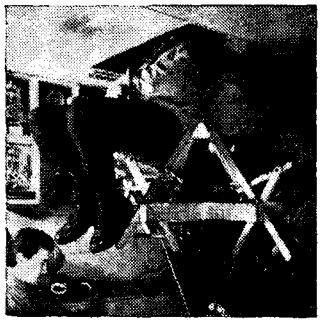

SR/Research

SCIENCE & HUMANITY

RESEARCH IN AMERICA

- *ANTARCTIC HEADHUNT*
- *A SPARE HEART*
- *DOG-EARED RABBITS*

WHERE are the heads that belong to the bodies so awkwardly perched on the camp-chairs hanging in our masthead photograph? We raise the question for the benefit of those people who have been telling us how unhappy they are not to be able to participate in that romantic adventure—the exploration of Antarctica. Our purpose is to remind that adventure seldom is free of drudgery. The cramped and probably aching gentlemen above are watching meteors from a hut built beneath the snow. Their heads protrude into a rectangular observation dome that juts above the ice.

We borrowed the picture from the Poulter Report (named for Dr. Thomas C. Poulter, who went to the South Polar ice with Admiral Richard Byrd in the 1933-35 expedition) of the Stanford Research Institute, and we publish herewith the scientific explanation for the predicament displayed:

> It was found that an observer could see more than twice as many meteors if observing from a comfortably heated observatory than he could if attempting to observe while dressed in furs and making the observations outside with the temperature forty below zero or colder.

As usually happens in science, the tedious watch paid off. Before it was begun, meteors entering earth's atmosphere were thought to number ten to twenty million a day. The number was actually found to be closer to a billion a day. At times they crossed the Antarctic sky at the rate of thirty-five per minute. Some of them were bright enough to cast shadows on the ice as they passed far overhead.

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ARTIFICIAL hearts have come into fairly common use to keep patients alive during delicate operations which require the stoppage of the heart itself. Last week professional science writers traveling as guests of the New York Heart Association saw experimental apparatus which it is hoped will lead to broader application of these fascinating machines.

At Kings County Hospital in Brooklyn, a special surgery room has been set aside. Standing ready is a device designed by Dr. Clarence Dennis, chief of the department of surgery of the State University of New York. Like other machines of its kind, it supplies oxygen in lieu of lungs and pumps blood to substitute for the heartbeat.

Into this emergency room will be brought patients threatened with immediate death from acute heart attacks. Admission will be open only to those who have had at least one previous attack and have been left with a weak spot in the heart muscle, technically known as a myocardial infarction. When the second attack comes, a larger part of the heart is affected and patients usually die.

In these cases the heart will not be stopped. But Dr. Dennis's machine will be hooked up, with one tube inserted in an arm artery and another in a leg vein. Blood from the vein will be infused with oxygen in the machine, then returned to the arm artery, altogether accounting for about one-third of the heart's pumping work. When the crisis is past—perhaps six or eight hours later—the patient's own heart will be better able to resume its normal load.

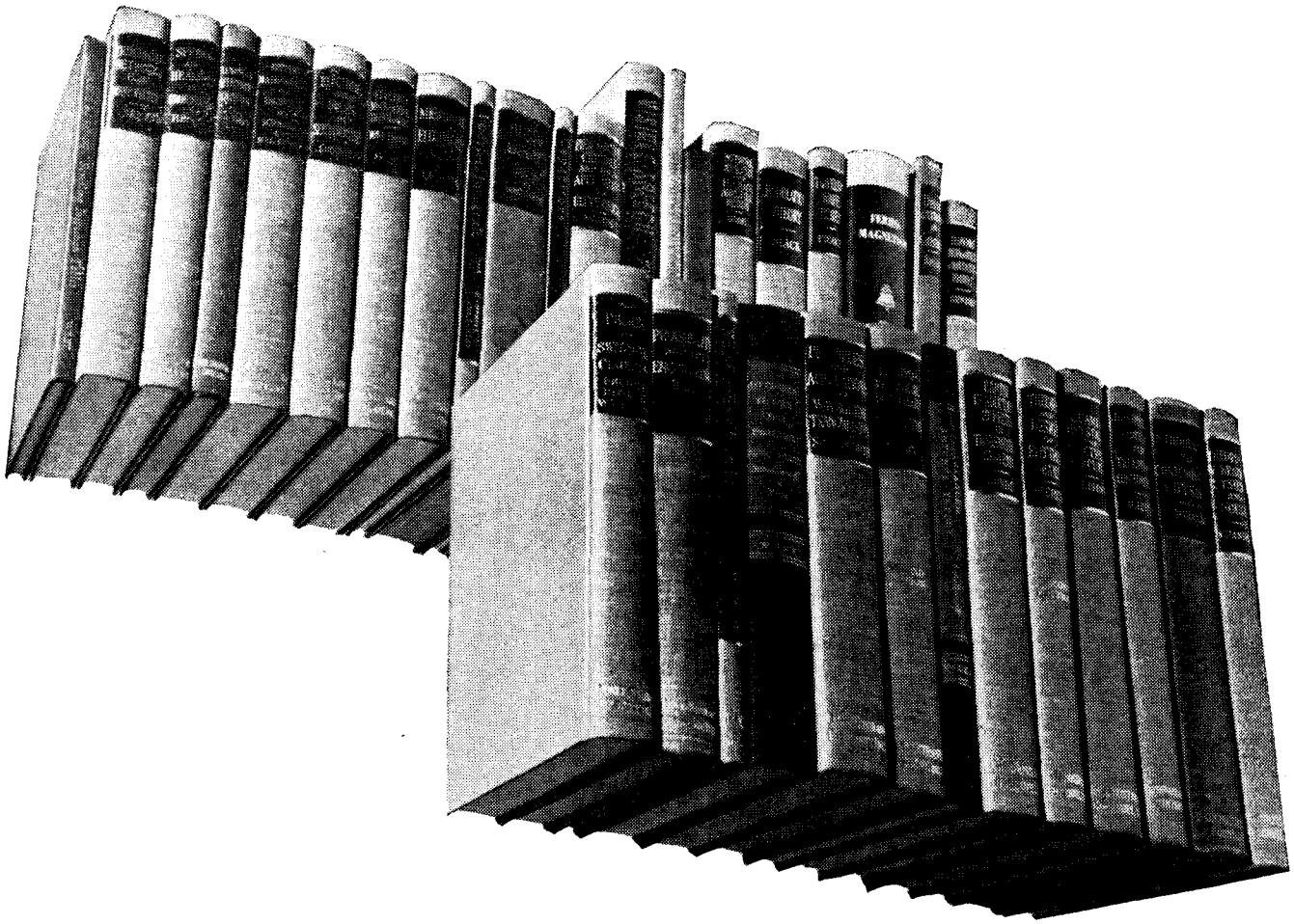
At another stop on the heart tour, the science writers learned of an accident that may prove very important to medicine. An enzyme from green papaya was being fed to rabbits in a study of the body's defenses against infection. The ears of the rabbits unexpectedly flopped like the ears of spaniels. That caused Dr. Lewis Thomas, of New York University-Bellevue Medical School to investigate further, and he found that the enzyme dissolves cartilage not only in ears but in joints, windpipe, and elsewhere.

• • •

DR. ROBERT H. Wentorf, Jr., a physical chemist in the General Electric Research Laboratory at Schenectady, N. Y., has discovered how to make an element that never existed before. It is the cubic form of boron nitride, and is as hard as diamond. More important, it withstands heat that would melt a diamond.

• • •

THE real extent of scientific influence in the life of the United States is only now being brought out in survey reports published by the National Science Foundation. Though the latest of these deals with facts and figures two and three years old, it is still something of a shock to learn that numbers of men and amounts of money employed in scientific research within industry "is far above the top figure suggested by the most comprehensive previous



How the scientific world shares in fruits of the telephone art

In their work to improve telephony the scientists and engineers of Bell Telephone Laboratories make important findings in many sciences. They thoroughly report these findings in professional journals and magazines. But sometimes, as knowledge accumulates in a vital field, a "treatment in depth" is prepared in book form.

Bell Laboratories authors have written 36 books to date and others are in preparation. Many have become classics in the Laboratories' primary field of communications. Many have become standard works of wide application because they provide a fundamental guide for technologies in other fields. For example, the design of automatic switching systems is of primary importance in computers; statistical quality control provides the indispensable basis for economical manufacture. Through their books these scientists and engineers and the Laboratories attempt to repay benefits they receive from the published works of others.

The pictures on the opposite page show some Bell Laboratories authors of technical books. A complete listing of titles may be obtained by sending in this coupon.

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data." Small companies were assumed to be scientifically backward and were consequently passed over in past studies; today the small enterprises turn out to be the great majority of firms participating in scientific research.

Slightly more than 15,500 companies were involved in research in 1953, the year covered by the latest NSF survey. The size breakdown in general followed the pattern of manufacturing concerns, which was this:

total of firms in research	14,000
firms employing 8-99 workers	8,500
firms employing 100-499 workers	3,300
firms employing 5,000 or more workers	314

During that year 1953, the 15,500 companies spent $3.7 billion, $2.3 billion of it on their own private projects and the other $1.4 billion on Government contracts (while the Government itself was spending $1.3 billion in Government laboratories and universities). This was almost double the private industrial research expenditure of 1951 ($2 billion); although the trend they set would most probably not be uniform, 100 companies included in both the 1951 and 1953 surveys reported a 44 per cent increase in research spending in the two-year period.

The *number* of small companies engaged in scientific research came as a surprise, but they do not outweigh the big companies *proportionately*. Indeed, only 8 per cent of all firms employing 8-to-99 workers have research budgets, whereas 95 per cent of all companies with payrolls listing 5,000 or more names are committed to research.

The cost of maintaining one scientist on the job averaged out to $27,000 in 1953 (it was $23,000 in 1951), with half that amount budgeted to land and buildings and the other half to equipment. The whole bill for industrial research scientists adds to 1.7 per cent of total sales.

Why research is worth that sum, or even *if* it is worth it, the surveyed companies had no objective method of deciding. Reasons given for research were almost entirely subjective, and frequently boiled down to one cliche: keeping up with the corporate Joneses.

Only $150 million of industry's $3.7 billion expenditure on science was going into pure research in 1953. Paradoxically, many firms could already foresee roadblocks in their own future rising from lack of basic scientific knowledge in their chosen fields. Some realization of the contradiction appeared to be reflected in the growing numbers of physicists and mathematicians assigned to research payrolls.

One cheap toll-road out of the research dilemma might be opened through swifter communication of results of scientific experiments. Many executives of surveyed companies so expressed themselves. To engineer such a road the National Science Foundation, in cooperation with the National Academy and the American Documentation Institute, have called an international conference on scientific information. The conferees will meet in Washington early in November 1958.

• • •

THERE is a greenhouse in Kansas City, Missouri, which grows nothing but human irritation. College students go there to be provoked into tears. It is all very scientific, however, and someday may rid Los Angeles of its notorious smog.

This glass-paneled house belongs to the Midwest Research Institute. Into its clammy interior, motor exhaust is introduced from a 1952 station wagon. Hydrocarbons wafted by the fumes are subjected to sunlight, whose photochemical effects turn out to be responsible for the eye-blistering quality of the air. A two-minute exposure to the stuff is enough to turn husky experimental volunteers into steady weepers.

Thanks to what the greenhouse has revealed, the Automobile Manufacturers Association is now working on a carburetor cutoff which is expected to cut exhaust emission of hydrocarbons in half.

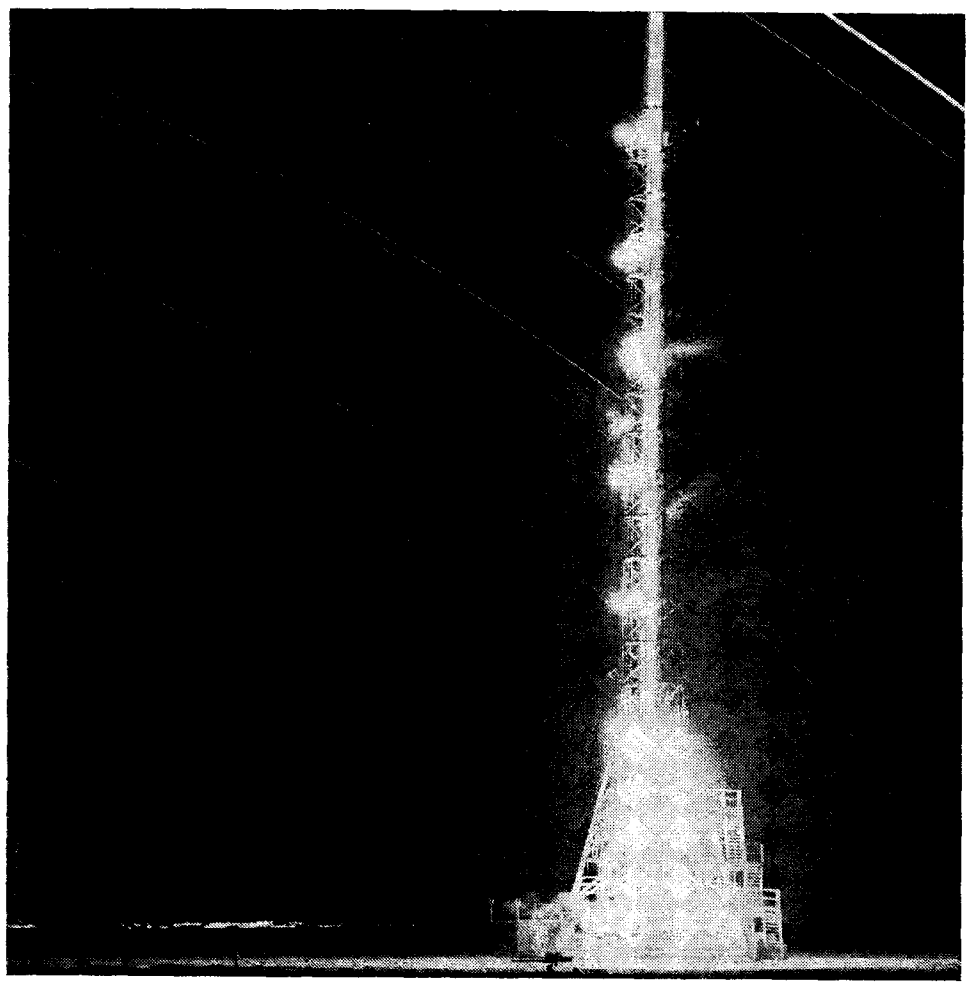
• • •

THE time may come when a policeman will clear up a motor traffic jam merely by making a telephone call. At least that hope has been raised in optimistic breasts by an experiment now being tried in the city of Rochester, New York. Participants are the business firm of Stromberg-Carlson, subsidiary of General Dynamics Corporation, and the Rochester Transit Corporation, which runs the city's buses.

Beginning on May 1, a two-way radio telephone system which Stromberg-Carlson has developed will be installed in the main bus station and in twenty-five buses for a ninety-day trial. If the trial succeeds, every one of Rochester's 300 buses will have its own telephone before the end of 1957. And other cities very likely will be trying to get onto the line.

—JOHN LEAR,
Science Editor.

MINERS OF THE SKY



—*Official USAF Photo.*

Sky mining shaft is marked off by light of rising rocket's fuse. Angled streaks are paths of stars.

By JOHN LEAR

SUNSPOT, NEW MEXICO.

THE LIGHT appeared above the desert floor five minutes and a fraction of a second after 1 o'clock on the morning of Saturday, February 2. From this snow-dusted 9,000-foot peak in the Sacramento Mountains, I saw it hanging like an enormous lantern, low in the midnight sky.

At first it seemed utterly still. Then, almost imperceptibly, it rose as though it were being drawn aloft by the hand of a patient giant. Probing the dark with amber shafts as broad as the unrimmed spokes of a stilled wheel, it dimmed the brightest constellations to insignificant twinkles.

As it climbed it dwindled and reddened. Up, up, straight up. Tinier, redder, dull at last as a dying coal. Blip! Along the path of its disappearance into the zenith, the sky once again was adazzle with stars.

I had witnessed the passage of an awesome miner's lamp sent into the heavens by man in one of his first attempts to find and tap invisible lodes between the earth and the sun.

Having kept fire alive as his servant for centuries by collecting fallen sticks, chopping down trees, digging peat from bogs, invading the earth beneath his feet for coal and oil and uranium, the human explorer now is turning his eyes overhead and reaching into the air for the fuel of the future.

That power can be extracted directly from sunlight has already been demonstrated by Bell Telephone Laboratories' solar battery and by solar furnaces that are being built of mirrors in homes and public buildings of the Southwest. But only a small fraction of the available energy is being captured by these devices. Here at the Sacramento Peak Observatory, solar astronomer John W. Evans shows his visitors motion pictures of the sun's corona, taken by the green light of iron atoms whose temperature he esti-