

## THE FOUNDATIONS OF ACADEMIC FREEDOM\*

MICHAEL POLANYI  
F.R.S.

PROFESSOR OF PHYSICAL CHEMISTRY IN THE UNIVERSITY OF MANCHESTER

THE idea of freedom is ambiguous, and therein lies a danger to freedom. There seem to be two ways of being free. One way is to be free from external constraint. The rational limit to this freedom is that it must not interfere with other people's right to the same freedom. I have, for example, freedom to choose between going to sleep or listening to the wireless, so long as my listening does not interfere with my neighbour's choice between the same two alternatives. This is the approach to freedom which the great utilitarians Bentham and Mill have impressed on our age. It is linked to the idea that the basic pursuit of a good society is the greatest happiness of its greatest number, and that freedom is a condition of this pursuit. But this individualist or self-assertive concept of freedom can, unfortunately, be used to justify all kinds of objectionable behaviour. It has been invoked in protection of the worst forms of exploitation, including slavery. It has encouraged the rise of lawless individuals and of nations striving for greatness at any price. Its fundamental opposition to all restraint can easily be turned into nihilism.

The other concept of freedom is, in its extreme form, almost the opposite of the first: it is liberation from personal ends by submission to impersonal obligations. Its prototype is Luther facing the hostile Assembly at Worms with the words: "Hier stehe ich und kann nicht anders." Such surrender to moral compulsion is certainly a form of liberation; but such freedom leads to totalitarianism, when the State is regarded as the supreme guardian of the public good, for it then follows that the individual is made free by surrendering completely to the State. Neither of these concepts affords by itself very safe grounds for freedom; for even without nihilism and totalitarianism the individualist concept may appear selfish, and the theory of freedom by self-surrender may offend against our respect for individuality and against our sympathy with men's claims to personal happiness.

In this dilemma the study of academic freedom may guide us, for in the foundations of academic freedom the two rival concepts of liberty are firmly interwoven.

### ACADEMIC FREEDOM †

Academic freedom consists in the right to choose one's own problem for investigation, to conduct research free from any outside control, and to teach one's subject in the light of one's own opinions.

At first sight this freedom may seem contrary to both concepts; for the scholar is not given freedom primarily to promote his own happiness or merely to fulfil an obligation. Something seems to be missing; and here a statement made recently by Dr. Enrico Fermi to an American Senate committee on legislation in support of scientific research gives us a hint:

"Experience has indicated that the somewhat haphazard exploration of the field of knowledge that results from an intensive freedom of the individual scientific worker to choose his own subject is the only way to insure that no important line of attack is neglected."

There is nothing uncommon in this claim, which is unquestioningly assumed as true by scientists in general. Though they rarely have occasion to express it in words, they effectively endorse it by the whole practice of scientific life, and we may safely assume that it is broadly true.

\* Abridged from the Lloyd Roberts lecture delivered in Manchester on Nov. 19, 1946.

† The argument in this section is the same as used in my article in "The Nineteenth Century and After," April, 1947.

The claim is that freedom is an efficient form of organisation. Scientists are viewed as a team exploring openings for discovery, and it is believed that their efforts will be efficiently coördinated if each is left to follow his own bent. It is claimed in fact that there is no other efficient way of organising the team—that any attempt to coördinate their efforts by directives of a superior authority would inevitably destroy the effectiveness of their coöperation.

This, in a way, is surprising, for usually coördination limits individual discretion. How can science be best coördinated by releasing individual impulses?

Usually, when several persons apply themselves independently to the same task, their efforts remain essentially uncoördinated: a party of women shelling peas represents no coördinated effort, for their total achievement is simply the sum of their individual outputs. But science is not conducted by isolated efforts like these, and science could make no progress that way. If all communications were cut off between scientists, science would almost come to a standstill. Discoveries might continue to be made during the first few years of such a regime at about the normal rate, but their flow would soon dry up, and thenceforth progress would become fitful and sporadic, and the systematic growth of science would cease entirely.

The coördinative principle of science consists in the adjustment of each scientist's activities to the results achieved by others. In adjusting himself to the others each scientist acts independently, but scientists as a body keep extending with maximum efficiency the achievements of science as a whole.

The basic principle leading to coördination of individual activities without the intervention of any coördinating authority can be demonstrated by a trivial example. Suppose we had to piece together a gigantic jigsaw puzzle in the shortest possible time. It would be useless to farm out sets of the puzzle to isolated collaborators and add up their results. The only way to get the job finished quickly would be to get many helpers to work on the same set, each following his own initiative. Each helper would watch and benefit by the progress made by the others.

It is also obvious what would happen if someone tried to improve matters by applying central administration. Each helper would then have to await a decision taken at the supreme level. In effect, all of them except the head of the organisation would cease to contribute to the piecing together of the puzzle. Coöperation would fall to zero.

This confirms the twofold claim of Dr. Fermi—that the independent actions of individuals may become spontaneously and efficiently coördinated in a joint task, and that subordination to a central authority would destroy their coördination.

### THE UNCERTAIN TASK

The logical basis of the spontaneous coördination of scientists is identical with that of the team engaged in piecing together a jigsaw puzzle; but there is a great difference between the two cases. The pieces of a jigsaw puzzle are bought in a shop on the understanding that they will yield a solution known to the manufacturer; but there is no similar assurance that scientists will be able to explain the universe by piecing together their discoveries.

It is not even clear in what sense science—or scholarship in general, to which all these considerations apply equally—can be said to have any comprehensive task at all. The search for a ground plan of the universe can only be meant in a vague and fluid sense. Pythagoras and even Kepler sought a ground plan in terms of numerical and geometrical rules; Galileo and Newton sought it in terms of mechanism; today we seek it once more in terms of mathematical harmonies, but other than the number rules of Pythagoras. In the field of general scholarship even more radical changes in the general purpose of inquiry take place. Compare the

moral interpretation of history by a Lord Acton or a Toynbee with the way history is interpreted by Marxists or by psycho-analysts. Moreover, whereas in the jigsaw puzzle a new piece either fits into a particular gap or does not; in science this is not so. Some new discoveries may obtain immediate recognition, but other claims, often more important, remain uncertain for years. To every step of scientific progress there is attached an element of uncertainty about its scope and value.

#### COHERENCE OF SCIENCE

The logic of self-coördination is unmistakably based, in science and scholarship in general, on elements much vaguer than those of a jigsaw puzzle. In science and scholarship the uncertainty of both each step and of the final task may call in question the whole analogy which we have hitherto pursued. Yet in my view this is only to be taken as a warning to use this analogy carefully.

In spite of the profound changes in general outlook and method which have occurred even in the last 400 years of scientific development, we can see a distinct coherence of the contribution made to science during that period. Most of the scientists of that period who were highly respected in their own time are still in high regard among scientists today, and few have been added to the ranks of great scientists today whose works were generally thought valueless in their own days. It is true that many of Kepler's or even Galileo's or Newton's arguments may appear irrelevant today; and Galileo and Newton would probably be profoundly dissatisfied with quantum mechanics. But Galileo and Newton remain nevertheless classics of modern science. Their discoveries are the very foundations of the picture which we are forming of nature today, and their methods of investigation are still among the archetypes of scientific methods. Their personal example is recognised with unchanging loyalty and indeed with a reverence which increases through the centuries as the realm of science, which they founded, continues to extend its domain.

This coherence of science is world-wide. Attempts have been made to make scientists in Germany believe that as Germans they must disbelieve relativity and quantum mechanics, and great pressure has been exercised on scientists in Russia to reject Mendelism because of its supposed incompatibility with Marxism. But science is, on the whole, still accepted today in the same way all over the world.

Here, I believe, we have a sufficient logical ground for the spontaneous coördination of individual scientific discoveries. The ground is provided by such coherence as science does possess. In so far as there exists a steady underlying purpose in each step of scientific discovery, and each step can be competently judged as to its conformity to this purpose and its success in approaching it, these steps can be made to add up spontaneously to the most efficient pursuit of science.

#### SPIRITUAL REALITY OF SCIENCE

It is not quite enough, however, to recognise science as pursuing a consistent purpose. So did, in a way, the students of the cabala, the witch-hunters, and the astrologers, and we must distinguish the purpose of science from that of these erroneous pursuits. We could not speak of a true spontaneous growth of science if we considered the apparent coherence of science as a result of a series of accidents or as the expression of a persistent error. We must believe, on the contrary, that it represents the consistent expansion of some kind of truth. In other words, we must accept science as something real, as a spiritual reality partly disclosed at any particular moment by the past achievements of science, and to be disclosed ever further by discoveries yet to come.

We should regard the minds of scientists engaged in research as seeking contact with these as yet undisclosed parts of science, and look upon discovery as the result of a

successful contact with a hitherto hidden spiritual reality. Whenever a scientist wrestles with his intellectual conscience, whether to accept or reject an idea, he should be taken to be making contact with the whole tradition of science, in fact with all scientists of the past whose example he is following, all those living whose approval he is seeking, and all those yet to come for whom he is proposing to lay down a new teaching. The coherence of science must be regarded as an expression of the common rootedness of scientists in the same spiritual reality. Then only can we properly understand that at each step each scientist is pursuing a common underlying purpose, and that every scientist can sufficiently judge—in general accordance with other scientific opinion—whether his contribution is valid or not. Only then are the conditions for the spontaneous coördination of scientists properly established.

#### COMBINATION OF THE TWO FREEDOMS

This view of the coherence of science and of the nature of science in general allows us to combine the two rival concepts of freedom.

Science, we can see now, has strong features corresponding to both concepts. The assertion of his personal interest and personal opinion with the full force of his personal passion is the mark of the great pioneer, who is the salt of the earth in science. Originality is the principal virtue of a scientist, and the revolutionary character of scientific progress is proverbial. At the same time science has a most closely knit professional tradition. It rivals the Church of Rome and the legal profession in continuity of doctrine and strength of corporate spirit. Scientific rigour is as proverbial as scientific radicalism. Science both fosters originality and imposes a rigorous criticism.

And yet between these two concepts there is no disharmony. A clash may occasionally occur between originality of the individual and the critical opinion of his fellow scientists, but there can be no conflict between the principles of spontaneity and constraint. There are no romantic scientists who demand the authority to express their individuality heedless of other scientists' opinions. No—the revolutionary in science does not claim to be heard on the grounds of any right to assert his personality against outside compulsion, but because he believes he has grounds for establishing a new universally compelling opinion. He breaks the law as it is in the name of the law as he believes it ought to be. His is an intensely personal vision of something which in his view henceforth everyone must recognise.

This unity between personal creative passion and willingness to submit to tradition and discipline is a necessary consequence of the spiritual reality of science. When a scientist seeks new knowledge he is sharing an adventure with all other research scientists guided by the same spiritual reality and is therefore linked most closely with the universal system and canons of science. And accordingly, though the whole progress of science is due to individual impulses, these impulses are not respected in science as such, but only in so far as they are dedicated to the tradition of science and are disciplined by the standards of science.

These principles can be readily generalised for scholarship in general. Academic freedom can claim to be an efficient form of organisation for discovery in all fields of systematic study controlled by a tradition of intellectual discipline.

#### CENTRAL AUTHORITY

If the spontaneous growth of scholarship requires that scholars be dedicated to the service of a transcendent reality, this implies that they must be free from all other authority. Any intervention on the part of another authority would only destroy their contact with the aims which they are pledged to pursue.

But tolerance of academic freedom by the State is not enough. Nowadays institutions of higher learning and higher education can be upheld only by public subsidies, and governments recognise that to give such support is a proper public responsibility. Yet if scholars are rewarded by the State and given by the State the means for conducting their researches, this may well bring to bear on them a pressure deflecting them from academic interests and standards. For example, a dairy-producing State, such as Iowa, may dislike its scholars discovering and making known the nutritive and economic advantages of margarine, and the legislature of the State may want to intervene against its own State university to prevent it from publishing such conclusions. This actually happened recently in Iowa. There are, indeed, many opportunities for such conflicts between the visible interests of the State and the interests of learning and truth cultivated for their own sake. How shall these conflicts be avoided?

Up to a point the problem of such conflicts is quite simple. The fact that the King appoints and pays the judges does not affect their independence, so long as the King is under the law. The King of England also appoints and pays the chief opponent of his own government in the person of the leader of the parliamentary opposition. Governmental patronage is no danger to the independence of the persons appointed, so long as these are allowed to function properly. It then means merely an undertaking by the government to provide fuel and oil for a machine which the government does not itself control. In the case of legal appointments, the machine is controlled by the principles of justice laid down by law and interpreted by the legal profession; and in the case of political appointments the King sanctions the popular will expressed through the established electoral machinery.

These examples, particularly that of the appointment of judges by the government, illustrate the way in which the State can support academic scholarship without affecting academic independence. It must regard an independent academic life in the same light as it regards an independent administration of justice. Its respect for scholarship and for the principles guiding the free advancement and dissemination of knowledge must be rooted as deeply as its respect for law and justice. Both should derive validity from similar sources—from spiritual realities, embodied in great traditions, to the service of which our civilisation is dedicated.

But however great the respect of the State for an independent judiciary, it could not give effect to this attitude if the legal profession were profoundly divided into rival schools of thought. For the State would then have to arbitrate between them. And we find something similar holding in respect to scholarship. A government can observe fully the freedom of science in all questions on which scientific opinion has on the whole agreed; but if academic opinion were sharply divided in assessing the merits of discoveries and the abilities of scholars there would be no possibility of maintaining academic freedom. If, when we assemble in committee to elect a new professor, we had no accepted leaders of scholarship to turn to for consultation, and no accepted standards of scholarship by which to judge candidates, then chairs would have to be filled by the light of other than academic considerations, the next best being probably to please popular opinion or the government in power.

#### SAFEGUARDS OF ACADEMIC FREEDOM

A strong and homogeneous academic opinion, deriving its coherence from its deep common rootedness in the same scholarly tradition, is an indispensable safeguard of academic freedom. If there exists such an academic opinion, and if public opinion respects academic opinion, then there is no danger to academic freedom. Then it matters little to academic freedom whether the universities get their money from public or private sources.

A survey of the universities in various countries shows a great variety of machinery for making academic appointments. But I can find very little connexion between the nature of these constitutions and the strength of academic freedom established under their dominion. In some Continental countries—e.g., Holland, Belgium, Sweden, Norway, Denmark, and Switzerland—State-run universities have been a complete success; whereas in some States of America, for example, they have been repeatedly impaired by an intolerant legislature. The difference lies entirely in the condition of public opinion, which has shown a greater respect for the autonomy of scholarship, say, in the canton of Zurich than in the State of Iowa.

Nor is self-government of universities a safeguard against corruption of academic freedom. It has happened that universities were run for a generation by a clique of professors keeping up a close system of nepotism and political patronage. Any candidate who had acquired a scientific reputation was regarded as a seeker of publicity trying to force himself on the university by unfair practices. Institutional safeguards of academic freedom are desirable, but we must not forget that they are not enough and may even become the shield of a corrupt academic opinion.

Among the desirable constitutional safeguards I should like particularly to mention the custom of permanent academic appointments. Appointment for life or until the age of retirement grants a high degree of independence to the scholar, as it does to the judge and to the minister of religion. The case of the permanently appointed scholar is, however, somewhat peculiar; for, in contrast to those of the judge and the minister, his obligations are not even remotely laid down by any explicit rule. His duties as teacher and administrator must be so apportioned as to leave him free to devote his principal energies to creative work. There is no way of assuring that a man so appointed will go on doing such work. The only thing you can rely on is his love for his work, and the prospect that this love will last. You cannot even hope that love may be successfully replaced by duty, as it may perhaps be in marriage. For no-one can make discoveries prompted mainly by a sense of duty; he needs to be urged on by a creative passion. We can see here how completely the personal aspect of freedom—liberty to assert oneself—coincides in the field of scholarship with the social aspect—surrender to the service of a higher purpose.

#### APPLIED SCIENCE

There is a difference, at first sight puzzling, between the independent standing claimed here for members of the academic profession and the admittedly subordinate condition of well-trained scientists engaged in various forms of surveying, scholars employed as bibliographers, and the like. This difference is justified by the distinction between creative and routine work.

The helpers in the jigsaw are granted individual liberty because they have to guess their way at each step. To guess the solution to a problem offered by nature, as is demanded of the scientist, requires the exercise of creative intuition controlled by intellectual conscience. Each discovery leads in a more or less unexpected direction, and it is precisely to find these directions that each scholar is made to act independently. In surveying, on the other hand, the direction of progress is essentially laid down in advance, and it is desirable that the work should be directed by a central authority. The individual surveyors therefore have no claim to academic freedom.

Indeed, any research conducted for a purpose other than the advancement of knowledge must be guided ultimately by the authorities responsible for that purpose, be it the waging of war, the improvement of a public service, or the earning of industrial profits. If the research-worker is to serve any of these purposes he must submit to the judgment of the responsible authorities.

There are many gradations in the degree of subordination that is essential to the successful working of the applied scientist; but there should be no difficulty in dealing with these intermediate cases on the basis of the same principle. You cannot serve two masters; you must choose between dedication to the advancement of a system of knowledge which requires freedom, or pursuit of applied science which involves subordination.

There is of course no difference between the personal respect due to the individual engaged in surveying or in applied science and that due to a pure scientist. He may be the same man at different periods of his life. During the war many academic scientists volunteered to do practical work. They all had to accept a measure of subordination. Certain jobs require for their efficient performance that men should be free, while others require that they should be subject to direction from above.

#### SOCIAL FREEDOM

Academic freedom is never isolated. It can exist only in a free society; for the principles underlying it are the same as those on which the most essential liberties of society as a whole are founded. It has its counterpart in other spheres of society. For example, in a court-room there are others than the judges who act on spiritual grounds: there are witnesses who may find it hard to tell the truth and yet do so; there are jurymen and counsel who must try to be fair and may have to wrestle with their consciences. And everywhere in the world there are people who are trusted by their fellow men to tell the truth or to be fair. There are consciences touched by compassion, struggling against the ties of comfort or of harsh custom. Our lives are full of such conflicts. Wherever these contacts with spiritual reality are made there is an opportunity for asserting liberty. There are extreme cases—great examples in history—and there are many small instances every day of people who assert their liberty on grounds of this kind. A nation whose citizens are sensitive to the claims of conscience and are not afraid to follow them is a free nation. A country in which the spiritual things which appeal to our conscience are generally regarded as real, and where people are on the whole prepared to admit them as legitimate motives and even to tolerate inconvenience or hardship to themselves from others acting on such motives—such a country is a free country.

These contacts with spiritual reality may reach high levels of creativity, accompanied in some fields—as in science, scholarship, and administration of the law—by a definite process of self-coordination. But all contacts with spiritual reality have some measure of coherence. A free people among whom many are on the alert for calls on their conscience will show a spontaneous coherence of this kind. They may feel that it all comes from being rooted in the same national tradition. But this tradition may well be merely a national variant of a universal human tradition. For a similar coherence will be found between different nations when each follows a national tradition of this type. They will form a community of free peoples. They may quarrel indefinitely yet always settle each new difficulty in the end, being all rooted in the same transcendent ground.

#### DANGER OF TOTALITARIANISM

The usual antithesis of the individual versus the State is a false guide to the issue of freedom versus totalitarianism. The most essential freedoms are those in which it is not the individual pursuing his personal interests who claims to be respected by the State. Respect is demanded by the dedicated individual because of the object to which he is dedicated. The disciplined individual demands to be respected for the sake of the spiritual reality under whose discipline he has undertaken to serve. He speaks to the State as a liegeman of a higher master, demanding homage to this master. The true antithesis is therefore

between the State and the invisible things which guide men's creative impulses and in which men's consciences are naturally rooted.

The totalitarian form of the State arises logically from the denial of reality to the transcendent ideas. When the spiritual foundations of all freely dedicated human activities—of the cultivation of science and scholarship, of the vindication of justice, of the profession of religion, of the pursuit of free art and free political discussion—are summarily denied, the State becomes of necessity inheritor to all ultimate devotion of men. For if truth is not real and absolute, it may seem proper that the public authorities should decide what should be called the truth. And if justice is not real and absolute, it may seem proper that the government should decide what shall be considered just or unjust. Indeed, if our conceptions of truth and justice are in any case determined by interests of some kind or other, it is right that the public interest should overrule all personal interests in this matter. We have here a full justification of totalitarian statehood.

The decisive point in the issue of liberty consists today in certain metaphysical assumptions without which freedom is logically untenable. Unless these are firmly professed, freedom can be upheld only in a state of suspended logic, which threatens to collapse at any moment and which in these searching and revolutionary times cannot fail to collapse before long.

## ANTITHYROID ACTIVITY OF ERGOTHIONEINE

### A NORMAL COMPONENT OF BLOOD

A. LAWSON

B.Sc., Ph.D. Glasg.  
READER IN ORGANIC  
CHEMISTRY AT THE  
ROYAL FREE HOSPITAL  
MEDICAL SCHOOL

C. RIMINGTON

M.A., Ph.D. Camb., B.Sc. Lond.  
PROFESSOR OF CHEMICAL PATHOLOGY  
IN THE UNIVERSITY OF LONDON, AT  
UNIVERSITY COLLEGE HOSPITAL  
MEDICAL SCHOOL

With the technical assistance of A. W. HEMMINGS

THE discovery of the goitrogenic action of thiourea (MacKenzie and MacKenzie 1943) has led to an investigation of the activity of very many types of thiol compounds (Astwood 1943, Astwood et al. 1943, 1945, McGinty and Bywater 1945). All the more active compounds described by Astwood and others contain the grouping  $>N-CS-N<$ , and it is believed that these compounds act by preventing the accumulation of iodine and synthesis of thyroxin by the thyroid gland (Rawson et al. 1944, Franklin et al. 1944).

Substances such as thiouracil and its more active propyl derivative have been proved clinically to be of great use in the treatment of hyperthyroid conditions. A serious consideration attending the use of these substances, however, is the possibility that toxic symptoms such as agranulocytosis may sometimes be evoked, and their administration is therefore not without risk. So far all the substances of the above type which have been tested experimentally or therapeutically have been synthetic products foreign to the animal body. It was therefore felt that ergothioneine, a normal constituent of blood, which belongs to the same chemical type, would be worthy of investigation.

Ergothioneine is the methyl betain of 2-thiol-histidine and was originally isolated by Tanret (1909) from ergot of rye. Its constitution was elucidated by Barger and Ewins (1911), and its presence in blood established by several workers (see Hunter 1928). It is generally considered to be devoid of pharmacological action.

#### EXPERIMENTAL

The ergothioneine used in this work was isolated from ergot of rye. At the time when the investigation was