

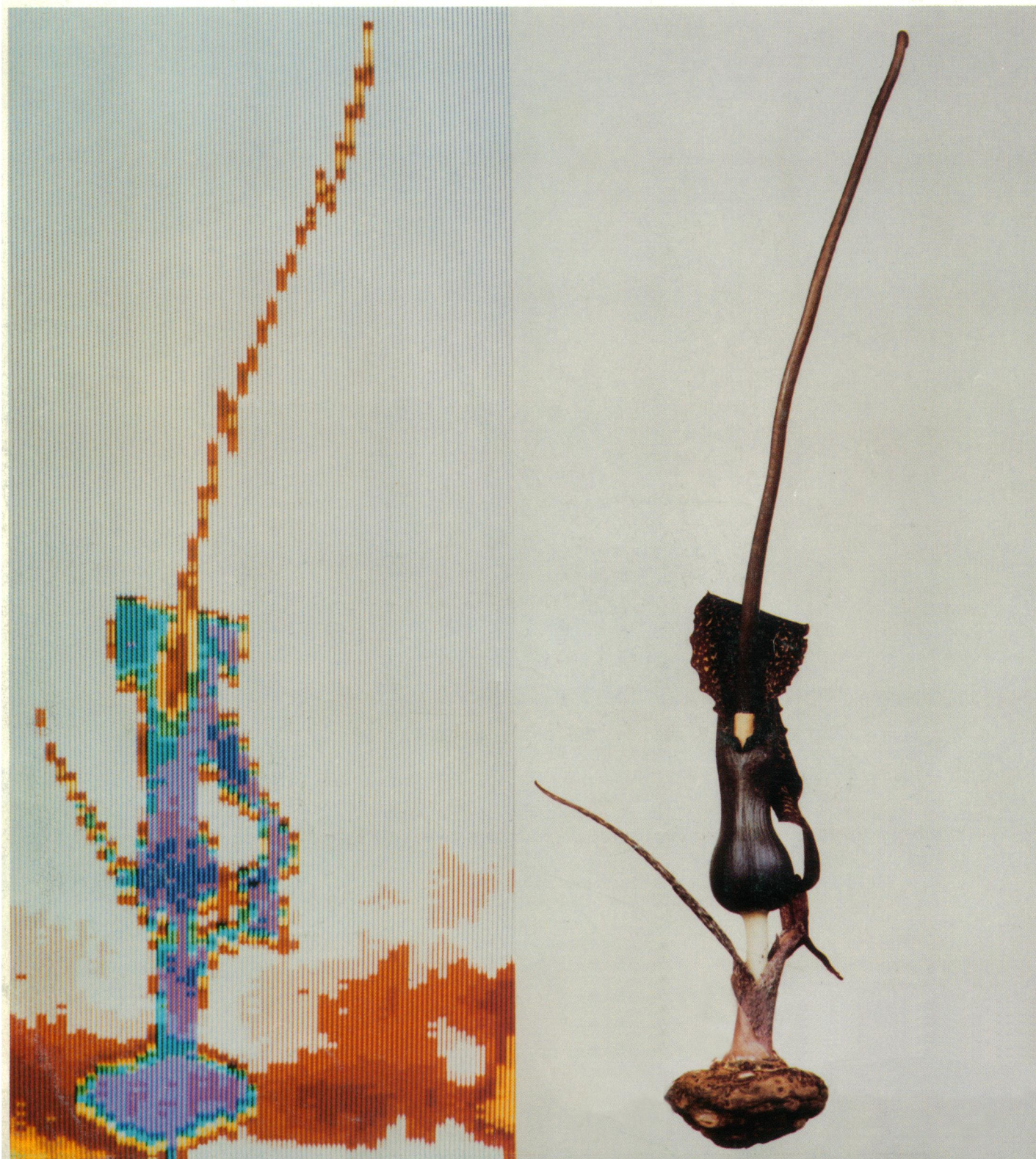
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COVER The thermogenic inflorescence of *Sauromatum guttatum* Schott, voodoo lily (right) and its thermographic image (left) on the day of flowering. Each 1°C difference in surface temperature corresponds to a different color. The appendix, upper cylindrical part of the inflorescence, is about 9°C warmer than the rest of the plant. This heating is triggered by salicylic acid which moves into the appendix 1 day before inflorescence unfolding. The heat is used to volatilize putrid-smelling compounds attractive to insect pollinators. See page 1601. [M. E. Nuttall, Photo Services, Du Pont Experimental Station, Wilmington, DE 19898]

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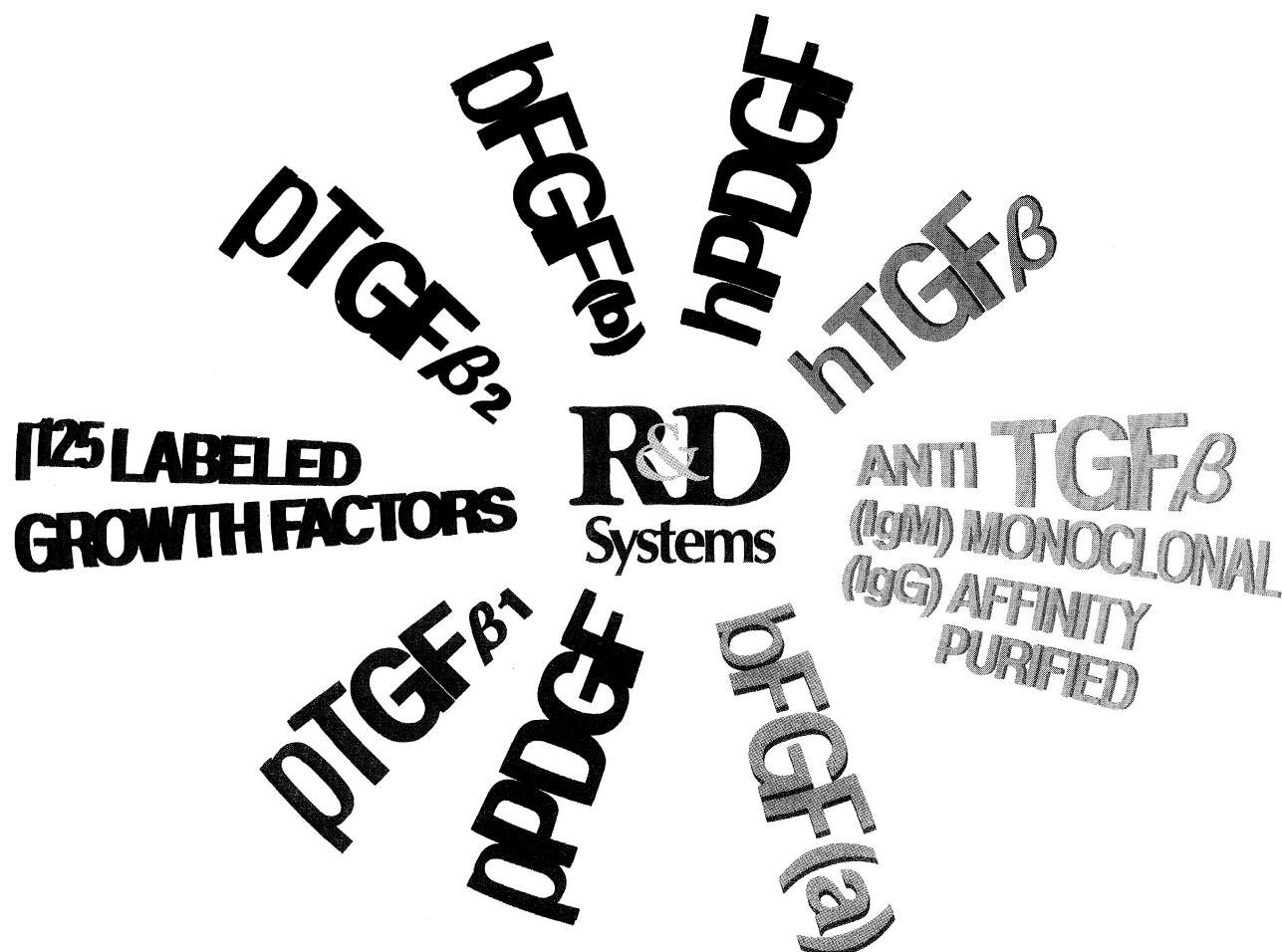
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- 3 Human platelet derived growth factor h(PDGF) is assayed on Balb/c-3T3 and NIH-3T3 cells for H³-thymidine incorporation as per Raines and Ross, Meth. in Enz. 109, p749.
- 4 Porcine PDGF is structurally very different from hPDGF (i.e. differs in M.W., subunit composition, N-terminus), it's activity is determined as in 3 above.
- 5 Both the acidic and basic forms of bovine fibroblast growth factor are isolated from brain and assayed for H³-thymidine incorporation on NR6-3T3 cells after Gospodarowicz, et al JBC, 253, p3736, 1978.

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This Week in SCIENCE

Biomaterial implants

IN clinical medicine, artificial organs, extended-wear contact lenses, dental implants, and other biomaterials are being used with increasing frequency (page 1588). These tissue substitutes integrate within host tissue; for the integration to succeed, available “dangling bonds” on the surface of the implanted biomaterials must be filled with cells of the host. With each implant, there is a race for surface sites between host cells and bacteria. Sometimes bacteria win the race, sabotage the “take” of the implant, and cause severe and even fatal infections. Gristina describes the desirable surface features for implant materials, physical and chemical interactions that take place between surfaces and bacterial or host cells, host immune defenses that affect implantation, types of bacteria that most often colonize implants, and ways in which the success rate of biomaterial implants can be increased.

Voodoo lily heater

VOODOO lilies and certain other related plants heat up before they flower (cover); the “calorigen” that causes heating is 2-hydroxybenzoic acid, commonly called salicylic acid (page 1601). On the day when a plant will flower, the upper part of the tall flowering structure unfolds and becomes hot. The heat causes some of the plant’s smelly amines and indoles to evaporate and these chemicals attract insect pollinators. The temperature may rise as much as 14°C that afternoon but returns to ambient temperature by night; somewhat later the same evening, the plant’s pollination chamber heats up. Raskin *et al.* purified the heat-inducing substance from voodoo lilies and identified it by mass spectrometry; heating and odor production were then induced through the application of crude or purified salicylic acid to plants. In the 5-day period leading up to flowering, the plants were sensitive to salicylic acid; on the day of flowering, the temperature always peaked 4.5 hours after plants were exposed to light, thus

showing the dependence of this process on daylight. The facilitation of flowering and pollination is but one role that has been defined for salicylic acid in these plants.

Haughton Astrobleme

AN asteroid hit Devon Island in the Canadian Arctic 22.4 ± 1.4 million years ago in the Miocene Epoch (page 1603). It left behind on the island the Haughton Astrobleme, a large circular scar with a diameter of 20 kilometers that has both the gross and fine shock features that characterize impact craters. After the impact, the multiring crater filled with water and sediments; the sediments retain fossils of flora and fauna that once lived in the area. Omar *et al.* were able to establish the time of the asteroid impact through nuclear fission-track dating of some of the crater’s sedimentary materials. Tracks left in the mineral apatite by alpha particles that escape from decaying uranium nuclei are visualized, and the density and number of tracks is related to the elapsed time since the apatite was shocked and all previous tracks were obliterated, that is, since the impact. The precise determination of the time of the asteroid impact provides a valuable reference point for the biochronology of the arctic; this marker will contribute to an understanding of the evolution and the succession of the flora and fauna in this isolated region.

Alaskan dinosaurs

DURING the Late Cretaceous Period some dinosaurs lived far to the north close to the Arctic Ocean, where, each winter, they probably experienced months of total darkness (page 1608). The Alaskan location at which dinosaur bones and pollen and spore fossils were collected marks the most northerly paleolatitude yet discovered for dinosaurs: the site probably was situated between 70° and 85° North during the Late Cretaceous. At this high latitude, most vegetation would have been seasonal, and the dinosaurs may

have entered a state of torpor, slowing their activities and metabolism considerably in order to endure the long winter. (An alternative is that these dinosaurs migrated south each year, but the great distance to a year-round food source and the mix of bones of old and young individuals in the collection make this scenario less likely.) Brouwers *et al.* speculate that something other than an impact may have caused the extinction of dinosaurs at the Cretaceous-Tertiary boundary, because at least these Alaskan dinosaurs were adapted to and should have been able to withstand the adverse conditions—months of dark and cold—that an impact is thought likely to have triggered.

Duchenne muscular dystrophy gene

PATIENTS with Duchenne muscular dystrophy (DMD) have severe cardiac and mental abnormalities; those with Becker muscular dystrophy have similar but milder pathologies (page 1620). In 20 women, these diseases have been associated with a gene that maps to a region of the X chromosome where a piece of chromosome 21 has been translocated; although only one X chromosome has this diagnostic translocation, carriers develop disease because their normal X chromosome is preferentially inactivated. Bodrug *et al.* studied the sequence of nucleotides at the translocation junction of the disease-causing X chromosome of one woman with DMD; comparisons were made with sequences at corresponding regions of derived and normal (unrearranged) X chromosomes and chromosomes 21. No major structural changes were found at the junction. However, small deletions (about 100 base pairs total) and some minor differences were found; in addition, a repeated tetranucleotide—possibly a recognition site for an enzyme catalyzing the translocation process—was found on both sides of the breakpoint. How these or other minor changes occur and whether they are causally associated with the development of disease remain to be determined.

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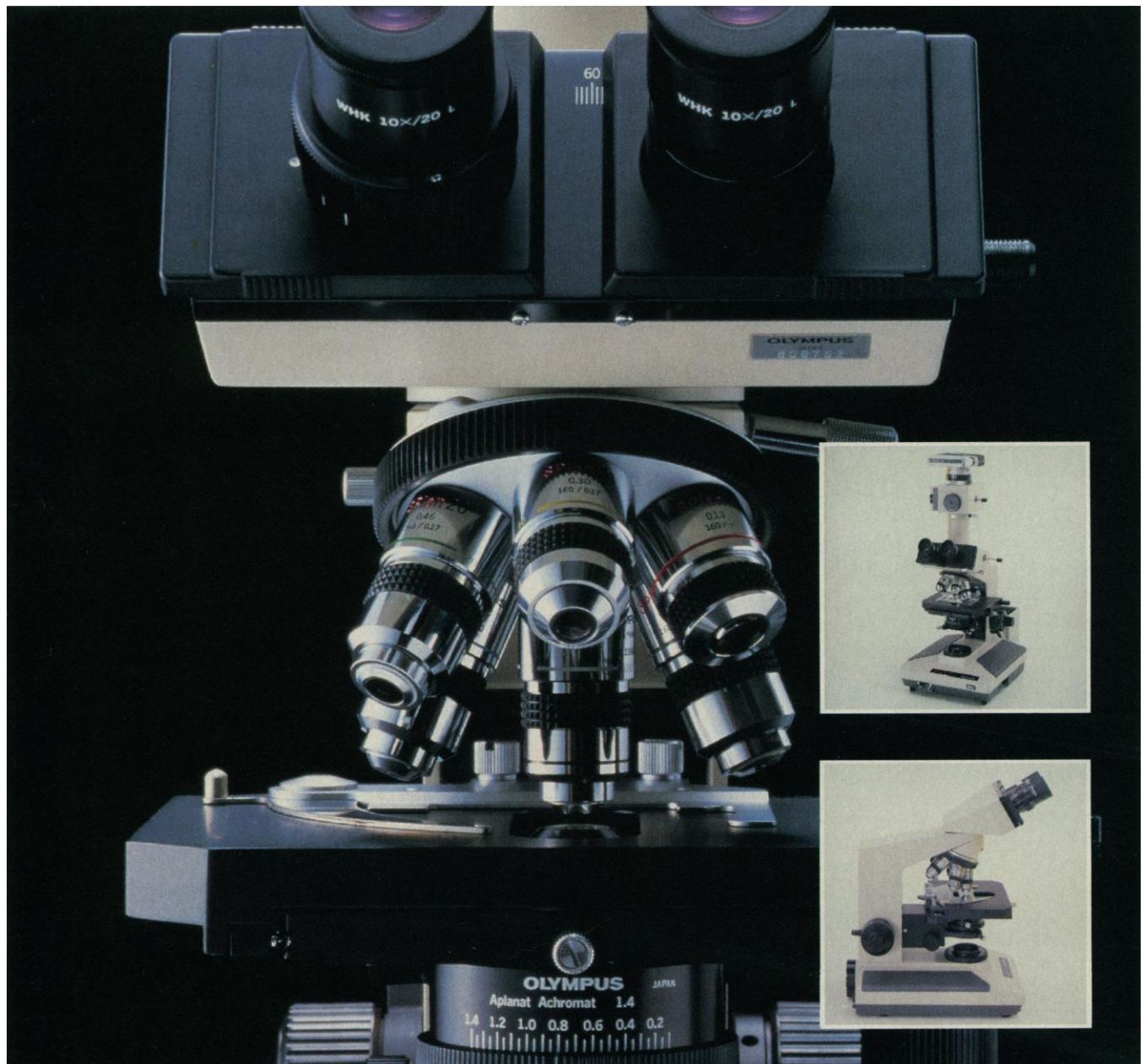
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California's Proposition 65

Impending implementation of the recently enacted California law entitled Safe Drinking Water and Toxic Enforcement Act of 1986 is causing concern among a substantial fraction of companies doing business in California. The groups affected include grocery manufacturers, producers of alcoholic beverages, the chemical industry, and restaurants. Anxiety is mounting because part of the law will become effective 1 March 1988, and there is uncertainty about what must be done to comply with it. Beyond that, the law contains a "bounty hunter" clause that is likely to lead to an enormous amount of litigation. Individuals can file suits against alleged violators of the law and share 25 percent of any fines. It costs only a few hundred dollars to file a suit. Defending against one may involve millions of dollars.

The new law has two major parts—one dealing with drinking water, the other requiring a warning before exposure to chemicals known to cause cancer or reproductive toxicity. It is the second part that becomes applicable on 1 March. This part of the law states, "No person in the course of doing business shall knowingly and intentionally expose any individual to a chemical known to the state to cause cancer or reproductive toxicity without first giving clear and reasonable warning to such individual. . . ."

The Grocery Manufacturers of America pointed out that virtually all food naturally contains arsenic and other trace elements known to be carcinogenic. Thus they estimate that 15,000 items on a supermarket's shelves may have to be identified as carcinogenic. The law does provide an exemption: "An exposure for which the person responsible can show that the exposure poses no significant risk assuming lifetime exposure at the level in question for substances known to the state to cause cancer, and that the exposure will have no observable effect assuming exposure at one thousand (1000) times the level in question for substances known to the state to cause reproductive toxicity. . . . [T]he burden of proof that an exposure meets the criteria of this subdivision shall be on the defendant."

The proviso about reproductive toxicity has the effect of requiring the labeling of common table salt as a reproductive toxic agent. The same is true of beer or wine. Ultimately when more tests have been performed on other substances that are ingested, most of them too are likely to be deemed toxic if the reproduction criteria of the law are applied.

Ultimately, roasted or broiled food will be added to the list of toxics, for they contain carcinogens. Thus the law will then require that those who dine out be informed that the wine is a carcinogen and a reproductive hazard, and when served their food, they will be told that their charbroiled steak is also carcinogenic. Such warnings will scarcely promote a romantic atmosphere or increased dining out.

Labeling a large number of items as carcinogens because they contain parts per billion of something of doubtful carcinogenicity will not enable the public to act more judiciously in safeguarding health. In fact, the opposite may be true. Milton Russell, who until recently was assistant administrator for Policy Planning and Evaluation at the Environmental Protection Agency has made the following comments in a different but similar context:

Real people are suffering and dying because they don't know when to worry, and when to calm down. They don't know when to demand action to reduce risk and when to relax, because health risks are trivial or simply not there. I see a nation on worry overload. One reaction is free floating anxiety. Another is defensive indifference. If everything causes cancer, why stop smoking, wear seat belts or do something about radon in the home? Anxiety and stress are public health hazards in themselves. When the worry is focused on phantom or insignificant risks it diverts personal attention from risks that can be reduced.

As time passes, many substances will be added to the state's list of carcinogens and reproductive toxins. Twenty months after they appear on the compilation, they will also be controlled by the drinking water part of the law. As a result, use of some agricultural chemicals is likely to be proscribed. Were Californians to find parts of the law irksome, it would not be easily changed. Modifying a California law that has been enacted by the initiative and referendum process is difficult and unlikely to be done soon.

—PHILIP H. ABELSON

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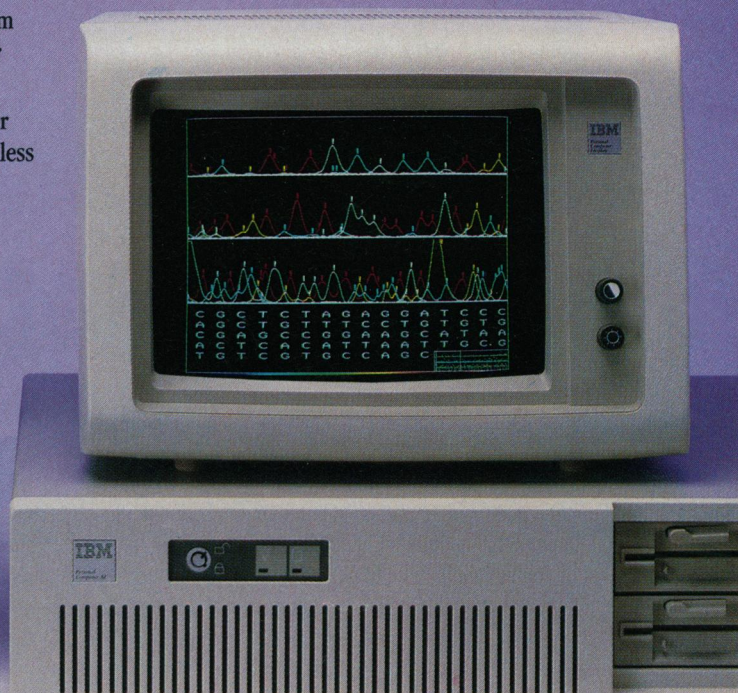
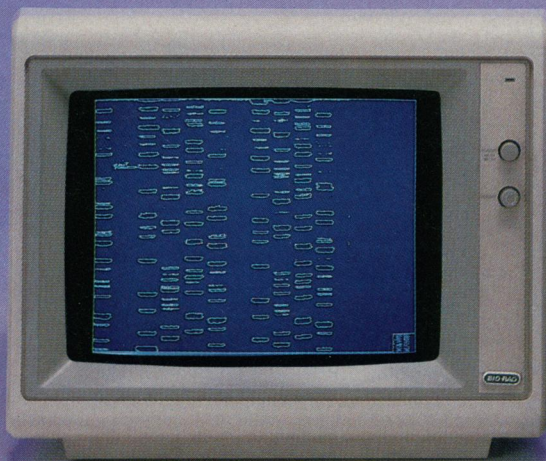
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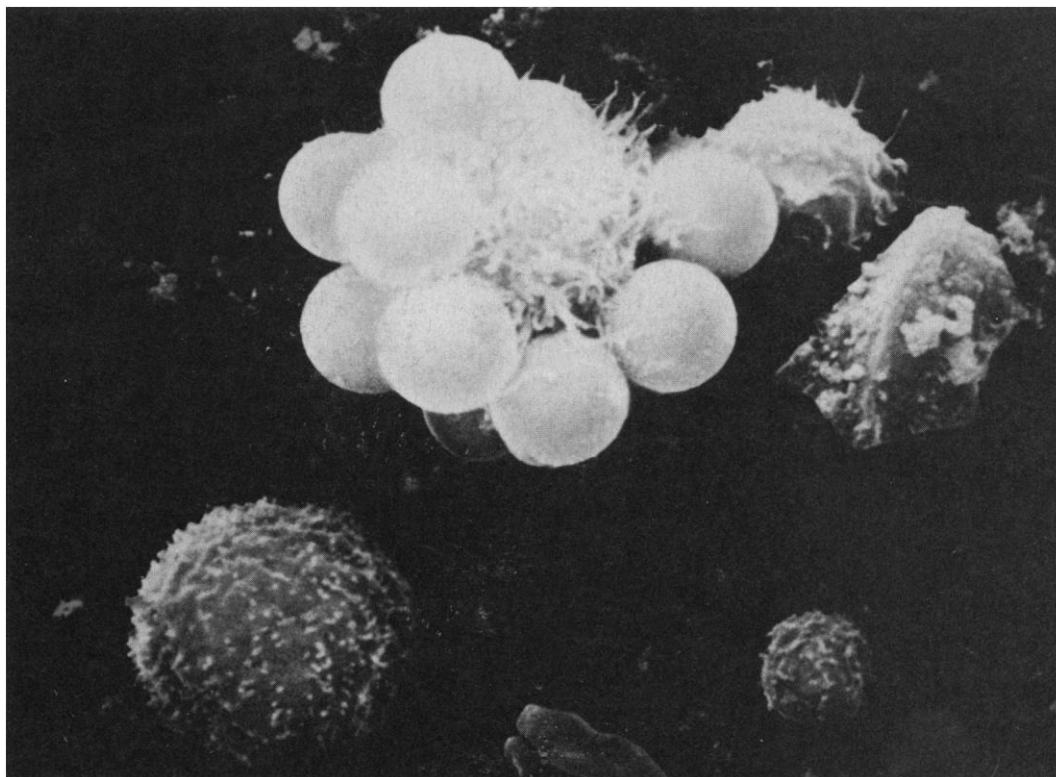
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DESIGN OF ENZYMES AND ENZYME MODELS**

November 2-4, 1987

The Westin Oaks Hotel, Houston, Texas

PROGRAM

Monday, November 2, 1987

- 9:00 **JACK S. JOSEY**, Welcoming of Guests
9:05 **EMIL T. KAISER**, Introductory Remarks
LONG-RANGE ELECTRON TRANSFER IN RUTHENATED PROTEINS
9:15 **HARRY B. GRAY**
Discussion to be led by **LOUIS B. HERSH**
STUDIES WITH METALLOPORPHYRINS WHICH RELATE TO THE CHEMISTRIES
OF CATALASE, PEROXIDASE AND CYTOCHROME P-450 ENZYMES
10:45 **THOMAS C. BRUICE**
Discussion to be led by **FRANCOIS N. DIEDERICH**
ARTIFICIAL ENZYMES
1:45 **RONALD BRESLOW**
Discussion to be led by **HAROLD KOHN**

Tuesday, November 3, 1987

- DESIGN OF ARTIFICIAL RESTRICTION ENZYMES
9:00 **PETER B. DERVAN**
Discussion to be led by **SIR DEREK BARTON**
THE USE OF SITE-DIRECTED MODIFICATION IN THE STUDY OF ENZYMES
10:30 **STEPHEN J. BENKOVIC**
Discussion to be led by **CARL O. PABO**
12:00 Luncheon
1:00 **HARRY G. DRICKAMER**, 1987 WELCH AWARDEE
DISSECTION OF THE STRUCTURE AND ACTIVITY OF AN ENZYME
2:15 **ALAN R. FERSHT**
Discussion to be led by **WILLIAM P. JENCKS**

Wednesday, November 4, 1987

- ENZYMES IN THE BIOSYNTHESIS OF POLYESTERS
9:00 **CHRISTOPHER T. WALSH**
Discussion to be led by **CHARLES S. CRAIK**
THE EVOLUTION OF ENZYME FUNCTION
10:30 **JEREMY R. KNOWLES**
Discussion to be led by **JOHN A. GERLT**

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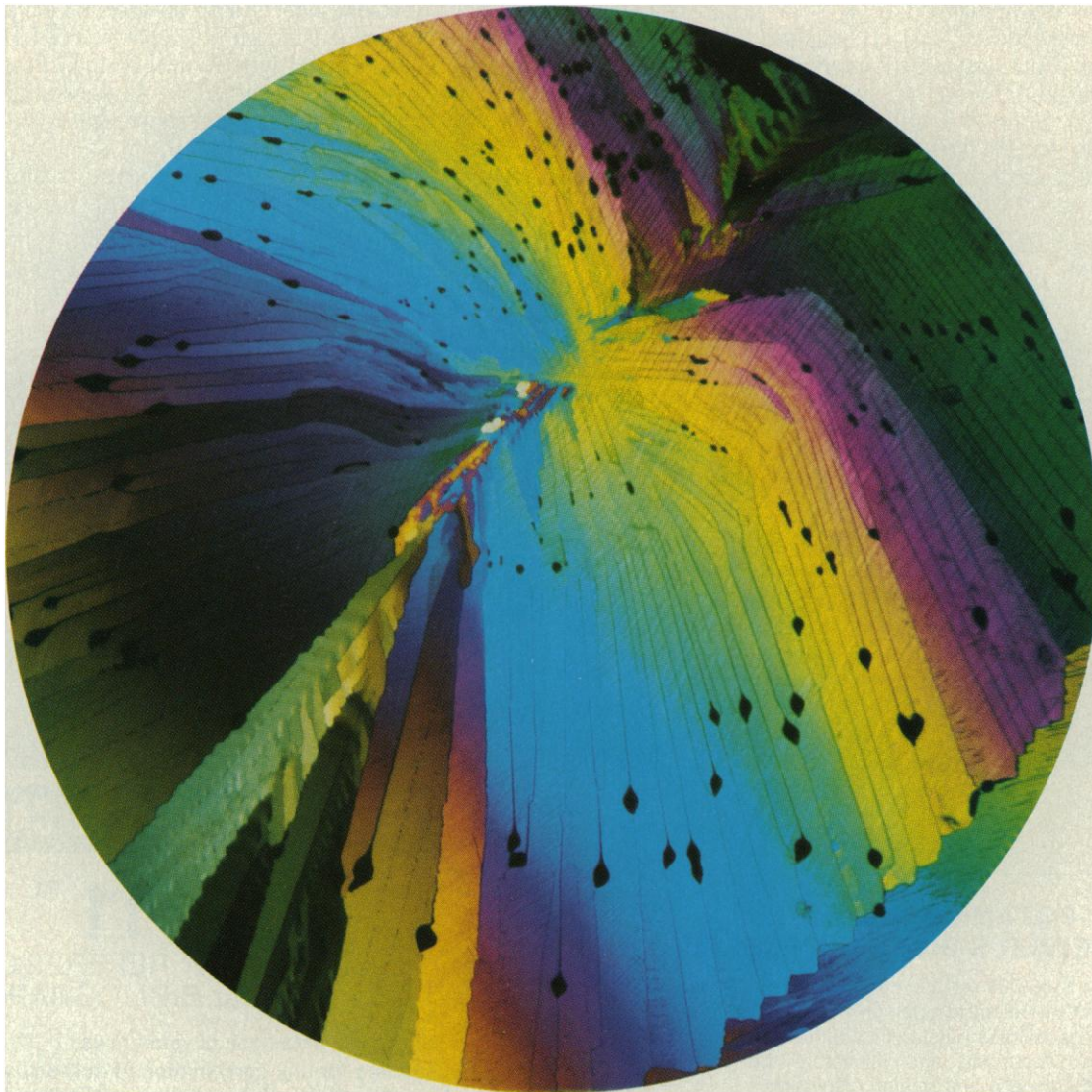


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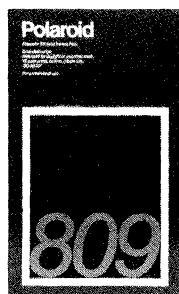
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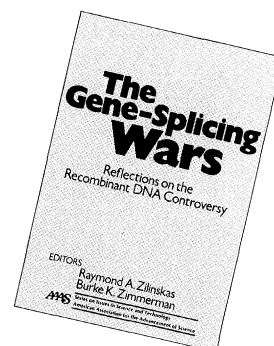
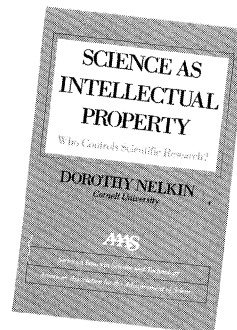
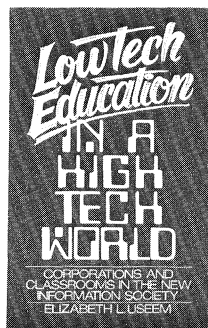
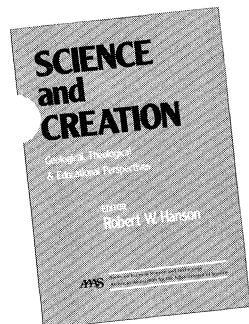
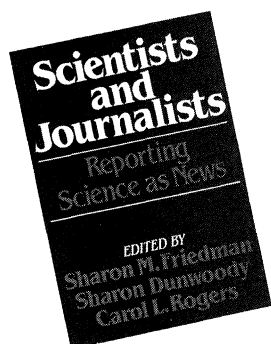
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When a paper is accepted for publication in *Science*, it is understood by the editors that (i) any materials necessary to verify the conclusions of the experiments reported will be made available to other investigators under appropriate conditions; (ii) all authors have seen and approved the final version of the manuscript; (iii) sequence and crystallographic data will be offered for deposit to the appropriate data bank; and (iv) a paper will not be released to the press or the public before its publication. If there is a need in exceptional cases to publicize data in advance of publication, the AAAS Office of Communications (202-326-6440) must be consulted.

Selection of Manuscripts

In selecting papers for publication, the editors give preference to those of general significance that are well written, well organized, and intelligible to scientists in different disciplines. An attempt is made to balance the subject matter in all sections of *Science*. Membership in the AAAS is not a factor in selection.

Accepted papers are edited to improve the accuracy and effectiveness of communication and to bring them within the specified length limits. When the author's meaning is not clear, the editor may consult the author by telephone; when editing is extensive, the manuscript may be returned for approval and retyping before the type is set.

Categories of signed papers include: general articles, research articles, reports, letters, technical comments, book and software reviews, perspectives, and policy forums.

General Articles. General articles (up to 5000 words) are expected to (i) review new developments in one field that will be of interest to readers in other fields; (ii) describe a current research problem or a technique of interdisciplinary significance; or (iii) discuss some aspect of the history, logic, policy, or administration of science. Readers should be able to learn from a general article

what has been firmly established and what are unresolved questions; speculation should be kept to a minimum.

Many of the general articles are solicited by the editor, but unsolicited articles are welcome. Both solicited and unsolicited articles undergo review.

General articles should include a note giving the authors' names, titles, and addresses; a summary (50 to 100 words); an introduction that outlines for the general reader the main point of the article; and brief subheadings to indicate the main ideas. The reference list should not be exhaustive; a maximum of 50 references is suggested. Figures and tables should occupy no more than one printed page.

Research Articles. A research article (up to 4000 words) is expected to contain new data representing a major breakthrough in its field. The article should include an author note, abstract, introduction, and sections with brief sideheads. A maximum of 40 references is suggested. Figures and tables together should occupy no more than one printed page.

Reports. Reports (up to 2000 words) are expected to contain important research results. They should include an abstract (no more than 100 words) and an introductory paragraph. A maximum of 30 references is suggested. Figures and tables together with their legends should occupy no more than one printed page.

Letters. Letters are selected for their pertinence to material published in *Science* or because they discuss problems of general interest to scientists. Letters pertaining to material published in *Science* may correct errors; provide support or agreement; or offer different points of view, clarifications, or additional information. Personal remarks about another author are inappropriate. Letters may be reviewed by outside consultants. Letters selected for publication are intended to reflect the range of opinions received. The author of the *Science* paper in question is usually given an opportunity to reply.

All letters are acknowledged by postcard; authors are notified if their letters are to be published. Preference is given to letters that do not exceed 250 words. Letters accepted for publication are frequently edited and shortened in consultation with the author.

Technical Comments. Technical comments (up to 500 words) may criticize articles or reports published in *Science* within the previous 6 months or may offer useful additional information. Minor issues should be resolved by private correspondence. The authors of the original paper are asked for an opinion of the comment and are given an opportunity to reply in the same issue if the

comment is published. The comments, and sometimes the reply, are subject to the usual review procedures. Priority disputes undergo extensive review and are published only when action is recommended.

Book and Software Reviews. The selection of books and software packages to be reviewed and of reviewers is made by the editors. Instructions and length specifications accompany items to be reviewed when they are sent to reviewers.

Manuscript Preparation

Typing. Use double-spacing throughout the text, tables, figure legends, and references and notes and leave margins of at least 2.5 centimeters. Put your name on each page and number the pages starting with the title page.

Titles. Titles should be short, specific, and amenable to indexing. For general articles the maximum length is 80 characters and spaces; for research articles and reports the maximum is 100 characters.

Summaries or abstracts. These should include a sentence or two explaining to the general reader why the research was undertaken and why the results should be viewed as important. The abstract should convey the main point of the paper and outline the results or conclusions.

Text. A brief introduction should indicate the broad significance of the paper. The whole text should be intelligible to readers in different disciplines. Technical terms should be defined. All tables and figures should be cited in the text in numerical order.

Symbols and abbreviations. Define all symbols, abbreviations, and acronyms.

Units of measure. Use metric units. If measurements were made in English units, give metric equivalents.

References and notes. Number references and notes in the order in which they are cited, first through the text and then through the table and figure legends. List a reference only one time. References that are *always* cited together may be grouped under

a single number. Use conventional abbreviations for well-known journals; provide complete titles for other journals. For references with up to five authors provide all the names; for more than five, provide the name of the first author only. See issues of the journal for examples.

Unpublished observations. Reference to unpublished data should be given a number in the text and placed, in correct sequence, in the references and notes.

Acknowledgments. Gather all acknowledgments into a brief statement at the end of the references and notes.

Informed consent. Investigations on human subjects must include a statement indicating that informed consent was obtained after the nature and possible consequences of the studies had been fully explained.

Animal welfare. Authors using experimental animals must state that their care was in accordance with institutional guidelines. For animals subjected to invasive procedures, the anesthetic, analgesic, and tranquilizing agents used, as well as the amounts and frequency of administration, must be stated.

Figures. For each figure submit three high-quality glossy prints or original drawings of sufficient size to permit relettering but not larger than 22 by 28 centimeters (8½ by 11 inches). On the back of every figure write the first author's name and the figure number and indicate the correct orientation. *Manuscripts with oversized figures will be returned to the author without review.* Photocopies of figures are not acceptable; transparencies, slides, or negatives cannot be used because they cannot be sent to reviewers.

On acceptance of a paper, authors requesting the use of color will be asked to supply slides or negatives of the color artwork and to pay \$600 for the first color figure and \$300 for each additional figure as a contribution toward printing costs.

Illustrations reprinted from other publications must be credited. It is the author's responsibility to obtain permission to reprint such illustrations in *Science*.

Tables. Tables should supplement, not duplicate, the text. They should be numbered consecutively with respect to their citation in the text. Each table should be typed, with its legend (double-spaced), on a separate sheet. Give each column a heading with units of measure indicated in parentheses. Do not change the unit of measure within a column.

Equations and formulas. Use quadruple-spacing around equations and formulas that are to be set off from the text. Define all symbols.

Uncertainties and reproducibility. Evidence that the results are reproducible and the conditions under which this reproducibility (replication) was obtained should be explicitly stated. The effect of limitations in experimental conditions on generalizability of results should be discussed. Uncertainties should be stated in terms of variation expected in independent repetitions of the experiments; they should include an allowance for possible systematic error arising from inadequacies in the assumed model and other known sources of possible bias. Probabilities from statistical tests of significance should be subordinated to the reporting of results and associated uncertainties.

Printing and Publication

Proofs and reprints. One set of galley proofs is sent to the authors. An order blank for reprints accompanies the proofs.

Scheduling. Papers are scheduled for publication after *Science* has received corrected galley proofs from the authors. Papers with tables or figures that present problems in layout, or with color figures or cover pictures, or that exceed the length limits may be subject to delay.

Cover Photographs

Particularly good photographs that pertain to a paper being submitted will be considered for use on the cover. Submit prints (not slides, negatives, or transparencies) with the manuscript.