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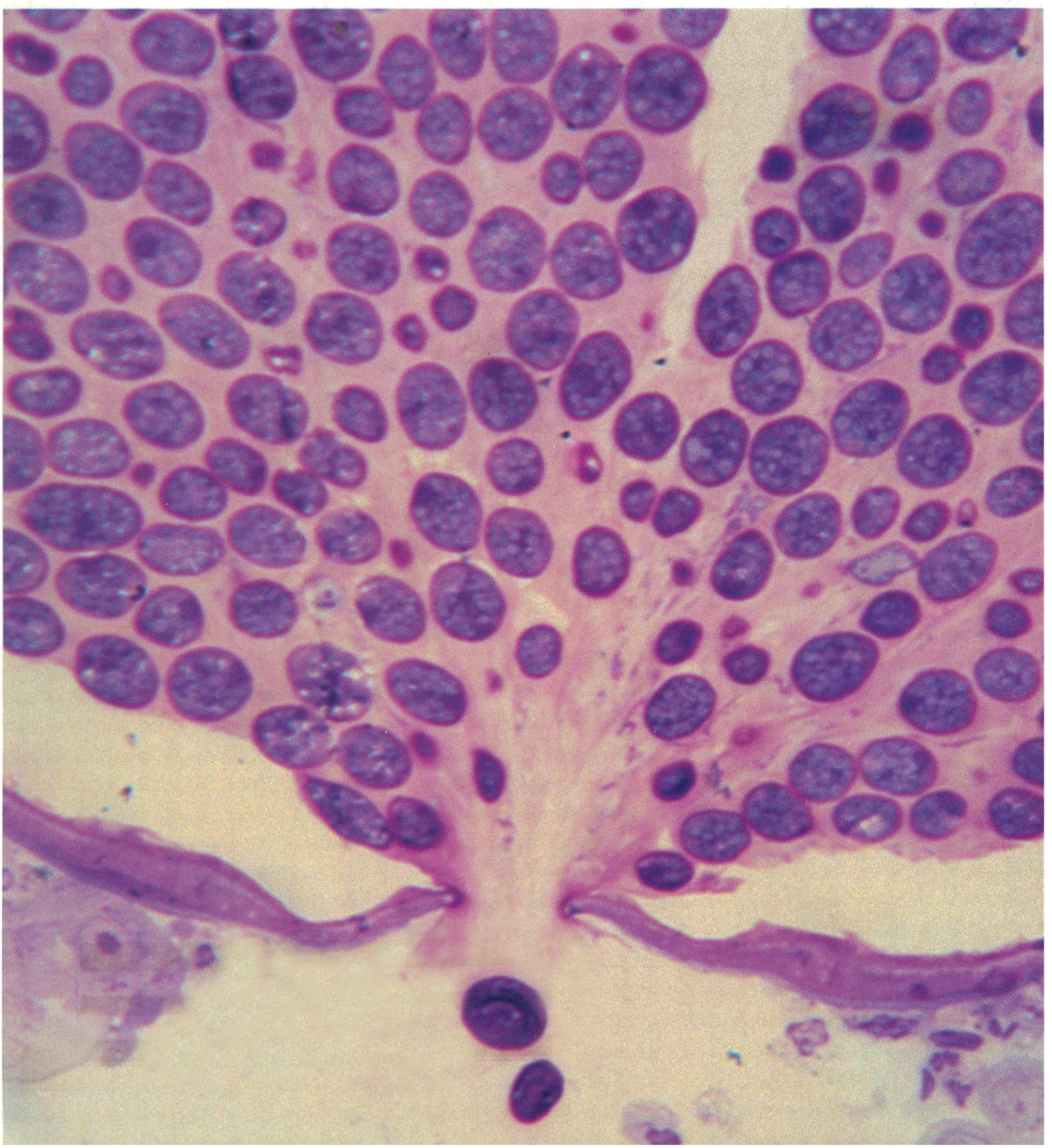

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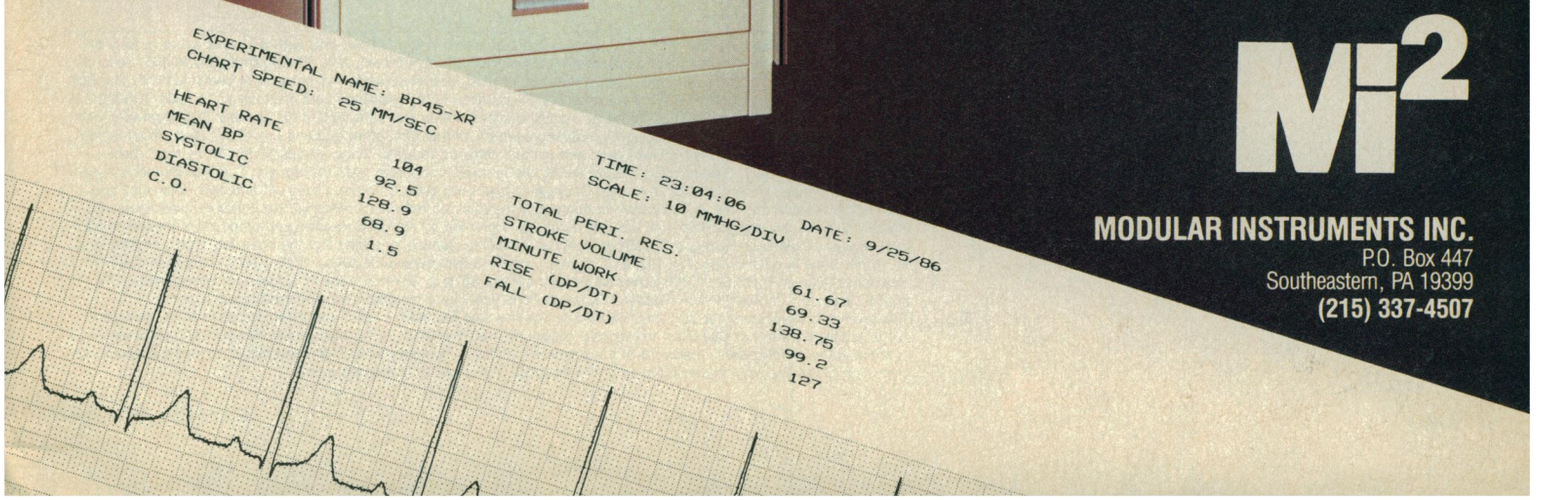

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SCIENCE

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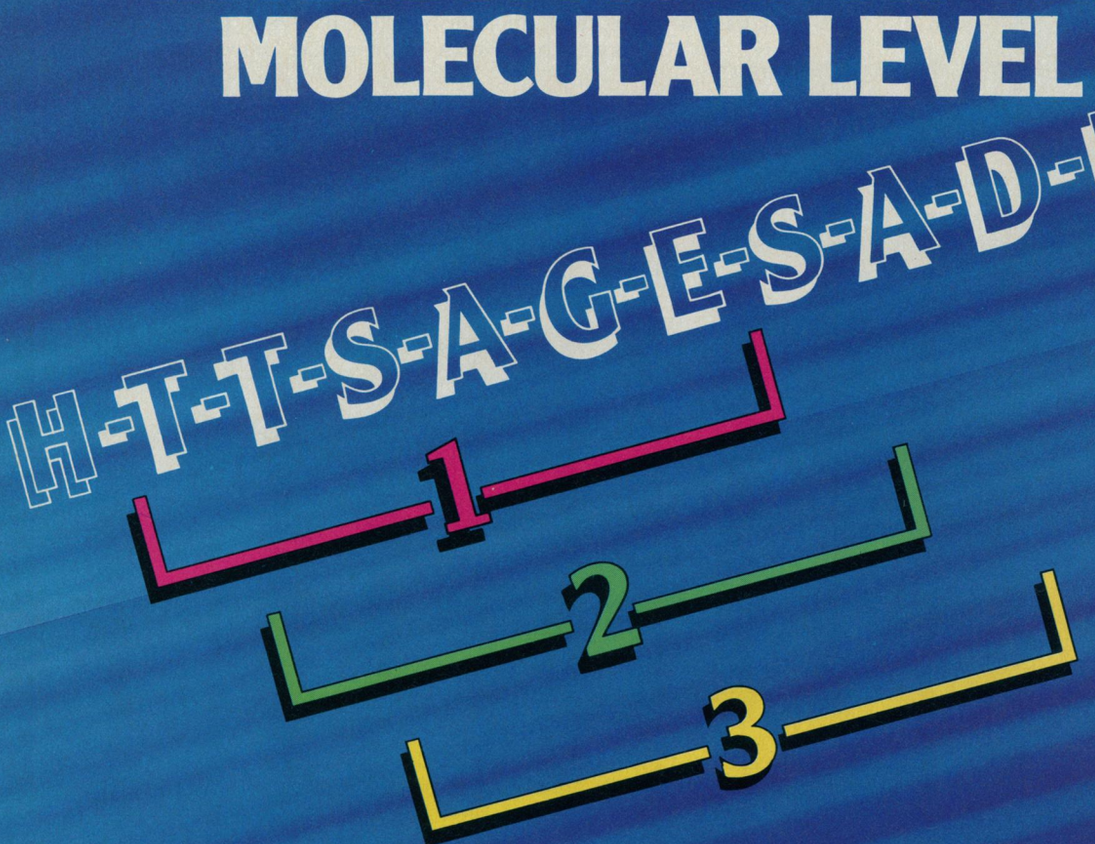
■ The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

COVER Mature sporangium of *Rhinosporidium seeberi* discharging endospores through a single pore. The organisms were present in a large polyp located in the external nares of a dog. Mature sporangia are approximately 100 to 400 micrometers in diameter and have relatively thin walls. They contain endospores that may be in various stages of maturation. This section is 1 micrometer in thickness and stained with toluidine blue. See page 474. [Donald J. Meuten, School of Veterinary Science, North Carolina State University, Raleigh, NC 27606]

ANTIGEN-ANTIBODY INTERACTIONS AT THE MOLECULAR LEVEL



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This Week in
SCIENCE

Economic trends

SINCE the late 1960's, there has been a steady decline in the growth of productivity in the nonfarm business sector of the United States economy (page 443). This sector includes everything except government operations, agriculture, and nonprofit organizations. Baily considers a number of factors to which the decline in the growth of productivity has been attributed: the labor force's educational quality and levels of experience and effort, the extent and value of capital investment in nonfarm business, the mix of products and the difficulty of measuring products in businesses that deal in services, the pace of innovation and efficient use of new technology, the rise in "professional" managers with management skills but no industry-specific insight, and increases in government regulations affecting business. It is possible to document that some but not all of these variables have contributed to the decline of productivity growth and to show that the economic troubles of the United States that have arisen from a combination of negative factors are not abating.

Martian dust storms

ON Mars, local dust storms are common, but occasionally a dust storm will expand to global proportions (page 459). With temperature, pressure, and wind data collected during the Viking missions to Mars, two circulation patterns have been identified that carry dust into the red planet's atmosphere. Active winds in the southern hemisphere in subtropical latitudes can lift dust high into the atmosphere, and Hadley circulation can then carry dust northward across the equator, generating a global dust storm. Dust raised in the northern hemisphere only reaches to heights below 10 km and is not distributed globally. Haberle performed numerical simulations that showed how northern hemisphere atmospheric dust could weaken the intensity of the Hadley circulation and thus the likelihood that a small storm would become a global one. Dust transported northward by Hadley circulation could, in succeeding years, remain available (until transported even farther north) to suppress Hadley circulation and delay the next global storm. Competition and feedback between northern and southern circulation patterns might therefore confine a storm locally or permit it to expand. Six well-documented global dust storms have been characterized in the last 30 years and continued observations of Martian storms should clarify how they originate.

Oncogene product

THE oncogene c-*myc* appears to code for a protein that is active when cells are synthesizing DNA (page 467). It is amplified or translocated to another chromosome and expressed in excess in a variety of human and animal cancers and probably contributes to the growth advantage enjoyed by the cancer cells. The structure of c-*myc* is conserved in vertebrate cells; its product may be crucial to the regulation of cellular proliferation. Studzinski *et al.* show that when nuclei isolated from human leukemic cells (as well as those from normal spleen, liver, and cultured fibroblastic cells) are treated with antibodies to the c-*myc* protein, DNA synthesis is interrupted. It resumes if antibody is removed and c-*myc* protein is added to the culture. The activity of the enzyme DNA polymerase is dramatically reduced during c-*myc* antibody treatment; and the effects of c-*myc* antibodies can be mimicked with antibody to DNA polymerase. It is therefore possible that the product of this oncogene is one of the proteins that stimulates the activity of DNA polymerase.

Polyp-producing fungus cultured

A fungus that produces polyp-like tumors in epithelial tissues of the eye, ear, nose, penis, and vagina in humans and other mammals has been successfully cultured for the first time (page 474). Disease caused by *Rhinosporidium seeberi* is endemic in India and Sri Lanka but is also known to occur in the United States and elsewhere around the world. Levy *et al.* homogenized a polyp (cover) from the nose of a dog, extracted the organisms, and cultured them with a cell line from a human rectal epithelioid tumor. The interactions of fungi and cells were monitored for more than 2 months. The fungi grew and produced sporangia (the cases in which spores form) and accompanying spores that were eventually released. The fungi also induced proliferation of the epithelial cells to which they had attached; polyp-like structures formed from the cells that were growing in the tissue culture flasks. It is now possible to study the life cycle of these fungi and the cellular changes that they induce as well as to evaluate pharmacologic agents for the treatment of this disfiguring infection.

Gene rearrangements during ontogeny

THREE gene families found within T lymphocytes—called α, β, and γ—have structures similar to the genes in B lymphocytes that produce immunoglobulins (page 479). The α and β genes produce proteins that together make up the receptor for antigen on the T-cell surface: the γ genes produce proteins whose functions are being sought. Born *et al.* analyzed γ gene expression in thymus cells of fetal mice and found that the component parts of the γ genes—called the variable, joining, and constant segments—had been rearranged in these cells but had not been rearranged in their progenitors in the fetal liver. The gene rearrangements were synchronized with rearrangements of the β gene segments during days 14 to 17 of gestation. Because rearrangements of the γ genes are less complicated than those of β genes, γ proteins may be expressed several days before receptors for antigen are expressed on the T-cell surface.

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Spanking, Reason, and the Environment

An exceedingly logical friend of mine told me that when he was 10 years old and playing peacefully with his siblings, his father suddenly picked him up and spanked him. He turned in bewilderment to ask, "What did I do to deserve that?" "Nothing," his father replied. "Then why was I spanked?" "To teach you that this is not a rational world," was the answer. Even scientists without perceptive and theatrical fathers eventually learn that this is not a rational world. It should be part of our responsibility, however, to make it more so.

A sizable expansion of research by the Environmental Protection Agency (EPA) should be encouraged in the years ahead. Emotion runs high on environmental issues and the EPA has been marred by political factionalism. Yet it deals with our most precious and increasingly threatened resources: the air we breathe, the water we drink, and the soil that nourishes our food sources. Environmentalists argue that we are doing too little to protect our resources; industry argues that excessive regulation stifles progress. The reality is that we live in a world that becomes more densely populated each year and that population depends on chemicals for its food and its standard of living. So the problems will only become more serious, and they cannot be solved by headlines, law cases, or political posturing.

In the past when faced with problems in health, fuel resources, defense, and food supplies, we responded with programs of basic research that paved the way for vast improvements. The environmental problems may be even more difficult. First, their solutions are bound to be costly and therefore opposed by both special interests and taxpayers. Second, the research is complex, requiring risk assessment analyses that strain current theories and are not easy to explain to lay audiences. Third, many of the solutions require international as well as national cooperation. Acquisition of convincing data is even more important when nonprofessionals must be persuaded of a course of action involving complex science. Time is of the essence. Governments delay action, claiming "lack of facts," as the clock ticks against a background of a deteriorating environment.

The current EPA research budget is approximately $300 million, but it is almost all devoted to specific problems: a selenium contamination of water in California, an acid rain problem in the Great Lakes, a toxic waste dump in New York. The specific problems must be pursued, but basic knowledge is needed to develop broad strategies as well as innovative solutions. The Superfund costs are in the billions; asbestos cleanup costs are staggering; the science of risk assessment itself is in a primitive state; the EPA is entering the recombinant DNA field, when most of the expertise is found in the National Institutes of Health. All of these areas are candidates for a basic research approach.

Furthermore, the type of research and its spatial requirements are unconventional. One model may be found in the recent opening by the Department of Energy of the gaseous fuels test site in Mercury, Nevada. Far away from any populated area, the facility is constructed to test the spread of toxic gases such as the methyl isocyanate released at Bhopal or hydrofluoric acid, a corrosive but widely used chemical. Tests are planned on protective measures such as vapor fences and detoxication techniques. A rational policy for toxic waste disposal requires facts, and this experimental approach is laudable.

A tripling of the EPA research budget is not unreasonable in view of the need. This could be achieved over the next couple of years mainly through a greatly expanded extramural program. EPA would be well advised to model its research program on the successful NIH example, with most of its research in a peer-reviewed extramural program but with a sizable intramural program as well. Because most of its research is inevitably controversial, it will gain by the outside component, both in terms of expertise and credibility.

There will be those who believe that these issues have become so politicized that they can only be solved by the media and publicity, others who say that they require lawyers and litigation, and still others who say that they devolve on politics and money. I would like to believe reason and data can be used to make decisions, but then I was never spanked at an appropriately impressionable age.—DANIEL E. KOSHLAND, JR.

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south of air route A90 and abeam of PAWES at 1406, when the sphere was dissipating) and Presley's observations (air route A90; behind McDade and approaching the intersection designated SABES) allows us to estimate the size and distance of the halo.

Our conclusion is that original estimated positions were in error. Additional data, primarily from Van den Berg, place the event between the Kurils and Sakhalin. The altitude of the center of the halo at the maximum observed size is estimated to have been greater than 200 miles, and the diameter of the halo is estimated to have been at least 380 miles. It seems unlikely that a ground-based explosion could produce this kind of an effect. It is surprising to us that no official data have been provided by government agencies and that such a significant observation from a region of demonstrated military sensitivity was, and still remains, a mystery. In retrospect, we believe that erroneous assumptions regarding the presumed location of the mystery cloud may have contributed to the early dismissal of a hypothesis that now deserves intense examination. The 10 April 1984 issue of the *Anchorage Daily News* reported (*2*) that the Soviet Union had informed Japanese officials that missile testing would begin on 9 April in an area west of the Kamchatka Peninsula. The 12 April 1984 issue of that newspaper reported (*3*) that "a Japanese aviation official confirmed Wednesday the Soviet Union had scheduled missile tests in the northern Pacific, but not on the day or in the area where the mysterious cloud burst was sighted."

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Hawaii Institute of Geophysics, University of Hawaii at Manoa

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1. H. Eggen, *Aarde Kosmos* **5**, 292 (1985).
2. L. Campbell, *Anchorage Daily News*, 10 April 1984, p. A1.
3. M. Kuramitsu, *ibid.*, 12 April 1984, p. A1.

Erratum: The Research News article "How unusual are unusual events?" by Roger Lewin (26 Sept., p. 1385) cited the statement "Given a 5% probability of an unusual event in a 1-year study, one should expect a 35% probability of such an event in a 7-year study." The expected correct probability for a 7-year study would be 30.17%.

Erratum: In the article by Jane Menken *et al.* "Age and infertility" (26 Sept., p. 1389), the first sentence under the sidehead "*Diagnosis of infertility by failure to conceive within a year*" (p. 1390, column two, paragraph two) should have read: "The historical evidence indicates that the proportion of women who were sterile increased rather slowly and almost linearly from the 20's until the early 40's.

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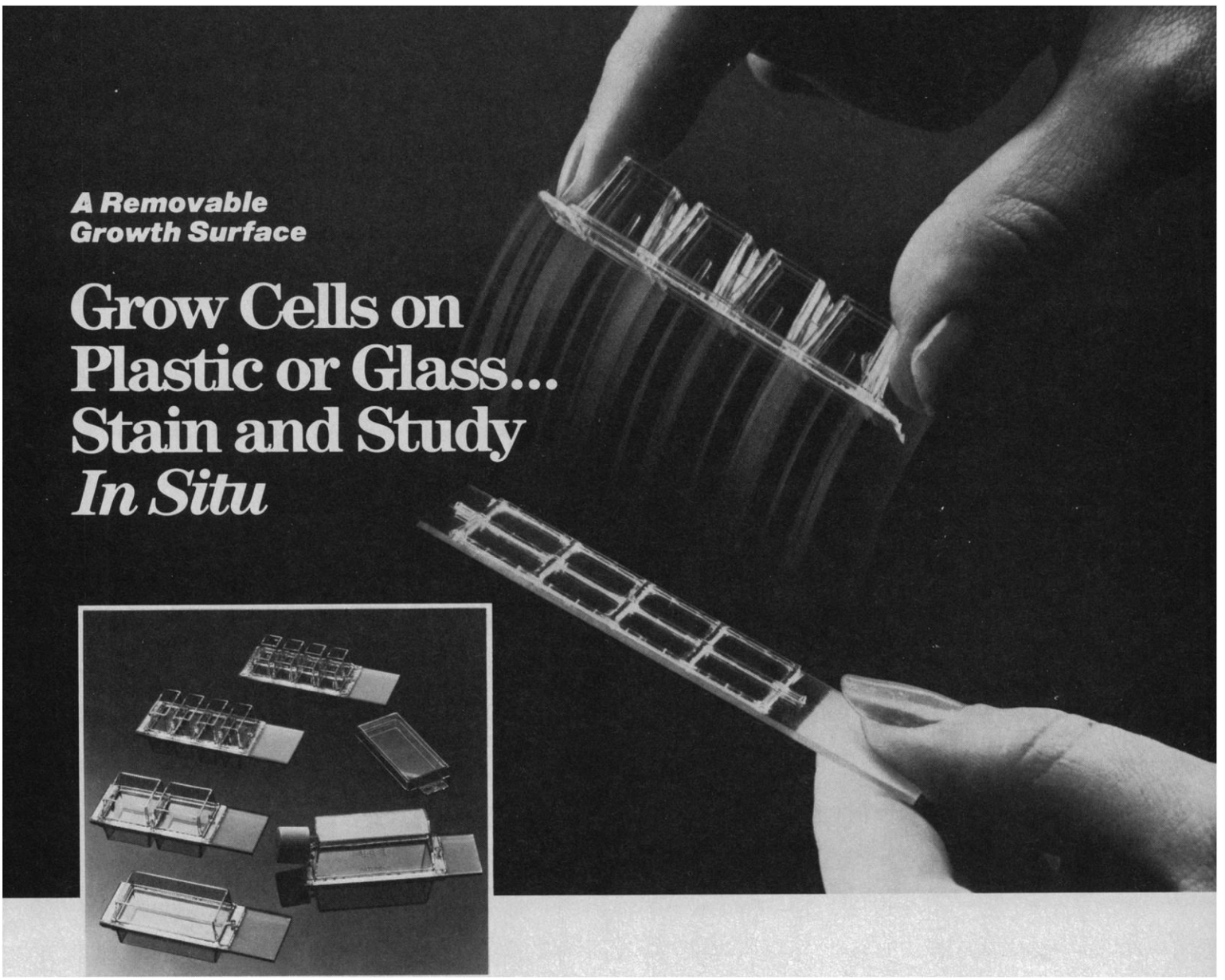

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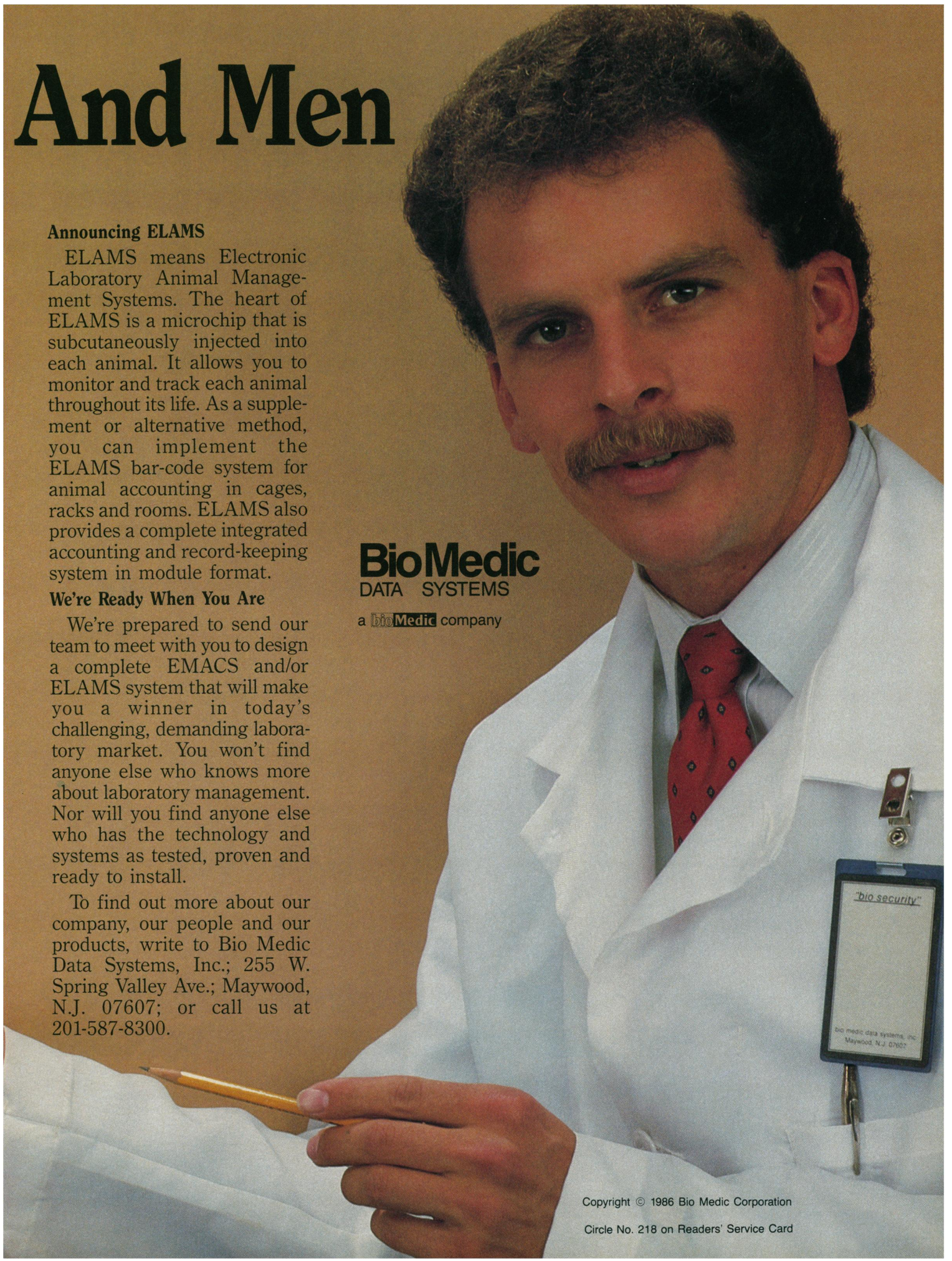

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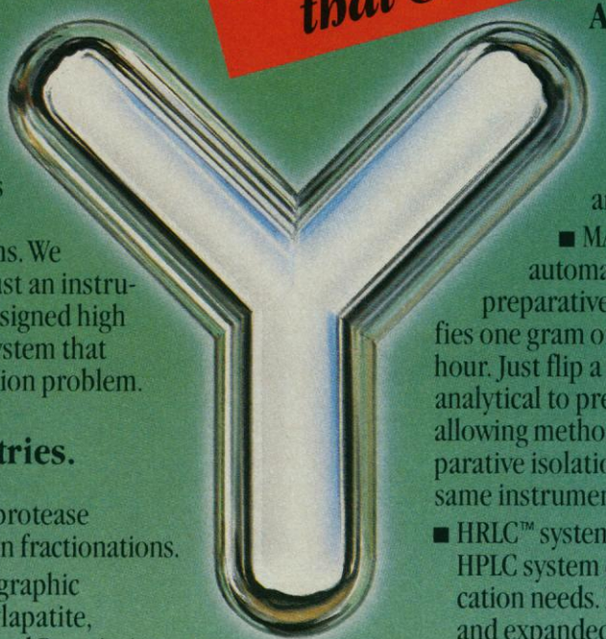

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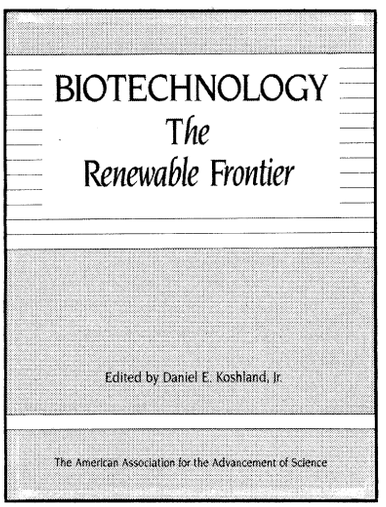

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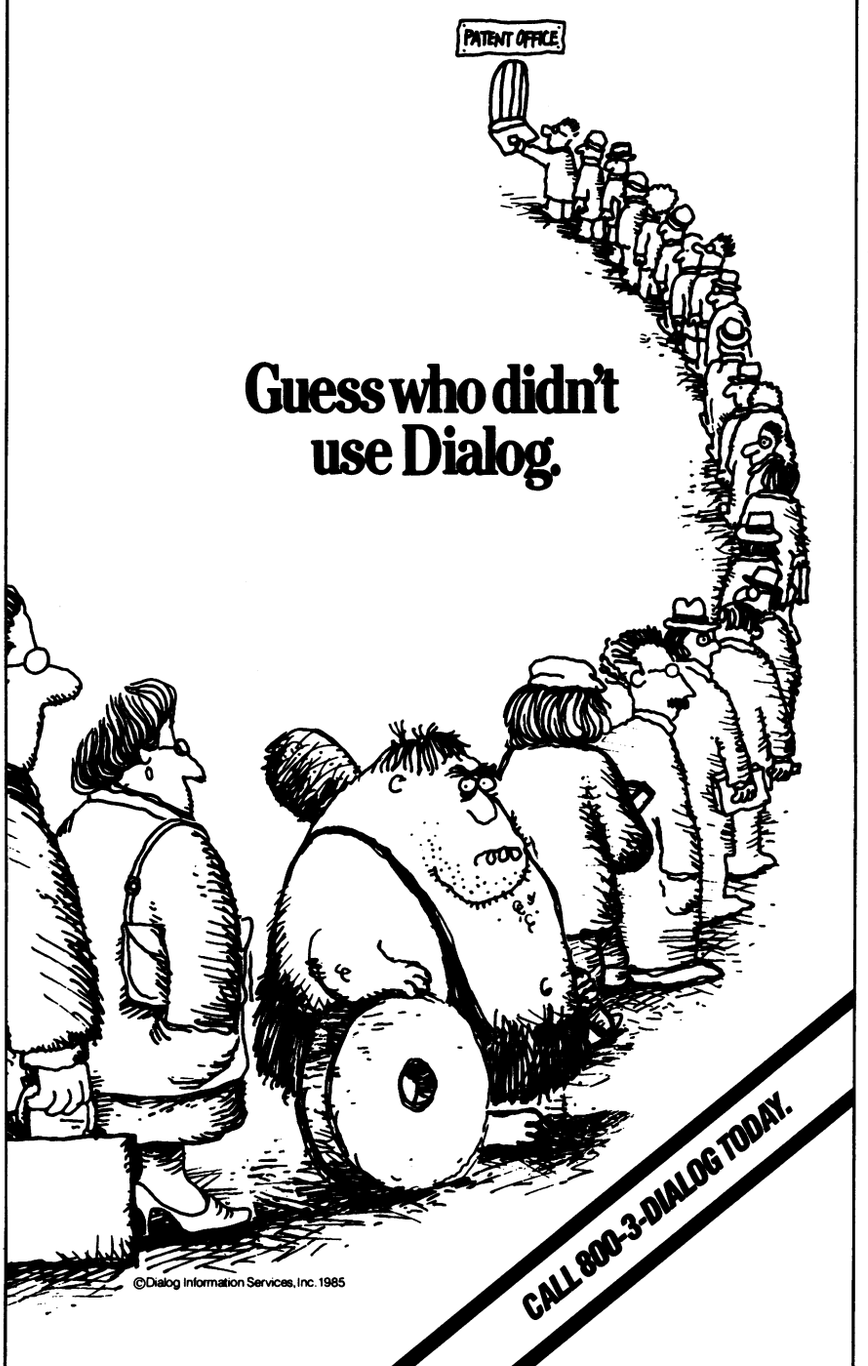

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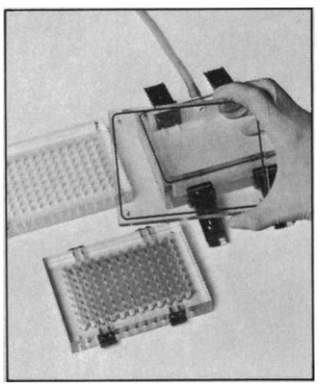

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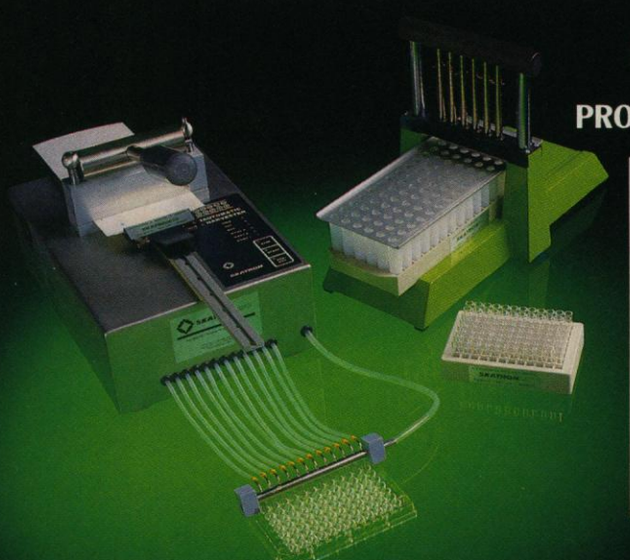

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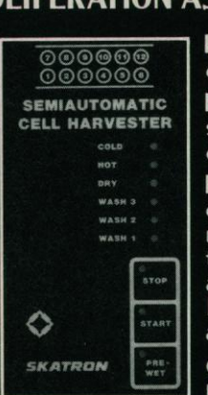

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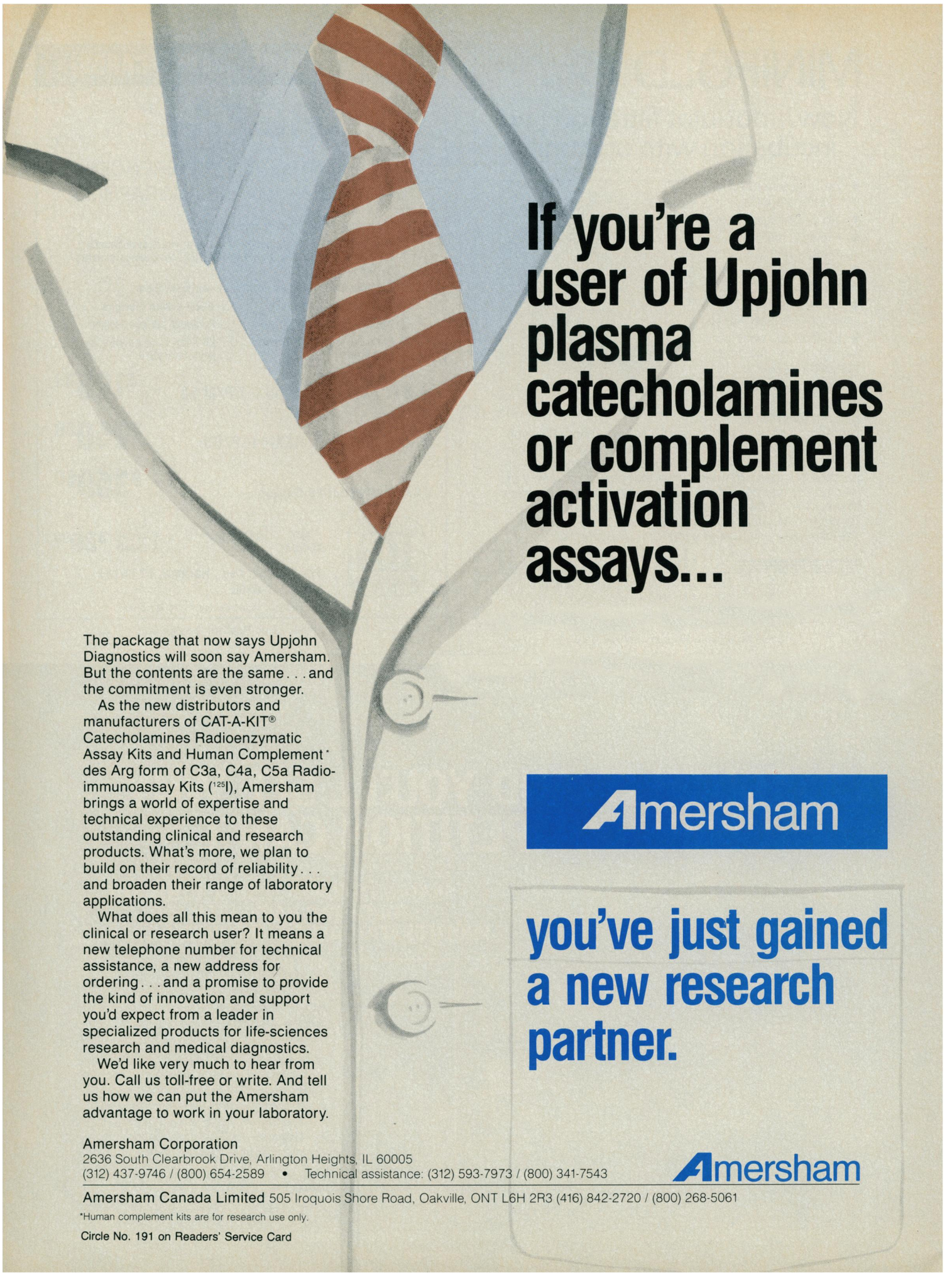

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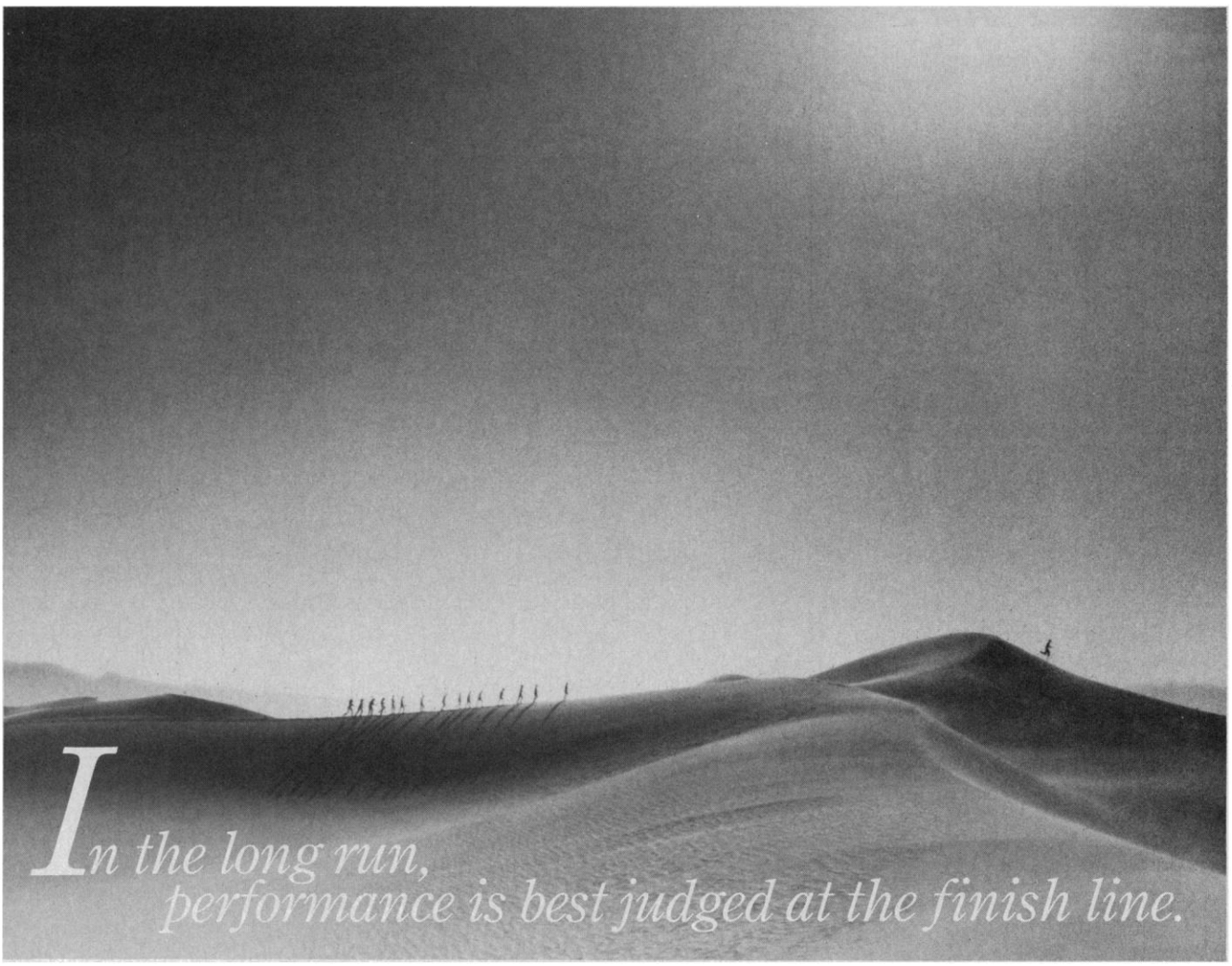

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