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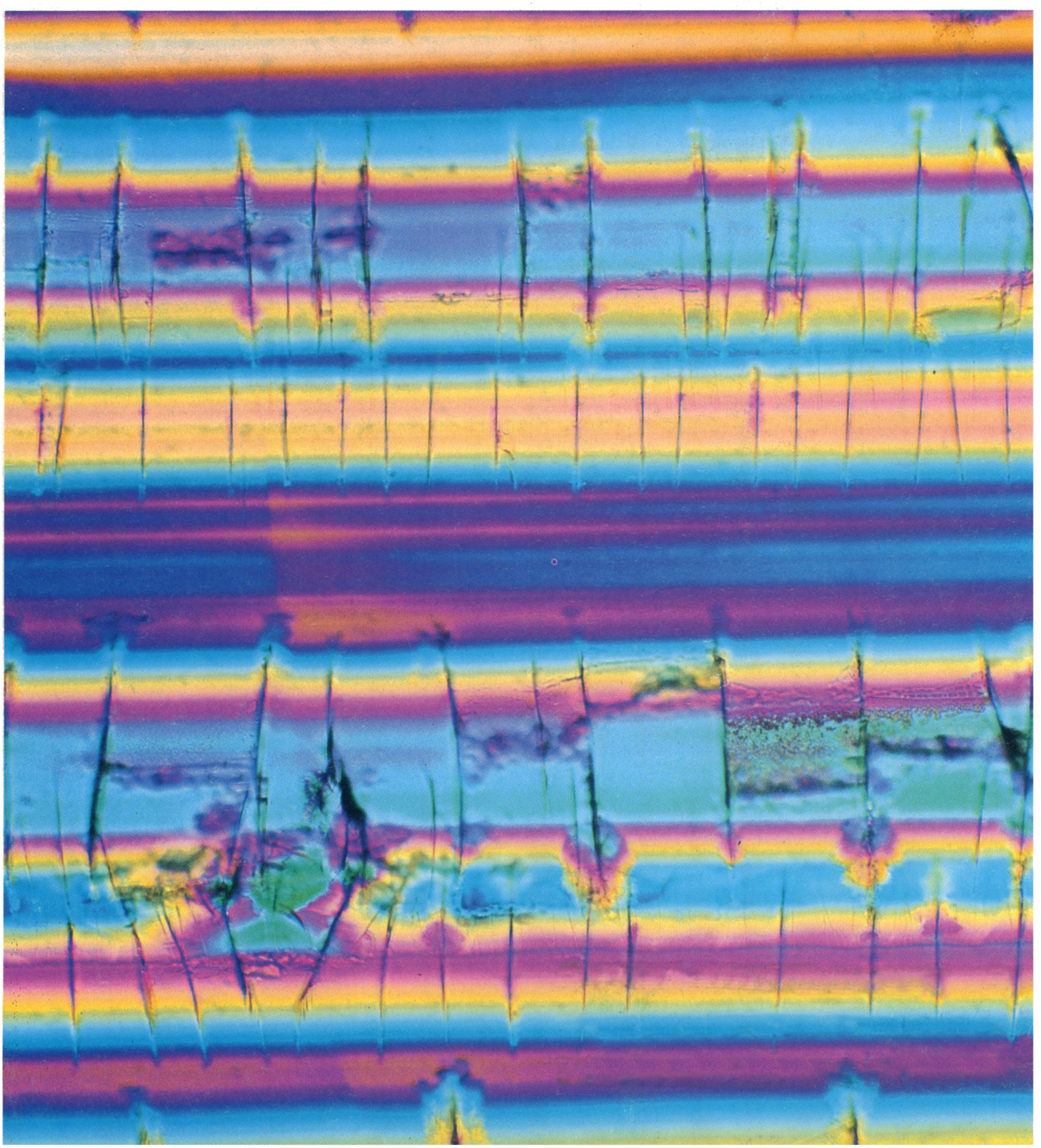

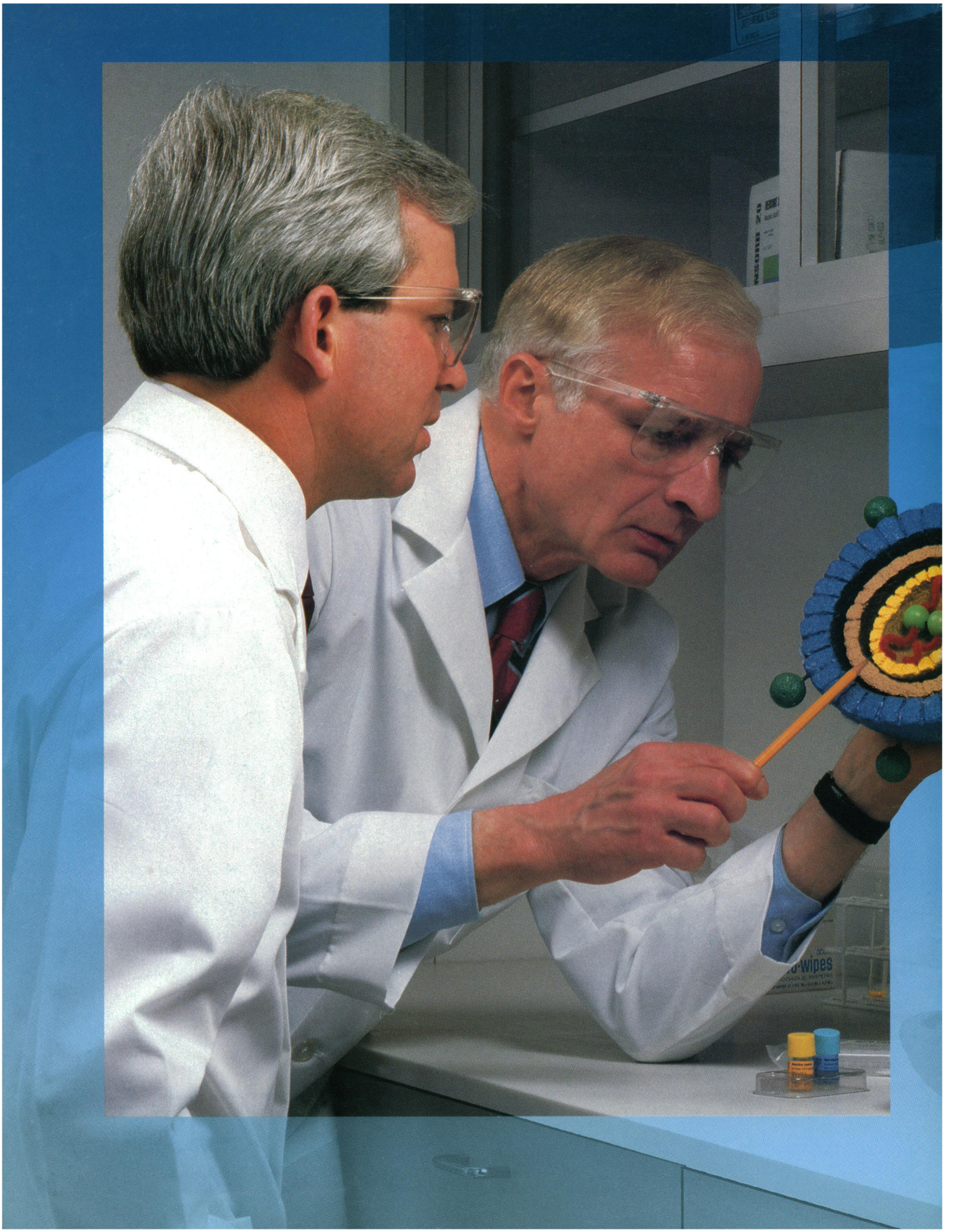

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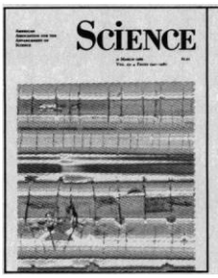

COVER Optical micrograph of zoning in a natural (570 million years old) zircon single crystal from Sri Lanka, viewed in a petrographic thin section between crossed polars. The field of view is 0.8 millimeter in length. The order of interference colors correlates inversely with UO_2 and ThO_2 contents of the layers. The microfractures perpendicular to the layering are the result of stress caused by anisotropic expansion of the unfractured layers, which have accumulated the greatest alpha-decay damage. This single crystal has a range of alpha-decay dose which spans the transition from the crystalline to the metamict state. See page 1556. [B. C. Chakoumakos *et al.*, University of New Mexico, Albuquerque 87131]

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This Week in
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Thorium dating of coral

A sensitive mass spectrometric technique for measuring thorium-230 abundances makes possible accurate dating of tiny samples of coral (page 1547). Edwards *et al.* compared dates obtained by ^{230}Th mass spectrometry with dates obtained with alpha counting methods, carbon-14 measurements, and counts of coral growth bands; corals from reefs off Barbados and Vanuatu were studied. Coral growth occurs close to the surface of the sea; corals can thus serve as indicators of sea height at particular times (in places where tectonic uplift is not a factor). Changes in sea level through time can be calculated by dating coral at different places. A date obtained for the last interglacial period, 122,000 to 130,000 years ago, confirms the prediction of the Milankovitch theory. The theory holds that global climate changes (ice ages, interglacial periods) are produced when changes in the geometric relation between the earth and the sun cause changes in the distribution of solar energy on the earth. This, in turn, affects the relative amounts of water and ice on the surface.

Crystallins and enzymes

DESPITE the fact that the lens is a highly specialized tissue, some of its crystallins (the major structural proteins) are similar to enzymes found in other tissues (page 1554). Crystallins account for 20 to 60% of the wet weight of a lens, depending on the species, and are constituents of vertebrate and invertebrate lenses. Not all the crystallins are found in all species; for example, vertebrates have a heterogeneous collection of crystallins (α, β, γ, δ, ϵ, and τ) found in different combinations in different species. Wistow and Piatigorsky found many homologies in sequences and similarities in other structural features of crystallins and various enzymes; in addition, some crystallins have enzyme activities. During evolution enzymes may have been recruited to the eye from other tissues of the body because they were thermodynamically stable and satisfied the requirement of lens cells for a long-lived structural protein.

Damage to zircons

EXPOSURE to damaging alpha radiation can cause phase transitions in zircons—common accessory minerals of igneous rocks—reducing them to an amorphous state (page 1556). Chakoumakos *et al.* studied such damage in a natural zircon crystal from Sri Lanka by high-resolution transmission electron microscopy. The almost 600-million-year-old crystal had a banded pattern; damage in different zones that had received different doses of radiation ranged from isolated patches of disorder to complete aperiodicity (cover). Radiation-induced microfractures caused by the alpha emitters thorium and uranium provide pathways along which these elements can leach from or be added to the crystal. The vulnerability of zircon crystals causes problems for geologic studies, because rocks typically are dated by measurements of uranium, thorium, and lead. Thorium and uranium are also constituents of certain ceramic materials that have been proposed for use in containing nuclear wastes; damage could allow radioactivity to leach from such containment facilities.

Acid rain in China

ACID rain falling in China poses, as elsewhere, a potential hazard to aquatic and terrestrial ecosystems (page 1559). Galloway *et al.* compared precipitation from rural and urban-suburban regions of China and the United States. The rain in China has a higher content of sulfate ion, the source of which is coal burned for cooking, heating, and generating electricity. Despite enriched levels of sulfates, the *p*H of China's precipitation is unusually high: in the atmosphere, calcium and ammonium ions (from soil, building materials, and agricultural fertilizers) form compounds that apparently neutralize the strong acid. The situation in China is reminiscent of conditions 70 years ago in Tennessee: high concentrations of sulfate ions prevailed and were attributed to fossil-fuel burning and low-to-the-ground smokestacks that kept pollution close to where it was generated. China's sulfates are estimated to be one or two orders of magnitude higher than sulfates in "remote" regions where human pollutants minimally, if at all, affect the composition of precipitation.

Homozygosity mapping

GENES responsible for diseases caused by recessive alleles may be most easily identified by homozygosity mapping of the DNA of a few inbred children (page 1567). Lander and Botstein describe how, as a more detailed genetic map of the human genome becomes available, specific chromosomal regions could be linked to specific diseases. Homozygosity mapping depends on the fact that in most affected individuals the chromosomal region containing the gene for the disease should be consistently homozygous. A genetic map will make recognition of such a region possible, because in the region a number of consecutive DNA markers will be homozygous. Calculations of the number of children required for homozygosity mapping take into account the relationship of the child's parents (siblings, first cousins, second cousins), the degree of polymorphism in the DNA markers in the general population, and the spacing between markers along the chromosome. Under optimum conditions, fewer than ten children might be needed to establish the connection of a region with a disease. Homozygosity mapping may be easier to carry out than a traditional family linkage study for which a larger number of families with several affected members is needed. Inbred children are easiest to find in societies (some are known in the Middle East, Italy, and India) in which consanguineous marriages are common.

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Answers.

SCIENCE

19 JUNE 1987
VOLUME 236
NUMBER 4808

The Budget for Motherhood

THE time has come to adopt a more scientific method for selecting presidents. The recent debate over the roles of character versus issues has highlighted the fact that issues actually get short shrift in any presidential campaign. Everyone says that we should discuss the issues, but practically no one does. The reason is that most pronouncements on issues are duller than daytime television. Character is important, and private life does reveal character, but interest in private life inevitably escalates beyond an appropriate level as the chance of distinguishing among candidates on issues diminishes.

The problem with issues pronouncements is that essentially all candidates sound alike. One can confidently predict that presidential hopefuls during the next year will proclaim that they are for a stronger defense, a greater safety net for the underprivileged and the elderly, strong support for farmers, greater emphasis on education, fairness to immigrants, affirmative action for minorities, job protection against cheap imports, increased competitiveness, no new taxes, and a decreased deficit. These feats will be accomplished by drastic elimination of waste in the military (except in the candidate's own district), fearless elimination of mismanagement in welfare programs (except when it becomes heartless), and the possible imposition of some trifling new taxes that are painless because they do not really apply to anyone. Coming out foursquare for motherhood might not only be more courageous but also more interesting.

The press, which loves scandal and controversy, rarely prints candidates' position papers, aware that few individuals read them. The public does not read them because they are Pious Parchments (see Editorial, 6 March, p. 1125) that reveal little. Candidates are identified as liberals because they sound sincere when they are denouncing the military and are not to be taken seriously when they propose welfare reform; conservatives, on the other hand, are identified because they sound sincere when they demand welfare reform and perfunctory when they talk about eliminating military waste.

To improve the selection process, a genuine objective test would require each candidate to devise a total federal budget. In that way the candidate could no longer hide behind platitudes and would have to reveal his or her true priorities. To make it a real test, the previous year's federal budget, including the actual federal income and expenses, would be used as the control. Candidates would be asked to present only the differences they would suggest from the previous budget for their proposed budgets for the following year. In that manner, advocates of increasing the budget in any category would have to name the new taxes they would levy or confess that the total deficit would be increased. Those who state that they would reduce military or welfare budgets would have to indicate how, by how much, and where the money was to be shifted. Last year's income and outlay figures would be essential so that candidates would be prevented from indulging in dubious estimates about the rising gross national product allowing all proposed spending increments without concomitant increases in taxes. Allowing only changes to be articulated would prevent pages and pages of sleep-inducing rhetoric which, when deciphered, turn out to recommend a 1 percent cut in the military budget or a 0.5 percent cut in subsidies to farmers.

Those weak of heart would say that candidates would refuse to follow this procedure, but in recent years candidates have learned that they must provide their income taxes and financial statements, that they are expected to take part in public debates, and that their private lives are fair game. Persistent questions (mainly from reporters) demanding hard decisions instead of soporific clichés would lead some candidates to take forthright stands and shame others into following suit.

This plan is a particularly appropriate innovation for the upcoming race in which no candidate has yet assumed a clear lead. If candidates really wish to discuss issues instead of having their private lives examined, they will have to discuss issues in a meaningful way. Proclaiming love of mother costs nothing and is banal. Stating that you will sell your Porsche to support her in the manner to which she has become accustomed is meaningful and arouses interest.—DANIEL E. KOSHLAND, JR.

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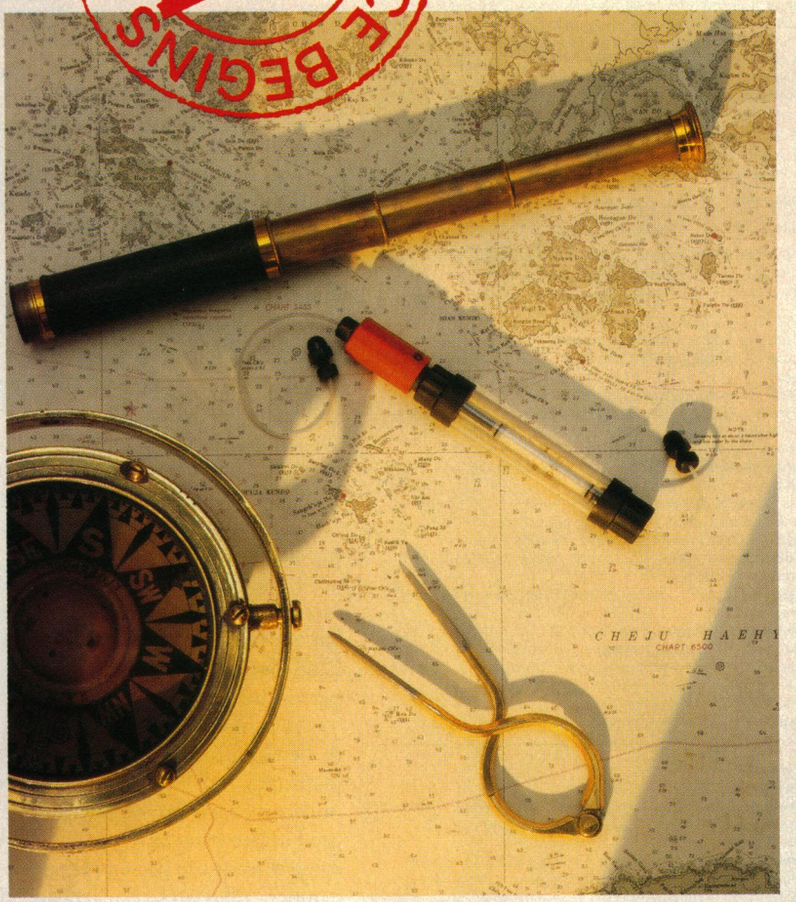

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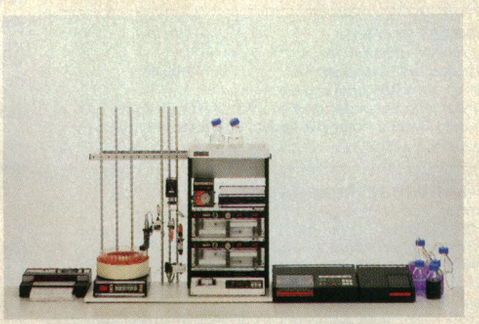

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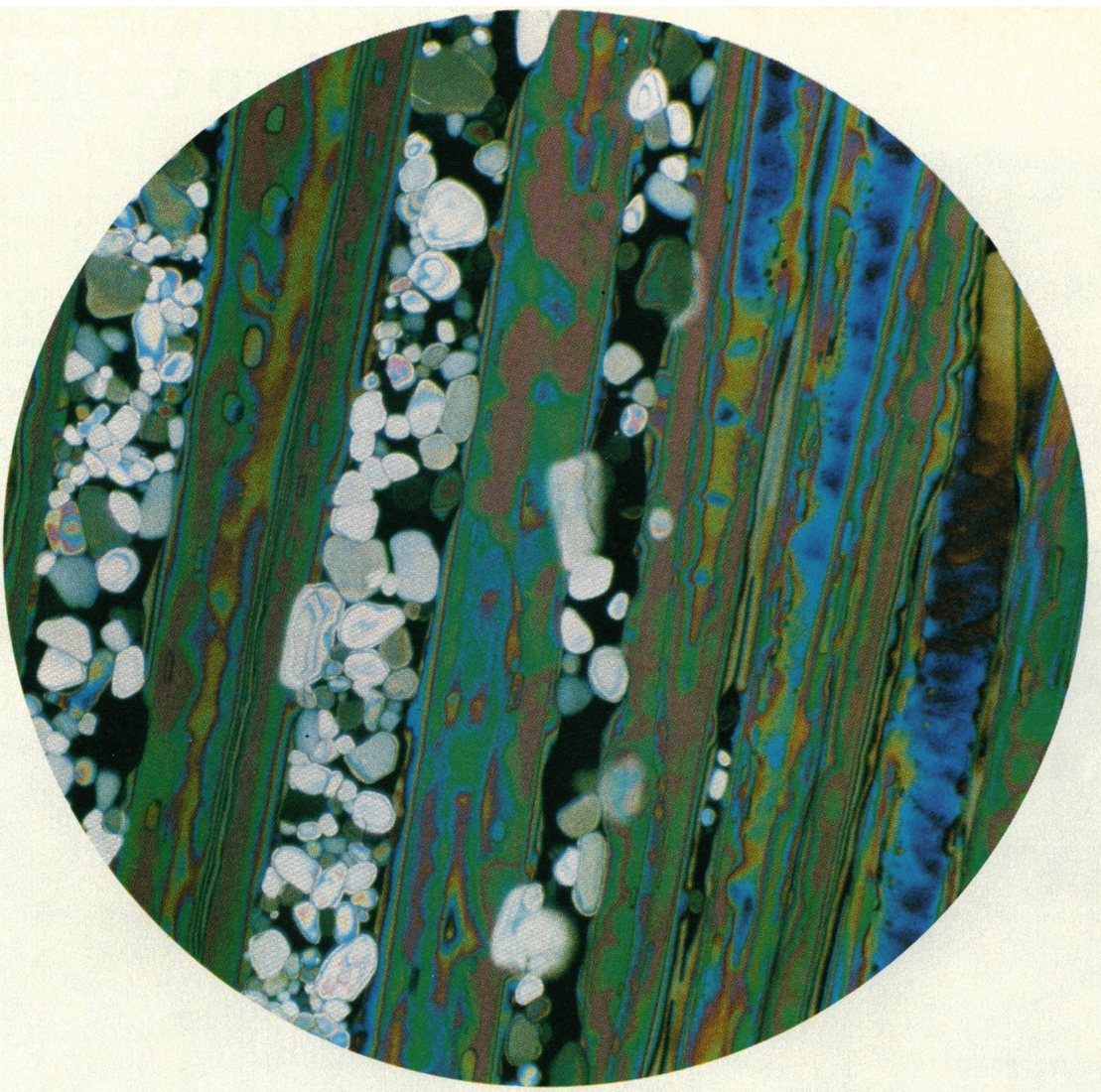

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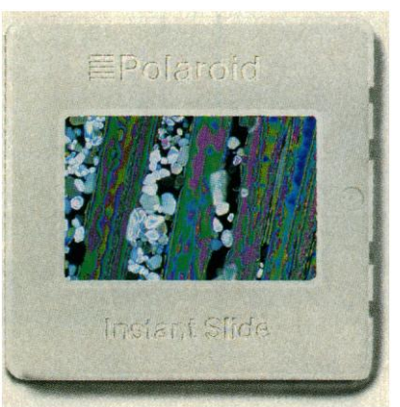

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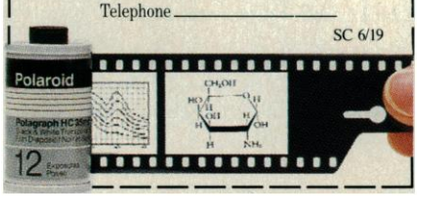

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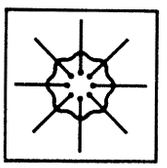

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Each contributor will be assigned to a poster session and will have a bulletin board on which to display large, easy to read text and graphics for approximately 1½ hours so that the work can be discussed with interested parties.

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AAAS ANNUAL MEETING IN BOSTON (11-15 FEBRUARY 1988)
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$$\Gamma^{\mu}_{\lambda\nu} = \frac{1}{2} g^{\mu\sigma}\left(\frac{\partial g_{\sigma\lambda}}{\partial x^{\nu}} + \frac{\partial g_{\sigma\nu}}{\partial x^{\lambda}} - \frac{\partial g_{\lambda\nu}}{\partial x^{\sigma}}\right)$$

$$R_{\mu\nu} = \frac{\partial \Gamma^{\lambda}_{\mu\lambda}}{\partial x^{\nu}} - \frac{\partial \Gamma^{\lambda}_{\mu\nu}}{\partial x^{\lambda}} + \Gamma^{\sigma}_{\mu\lambda}\Gamma^{\lambda}_{\nu\sigma} - \Gamma^{\sigma}_{\mu\nu}\Gamma^{\lambda}_{\lambda\sigma}$$

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