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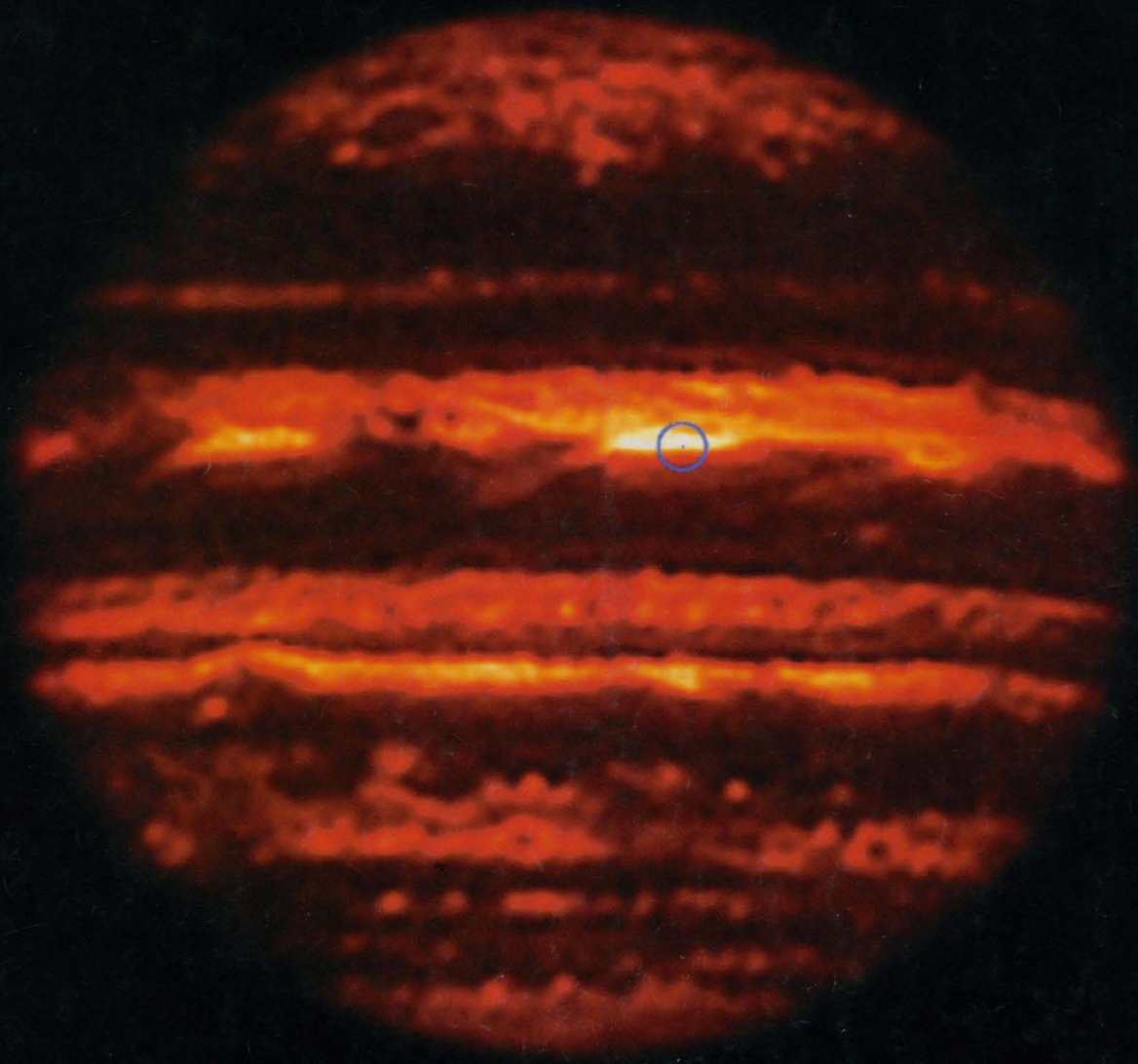
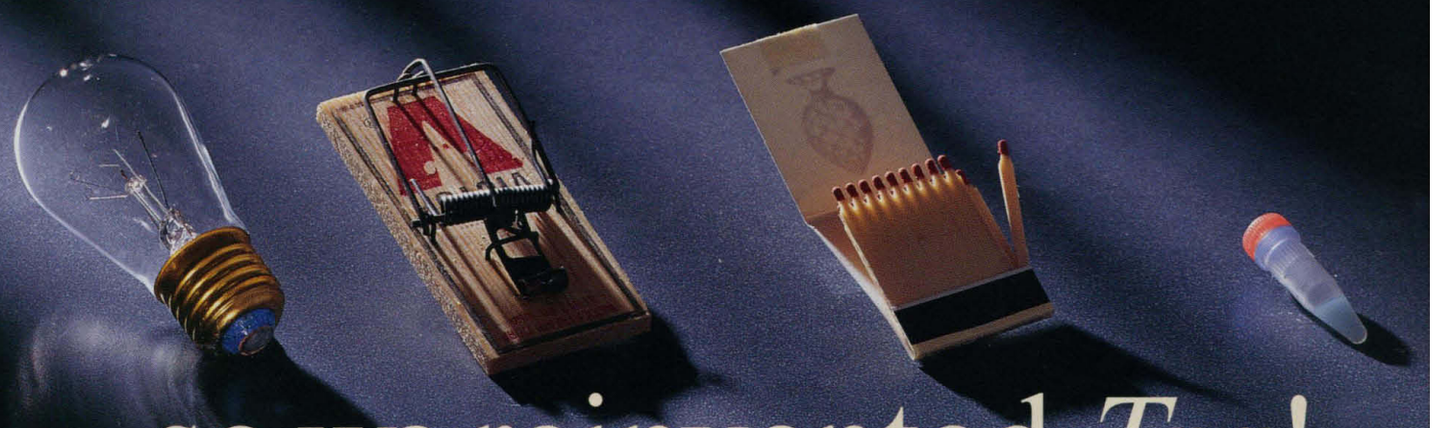


Galileo Probes Jupiter's Atmosphere

One of these had room for improvement...



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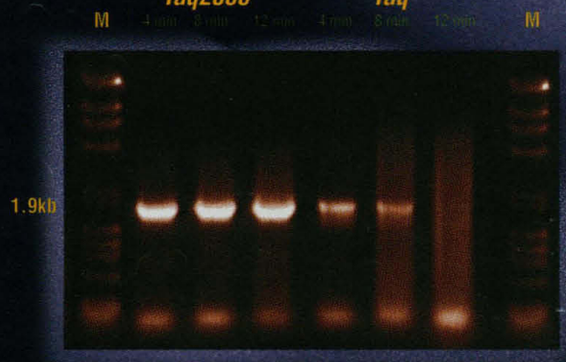

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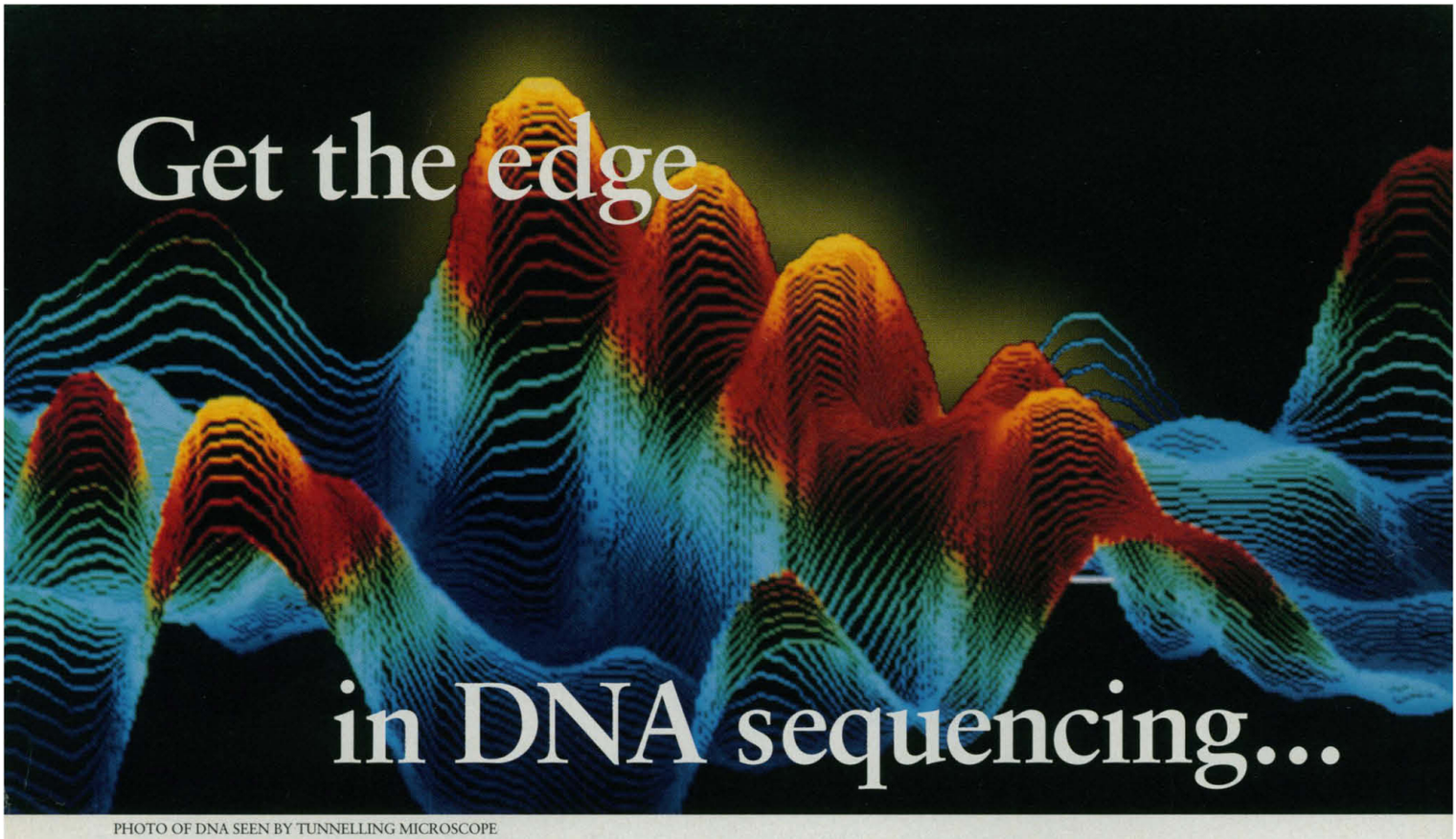

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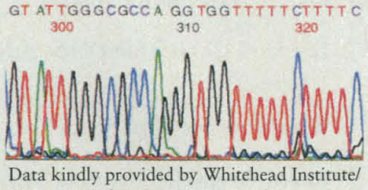

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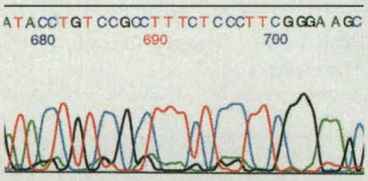

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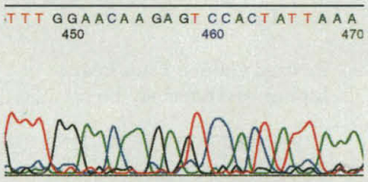

A reduction in template
- As low as 10ng with 15 cycles

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THERMO Sequenase

DYEnamic ET PRIMERS

1. *Proc. Natl. Acad. Sci., USA*, 92, pp. 6339-6343, (1995).
2. *Proc. Natl. Acad. Sci., USA*, 92, pp. 4347-4351, (1995).

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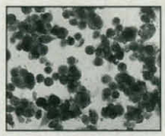
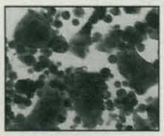
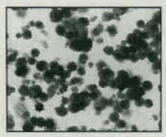






809 & 872
Cofactor for HIV-1 entry identified

NEWS & COMMENT

RESEARCH NEWS

PERSPECTIVES

RESEARCH ARTICLE

REPORTS

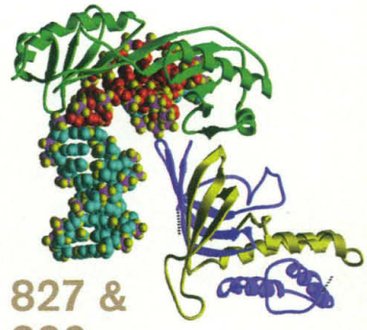
GALILEO PROBES JUPITER'S ATMOSPHERE

DEPARTMENTS

COVER

Thermal image of Jupiter's clouds at a wavelength of 4.85 micrometers. The image was acquired at the NASA Infrared Telescope Facility (IRTF), Mauna Kea, Hawaii, on 21 November 1995, 16 days before the Galileo probe entered the atmosphere at the location in the cloud field indicated by the circle with the central dot. See page 839, the related Reports beginning on page 837, and the News story on page 814. [Image: G. S. Orton, J. I. L. Ortiz, T. Z. Martin, and the NASA IRTF]

TECHNICAL COMMENTS



827 & 830

Yeast TFIIA/TBP/DNA complex

Indicates accompanying feature

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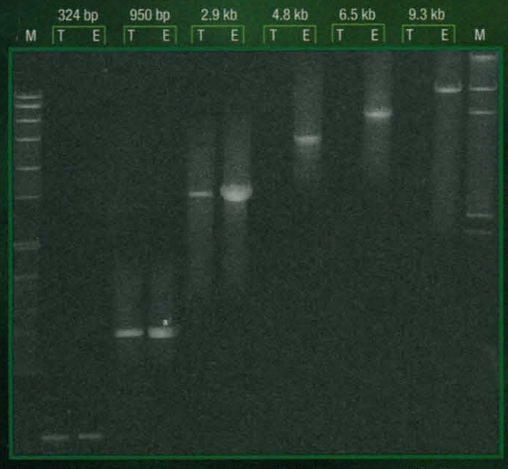

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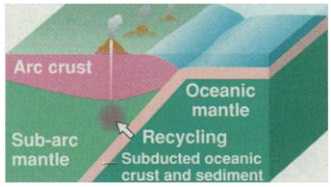
Osmium odyssey

Oceanic crust and some crustal sediments return to Earth's mantle at subduction zones; in turn, arc magmas derived from melting in the mantle wedge above the subducting slab replenish the crust. Comparison of the fractionation and abundance of many chemical tracers in the subducting slab and arc magmas have revealed key details of this overall recycling process. Brandon *et al.* (p. 861) have now examined osmium isotopes, which are finding increasing application in many studies (see the Perspective by Snow, p. 825), in pieces of the mantle wedge erupted from arc volcanoes. The data indicate that the mantle wedge may contain up to 15% of material recycled from the subducting slab.



Controlling radicals

Free-radical polymerization normally results in products with a broad distribution of molecular weights; methods that avoid chain propagation and termination steps, such as anionic polymerization, are used to produce polymers with a narrow range of molecular weights. Patten *et al.* (p. 866) have developed a polymerization method in which radical formation occurs but is controlled by a copper (I) complex that abstracts halogen atoms from the monomer or the growing polymer and produces a low steady-state concentration of reactive chains. They achieved low polydispersities for both polystyrene and polyacrylates.

A look at transcription initiation

Transcription is initiated by RNA polymerase II through the formation of a preinitiation complex (PIC) at the promoter. The binding of the central component of the PIC, TFIID, to the TATA box of the promoter, initiates PIC formation. The basal factor TFIIA associates with the PIC by binding to the TBP subunit of TFIID. Geiger *et al.* (p. 830; see the Perspective by Jacobson and Tjian, p. 827) describe the crystal structure of the yeast TFIIA/TBP/TATA promoter complex. TFIIA binds as a heterodimer to the TBP/promoter complex on the side opposite another basal factor, TFIIB, and does not alter the TBP/TATA promoter interaction. TFIIA associates with the amino terminus of TBP.

Social parasite

Parasitic wasp queens invade and colonize the nests of other wasp species. Bagnères *et al.* (p. 889) reveal that chemical mimicry is involved in the process of parasitization. Species and colony members recognize each other by means of the chemical signature of the cuticle. In usurping the *Polistes biglumis bimaculatis* queen, the parasitic *P. attrimandibularis* queen modifies its chemical signature to match that of the host queen; indeed, the signature displayed by the invading queen varies throughout the colonial cycle. This "tunability" of the glandular function of the cuticle is considerably more versatile than was previously realized and is associated with the ability to modify unsaturated hydrocarbons.

Mini RecA

Homologous recombination, a process crucial for the generation of genomic diversity, requires the two DNA molecules involved to pair at the regions of homology. In *Escherichia coli*, the RecA protein promotes homologous recombination. Voloshin *et al.* (p. 868; see the Perspective by Stasiak, p. 828) show that a 20–amino-acid protein from RecA can mimic some of the functions of the entire protein. It can pair a single-stranded DNA (ssDNA) to its homologous site on a DNA duplex and it can bind both substrates and unstack the ssDNA.

Fusing and entering

Although CD4 is the primary receptor for HIV-1 (human immunodeficiency virus–type 1), a human cofactor is also needed for this virus to fuse and enter the cell. Feng *et al.* (p. 872; see the news story by Cohen, p. 809) have identified this entry cofactor through functional screening of a complementary DNA library. Sequencing of a 1.7-kilobase insert revealed that the protein, called fusin, is a member of the superfamily of G protein–coupled receptors that have seven transmembrane segments. Nonhuman cells expressing both CD4 and recombinant fusin could be infected with HIV-1.

Splicing stages

Introns are removed from pre-messenger RNA by the spliceosome, a complex of small nuclear RNAs (snRNAs) and proteins. Ast and Weiner (p. 881) examined possible reaction intermediates in splicing by using an oligonucleotide complementary to U5 snRNA. During splicing, they find a U1/U4/U5 snRNP complex that specifically recognizes the 5′ splice site and that may serve as an intermediate in the displacement of U1 by U5.

Virus versus virus

Dengue (DEN) fever and related tropical illnesses have been difficult to control and result from transmission of DEN viruses from infected arthropods such as mosquitoes. These viruses have a positive-sense RNA genome and reproduce freely in the arthropod host. Olson *et al.* (p. 884; see the Perspective by James, p. 829) have limited the replication of DEN-2 virus in mosquitoes by infecting them with a recombinant Sindbis virus that encodes an antisense RNA to the premembrane coding region of DEN-2 virus. This treatment inhibited transmission of DEN virus through mosquito saliva.

NFAT1 now negative?

The NFAT family of transcription factors have been thought to play an important role in T cell activation, and mice lacking NFAT1 should display some signs of a compromised T cell compartment. Xanthoudakis *et al.* (p. 892) report that this is not the case: Both T cell development and in vitro functional responses are normal. More surprisingly, T cells from the NFAT1$^{-/-}$ mice display enhanced responsiveness to antigenic challenge. The mechanism that underlies these unexpected findings is still unknown, and there may be functional redundancy within the NFAT family. The data are consistent with a negative regulatory role for NFAT1.

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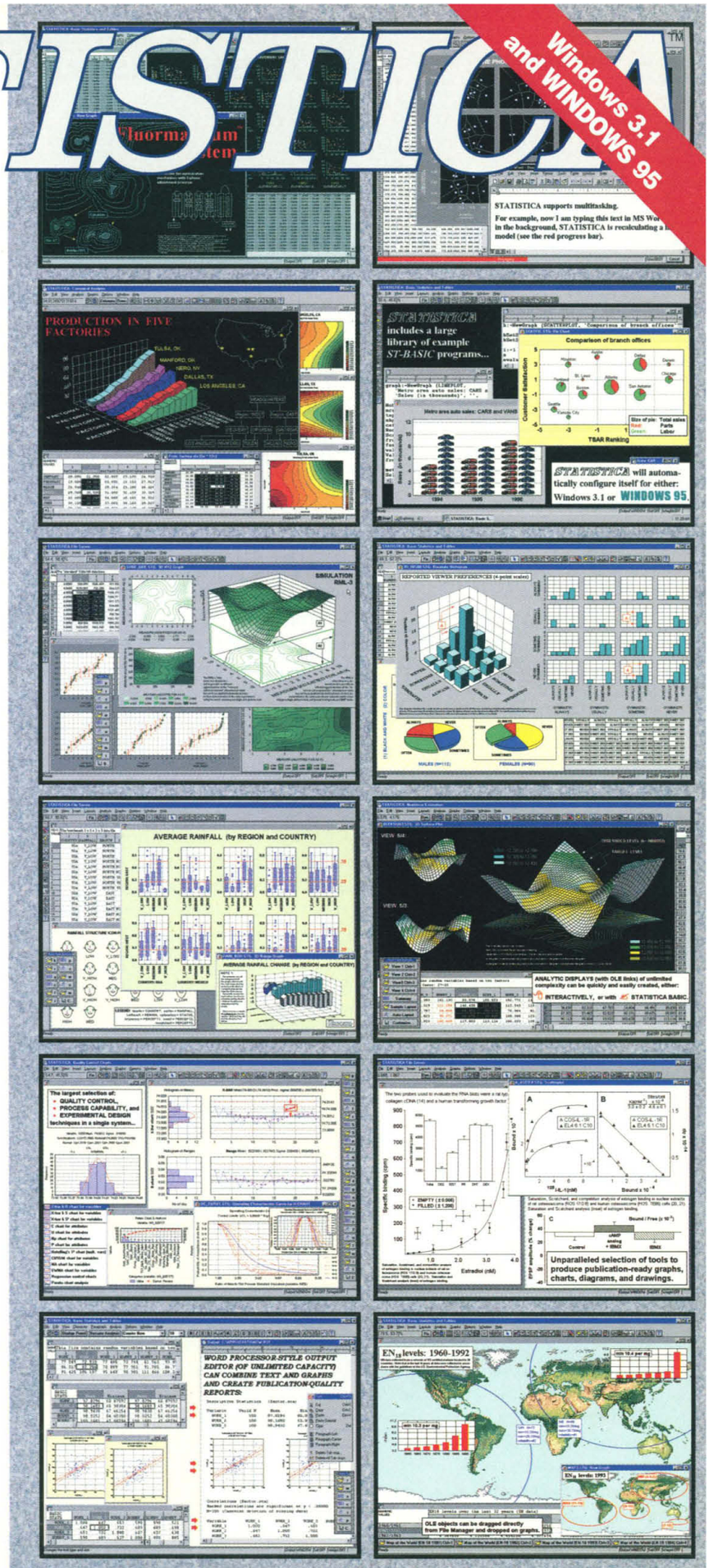

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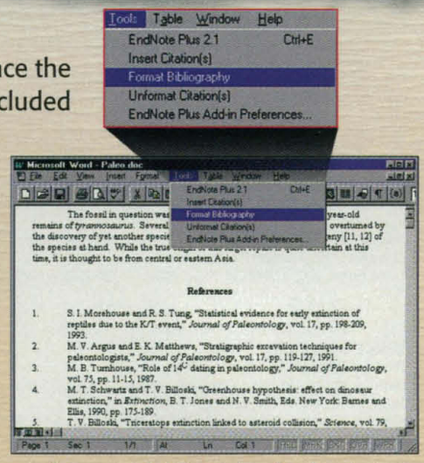

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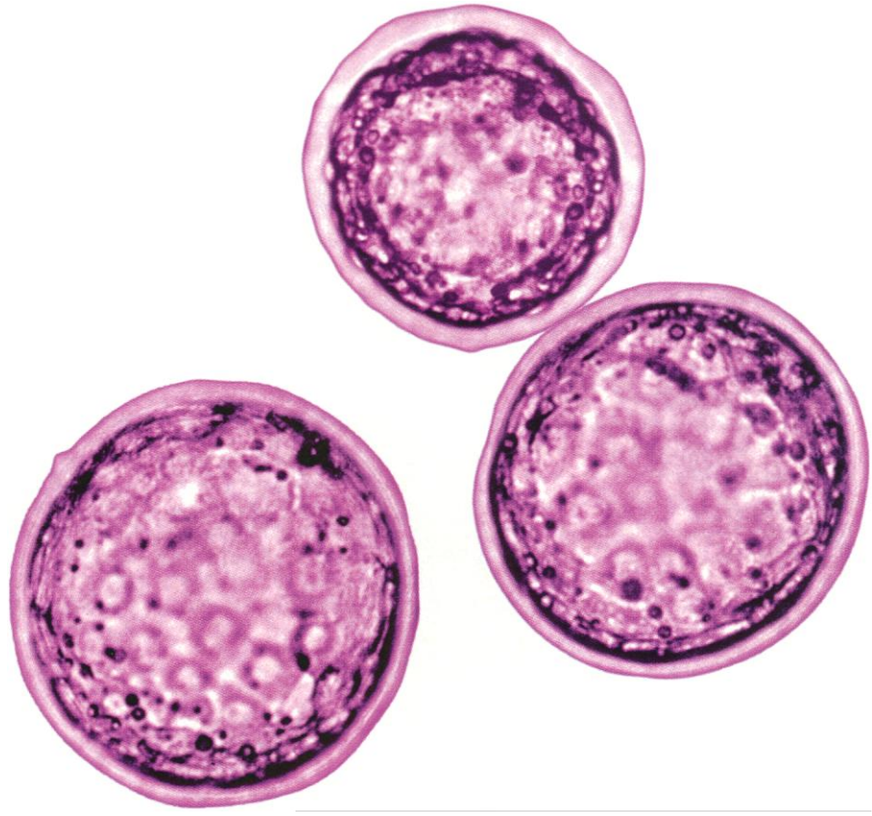

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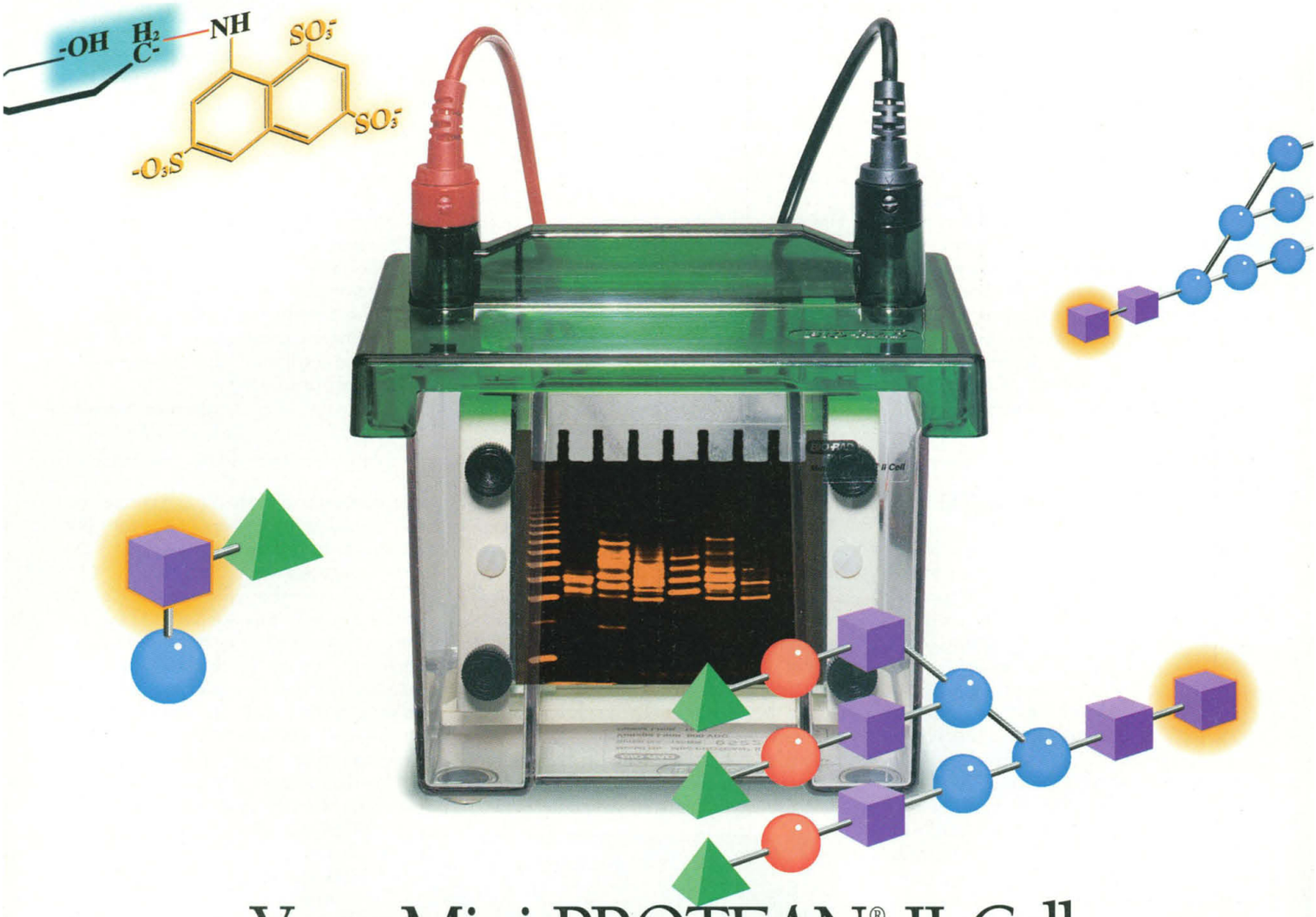

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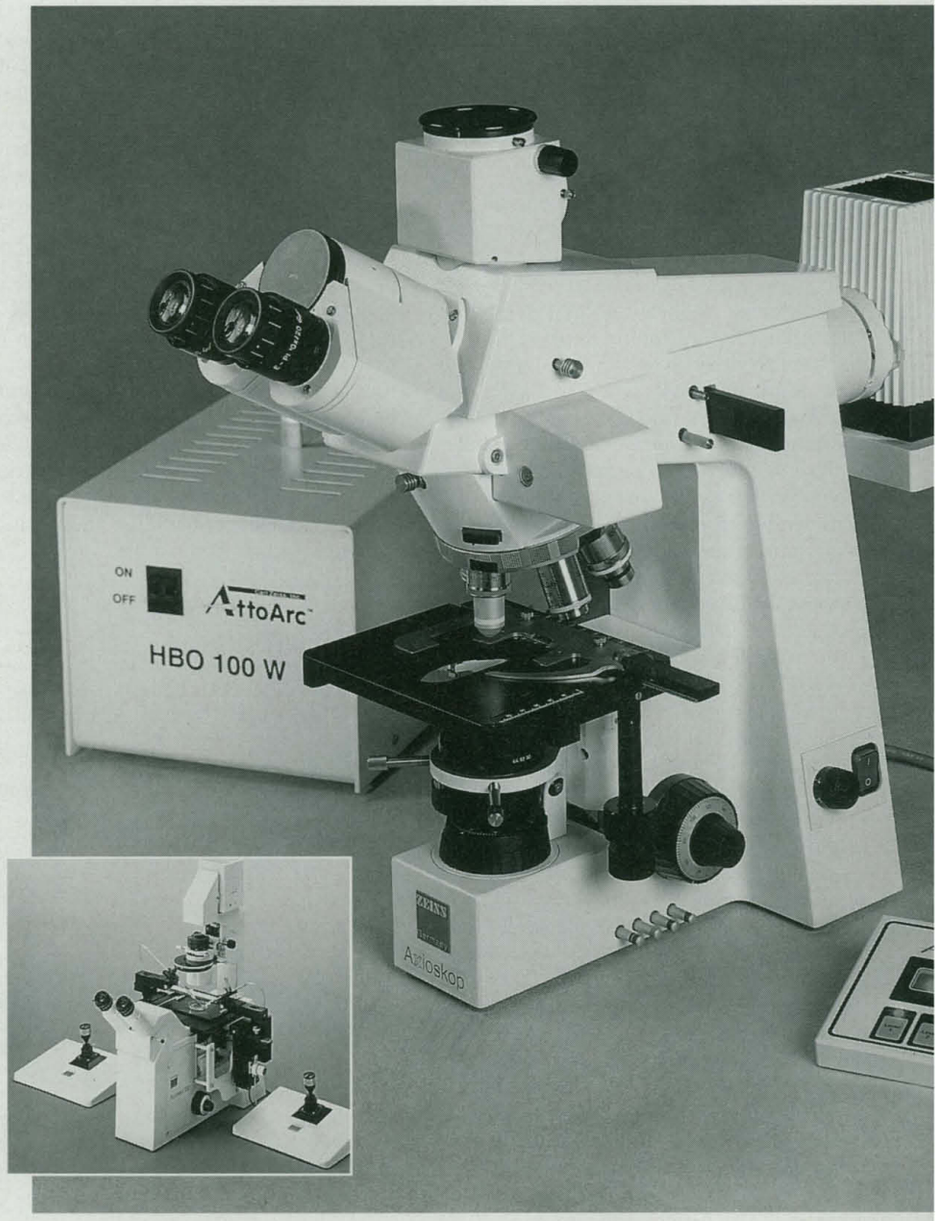

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