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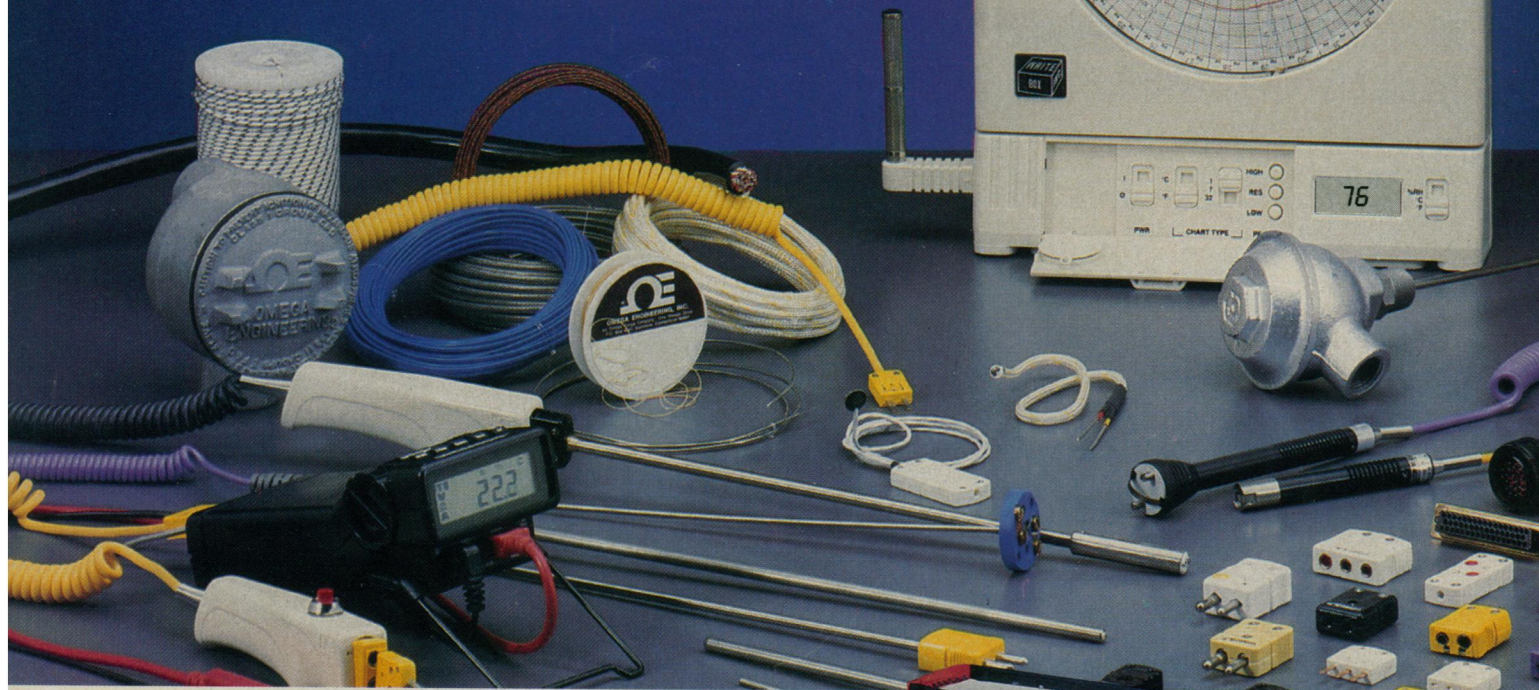
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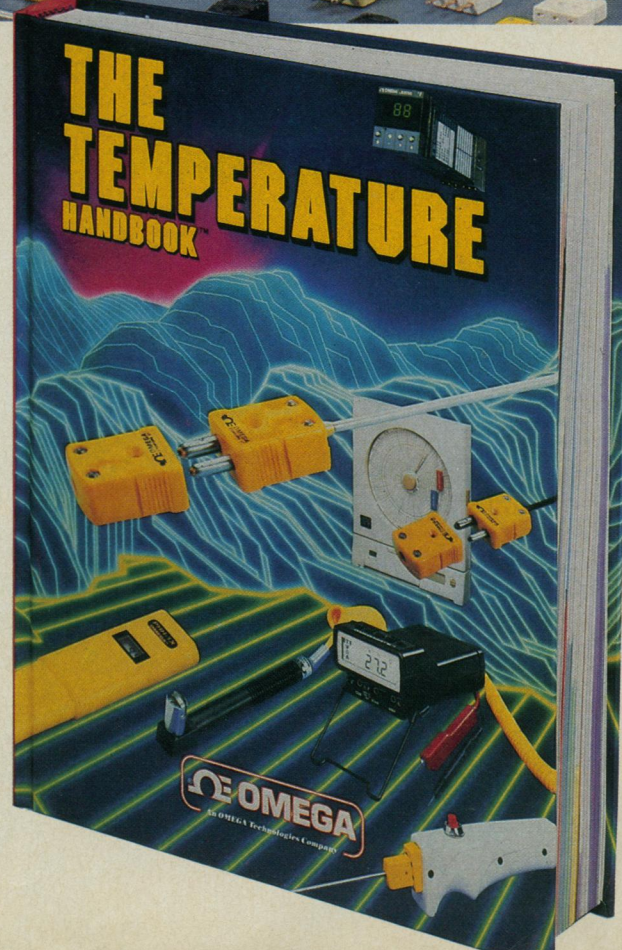
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COVER The mouth of a borehole drilled to the bottom of ice stream B, West Antarctic Ice Sheet. By means of such boreholes, about 1050 meters deep, observations of physical conditions at the base of the rapidly moving ice stream have been made (see page 57). Frost crystals have formed around the hole during overwintering. The mouth of the hole at the snow surface is defined by a circle 12.5 centimeters in diameter cut in plywood. [Photo by B. Kamb]

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This Week in SCIENCE

Glacial stability

How stable are the earth's great ice sheets? This issue is of concern because if global warming occurs and if the ice sheets can break up and melt easily, sea level could rise dramatically. One source of instability in the large West Antarctic Ice Sheet is its ice streams (page 57). Such streams, flowing at rates 10 to 100 times that of the rest of the ice sheet, are responsible for transporting much of the flow of ice into the ice shelves. The mechanisms that account for ice stream flow are not yet clear, but investigations are now under way to determine the dynamics and physical conditions of these currents. Englehardt *et al.* have drilled a series of boreholes (cover) through one of the West Antarctic ice streams; they measured temperatures throughout the stream, recorded water pressure at the base, and sampled material beneath the ice. Water at high pressure is present at the base of the glacier and may lubricate the sliding ice stream by supporting much of the weight of the overlying ice. Glacial till between bedrock and the base of the glacier shows signs of shear deformation and may also help accommodate flow.

Eggshell chronology

OSTRICH eggshells are virtually ubiquitous in African archeologic sites: for almost 2 million years the eggs have been eaten, and shells have been used for storing water. Brooks *et al.* found that, despite exposure to various laboratory heating and leaching conditions, organic components of eggshells stand up well; changes that occur are predictable with time (page 60). Because first-order kinetics govern the conversion of isoleucine to alloisoleucine, the ratio of these two can serve as a powerful and reliable chronologic indicator. Eggshell dates in the tropics are accurate back some 200,000 years and in colder regions to perhaps 1,000,000 years ago. The validity of the technique was illustrated at two African "Middle Stone Age" sites

where radiocarbon data and informative artifacts are also available. Eggshell chronology fills a crucial gap, covering the period beyond which radiocarbon dating is effective and before which potassium argon dating is accurate. Many hominid fossils have been recovered in this gap, and thus eggshell chronology should be helpful in clarifying milestones in hominid evolution.

Fluorescent imagery

HIGH-RESOLUTION three-dimensional images of the distribution of fluorescent markers in cells have been obtained with two-photon laser scanning fluorescence microscopy (page 73). Two long-wavelength photons from a rapidly pulsing laser are absorbed simultaneously by a fluorophore or dye molecule; the combined energies of the two photons excite the molecule and fluorescence is emitted. Two-photon scanning beams can also release "caged" molecules—inactive ions, neurotransmitters, and nucleotides that can be converted to active form by light; release of caged molecules at specific cellular locales is a powerful noninvasive tool for visualizing cell chemistry. Denk *et al.* present images of fluorescent latex beads and live dividing cells in which chromosomes are stained with a fluorescent tag. In the prototype experiments, no noticeable morphologic damage was sustained by the cells. (In contrast, conventional illuminators that expose cells to the same amount of energy cause extensive cell damage.) It is thus possible that this technique will be nondestructive enough to permit protracted observations of cells.

Papilloma protein

CERTAIN papillomaviruses cause anogenital cancers in humans; tumor induction may occur when viral proteins interfere with normal functioning of tumor suppressor genes. One suspect viral protein is E6. Werness *et al.* show that E6 binds in

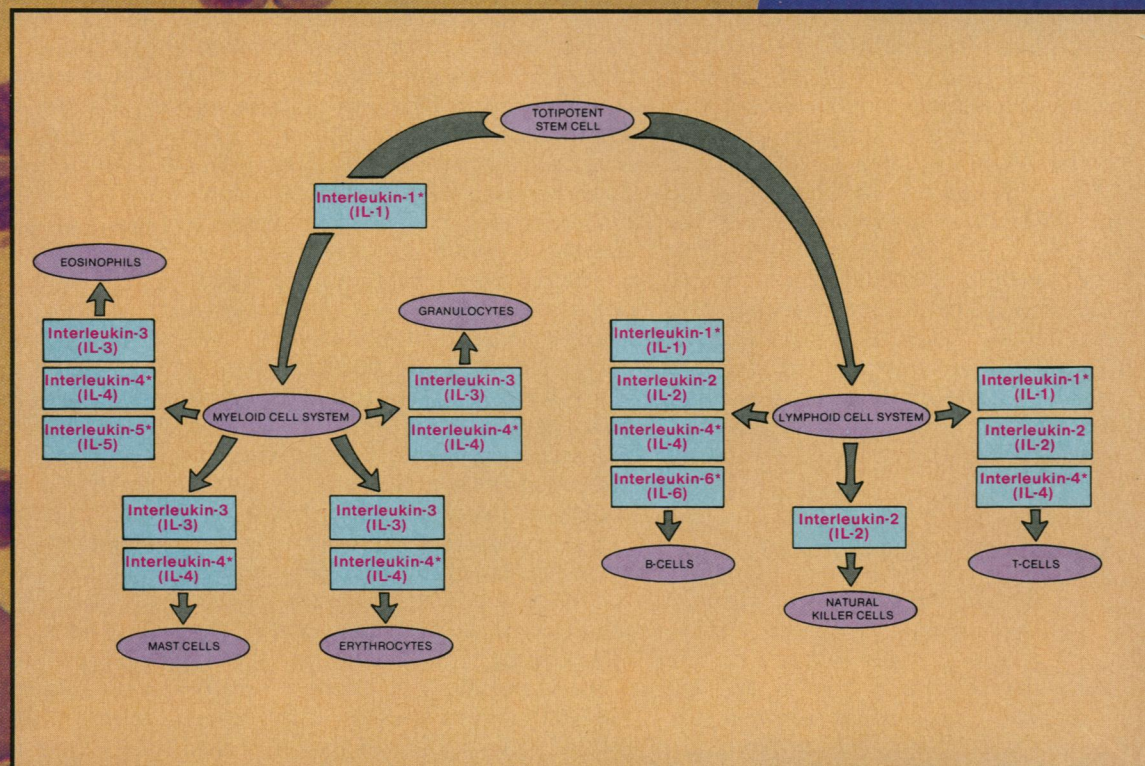
vitro with the host tumor suppressor protein p53 that normally inhibits cell growth (page 76). This interaction may block p53 activity. The ability of E6 from different papillomaviruses to bind to p53 was correlated with the ability of each virus to transform cells in vitro and with its clinical behavior: E6 from "high-risk" viruses that cause cervical cancer could bind p53 but E6 from "low-risk" wart-causing viruses did not. The small DNA tumor viruses—papillomaviruses, adenoviruses, and SV40—have small genomes, and it is therefore reasonable that they exert carcinogenic effects through interactions with and modifications of activities of host cell proteins; in fact, other examples of interactions of DNA virus proteins with p53 and with other tumor suppressor genes are known.

Oncogene actions

EXPERIMENTALLY, two structurally similar oncogenes tend to transform different types of cells—*erbB-2* is most potent at transforming 3T3 fibroblasts whereas *EGFR* is most potent at transforming 32D hematopoietic cells. Clinically, overexpression of each of the two genes is also typically associated with different types of tumors. Thus, it might be expected that dissimilar domains of the protein products of these two genes would induce mitogenic signals in cells in which the genes are expressed. However, studies by DiFiore *et al.* show that a highly conserved (80% homology) domain of the gene products—the tyrosine kinase (TK) domain—is in both genes directly involved in transducing signals that drive cells to proliferate (page 79). In chimeric genes, the source of the TK domain determined which cell type would proliferate: when TK was from *EGFR*, 32D cells formed colonies; when TK was from *erbB-2*, 3T3 cells proliferated. Thus, the TK domain may link up with and transduce signals through different intracellular components of mitogenic pathways in different cell types.

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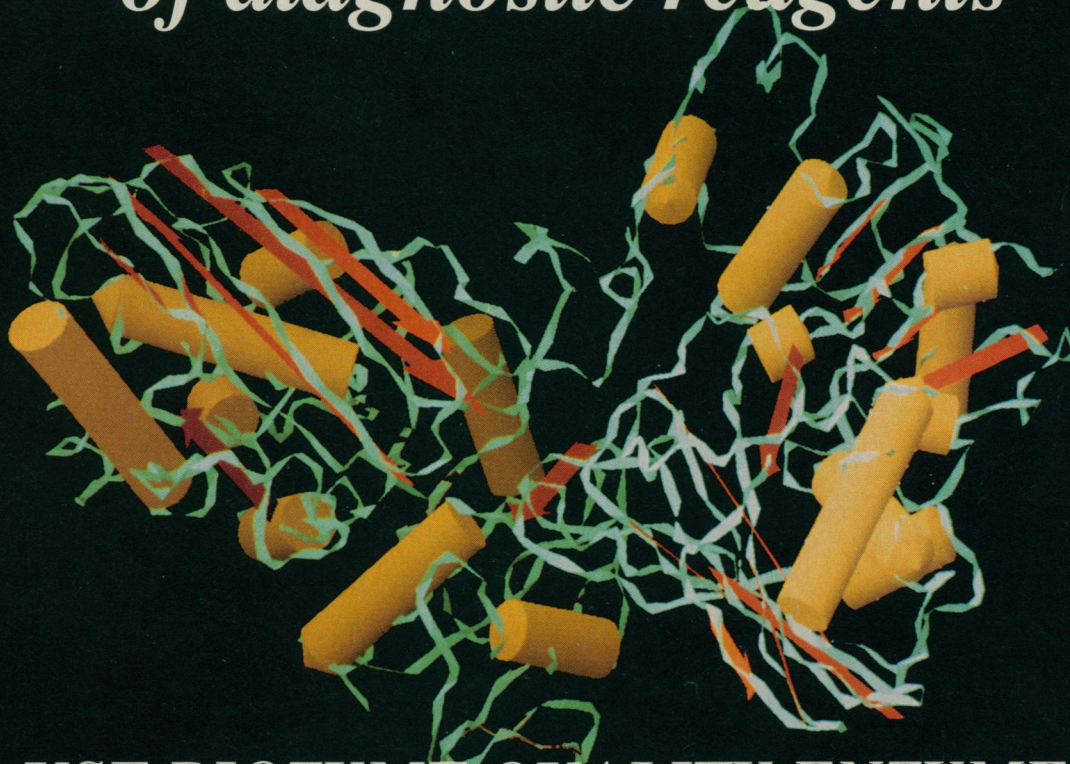
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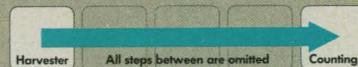
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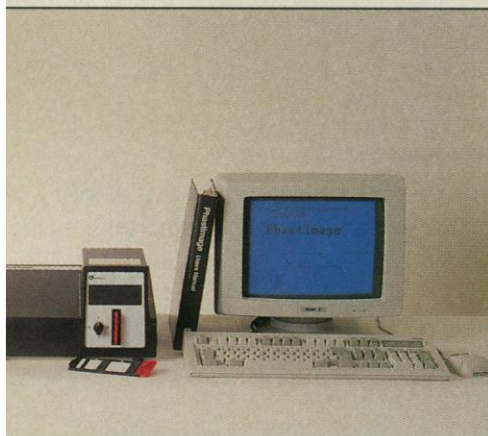
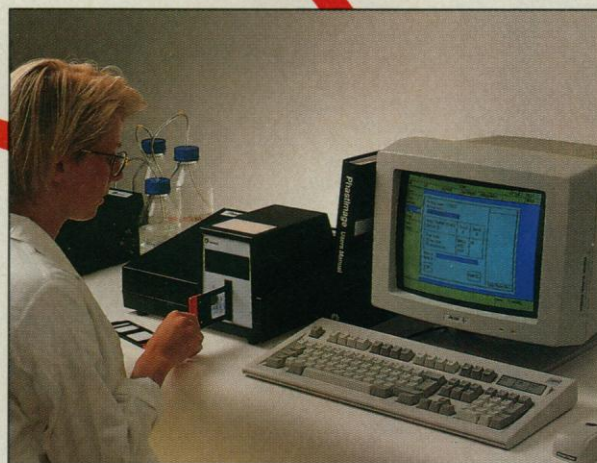
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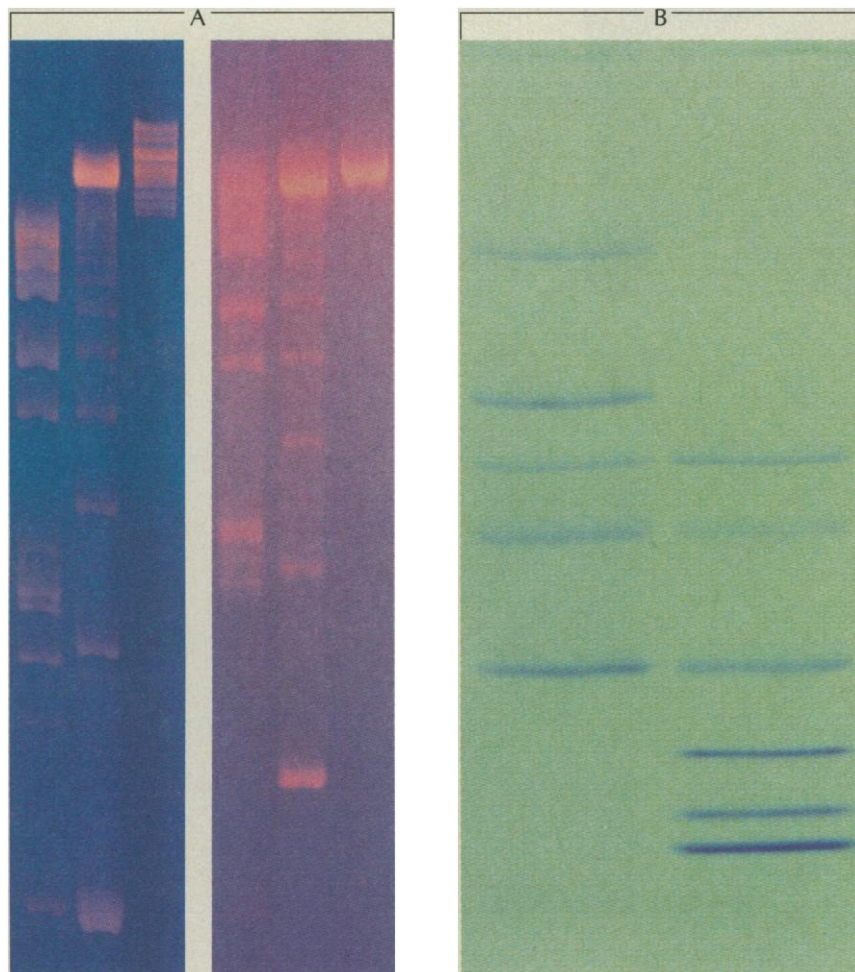
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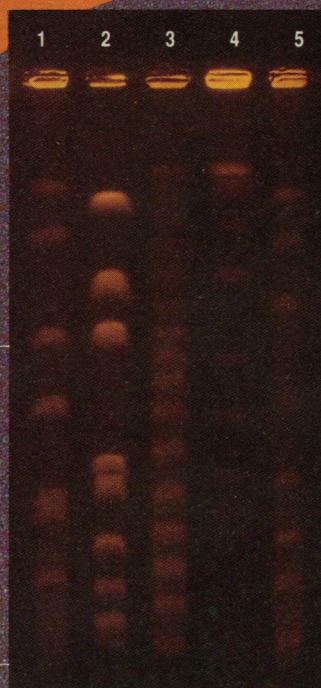
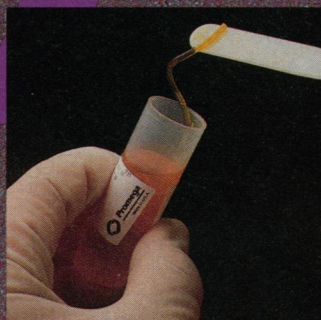
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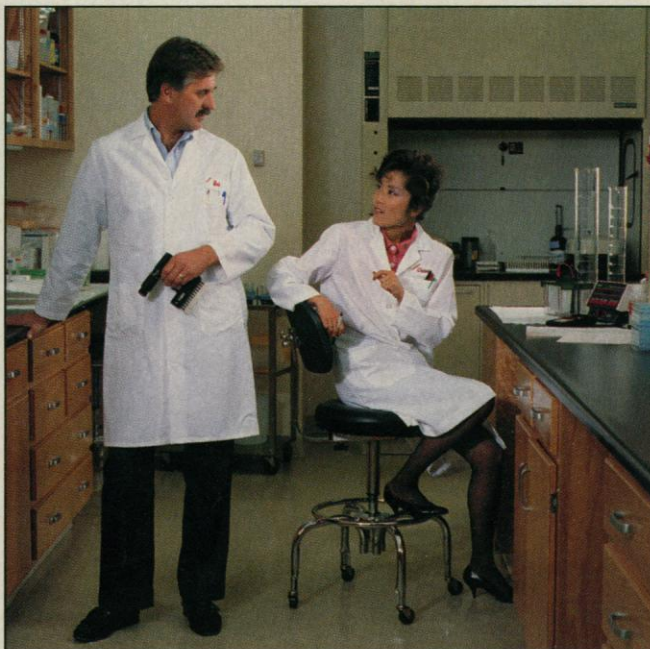
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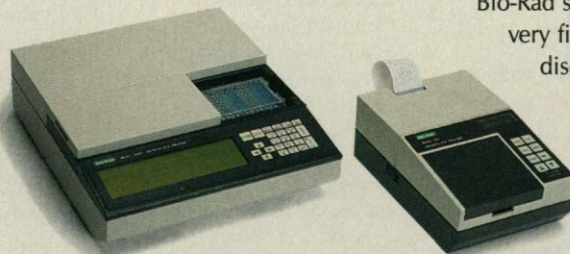
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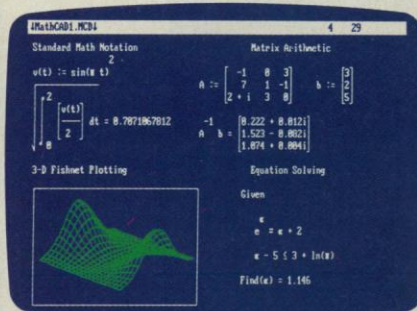
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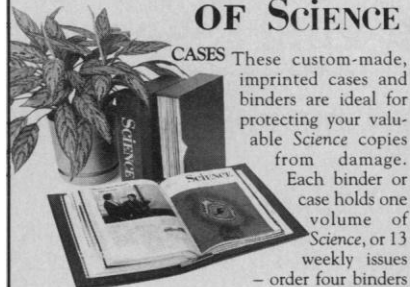
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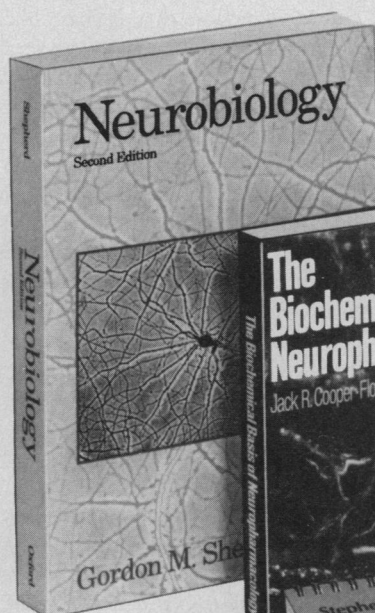
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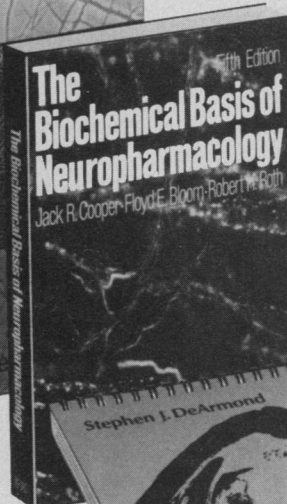
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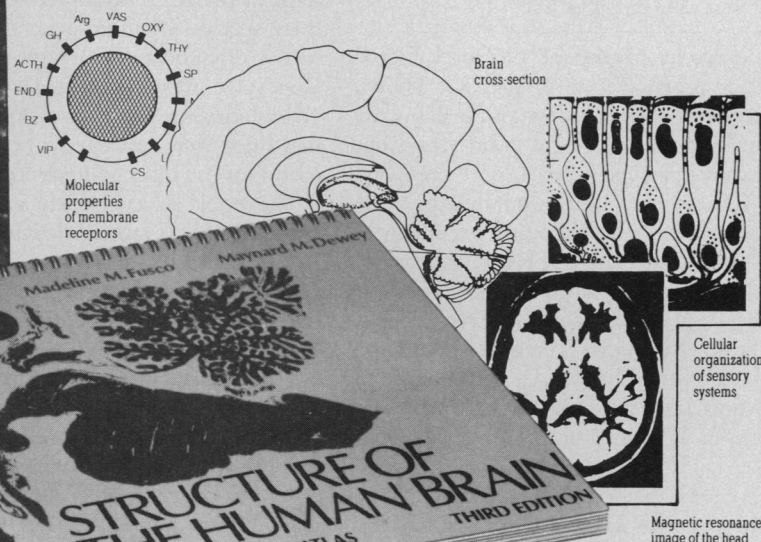
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