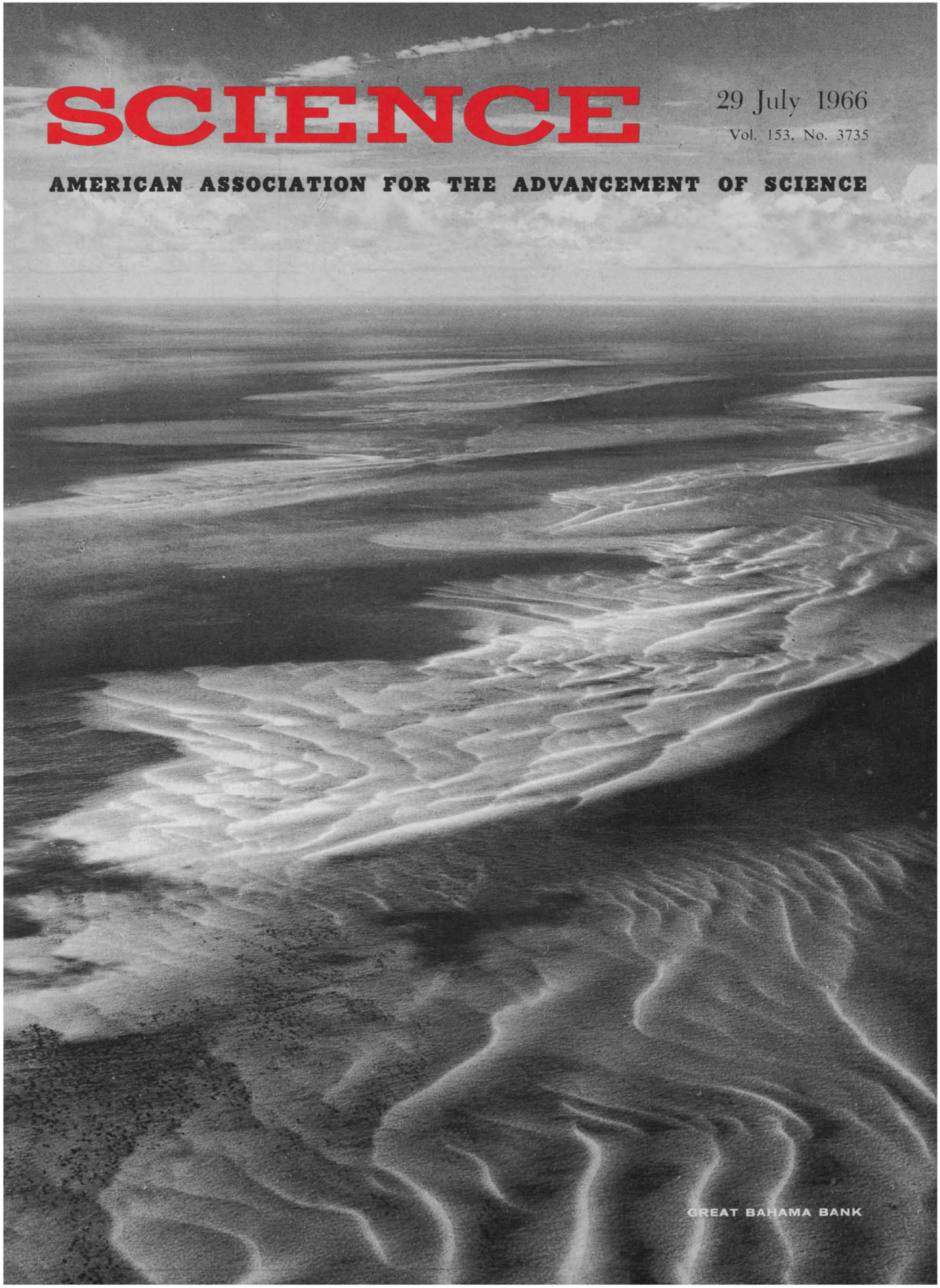
SCIENCE

29 July 1966

Vol. 153, No. 3735

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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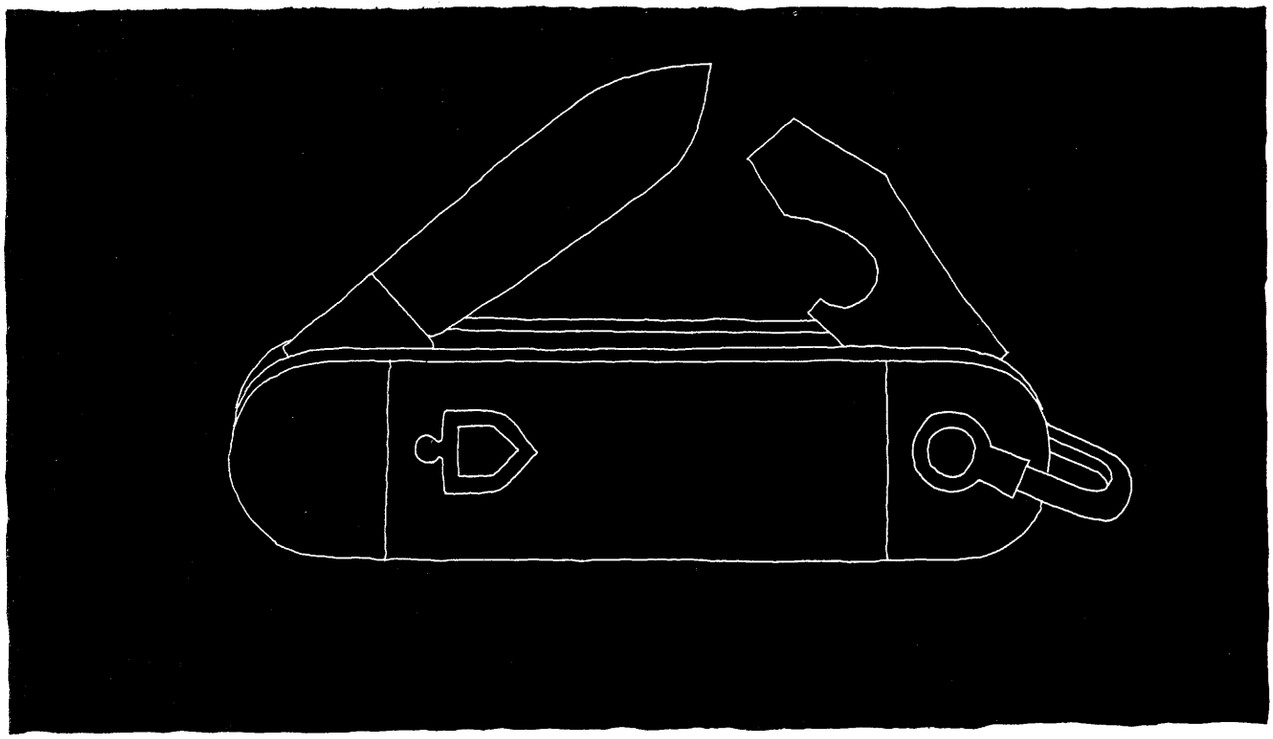

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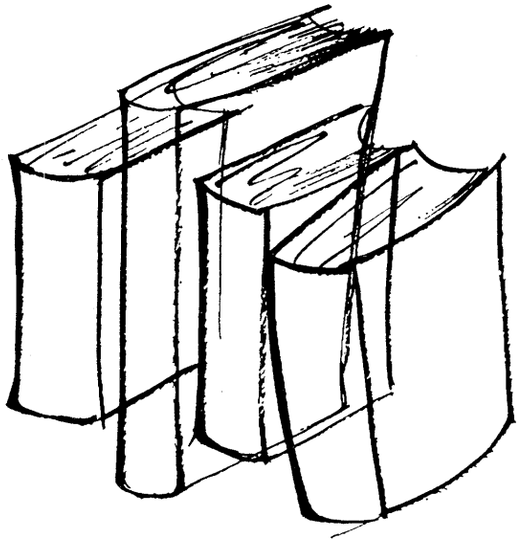

NEW SAUNDERS BOOKS

On rapidly developing areas of biological investigation

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By G. F. GAUSE, Director of the Institute of New Antibiotics of the Academy of Medical Sciences in Moscow.

Here are the fruits of the important work conducted by Dr. Gause over the past decade. This new monograph clearly shows how certain aspects of malignant transformation of cells can be investigated with the aid of microbial models.

Four main aspects are most strikingly illuminated: 1) *Defective control of enzyme synthesis,* 2) *Biosynthetic potentialities accompanying malignization,* 3) *The surface properties of cancer cells,* and 4) *Distortions of DNA base composition.* The author illustrates his research through nearly a dozen microbial models ranging from mutations in yeast to those in protozoa.

110 pages • Illustrated • $4.50 • New—April, 1966.

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The prime aim of this book is to show how the sex chromatin has been useful clinically and in research in the various fields of biological science. It serves as an invaluable reference for anatomists, cytologists, cytogeneticists, embryologists, psychiatrists, and biologists.

The discovery of the sex chromatin has provided a new cytological approach to many biological problems. In this work, Dr. Moore has tied together hitherto fragmented information collected over the last 15 years. The contributors to the volume were chosen for their knowledge of the sex chromatin and for their understanding of its clinical significance.

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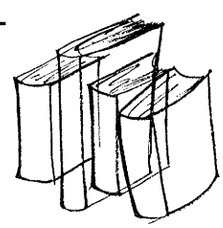

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SCIENCE

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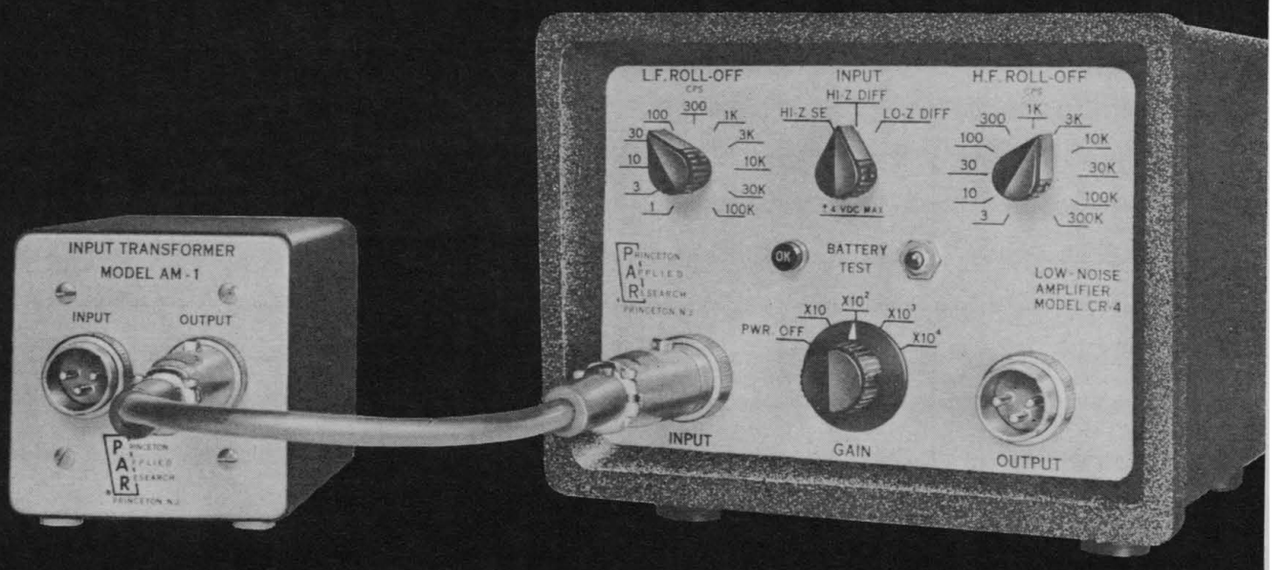
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

The sea as a builder constructed these limestone ridges in the Great Bahama Bank. Over countless years the precipitation of chemicals in the water and the drifting down of the shells and skeletons of minute lime-bearing marine organisms created deposits which solidified into sedimentary rock. The ridges, shown here at high tide, are covered with sand and mud and creased with ripple marks formed by currents. The channels across the banks are 10 to 15 feet deep. See page 560. [Fritz Goro–*Life* ©, Time Inc.]



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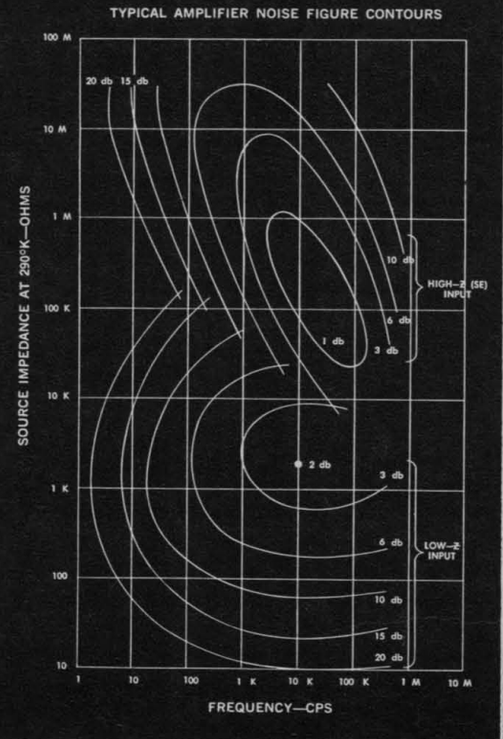

NOISE FIGURE CONTOURS

Experiments in general are performed at some definite source impedance level and over some definite frequency bandwidth. Noise referred to shorted input as frequently specified does not provide meaningful information for acutal experimental applications. It is instead essential to know the noise characteristics of an amplifier not only at the particular operating frequencies but also with the particular source impedances actually encountered. Noise figure contours are the loci of points of constant noise figure (F) plotted as a function of source impedance and operating frequency, and, therefore, provide this complete information. They indicate the degradation in signal-to-noise ratio obtained with the pre-amplifier at a particular frequency with a particular source impedance, input noise being the Johnson noise generated by that source impedance at 290 degrees Kelvin. The contours are obtained from the following equation:

$$F = 20 \log_{10} \frac{\text{total measured amplifier noise (including Johnson noise)}}{\text{calculated Johnson noise}} \text{ DB}$$

Write for Bulletin No. 117

PRINCETON APPLIED RESEARCH CORP.
Dept. G, Box 565, Princeton, New Jersey

scientific program on the grounds that it is glamorous and can be effectively promoted by some gimmick such as "a man on the moon by 19XX" shows the same kind of irresponsibility and moral failure as is shown by those advertisers and manufacturers who style their products according to popular fancy at the expense of function and durability and even of the personal safety of their users. With such a strategy we may well gain the moon at about the same time as we lose the earth.

J. L. FISCHER

843 Sonoma Terrace, Stanford, California

In my letter I did not take the position that the Apollo program was the best choice for allocation of national resources in science and technology, but rather that it is naive to believe that the choice of allocation is simple, or meaningful in the absence of public support. Still more important is (I feel) the enjoinder to scientists to pursue responsible roles in the allocation procedure, with some measure of the objectivity and intellectual honesty that is so essential a part of science.

E. W. PRICE

China Lake, California

Freight Trains

In "Speaking of space" (13 May, p. 875) David McNeill shows how we can try to translate "technical" writing. His suggestion that the word order of nominal compounds be reversed helps, but it does not replace the missing prepositions. Lawyers and physicians may have some reason for speaking in language that laymen cannot understand, but the language of scientific reports should be as simple and direct as possible. Technical terms that have precise meaning are necessary, but jargon should be resisted every time it appears.

Soon after one of my associates started working with an interpreter in order to communicate with Koreans, he asked the interpreter why it took so much Korean dialog to transmit the idea of a simple statement. The interpreter explained that he had to phrase the idea in many different ways so that it would not be misunderstood. My friend learned that Koreans commonly use only two prepositions. He agrees that the nominal compound, as illustrated by McNeill, is typical of Korean construction.

Just as impedance-matching devices couple units in electronic systems effectively, prepositions couple words. The trouble is that we have too few prepositions, and we are sometimes puzzled by the multiple meanings most of them have.

Perhaps the rapid advance of Western civilization is largely attributable to the ease with which precise ideas can be communicated by means of the grammatical structure of Western languages. Expressions like *driveway* are simple and useful, but when we face a long string of words in extended nominal compounds (nozzle gas ejection ship attitude control system) it is like waiting at a crossing for a freight train to pass. When we finally see the caboose we know what the noun is. Frequent use of freight trains is a sign of pompous jargon rather than of correct technical writing.

McNeill only slightly chides the perpetrators of the degradation of the English language. His solution to the problem seems comparable to an M.D. treating a patient with eye trouble by teaching him to read Braille. Many of the entries in the NASA dictionaries should be used only for translating documents that have already been written and as examples of expressions that are forbidden in future documents. I hope NASA officials will consider my suggestion, and I urge editors of scientific journals to be stern. The bad habits are widespread and deeply ingrained. The task will not be easy.

JAMES A. PEOPLES

Journal of Geophysical Research,
University of Kansas, Lawrence

It is not for the hackles of a general editor like myself to rise as he reads the findings of David McNeill. Or is it? I spend my days with papers by scientists, one of whom saw a message, not only for me but for his colleagues in horticulture, in the article on "space jargon" and its merits. I passed the piece about, for consideration here and there, and drew at least one pointed and positive reply. It is the opinion of a writer of a long list of distinguished papers. I quote at random from his reaction, based on nearly 40 years of experience in scholarly exercises involving the written word:

"I doubt that any grammatical sense is involved in the construction of these 'nominal compounds'—otherwise known

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as noun modifiers, run together by people too busy (or too indifferent? or too ignorant?) to develop more appropriate terminology. It is nothing but pidgin English. A piano is a piano—but to a Pacific aborigine it is '*Big black bokkis hit him in teeth he cry!*' Moreover, it raises the question 'Is that your kitten, honey chile?'—and evokes the answer, 'No'm, it's the little girl that lives two houses down the street's cat!' So much for nominal compounds which are merely a semiliterate substitute for sound word formation.

"The old scholars in botany and animal anatomy know how to develop fancy words which, however, had *exact meaning*. None of this 'male sex cell master container' stuff for the simple word 'anther.' Air space engineers are undoubted experts with many things, but not with language. They communicate with one another by *describing* the thing that they talk or write about, because they don't know how to invent a good word for it, one of sound Greek or Latin origin.

"Does Professor McNeill understand how working men communicate with one another? He may. But it seems rather obvious that the nominal compound is nothing but a proliferation of noun modifiers, used for lack of a *word*. All that he says about Zipf's law and the like may be true enough. The fact remains that somebody is putting forth a very fancy, unwarranted explanation for a simple phenomenon. Instead of ascribing scholarly motives to some atrocious new jargon, the experts should clobber the engineers for their palpable semiliteracy!"

A. E. FORD

4714 Cherokee Street,
College Park, Maryland 20740

Mohole: Cost versus Results

Despite Abelson's claim that the "morale of the scientific community has been damaged" by a reduction in expenditures for scientific research, and specifically, by the recent action on the Mohole Project, (Editorial, 3 June, p. 1332), I believe that far more damage to the morale of the scientific community has been and will be done by continued expenditures of large sums of money for non-scientific research.

The Mohole project may have great merit at a later date. In our current economic climate and in a period of

technical manpower shortage it appears to be a severe misallocation of our national resources. Abelson also stated that at stake are trillions of dollars worth of resources under the outer oceans. This is a surprisingly sweeping statement. It may well be true if we accept two modifications: (i) The cost of retrieval of these "reserves" may approach their economic value, a relationship neither stated nor implied in his comment. (ii) The time required for exploitation to reach any meaningful level may be so great that deferral of expenditures at this time will be of no real consequence.

W. D. CARSON
Skelly Oil Company,
Tulsa, Oklahoma 74102

Scientific Exchange with the U.S.S.R.

John Walsh states that the "U.S.-Soviet exchange program negotiated this year reflected a reduction of about 25 percent in the overall level of exchange activity in science," (News and Comment, 17 June, p. 1605). He appears to refer to the exchange activities carried on through a formal agreement between the National Academy of Sciences of the USA and the Academy of Sciences of the USSR. The reduction should read 6 percent or 18 percent, depending on how one calculates: the new interacademy agreement for 1966-67 provides for exchange visits by 45 scientists totaling 170 months, as compared with the level of the previous two-year agreements of 55 scientists for 180 months. Thus, in terms of number of visitors the reduction is 18 percent; in total length of visits, the reduction is 6 percent. The initiative for the reduction was the Soviet Academy's, prompted presumably by political circumstances.

One must recognize that these quotas express intent, and have never been completely filled. As the degree of fulfillment has progressively increased since the beginnings of the interacademy exchange program six years ago, it is likely that the small reduction of quota in the new agreement with the Soviet Academy will result in little or no real reduction in overall exchange activity within the program.

LAWRENCE C. MITCHELL
Office of the Foreign Secretary,
National Academy of Sciences,
Washington, D.C. 20418

Western Electric's big push on metal forming

Immerse a piece of metal in fluid, subject it to pressures of two or three hundred thousand psi, and what do you get? Fantastic ductility.

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The problem was not so much in reaching the necessary pressure, nor in working the metal while maintaining the pressure. It was rather in finding ways of forming the parts fast enough to make the process economical. Progress has been gratifying. One important part — the coaxial cable sleeve shown below — is now being produced in quantity by the new method.

The sleeve is formed by a combination of hydrostatic pressure and axial compression. A copper tube is placed inside a liquid-filled die, and pressure is raised to approximately 100,000 psi. A ram starts pushing against one end of the tube. At the same time pressure inside the tube is increased and liquid outside is bled off. What happens? The tube is blown out like a bladder and gets neatly squeezed to the necessary highly critical dimensions. What's more, we can do it 180 times an hour—with a 15 to 1 cost saving over the next best method.

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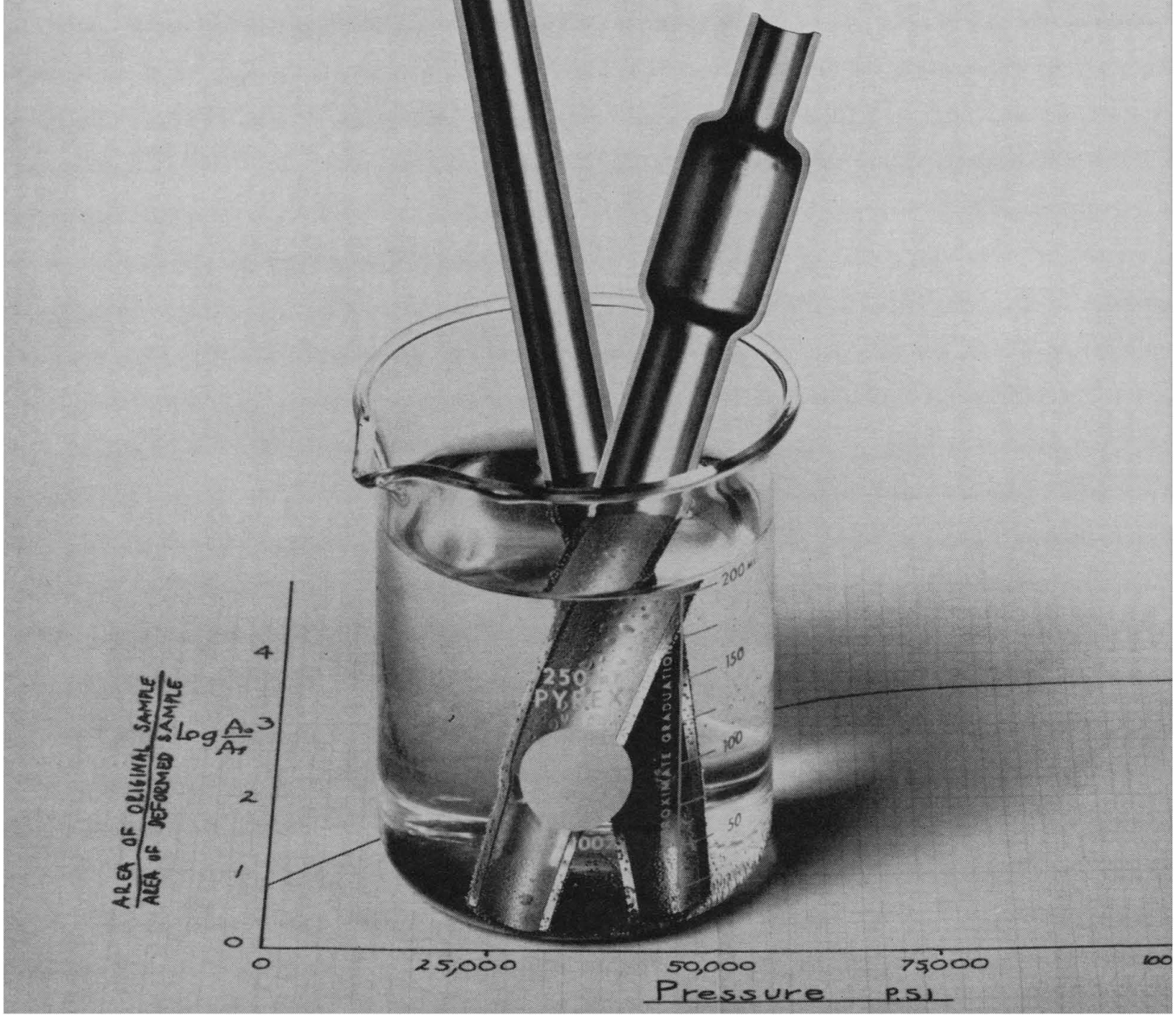

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Government Support for Social Science

A number of congressmen have become interested in developing better policies to govern relations of the Federal Government to the social sciences. A White House conference has been proposed, as has an Office of Social Sciences parallel to the Office of Science and Technology. A National Social Science Foundation, similar in organization and purpose to the National Science Foundation, has been recommended and was one of the topics discussed at recent hearings held by the Senate Subcommittee on Government Research (*Science*, 8 July 1966). Another bill before Congress proposes to assign to the National Science Foundation greater responsibility for increasing research competency in the social sciences.

The current interest arose in part from the Camelot affair and the resulting criticism of the Defense Department as an inappropriate agency to support social science research, particularly research carried out abroad. Some of the critics seem to forget that the military services have filled a gap that other agencies should have filled but did not. How lopsided the situation has become is shown by 1966 expenditures. Of $25 million spent by the U.S. Government on social science research abroad, the Department of Defense provided $12.5 million, while the Department of State provided only $200,000.

Policies concerning support and administration must be based on an understanding of why the Federal Government spends public funds on research in the social sciences. The reasons are exactly the same as those for supporting research in other areas: because it is good public policy to increase national research competency; and because the results are expected to help solve problems of broad public concern.

As for the first reason—fostering increased research competence—the National Science Foundation seems likely to be more effective than a separate agency, for the trend in science is toward a narrowing rather than a widening of the gaps separating different fields.

As for the second reason—usefulness—the historian Henry Steele Commager has drawn a parallel between the problems that troubled society during the industrial revolution and those that trouble society today. Considering the use and abuse of technology during the industrial revolution, it was humanistic values, he said, "and the practical efficiency of the social sciences which combined to provide partial solutions of these problems," and then, turning to the problems that now beset the world and the current uses and abuses of science and technology, added: ". . . the social sciences are called upon to perform once again, on a world scale, and for ultimate stakes, the tasks which they performed so well in the [19th century]."

The responsibility of the several agencies concerned with these problems is analogous to that of other agencies that find research useful in accomplishing their missions. The Department of Housing and Urban Affairs, the Agency for International Development, the Department of State, and other agencies that deal with major social problems should be marching up Capitol Hill asking for larger funds for research to enable them to do their jobs more effectively in the future.

Support and active involvement of the National Science Foundation and the relevant mission-oriented agencies will serve better than would a separate agency to keep the social sciences in close touch with other sciences and with the practical problems they can help solve. Compartmentalization in a separate agency is neither the best means of strengthening the social sciences nor of serving the Federal Government.

—DAEL WOLFLE

α-P^{32} ribonucleoside triphosphates

(To get them as hot as possible, why not try to find out when we're about to make some.)

If there were just some way that you could find out when we were scheduling a new batch of an α-P^{32} ribonucleoside triphosphate, you'd really have it made. You'd have the hottest α-P^{32} ribonucleoside triphosphate around, because, shortly after we first had it in *our* hands, you'd have it in *yours*.

Well, there *is* a way you can learn of our manufacturing plans. Ask us.

If you do, we'll do two things: (1) we'll send you our production schedule for the near term so that you can correlate our production dates with your research needs, and (2) we'll remind you by mail every time a new production run is imminent.

We now schedule regular production of the adenosine, cytidine, guanosine, and uridine α-P^{32} labeled ribonucleoside 5′-triphosphates. These compounds are prepared by enzymatic phosphorylation of the corresponding ribonucleoside 5′-monophosphate to which the P^{32} phosphate group has been attached by chemical procedures.

Noteworthy specifications: radiochemical purity in excess of 97%, specific activity from 200-900 mc/mmole, initial concentration at 0.5 mc/ml. And with each shipment to you, we include a Product Analysis Report with a radioautogram which gives the analytical data on the batch you receive and enables you to leave the quality control worries to us.

The cost? Only: 250μc/$150, 500$\mu$c/$225, and 1000 μc/$375. (The production schedule and follow-up reminders that we send you, the Product Analysis Report and the confidence it engenders, and our new catalog too if you don't already have it, are all on the house.)

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