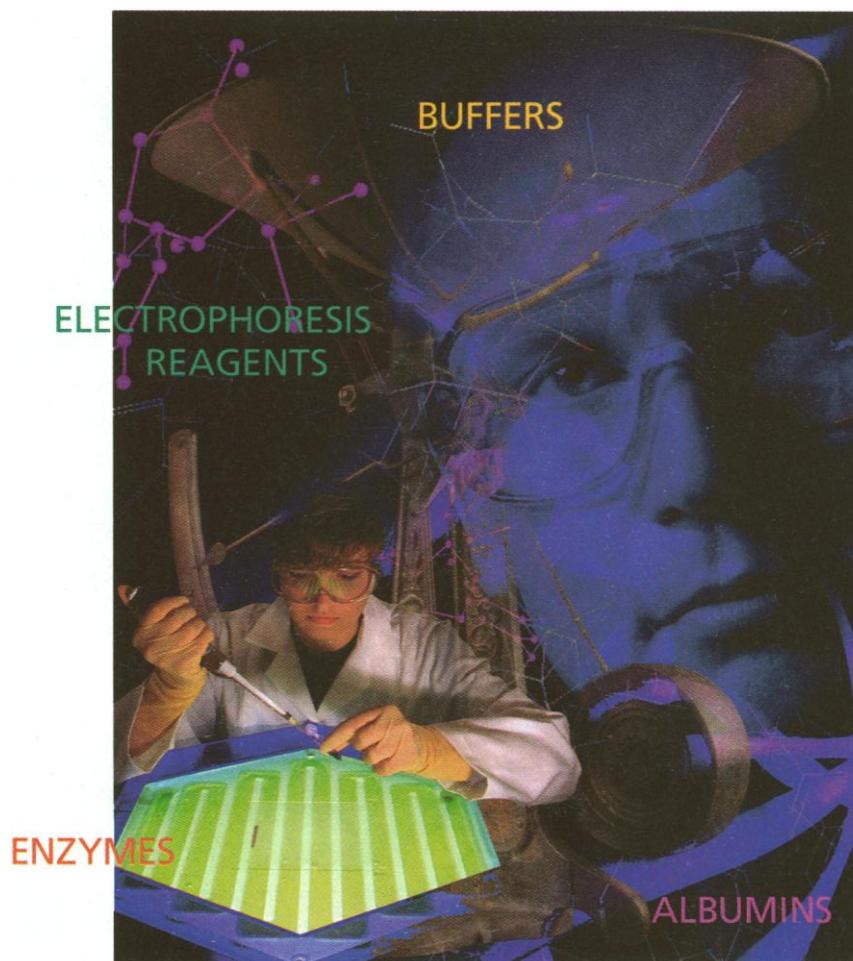
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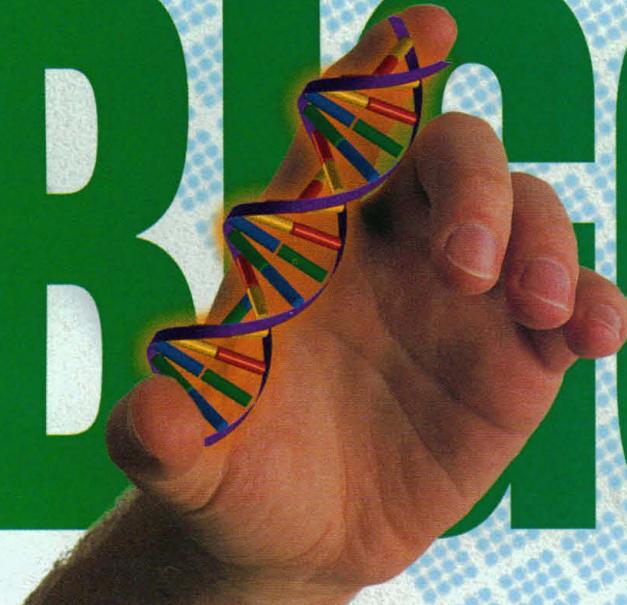
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—illustration by Pat Babcock



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# Landscapes

## The 46th AAAS Arctic Division Science Conference

President and Conference Chair: Robert G. White, Director, Institute of Arctic Biology

### Preliminary Schedule

Tuesday, 19 September

#### Plenary Session

#### Symposium on Landscapes

##### *Human Ecology*

Chair: Gerald Shields  
Dale Guthrie, Jeff Leer

##### *Landscape Ecology*

Chair: John Bryant  
Roger Ruess, Marilyn Walker, David Klein

##### *Earth System Science*

Chair: Amanda Lynch  
Larry Hinzman, Diana Versegny, Warren Washington

#### Symposium on Landscapes

#### Panel Discussion

Wednesday and Thursday, 20-21 September

#### Technical Sessions

Technical Sessions cover all disciplines, including:

##### *Land-Atmosphere Interactions*

Chair: Jeffrey Tilley

##### *Spatial Statistics, Geographic Information Systems and Spatially Explicit Models*

Chairs: Terry Bowyer, Sue Hills

##### *SEAScape—Ecosystem Studies of Prince William Sound*

Chair: David Eslinger

##### *Subsistence and Wildlife/Fisheries Resources*

Chair: Elizabeth Andrews

##### *Biological Diversity and Landscapes*

Chairs: Wendy Nixon, Scott Armbruster, Joe Cook

##### *Anthropogenic and Natural Change in Forest Landscapes of Alaska—Scientific and Policy Aspects*

Chair: Glenn P. Juday

##### *Ecosystem-Based Management*

Chair: Rosa Meehan

##### *Cold Regions Engineering*

Chair: Debendra Das

##### *A Retrospective on Research at the Naval Arctic Research Laboratory (NARL), sponsored by the Arctic Institute of North America (AINA)*

Chairs: Carl S. Benson, Jerry Brown

##### *Integrative Teaching—Human and Landscape Ecology*

Chair: Mark Oswood

### Special Workshop

Friday, 22 September

#### Preparing for an Uncertain Future: Impacts of Short and Long-term Climate Change on Alaska

Chairs: Juan Roederer  
TBA State of Alaska

Plenary Session and Working Group Discussions on:

- Climate scenarios and physical effects
  - Biological effects
  - Socio-economic effects
  - Policy implications
- Invited papers only at special workshop.*

For Information, contact:

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Executive Secretary  
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PO Box 757740  
University of Alaska Fairbanks  
Fairbanks, AK 99775-7740  
Phone:(907) 474-5698  
FAX:(907) 474-6722  
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Abstracts for Arctic Science Conference deadline: 17 July 1995

Early Registration deadline: 1 August 1995

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When you  
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**Human Genomic DNA** K562 DNA (100 ng) was amplified with ELONGASE Reagent for 35 cycles in a 50 µl volume. Lane 1 is lambda DNA/Hind III Fragments. Lanes 2-4 are amplifications of 1.3 kb, 4.1 kb and 7.5 kb β-globin targets, respectively. Lane 5 is an amplification of a 12.4 kb serum albumin target. Lanes 6 and 7 are amplifications of 15.1 kb and 20 kb Factor IX targets, respectively. Sample loads range from 4-10 µl.

## GIBCO BRL ELONGASE™ Reagents. Your best choice for success with long PCR.

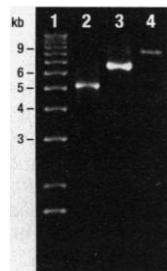
ELONGASE Reagents\* contain an optimized mixture of recombinant, thermostable polymerases, including a proofreading (3' → 5' exonuclease) activity, resulting in efficient amplification of long templates and exceptionally high yields.

### Efficient Amplification of Long Templates

- Amplification of λ DNA up to 30 kb and single-copy genomic DNA up to 20 kb.
- Amplification of long cDNA templates in RT-PCR applications.

### Exceptionally High Yield

- 10<sup>6</sup> fold amplification of DNA templates < 10 kb in size.



**RT-PCR** cDNA was synthesized from HeLa RNA (500 µg) with the SUPERSRIPT™ Preamplification System using oligo dT. A portion of the reaction was amplified with ELONGASE Reagent. Lane 1 is the 1 kb DNA Ladder. Lanes 2-4, respectively, are amplifications of 5.3 kb tuberous sclerosis II, 6.8 kb DNA polymerase ε and 8.9 kb adenomatous polyposis coli full length cDNAs.

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Tuesday, July 25th at 10 am

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Wednesday, July 26th at 10 am

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### Pharmacia Biotech & SCIENCE Prize for Young Scientists

IN MOLECULAR BIOLOGY 1995

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You must be a recent Ph.D. graduate (awarded between 1 January and 31 December 1994) working in molecular biology. Submissions must be in the form of a 1000 word essay, in English, on your thesis, highlighting the significance of its contribution and overall implications in the field. The winning essay will be published in SCIENCE. Closing date for entries is 5 July 1995. The prizes will be presented in Stockholm, Sweden, during December 1995.

Full details can be requested from the administrator, at the address below, or via Internet to:  
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