

**SCIENCE  
IN  
CHAINS**

**SIR RICHARD GREGORY**

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# SCIENCE IN CHAINS

*By*

SIR RICHARD GREGORY, Bt., F.R.S.

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Of the community of science as an international corps devoted to the service of mankind, no one can speak with fuller authority than Sir Richard Gregory. President of the British Association in 1940, and known to the general reader through his invigorating *Discovery* and other books, he has for years been a leading figure in that world of scientific co-

operation that recognizes no barriers of race. He can and here does describe from the inside the commonwealth based on intellectual freedom from which Germany has wilfully outlawed itself. For many years he edited *Nature* which, as a clearing-house of original contributions to knowledge, occupies a unique position not in Britain only, but also throughout the world. In 1937 it fell under the Reich ban. German thinkers must adjust their thinking to the dictates of the State. Not for them the high motto of the Royal Society "Nullius in verba"—not bound by the words of any man. "No thesis can now be submitted for scientific examination until it has passed the Nazi censor"—a political official. In all countries now subject to Germany "men of science are submitted to slavery or death."

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## SCIENCE IN CHAINS

**Parliaments of Science**

On August 23rd, 1939, a week before German military forces began the destruction of Poland, an international scientific congress was opened at Edinburgh. About six hundred biologists from fifty-five different countries had assembled to discuss problems affecting the study of heredity and variation in many forms of life, including mankind. The purpose was to advance this branch of science—genetics—by pooling the knowledge gained, exchanging views upon results of investigation described in more than four hundred original papers, and promoting further developments by co-operative effort in a spirit of common fellowship. On account of the rapidly darkening war clouds, many of the delegates from abroad left for their home countries before the end of the week, but a strong contingent of 130 American representatives remained with French, Poles, and Italians, until the Congress closed.

The German delegation of thirty-four members was the first to leave, having been advised to do so at an early stage of the meeting. They were, for the occasion, members of the world commonwealth of science, which recognizes no barriers of language or of racial or national prejudice. It was fortunate that no distinctions of this kind were included in the programme; for however much German scientists may desire the discovery of Truth by organized inquiry, they must see her only through the veil of Nazi doctrine. Their free and frank co-operation with colleagues in other countries in solving scientific problems, by establishing international schemes of work or systems of standards, was rendered impossible by regulations made by the Nazi authorities. The Reichminister of Propaganda announced in 1935 that representation at any congress, either in Germany or outside

that country, would in future be under the control of a Science Congress Centre.

### **Academic "Tourists" under Orders**

Since 1935, the programmes of a scientific conference or congress, and the lists of speakers from Germany, have been subject to the approval of this Centre. When a German delegation is permitted to attend an international congress, it must be under an appointed leader chosen for his reliability as a member of the Nazi party. There can be no free exchange of scientific opinion under such conditions, and no decisions on scientific matters accepted by the delegation, unless they conform to Nazi instructions.

The adoption of this nationalistic principle cuts away the very roots of international relationships of science. What it signifies was shown at a meeting of the Astronomische Gesellschaft held at Berne in 1934. This is a long established body with headquarters in Germany, but with strong international relations stressed by German astronomers themselves. Because, however, one of the most active and esteemed secretaries happened to be a Jew, the German delegates were instructed to exclude him or any other astronomer of Jewish blood from office, irrespective of their scientific qualifications. This attempt to bring an organization of international standing and repute under the control of an anti-Semitic group, failed at the Berne meeting, but the policy represented in it destroyed the basis of all

scientific relationships with Germany. It would make a world congress into an assembly to promote political propaganda instead of a co-operative fellowship by which knowledge is shared and extended.

University teachers and students must submit to the same orders as delegates to congresses. Because regulations concerning such foreign journeys were not always obeyed, the Minister of Education warned offenders in a special decree in 1936. "I therefore order," he said, "that all under control of my Ministry who travel abroad for study, research or lectures, or for congresses or similar purposes, shall on their arrival in a foreign country forthwith get into contact with the competent local representative of Germany, with the Foreign Organization of the Nazi party, and with the branch office of the German Academic Exchange Service, wherever possible. If this be not done, a short report of the reasons must be furnished to me." The Minister complained that news of a proposed journey abroad often reached him first from the Science Congress Centre, and was in defiance of his previous regulations. "I therefore hereby order," he added, "all controlled by my Office to obey in every detail the Decree on Foreign Travel, and to lay before me, through the official channels, any application for permission to travel abroad."

## **Freedom and Frustration**



Scientific men—individually or in assemblies—are concerned with the advancement and extension of natural knowledge; and their attention is concentrated so closely upon work in particular fields of inquiry that they are very rarely induced to take organized action against conditions which frustrate their aims. Until the policy of Nazi isolation instituted a new form of inquisition by purge and persecution, science was a world commonwealth in which each group was free to follow its own inborn light, but was encouraged to co-operate in the common cause of discovering new realms in which the pursuit of scientific truth could be carried forward. Without this freedom and this spirit, expansion in any sphere of intellectual activity is confined to a narrow range, and its service is selfishly restricted.

The spirit of modern science as expressed in the motto of the Royal Society of London, is *Nullius in verba*—signifying "not bound by the words of any man". This implies the right of independent inquiry into the validity of the pronouncements of any scientific authority—past or present—and also to challenge any forces which would restrict this freedom. T.H. Huxley said long ago that science "commits suicide when it adopts a creed"; and the danger of self-destruction is even greater if it submits to a creed imposed by political or racial powers. To accept any such proscriptions of intellectual liberty would be to abandon the essential principle of scientific work and thought and make the fruits of discovery a national instead of an international possession. When the outlook of science is thus confined within political boundaries, it will lose its soul, and the empire of knowledge

will become a medley of confusing effort with national aggrandisement through aggression as its chief aims.

## **Devastated Centres of Learning**

This intellectual blight descends upon every country which comes under the control of German might. Ruthless measures are used to eliminate all intellectual activities except those subservient to Nazi doctrines. After the Munich "agreement" of 1938, one million Czechs in the ceded territories lost their scientific and technical institutions and other places of higher education and culture. With the German entry into Prague in March, 1939, all cultural work and scientific research had to cease. Libraries were purged of every book or journal containing any references not approved by Nazi officials. At the same time, books and valuable apparatus were removed from Czech universities, scientific institutes and museums, and were either sent to Germany or wantonly destroyed. In November, 1939, because Czech students and other intellectuals would not forget their historic past, the University of Prague—the oldest in Eastern Europe—and all other Czech universities, medical schools, and establishments of higher education were closed, and more than one thousand university lecturers and students, and teachers in secondary schools, suffered death. In addition, about seventy thousand men of culture, students, authors and others were imprisoned or sent to German concentration camps, while those who were permitted to remain, although they had been deprived of their

means of livelihood, were condemned to intellectual oblivion.

When Poland came under the same German heel, its people and learned institutions suffered the same fate. The Institution of Experimental Physics of the University of Warsaw was soon totally demolished, and all its equipment for scientific research was transferred to the Reich. Professor C. Bialobrzewski, professor of theoretical physics in this University, was one of the distinguished scientists executed by the Germans soon after they assumed power over Polish teaching and learning. At the University of Cracow, the members of the teaching staff were summoned to attend a meeting at which the meaning of German National Socialism was to be explained. They were then told that they would have to learn what it was like, in order to know what to teach. When the staff left the hall they found awaiting them outside, lorries in which they were removed and sent eventually to prison camps in Germany. The charges made against the 180 members of the University staff who were thus arrested by the Gestapo were:

(1). That the professors have attempted to begin their University courses without the German authorities being informed.

(2). That they have continued to teach in institutions and colleges of which they were the heads, and carried out pass examinations, without asking for authority to do so.

(3). That for five centuries the University of Cracow has been a citadel of the Polish spirit.

In other words, because Polish professors wished to continue to teach, and students to learn, in their own university, they committed crimes against their German invaders. Eighteen of the professors died in the first camp and fifty were transferred to another camp to do heavy stonebreaking work. The remainder were afterwards released. They were all truly martyrs for the cause of intellectual freedom and will always be honoured as such in the history of civilization. No penance can be too great for Germany to suffer for such barbarous acts to destroy national culture.

Creative thought and independent inquiry have been destroyed in all parts of Europe which have become the victims of German aggression. Vienna, Prague, Warsaw, Cracow, Copenhagen, Oslo, Brussels, Leyden, Utrecht, Delft, Louvain, and other great centres of learning, have been made cities of intellectual slavery and death. Civilized humanity is horrified by the savagery of such onslaughts against national life, and the intellectual world is dismayed at the losses it has sustained since Germany decided to extend its debasing Nazi doctrines by the merciless use of forces of destruction. It cannot, however, despoil the soul of a people or the passion for the pursuit of truth by which mankind has attained its highest cultural triumphs. As in the past, so in the future, good will prevail over evil, and the lanterns in the lighthouses of knowledge will again be lit to shine throughout the world and regenerate the human race in the spirit of truth and righteousness.

## **Perverted Principles**

The use of force to devastate communities and institutions is believed by Nazi Germany to conform to a natural law of "struggle for existence" and "survival of the fittest". These principles were made the basis of aggressive action in the War of 1914-18, and they are proclaimed to-day as the means by which the doctrine of "Race, Blood and Soil" of the German people seeks to subdue the world. The view that Darwinism, or evolution by natural selection, is bounded by the "law of the jungle", has been repudiated over and over again by men of science. Evolution applies to the spirit as well as to the physical structure of man: to the development of social ethics as much as to material progress. To exalt might and force as essential factors of human advancement is to deprive mankind of the possibility of being anything more than a fighting animal and to make civilization a mockery. Nazi Germany exults in this reversion to barbarism, by which it is hoped to destroy all cultural types and institutions other than its own. It has jettisoned the attributes which distinguish man from other living creatures, and despises the humane standards of civilized life. Judged by all people who associate civilization with high ethical values, Nazi Germany stands condemned as guilty of a persecution no less barbarous, and an intolerance as rigid and as gross as any that figure in the history of the Middle Ages. Any State can prescribe its own conditions of citizenship, but the Nuremberg legislation of September 1935, shattered the ideal of freedom of thought and individual liberty which had been regarded as fundamental human rights of civilized life. It not only deprived half-a-million Jews and "non-Aryans" of the

right to live in a country of which they were citizens, but also created a social and intellectual ghetto of a new type.

Science would be false to its tradition if it failed to protest against such criminal assaults on the human mind. Its spirit cannot be confined within any national or racial boundaries, and its service cannot be monopolised by any single country, without debasing the principles for which it has always stood. To make race, political convictions, or religious faith, barriers to the pursuit of natural knowledge, means that science in Nazi Germany loses its soul for the purpose of gaining the world.

### **Arrogant Racial Philosophy**

Philosophy has long been understood to mean the study or pursuit of wisdom, or of knowledge of things and their causes, whether theoretical or practical. Natural philosophy signifies the study or knowledge of natural objects and phenomena, and is what most people think of as "science". Since 1933, natural philosophy has been subordinated to Nazi philosophy in Germany, and knowledge is shaped and confined within a political mould. In that country, science is free only when its energies are concentrated upon the development of the German *Weltanschauung*, the aims and character of which are condemned by all who believe in the unity of man and the universality of knowledge.

Unless a scientific investigator or teacher is of "Aryan" birth and will assist in making Germany the master of the world, he is treated as an enemy of the State. The implications of this new philosophy of life and work were frankly stated before a scientific assembly when the Philipp-Lenard Institut of the University of Heidelberg was solemnly dedicated at the end of 1935. The occasion was made one of public confession of the union of German Physicists against the Jewish evil (jüdischer Ungeist) from which German science must be completely freed. Most of the speakers had the title of "Party Member", and they therefore expressed with political authority, as well as that due to their academic positions, the changes of the conception and system of science in the National-Socialist world philosophy.

The great series of scientific discoveries of "Nordic" investigators from Hipparchus to the present time was said to be characteristic of the "essence of German blood in the fight for knowledge of Nature". Hippocrates, the "Father of Medicine", was held to have been a great philosopher and physician because he possessed the qualities of this group. Full-blooded "Nordic" types are to constitute the new scientific aristocracy; and Germany claims their heritage as its own to be used to bring all other nations under its domination by the co-operation of serfdom. The "living conception of high and holy laws of Nature such as the Nordic investigator wins for himself in reverence before the logic and greatness of Nature" is that which conforms with Nazi doctrines.

Even in medicine, the main purpose of scientific investigation must be to strengthen the forces which will

further the mission of Germans to rule the world. For "Under National Socialism the physician realizes his high responsibility for blood and race, health and potency of his people"—so said one of the chief speakers of the Heidelberg assembly. Medical research is not to be undertaken in Germany with the object of benefiting mankind, but to increase the power of a self-styled *Herrenvolk* which glories in debasing the noblest human virtues to assert its superiority over all other peoples. Learning is not to be a torch to shine among men, but a masked fire in an intellectual sepulchre.

### **Degradation of University Ideals**

The spirit of Science can never be confined within such a valley of dry bones, or the shape given to it by racial fanaticism be accepted as true by free peoples. By expelling from German universities and other institutions of learning, hundreds of scholars who could not, or did not, shout the battle-cry of National Socialism, the German Government made armed force the arbiter of life in academic as well as in other fields. This pogrom was specially severe in the ancient University of Heidelberg; and it aroused indignation in most parts of the civilized world. This was clearly shown when the University invited delegates from abroad to a celebration of its five hundred and fiftieth anniversary in 1936. The invitations to universities and scientific institutions in Great Britain gave rise to so much discussion in the Press, that they were afterwards withdrawn. The feeling here was that to



send delegates or addresses of congratulation would be to condone crimes against university life and ideals.

The representatives of foreign universities who did attend the celebration were left in no doubt about the deliberate sacrifice of the traditional principles and practice of *Lehrfreiheit* and *Lernfreiheit* upon the altar of National Socialism. The Reich Minister of Education, Herr Bernhard Rust, and Professor Ernst Krieck, a fervent advocate of the Nazi philosophy of learning, stated frankly the terms under which higher education and research were forced to capitulate in Germany. It was held that the stern—many would say criminal—measures used by Nazi zealots in their purge, were necessary for the good of the State, which is reminiscent of the use of the secular arm for punishment after condemnation.

As to science, Herr Rust made the principle of freedom of teaching and learning subservient to the philosophy of Teutonic superiority. "National Socialism," he said, "is justly described as unfriendly to Science if its valuer assumes that independence of presuppositions and freedom from bias are the essential characteristics of scientific inquiry. But this we emphatically deny. National Socialism has recognized the fact that to construct a system of knowledge without presuppositions and without certain value judgments at its foundation is totally impossible." The value judgments are those of the "nurturing philosophy of life" adopted in 1933 and made a national faith by injustice and violence.

This new gospel is asserted, not with shame, but offered with pride to the civilized world for acceptance as a means of

recognition. With specious magnanimity, Professor Krieck, the active National Socialist who is now the Rektor of the University of Heidelberg, said at the celebration already referred to:

"To-day we find ourselves at the threshold of an age in which we are again making a beginning, not only politically but also in the field of learning, of scientific investigation. We feel that in science too we are moving forward toward new goals, along the path marked out for us by our individuality, our fate, and our past history—by a path to which we are called to lead the way, a path which our sister nations, some sooner, some later, are destined to tread. It is our profound conviction that as we move onward we shall find ourselves in a new relationship of co-operation with the scholars of other nations and in fruitful intercourse with them."

### **Protests of the Democracy of Science.**

Instead of welcoming this invitation, the free scientific world has rejected it with scorn. At the annual meeting of the American Association for the Advancement of Science in 1938, the democratic principles of science and the necessity for intellectual freedom of scientific investigation everywhere, were strongly asserted, and actions which suppressed such independent thought, or gave it racial or political boundaries, were denounced as committing crimes against the human race. In full session it was resolved that:

"The American Association for the Advancement of Science feels great concern over persistent and threatening inroads on intellectual freedom which have been made in recent times in many parts of the world.

"Our existing liberties 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 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 extra-legal 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."

The American Association expressed the views of all scientific workers in this resolution, and the Council of the Association invited the co-operation of similar bodies throughout the world in promoting them. It demanded free trade in scientific knowledge and a Magna Charta for those engaged in its advancement. This declaration of scientific

rights was a reply and a challenge to any political system which would suppress all independent scientific activities not prescribed for its own benefit, and would make science solely a national study pursued in self-interest instead of a service in which contributions to knowledge are welcomed and made available to the world.

Whatever may be urged in favour of the principle of autarchy in economic fields, nothing can be justly said in support of it in the realm of science. In music, art and literature, national or racial characteristics of thought and feeling are expressed in their achievements. Similarly in science, tendencies to different outlooks may be recognized without offensively asserting the superiority of a particular type and placing barbed wire around a submissive group of people who are content to cultivate it with blinkers upon their heads.

### **An "Index Expurgatorius" for Scientific Journals**

Because of its protests against the treatment of "non-Aryan" scientists in Germany, and the separation of Nazi science from that of the rest of the world, the weekly journal of science, *Nature*, came under an interdict of the Reich in 1937. This journal circulates in all parts of the scientific world, and has long been recognized as a clearing-house in which original contributions to knowledge are first announced, and their significance freely discussed. As testimony to the international character of the journal, it is

sufficient to say that, in a single year, nearly a thousand of such original communications are published in its columns, from scientific workers in as many as thirty countries outside Great Britain and nearly a hundred and fifty different scientific centres in them. Germany was one of the countries which appreciated the value of such an international medium in which to make the results of their researches known and to exchange views upon them. Towards the end of 1937, however, the German Minister of Education prohibited the circulation of *Nature* in his institutions of higher learning by the following rescript:

"In the scientific weekly journal *Nature*, articles have often been published containing unprecedented and base (*unerhörte und niedrige*) attacks against German science and the Nationalsocialistic State. Therefore the journal must be excluded from general use in scientific libraries. I request that appropriate orders be given to the libraries of the Universities, Colleges, Institutes, and Research Departments."

The assertion that German science was attacked in *Nature* or any other scientific journal is as false as it is disingenuous. Indeed, the reverse would be a truer statement. The British tendency to disregard its own achievements, while acclaiming those announced in other countries, applies to science as much as to music. Even after the issue of the edict by the Minister of Education, German publishers continued until the opening of the present war to submit their works for review in *Nature*, knowing that these would be justly appraised by competent authorities, and that the judgments would be read by colleagues in all parts of the scientific

world. The journal has always welcomed the opportunity of recording worthy additions to the literature of science or original contributions to natural knowledge from any country or race, or in any language.

Scientists, however, have hearts as well as minds, and only a German political official could expect them to be silent while they see renowned and respected fellow-workers expelled with cruel indignities from their laboratories as the result of bitter racial prejudice or lack of support of a social system which would place science in chains. They would be inhuman if they failed to sympathize with such sufferings, and traitors to scientific tradition if they neglected to condemn influences which would make the pursuit of scientific truth a servile means of promoting Teutonic arrogance.

### **Science under the "New Order"**

When a new State Council for Research was founded in Germany in the spring of 1937, the Minister of Education, Herr Rust, called upon German science to co-operate in the Four Year Plan for national self-sufficiency. The functions of the Council are, in the main, much the same as those of the Advisory Council of our Department of Scientific and Industrial Research. As, however, the President is an Artillery-General who was responsible for the entire technical developments of the Army, and the Vice-President became a district leader during the revolutionary period and

is a well-known S.S. Commander, military control is obvious.

In his address at the inauguration of the new Council, Herr Rust urged that complete freedom of opinion and judgment were not marks of a truly free science, but rather of an estrangement from the national and natural spirit. "The Council", he said, "is initiated at a moment when the German people is preparing in a manner hitherto unprecedented and by an unexampled expenditure of its utmost effort, to win its rightful foundations of existence, independent of its environment.... Not long ago many of us felt that learning was too aloof from the great decisions of our times to co-operate in the great struggle of the German people. But the course of German history had itself brought this idyllic attitude to an end, and with it has ended also certain idyllic aspects of scientific work. The Nazi Revolution summoned science to the decisive battle."

Much can be said in support of the unification of scientific forces in the service of the State for purposes of peace or of national defence, but nothing can justify a policy which binds freedom of thought to a formula and eliminates all who, by accident of birth or adopted place of settlement, are condemned as intellectual heretics. For centuries the only qualification for admission to the citizenship of science has been devotion to the discovery of truth in Nature by unprejudiced observation and experiment combined with creative ideas. As in art and poetry, so in science, the highest achievements are the expression of an inner impulse and vision which acknowledges no boundaries of thought and can be exercised only in a free atmosphere.

## Nazification of Medicine

Such freedom of thought is now denied in Nazi Germany not only to Jews and other "non-Aryans", but also to all workers in scientific institutions of the Reich whose minds extend to a wider philosophy than that specified by the existing political system. An article entitled "'Weisse Juden' in Wissenschaft", which appeared in the Nazi journal *Das Schwarze Korps* of July 15, 1937, condemned in the strongest terms any such free-thinkers in the realm of science. The main theme of the article was that it was not sufficient to exclude all Jews from sharing in the political, cultural and economic life of the nation, but to exterminate the so-called Jewish spirit, which was stated to be most clearly recognizable in the field of physics and its most significant representative to be Professor Einstein.

"There is one sphere in particular", the article said, "where we meet the spirit of the 'White Jews' in its most intensive form and where what is common between the outlook of the 'White Jews' and Jewish teaching and tradition, can be directly proved, namely in SCIENCE. To purge science from this Jewish spirit is our most urgent task. For science represents the key position from which intellectual Judaism can always regain a significant influence on all spheres of national life. Thus it is characteristic that in a time which brings fresh tasks to German medicine and which awaits decisive developments in the fields of heredity, race-hygiene and public health, our medical journals should, in the space



of six months, publish from a total of 2,138 articles, 1,085 from foreign sources, including 116 from Russians of the U.S.S.R. These articles of foreign origin scarcely concern themselves with those problems which seem so urgent to us. Under cover of the term 'exchange of experience' there lurks that doctrine of the internationality of science which the Jewish spirit has always propagated, because it provides the basis for unlimited self-glorification."

The international spirit of science is a glory and not a crime; and if it were true that its existence is due solely to Jewish thought and influence, the indictment would be a tribute rather than a condemnation. To credit the Jewish people with particular possession of the spirit is such a travesty of history as only minds distorted by racial bitterness could conceive. When, in addition, all who work for the advancement of knowledge, except according to Nazi specification, are excluded from the service of science, the intellectual aspirations of the human race will indeed sink to their lowest depths. It is almost unbelievable that a responsible organ of Nazi opinion should urge that, even in the fields of medicine and public health, Germany should work by itself and for itself alone, and disparage "exchange of experience" with workers in other countries contributing to the solution of problems of health and disease in the human race. It is impossible for the democracy of science to be tolerant of such inhuman intolerance.

## **Repression of Creative Thought**

Not only in medicine, but also in the whole domain of science, this doctrine of self-sufficient isolation from "non-Aryan" thought now determines the nature and aims of scientific work in Germany. It is held that Aryans, particularly Germans who can be sure of their ancestry for two or three generations, are by nature realists; and that idealists, especially those of Jewish birth, are intellectual acrobats whose performances may entertain but serve no useful scientific purpose. The distinction between these two types of mind from the Nazi point of view was stated with authority by Professor J. Stark, President of the Physikalisch-Technischen Reichsanstalt, Berlin-Charlottenberg, in *Nature* of April 30, 1938. Professor Stark had expressed approval of the purge of the "Jewish" spirit from German science advocated by *Das Schwarze Korps*, and the Editor of *Nature* thereupon invited him to let the scientific world know the grounds for a divorce between mathematical philosophy and experimental science.

This is not the place to discuss the strength or the weakness of the position occupied by Professor Stark and the Nazi forces under which he serves. It is sufficient to say that he regards Professor Einstein and other world-renowned creative thinkers in physics as obscurantists who contaminate Aryan or Nordic science, and whose expression of scientific thought has brought them the penalty of expulsion from the country of their birth. The main assertion is that Germany represents Aryan or Nordic science in a superior degree and intends to keep its faith undefiled by the influences of minds which see deeper into the meaning of natural facts and phenomena than circumscribed material inquiry can ever reveal.

It would be easy to show how such original intellectual conceptions have been fertilizers instead of polluters of the field of science; but a single example of this influence will now suffice. It was the great Cambridge mathematical physicist, James Clerk Maxwell, who first proved by theoretical reasoning and mathematical equations that the electric waves which are now broadcast around the world every day had similar properties to waves of light and could therefore be propagated through space without intervening wires. According to the views accepted before he arrived at this result, such waves could not exist, whereas he showed that all changes in electric and magnetic forces created vibrations which spread through space.

Maxwell's mathematical predictions were confirmed experimentally in Britain by Sir Oliver Lodge, and they stimulated the German scientist, Heinrich Hertz, to investigate their conceived existence and properties. Hertz was able to prove that these waves travelled with the velocity of light—186,000 miles a second—and could, by suitable apparatus, be created and detected and therefore be used for communication without wires connecting the source and the receiver. It was, in fact, upon the basis of Maxwell's theory of the electromagnetic nature of light that experiments were undertaken which have developed into the marvellous service of broadcasting now familiar throughout the world.

Scientists of many nations have taken part in these developments, and the use of their discoveries by all mankind reflects the international spirit of scientific achievement. Such a result, and such a combination of scientific workers in a true commonwealth of knowledge, are

altogether contrary to the existing Nazi control of scientific thought and service. Fortunately for the world, Hertz himself died long before German science had to submit to the dictates of a vengeful political system; for he was partly of Jewish blood and would have suffered the same cruel fate as that to which other distinguished scientific members of his community have been subjected in recent years.

### **Repudiation of Scientific Nationalism**

In no free country have men of science shown any desire to follow the new path laid out for them with insidious sophistry by Nazi authorities. It is not an international highway to knowledge but a private road cemented with blood and tears, and from it the view is everywhere restricted by pretentious racial barricades. In its construction both truth and justice are violated, and admission into the path which other peoples "some sooner, some later, are destined to tread" can be obtained only by the acceptance of debased scientific principles or the use of military force.

How strongly such doctrines are repudiated by the scientific democracy was shown in 1938, when a manifesto signed by nearly thirteen hundred American scientists was published. The signatories were from a hundred and sixty-seven universities and research institutions, and included eighty-five college presidents and directors of industrial laboratories and experimental stations. Sixty-four of these

were members of the U.S. National Academy of Sciences and three were Nobel prize winners.

The manifesto, like the resolutions adopted by the American Association for the Advancement of Science, condemned the doctrine of national isolation of science, because it not only destroyed intellectual freedom, but also endangered the possibility of the advancement of man's well-being. It represented the solidarity of the world of science in matters of the spirit, and rejected Nazi mastery in any part of its territory. The realm of science is the whole world of Nature, and no nation has the right to divide it into racial or religious regions. To debar Jews and "non-Aryans" from entering into the scientific field is an offence for which the true motive is Nazi ambition to master the world.

### **Nazi Scientists and Greek Philosophers**

Academic leaders in National Socialism justify this assault against science on other grounds. They divide scientists into theoretical or Jewish, and practical or Aryan. The Aryan type is good and must consecrate itself to Nazi faith in German superiority: the theoretical type, particularly when of Jewish birth, is held to be evil, and therefore to be eliminated from all scientific fields.

Only racial prejudice could construct such a theory and apply it to scientific right, or see in it a reason for conflict. The greatest achievements of science have been attained

through the agency of creative theory; and the Jews have no monopoly of this stimulating quality. Both history and science would give the ancient Greek philosophers the supreme place in this respect rather than any other racial group. Even Nazi science has to acknowledge this, but until the recent attack upon Greece by Italy it was hoped that the revered shrine of pure knowledge and democratic principles would be saved from desecration.

The sacrifice of Greece would mean the loss of the most precious heritage of the civilized world. The foundations of mathematical thought, laid down by Greek philosophers more than two thousand years ago, would be buried under an oppressive rubble-heap. The danger to civilization and to science involved in Nazi and Fascist policies of violence was expressed in an appeal made by the Greek Mathematical Society in November 1940, to mathematicians of all countries.

"We are," the appeal said, "fighting for freedom for our altars and our hearths, and for the highest ideals of civilized man. We shall fight to the end in accordance with the national traditions of our history over the past three thousand years. We appeal to the mathematicians of all countries to give every help to little Greece, so that the lofty principles of freedom and justice and the noble ideals of truly civilized humanity may prevail."

Minds not distorted by Nazi doctrines into crabbed conceptions of the meaning of science cannot fail to respond with sympathy and support to this appeal for the preservation

of the freedom of thought and liberation of the spirit, which is the glory of Greek influence.

When official Nazi scientists condemn mathematical conceptions having no immediate relation to practical purpose, and expel creators of them with ignominy, they dishonour the history of science and the contribution of Greek thought to it. Although Greek philosophers concerned themselves more with such abstract ideas than with the material aspects of natural knowledge, they also originated principles and practice which have had profound influences upon the development of science. It was Archimedes who founded the science of mechanics. He established by experiment the principle of the lever and the law of floating bodies used to-day to determine marine displacement and the lifting power of airships. The old type of fire-engine, with two force-pumps working alternately, was designed by Ctesibius of Alexandria; and his pupil, Hero, made a simple steam engine in which the same reaction principle was used as that of the modern steam turbine which now drives most of the largest ships of the world.

### **Union of Theory and Practice**

As with the Greeks, so with the Jews, even if the tendency is towards abstract ideas or theoretical speculations, this does not exclude all members of their races from exercising their practical or mechanical genius. The American manifesto shows, how, by proscribing Jewish science as specifically

theoretical, the Nazi pragmatic philosophy is as dishonest as it is unsound. "We need only point," it says, "to the work of Heinrich Hertz in physics; Fritz Haber and Richard Willstätter in chemistry; Ludwig Traube, Paul Ehrlich, and August Wassermann in biology and medicine, all German Jews and empirical scientists. The charge that theory leads 'to a crippling of experimental research' is tantamount to a denial of the whole history of modern physics. From Copernicus to Kepler on, all the great figures in Western science have insisted, in deed or in word, upon the futility of experimental research divorced from theory."

It must be conceded that, as Nazi scientists desire to live separate scientific lives, they cannot be denied a divorce of theory and practice in their own country. But in abandoning a union which has been so happy and fruitful, they presume too much in expecting scientists of other countries to follow their examples. When, moreover, they see hundreds of their esteemed colleagues martyred without offering any protest against such cruelties, and often with gloating eyes, they sever themselves from the heart of the civilized world. To accept a system which makes birth or religious belief the basis of the charge of infamous conduct, and the reason for dismissal from an academic organization, is to approve a dogmatism of intellectual death.

How disastrous this Nazi policy can be to co-operative thought and work for the expansion of knowledge is shown by the expulsion of distinguished foreign members of Jewish blood from German scientific societies. Most learned societies elect a certain number of honorary fellows whose original work has placed them in the front rank of



contributors to progress in their particular fields, but many such leaders have now been asked to return their diplomas, as the societies no longer desire to have association of any kind with Jews. The reply of one such foreign honorary member, upon receiving this notice of expulsion, was that the society, by its action, ceased to be scientific, and therefore he no longer desired to be connected with it!

### **Censorship of the Mind**

In order to remove any similar taints of Nazi doctrines derived from free thought, German universities were informed in 1939 that, in future, all scientific theses for the degree of doctor of philosophy must be submitted to official censorship. This regulation, it is said, is intended to guard against the introduction of theories offending against Nazi doctrines. In view of the distorted interpretation of certain scientific and historical facts which alone is officially permitted in Germany to-day, any further bar to research would scarcely seem to be necessary, but as the new generation has to live within intellectual limits prescribed by its political masters, it must be prevented by stringent regulations from straying beyond them!

No thesis can now be submitted for scientific examination until it has passed the Nazi censor. The value of results arrived at from a scientific and dispassionate study of facts, or original thought upon any subject, is not to be determined by university authorities without the approval of a political

official. In the very period of life when original thought is most fertile, it is made hidebound. Such regimentation strikes at the very root of intellectual development and scientific training. In Germany, these must no longer be concerned with the search for truth through the investigation of the facts of Nature and history in both the broad and narrower sense, but only with the fanatical application of a selective theory dictated by racial prejudice and enforced by military power.

Many German scientists know that these and similar shackles upon freedom of scientific thought must impede their rate of movement in comparison with that of their colleagues in other countries. Whatever their concealed reservations, they must abandon their scientific faith and be apostates in order to carry on their work. Whether they accept these conditions of continued service willingly or not, men of science in other countries do not wish to influence their decisions. Such thralldom cannot, however, be endured without danger to human progress. If it were confined to Germany alone, that country would soon fall behind other nations in the advance of knowledge, and be a field of distorted and stunted scientific growth. It is because men of science in all countries ravaged by Germany are subjected to similar slavery or death, that their colleagues throughout the world assemble under a single banner to fight against the forces which have already desecrated many centres of scientific learning, and to defend the realm of intellectual freedom from further invasion.

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[The end of *Science in Chains* by Sir Richard Arman  
Gregory]