

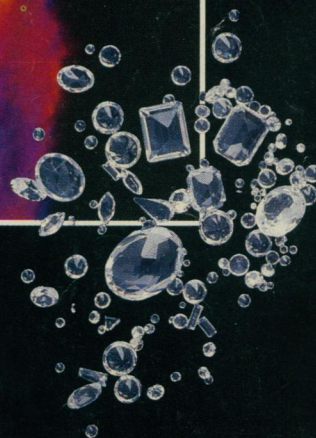
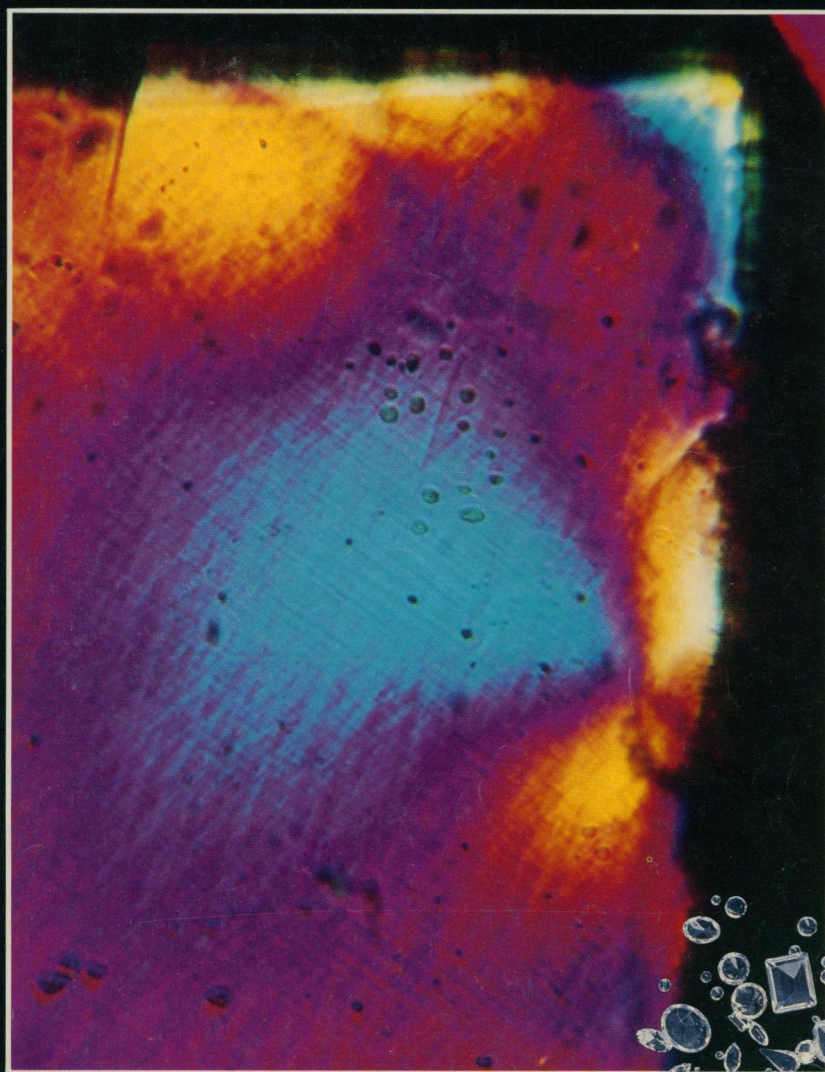
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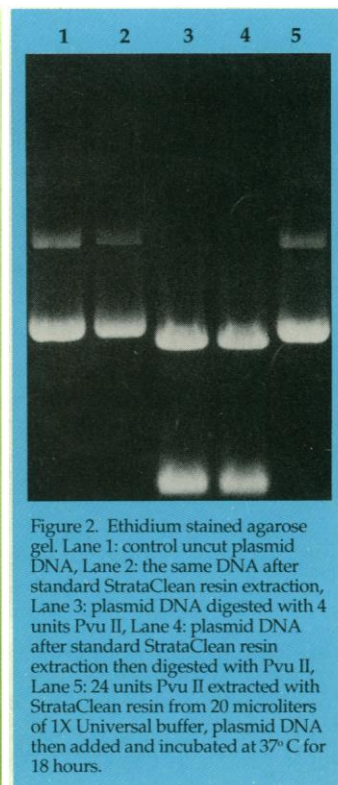
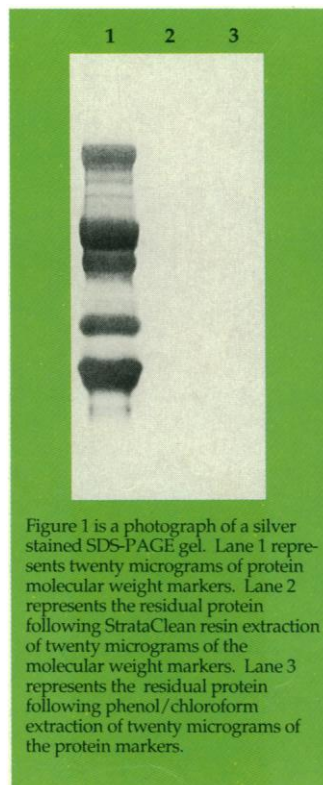
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COVER Optical image of a 6.0-micrometer-thick single-crystal diamond film grown by chemical vapor deposition, together with gem-cut natural diamonds. Strain in the crystal causes the various colors in polarized light. Such films may form the basis for new kinds of electronic and optical devices. See Editorial, page 1637, and Molecule of the Year, p. 1640. [Diamond film made by A. Badzian and T. Badzian, micrograph by Barry Scheetz, Pennsylvania State University, University Park, PA 16802; photograph of gem-cut diamonds by Randy Duchaine/The Stock Market]

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This Week in SCIENCE

Biomass burning in the tropics

IT has been much easier to quantify the amount of fossil fuel burned each year throughout the world than the amount of biomass. Biomass burning is not a regulated activity; it is engaged in mainly by farmers and settlers in developing countries for such diverse purposes as clearing of forests, heating of homes, weed and pest control, cooking, and religious ceremonies. Nonetheless, burning of wood, dung, and agricultural wastes is a big enterprise: in the 1960s, for example, slash-and-burn agriculture was practiced by some 200 million people. Crutzen and Andreae present quantitative estimates of the amount of biomass burning that is occurring today in the tropics (page 1669). They describe how the gases and smoke particles that are produced by burning affect the atmosphere and terrestrial ecosystems. Tropical biomass burning has local, global, and atmospheric impacts, and its effects are directly tied in with such well-documented phenomena as ozone depletion, photochemical reactions in the atmosphere, acid precipitation, and greenhouse warming.

Breast cancer markers

IDENTIFICATION of markers—either gene mutations or changed phenotypes—that segregate with enhanced susceptibility to breast cancer would make possible closer monitoring of the development of breast cancer in women and earlier therapeutic interventions. Two papers this week describe potential markers. Hall *et al.* carried out linkage analyses in Caucasian families and found that susceptibility to early-onset breast cancer (where disease diagnosis occurs at or below age 45) is associated with the genetic marker D17S74 in chromosomal region 17q21 (page 1684). In a separate study Skolnick *et al.* tracked a genetic susceptibility to both proliferative breast disease and frank disease. This susceptibility gene was more common than previously noted and segregated with disease in families in which both premenopausal and

postmenopausal cancer occurs. Proliferative breast disease, a premalignant state in which benign breast lesions arise, can be detected by biopsies and might be an effective early phenotypic marker (page 1715). The significance of these papers and some caveats are discussed by Wright (page 1659).

Keystone species

THE removal of three related species (a guild) of kangaroo rats from their shared habitat in the Chihuahuan Desert of Arizona has led to permanent conversion of a desert shrubland to grassland (page 1705). In the dozen years since the kangaroo rats were taken from the experimental plots, tall grasses filled in between the shrubs, large-seeded plants replaced those with smaller seeds, litter accumulated, snow melted more slowly, seed-eating birds decreased in number, and six new species of rodents took over. The kangaroo rats proved to be the “keystone guild” of the ecosystem whose removal was directly responsible for initiating the dramatic ecologic changes. Typically, kangaroo rats hunt for large seeds and disturb the soil as they forage and burrow; in their absence, large-seeded plants can gain a colonization edge and tall grasses can grow and establish a grassland habitat. The Chihuahuan plots are situated close to the natural zone of transition between desert and grassland. At such a boundary both biotic and climate changes can alter the ecosystem. Brown and Heske point out that an understanding of the part played by keystone species might help in the redressing of imbalances at boundaries when they develop in the future under natural conditions.

Transporter proteins in immunity

THE immune system reacts to small peptides of larger antigens. The peptides are presented to responsive T cells by major histocompatibility antigens that are on the surfaces of antigen-presenting cells. Differ-

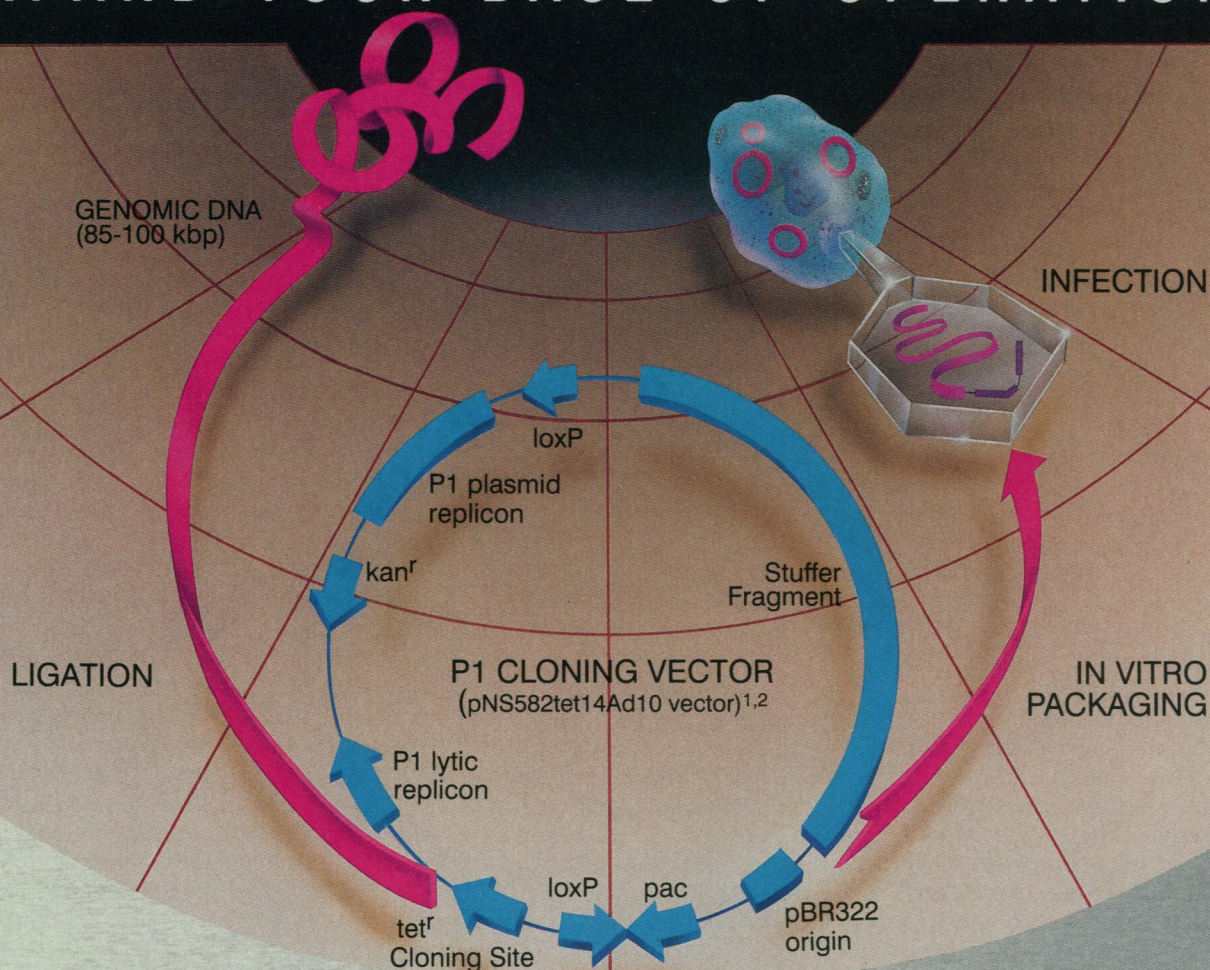
ent types of responses can be elicited, depending on which histocompatibility antigens are involved (class I or class II) and where the peptides originated (inside or outside the cell). In general, the steps in the processing and presentation of antigen and the intracellular sites where peptide fragments are generated have not been delineated. Two genes that appear to play a role in these processes have now been identified (page 1723). Complementary DNA for HAM1 and HAM2 was cloned, and both the sequences of the predicted protein products and the predicted secondary structures showed strong homology with those of members of a superfamily of transport proteins. Monaco *et al.* propose that the products of HAM1 and HAM2 may be transporters of the antigenic peptides to sites where they join up with histocompatibility molecules. On page 1657 Barinaga discusses transporter proteins in this and other experimental systems.

Immune proteins of infected insects

INSECTS can produce both cellular and humoral immune responses; although their humoral responses include several different proteins, antibody-like molecules were not thought to be among them. However, studies of giant silk moths infected by bacteria showed that the silk moth pupae produced an antibacterial protein that had domains much like those of immunoglobulins (page 1729). The protein hemolin, which appears in the hemolymph, was similar in both sequence and organization to proteins in the immunoglobulin superfamily. It could bind to the bacteria but did not kill them; on the surface it formed a complex with other protein molecules, and this complex may have triggered molecular events that produced the antibacterial response. Sun *et al.* discuss the possible significance of structural homologies between hemolin and a membrane-associated protein, neuroglian, that is involved in cell-cell interactions in the insect nervous system.

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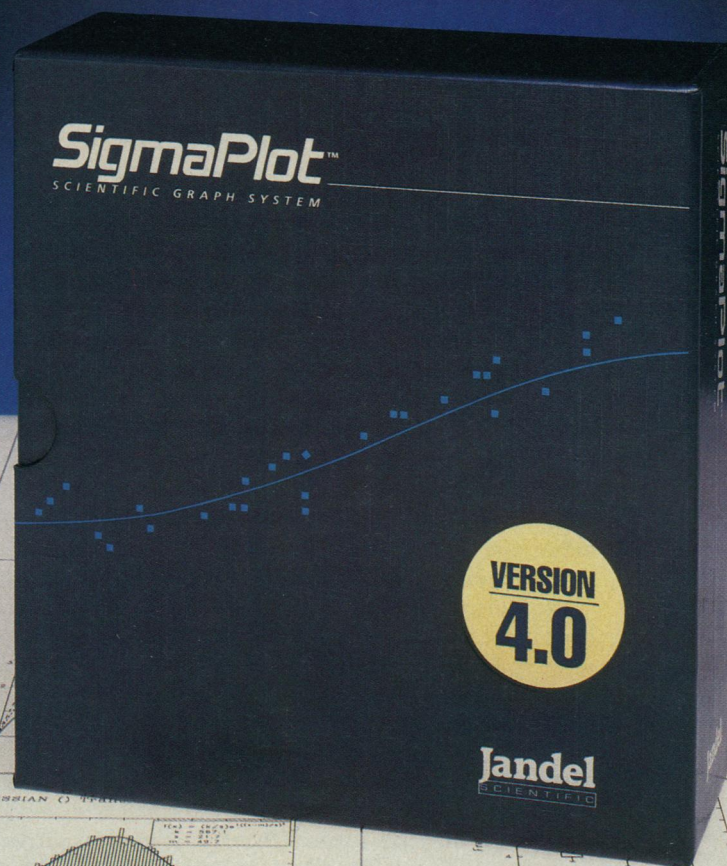
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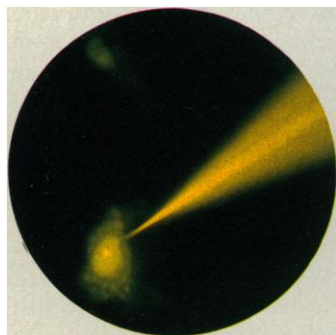
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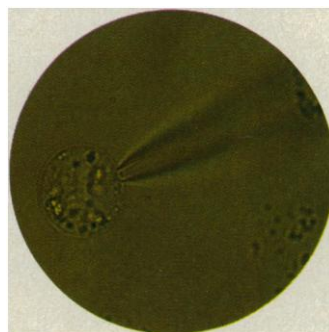
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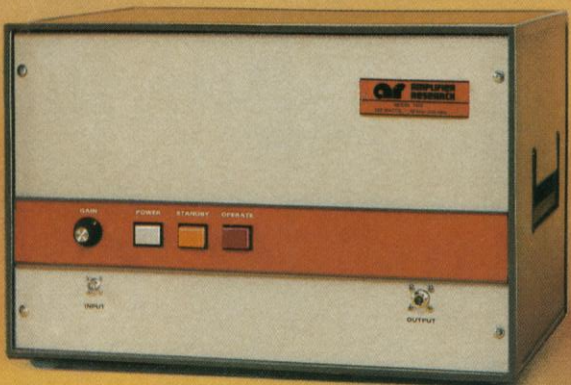
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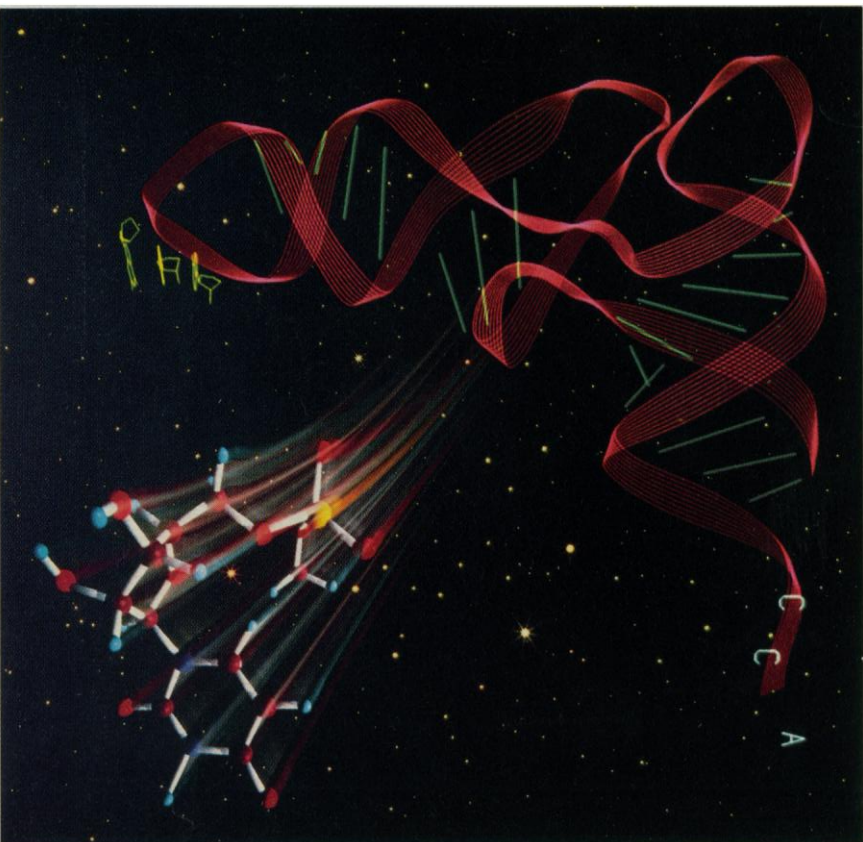
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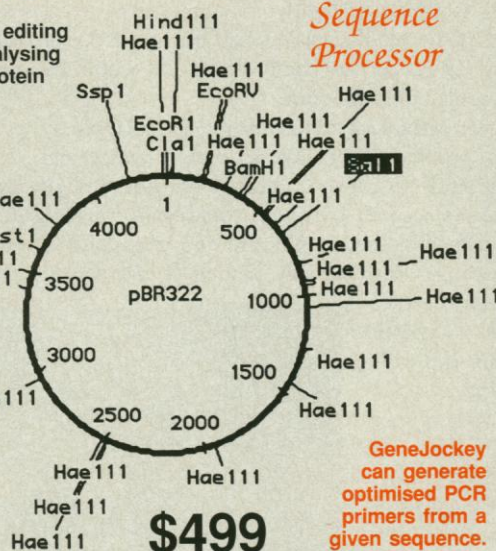
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