
6. Science and Free Culture

It is no longer possible to hold the simple faith of the Enlightenment that assured advance of science will produce free institutions by dispelling ignorance and superstition:—the sources of human servitude and the pillars of oppressive government. The progress of natural science has been even more rapid and extensive than could have been anticipated. But its technological application in mass production and distribution of goods has required concentration of capital; it has resulted in business corporations possessed of extensive legal rights and immunities; and, as is a commonplace, has created a vast and intricate set of new problems. It has put at the disposal of dictators means of controlling opinion and sentiment of a potency which reduces to a mere shadow all previous agencies at the command of despotic rulers. For negative censorship it has substituted means of propaganda of ideas and alleged information on a scale that reaches every individual, reiterated day after day by every organ of publicity and communication, old and new. In consequence, for practically the first time in human history, totalitarian states exist claiming to rest upon the active consent of the governed. While despotic governments are as old as political history, this particular phenomenon is as startlingly unexpected as it is powerful.

One of the earlier arguments for democracy is countered in the most disturbing way. Before the industrial revolution had made much headway it was a commonplace that oppressive governments had the support of only a relatively small class. Republican government, it was assumed, would have the broad support of the masses, so that the “people” who, as Rousseau expressed it, had been nothing would become everything. We are now told the contrary. Democracy is said to be but a numerical contrivance, resting upon shifting combinations of individuals who happen at a given time to make up a majority of voters. We are told that the

moral consensus which exists only when there is unity of beliefs and aims, is conspicuously lacking in democracies, and is of the very essence of totalitarian states. The claim stands side by side with that of Marxist communists who say that since their views are inherently scientific, false opinions have no legitimate standing as against the authority of The Truth. But in a way the Fascist claim goes deeper since it pretends to extend below merely intellectual loyalties, to which science appeals, and lay hold of fundamental emotions and impulses.

There is an argument about science which so far has found comparatively little response in democratic countries, but which nevertheless puts a problem so basic that it will receive more and more attention as time goes by. It is said that the principles of laissez-faire individualism have governed the conduct of scientific inquiry; that the tastes and preferences of individual investigators have been allowed to regulate its course to such an extent that present intellectual confusion and moral chaos of the world exists because of tacit connivance of science with uncontrolled individualistic activity in industry.

The position is so extreme and goes so contrary to all we had come to believe that it is easily passed over as an aberration. But the view, because of its extreme character, may be taken to point to a genuine issue: just what are the social consequences of science? Are they not so important, because of technological applications, that the social interest is paramount over intellectual interest? Can the type of social control of industry urged by socialists be carried through without some kind of public regulation of the scientific investigations that are the source of the inventions determining the course of industry? And might not such regulation throttle the freedom of science? Those who say that the social effect of inventions (which exist only because of the findings of scientific inquiry) is so unsettling that the least which can be done is to declare a moratorium on science express the same problem with more moderation.

The claim is made in Russia that the direction taken by science has in the last hundred and fifty years been so determined by the interest of the dominant economic class, that science has been upon the whole an organ of bourgeois democracy:—not so consciously perhaps as in the case of government, the police and the army, but yet in substantial effect. Since it is impossible to draw

any fixed line between the physical and the social sciences, and since the latter—both with respect to investigation and teaching—must be regulated in the interest of the politics of the new social order, it is impossible to allow the physical sciences to go their way apart without political regulation. Nazi Germany decrees what is scientific truth in anthropology regarding race, and Moscow determines that Mendelism is scientifically false, and dictates the course to be pursued by Genetics. Both countries look askance at the theory of Relativity, although on different grounds. Quite aside, however, from special cases, a general atmosphere of control of opinion cannot exist without reacting in pretty fundamental ways upon every form of intellectual activity—art too as well as science.

Even if we hold that extreme views are so extreme as to be distorted caricatures, there remains an actual problem. Can society, especially a democratic society, exist without a basic consensus and community of beliefs? If it cannot, can the required community be achieved without regulation of scientific pursuits exercised by a public authority in behalf of social unity?

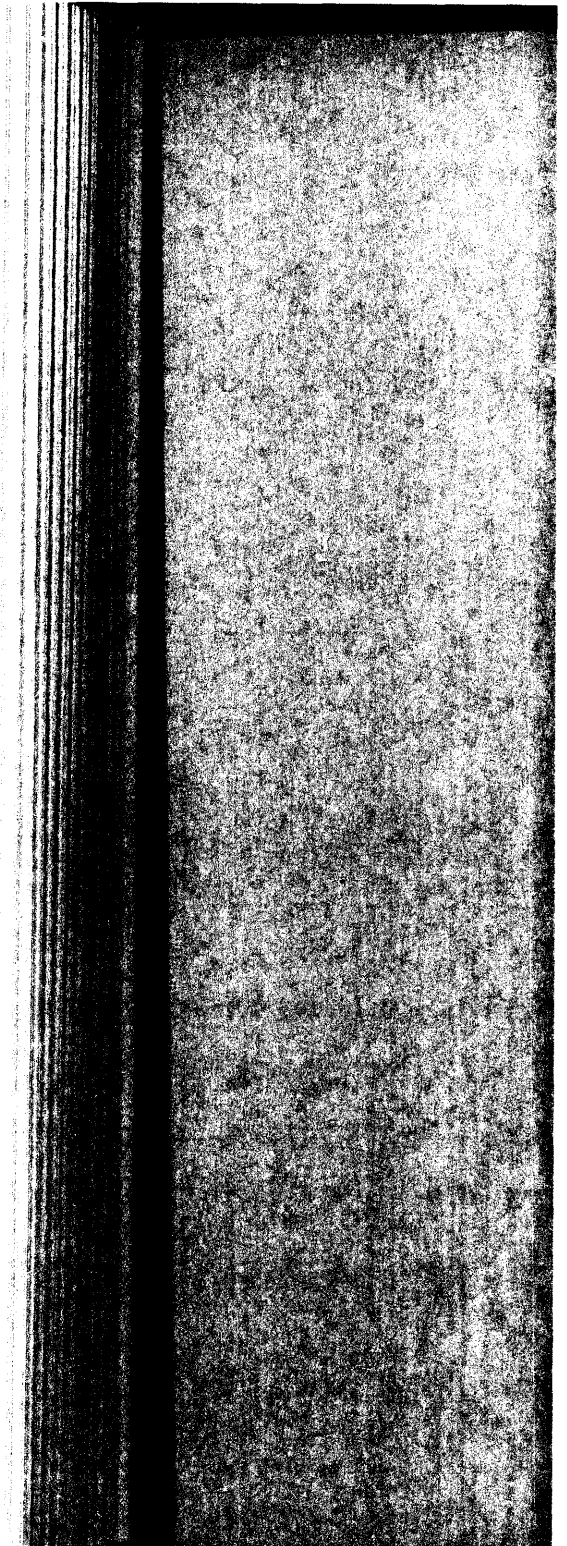
In this connection the accusation of irresponsibility as to social consequences is brought against scientific men, and it is in this context that the underlying issue takes shape. It is argued (and some who take the position are themselves scientists) that the main directions of physical science during the past hundred years, increasingly so in the last half century, have been set, indirectly and directly, by the requirements of industry carried on for private profit. Consideration of the *problems* which have not received attention in comparison with those which have absorbed expenditure of intellectual energies will, it is said, prove the proposition.

Direct control has been exercised for the most part by governments. They have subsidized the kind of investigations that promise increased national power, either by promoting manufacturing and commerce as against other national states, or by fostering researches that strengthen military prowess. Indirect control has been exercised in subtler ways. The place of industry is so central in modern life that quite apart from questions handed directly over to scientific laboratories by industrial enterprises, it is psychologically impossible for men engaged in scientific research not to be most sensitive and most responsive to the *type* of

problems presented in practical effort to control natural energies;—which in the concrete means manufacturing and distributing goods. Moreover, a kind of positive halo surrounds scientific endeavors. For it has been held, not without grounds, that general social—or at least national—welfare is thereby promoted. Germany led other countries in physical research; and it was in Germany that scientific advances could be shown to have contributed most directly to national strength and prestige. It was thus possible for some intellectual observers, not particularly naïve, to hold up German universities as models to follow in our own country.

It is not implied that personal economic interest has played any important part in directing the researches of individual scientists. The contrary is notoriously the rule. But attention and interest are not freely ranging searchlights that can be directed at all parts of the natural universe with equal ease. They operate within certain channels, and the general state of culture determines what and where the channels are. The “climate of opinion” decides the direction taken by scientific activity as truly as physical climate decides what agricultural pursuits can be carried on. Social imagination comes to have a certain tone and color; intellectual immunity in one direction and intellectual sensitivity in other directions are the result. It has even been said, and with a good deal of evidence in its support, that the prevailing mechanistic creed of science during the nineteenth century was an indirect product of the importance assumed by the machine in industrial production, so that now, when machine-production is giving way to power-production, basic scientific “concepts” are also changing.

I referred above to the role of nationalism in deciding the direction taken by science. The striking instance is of course the organization of scientific men for aid to a nation in time of war. The instance brings to a head tendencies that are going on in less overt and more unconscious ways pretty much all the time, even in times of nominal peace. Increase of the scope of governmental activities in all industrialized countries, going on for some years at an accelerated pace, has reinforced the alliance between national interest and scientific inquiry. It is certainly arguable that when the choice at hand is between regulation of science by private economic interests and by nationalist interest, the latter



should have preference. It may be inferred that the open control of science exercised in totalitarian states is but a culmination of tendencies that have been going on in more or less covert ways for some time—from which it follows that the problem presented extends beyond the borders of those particular states.

Strangely enough, at first sight, the demand for direct social control of scientific inquiries and conclusion is unwittingly reinforced by an attitude quite commonly taken by scientific men themselves. For it is commonly said and commonly believed that science is completely neutral and indifferent as to the ends and values which move men to act: that at most it only provides more efficient means for realization of ends that are and must be due to wants and desires completely independent of science. It is at this point that the present climate of opinion differs so widely from that which marked the optimistic faith of the Enlightenment; the faith that human science and freedom would advance hand in hand to usher in an era of indefinite human perfectibility.

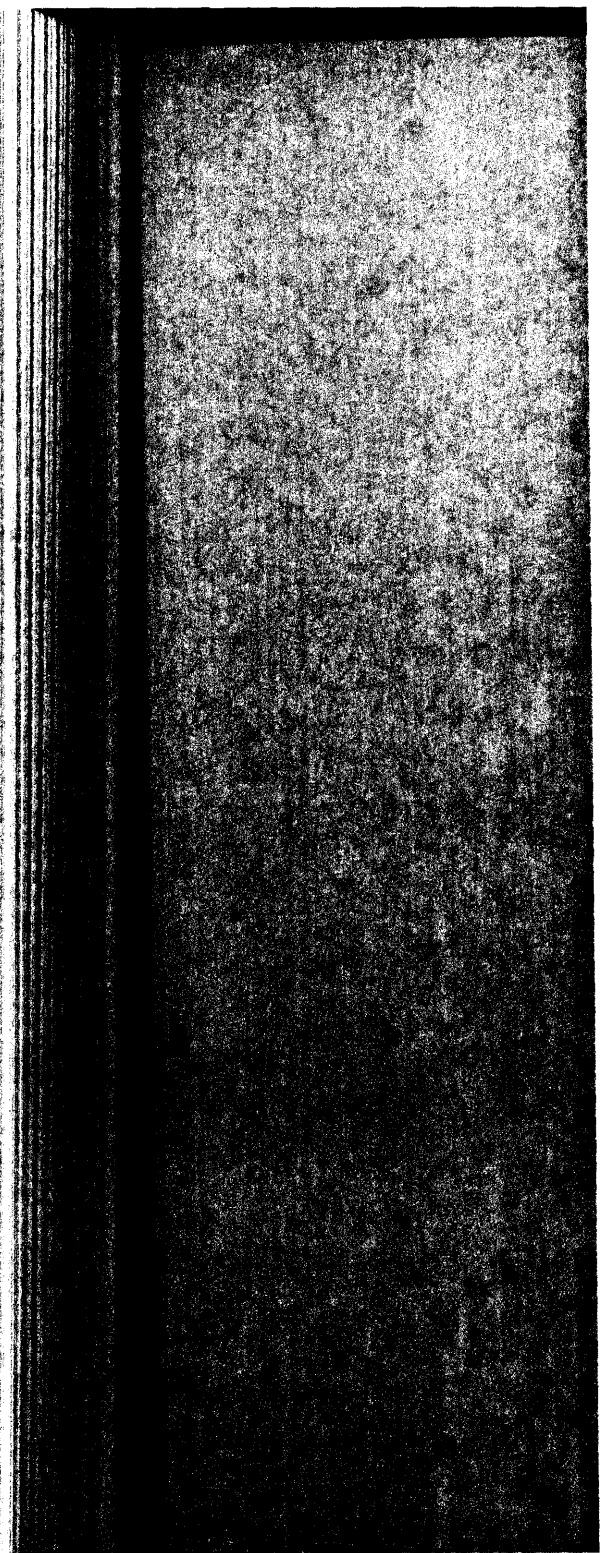
That the popular esteem of science is largely due to the aid it has given to men for attainment of things they wanted independently of what they had learned from science is doubtless true. Russell has stated in a vivid way the sort of thing that has enabled science to displace beliefs that had previously been held: "The world ceased to believe that Joshua caused the sun to stand still, because Copernican astronomy was useful in navigation; it abandoned Aristotle's physics, because Galileo's theory of falling bodies made it possible to calculate the trajectory of a cannonball. It rejected the theory of the flood because geology is useful in mining and so on."¹ That the quotation expresses the sort of thing that gave the conclusions of the new science prestige and following at a time when it badly needed some outside aid in getting a hearing can hardly be doubted. As illustrative material it is especially impressive because of the enormous authority enjoyed by the doctrines of Aristotle and of the Church. If even in the case where all the advantage was on the side of old doctrines, the demonstrated serviceability of science gave it the victory, we can easily judge the enhancement of the esteem in which science was held in matters where it had no such powerful foe to contend with.

Quite apart from the antagonism to science displayed by en-

1. Bertrand Russell, *Power*, p. 138.

trenched institutional interests that had previously obtained a monopoly over beliefs in, say, astronomy, geology and some fields of history, history proves the existence of so much indifference on the part of mankind to the quality of its beliefs and such lethargy towards methods that disturb old beliefs, that we should be glad that the new science has had such powerful adventitious aid. But it leaves untouched the question as to whether scientific knowledge has power to modify the ends which men prize and strive to attain. Is it proved that the findings of science—the best authenticated knowledge we have—add only to our power to realize desires already in existence? Or is this view derived from some previous theory about the constitution of human nature? Can it be true that desires and knowledge exist in separate non-communicating compartments? Do the facts which can undoubtedly be cited as evidence, such as the use of scientific knowledge indifferently to heal disease and prolong human life and to provide the instruments for wholesale destruction of life, really prove the case? Or are they specially selected cases that support a doctrine that originated on other grounds than the evidence of facts? Is there such a complete separation of human ends from human beliefs as the theory assumes?

The shock given old ideas by the idea that knowledge is incapable of modifying the quality of desires (and hence cannot affect the formation of ends and purposes) is not of course in itself a ground for denying it is sound. It may be that the old view is totally false. Nevertheless, the point is worth discussion. We do not have to refer to the theory of Plato that knowledge, or what passes as knowledge, is the sole final determinant of men's ideas of the Good and hence of their actions. Nor is it needful to refer to Bacon's vision of the organization of scientific knowledge as the prospective foundation of future social policies directed exclusively to the advance of human well-being. The simple fact is that all the deliberately liberal and progressive movements of modern times have based themselves on the idea that action is determined by ideas, up to the time when Hume said that reason was and should be the "slave of the passions"; or, in contemporary language, of the emotions and desires. Hume's voice was a lonely one when he uttered the remark. The idea is now echoed and re-echoed from almost every quarter. The classic economic school made wants the prime motors of human action, reducing



reason to a power of calculating the means best fitted to satisfy the wants. The first effect of biology upon psychology was to emphasize the primacy of appetites and instincts. Psychiatrists have enforced the same conclusion by showing that intellectual disturbances originate in emotional maladjustments, and by exhibiting the extent of dictation of belief by desire.

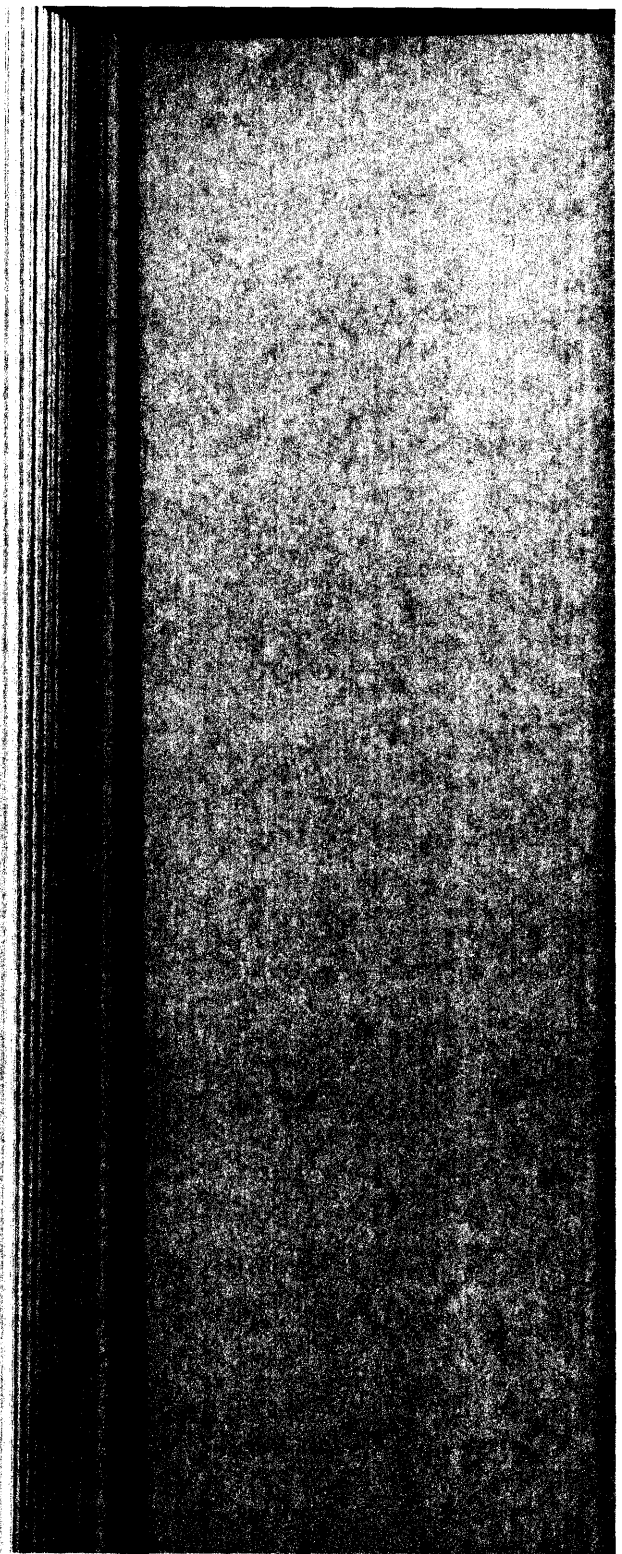
It is one thing, however, to recognize that earlier theories neglected the importance of emotions and habits as determinants of conduct and exaggerated that of ideas and reason. It is quite another thing to hold that ideas (especially those warranted by competent inquiry) and emotions (with needs and desires) exist in separate compartments so that no interaction between them exists. When the view is as baldly stated it strikes one as highly improbable that there can be any such complete separation in the constitution of human nature. And while the idea must be accepted if the evidence points that way, no matter into what plight human affairs are forever plunged, the implications of the doctrine of complete separation of desire and knowledge must be noted. The assumption that desires are rigidly fixed is not one on its face consistent with the history of man's progress from savagery through barbarism to even the present defective state of civilization. If knowledge, even of the most authenticated kind, cannot influence desires and aims, if it cannot determine what is of value and what is not, the future outlook as to formation of desires is depressing. Denial that they can be influenced by knowledge points emphatically to the non-rational and anti-rational forces that will form them. One alternative to the power of ideas is habit or custom, and then when the rule of sheer habit breaks down—as it has done at the present time—all that is left is competition on the part of various bodies and interests to decide which shall come out ahead in a struggle, carried on by intimidation, coercion, bribery, and all sorts of propaganda, to shape the desires which shall predominantly control the ends of human action. The prospect is a black one. It leads one to consider the possibility that Bacon, Locke, and the leaders of the Enlightenment—typified by the act of Condorcet, writing, while imprisoned and waiting for death, about the role of science in the future liberation of mankind—were after all quite aware of the actual influence of appetite, habit, and blind desire upon action, but were engaged in holding up another and better way as the alternative to follow in the future.

That the course they anticipated has not come to fruition is obvious without argument. Bacon's action in using his own knowledge as a servant of the Crown in strengthening Great Britain in a military way against other nations now seems more prophetic of what has happened than what he put down in words. The power over Nature which he expected to follow the advance of science has come to pass. But in contradiction to his expectations, it has been largely used to increase, instead of reduce, the power of Man over Man. Shall we conclude that the early prophets were totally and intrinsically wrong? Or shall we conclude that they immensely underestimated the obduracy of institutions and customs antedating the appearance of science on the scene in shaping desires in their image? Have events after all but accentuated the problem of discovering the means by which authenticated beliefs shall influence desires, the formation of ends, and thereby the course of events? Is it possible to admit the power of propaganda to shape ends and deny that of science?

Looked at from one angle, the question brings us back to our fundamental issue: the relation of culture and human nature. For the fact which is decisive in answering the question whether verified knowledge is or is not capable of shaping desires and ends (as well as means) is whether the desires that are effective in settling the course of action are innate and fixed, or are themselves the product of a certain culture. If the latter is the case, the practical issue reduces itself to this: Is it possible for the scientific attitude to become such a weighty and widespread constituent of culture that, through the medium of culture, it may shape human desires and purposes?

To state the question is a long way from ability to answer it. But it is something to have the issue before us in its actual instead of in its factitious form. The issue ceases to be the indeterminate one of the relation of knowledge and desires in the native psychological constitution of man—indeterminate, among other reasons, because it is disputable whether there is any such thing as the latter apart from native biological constitution. It becomes the determinate one of the institution of the kind of culture in which scientific method and scientific conclusions are integrally incorporated.

The problem stated in this way puts in a different light the esteem gained by science because of its serviceability. That there are individuals here and there who have been influenced to es-



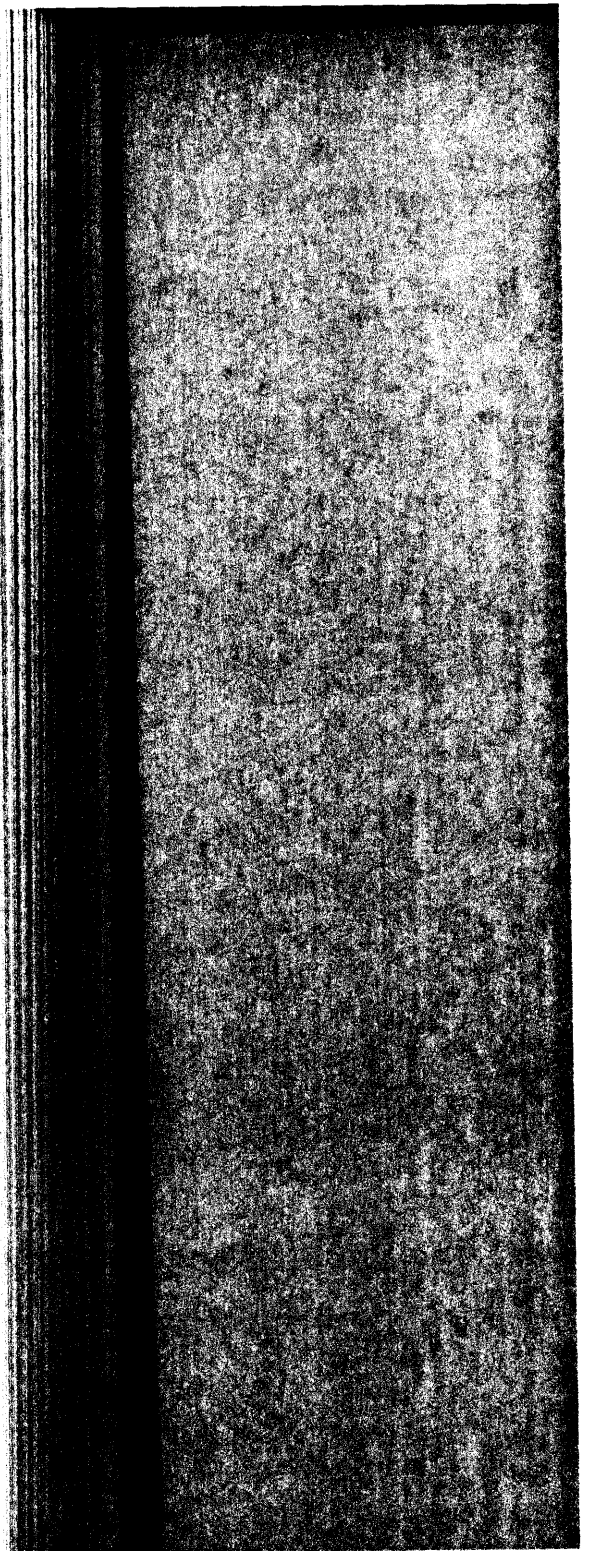
teem science because of some obvious contribution to satisfaction of their merely personal desires may well be a fact. That there are groups similarly influenced must be admitted. But the reasons why men have been willing to accept conclusions derived from science in lieu of older ideas are not exclusively or even mainly those of direct personal and class benefit. Improvements in navigation and mining have become part of the state of culture. It is in this capacity they have tended to displace beliefs that were congenial to an earlier state of culture. By and large the same thing is true of the application of physics and chemistry in more effective satisfaction of wants and in creation of new wants. While their application to produce increased efficiency in carrying on war has doubtlessly recommended those sciences to persons like rulers and generals, who otherwise would have been indifferent, the mass of persons have been moved to an attitude of favorable esteem by what has happened in the arts of peace. The decisive factor would seem to be whether the arts of war or of peace are to be in the future the ones that will control culture, a question that involves the need of discovering why war is such an important constituent of present culture.

I should be on controversial ground if I held up as evidence the belief that the technologies, which are the practical correlates of scientific theories, have now reached a point in which they can be used to create an era of abundance instead of the deficit-economies that existed before natural science developed, and that with an era of abundance and security the causes of conflict would be reduced. It may be mentioned as a hypothetical illustration. The kind of serviceability which is capable of generating high esteem for science *may* possibly be serviceability for general and shared, or "social," welfare. If the economic regime were so changed that the resources of science were employed to maintain security for all, the present view about the limitation of science might fade away. I imagine there are not many who will deny that esteem for science, even when placed upon the ground of serviceability alone, is produced at least in part by an admixture of general with private serviceability. If there is a skeptic let him consider the contribution made by science both actually and still more potentially to agriculture, and the social consequences of the change in production of foods and raw materials, thereby effected.

The other side of the ledger is marked by such a debit entry as the following from the English chemist Soddy: "So far the pearls of science have been cast before swine, who have given us in return millionaires and slums, armaments and the desolation of war." The contrast is real. If its existence seems to support the doctrine that science only supplies means for more efficient execution of already existing desires and purposes, it is because it points to the division which exists in our culture. The war that mobilizes science for wholesale destruction mobilizes it, also, for support of life and for healing the wounded. The desires and ends involved proceed not from native and naked human nature but from modifications it has undergone in interaction with a complex of cultural factors of which science is indeed one, but one which produces social consequences only as it is affected by economic and political traditions and customs formed before its rise.

For in any case, the influence of science on both means and ends is not exercised directly upon individuals but indirectly through incorporation within culture. In this function and capacity it is that scientific beliefs have replaced earlier unscientific beliefs. The position stated at its worst is that science operates as a part of folklore, not just as science. Even when put in this way, attention is invited to differences in folklore and to differences of the consequences that are produced by different folklores. And when it is admitted that the folklore may be one of aggressive nationalism, where the consequences of science as part of the prevailing folklore is war of the present destructive scope, we at least have the advantage of clear knowledge as to the location of the problem.

We have been considering science as a body of conclusions. We have ignored science in its quality of an attitude embodied in habitual will to employ certain methods of observation, reflection, and test rather than others. When we look at science from this point of view, the significance of science as a constituent of culture takes on a new color. The great body of scientific inquirers would deny with indignation that they are actuated in *their* esteem for science by its material serviceability. If they use words sanctioned by long tradition, they say they are moved by love of the truth. If they use contemporary phraseology, less grandiloquent in sound but of equivalent meaning, they say they are



moved by a controlling interest in inquiry, in discovery, in following where the evidence of discovered facts points. Above all they say that this kind of interest excludes interest in reaching any conclusion not warranted by evidence, no matter how personally congenial it may be.

In short, it is a fact that a certain group of men, perhaps relatively not very numerous, have a "disinterested" interest in scientific inquiry. This interest has developed a morale having its own distinctive features. Some of its obvious elements are willingness to hold belief in suspense, ability to doubt until evidence is obtained; willingness to go where evidence points instead of putting first a personally preferred conclusion; ability to hold ideas in solution and use them as hypotheses to be tested instead of as dogmas to be asserted; and (possibly the most distinctive of all) enjoyment of new fields for inquiry and of new problems.

Every one of these traits goes contrary to some human impulse that is naturally strong. Uncertainty is disagreeable to most persons; suspense is so hard to endure that assured expectation of an unfortunate outcome is usually preferred to a long-continued state of doubt. "Wishful thinking" is a comparatively modern phrase; but men upon the whole have usually believed what they wanted to believe, except as very convincing evidence made it impossible. Apart from a scientific attitude, guesses, with persons left to themselves, tend to become opinions and opinions dogmas. To hold theories and principles in solution, awaiting confirmation, goes contrary to the grain. Even today questioning a statement made by a person is often taken by him as a reflection upon his integrity, and is resented. For many millennia opposition to views widely held in a community was intolerable. It called down the wrath of the deities who are in charge of the group. Fear of the unknown, fear of change and novelty, tended, at all times before the rise of scientific attitude, to drive men into rigidity of beliefs and habits; they entered upon unaccustomed lines of behavior—even in matters of minor moment—with qualms which exacted rites of expiation. Exceptions to accepted rules have either been ignored or systematically explained away when they were too conspicuous to ignore. Baconian idols of the tribe, the cave, the theater, and den have caused men to rush to conclusions, and then to use all their powers to defend from criticism and change the conclusions arrived at. The connection

of common law with custom and its resistance to change are familiar facts. Even religious beliefs and rites which were at first more or less heretical deviations harden into modes of action it is impious to question, after once they have become part of the habits of a group.

If I mention such familiar considerations it is in part to suggest that we may well be grateful that science has had undeniable social serviceability, and that to some extent and in some places strong obstructions to adoption of changed beliefs have been overcome. But the chief reason for calling attention to them is the proof they furnish that in some persons and to some degree science has already created a new morale—which is equivalent to the creation of new desires and new ends. The existence of the scientific attitude and spirit, even upon a limited scale, is proof that science is capable of developing a distinctive type of disposition and purpose: a type that goes far beyond provision of more effective means for realizing desires which exist independently of any effect of science.

It is not becoming, to put it moderately, for those who are themselves animated by the scientific morale to assert that other persons are incapable of coming into possession of it and being moved by it.

Such an attitude is saved from being professional snobbery only when it is the result of sheer thoughtlessness. When one and the same representative of the intellectual class denounces any view that attaches inherent importance to the consequences of science, claiming the view is false to the spirit of science—and also holds that it is impossible for science to do anything to affect desires and ends, the inconsistency demands explanation.

A situation in which the fundamental dispositions and ends of a few are influenced by science while that of most persons and most groups is not so influenced proves that the issue is cultural. The difference sets a social problem: what are the causes for the existence of this great gap, especially since it has such serious consequences? If it is possible for persons to have their beliefs formed on the ground of evidence, procured by systematic and competent inquiry, nothing can be more disastrous socially than that the great majority of persons should have them formed by habit, accidents of circumstance, propaganda, personal and class bias. The existence, even on a relatively narrow scale, of a morale

of fairmindedness, intellectual integrity, of will to subordinate personal preference to ascertained facts and to share with others what is found out, instead of using it for personal gain, is a challenge of the most searching kind. Why don't a great many more persons have this attitude?

The answer given to this challenge is bound up with the fate of democracy. The spread of literacy, the immense extension of the influence of the press in books, newspapers, periodicals, make the issue peculiarly urgent for a democracy. The very agencies that a century and a half ago were looked upon as those that were sure to advance the cause of democratic freedom, are those which now make it possible to create pseudo-public opinion and to undermine democracy from within. Callousness due to continuous reiteration may produce a certain immunity to the grosser kinds of propaganda. But in the long run negative measures afford no assurance. While it would be absurd to believe it desirable or possible for every one to become a scientist when science is defined from the side of subject matter, the future of democracy is allied with spread of the scientific attitude. It is the sole guarantee against wholesale misleading by propaganda. More important still, it is the only assurance of the possibility of a public opinion intelligent enough to meet present social problems.

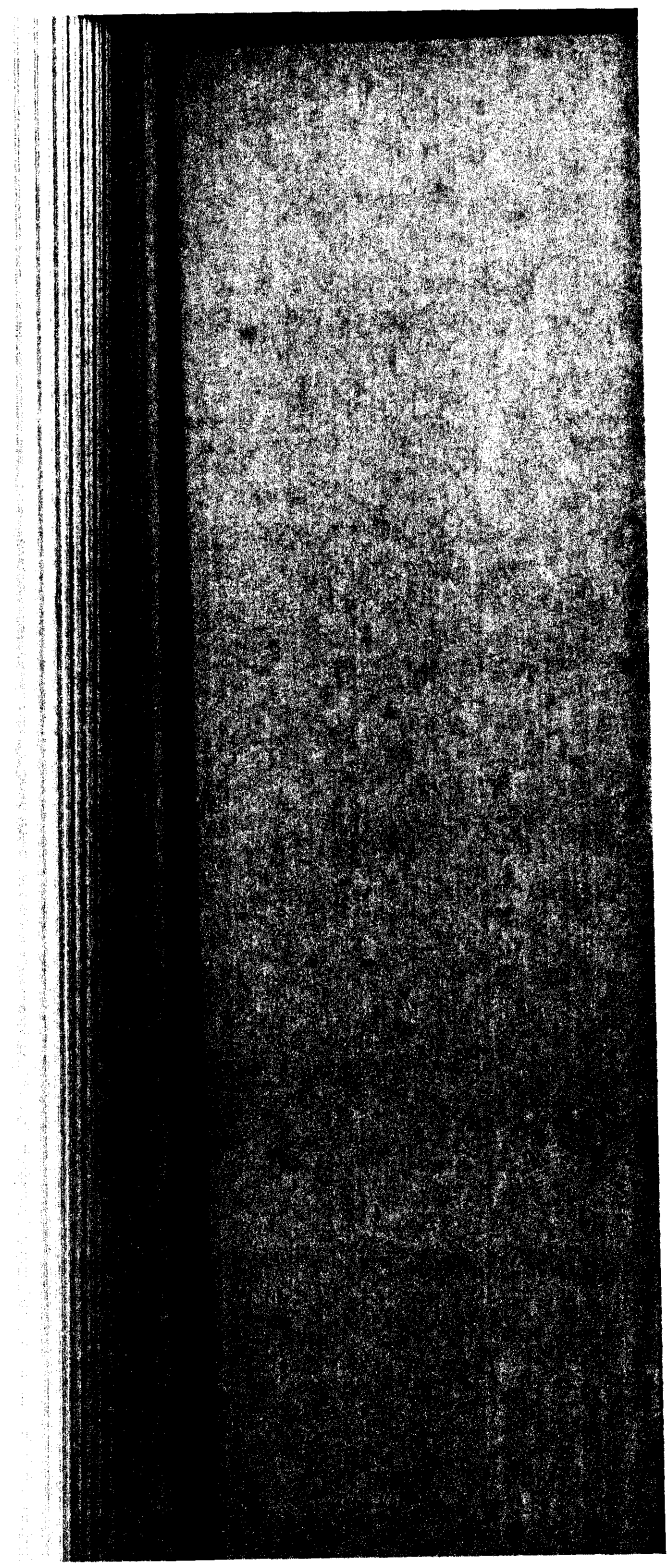
To become aware of the problem is a condition of taking steps toward its solution. The problem is in part economic. The nature of control of the means of publicity enters directly; sheer financial control is not a favorable sign. The democratic belief in free speech, free press and free assembly is one of the things that exposes democratic institutions to attack. For representatives of totalitarian states, who are the first to deny such freedom when they are in power, shrewdly employ it in a democratic country to destroy the foundations of democracy. Backed with the necessary financial means, they are capable of carrying on a work of continuous sapping and mining. More dangerous, perhaps, in the end is the fact that all economic conditions tending toward centralization and concentration of the means of production and distribution affect the public press, whether individuals so desire or not. The causes which require large corporate capital to carry on modern business, naturally influence the publishing business.

The problem is also an educative one. A book instead of a paragraph could be given to this aspect of the topic. That the

schools have mostly been given to imparting information ready-made, along with teaching the tools of literacy, cannot be denied. The methods used in acquiring such information are not those which develop skill in inquiry and in test of opinions. On the contrary, they are positively hostile to it. They tend to dull native curiosity, and to load powers of observation and experimentation with such a mass of unrelated material that they do not operate as effectively as they do in many an illiterate person. The problem of the common schools in a democracy has reached only its first stage when they are provided for everybody. Until what shall be taught and how it is taught is settled upon the basis of formation of the scientific attitude, the so-called educational work of schools is a dangerously hit-or-miss affair as far as democracy is concerned.

The problem—as was suggested earlier—is also one of art. It is difficult to write briefly on this aspect of the question without giving rise to false impressions. For of late there has been an active campaign, carried on in the name of the social function of art, for using the arts, the plastic arts as well as literature, in propaganda for special views which are dogmatically asserted to be socially necessary. In consequence, any reference to the topic may seem to have a flavor of commendation of something of the same kind, only exercised by way of a counter-campaign in behalf of democratic ideas. The point is different. It is a reminder that ideas are effective not as bare ideas but as they have imaginative content and emotional appeal. I have alluded to the extensive reaction that has set in against the earlier over-simplified rationalism. The reaction tended to go to an opposite extreme. In emphasizing the role of wants, impulse, habit, and emotion, it often denied any efficacy whatever to ideas, to intelligence. The problem is that of effecting the union of ideas and knowledge with the non-rational factors in the human make-up. Art is the name given to all the agencies by which this union is effected.

The problem is also a moral and religious one. That religions have operated most effectively in alliance with the fine arts was indicated earlier. Yet the historic influence of religions has often been to magnify doctrines that are not subject to critical inquiry and test. Their cumulative effect in producing habits of mind at odds with the attitudes required for maintenance of democracy is probably much greater than is usually recognized. Shrewd ob-



servers have said that one factor in the relatively easy victory of totalitarianism in Germany was the void left by decay of former theological beliefs. Those who had lost one external authority upon which they had depended were ready to turn to another one which was closer and more tangible.

To say that the issue is a moral one is to say that in the end it comes back to personal choice and action. From one point of view everything which has been said is a laboring of the commonplace that democratic government is a function of public opinion and public sentiment. But identification of its formation in the democratic direction with democratic extension of the scientific morale till it is part of the ordinary equipment of the ordinary individual indicates the issue is a moral one. It is individual persons who need to have this attitude substituted for pride and prejudice, for class and personal interest, for beliefs made dear by custom and early emotional associations. It is only by the choice and the active endeavor of many individuals that this result can be effected.

A former president of the United States once made a political stir by saying that "Public office is a public trust." The saying was a truism although one that needed emphasis. That possession of knowledge and special skill in intellectual methods is a public trust has not become a truism even in words. Scientific morale has developed in some persons to a point where it is a matter of course that what is found out is communicated to other persons who are also engaged in specialized research. But it has not developed to the point where wider responsibility for communication is acknowledged. Circumstances which have attended the historic growth of modern science explain why this is so, although they do not justify its continuance. Internal and external circumstances have brought about a social seclusion of science which from a certain standpoint is analogous to an earlier monastic seclusion.

The external circumstance was the opposition scientific men had to overcome before it was possible for them to carry on their work free from dictation or persecution. The internal circumstance was in part the need for extreme specialization of inquiries which necessarily accompanied the novelty of the new method; in part, it was a self-protective policy for maintaining the purity of a new, still immature and struggling attitude from contamina-

tion that proceeded from taking sides in practical affairs. This attitude had the blessing of the old and ingrained tradition of the "purity" of science as an exclusively theoretical subject; a subject aloof from practice, since reason and theory were so high above practice, which was, according to tradition, only material and utilitarian. The danger of loss of the impartiality of the scientific spirit through affiliation with some partisan and partial interest seemed to give significance to the established tradition about "purity," which, like traditional feminine chastity, needed all kinds of external safeguards to hedge it about. The need is not that scientific men become crusaders in special practical causes. Just as the problem with art is to unite the inherent integrity of the artist with imaginative and emotional appeal of ideas, so the present need is recognition by scientific men of social responsibility for contagious diffusion of the scientific attitude: a task not to be accomplished without abandoning once for all the belief that science is set apart from all other social interests as if possessed of a peculiar holiness.

Extension of the qualities that make up the scientific attitude is quite a different matter than dissemination of the results of physics, chemistry, biology and astronomy, valuable as the latter may be. The difference is the reason why the issue is a moral one. The question of whether science is capable of influencing the formation of ends for which men strive or is limited to increasing power of realizing those which are formed independently of it is the question whether science has intrinsic moral potentiality. Historically, the position that science is devoid of moral quality has been held by theologians and their metaphysical allies. For the position points unmistakably to the necessity for recourse to some other source of moral guidance. That a similar position is now taken in the name of science is either a sign of a confusion that permeates all aspects of culture, or is an omen of ill for democracy. If control of conduct amounts to conflict of desires with no possibility of determination of desire and purpose by scientifically warranted beliefs, then the practical alternative is competition and conflict between unintelligent forces for control of desire. The conclusion is so extreme as to suggest that denial in the name of science of the existence of any such things as moral facts may mark a transitional stage thoughtlessly taken to be final. It is quite true that science cannot affect moral values, ends,

rules, principles as these were once thought of and believed in, namely, prior to the rise of science. But to say that there are no such things as moral facts because desires control formation and valuation of ends is in truth but to point to desires and interests as themselves moral facts requiring control by intelligence equipped with knowledge. Science through its physical technological consequences is now determining the relations which human beings, severally and in groups, sustain to one another. If it is incapable of developing moral techniques which will also determine these relations, the split in modern culture goes so deep that not only democracy but all civilized values are doomed. Such at least is the problem. A culture which permits science to destroy traditional values but which distrusts its power to create new ones is a culture which is destroying itself. War is a symptom as well as a cause of the inner division.