

SCIENCE

Scientists, Unite!

Science Must Have Freedom if Peace and Civilization Are to Survive; Dictatorship and War Are Foes of Knowledge

By WATSON DAVIS

THE MOST important problem before the scientific world today is not the cure of cancer, the discovery of a new source of energy, or any other specific achievement.

It is:

How can science maintain its freedom and how can it help preserve a peaceful and effective civilization?

If science is inundated by preconceived ideas and brought under the control of dictatorships, as it has in recent years in some countries, it will not continue to create that new knowledge that is necessary for human progress in the years and generations to come.

Oases of Freedom

Viewed frankly, the human intellect is free in the broad and important sense only in geographically limited areas of the globe: The English-speaking areas, France, Scandinavia, Switzerland, the Netherlands, hard-pressed Czecho-Slovakia, some other areas of the Western World, and few intellectual oases elsewhere.

Germany, Soviet Russia, Italy, and perhaps to a less extent Japan are molding science and other intellectual endeavors to suit nationalistic purposes. China and Spain have suffered the physical hardships of war in the midst of which science does not flourish. Even under dictatorships and restraints, some hardy intellects struggle to continue their work. Some sacrifice principles to accomplish research tolerated by the dictatorships, scientific jobs that do not conflict with ideologies or that actually aid self-contained nationalism.

A major conservation problem is the rescue of the scientists among the refugees from Germany, Austria and other intolerant areas. Quietly, an effective job is being done in refugee rehabilitation, but more thousands are being banished cruelly from their native laboratories because of political, so-called "racial", and religious circumstances. This rescue of scientific brains is important because they hand on the torch of knowledge. Once extinguished the flame is difficult to rekindle.

Even in the scientifically liberal countries there are sometimes anti-science activities, such as the anti-evolution wave in America some years ago, and the perennial antivivisection propaganda.

During the past few years scientists, in the face of increasing limitations upon science's freedom, have been wondering what they can do about it. Can they help to put the world in better order? Can they help capital, labor, management, and government adapt and apply successfully the research riches that science has given civilization? Can they infuse into international affairs generally the spirit that makes all scientists intellectual brothers regardless of nationality?

Big problems, these. Formless, amorphous situations, difficult to grasp. Wordy ideals, hard to nail down to realities.

The national science organizations are beginning to reach out to each other. In 1933 the American Association for the Advancement of Science formally expressed "grave concern over persistent and threatening inroads upon intellectual freedom which have been made in recent times in many parts of the world." In 1936 the British Association was urged to become a forum for the discussion of the impact of science on society. In 1937 the American Association extended to the British Association and like science organizations an invitation "to cooperate in promoting peace among nations and intellectual freedom in order that science may continue to advance and spread more abundantly its benefits to all mankind." The ferment is working.

Notable Declaration

The A. A. A. S. resolution of 1933 framed by Dr. Robert A. Millikan and Prof. Henry Norris Russell is a notable declaration of scientific freedom.

"Our existing liberties," it reads, "have been won through ages of struggle and at enormous cost. If these are lost or seriously impaired there can be no hope of continued progress in science, or justice in government, of international or domestic peace, or even of lasting material well-being.

"We regard the suppression of inde-

pendent thought and of its free expression as a major crime against civilization itself. Yet oppression of this sort has been inflicted upon investigators, scholars, teachers and professional men in many ways, whether by government action, administrative coercion or extralegal violence.

"We feel it our duty to denounce all such actions as intolerable forms of tyranny.

"There can be no compromise on this issue, for even the commonwealth of learning cannot endure 'half slave and half free'. By our life and training as scientists and by our heritage as Americans we must stand for freedom."

Conferring at Cambridge

Latest effort to bring scientists of different nations into formal mutual endeavor is the proposed cooperation between the British and American Associations for the Advancement of Science. This is a major topic for the meeting of the British Association now in session at historic Cambridge. An official delegation from the American organization is attending, supported by the presence of additional leading American scientists who like to mingle with their British brothers in science.

This venturing abroad enables great scientific leaders to meet face to face. The institution of international science congresses is well-established. The World War merely interrupted the succession of world conclaves on all sorts of subjects. Most of the world science meetings keep on repeating themselves through international committees, aided by convention-seeking cities and nations. But science has its international government, official in that nations support it and give it sanction. In fact there are in effect two or three international governments, relatively non-conflicting.

There is the International Council of Scientific Unions which binds together specialized international unions, in astronomy, geodesy and geophysics, chemistry, radio, physics, geography and biology. These act as planning boards, arranging joint researches, adopting definitions, standards, etc. There are numerous commissions and committees, with and without governmental sanction that play their world-wide roles. The League of Nations has its International Committee on Intellectual Cooperation with an

institute at Paris. But these organizations are concerned almost solely with technical matters and not so much with the impact of science upon society. The League's health and labor organizations have gathered factual material in some scientific fields. The recent League report on nutrition is an important document whose recommendations will be difficult to put into effect in countries preoccupied with nationalism.

Scientists self-conscious of their effects on the world at large constitute a rather recent phenomenon. There has always been a leaven of professors and doctors who worried about how the world uses the fruits of science. Even more have been concerned with the relatively meager support given to research by an indulgent, charitable or financially shrewd work-a-day world.

Now the cry of "Scientists of the World, Unite!" might be heard if scientists expressed themselves that way. They are tempted to organize for a dual purpose: to save science from intolerance and to apply science to an endangered world.

Search for Defenses

Can they do this? What chance has a scientist or a scientific group when a dictator makes up his mind to misuse some body of accepted fact? Can the scientists of the world get together for their own protection and the preservation of the methods and facts they perpetuate? With the scientific ruination of Germany staring them in the face, it is little wonder that serious thinking is being done.

Can militant defensive tactics be grafted upon the old-line technical organizations, such as the British and American Associations? Or will there need to be a new science society, a World Association for the Support of Science, a scientists' league of nations, whose sole objective will be to defend and support scientific freedom? Or should the scientists, not as research workers but as citizens, throw their lot in with the politically liberal groups that are supporting democracy in the fight against totalitarian doctrines?

Even more basically, should scientists be militant or should they encourage the educative process, trusting that the common-sense of the scientific method will outrun in the public mind the false enticements and the easier promises of the demagogue?

Among the scientists as among men and women in general, in democracies and intolerant countries alike, there are

"liberals" and "conservatives." The less radical react to current international situations by wishing to see scientists representing all governments, dictatorships and free countries alike, sit down together to discuss the impact of science upon world affairs. The less conservative throw their lot in with those in violent protest against intolerance and aggression, joining as best they may defensive conflicts for liberty and freedom, whether they be on battlefields in Spain and China or in the quieter battles on the fields of learning and commerce.

Can a scientist's oath, an affirmation of allegiance to scientific ethics, weld the intellectual world into an aggressive bloc against intolerance and dictatorship?

The Hippocratic Oath of more than 2,000 years ago promoted standards among medical practitioners. Oaths of loyalty are required by temporal rulers and nations. The Ten Commandments have long constituted a code of Judaeo-Christian ethics.

The conception of the objective truth basic to all science and human progress, constitutes an unwritten code of conduct, made vivid by the words and acts of the scientists themselves. Some feel that in the present crisis, the world of science needs a definite written oath around which the scientifically minded may rally with pledges and signatures.

Magna Charta of Science

A magna charta of science, or a declaration of scientific independence, has been suggested. It would "proclaim the freedom of research and exchange of knowledge, that science must be international to survive and that science stands for peace and the common good of all mankind." Since the scientific method is the direct opposite of the dogmatic, many scientists shy away from the written oath, feeling that the deed speaks louder than the word. The very essence of the scientific spirit is a matter of change, progress, freedom of thought, truth, tolerance and justice, which are qualities difficult to define in words.

A broadly-worded declaration of scientific principles, containing emotional appeal for intellectual and ethical conduct, might well win support for science's sanity in lay and political circles.

Adherence to such an oath or declaration would be treason in some countries today. There would be suppression of efforts to obtain signatures or organize active support for the scientific tradition of toleration and freedom. It would be considered subversive doctrine.

In more fortunate countries there is a complacent attitude that civilized traditions of science are safe and need no sacrifice or action to maintain them.

A declaration of scientific faith formulated by L. L. Whyte of London has been presented to the scientific world through publication in the British science journal, *Nature*. Signed by enough culture-conscious men and women throughout the world, it might become a rallying point in the growing struggle against the forces of intellectual darkness.

Declaration of Faith

This Declaration of Scientific Faith is as follows:

"I am the inheritor of the tradition of civilization which has proved more lasting than empires. Whenever I use the language or the products of science I unconsciously pay homage to the countless men for whom no sacrifice was too great in the struggle to develop the human mind and establish the truth. Toleration and freedom are the heart of this tradition; for individual thought and love of truth are the basis not only of science, but also of justice and of civilization.

"I declare my loyalty to this tradition, my belief in the freedom of the individual to develop his talents for the enrichment of the community, and my conviction that man's community is now the whole human race, within which each nation must play its characteristic part. The natural balance between personal freedom and the proper demands of society, which is the life and health of civilization, is today doubly threatened: in certain societies by the denial of freedom and in the democratic countries by the irresponsibility of individuals. In the face of this threat:

"I pledge myself to use every opportunity for action to uphold the great tradition of civilization, to protect all those who may suffer for its sake, and to pass it on to the coming generations. I recognize no loyalty greater than that to the task of preserving truth, toleration, and justice in the coming world order."

New international barriers hamper the advancement of knowledge. "Keep Out" signs are posted to bar the inquisitive and questioning mind. Governments impose uniform ideologies and circumscribe in the interests of a dominant regime the area of intellectual liberty. The march of science is stopped at some frontiers, not because the frontiers have any greater geographical significance than they had a few years ago, but because

behind them the search for truth by eager and skeptical minds has been made impossible.

Such are the rather regretful indictments made by President Raymond B. Fosdick of the Rockefeller Foundation in his current annual report.

Areas of Perversion

There are areas upon the earth where science is being perverted and distorted to serve compulsion and repression. Scientists who remain loyal to their principles are forced into exile, disappear into concentration camps for "protective custody" or even die as the result of their pursuit of truth. Books heretical to the current regime are burned or suppressed. Scientists who follow the world tradition of cooperation with their colleagues in other nations disappear and are heard from no longer.

Germany, the birthplace of so much scientific method and tradition, has had its scientific culture ravished by Nazi doctrine and domination. The Nazi "Aryan" race theory is repudiated by all competent biologists and anthropologists. The shocking pogrom directed against the Jews seeks its justification in a new pseudo-anthropology made in Germany.

Thought is regimented also in Italy under Mussolini, with non-conforming scientists eliminated. In Soviet Russia, where science of the Marxian brand has become almost a religion, there is little tolerance for non-conforming ideas or for science that does not serve the state.

In all three of these dictatorships, the kind of science that can be applied to war preparation, to production of substitutes for raw materials these nations lack, to material things that make the nation more "self-contained," is cherished and cultivated as a farmer cares for

a productive cow. To be sure, in democratic countries this is also the custom.

In the U. S. S. R. scientists see in the doctrine of dialectical materialism, the philosophical basis of Marxism, an explanation of natural law as useful in pursuing scientific knowledge as building a social order. And contrary to the Nazi dogma, the U. S. S. R. practices a theory of racial equality.

All science under a dictatorship is not completely suspect. For example, competent observers find psychology, medicine and some other applied branches of science richly supported in Soviet Russia. German organic chemistry is still productive.

Abuse of Epithets

If it were not so tragic it might be possible to find humor in the way in which the epithet "dogmatic" is applied to anti-Nazi scientists by the Nazis. For example, Prof. J. Stark, Nobelist in physics in 1919 and now under Hitler president of Germany's Physikalisch-Technische Reichsanstalt, holds that "natural inclination to dogmatic thought appears with especial frequency in people of Jewish origin" and that "the predisposition towards pragmatic thinking occurs most frequently in men of the Nordic race."

The rampant nationalism evident in sorely pressed countries today is counter to the slow, centuries-old growth of the scientific tradition of universal truth and world knowledge. This regression to nationalism and the subjection of intellect to political expediency must not be allowed to prevail.

To quote President Fosdick:

"In the last analysis knowledge cannot be nationalized. No successful embargoes can be maintained against the export or import of ideas. Whether new

conceptions in atomic physics come from Copenhagen or from Cambridge, England; whether the cure for cancer is developed in New Haven or in Berlin; whether it is a Russian or an Italian or an American who takes the next step forward in mankind's struggle with virus diseases—we are all of us, under whatever flag, the joint beneficiaries of the intellectual property of the race. In all the clash of competing nationalisms there is here an underlying principle of unity: the single aim and language of science in the discovery of truth. It is this principle which challenges the twentieth century with the conception of civilization as a cooperative achievement and with the ideal of intellectual capital as an international possession."

The infringement of scientific and intellectual freedom and the intolerant and oppressive nationalism rampant in large areas of the world today are little short of an undeclared war. Because the machine guns do not rattle and the bombers do not drop their deadly eggs, this war on science is largely unheralded. But it is destructive none the less. In the wake of actual warfare, which promises to follow abuses of truth and nationalistic propa- (Turn to Page 126)

ELECTRON PHOTOGRAPHY

Streams of electrons focussed by means of magnets, instead of beams of light focussed with lenses, can now be used for making photographs. Although the new electron cameras are commonly used in the laboratory for microphotography, ordinary outdoor scenes can also be photographed with them. At left is a village photographed with a conventional camera. In center, the same scene taken with an electron camera using a long solenoid to focus the electrons. At right, the same scene with another electron camera using permanent magnet as the focussing means.



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ganda with horrible inevitability, scientific work cannot continue.

Scientists are devising means of counterbalancing these dangers of intellectual suppression. A world organization of scientists to give militant attention to social problems is one possibility.

A more conscious effort through the mechanism of education, in school and out, is another possibility. A "world brain" taking the form of a world encyclopedia as suggested by H. G. Wells would provide the "Bible" of this movement, supplemented by the whole of the vast scientific literature.

How to carry this or any other method of scientific propaganda into the countries of censorship, suppression of freedom of speech and press, and concentration is another matter. A rising generation reared in ignorance of the long history of science, the centuries of struggle to attain the present state of our knowledge, may be difficult to reach when the artificial barriers of isolation are lowered.

Parent of Democracy

Democracy is the child of science. Without the growth of rational intelligence, government by and in the interest of the common man would not have been possible. The facts and method of science must be known to all the people. In part this is the task of the schools but to a larger extent it is the duty of the press. In recent years newspapers have conscientiously reported and interpreted scientific advances in order that all may know and understand.

Making the world safe for science will make the world safe for democracy, a task at which warfare was a failure.

In this great undertaking all kinds of science must participate, not just the physics, chemistry, biology, medicine, etc. of the so-called "physical and natural sciences." It is a concern of economics, sociology, engineering, psychology, anthropology, the so-called social and applied sciences. Scientists who do not often meet must work together.

If the great scientific "push" is to be successful there will need to be more and freer discussion than has been traditional. Whether the new science movement takes the form of a great intellectual brotherhood, a new political party, or an infiltration into existing progressive movements, it must be articulate, self-assertive and combative within the limits of the scientific method. It must become a crusade with truth as its only dogma.

If science is to rescue the society it has created, and if the world at large is to preserve in freedom and tolerance the intellectual urge that gives it continual rebirth, there must be some mechanism, whether organized or not, that makes this possible.

The world of science has been one of the most successful of the loosely organized activities on this planet. It is rooted in the idea of free exchange of experiences and experiment, freedom to draw conclusions, test them, discard them if necessary, theorize and test again.

A gigantic flow of literature, books, journals, proceedings, in a medley of languages records and distributes the results of science. There are some 30,000 regularly issued periodicals in the fields

of science alone.

In a tolerant world this mechanism of distribution, plus educational efforts, is sufficient. When the free flow of distribution is impeded, the situation becomes dangerous. This is what has happened in recent years in the intolerant areas.

Nuclei of the new science crusade already exist as groups within existing intellectual organizations. They could coalesce into larger units, either bringing together the same brand of scientists from different countries or all scientists of each country. Add to them millions of scientifically-minded laymen, fuse the various units and there would be a new international organization of mankind capable of making the world rational and worth living in.

Science News Letter, August 20, 1938

DEMOGRAPHY

Seeks Geographic Clue To America's Notables

WHAT kind of background produces the most notables?

This question intrigues Americans. It is a familiar saying that "Most famous Americans are born on farms." Wealth and leadership go together, it is also claimed. Another theory is that level lands yield, not only crops, but leaders.

Now, Indiana University's professor of geography, Dr. Stephen S. Visher, has gathered statistics on thousands of Americans who have made good. His facts and figures provide new ammunition for the old argument as to how geography and fame are related. And, as Prof. Visher points out, despite sarcastic remarks about brain trusters, every one knows that experts and other leaders play a large role in our country.

His findings include:

1. Neither rugged nor flat country can justly claim special significance in producing notable Americans.

2. Present day notables come from a peculiar concentration of birth places. New England has produced about twice as many, in proportion to population, as middle Atlantic or north central states, nearly three times as many as Pacific states, and about six times as many as south central states.

3. Despite all this, New England has fallen off lamentably in its proportion of notables. New York and other seaboard states are also slipping. Mean-

while, north central states and the west are raising more leaders.

4. States that stand out as producing one kind of leader—scientists, for example—also produce many noted artists, executives, and professional men.

Many other points can be made from Dr. Visher's study. He closes:

"Areas yield most notables which contain most mentally alert, ambitious, persistent, energetic people, possessed of high ideals. Such people seek opportunities to use their abilities; they appreciate congenial associates and therefore congregate in desirable towns and in choice residential districts or suburbs of cities."

Science News Letter, August 20, 1938

● Radio

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