

capsule six inches long and four inches thick will be thrown into space. Inside this manmade meteor will be scientific instruments and a powerful radio transmitter capable of reporting what electrical and magnetic forces are operating 1,000 to 5,000 miles out.

This is the sort of business that made old Henry Ford's Tin Lizzy famous. Old Henry's spirit would be pleased to know of the existence in the Ford Motor Company of a space travel subsidiary, Aeronutronic Systems, Inc. Aeronutronic put the four-stage rocket together at Glendale, Calif., under an AFOSR contract labeled Project Far Side. The components are so thoroughly standardized and simplified that Dr. Fred Singer, the brilliant young University of Maryland astrophysicist Aeronutronic hired as a consultant, is letting a crew of students fill the tiny space capsule.

The balloon itself is an unexpected byproduct of the law of gravity, as that law revealed itself to the world's biggest millers of wheat flour. Gravity governed the speed with which flour fell down the mill chutes to be bagged. The flour filled the bags faster than the men at the bottom of the chutes could close the bags. If a bag could be closed automatically, more flour could be marketed. So, in 1927, in order to keep up with the law of gravity, the millers hired a handful of mechanics to invent a flour bag sealer. A machine shop was set up in the flour mill. In time a sealer was invented, by a man named Anderson. What were the machinists to do then? They had never ground a grain in their lives and didn't know whole wheat from rye. To keep them off the breadline (no pun intended) General Mills assigned them to design pressure cookers for cake mixes and ingenious blowguns to explode grains into breakfast foods.

By the opening of World War II this little band of machinists were doing precision jobs that would have bankrupted big machine makers. At the request of the British Admiralty they shifted from mill gears to torpedo directors and from pressure cookers to roll-correctors for submarine destroyers in the North Atlantic. Later, they shifted again . . . to airplane bomb-sights . . . to remote-controlled mechanical arms for atomic installations . . . to robot-making-robots for the half-mile-long "brains" IBM built to stand radar watch in the Arctic Circle . . . and finally, toward the close of the war, to "Project Helios."

"Project Helios" was a creature of the Office of Naval Research. It originated in the 1930s with the noted French explorer, Dr. Jean Piccard, and Dr. John D. Ackerman of the University of Minnesota. Those two scientists knew, as did others, that bal-

loons were far more reliable sources of observation than were vehicles hurtling along at high speeds. For a balloon merely drifts without disturbing the air around it. But Piccard and Ackerman knew, too, that the record-breaking 1935 flight of the *Explorer II* from South Dakota's "Stratobowl" to an altitude of 72,395 feet had demonstrated the unlikelihood of higher jaunts in rubberized fabric envelopes. Lesser men might have been laughed out of suggesting balloons of cellophane and scotch tape. Piccard and Ackerman not only suggested those materials; they made small balloons of them and flew them long distances.

Now, a decade afterward, the Mechanical Division of General Mills was ordered by ONR to fabricate eighty to 100 plastic balloons suitable for flying as a cluster and strong enough to lift a gondola carrying Dr. Piccard and a Navy pilot with a cargo of scientific instruments 100,000 feet up.

The General Mills machinists made the balloons and the gondola. Although "Project Helios" was called off in 1946 for fear of the effects of cosmic rays on the balloon occupants, the plastic balloons flew remarkably well. Their gas envelopes, patterned of thousandth-inch polyethylene film, were light in weight yet tough and temperature-resistant; they didn't expand continuously like the older rubber; they could be floated at a given altitude, and could even be sent on journeys, following the wind at a chosen height. More than 2,000 General Mills balloons have in fact been floated across the United States, the Atlantic, Europe, South America, even in a circle around the North Pole.

• • •

THE Atomic Energy Commission has been telling the people for a long time now that A-bomb tests could be continued indefinitely at the rate of the last five years with no appreciable danger to ourselves or to our earthly neighbors from fall-out. Last week the first Congressional committee to investigate fall-out reported a contrary view. Drawing upon evidence submitted by the AEC's own scientific specialists, the committee—headed by Representative Chet Holifield of California—said continuance of present tests *could* become a hazard. This would appear to be an excellent reason for pursuing the suggestion Mr. Holifield made in SR/RESEARCH last month: that the AEC be left in charge of making A-bombs but that another government agency be given responsibility for appraising bomb effects injurious to public health.

—JOHN LEAR,
Science Editor.

LETTERS TO THE SCIENCE EDITOR

UNSCROOPULOUS

DID VERY much enjoy reading Will Jonathan's . . . "Weather-to-Wear-Man" (PERSONALITY PORTRAIT XVII, Aug. 3) since fabrics have been a source of study for me, too. . . . My search now is for a "soundproof" rather than a wrinkle-proof material, so that when I wear my hearing aid attached to my clothes (as I do) my ears will not be assaulted by a very Niagara of sound caused by the rustle of the material of my dress, picked up by the amplifier of the instrument. . . . Do you think Dr. Dillon could perhaps "tune-up" an answer for me on this?

MRS. D. E. KETCHAM.

Miami, Fla.

EDITOR'S NOTE: Dr. John H. Dillon, Director of the Textile Research Institute at Princeton, replies: "I believe Mrs. Ketcham's problem would be lessened, although probably not completely solved, if she would wear soft woolen dresses rather than crisp cottons, rayons, or silks. Silk, in particular, has a tendency to rustle, which is referred to by textile men as the 'scoop' of the silk. A great deal of effort is made to develop 'scoop' in rayon and cotton fabrics since it is a property which has long been associated with silk and, under normal circumstances, thought to be desirable."

SHRINKING WORLD

I SEVERELY doubt that Dr. White would think (LETTERS TO THE SCIENCE EDITOR, Aug. 3) that two antipodal points on the equator of earth would be 12,451 miles apart. That is the distance you have to travel to go from one to the other. But they are only 7,930 miles apart, even allowing for a little elevation above sea level on both sides.

WILLY LEY.

Jackson Heights, N. Y.

EDITOR'S NOTE: The phraseology was: "no . . . further apart than 12,451 miles." But we thank Willy Ley for tightening things up.

NEW STATUS

AFTER READING "Science in the Slums" (RESEARCH IN AMERICA, Aug. 3) I turned to the index to mark the section for future reference, as is my wont to indicate why I am keeping a particular copy. To my surprise, the SR/RESEARCH department has no index listing! May I suggest that this appears to be an oversight?

MRS. ALBERT FRIEDMAN.

Redondo Beach, Calif.

EDITOR'S NOTE: SR/RESEARCH is indexed starting with this issue.

NO PROOF

IN LETTERS TO THE SCIENCE EDITOR (SR/RESEARCH, Aug. 3), the editorial comment is made that "Scientific theory

generally is not considered to be proved until it is possible for man to duplicate a natural phenomenon symptomatic of the theory." Actually, from the viewpoint of scientific philosophy a theory is not an object of either proof or disproof. . . . The value of a scientific theory lies not in its degree of approximation to the "truth," but rather in the degree of success with which its abstractions imply relationships which are consistent with observed phenomena and in the degree to which it implies productive experimental hypotheses.

JAMES S. FORD.

Los Angeles, Calif.

UNSUSPECTED?

YOUR ARTICLE on the changes taking place at East Chicago (RESEARCH IN AMERICA, Aug. 3) was fascinating.

You whet my appetite and leave it keen. You say, in effect, that the industry leaders of the community learned of wants and dreams of their employes that had never been suspected. You tell of the progress in slum clearance and other things. But what was the QED of these studies which industry had never suspected?

I assume that it was learned that humans, in relation to their economic endeavors, are affected by many things other than payroll checks—i.e., social status, recognition, pride, etc. If this is all that was shown, I wonder if they were really so surprised. Motivation surveys, as I understand it, have demonstrated such things many times.

WILLIAM WOODRUFF,
Adjunct Professor of Economics,
Georgia State College of
Business Administration.

Atlanta, Ga.

EDITOR'S NOTE: We suggest that reader Woodruff read the letter below.

HAPPINESS, LTD.

WE SHOULD like to . . . suggest a few changes in the event you write further concerning the Purdue-Calumet Development Foundation and its activities (RESEARCH IN AMERICA, Aug. 3).

1. The Munster Tract will not be used to handle any "overflow" brought about by slum clearance or tighter zoning regulations in East Chicago or its neighboring cities, but will be developed as a major addition to the supply of middle and upper-middle income housing for the area. (A distinction of considerable importance to those in the Munster area.) While we have been included in preliminary discussions concerning the utilization of this site, and may eventually manage its development, neither we, nor anyone else, have been given the land.

2. We would appreciate deletion in any future references of your colorful but subjective phrases such as "sealed bottle of human unhappiness" and "in the throes of destroying itself." These phrases, together with your statement on the illiteracy rate, are of questionable validity, and, at the least, do not give an accurate overall picture of the dyna-

mism of East Chicago and the progress made and underway by its citizens and officials.

We know that you will appreciate our position in not wishing to stir up any unfavorable public reactions.

R. J. ROYAL,
Public Relations,
Purdue-Calumet

Development Foundation.

East Chicago, Ill.

EDITOR'S NOTE: Isn't it healthy to have unfavorable public reaction to a slum that houses one-third of a whole town's population?

ATOM JUDGE NOMINEE

I READ WITH interest the provocative essay ("On Serving Two Masters," SR/RESEARCH, Aug. 3) on the need for an independent body to observe and record the fall-out from industrial and military experimentation in atomic energy. Mr. Lear makes the point that the nation cannot reasonably expect the same agency both to develop the bomb and to protect the public from the adverse effects of its own activities. I agree . . .

Our need . . . is for a group which both enjoys the complete confidence of the people and is technically competent to measure, record, and evaluate the effects of industrial and military experimentation. I believe that a unique solution to this problem will lie in the utilization of the United States Geological Survey. . . .

There is probably no body within the Civil Service which has more firmly established the reputation of honesty, integrity, and fair play in the public interest than the Geological Survey. . . . This group of well-educated and competent scientists has been dealing with radiation from an observation and recording standpoint for many years. The entire geological education, moreover, is pointed toward observation, recording, projection, and prediction from physical phenomena. The present geographic distribution of personnel within the Survey is such that they would be able to undertake this function with a minimum of relocation. . . .

Whether the danger is real or imagined, the need of the people for reassurance is . . . valid . . .

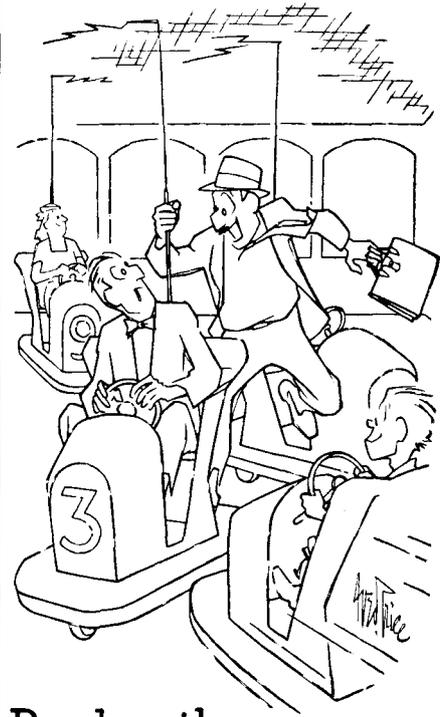
GEORGE CLARK,
Richfield Oil Corp.

Bakersfield, Calif.

HUMANITY FIRST

I WANT to give Representative Chet Holifield my thanks for his sobering essay on the atom (SR/RESEARCH, Aug. 3). However, I found myself disagreeing that: "Any . . . agreement to stop (weapons) testing, (not) based on a fool-proof system of inspection would . . . jeopardize our national security." We simply have no right to jeopardize the health of all mankind to insure our national security. We will justly merit the undying hatred of men the world over; . . . the atmosphere . . . belongs to all of them.

FR. LEON SULLIVAN, OFM.
Peoria, Ill.



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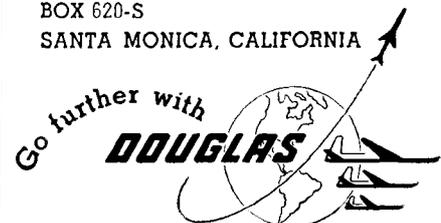
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WHY DON'T THE SCIENTISTS ADMIT THEY'RE HUMAN?

By W. FURNESS THOMPSON

DID you ever read a scientific paper that begins, "For no good reason at all I had a hunch that . . ." or "I was just fooling around one day when . . ."? No sir! Seldom does a trace of anything haphazard, anything *human*, appear in published reports of research experiments. The scientific paper will more likely begin: "In view of recent evidence concerning the Glockenspiel theory, it seemed advisable to conduct. . ." And the report will go on to describe a carefully thought-out experiment that followed not only a logical but also a chronological order. *This* was done, *this* resulted, therefore *these* conclusions were suggested. Scientific tradition demands that scientific papers follow that formal progression: method first, results second, conclusion third. The rules permit no hint that, as often happens, the method was really made up as the scientist went along, or that accidental results determined the method, or that the scientist reached certain conclusions before the results were all in, or that he *started out* with certain conclusions, or that he started doing a different experiment.

Much scientific writing not only misrepresents the workings of science but also does a disservice to scientists themselves. By writing re-

ports that make scientific investigations sound as unvarying and predictable as a pavan, scientists tend to promulgate the curious notion that science is infallible. That many of them are unconscious of the effect they create does not alter the image in the popular mind. We hear time and again of the superiority of the "scientific method." In fact, the word "unscientific" has almost become a synonym for "untrue." Yet the final evaluation of any set of data is an individual, subjective judgment; and all human judgment is liable to error. Thoughtful scientists realize all this; but you wouldn't gather so from reading most scientific literature. A pompous, stilted style too often seizes the pen of the experimenter the moment he starts putting words on paper.

Words direct our lives, after all. And if the words in which we read the scientist's own unfolding story of his science are all cold and calculated, empty of foible or failing, above even mention of mistake, how are we to divine that in the vast majority of moments when he is not writing the scientist is a genial, sensible, rather humble man? By what occult power are we to recognize that his "objective evaluations" in the scientific journals are actually not magnificent infallibilities but fortunate conclusions of persistently pursued hunches, exhaustively explored in-

tuitions, and unexpected observations?

Editors of scientific publications are not without their reasons for the current style of scientific writing. Their journals aren't rich. Paper and printing are expensive. Therefore, it is expedient to condense articles as much as possible. Under pressure of tradition, the condensation process removes the human elements first. And few scientific writers rebel against the tradition. Even courageous men do not go out of their way to publicize their deviations from accepted procedures. Then, too, there is an apparent objectivity and humility attached to the third person, passive voice writing technique adopted in the preparation of most scientific papers. So, bit by bit, the true face of science becomes hidden behind what seems to the outsider to be a smug all-knowing mask. Is it any wonder that in the popular literature the scientist often appears as a hybrid superman-spoiled child?

NO SMALL contribution to modern culture could be the simple introduction, into the earliest stage of our public-school science courses, of a natural style of writing about laboratory experiments as they really happen. This is something that could be done immediately with the opening of classes this fall. It requires no