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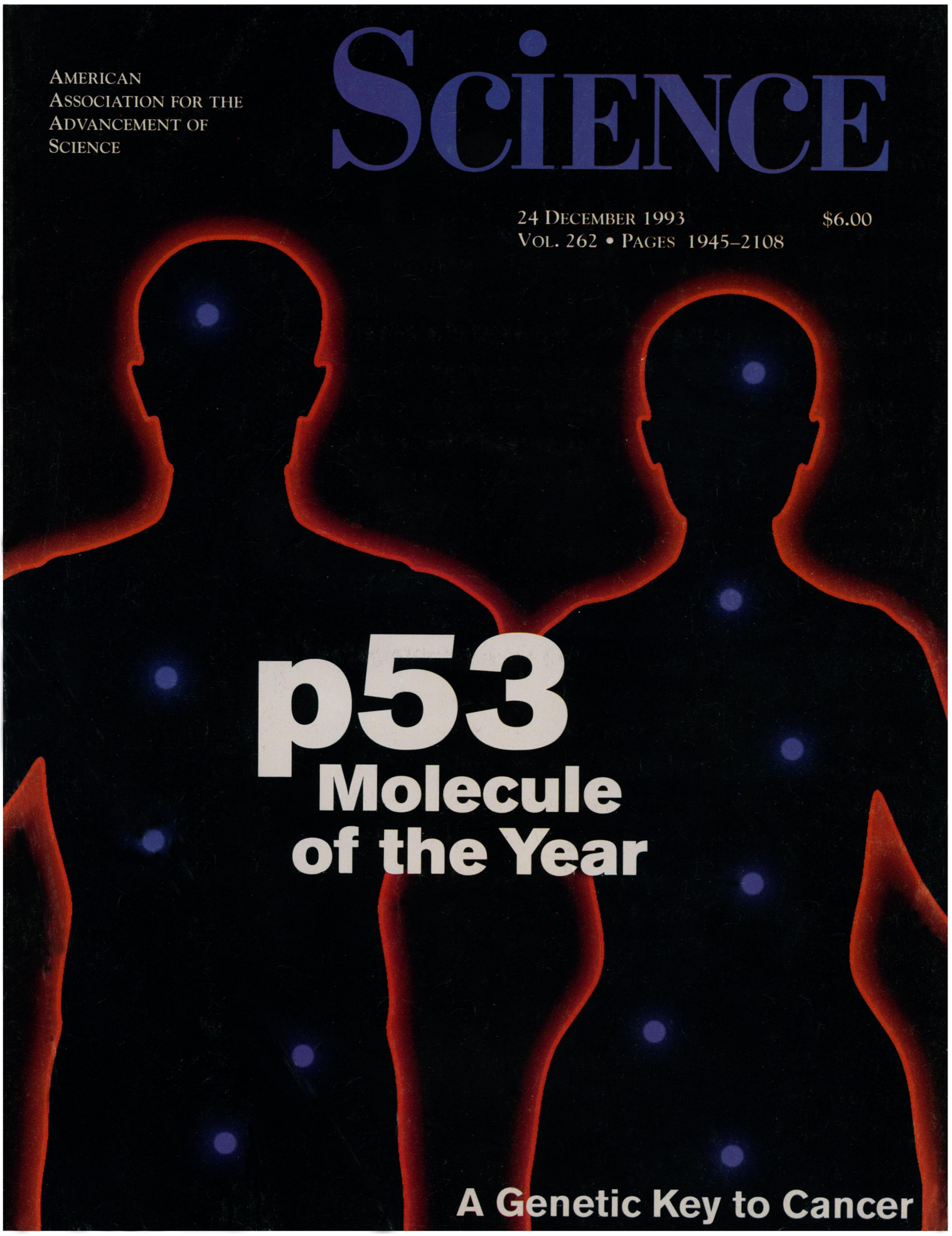

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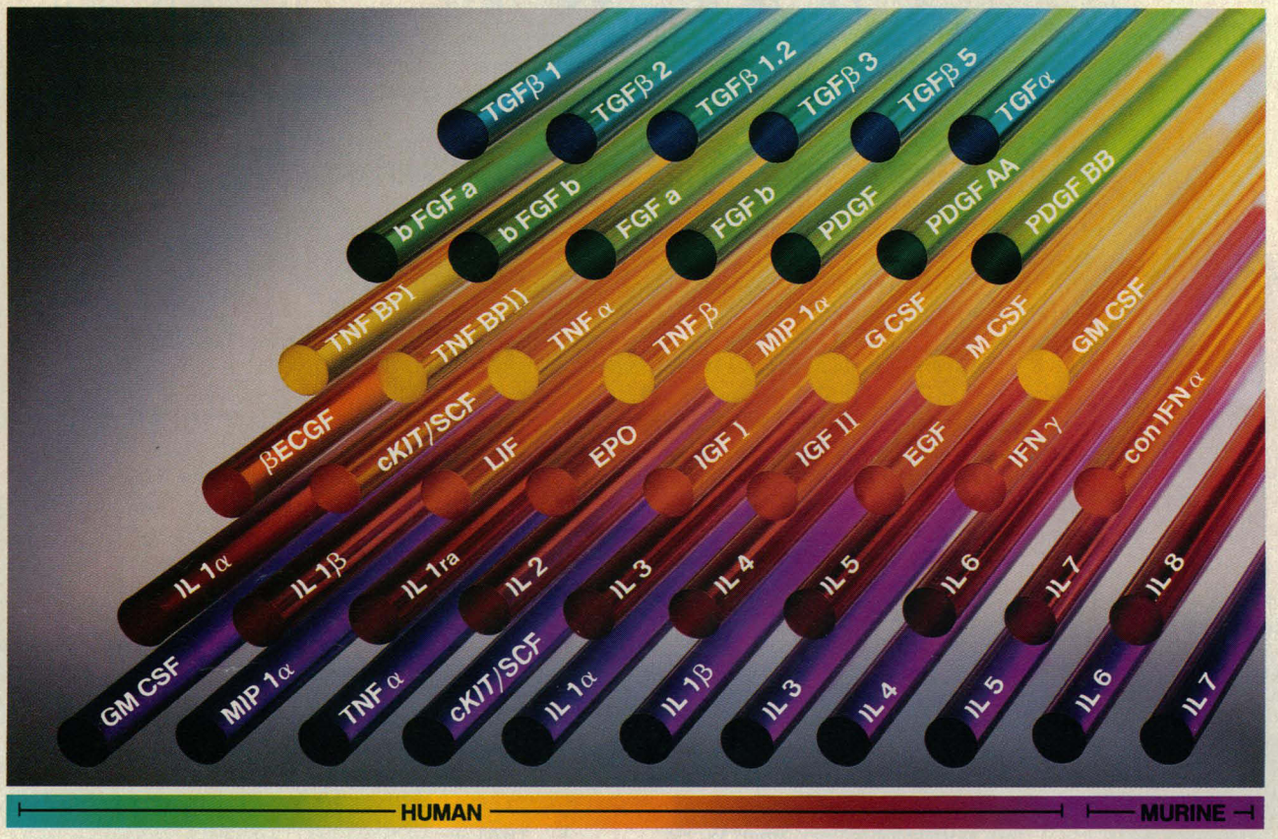

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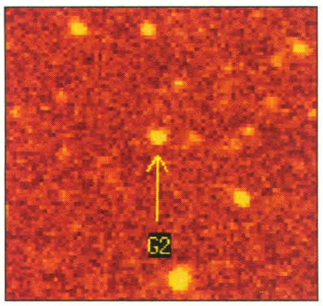


1969
The first galaxies

1975 & 2020
Reading the bones of dinosaur development

NEWS & COMMENT

RESEARCH NEWS

PERSPECTIVES

RESEARCH ARTICLES

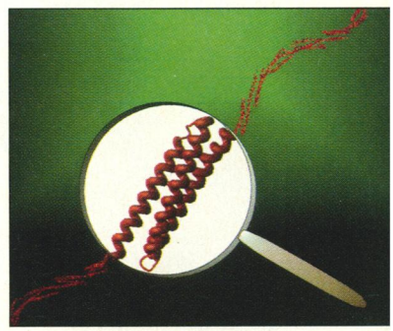
REPORTS

DEPARTMENTS

COVER

The protective action of the wild-type *p53* gene helps to suppress tumors in humans. However, the *p53* gene is the most commonly mutated gene in human cancer, and these mutations may actively promote tumor growth. The purple dots indicate some of the many tumor types that may carry *p53* mutations, including brain, esophagus, lung, breast, liver, prostate, and colon. See Editorial, page 1953, Molecule of the Year article, page 1958, and Perspective, page 1980. [Illustration: K. Sutliff and C. Faber Smith]

TECHNICAL COMMENTS



2027

A walk along the strand

Indicates accompanying feature

■ **SCIENCE (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1333 H Street, NW, Washington, DC 20005**. Second-class postage (publication No. 484460) paid at Washington, DC, and additional mailing offices.

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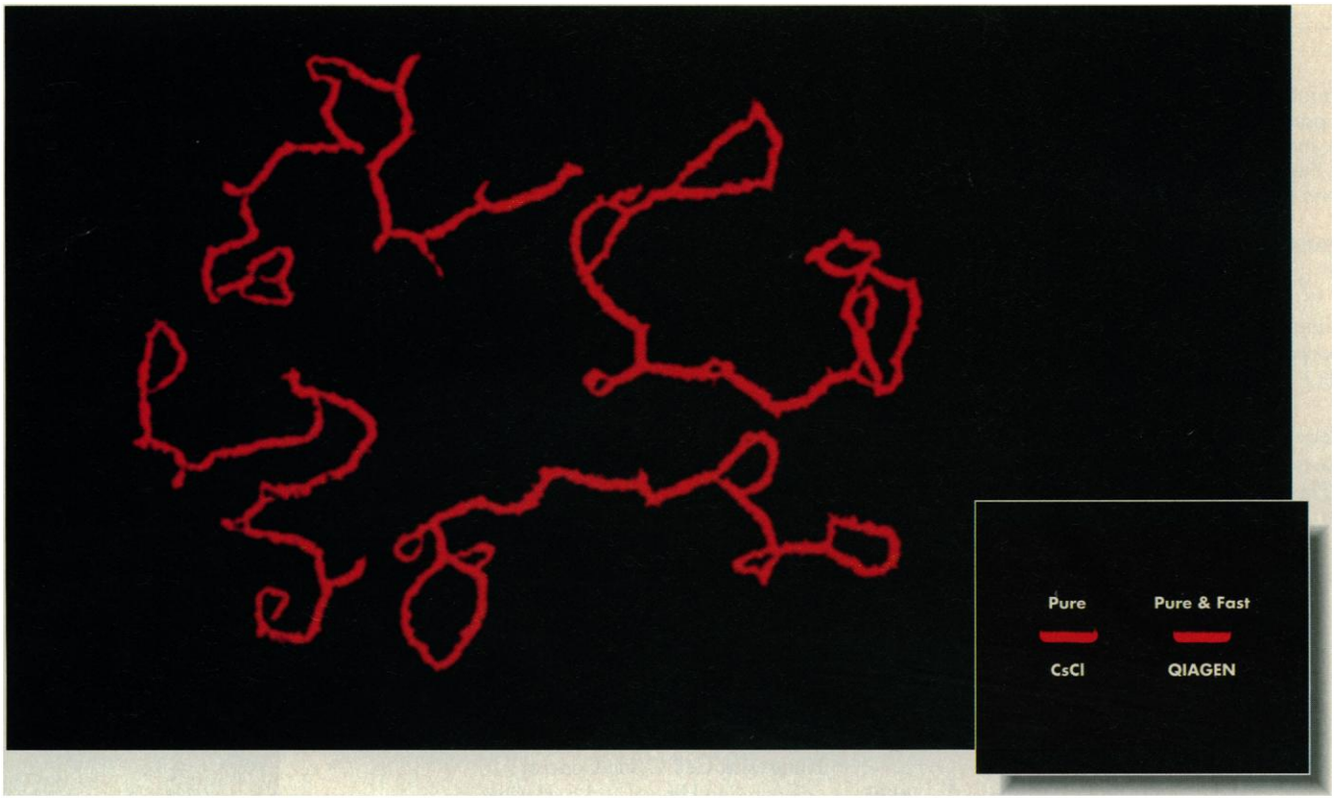

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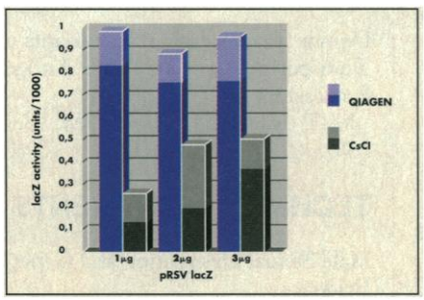

Comparison of transfection efficiencies. NIH 3T3 cells were transfected with the plasmid pRSVlacZ which was prepared with QIAGEN Plasmid Mega Kit (blue bar) or by CsCl (gray bar). Data from Ehlert et. al. (1993) BioTechniques ***14****: 546*

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Title photo: digitalized reproduction of EM photo of supercoiled DNA prepared with QIAGEN resin.

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edited by PHIL SZUROMI

It's the water

In the theoretical description of nuclear magnetic resonance spectroscopy, interactions between a molecule dissolved in a solvent have been thought to be so weak that they could be ignored. Warren *et al.* (p. 2005) show experimentally that peaks due to multiple quantum coherences can be observed for a glycoprotein fragment dissolved in water. They use density matrix theory to show that this "impossible" effect arises in part because of the huge number of possible spin pairs ($\sim 10^{45}$) in a typical sample. They also discuss ways to suppress this effect as well as how to put it to use.

■

Light at the end of the tunneling

Inelastic electron tunneling that occurs in scanning tunneling microscope (STM) junctions can excite molecular light emission that could serve us a useful spectroscopic probe, but such emission is often quenched rapidly. Flaxer *et al.* (p. 2012) were able to observe light emission characteristic of electroluminescence from molecules adsorbed on electrodes of indium–tin oxide, a transparent conductor. This method shows good prospects for imaging emission of molecules and chromophoric groups with atomic resolution.

■

Summer storms

Most old ground waters in aquifers that were recharged during the last glacial maximum have lower $^{18}O/^{16}O$ ratios than present-day waters, largely reflecting the effect of cooler climates in the past. Plummer (p. 2016), however, reports that paleowaters in the Floridan aquifer system have $^{18}O/^{16}O$ ratios that exceed those of Holocene waters by up to 2.3 per mil, even though rare gas contents suggest the presence of a cooler local climate. The likely explanation is that most of the moisture falling on the southeast United States during the glacial maximum was derived from late summer tropical storms, which tend to have higher $^{18}O/^{16}O$ ratios.

■

Growing up fast

Growth plate cartilage at the ends of long bones is responsible for bone growth, and its morphology varies among species, apparently to produce different bone structures. Barreto *et al.* (p. 2020; see news story by Fischman, p. 1975) studied well-preserved fossil bone plates in juvenile dinosaurs and compared the morphology with modern bone plates from several species. The dinosaur bone plates were most similar to those of extant birds, in which the growth plate facilitates rapid growth of long bones, and unlike those of mammals and reptiles. Dinosaurs, like birds, may have had a high metabolism.

■

Snapshot of spectrin

Cross-linking proteins such as spectrin, α-actinin, and dystrophin associate with actin to create the resilient cellular networks of the cytoskeleton and plasma membranes. The polymeric nature of these proteins makes them difficult to crystallize, so Yan *et al.* (p. 2027) grew crystals of one repeat, the 14th segment of α-spectrin from *Drosophila*. An x-ray structural analysis revealed a three-helix bundle. Modeling studies suggest that the interface between adjoining segments is stabilized and constrained by hydrophobic interactions. Spectrin mutations in human hemolytic disorders apparently disrupt helical packing.

■

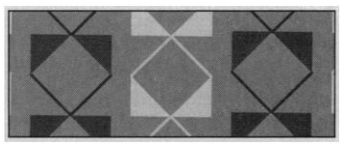
Breaking and entering

Many mitochondrial proteins are synthesized by cytosolic ribosomes as precursor proteins that undergo proteolytic cleavage in the mitochondrial intermembrane space (IMS) prior to entry. Nunnari *et al.* (p. 1997) identified in yeast a second component of this protease, Imp2p, that forms a complex of two catalytic subunits with Imp1p on the IMS side of the mitochondrial inner membrane. In addition to the functions that it shares with Imp1p, the Imp2p subunit is required for the stability and function of Imp1p. These subunits have nonoverlapping substrate specificities and belong to a larger family of eukaryotic signal peptidases.

■

Lightness of seeing

We can match the reflectance or lightness of two surfaces that are painted the same shade, even if they appear different from a particular point of view. We do this by taking into account higher order features of the scene, such as geometrical organization, and such processing occurs relatively late in the visual pathway. However, judging the relative luminance or brightness of two surfaces has been assumed to be a local phenomenon that requires only low-level mechanisms of visual processing. Adelson (p. 2042) has devised a set of illusions that indicate that the judgment of brightness incorporates our perception of other parts of the visual stimulus and must also involve later stages of the visual processing pathway.



■

Wilms tumor variant

A subset of Wilms tumors, a form of kidney cancer, displays inactivating mutations in *WT1*, a gene encoding a zinc finger transcription factor. Haber *et al.* (p. 2057) present direct evidence that the WT1 protein functions as a tumor suppressor by showing that wild-type WT1 can inhibit the growth of cultured cells derived from a human Wilms tumor. They also describe a previously undetected *WT1* transcript that is devoid of exon 2 sequences. This transcript, apparently an aberrant splicing product, is expressed in varying amounts in all Wilms tumor cell lines and primary tumors examined, and the protein it encodes does not suppress growth of cultured Wilms tumor cells.

■

Connexin connection

Progressive degeneration of peripheral nerves occurs in Charcot-Marie-Tooth (CMT) disease, a family of disorders linked to several chromosomes. Bergoffen *et al.* (p. 2039) examined the gap junction protein connexin32, which they found is normally expressed in myelinated peripheral nerve, as a candidate protein for the mutation mapped to q13.1 on the X chromosome. Direct sequencing revealed seven different connexin32 mutations in eight X-linked CMT families.

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