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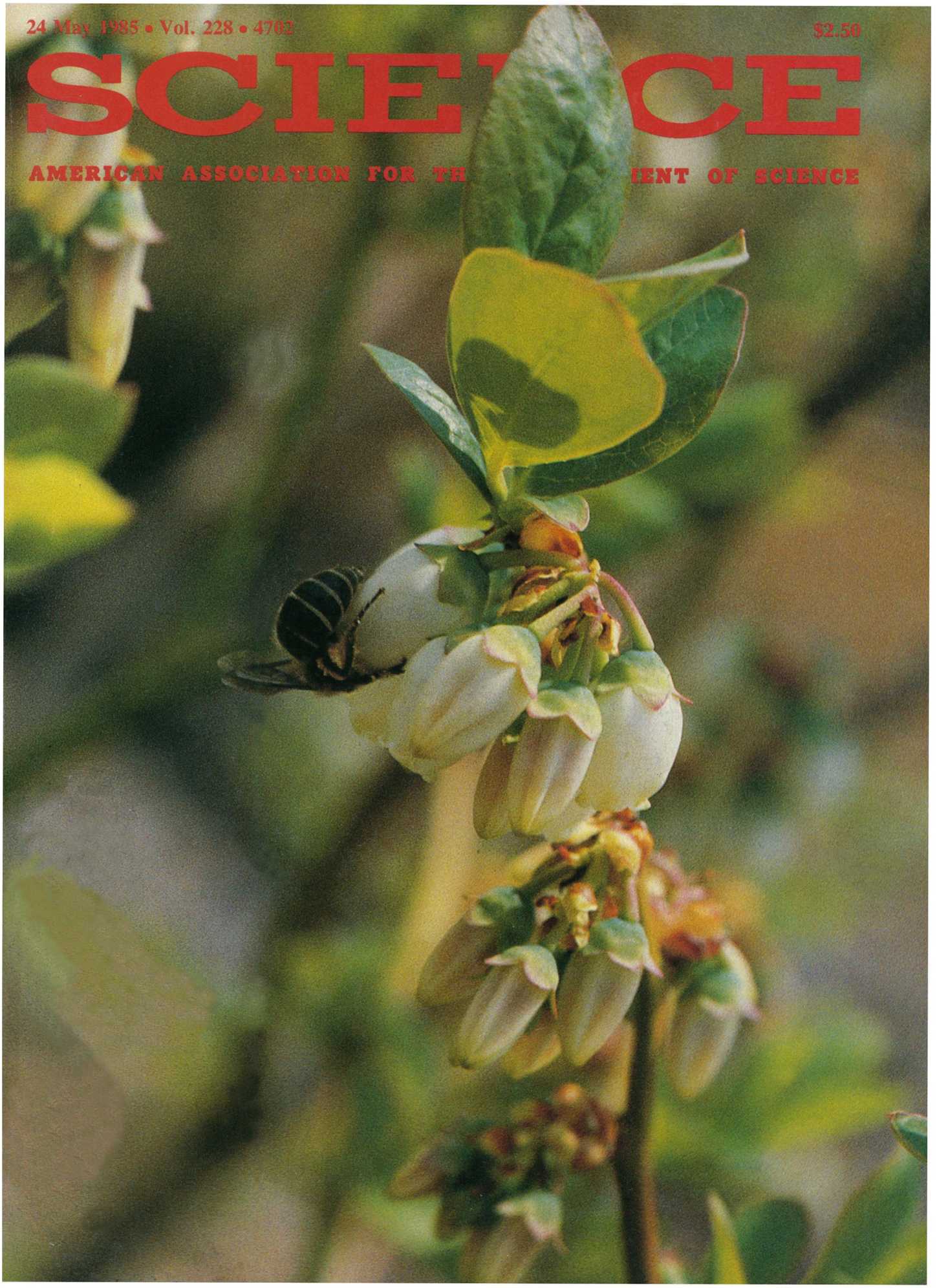

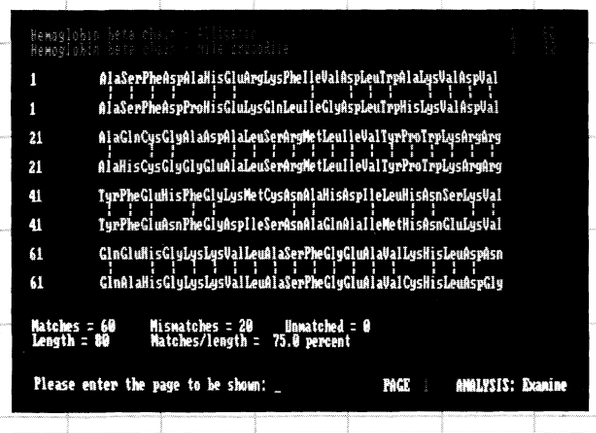

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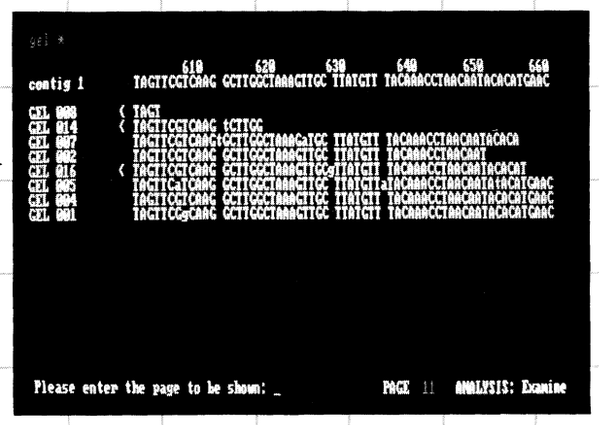

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COVER

A solitary bee, *Colletes validus*, pollinating a blueberry flower. This specialized bee prefers *Vaccinium* to other hosts. See page 1011. [Suzanne W. T. Batra, U.S. Department of Agriculture, Beltsville, Maryland 20705]

The sensitive measure of complement activation

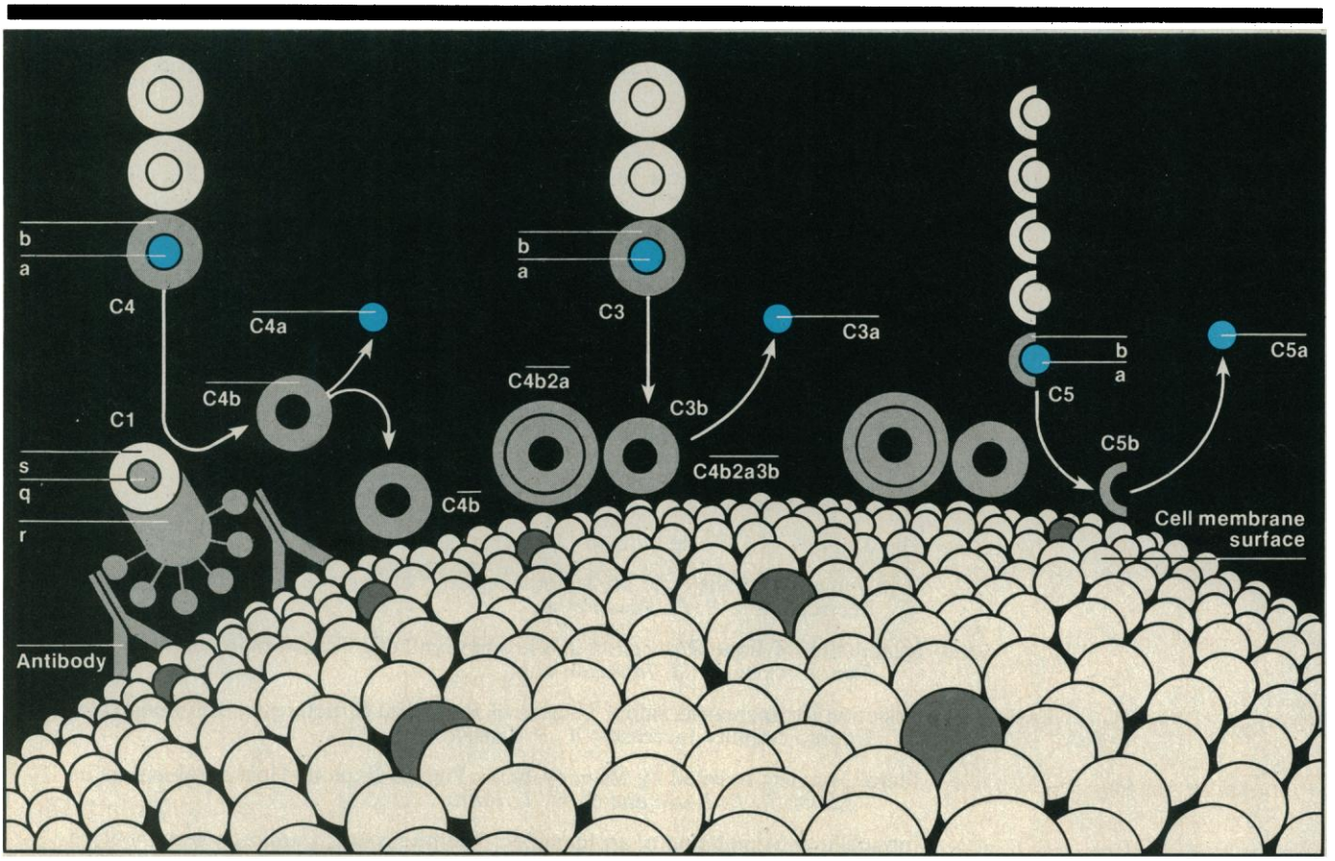

Illustration C3, C4, C5 activation in the classical complement cascade: Activated C1 (C1s), which binds to antigenic sites on the cell surface, cleaves C4 by limited protealysis to yield C4a which is released to the fluid phase and C4b which binds to the surface of the cell. C4b2a cleaves C3 to yield C3a and C3b. The latter binds to the cell surface. Complexes of C4b2a and C3b form a C5 convertase (C4b2a3b) that cleaves C5 to yield C5a, and C5b which binds to the cell surface.

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(1) Hugli, T E, and Chenoweth, D E, "Biologically Active Peptides of Complement: Techniques and Significance of C3a and C5a Measurement," *Laboratory and Research Methods in Biology and Medicine*, (ed. R M Nakamura, W R Dita, E S Tucker III: Alan R. Liss, Inc, 1980), pp.443-460.

(2) Gorski, J P, "Quantitation of Human Complement Fragment C4ai in Physiological Fluids by Competitive Inhibition Radioimmunoassay," *J. Immunol. Methods*, (**47**,1981), pp. 61-73.

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Earthquake warning network

A simple but elegant plan that might reduce substantially the damage caused by earthquakes has been devised by Heaton (page 987). Much damage is actually secondary—floods from water-main breaks or fires from broken gas lines, for example. A seismic computerized alert network (SCAN), linking computers with monitors that are able to detect strong ground motions, could transmit warnings to areas that might soon be affected by the earthquake. The outlying computers could then automatically shut off water and the flow of gas, activate emergency systems in hospitals and fire stations, and so on. SCAN could be implemented with a lead time of only tens of seconds.

Earthquake prediction

Places where active fault lines bend would, according to the observations of King and Nábělek, be logical sites for earthquake monitoring devices (page 984). Eight recent earthquakes both began and ended at such bends in faults. Monitors placed in the ground could detect the microscopic movements that occur at these bends in fault lines and that apparently precede earthquakes. These small movements may release interlocking faces of the fault and allow major motions to follow. The realignment of the faces of the fault at a distant bend may create an interlocking surface that could become the initiation site for another earthquake.

Bacterial growth on bones

Bacteria can grow on the surfaces of compromised bones, dead tissues, metallic objects, prosthetic devices, and other traumatized tissues and biomaterials in the body. From such sites, the bacteria can further invade normally sterile tissues. In osteomyelitis, bones often become so heavily coated with bacteria that only surgical removal can ameliorate the condition. The Gristina group analyzed bacteria on bones and other materials taken from individuals with osteomyelitis. They found a mixture of organisms surrounded by a thick protective polysaccharide layer (page 990). This biological film promotes the adherence of the bacteria to the bone surfaces and may account for the resistance of the bacteria to antibiotic therapy and to natural host defense mechanisms. The implications for clinical medicine are disturbing. The use of biomaterials and transplants is increasing and so are the infectious complications that they can cause.

Sugars direct lymphocyte movements

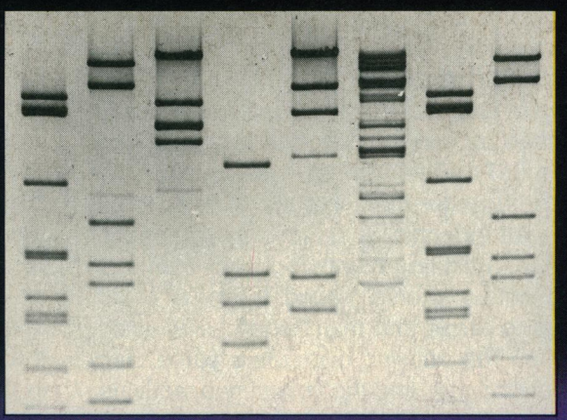
Lymphocytes travel in the blood as they move between various lymphoid tissues providing immunologic protection to the body. In their travels, they encounter specialized blood vessels called HEV; they must attach to and cross the lining cells of HEV to enter lymphoid organs. Rosen and his colleagues have shown that sugars on the surfaces of HEV cells are crucial for this lymphocyte movement (page 1005). When all surface sugars on HEV cells are chemically altered, the attachment of lymphocytes cannot take place. One sugar, sialic acid, specifically guides lymphocytes through HEV cells from the peripheral lymph nodes. It has no role in attachment in the intestines and an intermediate role in attachment in mesenteric lymphoid tissues. These differences support a mechanism by which characteristic sugars mark various tissues for entry by lymphocytes that are needed to populate the tissues and maintain their architecture and to carry out immune surveillance functions.

Bone destruction by growth factor

A growth factor produced and released by tumor cells may initiate the bone destruction that accompanies some malignant diseases of the lungs, head and neck, and other sites. Ibbotson *et al.* have added transforming growth factor-α (TGF-α) to bones in culture (page 1007). As the bones deteriorate, the calcium that is released gives an indication of the extent of bone destruction that has taken place. A synthetic form of TGF and several human factor preparations all caused such bone resorption, and the extent of calcium release was directly correlated with the amount of factor used. The resorption process and the laying down of new bone are crucial to the structural integrity of the skeleton and the repair of bone damage. Normal growth factors may contribute to this continuous process under standard physiological conditions, whereas, in malignancies, the process may be accelerated by the production of TGF or related factors.

Insects confuse wilted leaves with flowers

It smells and tastes sweet and is found on a surface that reflects ultraviolet light—it must be nectar. Batra and Batra show how insect pollinators mistake blight-ridden leaves for nectar-yielding flowers (page 1011) and thereby spread a serious fungal disease among blueberry and huckleberry plants. When infected, plant ovaries do not mature into berries. They become mummified and are hard, seedless, and inedible. Fungi remain in these mummy berries for 10 months; then they are released and are carried by the wind to the young leaves of other plants. The infected leaves emit an odor, reflect ultraviolet light, and exude sugar. The insects approach these leaves as they do the flowers, lick the "pseudonectar," and later carry the infection to new plants. The infection cycle is reinitiated and the propagation of the fungus ensured.



A better way to get uniform band s

Wedge-sha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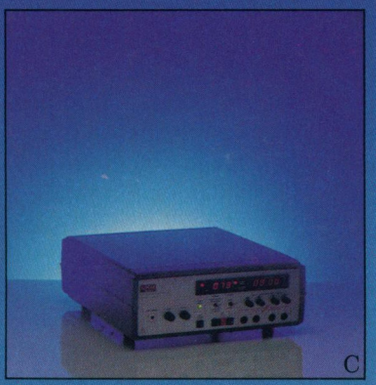
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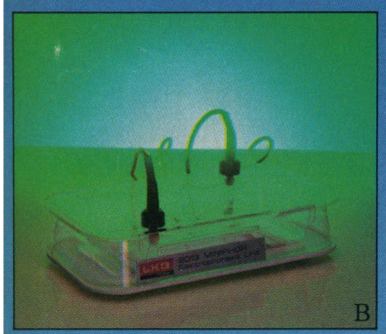
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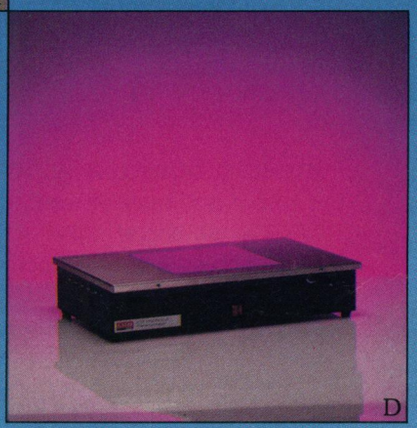
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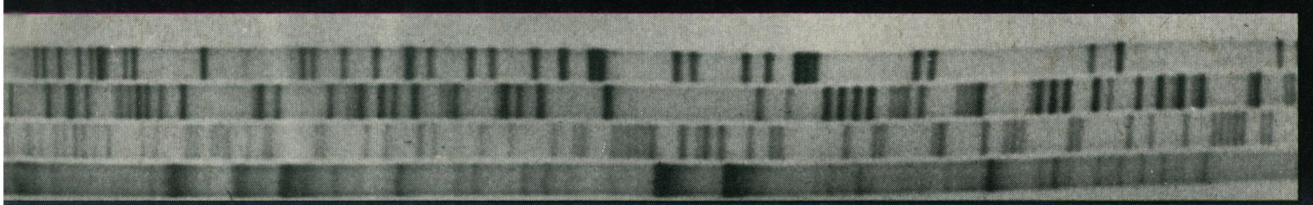

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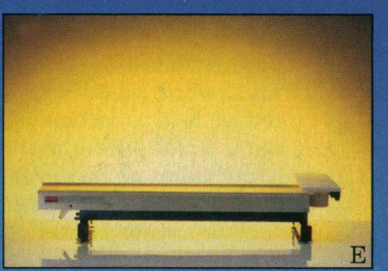
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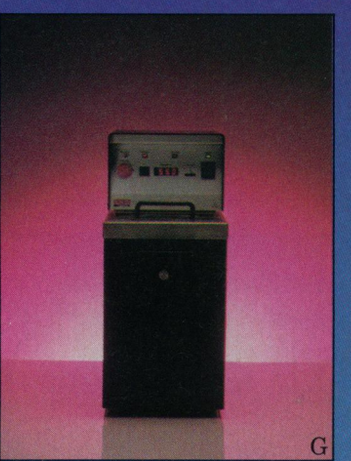
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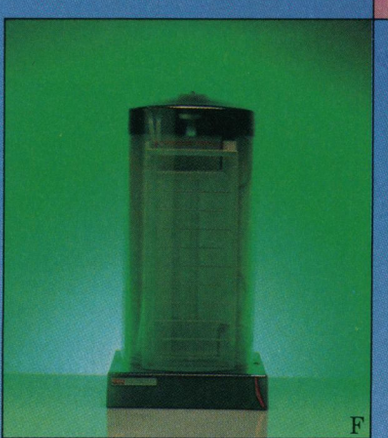
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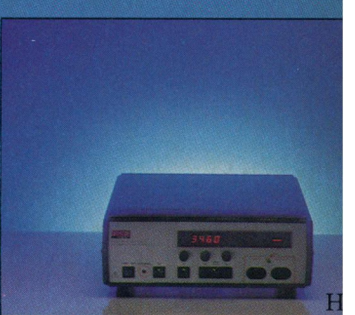
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LETTERS

NAS Exchange Agreement

C. B. Anfinsen, P. J. Flory, and A. A. Penzias (Letters, 3 May, p. 530) raise fundamental questions concerning the role of the National Academy of Sciences (NAS) in relation to violations of human rights in the Soviet Union. There is no dispute over the basic facts. In 1980 the National Academy did indeed suspend most of its exchange agreements with the Soviet Academy as a protest against violations of human rights of scientists in the U.S.S.R., culminating in the exile of Andrei Sakharov to Gorky. The recent draft protocol between the academies, accepted by the NAS Council, calls for a resumption of the exchanges, subject to certain new conditions. Yet Sakharov and his wife are still virtually prisoners in Gorky, and the situation regarding human rights in the Soviet Union is probably worse than it was in 1980.

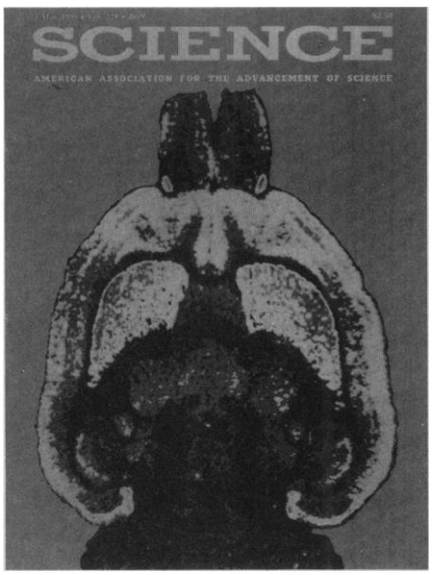
In view of these grim facts, is the NAS justified in signing the protocol? As one with strong concern over the maintenance of human rights, I believe that the answer is "yes." To have suspended the exchanges in 1980, and to resume them now, is indeed to acknowledge that the aims underlying the suspension—namely to give help to victims of oppression in the U.S.S.R.—have not been achieved. There seems no reason to believe that a prolongation of the suspension would result in anything better. Should the relations between the two academies, therefore, continue to be as limited, and as frosty, as they have been since 1980?

On the contrary, I believe that there are compelling reasons for an increase of mutual communication, when we consider the course of relations between the United States and the U.S.S.R. over the last 5 years. Both countries have been involved in enormous programs of rearmament; in our own case, it is by far the largest rearmament program in our peacetime history. In both cases a large part of the program involves production of thousands of new nuclear weapons, including (on both sides) weapons such as the MX missile, which are at once powerful, highly accurate, and vulnerable and hence calculated to make each side fear a possible first strike by the other. Each side is deeply alarmed by the preparations of the other, since such weapons in the hands of another great power rightly inspire fear that cannot be much alleviated by the knowledge that we have such weapons also. The sense of alarm has been increased by pronouncements at the highest level concerning an "evil empire," and proposals about preparing, in certain circumstances, to fight a "protracted nuclear war," in which our side is to "prevail," although it is acknowledged that nobody can win.

These developments had, by 1983, produced the highest level of mistrust between the two superpowers since the Cuban missile crisis. The shooting down, by the Soviets, of the Korean airliner in September 1983 appallingly exemplified this mistrust and served also to enhance it. I well remember my own intense anger and outrage on first hearing the news of that event; on further reflection I realized the urgency of establishing better communications between the United States and the U.S.S.R. in order to minimize the danger that similar events might recur with still more terrible potential consequences. The risk of nuclear war, even after such alarming events, may be very small in any given year, but the magnitude of the catastrophe, if it occurred, would be so overwhelming that even a small risk is intolerably great. In spite of deep mistrust, both countries have a common interest in reducing that risk to a minimum. The NAS, among many other organizations, has a part to play in that process, and it cannot play it adequately simply by continuing studies on arms control through joint meetings of committees of experts in the two academies. Those meetings are all to the good, but they are not enough. It is essential for citizens of both countries, including scientists, to meet together and work together in a variety of ways to develop mutual understanding and common interests. Such developments have occurred most notably among Soviet and American physicians, who have organized to form International Physicians for the Prevention of Nuclear War, including also physicians from more than 30 other countries. The views of the American physicians, in joint discussions with their Soviet counterparts, have been broadcast in the U.S.S.R. and heard by millions of listeners.

We cannot divorce the issue of preventing nuclear war from that of human rights. Nuclear war, if it were ever to occur, would be the supreme violation of human rights for uncountable millions of innocent human beings, including millions living outside the warring countries, if they were destroyed by a subsequent nuclear winter. Those who champion human rights must also recognize the supreme priority of this issue.

The treatment of dissidents and refuseniks in the U.S.S.R. is indeed calcu-



Reference: cover article, May 3, 1985; Pg. 597

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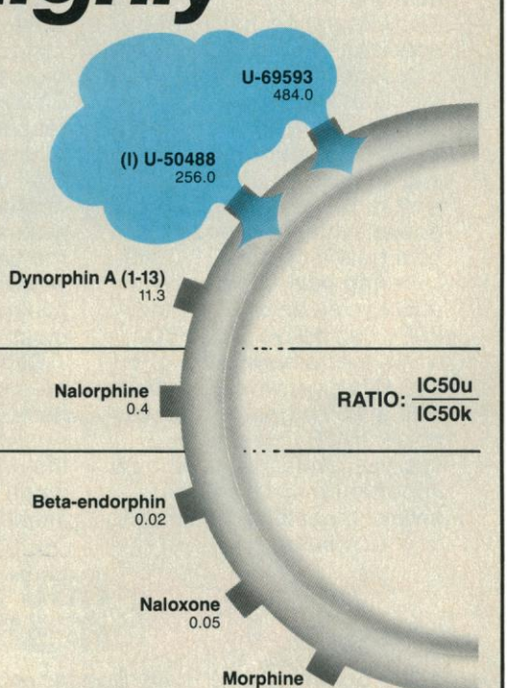
Dynorphin A (1-13)	43.0	3.8	11.3
Nalorphine	7.4	18	0.4
Beta-endorphin	5.0	230	0.02
Naloxone	8.2	160	0.05
Morphine	27.0	335	0.08

Ref. Lahti, R.A., et. al. *European Journal of Pharmacology*, accepted for publication.



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lated to arouse grief and outrage among those who care about human rights; but, in the present era of unparalleled danger for the human future, the need to take every possible step for the prevention of nuclear war is overriding. Moreover, I believe that the chance of ameliorating the lot of the oppressed in the Soviet Union is more likely to be increased (although perhaps very slowly) by closer and more cooperative personal relations than by maintaining a refusal to undertake further exchanges.

We should, of course, continue, as individuals and in groups, to plead the cause of those whose human rights have been violated, under every regime that has been guilty of oppression. Among these, the Soviet Union is one of many. Certainly we should continue our work in petitioning for the rights of those who are persecuted. However, the relation of the United States and the U.S.S.R. is unique today. Each has the power to destroy the other; we hold the fate of the world in our hands. We are trustees for the future of humanity; the development of nuclear energy and nuclear weapons has thrust that awesome responsibility upon us, and for me that must remain the primary consideration.

JOHN T. EDSALL
Department of Biochemistry and Molecular Biology, Harvard University, Cambridge, Massachusetts 02138

Arms Negotiations

R. Jeffrey Smith's article "Allegations of cheating endanger arms talks" (News and Comment, 8 Mar., p. 1180) is a misleading portrayal of the President's General Advisory Committee on Arms Control and Disarmament (GAC) and its report *A Quarter Century of Soviet Compliance Practices Under Arms Control Commitments: 1958–1983*.

The GAC report resulted from a year-long analysis of all available data, through the highest levels of classification, concerning post–World War II Soviet actions pertinent to Soviet arms control commitments, including 26 documentary arms control agreements and numerous Soviet unilateral commitments.

Looking across the spectrum of Soviet arms control practices provided new insight into Soviet approaches to arms control. For example, the GAC found the complete body of available evidence persuasive in establishing that the Soviets had *planned* to violate certain arms control agreements even as they were in

the process of signing and ratifying those agreements.

Smith does not note that (i) the Committee used the 1969 Vienna Convention of the Law of Treaties and decisions of the International Court of Justice concerning unilateral commitments as the legal basis for analyzing Soviet compliance behavior; (ii) the GAC carefully distinguished among the categories of material breaches; (iii) the GAC distinguished between the 17 instances for which the evidence indicates with high confidence that material Soviet breaches have occurred and those numerous areas for which the evidence gives substantial reason for suspicion but is not conclusive; (iv) it was the purpose of the report to look at all data concerning Soviet behavior under arms control constraints and not to disregard information on the basis of a prior bias or rationalization; and (v) several Soviet actions that may appear to be minor breaches when viewed in isolation and with only limited information take on a more serious complexion when viewed in the context of other Soviet actions and in light of all evidence that has been acquired to date.

Finally, the title of Smith's article implies that those concerned about Soviet cheating are really opposed to arms control and are using the violations issue as a way to block any new agreement. Nothing could be further from the truth. It is not the discovery and discussion of Soviet cheating that endangers arms control, but the cheating itself that discredits arms control as an instrument of international relations. The arms control process is strengthened when the parties comply with their commitments.

WILLIAM R. VAN CLEAVE
Defense and Strategic Studies Program, University of Southern California, Los Angeles 90007

Although Van Cleave says that the article was misleading, he does not identify anything misleading in it, and I stand by it as a fair and accurate portrayal of the report and the ongoing debate over treaty compliance.

The article did not suggest that only arms control opponents are concerned about Soviet treaty violations. In fact, it prominently featured statements of concern by longtime arms control advocates such as Paul Warnke and Gerard Smith, as well as moderates such as Gary Hart.—R. JEFFREY SMITH

Erratum: In M. Mitchell Waldrop's briefing "Reagan names space commission" (News and Comment, 12 Apr., p. 160), Charles M. Herzfeld's name was spelled incorrectly.

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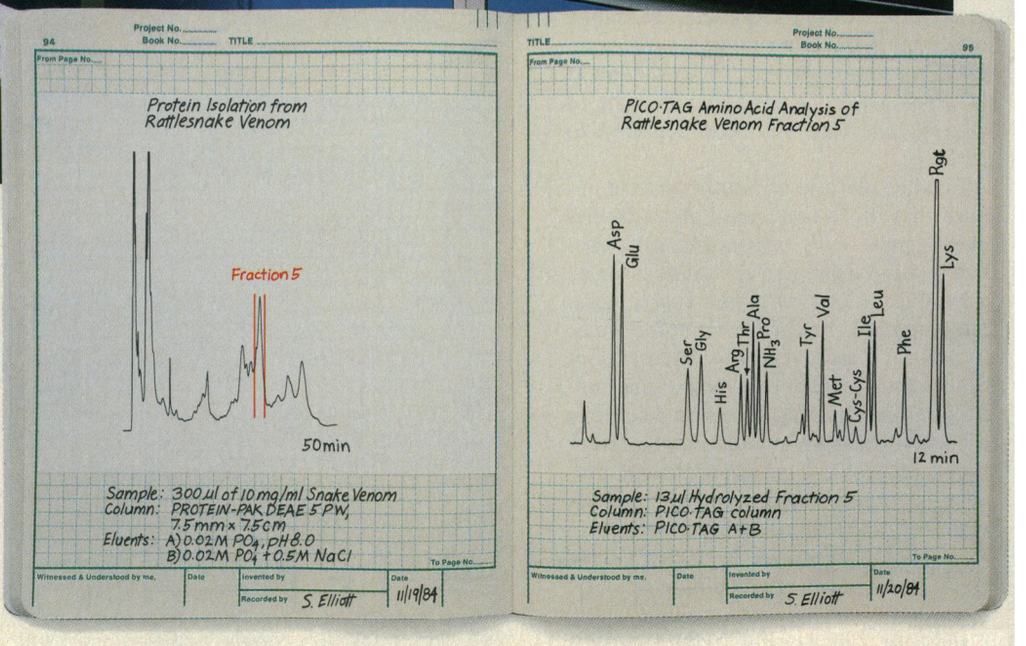

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[1]Thomas H. Maugh II, "New Tool for Amino Acid Analysis," *Science*, 6 July 1984, Vol. 225, No. 4657, p. 42.
[2]Ibid.

The references cited in this advertisement do not imply endorsement by *Science* Magazine or AAAS.

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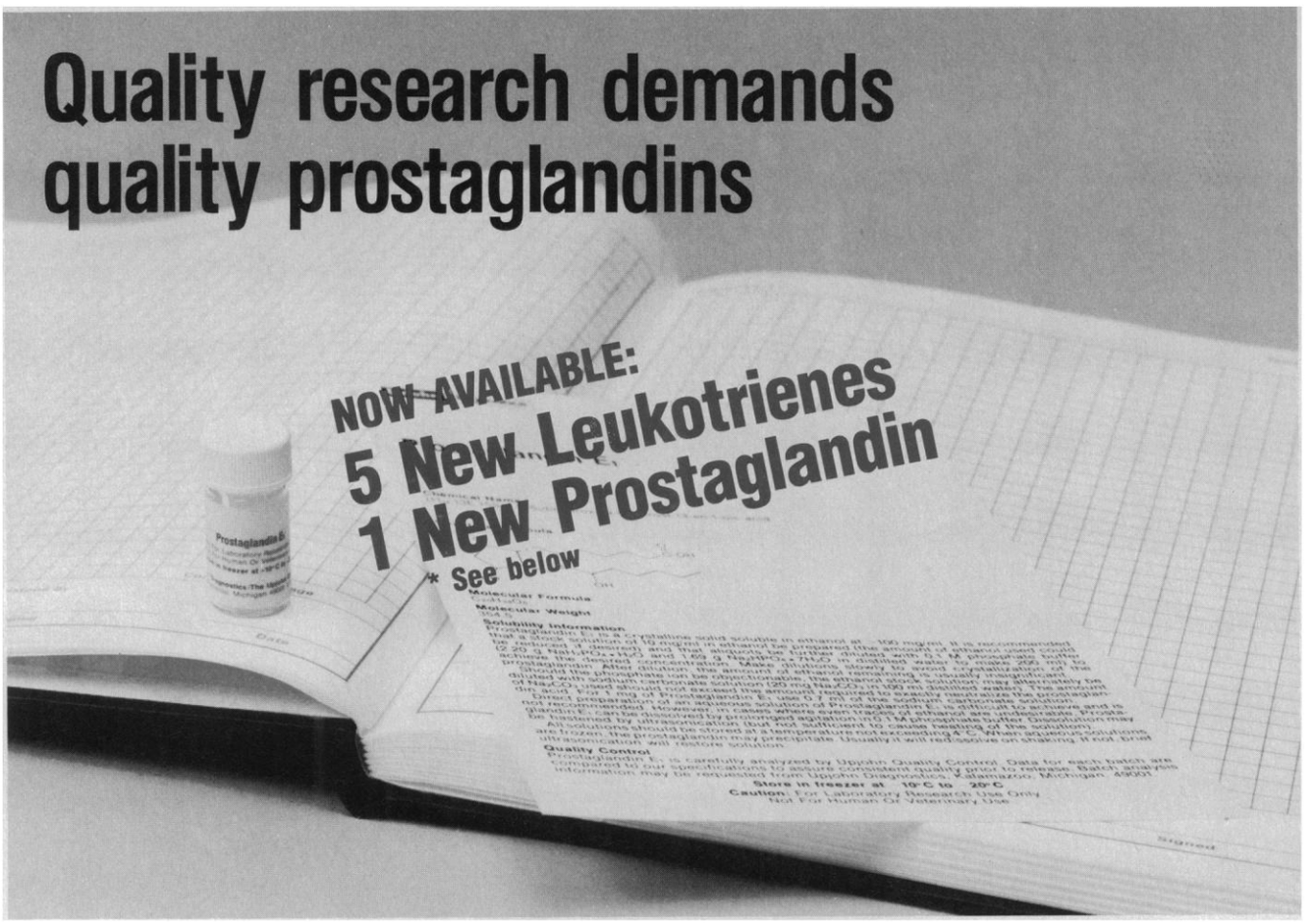

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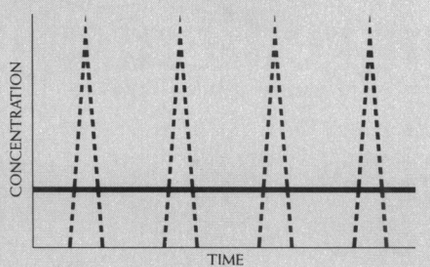

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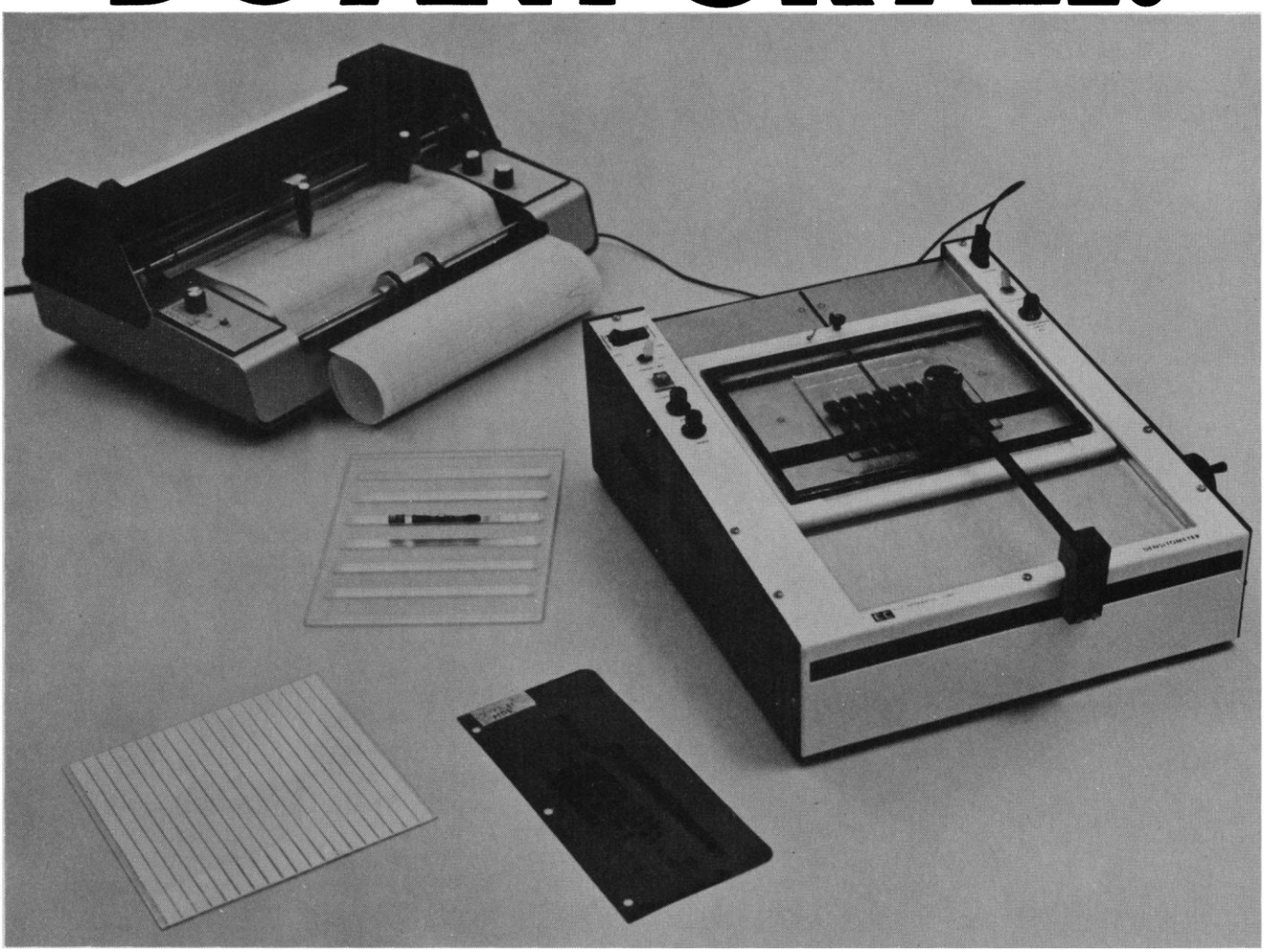

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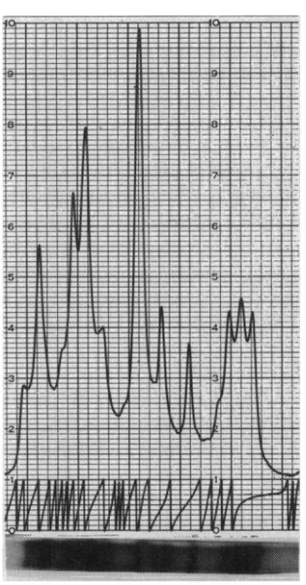

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24 May 1985, Volume 228, Number 4702 **SCIENCE**

A Good Word for Delusions

It is time to say a good word for delusions. Self-deception is routinely denounced in the newspapers. I am supposed to look myself squarely in the mirror each morning, remind myself of my blemishes, painfully document my limitations, and evaluate realistically my future limited prospects. That is described as the path to mental health. Inscribed at Delphi, we are told, were the words, "Know thyself," and modern psychiatry has rediscovered the real.

My fellow scientists and I have no intention of following this advice. I consider myself a part of a small band of heroes designated by fate to prevent masses of neurobiological data from sinking forever into the seas of incomprehensibility. Astrophysicists I know consider stout Cortez a timid homebody as they intrepidly travel millions of light years to the edge of the galaxies with only a computer and a few infrared rays to guide them. Chemists are valiantly being exposed to carcinogens, deaf to the sirens at the Occupational Safety and Health Administration; economists are fearlessly treading through quagmires of statistics; evolutionists are facing extinctions unflinchingly—all in the belief that we have missions no less important than the crusades of yesteryear.

Science is a low-paying profession, and Mother Nature is our implacable enemy, guarding her secrets more closely than the CIA, willing to plant mine fields of false positives to destroy the unwary, hiring deans to delay us with tentacles of red tape, and teaching students to fill notebooks with illegible hieroglyphics, sometimes called handwriting. Only a touch of fantasy in regard to the importance of our missions and the elegance with which they are recounted would keep otherwise rational persons working incredible hours against such fearful odds.

Up to a point delusions of grandeur are valuable and desirable, but eventually problems arise. The distilled product of the adventure is a manuscript, the ballad of the troubadour to be delivered to what he perceives as an eager audience. But there are too many ballads. Moreover, troubadours convince themselves that audiences want to hear every detail of the odyssey. Someone must select whose song is sung and at what length. Thus enter on the scene new characters with icewater in their veins, hearts resistant to fire, and epidermises that are not dissolved by tears. They are editors.

Editors are paid and treated even worse than authors, but they are sustained by a second delusion, righteousness. In their minds they stand at the bridge, like Horatius, to protect the standards of scholarship by deflecting the hordes of unworthy manuscripts. It is inevitable that the qualities that make scientists overcome obstacles and battle the perversities of nature are not abandoned when they meet this new obstacle. They consider editors incapable of understanding adventure, much less evaluating it. And the editors, who are also scientists, have the strength of their righteousness and do not buckle under at the onslaught no matter how distinguished the author.

The procedures that we inaugurated in January (see *Science*, 18 January, p. 249) were designed to preserve the grandeur of our authors, whom we cherish and wish to encourage, as well as the righteousness of our Board of Reviewing Editors, whom we respect and need at our side to maintain standards. It required for success a willingness of authors to recognize that other authors deserved a place in the sun, too, and for editors to recognize that even the righteous can be fallible. It seems to be working because most scientists, in their individual ways, produce delusions with a dash of realism. A detailed account of what we are doing and have learned from the first 3 months of experience will be described next week to, I expect, a breathlessly eager audience.—DANIEL E. KOSHLAND, JR.