GENERAL SCIENCE

Science's Ethical Dilemma

Prof. A. V. Hill, speaking as president of the British Association for the Advancement of Science at Belfast, discusses dangers and morality of science.

Excerpt from the presidential address before the BAAS by Prof. A. V. Hill, physiologist, Nobelist and Foulerton Research Professor of the Royal Society.

➤ NUCLEAR FISSION has released the threat of unprecedented violence, with the possible destruction of many millions of lives and the accumulated treasures, moral and material, of civilization. The individual conscience may tell a man to have no part in it: that is easy enough, for there are plenty of other interesting things to do, but it does not solve the problem. Moreover, it is possible that defensive weapons, based on nuclear fission, but not of the type intended for mass destruction, can be developed which would make armed aggression intolerably costly.

What then of the abolition of secrecy? In principle, yes, for the historic and unique contribution of science to international goodwill has been in sharing knowledge regardless of race and frontier, and the chief satisfaction of scientific work, the condition of its fruitful development, is frank and free discussion.

"Cast thy bread upon the waters, for thou shalt find it after many days," is wise and acceptable counsel in dealing with scientific knowledge: while "he that observeth the wind shall not sow and he that regardeth the clouds shall not reap," is as aptly applied to human relations as to agriculture.

Every possible endeavor, therefore, should be made towards international agreement on sharing scientific and technical knowledge and controlling nuclear weapons: but this, like peace itself, is a concern of every citizen, not only of scientific people.

Much scientific and technical advance has led to unexpected dangers and difficulties. Without our present knowledge of bacteriology and preventive medicine, gigantic armies could never be kept in the field, and land war on the recent scale would be impossible: is medical science, therefore, to be blamed for twentieth-century war? The indiscriminate use of insecticides, by upsetting the balance of nature, can quickly do more harm than good. Radio communication may be used for spreading lies and disorder as well as truth and goodwill. Developments in microbiology, in many ways beneficient, may be used in the future for biological warfare, with effects at present unpredictable; and control by international agreement and inspection might be very difficult.

The list need not be multiplied, all are aware that every new benefit to mankind provides also its own dangers, either as unexpected consequences or by deliberate misuse. Science is not alone in this: liberty may lead to license, religion can be used to inflame passions, laws can be exploited to protect wrongdoing. If scientists feel called upon to examine their consciences, so much the better: but they need not imagine that in this they are exceptional!

It has been debated whether "the scientific mind is fundamentally amoral." The real answer is that there is no such a thing as *"the* scientific mind." Scientists for the most part are quite ordinary folk. In their particular scientific jobs they have developed a habit of critical examination, but this does not save them from wishful thinking in ordinary affairs, or sometimes even from misrepresentation and falsehood when their emotions or prejudices are strongly enough moved. Their minds are no more amoral than those of surgeons, lawyers, or scholars. As investigators most of them realize that their function would be stultified were they to introduce moral data into a scientific argument.

A surgeon is not required, or indeed allowed, to consider whether it would be better for the world if his patient died under the operation, he has only to carry it out with skill, care and integrity: but it would be foolish to conclude that the surgical mind is amoral. The surgeon himself, as a human being, has to make moral judgments: but he does so outside the operating theatre.

So it is with scientific people: like all good citizens they must take account of ethical considerations, and the chief of these, as with other good citizens, are of integrity, courage and goodwill. Integrity forbids them to allow feelings of any kind to obscure facts, but that does not make them amoral: after all, integrity is the first condition of morality.

In the practical world of today, complete abandonment of secrecy, in government and industry, is out of the question. The advantages to international relations, and to general scientific progress, of the greatest possible freedom are evident; to these can be added the impossibility, in a free democracy, of keeping the best people unless the conditions of their work are congenial. If scientific men consistently avoid jobs which seem to them to fall short of reasonable freedom, they will force changes of organization so that only necessary secrecy is maintained. The penalty of filling an organization, governmental or industrial, with second-rate people, cheerfully amenable to unnecessary restrictions, is far too evident in its result on efficiency to be tolerable for long. The cure, therefore, is largely in scientists' own hands. In this, as in many other aspects of their work, moral considerations come in, and the only way to resolve the dilemma which is in so many minds is to discuss it frankly. To neglect it altogether is not amoral but immoral, it is the duty of all of us as citizens to consider the ethical basis of our work.

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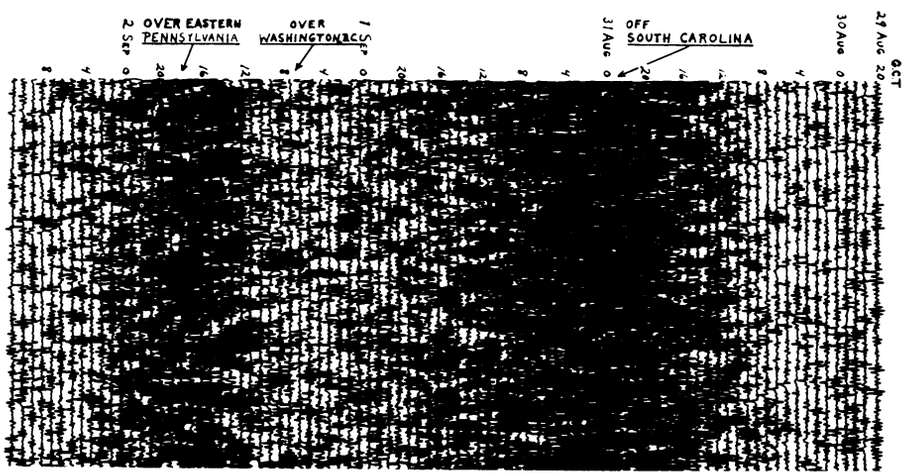
SEISMOLOGY

Two Seismograph Peaks Show Recent Hurricane

➤ THE HURRICANE that lashed the East Coast over Labor Day weekend was recorded on a seismograph at the U. S. Coast and Geodetic Survey in Washington. Microseisms generated by the superstorm show two black, very well-defined peaks.

The peaks, Leonard Murphy of the Survey explained, indicate the path of the twirler, and the records are not often clear enough to do this. After slamming the East Coast



HURRICANE'S MICROSEISMS—The two black areas in this seismograph are caused by the many microseisms from the hurricane that swept the East Coast Labor Day weekend. The unusually well-defined peaks occurred when the storm's center was over the Atlantic.