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ESSAYS IN PHILOSOPHY

AND OTHER PIECES

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AND OTHER PIECES

BY

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PREFACE

SOME apology is needed for reprinting pieces which should perhaps have been left to die a natural death; especially when revision has gone no further than removing some minor ambiguities and making good some minor omissions.

The first five essays are intended as popular expositions of subjects of general interest. Two are political. Since contemporary background colours political discussion, I have added a short postscript to the essay on *Pacifism*, written against a different background. The essay on *Magic* did not appear to need much revision, as political magic we have with us always, and it is the same old magic. The argument on *Miracles* really requires restatement in the light of Dr. C. S. Lewis's masterly exposition of the Thomist view (*Miracles*, Bles, 1947). I hope my discussion may be allowed to stand as a preliminary account of an alternative theory. I have indicated, though too briefly, the character of the Thomist theory and its chief philosophical weakness (pp. 32–33). It remains of course a consistent and, granted its assumptions, a perfectly reasonable theory.

The next four essays (VI–IX) are more technical and deal with philosophy of science and logic. They are more controversial too and ask for more apology. The apology is that I believe many logicians are still barking up the wrong tree and need to be directed to the right one. In X and XI I have ventured on definitely theological ground. XI attempts to give a new turn to the well-worn theme of the arguments for the existence of God. It has not been published before. Its form and length were such that I judged that Editors would look on it with disfavour, and I did not trouble them with it. I am glad to have the opportunity to publish it under the protection of more conventional expositions, even if it is *pastiche*. The dialogue form is well suited for arguments that are tentative and inconclusive. If the discussion is to be a dialogue it is hard to resist the temptation to put it into the environment where dialogue is naturally at home.

XII contains nothing new and was produced to celebrate a centenary, but Newton has too much life in him just to be disinterred twice in a hundred years and forgotten the rest of the

time. The essay on Alexander (XIII) is a tribute to one whom I was proud to call a friend and whose work receives less attention than it deserves, at any rate in this country. The last two essays are meant for light relief. They are not philosophy but descriptive pieces, the fruit of summers spent on the coast of New Brunswick, only too many years ago. I have to confess to an error; a small matter but one that gives rise to melancholy reflections. In describing the idyllic state of the small community tending the light on Dochet Island in 1925 I rashly used what may be called "the historic future tense" (pp. 203–204). On a later visit the light was found to be in charge of a solitary and morose individual —*sic transit gloria.*

I wish to acknowledge my indebtedness for permission to reprint as follows:—

To Messrs. John Murray for my essay entitled "Dochet" from the *Cornhill Magazine*, to Open Court Publishing Co. for "Miracles" from *The Monist*, to Messrs. George Allen & Unwin Ltd. for "Freedom" and "Magic in Modern Politics" from the *Hibbert Journal*, to the Editor of *Mind* for "Logic of Question and Answer" and "A Defence of Aristotle's Logic," to the Editor of *Philosophy* for "The Biological Approach to Philosophy," "Errors of Logical Positivism," "Ethics of Pacifism," and "Theories of Immortality," to the Editor of the *Proceedings of the Aristotelian Society* for "The Atomic Theory," and to the Editor of *Manchester Memoirs* for "Samuel Alexander" and "Isaac Newton."

A. D. RITCHIE.

Edinburgh, October 1947.

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ESSAYS IN PHILOSOPHY
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I

FREEDOM

Can Commonsense be Trusted? [1]

THE purpose of this discussion is to defend the ordinary commonsense belief that men do actually enjoy some degree of freedom of choice in their actions. It is usual, but rather misleading, to call this Freewill; since it is not the will but the man who is supposed to be free. Will, if there is such a thing, is only an instrument. Against the commonsense belief certain theoretical arguments have been brought which profess to demonstrate that men are really no more free to choose what they will do, than a stone that is thrown upwards is free to choose whether or not it will return to the ground.

The first question is how far we ought to rely on commonsense beliefs. Most philosophers begin their discussions by accepting provisionally certain commonsense beliefs, but are prepared, if their argument tends that way, to contradict these or any others. If at the end of the argument the commonsense belief is said to be justified, the plain man is apt to sneer and say: "Why all this palaver merely to repeat in an uncouth jargon what everybody knew already?" The sneer is undeserved because if the philosopher has done his work properly he will have supplied a more reasonable and articulate basis for something that might have been wrong and in any case was probably liable to misinterpretation. On the other hand the philosopher may conclude that commonsense is wrong and put in its place a paradoxical conclusion. If this happens the plain man sneers again, perhaps with better reason. For now the matter is more complicated and caution is needed. Commonsense beliefs are liable to be confusedly and obscurely expressed. They may conceal a mixture of incompatible views, some of which must be abandoned. They

[1] *Hibbert Journal*, 1939.

may be based upon a superficial and onesided view of the facts. So that although they are deserving of careful treatment they should not be treated as sacrosanct. As Aristotle said, there must be something in what large numbers of men have steadfastly believed, but the something may be concealed rather than revealed in the actual assertions made. This is specially the case where technical information is needed for a correct judgment.

For hundreds of years the universal commonsense belief was that the earth was flat. You have only to stand on a hill and look, it was said, and you can see it is so. This was because the question at issue was not considered really interesting and the data had never been seriously examined. As soon as all the available data were systematically considered by scientific investigators it was realised that the belief was false. Because the very small portion of the earth's surface you can see from any one place looks more or less flat it was assumed without further inquiry that the whole is flat.

Let me take a more recent and more instructive example. Many generations of farmers maintained the commonsense view that grain crops, wheat or barley, take more nourishment out of the soil than root crops, like turnips. When the matter was examined scientifically by chemical analysis of soil and plants it was found that the opposite was true; root crops take more out of the soil than grain crops. Nevertheless it was found that the farmer's practical deduction from his belief was justified; namely that to restore fertility to the soil after grain crops, more manure is needed than after roots. The solution of the puzzle is that roots are winter crops so that the land is cultivated in summer and kept clear of weeds. Under grain the land is not touched in summer and so tends to be full of weeds. It is the weeds that grow along with the grain that take the extra nourishment out of the soil. Commonsense was partly wrong and partly right. Commonsense led the farmer to a method of coping with the situation which was successful and reasonable up to a point, but it was based upon an incomplete analysis of the situation and an incomplete acquaintance with the facts. In this instance of course the farmer's acquaintance with the facts was originally incomplete because special technical methods were needed to arrive at these facts.

When technical methods and technical information are needed, as in the sphere of the physical sciences, commonsense is not

entirely to be relied upon. But in matters where there are no special methods of investigation and where anybody who cares can see all the relevant facts, commonsense belief is probably on a sounder basis. Plain men have always been interested in moral questions; the relevant data are obvious to anyone and the discussion proceeds along familiar lines. In practical judgments, then, or in matters of moral conduct, commonsense belief is not lightly to be put aside.

Commonsense has never doubted that men are free agents and are morally responsible for their actions. All ordinary modes of speech are based on that assumption. At the same time commonsense has accepted the view that natural events are causally determined by previous events. There may be doubts as to how these two sets of beliefs are to be reconciled in theory, but in particular cases there is seldom any doubt as to what action a man was free to do or not to do; and how far he was unfree or compelled by external causes. Problems of this kind are settled every day in courts of law without difficulty or obscurity for the most part. The commonsense of plain men, and plain lawyers, sees no difficulties, except for certain special cases, such as the acts of lunatics. Philosophers and theologians, however, have raised great theoretical difficulties and sometimes come to very curious conclusions. Some conclude that men always act under compulsion and are not free in any ordinary sense of the term. Some conclude that if this is so then men are not morally responsible for their actions. Others conclude that men are morally responsible although unfree. Others still that human actions that are free are in some sense uncaused.

I have no wish to ridicule theorising of this type because there are admittedly very puzzling problems, nor am I going to attempt to solve these problems. Rather I would suggest that they can be put aside. When an elaborate theoretical argument is used to show that something that appears to be a plain matter of fact is really an illusion, it is generally safer to conclude that the argument is untrustworthy than that the apparent fact is an illusion, unless we have direct evidence that our faith in the fact deceives us. That men are free, within limits, to choose what they will do, is such an apparent fact. My purpose is to consider two types of argument which have been used against freedom. They will be most easily considered by way of a concrete example.

It is generally believed that drivers of cars reaching a crossroads

are actually free to stop, or go on, or turn right or left at will. This belief is rendered plausible by the fact that different drivers at different times do actually do all these different things, when all observable external circumstances are similar. That is to say, nothing anybody can discover about physical processes occurring at the crossroads or in the cars will suffice to explain why any one car is driven in one direction, not in the other. If you observe that more cars turn left than go straight on or to the right, and then find there is a large cinema a little way down the road to the left; that is not a physical cause of a type known to the physical sciences. It provides an explanation in terms of motives or psychological factors, in connection with which it is very misleading to use the word *cause* at all. To explain in terms of motives is to acknowledge the freedom of the drivers. Further, the drivers of the cars themselves assert that what they do is not the result of external compulsion or of chance.

The public authorities, even, believe that drivers are free agents because they put up traffic lights at certain crossroads to warn these drivers. It is clear that the red light is not a cause of the driver stopping or the green of his going ahead. The fact that a small but important minority go ahead in spite of the red light is an indication of this. Moreover one knows that an opposite convention might be adopted in other countries and would work equally well.

Perhaps at this point I ought to add a word of explanation about physical causation. A *part cause* is some factor without which an event never happens, but which is not by itself sufficient to produce the effect. Thus turning over the engine of a car is a part cause of starting it, because it never starts unless it is turned over. But turning over will not start it if the ignition is switched off, there is no petrol, the valves are not opening and closing at the correct times, and so on. These are all *part causes*. The effect, the running of the engine, only occurs if all these part causes or causal conditions are operating in the right order. It is only this complete complex of conditions that can be called *The Cause*.

While on the face of it there is no reason to call the red light the cause or even a part cause of stopping a car, simply because some cars go on in spite of it; it is possible by means of a rather elaborate theory to maintain that it is a part cause in the physical sense. The theory takes some such form as this. The red rays from the lamp cause certain chemical changes in the eyes of the

driver, these cause certain changes in his optic nerves and these in turn certain complicated (and at present entirely unknown) changes in his brain. Ultimately the brain processes cause changes in his motor nerves and these make his leg muscles work and so he presses the brake. The theory is, of course, a correct account as far as it goes, but there is a gap in it at the most important point where brain processes come in. Even if there were no gap and all the processes were known (which may be an absurd assumption) we can be certain that the causal series proceeding from the red light is only a part cause and that the main determining processes are quite different. In fact the theory is futile, because it really throws no light on the situation. It does not explain why a red light makes the driver push the brake pedal and a green light the accelerator, nor why occasionally the process is reversed. This has to be explained by the theory, not in terms of red and green lights we know about, but of hypothetical internal causes we do not know about. So that at the end we are no further on than we were without the theory. It is not much use saying that *if* we knew about the unknown causes the theory would work because any theory can be supported by arguments of this kind; for instance, the theory that when drivers ignore the traffic lights it is the work of malevolent demons.

Certainly in a court of law, where a driver was being tried for crashing traffic lights, no magistrate would consider such a theory to provide relevant evidence. Though magistrates are sometimes stupid, this refusal would not be due to stupidity. The magistrate has actually to examine two different sets of considerations, those concerned with causal conditions in the physical world and those concerned with human actions, which, for brevity, may be called material and moral respectively. Commonsense has never had much difficulty in separating them, leaving out of account primitive theories about magic and witchcraft. In a court of law material facts must first be settled; what was actually happening to make the situation what it was, and provide the physical limitations and means without which the motives of the human agents operated. The material questions here are: (1) were the lights actually showing red when the car passed; (2) were conditions such that the driver could be expected to see them; (3) was the car in such a condition, as to brakes and so on, that it was under control. The driver may plead that material conditions outside his control prevented his stopping; the sun

was in his eyes, so that he could not see the lights, or the brakes did not work. Of course at this point secondary moral considerations come in, as to whether he was responsible for getting into a position outside his control. If the sun was in his eyes he should have gone slower; if the brakes were not working he should not have driven the car. Nevertheless, to avoid complications, we may assume that a certain material setting is given. Then there are further questions to ask within this setting and these are in the end moral questions.

The questions to ask are of two sorts; those that turn on knowledge or information; those that turn on motive or purpose. As regards the first the driver might plead that he did not see the lights because he was distracted by a child running into the road, or that he was a foreigner ignorant of the signals. But these questions ultimately come back to moral questions. If the driver was ignorant ought he to have been ignorant? Did concern for the safety of the child justify his ignoring of the lights? Ought a man to drive a car who does not understand traffic signals?

In the end, therefore, the questions asked are all moral questions which imply the responsibility of a free agent for his own acts and their consequences. We ask if it was right to act as he did, and we assume that he could have acted otherwise if he had wanted to. Where it is a matter of knowledge we ask if he could have known and if he ought to have known. Where it is a question of material conditions outside his control, we can still ask if he ought to have got himself involved in a situation which in that respect came to be outside his control. Is he to blame for not avoiding it at the beginning? Commonsense has no difficulty in dealing with these problems. It inquires how far physical causes limit freedom and does not admit that physical causes abolish it under ordinary circumstances.

However, commonsense does admit that there are cases where human action is not free, as for instance in some acts of lunatics and other abnormal individuals. These acts are unfree because they are psychologically determined, not because they are more or less physically determined than any others. But they are held to be abnormal or pathological. It is admitted that the dipsomaniac is drawn to the whisky bottle, as the moth to the candle, or the iron to the magnet, by something like a physical compulsion. It is also said that he is beside himself or a slave of his passions. These phrases mean that he is not an ordinary

human agent but something less, more like the moth, even if he has not descended as far as the iron. Now certain psychologists have said (or implied) that all human action is really like the drunkard's. If a man crashes the traffic lights, they say " Poor fellow, he could not help it ; he was born that way ; his mental dispositions compelled him to do it." The magistrate may say " Poor fellow," but he also says " Take away his driving licence, and if he does it again, lock him up." The magistrate's methods are often very crude, but they do involve the assumption that, even if the prisoner himself is not a free agent, he is exceptional and other people are free agents. I believe that most people nowadays who deny human freedom and moral responsibility do so because they assume psychological determinism. This theory, in so far as it is more than the simple fallacy of taking the pathological for the normal, rests upon a misinterpretation of physical determinism, that is to say the theory of the relations of cause and effect that is required by physical science. Something therefore must be said about physical determinism.

At this point there is a red herring to be avoided. The theoretical physicists have recently got into difficulties over the alleged behaviour of electrons and other small scale entities of physics. Some of them think that the behaviour of electrons is in some respects undetermined, uncaused or random. Others do not agree. Now this is a private fight among the theoretical physicists, and it is no business of ours to interfere. Whichever way the fight goes, it cannot matter very much for our present purpose which is concerned only with such large scale operations of material objects as are directly observable. Whatever the behaviour or misbehaviour of individual electrons may be, it will not make any difference to the observed regularities we find among material objects which contain many millions of them. No more does the nation's death-rate depend on whether or not John Smith forgets his overcoat and catches his death of cold ; because if John Smith forgets, Bill Jones remembers, and in the long run these accidents average out.

It is only so far as like causes produce like effects, so that events are found to follow regular laws, that the methods of physical science can tell us anything about them. If there are processes which are really chance processes, really uncaused, science simply does not tell us anything about them. But if there is a large enough aggregate of chance processes to which we can attend,

then regularities can be observed in the behaviour of the aggregate as such. The universe might be completely random at bottom as regards individual small scale entities and yet we should still find regularity somewhere. It is that regularity that science looks for and finds.

As an observed fact, then, some regularities are found in nature and upon these our knowledge is based. At present we need make no further assumptions nor need we be troubled by any speculations of theoretical physicists. It is well, however, to consider what kind of regularity is to be found. If events of type A are always followed by events of type B, and B's never occur without A's preceding, we have the simplest and clearest case of complete causal determination. Such cases are relatively rare except among the heavenly bodies and in laboratories where apparatus has been devised for the very purpose of producing such simple regularities. More frequently we find that B's never occur without A's but sometimes fail to occur even after A has occurred. This may be because A is a part cause of B, other factors being necessary for the complete determination of B. It is to meet this very situation that the experimental method has been devised; that is, we deliberately arrange things so that all other factors or part causes are kept constant while A is varied, then a corresponding variation is found in B, if A is a part cause. Thus if a gas is heated it expands and there is a simple numerical relation between expansion and rise in temperature. But this cannot be observed unless other relevant factors, such as pressure, are kept constant.

Wherever causal relations are asserted to hold we expect some degree of homogeneity or similarity between cause and effect and some degree of spatial and temporal contiguity. Thus rain causes floods and sparks cause fires, not *vice versa.* A small spark may set a whole town alight, but the fire spreads by a continuous process from where and when the spark first was.

Physical determinism does not imply that every event has one single cause. That is the limiting case of maximum simplicity. It does imply that for every event there is a complex of causes or conditions. Sometimes we can enumerate all the part causes and so define the whole complex of them. To do this the experimental method has to be applied, that is, we must vary each separate factor while keeping the rest constant. This is not always easy or even possible. Where it has not been done suc-

cessfully we have to be content with incomplete and imperfect information. We may still be convinced that the event is causally determined and yet only know rather vaguely something about some of the factors.

In the case of the driver and the traffic lights ; we may say that there is a causal series beginning with the rays of light and going on to events in his body which terminate in movements of his legs. The light, however, is at best a part cause and one of a very large complex of simultaneous causal processes going on in his body. It would not be much use to take the man into a laboratory and flash green and red lights on him in the hope of observing some regularity in the way he moved his legs. We may well believe that human volitions are in some kind of way causally determined by a complex of events inside the body, but as long as these events are unknown and unexamined, this is not very much help. The belief is academic in the bad sense of the word.

Some people try to get over the difficulty by substituting psychological determinism for physical determinism. As the search for regularity and simplicity of physical causes by the classical experimental method is proving too slow and too difficult, they assume that there is regularity and simplicity of psychological causes, which will provide a short cut. It is forgotten that psychological causes, if there are such things, are neither simple nor regular nor easily studied by the experimental method. The first attempt at such a psychological causal theory was embodied in the so-called Laws of Association of Ideas. A theory that at one time was supposed to provide a clue to the working of the human mind, but which is now almost forgotten. Ideas are not popular among psychologists at the present day, in fact they are absolutely tabooed by some. Instead we hear about instincts, urges, drives, libido and so on. These entities are like the gods of classical mythology. They have many and diverse names ; it is not certain how many there are ; there is some confusion about their functions ; their relations with one another are complicated and hardly respectable ; and we are often in doubt as to how to recognise them when we meet them. Still, let us take them at their face value for the moment ; the instincts, etc. not the gods. There clearly are cases when, given certain external conditions, an animal or a man will act in a definite and regular way in obedience to some internal compulsion just as the moth goes to the flame and the drunkard to the bottle. It is characteristic of

the drunkard (and probably of the moth) that he acts in accordance with a fixed desire or a fixed idea, to which all other desires or ideas present in normal individuals are subordinated. But it is not true that the drunkard always goes to the bottle every time, or even that the moth always goes to the candle every time. That is where they both differ from the iron and the magnet. If the iron ever failed to go to the magnet, there would be something wrong with the science of physics. The fact is that the drunkard goes to the bottle ninety or ninety-nine times out of a hundred, but not always. The sight of the bottle if it is a cause is only a part cause, though in the majority of cases it is as though it was the totally determining cause. The same applies *mutatis mutandis* to the moth.

The drunkard's case is pathological or abnormal. Some people might define the difference between him and the normal man in terms of deviation from an average. If you tested the whole population, you would find that, in a number of trials, different individuals would be attracted to the whisky bottle anything between 0 and 100 per cent. of the times. The average, let us suppose, would work out at about 15 per cent., the highest for anybody to be considered normal being about 40 per cent. The normal ones would be the vast majority. The real dipsomaniacs would form a small compact group tending towards the upper limit of 100 per cent. positive responses. Very likely a statistical examination would reveal something of this kind and it would be most interesting, but it would have no bearing at all on the distinction between the normal and the abnormal. Even if there was only one sober man among a million drunkards he would still be normal and the million abnormal. The essential difference between the normal and the abnormal in this respect is simply that the abnormal are less capable of coping successfully with their environment. The difference is not simply the number of times the drunkard goes to the whisky bottle but that the more he does it the less he can do anything else which normal people are capable of doing. If a man is psychologically determined in the sense of being under compulsion to follow a limited group of instincts or urges regardless of anything else then he is in a quite definite sense unfree ; but he is also abnormal and thereby something less than a man. The complete and free man is able to respond to all the variety of the situation as it arises by an equivalent variety of behaviour.

Suppose a man taking part in a debate, instead of listening to his opponents' arguments and trying to answer them, has learnt a set speech by heart beforehand and he looses it off regardless of what anybody else has said. Then while taking part in the debate he is to that extent unfree ; he is also a silly idiot. He has also taken one step on the road at the end of which are the dipsomaniac and many other lunatics. He has shunned facing and responding to the situation as it exists and as it changes from moment to moment, and has made mere habit take the place that intelligence ought to occupy. Practical intelligence is the power to comprehend and to respond to what is actually happening around us. This and freedom are one and the same.

In all mental life there are two sets of factors concerned : (1) the different possible ways in which we can and may re-act ; (2) our apprehension of the existing state of affairs according to which we select which of the possibilities will be realised. For the exercise of freedom there must be choice between alternatives which are possible. There must at the present be more possibilities than will ever be actualised. It is just this that the traditional theory of complete determinism denies. It denies that there can be unactualised possibilities at all. It asserts that the whole ground of what comes to be is to be found in the past, and that the actual and the possible are the same. This theory seems to me to be pure dogmatism without any sort of foundation in experience or reason. It is generally supposed to be a consequence of our faith in physical laws, but I fail to see any logical connection. Physical science predicts that those kinds of regularity that were found in the past will be found in the future, but where no regularity has been found no prediction as to the future can be made. Nor can it be assumed that the things about which science can predict because of their simplicity are a sure guide to those about which science cannot as yet predict because of their complexity. We assume that the past contained no possibilities because all that we record about it consists of actualities, the things that did happen to occur. This is no justification for saying that the future contains no possibilities, because the future's very difference from the past is that it is not actual.

What we know is all knowledge of the past, but it is not knowledge of the whole of the past ; only of those parts we do know about. What we infer about the future is merely those aspects

of it wherein it resembles the known past. Lastly when the future is predicted from scientific data the prediction to be correctly formulated should be in the hypothetical form. "If A occurs, then B will occur too." In the majority of cases a full formulation would add "and if A does not occur then neither will B." If a man cuts his jugular vein he will bleed to death. On the other hand if he does not, he will not; at least from that particular cause. This prediction remains valid whether or not men do cut their throats and merely defines certain limiting conditions of life. A man cannot both cut his throat and go on with his usual business; but within these limits he is free to choose which alternative to adopt.

We can grant all the physical determination that science requires without denying human freedom. If in any special case we find reason to consider a man's actions psychologically determined in the sense described, then he is unfree, but so far as he is unfree he is less than a man.

A really thorough-going discussion of freedom would require us to distinguish between the negative and positive aspect. This can only be indicated briefly. The negative aspect of freedom is the sense in which freedom is merely choice or the absence of certain limitations. The positive aspect is not the absence of limitations only but the development through action of new possibilities. A man may use his freedom to make the wrong choice, but by so doing he limits his freedom of choice in future acts and so may ultimately destroy it. On the other hand he may use it to make the right choice and that is positive freedom.

This brings me to a final word about political freedom. Political freedom is usually considered under the negative aspect of freedom. The extent to which social organisation removes limitations on choice of action for individuals. But political liberty can persist only in so far as men are positively free. If freedom of choice is constantly used in the wrong way political freedom tends to disappear. It is not fair to say that all peoples have the political liberty they deserve, because some have much less, but none have more. Once opportunities are lost they may not be recoverable. The problems of political freedom are not for the most part theoretical but practical; they depend upon the fact that there is not enough of it and it is unfairly distributed. Opponents of politcal liberty, like the Fascists, have no coherent theory against which it either is possible or necessary to argue.

II

The Ethics of Pacifism [1]

Everybody is to some extent pacific, as everybody prefers to attain his ends by peaceful means if he can. Even the most bloodthirsty militarist uses threats of war rather than war, if threats will do the work. Though most people prefer persuasion to violence and peace to war, they are prepared as a last resort to go to war and use violence, when that seems the only means of attaining some end they consider to be of vital importance. The one hundred per cent. pacifist, however, refuses to engage in war or support warlike action under any circumstances whatever. It is his case that I wish to consider. It is not my purpose to try to persuade anyone to be a pacifist or to be the opposite, but to point out that absolute pacifism carries with it certain logical consequences which are not particularly palatable. The opposed view, which I shall call the case for civic virtues, also carries unpalatable though different consequences. These two appear to be simple and clear-cut opposed views which I propose to state as fairly as I can, with their consequences. Certain qualifications and modifications will have to be considered later, but I do not think that there is actually any possible mean position which avoids the dilemma I am concerned to present. I shall state the case for civic virtue first and the pacifist case second.

The discussion turns upon the alternative policies of using persuasion or violence. The pacifist argues that only persuasion is morally permissible ; his opponent that violence is sometimes permissible. These terms must, however, be used with caution and with certain qualifications if fallacies are to be avoided. The threat to use violence might be called persuasion. Persuasion by systematic lying is really a kind of violence—a violence to the soul. At any rate, I doubt whether any sincere pacifist, who bases his pacifism on moral grounds, would see much to choose between the two methods, and most others would consider deception worse than open violence. But with this warning in mind there should be no difficulty in distinguishing genuine persuasion from force or violence.

[1] *Philosophy*, 1940.

It is necessary at the outset to distinguish between the organised large-scale violence which is war, internal or external, civil or international, on the one hand ; and on the other private violence or the use of violence by the police. In a well-ordered community governed by law the police are authorised to use a necessary minimum of violence against those who by violence are breaking the peace. This is necessary to maintain peace and justice because there are a few recalcitrant individuals who can be suppressed only by violence and who if not suppressed are an intolerable nuisance and may even produce anarchy. This kind of violence is not unjust given certain conditions ; namely, that it is done in accordance with law, that there is an independent tribunal to judge the case, and an authority to punish the policeman who abuses his authority as well as those whom he arrests. The system is justified solely by its success ; that on the whole the peace is kept. To keep the peace is in the interests of practically everybody always, and usually even in the interests of those few who may wish at times to break it. The burglar does not wish to be robbed by anyone else or to be assaulted while he is walking abroad. Moreover, when there is a breach of the peace and the police are not strong enough to quell it or are not there to quell it, the private citizen may, and by English Law must, himself take the part of the police and use the same violence, with exactly the same limitations.

There is a difference, of course, between the use of violence to coerce and the use of violence to kill. But use of violence to kill is justified under similar conditions if it is used to prevent killing. That is to say, if the potential murderer cannot be restrained except by killing him, it is not unjust to kill. An innocent life is worth more than a guilty one. But here again success is necessary for justification : it is the rarity of crime more than its punishment which redounds to the credit of the police. At the moment I am only defending the use of killing to prevent killing and not the use of killing as a penalty. That is another and more difficult problem which fortunately I can ignore for the present. Let me emphasise the point. Violence even to the point of killing is compatible with justice, but only under the conditions mentioned ; it must be done to preserve the peace and be successful on the whole ; be done in accordance with law, under the jurisdiction of an independent court and a civil authority to enforce the court's decisions ; the court must be able to punish excesses on the

part of the police. Unless all these conditions are fulfilled it is unjust.

So much I believe the absolute pacifist might be prepared to accept. The strength of his case against war rests, not upon its violence but its injustice. In war each party is judge in its own cause; there is no impartial tribunal and no authority to enforce decisions. There may exist rudiments of a system of international law, but without the tribunal and the authority they remain rudiments; this applies equally to civil war and international war. It is the innocent who get killed in war rather than the guilty. Lastly, in war the decision is in favour of the winner irrespective of the justice of his cause. It has been argued that justice always triumphs in war, but the historical truth of this view is not obvious and even when it is true it may be an accident. To put the issue in a sentence: the pacifist argues that because war is unjust in the sense considered it is necessarily wrong: his opponent argues that although war is unjust it may be a means to avoid greater injustice. It must be remembered that to be prepared to use the means of war as a last resort is not the same thing as believing that war is in itself justified, is a proper end of action, as the genuine militarist does. The militarist's case is not worth stating, and need not delay us.

Let me now try to state the case for civic virtues as well as I can, taking it first from the point of view of the government and secondly from the point of view of the individual citizen. No government can dispense entirely with the use of force, even to the point of killing, because its first duty is to govern; namely, to preserve peace and order by quelling actual and possible disturbances within and also without. The government uses force not only against individuals or minorities who would disturb the peace but also to protect unpopular minorities who might suffer from mob violence with the acquiescence of the majority. In this country they might be Communists or Fascists, or possibly Pacifists. However, the second duty of the government is to govern well or justly, so as to give its citizens no proper cause to wish to break the peace. The better it governs the less force it needs, and good government means secure government. Because force ought to be kept in the background that does not mean it can be dispensed with altogether. However benevolent governments may be, a few individuals will always wish it were not there and break the peace if they dare. Peace and order come first,

justice second. In all matters where the government as such is really impartial there is no difficulty about securing justice, but where it is a question of the citizen (or group of citizens) versus the government it is harder. One of the unsolved political problems is how to curb the powers of government, so that it shall do no injustice to individuals without crippling its power to act when action is needed. So much for internal affairs.

In external affairs similar principles apply. No government while it remains in power can submit to external threats any more than to internal ones. Here again persuasion is always better than force, and gives greater security, when it can be used. But force is always present at least in the background. As long as there is international anarchy it remains in the foreground and international justice is an empty phrase. Nations in fact live in Hobbes's " state of nature " with the consequences he so vividly described.

In certain emergencies governments must count on the active support of every citizen, even though they cannot expect support of their policy in all things. It is a necessary part of democratic government that criticism should be freely and openly expressed and within legal limits freely and openly organised. Any government that refuses to allow criticism is thereby confessing its weakness and insecurity. But no government without abdicating its functions can allow an open breach of the peace or an open threat of it to pass unchallenged. It was, for instance, a fatal weakness of the German governments from 1919 to 1933 that private armies were not suppressed. Violence or threats of it must be met with superior force and when a breach of the peace threatens no government can admit that individuals have an inherent right to remain indifferent; it must assume their active support. This applies equally to threats from internal and external enemies. I am not saying that every government acts rightly; only that any government which does not act on these assumptions is on the way to forfeiting its authority. Possibly it may be right for it to forfeit its authority, but that is another matter.

If there are any who on grounds of pacifism refuse this active support, the government is probably wise to leave them alone. If they are few and not very influential and if the government is secure in the support of a large majority, that is of course the best course both on grounds of expediency and moral principle. On the other hand, if they are numerous or influential, or the government

is not very sure of its popularity, it may have to take some action against them. The principle on which such action can be justified is that the citizen's first duty is to help in preserving or restoring peace and order, so that anyone who refuses to do this forfeits his rights as a citizen—without duties there can be no just rights. The government has to assume it is acting justly and in the public interest. The very difficult question of how much free play ought to be allowed to criticism and active or passive opposition cannot be discussed here. Perhaps I may be allowed to state baldly the paradoxical conclusion, as it appears to me. Weak governments cannot afford to give rein to criticism or opposition, but, if they are to survive, must suppress it, though suppression may be difficult and dangerous. Strong governments are in a position to suppress criticism and opposition quite easily but they have no need to do so, in fact ought to give it free play. If a policy is wise free criticism makes its wisdom more obvious: if a government is secure full liberty for legal and peaceful opposition can only increase its security. The strength of governments depends less upon forms and institutions than upon the common interests of its people and their active political interest and political education, all of which depend on free discussion.

One further remark at this stage: the art of government, as it has been said, is a perpetual search for the second best, for fear of falling to the third or fourth best or worse. In the tangled state of human affairs the best is usually out of reach, though armchair commentators can talk about it. Those who are in authority and responsible for policy feel a quite natural exasperation when they are blamed for not attaining the unattainable. On the other hand, it is good for those who enjoy political power to be criticised or they become too pleased with themselves. Official complacency is the first and most fatal step on the downward path that leads to inefficiency, corruption, and tyranny.

Consider now the point of view of the individual citizen. For people to live together requires a perpetual process of adjustment and compromise between conflicting desires and aims. Each is a member of the community in so far as he both gives and receives; gives in the way of services to his fellows and receives services in return. All social, political, and economic relations whatsoever, by whatsoever high-sounding abstract names they are called, boil down to relations between individual human beings. Smith

does something and Brown is harmed or benefited by it. Brown in his turn and partly in consequence of Smith's action does something that affects Robinson's welfare, and so on throughout the whole community. The principle of justice and of right requires that there should be some proper balance between what each one gives and what he receives, between his duties and his rights. (The principle is stated by Aristotle, when he says that justice is a kind of equality as between equals but proportionality as between unequals, and in another form by Hobbes in his first three " Laws of Nature.") It is useful where possible to interpret the principle in terms of equality, but very often it is not possible because the notion of equality, which is really a metaphor when applied to social matters, is not applicable " Equal pay for equal work " seems a sound rule, so does " Equal pay for equal needs " ; but one cannot have both at once if different people do different work and have different needs and responsibilities. The only universal rule is that rights and duties should be in some way mutual and reciprocal. I have no right to receive except in so far as I am giving something. As between individuals, where duties are equal, rights are equal and only if duties are greater can rights be greater.

Acting on this rule, no citizen, merely as such, can justly claim to be exempt from duties that are performed or obligations that are acknowledged in general by his fellows. If it is the general duty of citizens to serve in the army or at any rate give some active support to the government against internal or external violence, then no one can claim exemption unless by reason of special duties or because he surrenders some common rights, does not claim full citizenship, or else has not received common rights. Examples of the first are that medical men are never called upon for combatant duties, and the custom in some countries of exempting the only sons of widows. This last is not mere sentimentalism but a recognition that they have certain responsibilities not borne by young men with fathers and brothers. This is markedly the case in non-industrial communities where the family is the economic productive unit.

The second reason for exemption is more complicated but more relevant to the present discussion, and is perhaps best dealt with in terms of a historical example. The early Christians, though they lived in the Roman Empire, did not, whatever their legal status, feel themselves to be citizens in any complete sense.

Public service was too closely wrapped up in idolatry. The government as a whole appeared as an alien power conferring no rights of any importance and even spasmodically persecuting them. The Christians therefore felt no obligation towards it. They may have been unfair to the Empire, but that is not the point; the point is that they did not consider they had any special obligations. Actually the Roman government was peculiar in that it relied on a professional army and made no claim on the ordinary citizen beyond payment of taxes. However, one can be sure that if the Christians had been called upon for military service they would have refused. Certainly they had grave doubts whether a soldier could be a Christian as long as he was actually serving. After Christianity obtained official recognition under Constantine, the state of affairs was entirely altered. The Christian became a responsible and integral part of the State and could no longer repudiate obligations of citizenship. Absolute pacifism ceased to be considered an obligation, and it came to be admitted that a man could be both a soldier and a Christian. There has always been, however, some hesitation about this question in Christian tradition. Hence the standard evasion that a Christian may fight in a " just " war, leaving it undecided how to distinguish " just " wars from others and leaving open the possibility that there are no "just " wars. Those who have decided in favour of military service have done so, I believe on the principle that it is a common obligation of citizenship, a necessary return for benefits conferred. Those who have decided against have done so because they considered that a Christian was not primarily a citizen but owed his first allegiance to something outside the system of the State.

A different type of case is the one where exemption might be claimed on the ground that common rights had been withheld. Thus in the 1930's a young man who had been unemployed since he left school could very reasonably claim that he was under no obligation to serve in the army of a country that had so neglected him.

To sum up, the civic virtues arise from the feeling of solidarity with one's fellows; that this country is my country and its cause my cause. If these are the primary virtues, then refusal to fight for one's country is in general wrong; it means claiming rights without fulfilling corresponding duties. If anyone refuses it will be because the feeling of solidarity is lacking. The positive

ground for this must be that there are higher virtues than the civic ones. However, the man who refuses must be prepared to suffer for his refusal. The negative ground that rights have been refused or claims insufficiently met is perhaps less important.

The chief moral difficulties met with in deciding on a course of action arise from conflict of duties or conflict of goods or ends. The hardest of these arise out of conflicting loyalties. We mostly find ourselves members at the same time of different groups, societies, or communities, and when the interests of these clash it is never easy to decide which loyalty should prevail over which. The most frequent and perhaps the most painful of these conflicts are those where duty to one's family clashes with duty to some other group or to society as a whole; as, for example, where a man in business has to choose between doing something dishonest or losing his job and ruining his family. It is necessary to emphasise this because it is too easily and too often assumed that the path of duty is always clear and simple and that we never have to choose between two evils or two conflicting goods. The difficulties surrounding civic duties are of this kind. The man who desires to be a good citizen must to some extent surrender his conscience to the keeping of the government. He must be prepared to support the actions of the State with his life and property, even though at times he disapproves of them. The old catch-phrase " My country, right or wrong ! " is a caricature of civic loyalty, but does express clearly the nature of the problem. The problem is all the more difficult because to some extent it is not a matter of choice but of necessity. Anybody living in a country, paying its taxes and obeying its laws, is involved in its political system, and is co-operating in its policy to some extent. It is not easy to refuse this co-operation short of going to prison or leaving the country to live in a desert island.

In a country with free democratic institutions (if such a country exists) where criticism of government policy can be fully expressed by legal methods and can lead to a change of policy or change of government, those who object to existing policy may be considered to have had the chance of converting their fellows to their own point of view. If they have failed to convert more than a small minority, that is to some extent a condemnation of the criticism. How far it is really a condemnation depends upon how far we can assume that men are in general reasonable and how far the institutions of the country concerned are effectively free

and democratic. If we took the most favourable view possible of human nature and politicial institutions it would be a complete condemnation ; even if not theoretically complete, sufficiently so for practical purposes. Therefore in that case the minority ought in matters of urgency to acquiesce in and indeed support the majority decision until such time as they can turn themselves into a majority. This is, of course, a hypothetical case ; one cannot assume any democracy actually works so well. The opposite extreme is unfortunately not hypothetical at all. Where there is autocratic rule and no free expression of opinion, those who object to government policy are restrained by force and force only. They cannot therefore be blamed for taking any action that is likely to alter the government or its policy. Rulers who remove their opponents and critics by assassination have no reasonable ground of complaint if they themselves are removed in the same way. This much may be said without implying an unqualified approval of tyrannicide as a political method.

What has just been said brings up another aspect of the paradox already mentioned. When the government rules by force and terror, its subjects are morally entitled to resist it to the uttermost. In such a country the mere expression of pacifist views will lead to death, torture, or at the very least imprisonment, and pacifism may well appear as the supreme form of heroism. Where the government rules by persuasion as far as possible instead of force and the expression of opinion is free, open disobedience whether passive or active is harder to justify. In such a country there is some plausibility in the common view that the pacifist is merely a crank. Still one has to ask the question; in the freest and most democratic State, is the individual morally obliged to obey all orders of the government under all possible circumstances? Government exists for the service of the individuals who compose the State and such a government must openly admit this principle. Government is only a piece of machinery: a means and not an end. It is only individuals who are moral agents and ends in themselves. Solidarity with one's fellows and loyalty to the State are desirable and important aims, but they are not the only ones. So here is a loophole for the pacifist, whose case must now be stated.

I am assuming it to be true as a matter of fact that absolute pacifists are few in numbers and always have been. Most people have no fundamental objection to the use of violence and of

warfare if they are persuaded it is used in a good cause and most people think their own country's cause is a good one. Few people are capable of rebelling unless many others are rebelling too along with them, so that the feeling of solidarity with their fellows is not lost. The pacifist is a sort of rebel, though admittedly a harmless sort: he is also a lonely rebel.

I admit that matters would be very different if pacifists were numerous and if governments were likely to abjure the use of force. But I believe that things are as stated, and there is no need to pursue possibilities that are not likely to be realised. Indeed, I cannot see how any government can abjure the use of force and remain a government. For them to say " We will never use force under any circumstances " is to invite criminals to take control. To say " We will never use force against external aggression " is to invite any Hitler or other rascal on the look-out for easy conquests. The lion is reported to have said that he had no objection to lying down with the lamb, as long as there was plenty of lamb. Governments cannot afford to be lamblike.

If the pacifist's case rested upon the assumption that he was proposing an immediately practicable public policy, he would hardly have a case at all. If it rested upon the assumption that the use of force under the conditions of law and justice within the State was wrong, it would be a weak one. But it need not rest upon either of these assumptions. It insists upon the point already mentioned, that war is a denial of justice. War denies to the enemy what any man owes to another simply as a man, the right to have his case heard and impartially judged. It is tantamount to denying the humanity of the enemy and treating them not as ends in themselves but merely as means. While the injustice may be far greater on one side than on the other there is injustice on both sides. In ancient times the logical consequences of war were understood and acted on. Those who were defeated were massacred or enslaved. More recently we have become more squeamish and less logical, and want to enjoy the advantages of warfare without some of its horrors.

The argument that persuades the ordinary decent man to be prepared to go to war is that the safety of the State depends upon it, and that the State is *his* State, to which he is bound by ties of duty and affection (and, after all, the others are only foreigners). The pacifist's reply must be that if the safety of the State depends upon injustice, then the State is none of his and is not worth saving.

A man might say this out of sheer despair for humanity. But despair alone should lead him, strictly and logically, to say it makes no difference whether a man fights or not. The pacifist's refusal must be based on despair of the State but faith in humanity; faith that there are things that matter and that refusal to do injustice is one of them. This means that he takes an other-worldly or religious view of the ends of human action. He breaks the laws of men to keep the laws of God. If God has a purpose in the world, then in His view nations and states and governments have no great part in it. If the State is founded and maintained by the sword used without justice, let it perish by the sword. The ends of the State are purely material and at best indifferent. If the State asks him to do anything that is harmless in itself, then of course he will do it for the sake of peace and quiet. If it asks him to do anything wrong he will refuse and be prepared to take the consequences. He is concerned only with the integrity of his own soul and the example he gives his fellows, by martyrdom if necessary. His action is a protest against conventional morality in favour of an ideal of justice. The pacifist has no need to consider whether or not his ideal can be realised now or at any time.

There are two objections to be met. First the objector to the pacifist will say: granted that men should be treated as ends in themselves, that only holds good while they behave like men, that is to say treat others in the same way. Nobody may claim for himself what he refuses to others. If therefore we are attacked by force or fraud our assailants have by their action put themselves outside the pale, and it is in accordance with the principle of justice to treat them with their own medicine. If we kill them their blood will be upon their own heads.

The pacifist has two arguments in reply. First he can point out that in war everybody always believes that his is the innocent and injured party and the others the aggressors; just as in family quarrels every member of the family discovers long lists of injuries the others have inflicted on him. Each side in war claims to be acting in self-defence. The verdict of history, however, does not always bear out these claims.

The second argument is much more important, though not easy to state simply. Granted that nobody can justly claim for himself and his friends what he refuses to others, that is merely the absolute minimum. The man who claims more is positively

wrong, but the man who claims for himself strict equality or reciprocity is not positively right, he is neutral. Positive morality always implies rendering more and claiming less. The aggressor has by his action put himself in the wrong, but by meeting wrong with wrong you do not put yourself right; you can only do that by treating him better than he deserves. This has been recognised for centuries in private morals, and has not only been recognised but acted upon, because men's natural affections lead them to treat better than they deserve those for whom they feel these affections—relatives, friends, and fellow countrymen. Men's affections, however, are limited and spasmodic and never extend far enough. They tend to repudiate the claims of those beyond the usual circle of their affections. The pacifist's protest is directed against these indefensible limitations.

Laws, customs, and ordinary moral rules represent the level at which almost everybody is prepared to act or, at least, says he is prepared to act and below which very few openly fall. But this level is much lower than the one the more enlightened try to attain, and really represents neutrality rather than positive morality. Positive morality is progressive; it means doing better than has been done before, and it is the result of the acts and protests of the saints and prophets. What saints do and prophets preach is never practical politics in their own day; hence their unpopularity. With luck, though, it may become the practical politics of a later day. After a long interval and with much grumbling the ordinary sinner may begin to do what the saint by his example and the prophet by his teaching have shown him. But even if he does not, that is no argument against the saints and prophets; it is merely a condemnation of the ordinary sinner.

The other objection that may be made against the pacifist may seem trivial but is worth discussing. The objector argues it is inconsistent of the pacifist to live in a country which possesses armed forces, to pay taxes for their upkeep and enjoy the protection which they give him. By so doing he is contributing to warlike action and in a passive way at least participating in it. As regards taxes, refusal to pay might be a powerful political weapon if carried out in an organised way by large numbers, especially if they formed a majority in one district; but for pacifists who are few and scattered it would be entirely futile. It would merely result in their goods being sold up, so that the taxes

would be paid in the end but with the maximum of waste and inconvenience all round. However this may be, it is perfectly true that you cannot continue to live in an ordered community without to some extent participating in the policy of its government, enjoying the fruits, whatever they may be, of its warlike policy and contributing to its cost. The genuine pacifist, however, who takes an other-worldly or religious view has a simple and effective answer to the objection. He will admit that nobody who lives in a community with an evil policy can escape entirely from defilement by that evil. Where there is only a choice of evils, he chooses the lesser one of acquiescing up to a point in the laws of the country in order to retain as far as possible freedom of speech and action to make his protest when and how it is possible. In any case he will refuse to be a combatant himself even if it costs him his freedom or life. The pacifist is advocating an ideal and is prepared to suffer for it. He is not concerned with practical politics, but only to bear witness to his faith and prick other men's consciences,. even if he does little to alter their actions. As against the kind of pacifist who considers that pacifism is an immediately practicable policy the objection is a serious one. This point will be considered again later.

The case that I have stated for pacifism is based upon general principles of morality, upon the argument that war is unjust. Some pacifists, however, lay more stress upon the evil of violence and of slaughter, and may be inclined even to rest their whole case upon the assumption that " Thou shalt not kill " is an absolute and universally binding rule. This seems to me to be a mistaken policy. Moral codes, such as the prohibitions in the Decalogue, consist of a plurality of rules, as to the kinds of acts to be done or not done. They are very useful guides for most circumstances, but they are not all valid in all circumstances because sometimes they clash and we have to choose which to obey and which to break. The rules themselves give no guidance how the choice is to be made. If any one rule is considered sacrosanct and inviolable, it must be because it is the supreme moral rule and the others subordinate. If " Thou shalt not kill " is the supreme moral rule, it means that the mere preservation of life is good in itself regardless of what people do with their lives. Seeing that everybody has to die some day, this seems absurd. It certainly suggests rather a lop-sided and materialistic view of the aims of human life. It must be admitted, however, that there is something

rather special about the prohibition of killing. For practically all wrongs done against a man some compensation can be made afterwards, if he is still alive. But for killing there is no compensation. The rule previously stated seems to me valid, that if an innocent life can be saved only by taking a guilty one, it is right to take it. There are other conceivable circumstances too where killing may be justified. Killing in warfare is of course a different thing, and strictly cannot be justified. The general common-sense view, however, is that the serving soldier is not guilty of any great sin in so far as he runs risks equal to those of the man he kills. The soldier does not in practice appear to be degraded morally by his actions. The contempt and hatred of men has always been reserved for those who cause the slaughter of others while avoiding all risks themselves.

It has to be remembered in this connection that people have their idiosyncrasies as to which they consider the gravest sin. It is hardly a matter of argument but of innate, sometimes almost physical, feeling. There are people who have a special horror of violence and killing which others neither more nor less moral do not feel at all. Those who feel such horror will almost certainly be pacifists. It may cause them to say quite sincerely that they would rather stand by and see injustice done than use violence towards anyone. One can respect such feelings, but they do not constitute an argument and the pacifist's case would be a weak one if it rested on them alone.

After dealing with what I believe to be genuine pacifism, there are certain kinds of sham pacifism to be considered. The first and most important has been mentioned already, the advocacy of pacifism as a practicable policy in the place of force for resisting external aggression, tyranny, or injustice of any kind. Two forms may be distinguished: one a pure sham, the other more genuine. The first is advocated by those who are comfortable and rich and who reflect that war is extremely uncomfortable and expensive. It seems to them that, if everybody were nice and polite to everybody else and content to leave things just as they are, there need be no wars and nobody need worry. It is true, of course, that " a soft answer turneth away wrath " in a very large number of cases. Perhaps it would in all if everybody was rich and comfortable. Unfortunately, some people are neither but would like to be at somebody else's expense. There are some even who do not care about comfort at all, but want excitement

and power and applause. There are some who want even queerer things. At any rate, the world is full of disputes of greater or less violence, about which the participants are not prepared to compromise because they consider that vital interests are involved. Against such advocates of pacifism it is relevant to point out the inconsistency of living in a country with armed forces, paying taxes for their upkeep, and enjoying their protection.

There is, however, a serious argument which must be considered seriously. The argument applies not only to ordinary warfare but to all use of force by one group of people to impose their will on another. To use force against force, it is said, only begets more force and never justice. Justice against aggressors or those who have power can only be obtained by abandoning force and using passive resistance or, in Mr. Gandhi's more accurate terminology, non-violent non-co-operation. Non-co-operation can embarrass aggressors or those in authority and may appeal to their consciences, if they have any. The non-co-operators may suffer but they cause no suffering to others, and their own sufferings constitute part of their propaganda. This argument contains an important germ of truth, but involves certain assumptions which are, to say the least, doubtful. It is assumed (1) that it is possible to organise large numbers of people for non-violent non-co-operation. It is easy enough to organise violent non-co-operation because of the excitement that violent action induces. But the capacity for heroism without excitement is very rare. It is also assumed (2) that those against whom the non-co-operation is directed are not really whole-hearted and confident in their use of force, so that there is something that can be appealed to. If they are prepared to massacre non-co-operators wholesale, non-co-operation will not worry them. It is hardly conceivable that a Hitler or Stalin would be embarrassed by it. A Mussolini might, because in Italy the voice of Christian tradition was not completely silenced. The important germ of truth is that within the State, given a certain degree of freedom and at least something of the democratic spirit (a preference for persuasion rather than force), then non-violent non-co-operation provides a last stage of protest short of civil war. If the ordinary methods of public criticism, protest, and organisation of opposition in ordinary legal ways all fail to remove grievances, there is still this last method to use. It corresponds in the political sphere to the method of the strike in the industrial. It suffers from the

drawback that non-violent non-co-operation pursued on any large scale and with any enthusiasm, if not fairly quickly successful, may easily turn into violent forms, open civil war or secret civil war by methods of terrorism with assassination and bomb throwing. Once resistance to authority is organised, advocates of violence are more likely to be listened to than those of non-violence. Industrial strikes and lock-outs are carried on peacefully only so long as there is a public authority to enforce the keeping of the peace on the parties to the dispute. It is very doubtful whether non-violent non-co-operation would work against an external enemy, unless a very half-hearted one.

The history of mankind does not on the whole favour the notion that the methods of pacifism have any immediate political success. For example, though the abolition of slavery over most of the world has been the result of Christian teaching and example, this has been combined with economic changes which gradually made slavery less profitable, and it has taken two thousand years to do it. As long as there is a demand for slaves the slave trade flourishes, provided it is profitable. What suppressed it in the nineteenth century, by making it unprofitable, was the British Navy. In the long history of slavery the complete helplessness of slaves against their masters has never saved them from exploitation or cruelty. When more primitive people have been in contact with others at a higher stage of development, the more warlike of the primitive people have generally been better treated than the less warlike, for instance the Maoris of New Zealand as compared with the Australian natives. The last and most dreadful instance is the persecution of the Jews (and others) by the Nazis in Germany. The more completely helpless and pacific they have been, the more the rage of their persecutors has been kindled against them. What kind of passive resistance, or non-violent non-co-operation, could they have used that would have saved them from all this deliberate cruelty?

There may arise special conditions at certain times and places which make pacifism a practical policy for limited purposes. But in general it is too much like sprinkling rose-water on a dunghill. It may be that the armed belligerent State is a dunghill, as the pacifist claims. If so, the most he can do is to declare the fact and keep away from it. In the meanwhile it is the duty of the practical politician to cart the dung and spread it where it is needed. The value of the attitude of the pacifist and of voluntarily endured

suffering is not political but spiritual. The martyrdom of the early Christians did not influence the policy of the Roman Empire under Nero or even under Marcus Aurelius, but it kept Christianity alive. Genuine pacifism, as I understand it, is necessarily religious, because only religion can supply the motive. That is not to say it is necessarily right; there are false prophets as well as true, spurious saints as well as genuine. It is also necessarily other-worldly in that it appeals to a system of ideals which are not at present realised and may never be realised in this world at all completely, though one always hopes they may be at least partly realised.

Two points of view, which sometimes pass for pacifism, remain to be mentioned briefly. The first is that of the man who refuses to fight in some one particular war because he considers it unjust, though he would be willing to fight in some other he considers just. This is a perfectly reasonable attitude, on the face of it, but as it is not an objection to war as such it is not pacifism. It is an attitude that can hardly be discussed in general terms because there are so many different possible reasons for judging of the relative justice or injustice of wars. It raises, too, the very difficult question of how far a conditional acceptance of civic duties is possible and justifiable. Can a man be half a citizen and half not a citizen or even a rebel? To some extent a man in virtue of his citizenship surrenders his conscience to the keeping of the State, which in practice means the government. On the other hand, the healthy functioning of government requires criticism and, within limits, opposition. These questions cannot be discussed here.

The other point of view has been mentioned in passing. It may be called pacifism of despair. It is argued that owing to the great power of modern governments and modern methods of propaganda, the ordinary person never knows the truth, particularly about foreign affairs, and cannot tell if the policy of his government is right or wrong. Consequently the only sensible course is to listen to nothing and refuse to fight or assist in any kind of warlike action. The argument suffers from the defect that in any case we are involved in the warlike action of our governments, and we all do have opinions, however ill formed, of the rightness or wrongness of our government's policies. But the main weakness of the argument is that it is entirely negative and implies that politics are, for the ordinary man, meaningless and aimless; so

that it should not matter what anyone decides to do. If there is a war it cannot on this view make much difference whether a man dies in uniform or in civilian dress. Indifference cannot be a reason for genuine pacifism, some positive reason is needed.

To sum up. The issue is between an attainable good for our country which ultimately may not be good at all, and a good not yet attainable and perhaps never to be realised on this earth. It is one aspect of the conflict between standards that are actually operative and seen in the rule of law, and ideals that are not operative but compared with which the law is hardly of value at all.

POSTSCRIPT

This was written, except for minor corrections, between 1936 and 1938. I think the argument will still bear examination even after the intervening ten years, though I should now put the emphasis differently. In no war has the aggressiveness of the aggressor been more clearly shown by treachery and bad faith than by Hitler in 1938, 1939, 1940 and 1941, by Mussolini in 1940, by the Japanese government in 1941. In no war has the purely defensive intention of the other side been more evident, their defence more desperate, or have they been more obviously defending all that makes life worth living. In Britain in the summer of 1940 it might well appear as though pacifism were mere cowardice and perversity. And yet in no war has it been more evident that men cannot touch pitch without being defiled ; in no war has slaughter and destruction been so indiscriminate or on so stupendous a scale. Responsibility for the bombing of Germany and the dropping of atomic bombs on Japan is a heavy moral burden. The pacifist may well say, " I told you so." On the other hand, it is clearer than ever that nobody can " contract out." What is done is done to all, and, in a sense, by all.

III

MIRACLES [1]

A REASONABLE discussion of miracles is not possible unless we can dissociate them in our minds from the propagandist use that has been made of them. In the past, miracles have been proclaimed as proofs of the unique sanctity of ecclesiastical institutions, or they have been denounced as the tricks of mountebanks. At the present time they have a rather different status. The opposers of religion use them as a stick to beat institutions hitherto propped up by them. The defenders of religion take their choice of two alternatives; either they are defiant and profess with slightly uneasy emphasis the old doctrine—*credo quia impossibile*—or else they are deprecating and are prepared to throw away most of the traditional miracles as sops to Cerberus, if they may retain a few on the grounds that they are only little ones. Let us however try to forget the methods of propaganda and consider miracles or the belief in miracles calmly as a natural phenomenon. Suppose it is assumed that miracles are as absurd and impossible as a nineteenth century materialist would have us think, there still remains an interesting problem: why have many men at least as intelligent and rational as the nineteenth century materialist believed in them and considered them important? St. Thomas Aquinas was as intelligent as Mr. Herbert Spencer, yet St. Thomas did not exclude miracles from his scheme of the universe.

A few words on the historical aspect are necessary to begin with. Primitive man does not feel the need for any explanation of familiar things; but for unfamiliar things he does seek one. Sunrise and sunset, winter and summer, seedtime and harvest, all ordinary daily events are accepted without enquiry. Anything that upsets his routine and takes him by surprise, eclipses, storms, drought, flood, pestilence, famine and death, all need to be accounted for somehow. Many savages, for instance, do not believe there is such a thing as " death from natural causes " ; any death among his friends must be caused by the malevolence of an enemy. For the continuance of life no cause is needed. The traditional view

[1] *The Monist*, 1931.

of miracles, which the rise of natural science during the last four centuries has pushed into the background, is essentially a development and rationalisation of the primitive attitude. Originally miracles were the startling things that upset the ordinary routine of life: they tended to be in the main harmful because what upsets routine is generally so. It is worth noting that a large number of the Old Testament miracles are maleficent, at least in their immediate effects, but that in the New Testament they are beneficent.

Miracles are described in the New Testament as (1) τέρατα, prodigies; (2) σημεῖα, signs; (3) δυνάμεις, powers. It is their prodigious character which is diagnostic, which marks them off from ordinary events and makes people notice them. Their essential characters are (2) and (3), that they are signs of God's power.

At this point a natural comment may be made. The fact that certain events are τέρατα makes us notice them and examine them and possibly discover them to be signs of divine power, but why should not ordinary events we do not notice be equally signs of divine power? Is it in fact flattering to God to look on Him as a *saboteur* who occasionally breaks the machinery rather than as a good works manager who creates and keeps going an orderly and successful universe? As a matter of history, God was for a long time conceived as similar to the kind of human ruler people were acquainted with, who from time to time intervened dramatically and arbitrarily with the affairs of his subjects. The power of an ancient ruler was to be seen much more in sudden pounces upon malefactors and others and spectacular severing of heads, than in the smooth running of everyday affairs. So with the ancient conception of God's power.

St. Thomas Aquinas defines a miracle as an effect that is beyond the order of the whole of created nature—*praeter ordinem totius naturae creatae*. An effect that is beyond the order of a part of nature is not a miracle if it is in accord with the order of some other part. It is in accordance with the nature of stones to fall downwards but it is not a miracle for a man to throw a stone in the air because that is in accordance with the working of human muscles. The definition involves the assumption that there are two systems, the natural and the supernatural. A miracle is the intrusion of the supernatural into the sphere usually occupied by the natural. There is nothing inherently absurd in this assumption of two systems or orders in the universe, though there are

important objections to it. But there is a further assumption involved which we now realise to be absurd, though St. Thomas was hardly in a position to realise it. That is the assumption that the natural order of the universe is fixed and known. To the Schoolmen the material world appeared to be finite, simple and completely explored. It was in any case of minor importance and interest to reasonable men. Any question in matters of natural knowledge could be answered offhand by consulting the authorities and by simple processes of deduction from the principles there laid down. Of any event reported the learned world could easily and confidently decide whether it was beyond the whole order of created nature or not.

Now, alas, we are not in this happy position. The things dreamt of in our philosophy concern only a few corners of created nature and illumine them feebly. The material universe we know to be vast, obscure, and of bewildering complexity. Our knowledge is partial and tentative. We have no criterion of whether an event is beyond the order of nature. We may think it is, but possibly simply because we are mistaken in our surmise as to what that order is. Clearly the ground is cut away equally from beneath the feet of those who deny the existence of miracles in the traditional sense and those who would assert it. There is no general *a priori* solution of the problem. We can only collect evidence and weigh probabilities. There may always be scope for wide differences of opinion.

This brings us to Locke's eminently sane and cautious definition; that a miracle is "a sensible operation which being above the comprehension of the spectator and in his opinion contrary [1] to the established course of nature, is taken by him to be divine." As a sequel to this view we have Hume's contention that the actuality of an event, which is *prima facie* contrary to the order of nature and hence highly improbable, is far harder to establish than that of an ordinary and probable kind of event. For instance if someone says there is a bus in the street we readily believe him without further testimony because buses in streets are common phenomena and the statement highly probable: nevertheless the assertion may be false. If he says there is an elephant in the street we shall want confirmatory evidence before taking this rather improbable statement seriously, but the statement may be

[1] The term "contrary" here is ambiguous. It might mean only "beyond," as above, or else "conflicting with."

true. For the assertion that there is a ghost in the street very strong confirmatory evidence will be demanded.

Our judgment as to the prior probability of an event depends upon the evidence we have before us from our past experience, from the assertions of other people, and the general system of beliefs we have arrived at. Thus normally the assertion that a bus is in the street is highly probable, but if we have heard there is a strike of busmen it becomes less so. The assertion that there is an elephant in the street becomes quite probable if we know there is a circus in the town. If we belong to the select few who see ghosts we shall not consider the presence of a ghost in the street as improbable ; but if we belong to the larger class who have never been nearer to a ghost than knowing someone who met a man who had an aunt who saw a ghost we shall accept all statements about ghosts with extreme caution.

In societies where miracles or reports of miracles are frequent and the generally accepted philosophy includes them as proper ingredients in the universe, the assertion that some particular event is miraculous is easily accepted. In other societies where they are not commonly reported and the general philosophy excludes them, reports of miracles are generally disbelieved. This is natural and not unreasonable. What is unreasonable is to say dogmatically that miracles in any of the senses defined cannot occur. On the other hand as a miracle is by definition an extremely improbable kind of event it is difficult to collect evidence sufficient to convince anyone who is not at the start favourably disposed towards belief. As a means of propaganda and for convincing the unbeliever its value ought to be considered nil. But anyone who is already favourably disposed may quite reasonably have decided that the event has occurred as alleged. He has then to decide whether it is " contrary " to the order of nature or not, and here the real difficulties begin, for his acquaintance with that order is necessarily meagre. Fifty years ago practically all medical men would have agreed that the miracles of healing described in the Gospels were " contrary " to the order of nature : now they would be much less certain and would agree that the confidence of their forbears was based on an inadequate acquaintance with the facts.[1]

The question has been asked already, why should events that

[1] For most of the foregoing discussion I am indebted to Dr. F. R. Tennant's *Miracle and its Philosophical Presuppositions*, Cambridge, 1925.

are " contrary " to the order of nature be considered to be solely or pre-eminently signs of the power of the God who created that order ? There is a further question, if miracles are signs what do they signify ? The old view of course was that mere arbitrariness and capriciousness were signs of power. A great ruler could do as he liked and demonstrated his greatness by doing something silly. Similarly miracles were God's way of showing He could do as He liked and it was not for mere creatures to enquire too closely whether there was any sense in what was done. If we take a more reasonable view of deity we may be permitted to enquire and we find it hard to see what miracles signify. Many of the great saints and mystics have taken a critical view of miracles, not so much as to their actuality but as to their significance. It is notorious that the Devil can produce prodigies which, if not miracles in the strict technical sense of the word, are very difficult to distinguish from them and yet have an altogether different significance. There is plenty of New Testament authority for a critical view in this respect. Lastly there is the *locus classicus* in the 19th Chapter of the First Book of Kings; here Elijah realises that the power of God was not manifested in theatrical cataclysms of nature but in the " still small voice." The behaviour of Elijah before and after his discovery is worth noting.

One last piece of destructive criticism is necessary before passing on to an attempt to be constructive. It has been suggested sometimes in connection with particular miracles that they were unique events and that that is a distinguishing characteristic. The cheap criticism that if a miraculous act is repeated it does not cease to be miraculous need not detain us. A more serious point is the significance of the term " unique." Every event is unique in the sense that no other event is exactly the same in all respects. If nothing else, its place and date are unique. On the other hand no event is unique in the sense of being utterly dissimilar to other events ; if there were such an event our faculties could not take cognizance of it. Moreover an acquaintance with the whole universe is necessary in order to judge with confidence that an event is unique in any reasonable sense of the word. It is possible that if we could explore to a sufficient distance in time and space we should find that every event on this earth has its replica. Only omniscience can decide as to the uniqueness or otherwise of events, so that uniqueness as a criterion of the miraculous is of no value to human beings.

So far a question put at the beginning has not yet been considered. The question is why have reasonable men who cannot have been oblivious to all the hard things to be said against miracles nevertheless believed in them and considered them important? As far as we have got, the argument has been that the assertion of two classes of events, the miraculous and non-miraculous, or two orders, the natural and supernatural, is quite useless, though possibly not absurd, simply because we cannot distinguish between the two sorts of events. To answer this further question is much more difficult. It is little use consulting theologians, men of science, or even philosophers. In this matter as in some others, when one is in doubt it is best to turn to what the poets have said. Let me state briefly and in plain prose what I believe they have to say on the subject. It is not that there are two orders of events in the universe, but two ways of considering events; two at least, there may be more. The two ways are not contradictory, they are different: they involve different kinds of mental activity. Disputes may arise because men who are apt at one kind of activity are inept at the other. For brevity and convenience and purely for the time being the two ways may be called the "poetic" and the "scientific" respectively. The believer in miracles, in so far as he is rational in his belief, is looking at the world from the "poetic" point of view. The difficulties and disputes have arisen because people have attempted to give an account of the poetic view in terms belonging properly only to the scientific. The fact that they have also frequently made use of false "scientific" theories has made things worse but is not the fundamental mistake. It is necessary of course to define the two terms here introduced. As the term "poetic" must be defined by negation and contrast more than by direct statement it is best to start with the other.

When events are regarded from the "scientific" point of view, they are taken at their face value, as being just what they are and as they appear. But the events themselves in their own private character are not considered any further than is necessary to discover certain relations of a general character which they have to one another. Systematic scientific knowledge consists of the knowledge of these relations. The particular and individual character of the events related is a matter of indifference and does not enter into the scientific account. Recent writers who have dwelt on this formal and abstract character of scientific

knowledge have tended to take their illustrations from theoretical physics ; and certainly the present day changes and developments in that science have made it peculiarly conspicuous and interesting. But physical theory is a difficult study, the ideas and thought processes involved are unfamiliar and even repellent to the untrained. In order to illustrate the essential nature of scientific knowledge we have no need to dwell on anything remote or abstruse : indeed it is an advantage to consider the most familiar and simple matters. The structure of the atom or the stellar universe and the nature of space and time need not detain us. It will be quite enough to consider the " primrose by the river's brim." The systematic botanical description of a plant differs in no essential respect from the description of the structure of a sodium atom or a star. In every case the description is mainly a piece of geometry : this statement is intended quite literally, it is not a metaphor.

The botanist makes use of certain technical terms to abbreviate his account and also of conventional diagrams. A moment's study of these will show that with a few unimportant exceptions, the whole description of the plant that is used for purposes of classification can take the form of a geometrical diagram or series of diagrams. If the whole development and life history is considered, as it ought to be, the full account would take the form of a four dimensional figure. Sections at right angles to the time direction give instantaneous three dimensional figures of the plant at any stage of development. As unfortunately four dimensional figures cannot be drawn and three dimensional ones only with difficulty, the representation is done by means of conventional symbols, technical names and two dimensional diagrams. But the important point to note is that the description is abstract and formal and wherever possible mathematical symbolism is used ; it is because it is of this type that it is of scientific value. The value is that any specimen we happen to find will on examination fit the abstract frame of the scientific description in certain respects and within certain limits (there is always a certain margin of fluctuation). If our specimen does not fit the frame, then we have to look for another one. If it does, then we have information of a general character at our disposal which has been obtained from other specimens. The specimen itself in its particular individual character, as the name " specimen " implies, is nothing apart from the question whether it fits the general description or not.

It was mentioned above that the systematic description was evidently geometrical with some unimportant exceptions. The exceptions are features such as colour, habitat and so on. Ordinary descriptions of such properties lack the precision and reliability of the descriptions of geometrical properties. You say that a primrose flower is yellow and the information conveyed is vague. It can be made more precise by reference to standard coloured objects forming a graded series, or better still by spectroscopic analysis. In that case we neglect entirely the actual quality of the appearance and use a system of measurement depending upon abstract physical theory. The observations are then assimilated to the geometrical type.

It may be objected that the figures concerned in descriptive botany are not the sort a geometrician would recognise as belonging to his science. It is true that the mathematical analysis of figures is generally confined to simple cases and that the figures necessary for a description of plants and animals are generally of a more complex type than the mathematician has tackled ; but, if I may be pardoned for saying so, it is the laziness and stupidity of the mathematician that has limited his activities, not any inherent intractability to his methods on the part of the biological material. As it is, forms that are familiar to him are found fairly frequently among living things ; the spiral of the snail's shell, the garden spider's web and the honey comb are familiar instances.

To sum up then, scientific knowledge begins as soon as some part of experience can be fitted into an abstract framework, can be numbered or measured or somehow described in general terms, but preferably measured. As soon as this is done we can attend exclusively to the general relations and pay no more attention to the experience itself. Complaints are often made of the narrowness and poverty of the information so obtained, but these complaints are beside the point when applied to scientific procedure in its proper sphere and apart from the attempt to base a general philosophy on its special method. Because it remains a fact that the method is the only one hitherto discovered that produces certain results, namely the prediction and consequently the control of events. It is open to anyone to find another method if he can, but until he does so he had better not complain of this half-loaf which is the only alternative to no bread.

Suppose, however, our ends are not " practical " ; that for the

moment we do not want to predict or control events; but are interested in some part of experience for its own sake, then the methods of science will not help us. Suppose we consider again the "primrose by the river's brim," not as the botanist might but in the way that Wordsworth meant when he said:—

> "To me the meanest flower that blows can give
> Thoughts that do often lie too deep for tears."

The sight of the primrose brought him a special experience and engendered a special emotion. In producing such an experience and emotion many factors may play a part. The direct apprehension, such as a child may have, of the simple sensuous beauty of the flower plays a part. Associations of place and time: its early blooming "before the swallow dares": its setting in the delicate spring landscape: its literary associations: possibly even its political associations: all these things may help but are not necessary. A scientific knowledge may help also, but is not necessary. What is necessary is a certain loving intensity of contemplation. What was lacking in the man to whom it was a yellow primrose and nothing more was just this intensity; he merely glanced and passed on. It was not because he was unlearned in the scientific or literary way. A man who has read neither Sophocles nor Keats may be moved by the song of the nightingale if he hears it in the same spirit as these poets. If he knew the chorus about the nightingales at Colonus or Keats' Ode, then the song itself might move him more intensely, but he must be capable of being moved independently of literary sources. So with scientific knowledge; if a man is capable of this loving contemplation then it may be developed and intensified by knowledge, as some anatomists are able to contemplate in just this spirit and be moved by the beauty of a human corpse preserved in formalin; an object that is repulsive to the untrained eye.

It is the object of the poets as of other creative artists to communicate and preserve the experience they have had themselves, so that we who have less poetic capacity can share their vision at second hand. To appreciate and be moved by Keats' Ode it is not necessary to have heard a nightingale. In fact many whom the poem has deeply moved have been disappointed when faced with what is after all only a feather headed twitterer. This is not the place to discuss whether the nightingale's charm is merely

a meretricious adornment due to the scented dusk he sings in and the enchantments the poets have woven round him, or whether it is his very own. Let me simply point out that it is the poets who have the capacity for first hand vision and that we others who get the vision from them at second hand are more readily moved by the poet's words than by the very thing that inspired the poet; for this is a point to be referred to later. At any rate it is clear that the poetic experience may come from the contemplation of natural events or objects, from the contemplation of human relationships, from the contemplation of works of art, even from the contemplation of the abstractions of science, as Plato stoutly maintained and some other poets have agreed with him. Indeed the abstractions of science are a kind of work of art.

Poetic experience and activity has been taken as the type of a certain kind of experience and activity which is contrasted with the scientific kind. As a general term to include the poetic and all similar types "spiritual" experience or activity may be used. It must be recognised of course that not only are there different kinds of spiritual activity differing qualitatively but that there are also better or worse, higher or lower kinds. What seems to be characteristic of all forms is that there is directed towards some object a certain loving intensity of contemplation. This contemplation will be specifically religious when the object is infinite and eternal and apprehended as such (following Spinoza's mode of expression). Whether the experience is religious or not depends on the object; whether it is poetic or not depends on the form of expression used in communicating the experience, not on the nature of the object. Atheism might be defined as the denial that there is an infinite and eternal object or that any experience can be concerned with or be an experience of such an object. If this definition of religious experience be objected to on the grounds that it excludes primitive religious experience, I shall reply—let it. One might as well object to describing a butterfly as a winged insect because a caterpillar has none.

So far we have been clearing the ground to make it possible to come to the point. Descriptions of miracles, serious descriptions that is, not merely frivolous ones made in telling stories that are avowedly nothing but fictions; descriptions of miracles are always connected with an intense spiritual experience, generally the type of experience that comes at second hand, as by contact

with a religious teacher. The disciple says for instance, " The prophet worked such and such miracles." This may be translated " On such and such occasions the words and acts of the prophet produced intense religious experience or emotion." The conventional description of the miracle is an attempt to specify the causes and circumstances of the experience. To do this the contemporary events are described in terms of the scientific type and some sort of physical theory is implied. The events so treated may appear as contrary to the ordinary course of events or not ; the theory utilised may be false or not. When the account is given in terms of a theory now known to be false we can at once see its absurdity, an absurdity not so obvious but just as real when the theory is one we believe to be true. When the events described appear to be contrary to the ordinary course of nature we are inclined to be suspicious : we ought to be no more and no less suspicious when they appear to be in accordance with the ordinary course of nature.

The matter is best considered by means of an example. If the choice of the example is a cause of offence to any one, I must apologise beforehand. No offence is intended. The example is chosen for its special suitability, as will shortly appear. The accounts given in the Gospels which are summed up in the Apostles' Creed by the words " He descended into Hell ; the third day He rose again from the dead ; He ascended into Heaven," imply a theory at one time universally held and now abandoned by all civilised people. The theory, namely, that there is vertically over our heads a place in physical space where God lives and also vertically under our feet a place where people go when they die. Our astronomical and geographical knowledge, if nothing else, show us it is absurd. There is no doubt however that the early disciples and Christians throughout many centuries firmly and honestly believed the theory and that the words of the Creed were intended to be a perfectly literal description of physical facts. It was natural for the disciples to describe what they had experienced in terms of the theories they knew. We cannot blame them if those theories were false—our own are not likely to be much better—but we can blame them for mixing up physics and spiritual experience. The mistake lay, not in describing spiritual experience in terms of a false cosmology, but in terms of any cosmology ; for it is bound to be superficial and irrelevant. However, we have to remember in extenuation of

the mistake that they had to describe their experience somehow in terms their contemporaries would understand. In that they undoubtedly succeeded. That there would be difficulties sixteen centuries later they could hardly be expected to foresee.

The value of the example lies in the fact that the issue is perfectly plain and as it involves the central mystery of the Christian religion cannot be slurred over or dismissed as of no importance. The point is of vital importance for any person who has any religion at all and equally so for the philosophical atheist, on the other side. If one were of the type who is incapable of religious experience, one might dismiss the whole thing as myth or imposture, as many have dismissed all religions as inventions of priests and rulers for keeping the people quiet. But in that case the whole of human history becomes incredible. If he were not so bold or so stupid as this he would acknowledge that there was some factor present that he could not understand, just as a blind man has to acknowledge that there is a kind of experience he does not have, the results of which he is inherently incapable of fully understanding. Our supposed open minded atheist may then go on to admit that since certain alleged events in Palestine about nineteen hundred years ago there has been a novel factor in human affairs, that has had a profound effect on the history of the world, particularly in Europe and the Mediterranean countries. If he dismisses the alleged events as of no causal importance he is flying in the face of all ordinary rules of evidence. The myth or imposture theory, though not impossible, raises far more difficulties than it solves and is a far greater strain on our credulity than an ordinary straightforward miracle. Certain facts therefore have to be accepted whether we like them or not. Our only choice is as to the interpretation. Orthodox Christian tradition and dogma constitute one such interpretation. An interpretation which I believe to be vitiated, as regards the particular point under discussion, by the attempt to use scientific theory to describe spiritual things and the belief that such descriptions are to be taken literally. This mistake was not made by the founder of Christianity who deliberately spoke of spiritual things in parables and explicitly addressed them to those only who were capable of spiritual experience.

The great religious teachers have not as a rule laid much stress upon miracles; it has been left to the less intelligent of their disciples to do it. The reason seems fairly plain. Whoever has

first hand religious experience to a pre-eminent degree is not confined to special events for his experience. He is able—

" To see a World in a grain of sand,
And a Heaven in a wild flower,
Hold Infinity in the palm of his hand
And Eternity in an hour."

Everything is miraculous or nothing is. The follower on the other hand, who in the main gets his religious experience at second hand through his teacher, will associate it with certain events or acts whereby he was specially moved or enlightened, and these are liable to be reported as miracles. They may tend to be events of a startling and unusual nature, because common routine and spiritual experience do not live well together. The man who prays in a shipwreck never having prayed before may be simply a fool and a coward, but he may not. He may be a reasonable, brave and honest man, but one who needs a sudden shock like the fear of death to waken his spiritual faculties.

From what was said at the beginning it will be clear that there is no means of deciding whether the physical events that accompany spiritual experience differ from those that do not. As one individual will find spiritual experience where another finds none, it is natural to look for the difference in the observer rather than in the events. This suggestion is not made with the intention to impugn the reality or genuineness of spiritual experience. A headache that is caused by worry is as genuine an experience as one caused by a falling brick, though in the latter case the physical events are more impressive to an onlooker. For the headache itself, as an ache, the difference in the physical events is immaterial. If we were considering spiritual experience from the point of view of the onlooker as a psychological or biological phenomenon the difference in the events, if it were discoverable, would be important. But the value of the experience for the recipient and others is determined by the nature of the experience itself and its consequences in the lives of men—by their fruits ye shall know them.

IV

Magic in Modern Politics [1]

The purpose of this article is to point out that among supposedly civilised people at the present day certain magical beliefs are rife, and to make some attempt to explain what they are and why they persist. A magical belief, as I propose to use the term, is a belief about relations of cause and effect which is based solely upon desire, wish or fancy, and not upon evidence or any scientific principle. A man who believes that he can destroy his enemy by making a wax image of him and melting it in front of the fire or sticking pins into it, believes in magic. We are liable to cherish the comfortable theory that faith in magic is a vagary of the human mind, that used to prevail among our benighted ancestors of the Middle Ages, still lingers among people (mostly with dark skins) who live in remote places, but is quite extinct among our enlightened selves. This is a very dangerous illusion and one that ought to be dispelled by looking at the advertisement pages of almost any periodical, for they are largely devoted to purveying medical magic, or even by looking at the leading articles, which sometimes advocate political magic. What I here call magic is generally referred to by other names, such as irrationalism, but I believe that classifying these aberrations of thought under the head of magic brings out better their real character.

It is necessary first of all to distinguish between magic and miracles. The popular idea of a miracle would appear to be something entirely unexpected and outside ordinary means of control but also unexpectedly advantageous. Thus, if you arrive at the station ten minutes late for the last train and find it waiting at the platform, you say it is "just like a miracle." Magic, however, is supposed to operate regularly and to be under control. If it is to be connected with the miraculous it would be best to say that it is the attempt to regularise and control miracles. That is just the weak point of magic, that because of this attempt it can be put to the test like any theory of causal relations. Anybody who believes in the wax image method of killing people can be challenged to prepare a dozen images, treat them according to

[1] *Hibbert Journal*, 1941.

the formula and then wait for the result. If at least eleven are still alive after a month then his magic is exploded. If they all die then he has established a *prima facie* case. But in this event it still remains to inquire whether or not the victims knew what was being done against them and if they did whether or not they believed such methods to be efficacious.

Magic has no necessary connection with religion or with belief in demons or supernatural agents of any kind. It is true that it was mixed up with primitive religion, but so was science in its early stages and many other things too, including politics. (The relation of magic and religion will be discussed later.) As soon as science and religion are distinguished, magic is seen to be properly a sham kind of science. By genuine science I mean any systematic investigation and thought about some determinate subject matter the ultimate aim of which is to ascertain the truth about that subject matter as fully as possible. Many sciences are practical or have practical applications, and so far they have the proximate aim of giving the possessor of scientific knowledge control over specific natural processes. Engineering and Medicine are typical practical sciences. In view of certain current fallacies it must be insisted that even practical sciences are successful in giving control and therefore " socially useful " because they are true and not *vice versa*.

Control over a natural process is obtained by discovering its " cause." Thus in Medicine you know the " cause " of a disease when you know of some factor which when added, removed or appropriately altered, will prevent or cure the disease. The " cause " of malaria is the bite of certain species of mosquito when infected by certain micro-organisms, because if you can prevent a person from being bitten by such insects you can prevent him from getting malaria however many other insects may bite him and however many other micro-organisms he may harbour in his body. The " cause " of cretinism is lack of thyroid gland secretion, because when the active principle of the gland is supplied to a patient he becomes normal. Of course, even if we know the cause it may not always be in our power to supply the remedy, but if we do not know the cause we are completely helpless in the face of the disease.

It is this feeling of helplessness that gives magic its opportunity. Where knowledge is lacking magic steps into its place with bogus suggestions about causes. Science in the sense defined includes

the humblest rule-of-thumb technical knowledge as long as it is genuine and not bogus. The primitive fishermen of the Pacific Islands have sufficient knowledge of engineering to build serviceable canoes and do not have recourse to magic for this purpose. They know that they are masters of the situation: they know what materials to use and how to use them. The construction of a canoe is of course a consequence of desire as is every human act, but it is desire plus knowledge and the control given by knowledge that is efficacious. Desire alone leads to magic or to nothing. Thus the Pacific Islander does not possess the knowlege and control to ensure his safe return to harbour after a fishing expedition, so he may try magic to supply the defect. He does not have knowledge enough to be sure of catching fish when he wants them and therefore he may try to ensure his fish supply by magic. The most primitive and ignorant of men generally use what science they have as far as it goes and only have recourse to magic where science fails them. But science may fail them in either of two ways. They may simply and genuinely lack the knowledge or they may have the knowledge but it may not come up to their expectations or desires. The fisherman may be ignorant whether or not it is safe to sail through a certain strait under certain conditions of tide and weather and may trust to magic to see him through. He may know it is dangerous and should not be attempted and still may trust to magic to see him through, because he very badly wants to make the passage.

Wherever there is definite knowledge of causal relations and efficient control of causes faith in magic soon disappears, and has disappeared in all those matters where causal relations are simple and easily discovered. Magic therefore thrives best where causal relations are complex so that knowledge of them is difficult to arrive at, or where for some other reason control is inadequate. Thus in agriculture it is as difficult to eradicate magical beliefs as weeds, because the growth of crops depends upon an immense number of causal factors, some of them imperfectly known and some, like the weather, outside human control. Thus it is not at all easy to discover whether the ancient belief that seed ought to be sown while the moon is waxing and not while it is waning is merely sympathetic magic, as would appear *prima facie*, or whether it rests upon any genuine basis, as is not impossible, because lunar rhythms are known to occur in the organic world, *e.g.* in the reproductive cycle of some animals. The matter can

only be decided by careful statistical analysis of tests lasting over many years in order to eliminate chance variations due to weather, pests, etc. The prevalence of magical belief in medicine comes from the complex causal relations concerned in the maintenance of health, but also from another source that must be considered.

When it comes to his own health almost everybody is liable to believe in magic, however scientific he may be about other people's health or about non-medical matters. Fear produces faith of a sort. He may believe spasmodically and dabble in patent-medicines or Harley Street specialists (more expensive but not always more efficacious). He may believe systematically and become a vegetarian or a nudist. In any case if he feels ill, he generally does not know why, but he wants a quick and easy way out of his trouble, and his acts are determined by his fears and desires and not by any knowledge possessed by himself or others. It is true that the correct scientific attitude towards the problems of health and disease has been available since the time of Hippocrates, but mankind in general have preferred magic because it asks less of them and promises more.

Consider a simple and crude instance. If somebody breaks a bone it is, properly speaking, his own organism that mends it, not the surgeon. But it is the surgeon's business to use his scientific knowledge to ensure that the mending goes on under the most favourable conditions. He has to keep the broken ends together in the right position. He also has to see that the patient's general bodily condition is as favourable as possible. Among the favourable conditions must be included keeping the patient cheerful and confident in his recovery. If it appears that the patient has read that "Blank's Pills Cure Broken Bones" and has been impressed by the statement, then, provided the pills are not very poisonous, he may actually hasten his recovery by swallowing some. Though if he thinks swallowing the pills will do instead of proper treatment he will be crippled for life, if he survives at all. As long as magical treatment does not displace scientific treatment it may actually be a useful supplement in so far as it cheers up the patient. Thus every conscientious medical man is in perpetual doubt as to whether or not he is acting in violation of the Hippocratic Oath when he mixes magic with science in treating his patients.

There is a dreadful and fascinating complication in medicine that must be mentioned but cannot be discussed here. That is

that whereas most people in most circumstances strongly desire to get well, some people in some circumstances desire equally strongly to be ill, for a number of obvious reasons, and this desire will frequently make them ill. Actually both opposed desires may be present together.

It so happens that most common diseases are relatively mild, so that a large proportion of sufferers recover from them whatever treatment they do or do not have. If any of those who recover happen to have taken Blank's Pills they are liable to attribute their recovery to the pills. Messrs. Blank, of course, make good use of this fact, combined with the other fact that dead men write no testimonials. Certainly it is noticeable that there are plenty of quack remedies for the milder ailments but not so many for diseases with a high death rate like pneumonia, cholera or yellow fever. It is noticeable too that those who claim complete immunity from disease by eating raw carrots and walking about with bare feet or by other fanciful methods take good care to keep away from regions where the severe killing diseases are prevalent. The two factors mentioned, the statistical frequency of recovery from most diseases and the (apparently) direct influence of belief and emotion on recovery make it very difficult to eradicate magical belief and greatly hamper the advance of scientific medicine. It is worth mentioning in this connection that frequently when some new treatment is first introduced it is relatively more successful than later on when it has become a matter of routine and no longer a source of excitement and interest.

In medicine it is perfectly reasonable to admit that magical methods are a help without admitting that they constitute valid or scientific treatment, or that by themselves they would be a substitute for it. Wishes and feelings as such appear to be part causes, but they are no more than part causes, unless they operate through the means that scientific knowledge provides. To be useful, wishes must be restricted to what is possible and must utilise all possible means.

In considering political magic the analogy with medicine is mainly of value in order to emphasise the fact that modern and ostensibly civilised man is not immune from magic of another kind. In some respects the analogy is not very close. In politics there is very little scientific knowledge to compete with magic. We hardly know what wishes are possible of fulfilment, and what are the possible means. We do know, however, the devastating

effects of mass emotions. They certainly produce results, though seldom the results that were expected or desired. Though political magic in its lesser manifestations may be endemic the more disastrous types do not seem to be universal.

When social and political conditions have been more or less static and the life and thought of ordinary men have been governed by tradition there has not been much scope for political magic, either among the masses, or the intelligentsia who are responsible for formulating political theory. This is simply because they have not expected or hoped for much: they may have been dissatisfied but they were probably sceptical about possible remedies. But in an age of changing conditions and with a slackening of the hold of tradition all those who are dissatisfied, that is to say most people, are easily dominated by magical belief if any suitable one is presented to them which kindles their hopes. It is safe to say that experience goes to show that actual governments are mostly rather bad and that, although they may improve, it is always easier to change from better to worse. Inefficiency, corruption, injustice and tyranny are commoner than their opposites. On empirical grounds there is no reason to expect great or permanent improvements, though small improvements are always possible as long as people work to produce and maintain them.

I would suggest (subject to correction by the historians) that widespread and virulent political magic began in the eighteenth century with the doctrine of the perfectibility of man and that subsequent efforts have been directed to modifying this primary illusion or adding to it. How far Rousseau is responsible and how far it is one aspect of the Romantic Movement I am not concerned to argue. At any rate, there was at the end of the eighteenth century a widespread belief that once the artificial fetters forged by Kings and Priests were broken the true and natural nobility of man would at last appear and then everything would be perfect. If that is not faith in magic then nothing is. This or very similar illusions have haunted men's imaginations ever since. Marxist theory is an instance, with the difference that not only the wicked Kings and Priests are the enemy, but even more their friends the wicked Capitalists. First comes the Social Revolution, then the Dictatorship of the Proletariat, then the Classless Society and the Withering Away of the State, and finally Perfection. (Capitals are necessary to express the matter

properly.) The atmosphere is just that of the fairy tale—the Only Son of the Poor Widow slays the Wicked Giant, marries the Beautiful Princess and lives happily ever after. Nazi theorists have not succeeded in reproducing the vivid and precise fairy tale atmosphere, but something more like a nightmare. The formula would appear to be, however, that once everybody who is not a genuine Nazi German is killed, tortured, or enslaved then everything will be perfect. In essentials the formulæ are all the same: there is an enemy or bogey to be hated, then destroyed and after that the millennium comes automatically. The bogey is necessary, of course, to give the required emotional stimulus. Hatred promotes belief in magic perhaps even better than fear; it is more "dynamic" to use a popular catch word.

These instances quoted are extreme cases where the magical element is obvious; there is no relation between the means proposed, which are purely destructive and malevolent, and the end imagined which is something marvellous but otherwise unspecified. Of course the means proposed are not necessarily entirely irrational. Admittedly Kings and Priests have misused their power, as have Capitalists, and by destroying their power certain abuses can be removed, though in the very process others are likely to appear to take their place. Even the Nazis had some genuine grievances and it is possible that some of their actions were directed towards removing them. At least, we can afford to give them the benefit of the doubt in this respect. Making the greatest possible allowance for the part played by specific remedies for specific grievances, that is seen to form a very small part of the whole doctrine or whole inspiration that led to the French Revolution, to the Marxist movement or to Nazism. The rest is pure Magic. It is sometimes said that Nazism and Marxism are kinds of religion. This is only true if it is primitive religion that is meant in which the magical and the properly religious elements have not yet been distinguished. The discussion of this point must be deferred for the present, while the milder forms of political magic are considered.

In the milder forms of political magic, it is important to remember, there may be a large admixture of rational elements, as may happen in medical treatment, and it is not always easy to disentangle them in the present rudimentary or pre-Hippocratic stage of political science. Four main types of political magic are easily distinguished. These are (1) Militarist or Jingo Imperialist

Magic, (2) Nationalist or Chosen People Magic, (3) Superman or Leave it all to ME Magic, (4) Legislative Reform Magic. This is a classification in terms of means. It does not pretend to be exhaustive and, of course, the classes are not exclusive; a political movement may employ all these means. Classification according to ends is hardly possible on account of the vagueness of the ends, except for (4), the mildest form, which might be subdivided in accordance with differences of ends. With some hesitation I would suggest adding also (5) *Laissez Faire* Magic. It is perhaps a subspecies of (4).

As to (1), belief in the magical virtues of military conquest is probably endemic in the human race. If the people of A are in trouble it is hard for them not to believe that nearly all their troubles would be cured if only they conquered the wicked B's, their neighbours, especially if the B's are thought to be easily conquered. The people of B, of course, think the same of A, *mutatis mutandis*. It is one of the misfortunes of history that there have been beneficent conquests like those of Macedon which saved and spread Greek civilisation and those of Rome which did the same again and fostered, however unwillingly and unwittingly, the rise of Christianity. These are apt to be quoted as precedents. I need hardly say it is the precedent of wars of conquest that is unfortunate, not of wars of liberation. The most pernicious feature of militarist magic is that once A has conquered B and the millennium has failed to arrive, there is nothing for it but to conquer C. Under this same head one ought perhaps to include a relatively innocent faith that is prevalent on both sides during wars, that after the war something wonderful will happen or at least that "everything will be different"; whereas it is more probable that everything will be the same except for the things that are much worse.

As regards (2), there is, of course, a very close connection with (1), except that Nationalism flourishes even better among the conquered than the conquerors. It has also many subtle and complex variations which have no special connection with magic. The peculiar character of Nationalism is that it is not merely a means to an end, but an end in itself. The mere fact of being one of the chosen people is in itself something glorious and confers magic powers not possessed by the others. This may take the entirely vicious form, not confined to Nazis, that WE are destined to trample on everybody else. Or it may take a quite innocent

form, like the Celtic belief that it is the special privilege of the Celt to see and communicate with the Little People. (3) Needs no comment except that the belief is not confined to tyrants or the people ruled by them, but may spring up sporadically anywhere.

Type (4) is the most difficult to deal with because within this species magical beliefs shade off by insensible gradations into quite reasonable aims and aspirations. This might be said, too, of the other forms, but they tend much more obviously in the magical direction. Belief in the benefits of military conquest, nationalist aspirations, faith in demagogues and dictators might all be reasonably based and confined to reasonable limits; it is not likely that in fact they will be. On the other hand belief that a specific reform in the legal code or the political structure of the State will remove specific evils or confer specific benefits is quite often well grounded in reason and experience. Magic only comes in because hopes and wishes tend to outrun the proper limits. Instead of a limited result which is predictable with reasonable probability from some definite measure of reform unlimited results are looked for, or it is assumed that the limited result represents a more or less complete cure for all political grievances. There can be little doubt that in this country some advocates of the Single Tax and some supporters of Women's Suffrage have been under illusions of this kind. In the United States there appears to have been a widespread belief in the magical efficacy of legislation as such, as a kind of thing-in-itself, quite apart from whether the law is enforced or not. In many countries, too, in the nineteenth century, and even in the twentieth, there has been a professed belief in the efficacy of paper constitutions which have never been honestly worked and apparently have never been intended to be worked. When autocratic governments ape the forms of democracy it is difficult to discover whether it is due to (*a*) faith in the magical efficacy of these forms on the part of the rulers, (*b*) an attempt by the rulers to induce such faith in their subjects, (*c*) an attempt to impress the outside world, or (*d*) deception for its own sake. It is only alternatives (*a*) and (*b*) that bring this procedure obviously under the rubric of magic. Though perhaps (*d*) is a special kind of magic.

Lastly as to (5), the implicit faith in the virtues of *laissez faire* as a political principle which still survives in British and American politics is undoubtedly magical. The only question is whether

it ought to be considered a distinct type or a special form of legislative magic, that is to say faith in the magical efficacy of absence of legislative action and political control.

The conditions that favour political magic have already been mentioned. Given labile social conditions, political and economic maladjustments, widespread discontent, given also leaders to point out bogeys, produce a magic formula and with a will and capacity to rouse mass emotion, then there are all the ingredients needed to produce an explosive mixture. Something drastic is almost sure to happen. The result will not be the result promised, but that does not seem to matter as long as fresh bogeys can be invented. The persistence of magic depends on hopes, not upon results, and in politics few hopes other than the most modest are ever realised. In the sphere of medicine science can and gradually does supersede magic for two reasons. First, because the end to be attained, health, is limited, definite, and visible. But no one has ever seen a healthy State and few would know it if they saw it. Second, because the adequacy of the means can be demonstrated. Experimental tests can be applied, for in principle the method is simple. Select a hundred or so individuals who are suffering from the same type of ailment, but otherwise differ widely: divide them into two groups of fifty as closely similar as possible: treat one, the experimental group, in some definite way: treat the other, the control group, in the same way so far as they are aware, but without actually supplying the factor to be tested (*e.g.* if the treatment is by injecting something, the control group are given sterile salt solution): then, observe the difference between the two groups over a sufficient length of time using all relevant tests and, if necessary, statistical methods. In practice there are difficulties about applying rigid experimental tests and interpreting the results, but it can be done and is being done.

Can anything at all approaching this be done in politics? Aristotle seems to have thought something of the sort could be done, and certainly the Greek genius for political experiment had given him a good deal of material to go upon. It is easy to see now with our wider historical perspective that he was too sanguine, though not entirely wrong. While it must be granted that no ordinary form of experimental method is applicable to politics, that does not mean that experience and reason go for nothing. They do actually offer some guidance, but they offer no glittering prizes and make no appeal to violent emotions. It is undeniable

that there has been social and political progress, but it has been slow and difficult and the result of constant effort. In fact, without constant and well directed effort retrogression is likely to take the place of progression. Moreover it will be generally agreed that for the healthy working of any political system three conditions are necessary which have never been fully realised and may perhaps be impossible to realise fully. They are: (1) that the large majority of the people should be politically educated and politically responsible: (2) that there should be no privileged groups, that is to say, no people who succeed in claiming services and subordination from others which are grossly in excess of any corresponding functions to justify their exceptional position: (3) that the Government should possess and use powers sufficient for carrying out its policies promptly and efficiently, and yet be subject to effective criticism and public control, so that these powers are never misused, to do either too much or too little.

It is encouraging that the advocates of magical beliefs think it necessary to give a veneer of reason to their propaganda. This has often been easy because popular philosophising has already prepared the way by misuse of scientific analogies. For each period there tends to be some characteristic perversion. In the eighteenth century the key word was " Nature," in the nineteenth " Evolution." Open and unblushing irrationalism seems to be the prerogative of the present age. Indeed it is very disquieting that such an attitude should have any success at all even temporally, for it is the ultimate " lie in the soul."

Scientific and philosophical thought in the eighteenth century was deeply imbued with the conception of a system of Nature, uniform, orderly, operating in accordance with constant and universal laws. The orderliness of Nature was given a quasi-ethical status ; it was a kind of moral perfection. Granted this, it seemed an obvious corollary to include mankind in the system of Nature and to infer that human relations ought to show the same kind of order and simplicity and the same kind of perfection. The next step was either to assert, with the ethical optimists, that everything was actually ordered for the best, or else, with the believers in perfectibility, that nothing stood in the way of perfect order, but artificial barriers quickly to be removed. The learned world was thus divided between Conservatives and Liberals. This faith in Nature neglected the possibilities that (1) the order,

simplicity and perfection of the world of physical science might have been imposed on it by the thinker, (2) even if genuinely objective, the order and simplicity might have been obtained by selection from what, as a totality, was not entirely orderly or simple, or (3) granted the complete adequacy of physical theory in its own sphere, human nature and human relations when examined without prejudice might be found to bear little resemblance to the physical world. To realise that they ought to be orderly is not the same as to know what that order is, how it is to be brought about or that means for bringing it about are simple and ready to hand.

It may be granted now that analogies from physical theory are likely to be misleading applied to human society, but biological analogies might be more appropriate: as indeed they are, if not based on misunderstanding of biology and if applied cautiously. The most popular application of evolutionary ideas has been the notion that human society gradually improves, a notion that a study of human history does not actually belie, if " gradually " is interpreted in terms not of years but millennia and if the likelihood of serious set-backs is admitted. Generally in the nineteenth century there was added the notion that improvement was inevitable, a far more dangerous illusion than the older notion of perfectibility, which at least implied that a definite effort was needed. Moreover the inevitability notion is *a priori* like Herbert Spencer's doctrine that the trend of evolution is from a less to a more stable state. As far as the biological evidence goes, it goes to show that the fate of the vast majority of animal species is to die out, and that of nearly all the survivors is to reach a certain stage and stick there. Sometimes the sticking stage is reached by degeneration and sometimes by developing a parasitic habit too. If the human race is going to progress any further it will be in virtue of its unlikeness to other animal species, not its likeness.

So far I have been considering what is simple misunderstanding or misapplication of scientific theories valid in their own sphere. There is a different kind of difficulty to consider due to the limitations of our knowledge of social and political matters. Those who have attempted to construct political theory of a reasonable kind have been deeply divided in their fundamental attitude. One school of thought has emphasised the importance of the individual person, as alone having moral value and being an end in himself. On this view the State exists as a means and even

tends to be considered as a makeshift, something artificial and even something that should be superseded. The prevailing mood of nineteenth century liberalism was intensely individualistic, one side of Christian tradition is so too, and even Marxist theory treats the State as an evil, necessary to a certain stage of development but ultimately to disappear. On the other hand there is the opposed view, which can draw upon the authority of Plato and Aristotle, that the individual apart from society is a baseless abstraction, that the State is by no means an evil but is necessary for the full development of the individual. These two opposed attitudes tend to give rise to aberrant forms of theory, the first to anarchism, the second to treating the State as an end in itself, if not an object of worship. Apart from aberrations the science of politics, so far as there is such a thing, speaks with an uncertain and ambiguous voice, leaving ample room for magicians.

If the historical diagnosis given is correct the world has been suffering from an epidemic of political magic that began in the eighteenth century and may before long have run its course. Nevertheless there are some enduring factors that foster political magic. There is first the immense difficulty of arriving at anything like a science of society and politics with which to confute magical claims, and secondly the appeal that magic is able to make to crude emotion and particularly to mass emotion, largely because the magician will assert anything and promise anything.

Is there any legitimate appeal to emotion or any alternative to hate, fear and irrational hope as ways of moving men in the mass to action? Two answers will generally be given. The first is that if we had more knowledge of man and of human society and also more widespread knowledge, better and more universal education, irrational emotional appeals would fail and magic would lose its hold. This answer cannot be properly discussed here. It must suffice to say that there is obvious truth in it, but that those who advocate this kind of view are apt to overlook the fact that you cannot simply cut out emotion. Education that is not education of the emotions is nothing at all. Granted that we have not enough knowledge, we lack even more the capacity and will to use the knowledge we have and that lack is largely emotional. Education as at present practised is hardly a cure. Unsound judgment in political matters is by no means the exclusive privilege of the uneducated, in the ordinary sense of this word.

The second answer that may be given is that the cure is to be found in religion. This answer, though again it cannot be properly discussed here, contains, I believe, even more of the truth than the other. It may be combined, however, with a corollary that is misleading, the statement, namely, that movements like Marxism and Nazism are religions of a sort and owe their success to that fact. This statement must be discussed to some extent.

I should admit that for many people who have no proper religion Communism, Nazism, etc., provide a substitute to fill the gap. But they are only substitutes, just as golf or betting may be substitutes, unless by religion is meant something like primitive religion, which lacks elements present in advanced forms of religion and includes extraneous elements, of which magic is one. I must therefore justify the statement made earlier that magic has really nothing to do with religion but is simply a sham kind of science. The further question whether Communism and Nazism combine a sham kind of science with a sham kind of religion need not be answered.

The complete task of explaining what religion really is in its developed and undeveloped forms is long, difficult and controversial, and is the business of the ethnologist and the student of comparative religion. Even if I were competent to undertake the task, it could not be done here, so I must confine myself to a few and, as I hope, safe generalities. Primitive societies possess communal organisations for meeting and forestalling difficulties and emergencies. In part this will be concerned with methods for keeping up the spirits of the community, like a war-dance before fighting; in part with more mundane things like the food supply. Whether the ensuring of food supply consists in deciding at what season seed ought to be sown or else what rites should be performed to make it germinate, it is all religion in a primitive community. As soon as it is realised that these things are questions of cause and effect the whole of this sphere of activity is seen to belong to science. Ceremonies to assist the germination of seed are seen to belong to sham science or magic. Fully developed religion, that is to say, is not concerned directly with causes and effects in the physical world. This I will strenuously maintain in spite of the fact that prayers for rain or fine weather are heard in our churches and give some occasion to the heathen to blaspheme. But what about keeping up the spirits of the

people? What is the civilised equivalent of the communal war-dance? In Nazi Germany this is definitely politics and comes within the scope of the Ministry of Propaganda. I venture to doubt, however, whether this is really a civilised method. There seems to be something atavistic about the war-dances initiated by Dr. Goebbels. We may ask whether this is a matter for science, dealing as it does with causes and effects, for religion, or for politics, or for something else?

Primitive religion is a communal affair, because primitive man is hardly yet an individual and is certainly not individualistic; he is primarily a member of his family and tribal religion therefore is a matter for the family and tribe as such. The development of individuality is one of the consequences (also one of the conditions) of social progress, and with social progress religion not only becomes differentiated from science but becomes less communal and more individual. The individual is seen to be a free moral agent and an end in himself. Religion is not solely communal action but also individual faith. In addition religion gives up its original claim to produce success in politics or even be directly concerned with politics. The Delphic Oracle had to appear to be on the winning side in the Persian Wars to maintain its prestige. The early Hebrew priests and scribes had to be able to guarantee abundance of children and cattle to the righteous man and success against enemies to the rulers of Israel. The later prophets definitely repudiated this claim, just as in their own peculiar way the Stoics did. God has no nationality and belongs to no political party. The religious man does not despair of the Republic, but his heart is not set solely upon its success, for it is of secondary importance. If the sword is well tempered and sharp it matters the less what the scabbard looks like. From the point of view of religion the state is only a scabbard.

V

The Biological Approach to Philosophy [1]

There are many possible ways of approach to philosophy, and there is also an impossible one, though one that has often been tried. That the philosopher can somehow spin his philosophy out of what he finds inside himself; that he has some private internal source of information in virtue of which he can decide what the Universe must be, without needing to take the trouble to look at it, is a belief that dies hard. But it is now dying, if not dead, so that it is hardly necessary to refute it in detail. It should suffice to say that anybody who cherishes the belief will not find anything to interest him in what follows. I shall simply assume that the philospher is, what we all are to some extent, a spectator of the world and of man's life in it and a commentator on what he sees. Where the philosopher differs from others is in the kind of interest he takes in the facts, not in the facts that are there for him to be interested in.

The man of science is also an observer of facts and a commentator on them, but he deliberately narrows his range of facts to a special group, and all others he dismisses as irrelevant to his purpose. By this means he avoids at the outset a number of awkward questions and is enabled to develop a special technique for the study of his special department of fact. The philosopher is unlike the man of science in being a spectator of all the facts so far as is humanly possible. He is trying, that is to say, to take a view of the whole, and no fact, however troublesome, can be deliberately excluded. The great achievements of the sciences and also their limitations are the result of this method of theirs, and the immense difficulty as well as the interest of philosophy is due to its method.

There is a further point of resemblance between science and philosophy. The scientific investigator considers a certain group of facts and generalises from them. From his generalisation he predicts further facts and looks to see if the predictions are verified. Generalisation and prediction always involve risk of error. When the driver of a car comes to a bend in the road he

[1] *Philosophy*, 1933.

cannot see round he has to generalise—roads generally go on. He does it implicitly, of course. In one instance he may be wrong; there may have been a landslide and the road may end in a cliff round the corner. In that case he falls back upon another generalisation—if you push the brake pedal the car stops. But again he may be wrong, the brakes may not work. Wrong generalisations may lead to death, but to refrain from generalisation leads also to death, more quickly and certainly. In fact it is only by suicide that you can escape generalising, and suicide involves one final generalisation, that the means used will be efficacious.

A genuinely scientific generalisation differs from an unscientific one, not in being infallible, but in being made with caution after accurate scrutiny of the facts, in being carefully formulated, and above all in persistent following up and testing predictions from it. The facts themselves do not produce a generalisation, and for any set of facts there are many possible generalisations, which future experience will falsify. Of different observers presented with the same set of facts some will fail to generalise at all, some will generalise wrong, only a few will hit on a valuable or fruitful generalisation. These last are the great discoverers, and differ from the others in some intuitive or imaginative faculty, or whatever you like to call it. Of course, a few discoveries come by luck, many by sheer hard work, but these are mostly secondary or imitative, not really original. The real originator or pioneer discoverer, resembles the creative artist or poet. He is very rare, he is born and not made, and he is not always available when he is most needed.

Like the scientist, the philosopher must examine the facts and try to generalise. He cannot examine all the facts, as he is only human, and he will select according to his interests; but he must not deliberately exclude any facts, and he must not consider any facts departmentally and in isolation. In these respects he is badly handicapped compared with the man of science, whose success is largely the result of choosing easy facts and leaving hard ones alone. The scientist rushes along the high road in his car, leaving the philosopher to plod across country. The philosopher goes slowly and often loses his way, but he has the best views. In fact, so long as there is a view to admire he will not mind very much how far he goes or in what direction. To put the matter more plainly: it is not of prime importance what

facts the philosopher studies provided he studies them carefully and candidly with an open mind for others. For his generalisations are not restricted and departmental, but are attempts at something all embracing. They are based of necessity on a partial examination of fact, but they attempt to include all facts.

A large part of the facts the philosopher has at his disposal are the conclusions of the special sciences about their own subject-matter. But the sciences have left gaps. Also each science starts from a set of unproved, unexamined, and often incompletely stated assumptions. Some of these perhaps are borrowed from a sister science and have been properly examined by that science, but there are some that are simply assumed by all sciences. For instance, all physical sciences assume that in sense-perception we are in contact with a more or less stable and independent system of entities which are the same for all observers, and are not altered by the mere fact that we are aware of them. The assumption is quite likely to be correct, but it needs examination, and it is the task of philosophy to examine it. It is not the task of philosophy to make departmental criticisms of scientific methods and results, that is the scientist's own business. The philosopher only criticises what the departmentalist leaves uncriticised.

Philosophy consists of two processes, criticism and generalisation. They cannot be entirely separated, but as a rule criticism comes first. The philosopher's generalisations are a leap in the dark just like the scientist's, but are perhaps even more rash, for they are an attempt to find a formula which will make clear some absolutely general and universal aspect of things. Such generalisations ought, of course, to be put forward tentatively and modestly. If philosophers have often been cocksure and dogmatic, we may blame the bad example set them by theologians and politicians and, more seriously, false analogies drawn from mathematics. It is indeed, from these sources that the superstition comes that philosophy can be produced by the philosopher out of his own inner consciousness.

There is a grain of truth in this as in most superstitions. To make a real original generalisation in philosophy, as in other studies, calls for an imaginative and creative effort of which few are capable. There have not been many creative philosophers; they can almost be counted on the fingers, and at least half of them were ancient Greeks. Most philosophers simply take their generalisations ready made from some of these originators

and content themselves with developing them in one way or another.

There is one last preliminary consideration to be dealt with. The special sciences constitute a series of systematic inquiries into the facts. Among these inquiries I include not only the more obvious physical sciences but all attempts to get systematic orderly information and state it in general terms. Thus anthropology, economics, and political science are included, and history too if historians generalise from their data. All these studies deal with the things that happen to exist and their relations. The relations are permanent in the sense that though the things might be different similar relations would hold, but the things themselves might all be different. Where there is a difference between what is and what might be we are entitled to ask of alternative possibilities which is the best or which ought to be. Where human effort can produce one or the other the question is obviously important. But such questions are unknown in pure science, though they are not unknown to the engineer.

The engineer says (1) We want a bridge over this river, it could go here or there. (2) How can it be built in either position? (3) What will it cost? From the answers to (2) and (3) he can decide (4), which is the best position and is it worth the price? Now the answer to (2) is pure physics. The answer to (3) is also pure science, the science of costing. But (1) and (4) are outside the sphere of physical science altogether. The terms "worth" and "best" have no meaning in physics, but they have in engineering, and the philosopher cannot neglect them. The philosopher thus has his subject further divided into two parts, he has to study what is and what ought to be. In so far as he approaches his subject from the scientific side he will be more concerned with what is than with what ought to be.

At the present day physics is the most exciting science. The theoretical physicists are still busy sowing their wild oats. The biologists sowed theirs some time ago in the great Darwinian days, and are now respectable and dull. While the physicists are concentrating on a few central problems and seem to have a final solution almost within their grasp, each biologist is working away at his own little problem, neither knowing nor caring what any one else is doing, and nobody can see what will come of it all. A great part of the biological sciences, too, and that the most progressive part, consists of nothing but the application of physical

methods to biological problems ; that is to say it is merely rather complicated physics. Why, then, you may ask, should the philosopher bother about biology ?

This question might be answered historically by considering what advantages those philosophers have actually gained who did bother about biology. But this would be a lengthy business. It will be shorter and more interesting to consider one or two points that arise naturally from the work of a contemporary philosopher—Whitehead. It is remarkable that a thinker who is primarily a mathematician should have found the main inspiration of his philosophy in conceptions that are biological and psychological ; but in this matter, as in others, he resembles Leibnitz.

In all ages thoughtful men have been struck by the transience and impermanence of things. " Time," as Locke said, " is a perpetual perishing." This has been the theme underlying half the world's poetry—the grass withereth and the flower fadeth. The motive of all religion is to find, behind or beyond the transience of things, something which is permanent, infinite, and eternal. All philosophies are attempts to compromise between Heraclitus, who said (truly) that all things flow and nothing stays, and Parmenides who said (equally truly) that the Real is one and immutable. Theoretical physics has thrown its weight heavily on the side of permanence. It has always aimed, as Meyerson has insisted, at explaining away anything which is *prima facie* a process of change. Change is explained away in terms of the motions of simple structureless unchanging entities. There is nothing novel in this attitude of physics.

Aristotle said of his predecessors (Mure's *Aristotle*, p. 17): " Of the first philosophers most thought the principles which were of the nature of matter to be the only principles of all things: that of which all things consist and from which they first come to be, and into which they are finally resolved (the substance remaining but changing in the modifications)—this is what they call element and principle of things, and therefore they think nothing is ever generated or destroyed, since this sort of entity is always conserved."

You have only to translate the qualitative treatment of the early Greek physicists into quantitative mathematical terms and you have the modern classical physical theory. Modern physics is deeper because it has more and better facts to go upon, but it is not wider than ancient physics. At the present day some physicists

are beginning to tire of these first principles. The method of reducing all apparent change to motions of changeless entities has never worked as well as enthusiasts have tried to make out and has never been quite consistently and rigidly applied. It is still a fertile method in some fields, but in others its fertility has been exhausted.

It is an amusing paradox that the fertility of classical physical theory is greatest at present in certain branches of biology, so that its most fervent advocates are actually people who are by way of being biologists. Yet it is in biology that the insufficiency of the theory as a complete account is most glaring. We must admit that the classical theory appears to be capable of answering all biological questions that can be formulated *in the terms it uses.* The trouble is that there are questions we can ask and partly answer which cannot be formulated in those terms. The advocate of the classical theory is compelled to dismiss these questions as meaningless, but we need not follow him.

To anybody not blinded by theoretical presuppositions it must be clear that the essence of life, its stuff and substance as it were, is transience and change. Every living thing is born, grows to maturity, and dies. It is only because it dies that other organisms in their turn can be born and grow. The term of life may be reckoned in minutes for bacteria or yeasts, in hundreds of years for forest trees, but each one is subject to its own limits. The sequence of birth, growth, and death cannot be evaded or altered. All death is death from natural causes ; if it does not come sooner it comes later.

A true analogy of life is to be found in music. Would any one listen to an orchestra in which each instrument played one note for ever and for ever, however cunningly harmonised they might be or however beautiful that harmony might be in its proper succession and for its proper duration ? The only reason for the existence of any one note is that it comes into being after another and dies to give place to a succeeding note. The same is true of a whole piece of music: it has a beginning and an end. It could go on for ever only by means of repetition, which would soon become irksome, or by meandering on without design or significance.

Of course a symphony can be played many times, but each occasion is a new birth and not merely a repetition. The only thing that is permanent is the written score, and the form of it is

indeed timeless, but no music exists except when it is actually being played or the score is being read by someone of sufficient musical training. The score itself is only an abstract possibility of music.

We can easily see that transience is necessary to the existence of music because it has no spatial dimensions ; its whole existence is in its duration. When a thing has spatial dimensions, say a picture, we usually abstract from its history its spatial characters at some one moment and imagine those characters indefinitely extended into past and future, and we call that the thing. But it is not the thing ; at best it is a convenient abstraction, at worst a fiction. The picture *is* its whole history, from its birth, when the painter first laid pigments on the canvas, up to its maturity, when he laid his brushes aside and said " That's done." Then comes its slow decay, the paint gradually blackening and cracking ; perhaps there are efforts to restore it, but eventually the end will come. It may be postponed for hundreds of years, but by accident or design, by fire or water, or mere crumbling to dust, it will come. The picture will cease to exist as a picture, though ashes or green mould or dust may remain. For a few hours or a few years while we look at it there may be no noticeable change, so that the timeless spatial abstraction we make from its history seems to be the picture, and in any case as an abstraction, a convenience for thought, it has its uses.

The physical sciences have tried to find existing entities whose history is so long and uneventful—so boring in fact—that it may be entirely neglected, and the entities may be treated as though they were timeless. The physicist speaks of time, to be sure, but it is not historian's time he deals with ; it is merely the relation of before and after, not a relation of past, present, and future. There are no dates in physics. Timeless spatial abstractions are easily grasped by the mind, so that as a point of method it is a great advantage to be able to neglect actual histories which are not easily grasped. But a convenient methodological trick may be a deadly snare when it is treated as a metaphysical first principle.

From the observation of living things we get perhaps the clearest indication of what is meant by transience and by history. In their case it obviously is impossible to shut our eyes to the facts. But all that interests us most in this world is also transient and historical. Above all it is well to remember that, if anything is certain, it is certain that the earth once contained no living thing and that a time will come when again it will contain no living

thing. The whole earth itself had a beginning and will have an end. However vast the stage and however tremendous the drama it is hemmed in on two sides by the rising and falling of the curtain. However loud the applause and frantic the encores, the end is but put off for a moment and the dramatic climax spoilt.

Spengler in his *Decline of the West* has one indubitable fact to put forward: that all civilisations have a period of growth, maturity, and finally decay, and that our present civilisation can hardly be an exception. Where he is wrong is in supposing that every civilisation follows a parallel course and has a similar length of life. He has to distort the whole of history to make it fit his scheme. There is no possible way of knowing whether our present civilisation has passed its zenith or not. Its history follows no fixed inevitable course. Its future depends upon what its members are now doing or failing to do.

If Spengler had observed the course of nature more carefully and not read so many books, he would not have made such a mistake. A living organism develops as it can according to its circumstances, and is not like a train with a fixed time-table. He would have realised this if he had spent a winter in Devonshire, where roses are in flower in January and daffodils in November.

The growth and decay of a living organism is a real creation and a real perishing. You can say if you like that there is only a rearrangement of pre-existing and imperishable parts. This may be true, but its truth is trivial when applied to living things, though useful within its own sphere in physics. The physicist in order to simplify his problems uses an analytic method; he considers successively smaller and smaller parts of the objects he studies until he comes down to the smallest parts of all. If the larger objects are random collections of the smaller ones, the method gives you all the information you can reasonably expect. But if a large object is an ordered collection of the parts, information about the parts in isolation can never tell you everything about the whole collection except in the relatively uninteresting case where the order of the whole is merely a repetition of an order inherent in the parts. All the parts of a jigsaw puzzle laid out on a table can be said to contain the picture potentially, but you will not be able to see the picture until they are arranged in order, so that it is accurate to say that the picture exists only when they are arranged in order, and not when they are put away in the box. There is here on a small scale real creation and perishing.

Even if you have a fixed collection of immutable and imperishable parts, and even if nothing can happen to them except movement and rearrangement, it is still not true that all arrangements are equally significant. If you are examining the minute parts separately, you will naturally not see the arrangements. Seen from a "microscopical" point of view, heaps of bricks and timber and cement and sand will look exactly the same as a house built out of them. But that is not to say that there is no difference between casual heaps of builder's material and a house; what it means is that the house as such is only seen "macroscopically" when you can take in the whole of it. The house at any moment is an organisation of matter, and the history of the house, the whole house that is to say, is the history of the process of organisation while it was being built and of its maintenance until it falls to bits. From the point of view of the house it is a matter of indifference whether or not the bricks are eternal. In any case the house is not.

There are questions we can ask about a house and sometimes answer which are irrelevant to heaps of bricks and timber. Is it habitable, or convenient, or beautiful? These are questions about its functions, that is the extent to which it fulfils human purposes, and we can answer the question because we know something about human purposes. We cannot say exactly what the purpose of a living organism is or if it has one. The farmer, of course, says the purpose of a cow is to produce milk, but that is because he thinks of the cow simply as a machine for converting grass into milk. The cow does not think this of herself. When we come to consider the various parts of an organism, as the physiologist does, it is impossible to avoid questions of purpose or function. The function of the eye is to see, and any attempt at a scientific description of the structure of the eye and the processes going on in it which left its function out of account would be fatuous.

In respect to function, the point of view of the physiologist is that of the engineer, according to what has been said previously: they are both concerned with "efficiency." It would take too long to discuss this matter adequately, but one point must be mentioned. The engineer discusses efficiency in mathematical terms and with the use of units and methods of measurement borrowed from physics, but he is discussing something of which classical physical theory knows nothing. Similarly the physiologist can

discuss the efficiency of the eye as an organ of vision in mathematical terms and with the help of units and methods of measurement borrowed from physics, but again he is discussing something of which physics knows nothing. It is a great mistake to imagine that anything mathematical is physical. A pound note is worth twenty shillings; that is a mathematical relation, not a physical one; physics has never heard of "value."

In short, the biologist cannot avoid dealing with the notion of purpose; a notion the philosopher ought to help him to elucidate —if he can.

The last question I wish to deal with is one of enormous difficulty, but also great importance. From the fact that an organism grows, it follows that it must grow out of something; and from the fact that it dies, it follows that it must pass into something. Life is a process of exchange between what is conventionally and by abstraction called the organism, on the one hand, and its environment on the other. Conventionally we call the organism at any moment everything going on inside its skin and the environment everything going on outside its skin; that may affect it now or later. Distant things, *e.g.* the Sun, may affect an organism, but we suppose in accordance with physical theory that they do it only through an intervening medium. There is a definite meaning then in the assertion that the environment at any moment is what is happening at the surface of the skin of an organism. In any case things are always happening there, and they are of two sorts, what the environment does to the organism and what it does to the environment. It must be remembered that an important part of an organism's environment consists of other organisms. The philosopher Hobbes said that the life of man apart from society would be solitary, nasty, brutish, and short. That was an understatement; it would be of no length at all. Even the most unsocial man needs a father and mother to get himself born.

The distinction between organism and environment depends in the first instance on an abstraction, the timeless spatial abstraction I have mentioned already. We take the volume that at one moment is inside its skin and label all the parts O; all that is outside at the same moment we label E; and that seems quite clear. But if we stop and watch for a time the labels do not all stay in the right place. The air I breath in is now E; in a minute some of it will be O. The air I breath out is now E, a

minute ago some of it was O. A living organism is a process of exchange.

If we take the fully developed organism as simply given and as something stable, we can investigate the exchange between it and the environment in the terms of classical physics—the motions of unchanging entities. A great deal of useful information is obtained in this way, in fact a large part of physiology. But this information is limited in scope and depends upon assumptions that are not strictly true. The organism is not just given and it does not exist in isolation. It has developed out of its ancestors and its environment, and it is what its history has made it. In some respects and up to a point an organism can go its own way, but its freedom is strictly limited. For the most part its development is limited and even moulded by its environment, past and present. To some extent the environment is moulded by the organism. At any rate the mutual relationship is extremely close, so close that if we take a long view we can hardly say where one begins and the other ends. The method by which all things live by taking in each other's washing is one which physical theory has not yet acquired the categories to cope with. It is true that Whitehead has tried to give a philosophical basis for such a study, but it is also true that the parts of his book that deal with it are almost unreadable.

I have tried to show that there are certain aspects of the world which a study of biology inevitably thrusts upon the notice of the philosopher ; that these are aspects that classical physical theory has ignored and that physics is still ill adapted to cope with. There are, finally, two misapprehensions I wish to guard against.

In the first place, the classical physical theory is not " the Faith once and for all delivered to the Saints," as was thought only a few years ago. It is being reformed and extended under our eyes. The reformed physics ought to be able to take all these things into account. If not, so much the worse for physics, but also so much the worse for biology. We cannot admit a fundamental cleavage between the sciences without stultifying scientific method which is the same in all sciences.

Secondly, and this point follows from the first, these aspects are not peculiar to living things. But in considering the world of non-living things they can be ignored without much difficulty and have been ignored. In living things they simply stare you in the face.

VI

Errors of Logical Positivism [1]

Positivists have excelled at destructive criticism. This criticism has been useful for pruning away absurd and superfluous theories but it is liable to be used to prune away everything else. The latest exponents, the Logical Positivists, are no less adept at criticism than their predecessors. The doctrines of this school have been surrounded with an air of mystery and inquirers have been frightened off by alarming technical apparatus. We all know that the Logical Positivists had proved that everybody else talked nonsense, but we did not know what they themselves talked. Mr. A. J. Ayer's exposition of the doctrine, *Language, Truth and Logic*, is therefore welcome as it is simple, clear, and free from technical mystification. It gives the ordinary reader a chance of seeing what it is all about. When the fundamental assumptions of the theory are stated clearly, as they are by Mr. Ayer, it seems to me equally clear that they are wrong, so that it should not be surprising if some of the conclusions drawn from them turn out to be wrong too.

In what follows I shall be concerned only with the general statement of the doctrine and with its application to scientific theory ; not with any other applications.

The first set of assumptions are, as the name of the school implies, logical. It is assumed that all alleged propositions, that is all sentences or linguistic forms which profess to convey information or to make assertions which could be either true or false, are of three kinds. These are (1) Factual Propositions or Empirical Hypotheses, (2) Tautologies or Definitions, (3) Meaningless or Metaphysical verbal forms. Only class (1) are significant or actually say anything about anything.

Class (1) are either themselves assertions as to matters of fact which can be verified by experience or else they can by purely logical analysis without change of significance be translated into such propositions (p. 19 *seq.*). A proposition is said to be verified by experience when it refers to or describes correctly actual or possible contents of somebody's sense experience. It is not clear

[1] *Philosophy*, 1937.

whose experience is concerned, whether it is somebody specified, anybody, or only the speaker himself. I have put in " somebody," but I suspect that the upholders of this doctrine always mean themselves. There are difficulties connected with the method of verification, but Mr. Ayer deals with them and his treatment will be discussed later. One further brief comment may be put in here. Mr. Ayer recognises (p. 135 *seq.*) that the same form of words may function as (1) a factual proposition and also as (2) a tautology, without apparently realising that this admission will get him into trouble. The purely logical analysis of propositions becomes impossibly difficult if such initial ambiguities are allowed.

Class (2), Tautologies, are analytic in the sense that their contradictories cannot be asserted. For that very reason they do not assert any fact or inform us about facts. They have a legitimate use as definitions, to indicate what linguistic symbols are to be used as equivalent to what others. Mathematics consists entirely of such propositions; for instance $2 + 2 = 4$ defines (in part) how the symbols 2 and 4 are to be used. According to the Logical Positivists, philosophy ought to consist of such propositions, because its function is to analyse common assertions by substituting for them others which will display their true structure and significance, if any. There are propositions tautological in form, like " Business is Business," which have an emotional significance but no literal significance. Mr. Ayer disapproves of them.

This brings us to Class (3). Some propositions which are ostensibly factual or similar to factual ones have reference to entities which cannot from the nature of the case be experienced themselves or be displayed as logically constructed out of elements of experience. Alleged propositions of this kind are held to be strictly meaningless or " metaphysical." " Metaphysical " in Mr. Ayer's vocabulary is a term of abuse; that is to say it is an epithet applied to things he dislikes and not applied to things he likes, though possibly equally applicable.

This classification of propositions is the logical basis of the theory and distinguishes the " logical " from other positivists.

Perhaps it is a minor point, but it should be noticed that the term tautology is used in a loose and possibly misleading sense. Strictly tautology ought to mean an equation of identities, e.g. $2 = 2$, or Business is Business. Such equations, if intended

seriously, are asserted to show that the terms are to be understood strictly according to definition and not figuratively. In the equation $2 + 2 = 4$ the two sides are not identical; they contain distinct and different symbols. These can, however, be substituted for one another without error for all mathematical purposes. We may say "Two sheep and two goats, that makes four animals" as long as it is only the numbers we are interested in and can afford to neglect their special characters as sheep or goats. This brings me to the next and more important point.

Everything the Logical Positivists say about language is based upon a theory of the mathematical logicians about mathematical language. This is probably excellent within its own sphere, but can it be extended to apply to all kinds of communication by language, that is by signs? Granted that the symbols $2 + 2$ and 4 can be substituted for one another absolutely without error or change of meaning in all mathematical propositions, that is because the use of mathematical propositions depends entirely upon their form or structure and not at all upon their matter or content—if they have any. In other words, the propositions are used as definitions. In all ordinary language, including non-mathematical scientific language, form and matter cannot be readily distinguished. Even when they are distinguished the use of language depends upon the matter as well as the form, because the assertions are material; they point to what happens to exist, and are not purely formal like those of mathematics. The legitimate logical transformations that can be applied are limited to the formal or structural elements of language; in ordinary language what is expressed by signs such as "and," "or," "not," "all," "any," "some." Even then there are limitations. To say "The Nile is a great river" is not exactly the same as to say "The Nile is not a small river." Nor even is "Edinburgh is north of London" quite the same as "London is south of Edinburgh" except for certain limited technical purposes such as map reading, when A and B could stand for Edinburgh and London, and the propositions are in effect mathematical.

It is only to a very limited extent that linguistic signs can be interchanged without alteration of meaning, as is seen from the notorious fact that every language possesses words and phrases that cannot be translated into a foreign language. As a lawyer once pointed out to me, Mr. Justice Stareleigh's dictum, that "What the soldier said is not evidence," cannot be translated

into French, because in a French court everything is evidence, or into German, because in a German court it would be an insult to the army. Forms of words can be found in French and German which to the ignorant Englishman may seem equivalent. They are not equivalent for Frenchmen or Germans, because their different history and traditions have given their language signs different meanings ; they are referred to a different background.

If it is objected that all this has to do with the emotional effects of language and not with its legitimate scientific use, I would point out first of all that the proposition just mentioned is a technical one used in a strictly technical sense and not for the purpose of exciting irrelevant emotions, quite the contrary. But even where emotions are aroused, why assume that the expression or arousing of emotions must be illegitimate and incompatible with the scientific use of language ? When you make an assertion at least you desire (Emotion No. 1) your hearers to assent (Emotion No. 2). To express and arouse emotion is the essential and fundamental function of all linguistic intercourse between human beings, even mathematicians and logicians. If it were not for the emotions concerned nobody would say anything, and the emotions are as much a part of the meaning as anything else. Emotion of course may be and often is objectionable when it is misplaced or inappropriate, just as it is objectionable to tell lies or misunderstand what is said. The emotion is right and the proposition true when they fit the facts, wrong and false when they do not.

To give a general definition of language one would have to say something of this kind—Language symbolises primarily an attitude or type of behaviour of the speaker which is directed towards things or persons, and it is used for the purpose of modifying the attitude or behaviour of other persons or possibly himself. These attitudes or behaviours are the external expression of what is internally an emotion of some kind. A command is perhaps a more elementary kind of speech than an assertion. But language symbols are concerned secondarily with symbolising appearances which are themselves signs standing for the things or persons towards which the speaker's emotions, thoughts, or actions are directed. This applies to all types of language. Mathematical language is the limiting case where the symbols are emptied as far as possible of all content so as to apply to everything in general and nothing in particular. It is only in mathematics that terms are interchangeable absolutely without error.

The Logical Positivists, however, treat the limiting case as though it were the typical case, with the results that might be expected.

So much for the logical part which seems to be simply a mistake ; now for the positivist part which is a more serious affair. Mr. Ayer assumes that all valid propositions asserting matters of fact are logically equivalent to or can be reduced without change of meaning to propositions which assert nothing but that certain data of sense can be or are experienced under certain conditions. That is to say Positivists like Mr. Ayer are Phenomenalists. The chief use the Phenomenalists make of their assumption is to show that propositions they dislike cannot be so reduced and are therefore invalid. Propositions they like are treated more circumspectly. I am inclined to suspect that no proposition would come through the ordeal unscathed.

Consider an ordinary scientific law, say " The boiling point of benzene is 80·4° C." This is a straightforward empirical generalisation from experiment and can be verified (according to the scientific use of this term, not necessarily the positivist use) any day by anybody who can obtain the necessary apparatus and has the elementary knowledge and skill to use it properly. Let us see what this involves. In the first place Aristotle or Archimedes, though cleverer than you and I, could not do it. They could not obtain the necessary technical information and had no chance of acquiring the necessary technical skill. In the second place, Robinson Crusoe on his island could not do it even supposing he had the knowledge and skill. Though I say " could not," I am prepared to admit that if the necessary raw materials were present in the island and if he lived long enough and worked hard enough, it is just conceivable that he might manage it. He would not only have had to make glass and blow his apparatus—easy enough of course when you know how—he would have to construct a thermometer and a barometer. He would have to calibrate them and work out the various corrections to be applied to their use. Lastly he would have to prepare pure benzene.

You and I can buy the benzene in a bottle trusting to the knowledge, skill, and material equipment of the coal miners, gas workers, and chemical workers who prepare and purify it, and trusting too to the integrity of the people who bottle it and label it ; whereas they might have filled the bottle at the nearest garage. We must either trust in its purity as purchased or else purify it ourselves. We shall buy our thermometer and probably

trust to the maker's or somebody else's calibration ; even if we calibrate it ourselves we shall do so against another thermometer taken as a standard and assumed to be trustworthy. Even if we read the barometer ourselves, we shall trust to somebody else for the accuracy of the scale and the corrections to be applied. The last and really the least part of the business is setting up the apparatus and distilling the benzene, but even here the complications are not at an end. In nine cases out of ten we shall not see the mercury thread in the thermometer creep up to the mark we have agreed to call 80·4 and remain steady there while the bulk of the liquid distils over, but we shall see it remain steady at some other mark. However, when we have applied corrections, which people have worked out and printed in books, for the barometric pressure at that time and place and for the cool portion of the thermometer stem, the corrected number will come to 80·4 or something very near. Still we may have the bad luck to do the experiment during a storm when the barometer is changing rapidly, and then the temperature will not keep steady at all and we may have to start all over agian.

Positivists seem to imagine that all that happens is to read the name Benzene on the label and see the mercury thread coincide with 80·4 on the scale. If that was so, the assertion that benzene boils at 80·4° C. would be tautological. The name on the label is a linguistic sign ; so also is the scale on the thermometer. If there was nothing else involved we should have to conclude that by definition " Benzene " was equivalent to " what boils at 80·4° C. as indicated by the position of the mercury thread on such and such a scale," and similarly that the significance of the 80·4 mark was that by definition it corresponded to the temperature of the vapour of boiling " Benzene."

There is a grain of truth in this notion that the law holds by definition, as can be seen from the result of a negative experiment. Suppose that when distillation began the thermometer reading was round about 60° C. and then gradually and steadily rose until by the end it had reached 120° C. ; should I conclude that the law was false ? Of course not, I should conclude that the stuff in the bottle was not benzene ; in fact that it had been filled at the garage pump and the label was fraudulent. It is not fair to conclude, however, that the law is a tautology. We are not dealing here with mathematical terms which can be invented and defined at will, but with terms intended to described natural entities and

processes, that are largely independent of human volition. It may be part of the definition of benzene that it boils at 80·4 °C. but it is only part. There is no complete definition of benzene; something unexpected may always turn up. Moreover, something else may be found to boil at 80·4° C., in which case the definition would need to be modified.

For certain purposes scientific laws can be treated as equivalent to definitions, and so far as they are used in this way are not strictly true or false or liable to upset by observation. But the definition may always turn out to be inconvenient in use and have to be dropped and another put in its place. Moreover, the fact that for some purpose the same form of words is used as a definition does not prevent it being used in other ways simply as a summary of what has actually been found to happen. Every generalisation is both a summary of past events and a method of defining terms for future use; the two functions are distinct but related. The propositions of natural science must themselves be examined to see how they are actually used. It is a grave error to assume off hand that they are just like mathematical propositions.

I fear I am digressing and going back to matters of logic. The main point to be emphasised here is that the verification of so simple and obvious a generalisation as the boiling point of a substance is a matter of great complexity. It is not to be lightly dismissed as " an observer experiencing certain sense data under certain conditions." It is true that there are certain critical sense data which, if they are of one kind, verify the law, if of another, confute. But these critical sense data are a very small part of the whole story and they are meaningless by themselves without the rest of the story. The story even in this simple case is a long and complex one. It has behind it a vast structure of human effort and experience, a co-operative effort, and the experience of many generations. Countless men of science from Galileo on have worked out the knowledge needed for it. Cinnabar miners in Spain, coal miners in Yorkshire, and glass workers in Czechoslovakia have sweated for it. If the verification of this law really depended upon translating it into terms of a single man's sense experience, it would have to go by default; at the best his task would be insuperably complex and difficult, at the worst impossible. Can co-operative human effort be translated into sense data; and if so, whose? Berkeley would have had an answer to this question, but his modern imitators, who

think they can have his phenomenalism without his God to hold it all together, have no answer.

No proposition that enters into the discourse of the natural sciences describes or refers directly to an immediate datum of sense experience. They refer to the general properties and relations of physical objects and in certain cases to general relations between physical objects and classes of sense data. (For confirmation of this, see any scientific textbook.) The classes of sense-data to which they refer are of a restricted and highly conventionalised type, mainly what Sir Arthur Eddington called " pointer-readings." The function of the data is purely symbolic ; they are nothing by themselves. They symbolise causal relations among physical objects, more particularly the operations the observer carries out upon physical objects. In fact " the observer," that famous figure in philosophical discussion, is more correctly described as " the operator."

Nobody has ever reduced any scientific proposition to propositions referring to nothing but actual or possible data or contents of sense experience. Failure to do so is concealed under a smoke-screen of phrases like " the necessary conditions for observations " and " logical constructions from sense data." The conditions, the observer himself, and the reason for logically constructing remain unexplained. The logical constructions are never constructed in any specific case ; we are merely told they could be. In fact the positivist or phenomenalist account of the process of scientific verification is pure myth or, if you like, metaphysics. I should prefer to say that any possible account of the process of verification is metaphysical and the phenomenalist account is bad metaphysics.

This point is so important that perhaps I may be permitted to labour it further. The physical sciences as expounded by the investigators themselves have never been positivist. The positivists have always been armchair critics or else mathematicians. Meyerson has repeatedly emphasised this in his historical discussions of the matter, and it is no reply to Meyerson to say that though scientific investigation actually took this road, it ought to have taken another and positivist road. Science is what the investigators have actually done, and there is no " ought " about it. As Whitehead has pointed out (*Adventures of Ideas*, p. 161 *seq.*), if investigators had been positivists, they would in many cases have failed to make the discoveries they did. Physical

science has always been based upon a belief, possibly "metaphysical," that there are causal processes operating in a physical universe which does not consist entirely of sense data. This belief may give rise to difficulties but its abandonment gives rise to worse ones.

If sense data are the only things that exist, then the existing ones must be actual sense data somebody is experiencing. Possible sense data without something to render them actual are nothing, and what renders them actual cannot be other sense data unless we attribute to sense data hitherto unsuspected "metaphysical" properties. Again, the positivist to fill his universe has to resort to logical constructions from sense data, but these are not sense data themselves, any more than a class is one of its members. The theory that scientific entities are logical constructions from sense data is intended to provide a logical bridge between immediate experience and scientific theory. It cannot bear the additional burden of the doctrine that scientific entities are "nothing but" sense data. The plausibility of the positivist case rests upon his apparently appealing to actual sense data; the possibility of its being valid rests upon a concealed appeal to what are not actual sense data.

It is worth noticing that certain psychologists (e.g. D. Katz; *The World of Colour*) have endeavoured to describe the actual character of sense data, have found the task singularly difficult and are not all agreed as to the results. On the other hand, their difficulties and disagreements have no obvious relevance to the propositions of physical science, and throw no doubt upon them.

Admittedly there are difficulties on any theory in accounting for the relations between sense experience and the supposed real world, but ordinary common sense and most realist or idealist philosophies do not stultify themselves at the outset. They allow, for instance, for the existence of some machinery by which possible sense data may become actual even if they find it hard to give a coherent account of the machinery. Possible sense data without machinery to actualise them are myths. Berkeley's phenomenalism, as I have said before, was reasonable. You can say of the material world "*esse est percipi*" if there is some being whose *esse est percipere* always and everywhere. A world can be built out of actual sense data if they are all actual always. Otherwise it must be built out of sense data and other things which are not sense data.

Phenomenalism therefore seems to me to be definitely wrong. It is not so much that it asserts what is false as that it neglects what is true. Nevertheless, there does appear to be something of value in positivist criticism, and positivism is perhaps not necessarily bound up with phenomenalism. Before discussing this point, however, there are some further aspects of Mr. Ayer's exposition to be mentioned.

In discussing the process of verification by observation Mr. Ayer decides, for reasons that appear to me sound, that absolute certainty is unattainable for any type of factual assertion and that probability is all that can be expected. As to the notion of probability, he does not attempt (perhaps wisely) to give a logical account of it, but contents himself with a pragmatic one. He says (pp. 143, 144), " Roughly speaking, all that we mean by saying that an observation increases the probability of a proposition is that it increases *our confidence* in the proposition, as measured by our *willingness to rely on it in practice* as a forecast of our sensations and to retain it in preference to other hypotheses in face of an unfavourable experience." Then he goes on to develop this notion of probability in more detail, and says later that what he says applies to all empirical propositions without exception, whether singular, particular, or universal. The whole of the discussion could hardly be bettered, but it introduces a terrible serpent into the positivist Eden. Notice the words I have italicized, whereby the truth or probability of factual assertions is made to depend upon value judgments based upon our emotional response. This conclusion will not worry most people, but it should worry Mr. Ayer, because in the next chapter he dismisses all ethical and aesthetic value judgments as mere expressions of emotion, of no factual significance and strictly meaningless. He holds (p. 158) that to say (1) " you acted wrongly in stealing that money " adds nothing to the literal meaning of the assertion (2) " you stole that money." It merely shows that the expression of it is attended by certain feelings in the speaker. If this is so, he cannot also say that to assert his feelings of confidence in a proposition or his willingness to rely on it in practice add anything to its literal meaning. If to say that something is good, bad, right, wrong, beautiful, or ugly, is to say nothing, so also to say that something is probable is to say nothing.

It is worth noticing that the example is not quite fair because an ethical judgment is already implied in the word " stole." The

origin of the curious dogma that sensations are essential constituents of factual propositions but emotions are not, is easily seen. It is the theory that the " subject " or " observer " is a purely passive recipient and not an agent or operator.

The sources of the dilemma are the fundamentally false logical theory of propositions and the positivism from which Mr. Ayer starts, and not his eminently reasonable views on probability and verification. Any theory of verification would be placed in the same difficulty given the same assumptions. Any type of assertion about truth, falsity, or probability is an assertion of value and will be meaningless if assertions of value are meaningless. I understand that some who incline to logical positivist views would admit that assertions about the truth of propositions are meaningless, but if so they had better give up philosophy and take vows of silence.

It is perhaps necessary to insist further that there is no escape from the difficulty by saying that assertions about the truth or falsity of propositions are definitions of terms or tautologies, because that is what they are not. They are either statements of fact or nothing. If you want to explain the meaning of " It is true that . . ." you can do so by substituting " It is a fact that, . . ." " It happens that, . . ." or " I expect that, . . ." or " I am confident that . . ." It must be some phrase indicating an attitude of mind, or emotional state directed towards alleged facts or events. This is simply another way of saying what I have said already in defining language.

There is another dilemma for Mr. Ayer. It is not so vital perhaps, and I am not at all clear where the fallacy lies. He has an interesting argument (pp. 206, 207) against the common view that the contents of a person's sensations are entirely private and inaccessible to anybody else and that it is only the structure that is accessible. This is an argument which I should gladly subscribe to, but it involves the assumption explicitly stated by Mr. Ayer that it is a mistake to draw a distinction between the structure and content of sensations. But if the only factual propositions are propositions about sensations, how can it be legitimate to distinguish between structure and content in propositions? According to any theory, it must be admitted that there is some correspondence between propositions and what propositions are about; so that the difficulty is a real one. I do not profess to be able to see the way out.

The Logical Positivists have drawn attention to the problems of the character and functions of language and have shown that in some way the structure of language is or ought to be related to the structure of the world. We should be grateful to them for raising the question, even though their answers are wrong. They are wrong, as I have tried to show, in respect both of their logic and their phenomenalism. Their logic is a fallacious extension of theories applicable only to mathematics. In fact, the linguistic problems they raise cannot be solved by logic but need psychology too. To these fallacies they add the older one of phenomenalism.

Like Lucretius, the positivists conceive their role as that of destroyers of superstition. Most people are superstitious, and superstition takes many different forms, so that there is no lack of dragons for the slaying. To consider only scientific superstitions, there has been a tendency to include in scientific theory hypotheses or hypothetical entities which are superfluous in so far as no specific observable consequences can be deduced from them, or, at least, no consequences that cannot be deduced on other grounds. Criticism of such theories is a useful service, for they may be worse than superfluous, they may hinder the progress of knowledge by setting up barriers to observation.

Positivist criticism has, however, often been misdirected and ineffective because it was based upon misapprehensions as to the methods of scientific investigation, and because it was mixed up with phenomenalism. It has been assumed that science consisted of two parts, theories and facts. The theories were conceived as the most important part. They were essentially things written in books and capable of being criticised independently apart from "facts." It was forgotten that all statements of theory are metaphors (this statement is not a metaphor) and that metaphors are good or bad, helpful or unhelpful for purposes of communicating knowledge, rather than true or false simply. It was also assumed that the "facts" were simple collections of actual and possible sense data.

A correct statement is not easy to make in any simple way. The following is as near as I can get. Science is what scientifically trained persons do. Scientific training consists in acquiring technical skill, becoming a craftsman, as well as in learning what others are doing and have done by means of similar technique. The "facts" of science are not easy to disentangle from the theories because the ascertaining of facts depends upon the use of

instruments, the construction and use of which depends in turn upon theory. It is, however, possible to make a rough distinction between the minimum of theory that is needed for experimental operations and the immediate results of the operations on the one hand, methods and data one might say, and theory in the stricter sense on the other, that is to say the formulation of abstract schemes intended to generalise the data as far as possible. These abstract schemes will by preference be expressed in mathematical form.

There is a tendency among theoretical physicists to say that the terms that are used for theoretical formulation need not have any " meaning " provided that all variables in the theoretical formulation can be translated into variables capable of direct observation by the use of appropriate methods. This tendency implies a partial acceptance of positivism.

Opposed to this modern tendency is an older one, still popular among experimental physicists and perhaps universal among experimentalists in biological science, the tendency to construct models as theoretical formulations. The models may be conceived in mechanical terms or be merely diagrams describing hypothetical geometrical relations. The experimentalist is generally not a mathematician by nature though he may have acquired mathematical technique, but is something more like a mechanic. That is to say he is good at handling things, and he likes to picture the world of scientific theory after the fashion of the things he handles. The model-making tendency has led sometimes to serious fallacies, because it allowed people to think the ultimate small-scale entities, atoms, electrons, protons, etc., were endowed with the same familiar properties as the instruments they handled and the things they looked at. The notion will not, of course, bear examination, for the familiar properties of what we see and handle depend upon the fact that these are aggregates of vast numbers of the ultimate units, which must themselves have quite different properties. As a parallel, the average age of the whole population of the British Isles remains constant (or nearly so), but that does not prevent each one of us growing older from year to year. It is easy to understand that an atom cannot be coloured and that colour is a property of aggregates. It is perhaps less obvious but equally certain that an atom has strictly no shape or size, because whatever has shape and size must have a surface, and only a large aggregate can have a surface. In fact, if Des-

cartes was right in saying that the essential property of matter is extension, then atoms are not material.

An atom is best described as something happening round a centre. Sets of these centres tend to oscillate about certain mean distances when considered over long enough time intervals. To call this shape and size is at the best a figure of speech. That in fact is just the trouble ; everything that is said about atoms must be said in terms borrowed from our knowledge of gross matter and must be metaphorical. These metaphors are liable to be taken literally. The formulae of the mathematician are also metaphors, but fortunately they have no literal meaning to deceive us.

In so far as theories depending upon models are liable to abuse, positivist criticism is justified. But there is no justification for sweeping them away altogether, because they have undoubtedly been useful. It may be instructive in this respect to consider the history of the atomic theory.

The atomic theory is one of those very general theories such that all possibilities can be stated as a simple dichotomy—either matter is infinitely divisible or not ; if not, then there are atoms. No recent physicist, I believe, has ever taken infinite divisibility seriously. It is a difficult conception and its consequences obscure ; but as far as any consequences can be made out it seems to contradict certain elementary facts, such as the expansion of gases, the reflection of light at surfaces, the existence of chemical elements and compounds. All these things are easy to understand on the atomic theory. It is true that classical hydrodynamic theory appears to assume that fluids are infinitely divisible, but this means no more than that their structure, if any, must be very fine relative to the volumes actually considered. At any rate, seventeenth- and eighteenth-century physicists seem to have been atomists simply because the theory clarified their ideas. There were in those days no consequences that could be deduced from and directly checked by observation. On these grounds contemporary positivists might have condemned the theory. The fault, however, lay with the lack of the technique needed to make the right kind of observations. As soon as the technique developed, the deductions were made and verified by observation. Scientific observation does not consist, as many seem to believe, in sitting with your mouth open waiting for things to happen. It consists in going about and interfering with things. What

needed to be discovered were the methods of quantitative analysis of chemical compounds, begun by Lavoisier and continued by his successors. The last necessary step was taken by Dalton, who deduced from the atomic theory and the law of conservation of weight in chemical changes that, whenever two kinds of atom combine, they must combine in constant proportions by weight. Further, if two can combine in different proportions to make different compounds, the ratios of these proportions must be as simple whole numbers. These deductions he tested by experiment and found to be about right in the small number of cases he could try and as far as his very crude methods would allow. Very soon others took the matter up and it was found that the deductions held in every case examined. The more the methods of analysis improved the more exact the agreement became.

Since then other types of deduction from the atomic theory have been made and confirmed. Nevertheless, even towards the end of the nineteenth century there were philosophers of positivist views who looked with suspicion at the theory, largely, I believe, because it had been abused. Because, as mentioned already, atoms were supposed to be literally hard round things, like billiard balls, only smaller and less highly coloured. Nowadays the atomic theory is very firmly established, even though atoms are not quite so hard and round. At any rate, the old fallacies are avoided and even positivist philosophers no longer murmur against them. They have discovered that after all atoms are only " logical constructions " and quite respectable.

I think we must agree to the " Principle of Observability " ; namely that no hypothetical entity or process is to be admitted to scientific theory unless it leads to consequences verifiable by experiment or other kind of observation ; though two provisos should be added. The first has been mentioned already, namely that what can at any stage of progress be verified by observation depends upon the technique available for the purpose. No observational consequences of a hypothesis may be immediately apparent, but it may be a good hypothesis all the same, though obviously not so good as if they were apparent and verified.

The second proviso is rather more complicated. The most general hypotheses of physics that cover all entities or processes whatsoever are often such that both from the hypothesis and its contradictory observable consequences follow, so that each is a definite hypothesis ; the contradictory is not a mere blank.

Thus, either matter is infinitely divisible or it is atomic; either there is absolute motion or not; either there is no limit to the precision with which the position and velocity of electrons can be determined or there is a limit. In each case observable consequences follow from either alternative, and if one is false the other is true. This is not so with more special hypotheses, from the contradictories of which nothing can as a rule be deduced. If the structural formula of a chemical compound is so and so, then the compound will have such and such properties. It does not have those properties, therefore its formula is not so and so. Here there is only blank negation except on the unlikely assumption that there is one and only one positive alternative formula. There may be no alternative thought of; there may be far too many. There are cases where it is best to compromise. A hypothesis may fail in some respects, but it may be better than nothing. Something unexpected may always turn up to solve the difficulty.

In conclusion, if positivism in its scientific aspect meant nothing more than this kind of critical attitude towards hypotheses, there would be nothing to say against it. But positivism has always meant much more. In fact it has meant phenomenalism too; the theory that the material world consists of nothing but sense data. Whatever the truth may be, this theory I am sure is false and the mother of a great family of fallacies. It is plausible because it appeals to what we imagine to be immediate, certain, and actual, and because we do not realize that the possible sense data it has to drag in are purely mythical.

VII

The Atomic Theory as Metaphysics and as Science [1]

It has been the fate of the atomic theory to survive for centuries as metaphysical theory with no definite scientific standing, then in the nineteenth century to become scientific. In so doing it underwent considerable changes without in any way losing its metaphysical character. Its history is here briefly sketched as an illustration of the kind of relation that is to be found between speculative metaphysics and science, and within science between theory and practice. For this purpose it has the advantages that it lies within the relatively stable and well-explored realm of physical science; that it is easy to understand and, though mathematical, requires nothing more advanced than the multiplication table; and the evidence on which it is based, though very complicated, is in no way difficult to grasp. Experiment in chemistry, unlike experiment in modern physics, does not require for its understanding difficult theory or acquaintance with the functions of elaborate forms of apparatus. In short, it is science that is easy to understand now it has been discovered, though it was difficult to do for the first time. *Prima facie*, then, I am concerned with innocent historical statement, but my aim in setting it out is polemical; namely to try to counteract some of the mythology of science that has been industriously propagated by Positivists, old and new. In spite of that, I hope that what I have to say is correct in fact; and it is as historical fact I should like it judged.

Matter, body, or corporeal substance meant much the same to everybody until recent scientific theories complicated things. It meant, first of all, that which is apparent and common to the senses of sight and touch, which occupies space and moves in space. For physicists only spatial properties were of importance, others were no more than diagnostic signs. Now, few people have been content just to observe the observable properties of matter; most have also held theories about it. *A priori* there appear to be two possible theories about the spatial properties physics deals with. (1) Matter is infinitely divisible and all space

[1] *Proc. Aristotelian Society*, 1945.

is filled with some matter everywhere, though its density varies between the densest solids and what appears to our senses to be vacuous. (2) Matter consists of discrete units of finite volume separated by empty space, so that the apparent continuity of solid matter conceals discontinuity of its minute parts, and emptiness also. I shall call the first the Plenum Theory and the second by its familiar name, the Atomic Theory, though Corpuscular or Particulate Theory would be more correct, now that "atom" has acquired a restricted technical meaning. In the past the two theories were usually taken to be mutually exclusive and to exhaust the possibilities. Both theories are metaphysical in origin; that is to say, they spring from the distinction between appearance and reality and comprise doctrines about hypothetical real entities which do not appear in sense experience. The arguments for them are attempts to supplement and correct experience by logic. They are to the effect that reality must be such and such (whatever appearance may suggest to the contrary) because anything else is inconceivable. If there is an appeal to experience it is to its general character much more than to specific limited sets of facts.

Auguste Comte supposed there was an antithesis between metaphysics and science and on this account many of his followers refused to accept the atomic theory. There is, of course, no such antithesis and nothing to prevent a metaphysical theory becoming scientific, though it necessarily changes in the process; and that has been how many most respectable theories have started their careers. All that is needed is to deduce from the theory specific facts which can be verified or contradicted by experience; a process that may have to wait a long time until the advance of scientific technique makes it possible. If the advance in technique springs from sources outside the original scope of the theory, then the character of the technique used in verification will change the character of the theory.

The method of establishing a theory by refuting rival theories with purely rational arguments may be conclusive in mathematics, but elsewhere never completely so. Nevertheless the supporters of rival metaphysical theories are anxious to point out incoherences in the others. The incoherences in their own theory they are not so fussy about. Thus supporters of the plenum theory pointed to a number of defects in the atomic theory. (1) The notion of things being separated, yet separated by nothing, seems

absurd; but that is what empty space must mean. (2) If the supposed atoms have a finite volume they have at least spatial parts, are potentially divisible, therefore not strictly atomic. If they have no finite volume but are of the nature of massive points, all equally must possess infinite density. This not only seems absurd, but disposes of the possibility of distinguishing between light and heavy atoms as is usually done in terms of density. (3) Atomic theory presupposes that atoms interact by impact; but if two atoms approach, touch and separate, then at the moment of contact they must be deformed (or there is no repulsion). Deformation of a composite body by change of relative position of its parts is conceivable, but not deformation of a simple body. Therefore real contact between simple bodies is inconceivable. The alternative, in any case necessary for a massive point theory, is that they act at a distance by repulsive forces. But action at a distance implies some sort of plenum between centres of force; just what the atomic theory is designed to avoid.

Atomists ignore these difficulties because of certain attractive features of their theory. The chief of these is that it enables us to visualise the minute structure of things using the natural assumption that all physical operations are like our own operations by the process of pushing things about. Pushing requires contiguity in space between pusher and pushed, and also room or free space in which movement can take place. If the visualising process is carried through systematically, then the classical atomic theory necessarily crops up. Separate, distinct, indivisible entities separated by empty space are unavoidable. The only reply to the atomist is just to refuse to visualise and analyse at all. Thus the strongest atomist argument is based on the compressibility of gases. The smallest drop of water, when it is introduced into an evacuated vessel however large, evaporates and expands into every part and can again be compressed into its original volume. Once you start visualising the expansion and compression in terms of the minute structure of water vapour the atomist's case is granted. To oppose him you must be content to state large-scale facts; that solids and liquids have specific densities only slightly altered by pressure, while the density and pressure of a gas vary together so that its density is always the least possible. So long as this refusal is maintained atomist arguments cannot be pushed home; neither the one from

compressibility, nor the two older ones that a plenum makes motion impossible and that without atoms action at a distance has to be admitted. The reply to the first, the argument about motion, will be considered later. The reply to the second is that a thing is in the place where it acts and if it appears to act at a distance that is because what seems its limited volume and position is merely a nuclear volume and position of more intense or denser occupation, but that to some extent it is also elsewhere ; namely, wherever action occurs. In fact, anything may to some slight extent occupy any amount of space. If a magnet attracts a piece of iron, the magnet also *is* where the iron *is* ; in fact, as far as the magnetic field extends.

There is one more atomist argument to consider at this stage. Plenum theory involves a denial of the sharply differentiated specific properties which appear to distinguish certain kinds of matter from one another. If everything to some extent is spread everywhere, then everything must also be to some extent of every kind. All cheese would then be to some extent chalk (as chemists will admit) and also all chalk to some extent cheese (as they will not admit). Atomic theory implies the opposite ; namely, that, in principle at least, one kind of substance can be completely separated from other kinds. It was, in fact, through the study of the specific properties of different kinds of substance, that is to say through experimental chemistry, that the atomic theory in the hands of Dalton became a part of science. But it must be remembered that Dalton first came to chemistry from the study of the physical properties of gases, and his contribution was essentially the linking together of these two branches of science.

Before dealing with Dalton let us take the theory in its ancient form and consider the arguments. These are to be found in the first book of Lucretius' *De Rerum Natura*. There is no need to consider earlier atomists because they probably used the same arguments. Lucretius shows no signs of any knowledge of the science of his day ; the Geometry, Astronomy, Mechanics and Optics of the Alexandrian school. Lucretius is expounding dogma and is doing it " for edification " ; he is not interested in investigating anything. He propounds a cosmology which explains everything in terms of the laws of impact without examining the processes of impact experimentally or mathematically, and having in fact very queer ideas on the subject (II, 95–99).

It is not very clear what information about Optics was available at Alexandria in the first century B.C. but there must have been enough available to any genuine enquirer to contradict Lucretius' remarks on curved mirrors (IV, 311–317). Again, Lucretius' astronomy seems to remain at the stage of Ionian speculation of the fifth century B.C., as would appear from the curiously vague remarks about the sun and moon (V, 656 *seq.* and 751 *seq.*), written at a time when quite reasonable estimates of the distance of these bodies had been made. The statement that sun and moon are just the size they look (V, 564–591) is intelligible in terms of a pure phenomenalism after the modern fashion, but is nonsense in terms of any mechanical cosmology, such as atomism, or in terms of third-century astronomy. In addition, there is confusion of thought in the notion of a downward stream of atoms in an infinite universe (I, 1008 *seq.*, II, 216 *seq.*). This should suffice to show that Lucretius is no scientist and even this would be unnecessary but for the misleading statements of Professor Farrington in his *Science and Politics in the Ancient World.* If we take Lucretius as a metaphysician he appears in a much better light.

(1) The argument opens with the assertion that things do not arise out of nothing—" *Nil posse creari de nilo* "—(I, 155 *seq.*). This truth, if it is true, is a truth of reason and not an inductive generalisation from experience. For experience *prima facie* bears witness to change rather than constancy. Lucretius argues that to deny this assertion is equivalent to asserting that anything may arise out of anything ; and that is manifestly false because there is some order in nature, not mere chaos. The appeal to experience is indirect and is quite general, not specific. We may grant his point that there are some orderly processes, therefore it is false that anything may produce anything. The step from the falsity of the proposition " anything can arise out of anything " to the truth of the proposition " nothing can arise out of nothing," in the sense that matter in uncreated and uncreatable, is however not known to logic. Lucretius next (I, 215 *seq.*) argues that matter is indestructible. The argument is similar and no better. This stage of the argument is hard to reconcile with the doctrine that the evidence of sense is to be preferred to that of reason (IV, 478–85). Still, his conclusion is that of most Greek thinkers ; but those who were not Epicureans were honest in their avowal of their metaphysical faith that reason is more trustworthy than

sense. Strictly, Lucretius' assertion is an axiom that rests upon no argument save that creation and annihilation are inconceivable. This hardly amounts to more than that, since the notion of cause is that of constant relations between antecedent and consequent, *if* something were to be created it would have no antecedents, or *if* annihilated, no consequents. In either case no causal account could be given.

The scientific investigator must look for the most permanent elements he can find and rest his processes of measurement upon them, but he has no need to go on to assert that everything is really permanent and change cannot be anything but the shuffling of pre-existing parts. It would simplify his problems if it were so, but he has no empirical grounds for saying it is so.

After this first assertion comes one of Lucretius' best arguments (I, 265 *seq.*). He appeals to specific facts of experience after the manner of science, but appeals also in terms of the metaphysical distinction between appearance and reality, in order to establish the point that there are things which are corporeal and real although invisible and intangible. For instance, we can smell and can feel heat and cold when nothing visible or tangible is transferred to produce the effect. We note evaporation and condensation occurring when no visible moisture passes out or in. We often observe considerable effects produced by the summation of very many small processes, no one of which appears to produce any effect at all. One drop of water falling on a stone makes no difference we can discover, but the dripping of years wears it away; therefore even one drop must carry away something, but something so minute we cannot discern it in any way. Perhaps one should add that by recognising the corporeal nature of air, as distinct from empty space, Greek science had already recognised that a thing could be real yet intangible and invisible.

(2) The next step is the vital one. Granted that there are permanent real things and that they may be insensible because of their smallness, to show that there is empty space between them. Lucretius does not use the argument from the compressibility of gases because the facts were hardly realised by him or probably anybody else in his day. He relies entirely on the necessity of empty space for motion of any kind (I, 329 *seq.*). He ridicules the argument of the Stoics that a fish can swim through water, without there being any empty space in the water, by reason of the water flowing backwards as the fish moves

forwards, so that what is displaced by the fish's head flows in behind his tail (I, 370 *seq.*). Provided you avoid analysing and visualising the Stoic argument stands. It is just a matter of differential pressures. The swimming fish produces high pressure in front and low pressure behind. A fluid is by definition that which tends to flow from a region of high pressure to one of low. But if you analyse and visualise, then you can hardly avoid the atomist conclusion and have to admit that fluid motion implies some empty space between the fluid particles.

Lucretius sums up this section of the argument by saying (I, 418–82) that bodies must exist because our senses bear witness to them, that whatever acts or is actual is corporeal and that there is empty space which allows for motion. Anything else in the world is a property or accident of one of the two, body or void, and there is nothing "*quasi tertia natura*" (I, 430–33). For all this, Lucretius, like everybody else, resorts to a third factor when he is in difficulties; or else, why does he speak of "*natura daedala rerum*" or invoke Venus, who stands for the principle of growth and increase in the organic world? Lucretius also admits human free will.

(3) Primary substance must be indestructible (I, 483 *seq.*). Lucretius takes this to mean hard and resistant to shock, since interaction is by impact. Hence he concludes that primary substance encloses no empty space. Strictly and metaphysically speaking body and void are mutually exclusive. The familiar objects of experience therefore are not what they seem. They are all partly void, as well as composite. They all contain interstices, as can be inferred from their permeability to heat. (An excellent argument, if taken a little more subtly than was possible in Lucretius' day.) What is commonly called destruction of bodies is not destruction at all, only separation of parts. The conclusion then follows, that sensible bodies are not what they seem but are really (according to metaphysical, not experienced, truth) composed of simple, indestructible units. The density and rigidity of sensible bodies depends on the close packing of these units. The units must be of finite size because the sum of an infinite number of infinitesimals is not finite. This is not a good argument. A better might have been that an infinitely divisible body cannot be distinguished from a plenum and cannot contain empty space. In fact, the finitude of the unit is presupposed in the whole discussion.

(4) The existence of atoms established, there remains the last and most important argument, that there must be different kinds of atoms with diverse and specific properties on which depend the diverse and specific properties of sensible bodies (I, 635 *seq.*). Lucretius does not make his point very clear. We can hardly blame him because it depends upon establishing empirically the fact that there are definite, distinct and separable kinds of matter, each with its own specific properties. This, though suggested by Boyle, was not fully established before the late eighteenth century. But Lucretius' negative argument against the older cosmologists is clear enough. Experience does *prima facie* inform us of a diversity of things whose properties are more or less definite and distinct and not always interchangeable. Water is recognisable as such because of certain properties it always has, and air as air, because of certain other properties. The properties of the one are not those of the other and the two are mechanically separable. Therefore the atoms of which water and air are composed must have corresponding (not necessarily identical) specific properties. Those who claimed that everything is composed of water, or of air, or of the four " elements," earth, water, air and fire, were in effect denying specific properties and separable distinguishable kinds, as Anaxagoras seems to have realised. The alchemist of later days did the same. On the other side, Archimedes, when he found that the king's crown had been adulterated by showing that its density was less than that of pure gold had grasped the point about specific properties. Lucretius can be credited with a shrewd guess in seeing the connection between atomism and specific properties.

So far I have summarised the four stages of Lucretius' argument in his First Book. A good argument, but not put forward in the spirit of enquiry, and quite without considering that the opposed theory could be maintained just as consistently as his own. In the later Books, where the theory is developed and applied, the argument is not so good. Some of his lapses have been mentioned already. Besides these there is one difficulty which any form of atomic theory has to face, which ought to be considered. Lucretius says (II, 444) that hard dense bodies are composed of hooked atoms and liquids of smooth ones, forgetting that glass and metals can be melted and water can be frozen. What is worse, the idea of a simple indivisible unit with a hook on it is eccentric, to put it mildly. Nevertheless, we must recognise

that Lucretius is struggling with a genuine problem. Operation by impact means operation by repulsion ; but if there is repulsion there must also be attraction or everything would fall to pieces. The hooked atoms stand for some sort of recognition of attractive forces within the limits of atomic theory. They might be taken by exponents of the plenum as showing the defects of atomism.

In Lucretius' day no consequences were deduced from atomic theory which pointed explicitly to facts capable of observation by any means then available. Any facts known could be dealt with in terms of plenum theory. The important difference is that atoms appeal to imagination and atomic models can be constructed, whereas the plenum makes no such appeal and does not lend itself to models. Plenum theory can be developed mathematically but only with the help of the mathematics of later ages. In the seventeenth and eighteenth centuries leading continental philosophers, such as Descartes, Spinoza and Leibniz, were upholders of the plenum theory or at least were opposed to atomism. English thinkers (except Hobbes) were atomists. Newton, though inclined to speculate in terms of atomic theory, and so far an atomist, considered it a " hypothesis " not required by " natural philosophy." His verdict sufficiently defines its status until the end of the eighteenth century. Nevertheless speculation in terms of atomic models was on the whole helpful as it tended towards definite and concrete thinking about physical processes. It opened up possibilities. The objection to speculation in atomic terms was the one pointed out by Newton in his early controversy over optics, that speculative theories about the supposed atomic or non-atomic nature of light had usurped the place of observation. That is the wrong kind of metaphysics.

It was, however, in Newton's time that the two lines of investigation which led finally to the scientific atomic theory were begun. The first was the study of the physical properties of gases, and Newton himself actually stated the basic principle of the modern kinetic theory of gases. The other line was the study of the specific properties of substances ; experimental chemistry. Boyle was very largely responsible for initiating both.

The notion that there are substances in the chemical sense, definite kinds with definite invariable properties, was not arrived at easily. The teaching of the alchemists was directly contrary. You start, they said, with lead which has a dull whitish colour and if you are clever enough you give it a bright yellow colour,

and then you have gold. Why not? We constantly see some properties of things being changed while others are not, and one transmuted to another. Men had long ago learnt how to get pure silver from crude metal obtained from what we should now call silver-lead ores; it must have looked like turning lead into silver. The alchemists had discovered reagents which produced startling (though economically unprofitable) transformations. So why not lead into gold?

In the long query added to the 2nd Edition of his *Opticks* (1718) Newton could still state, on Boyle's authority, that water, even after it had been redistilled several times, leaves an earthy residue on evaporation. This was taken to mean that some water has been transformed to earth. It was only the painstaking work of Lavoisier more than half a century later that corrected this error. Newton also said that mercury was not always liquid at ordinary temperatures, but might be solid. Yet Boyle had already enunciated the contrary principles which were finally to dispose of the notion of transmutation. Boyle's principles were not obvious and not easily established. He realised that the ancient theory of four elements, earth, water, air and fire, or the later theory in terms of salt, sulphur and mercury, was entirely arbitrary and unconnected with practice; namely, what the chemist does in his laboratory. What he does is to separate mechanically the different kinds of things, so that they can be put into different bottles and labelled; and then to ascertain their properties by combination with others and further separation. Nobody, Boyle said, has ever extracted earth, water, air or fire out of gold; nor yet salt, sulphur or mercury unless he first put them in. On the other hand, gold can be alloyed with other metals or dissolved up in acids, and then recovered again entirely unchanged. If there are such things as chemical elements, gold is a better candidate for the post than any of these others. Chemical theory should arise out of chemical practice and practice be directed by theory. When Boyle's doctrine is fully developed it means that if any materials are found to be variable in their properties it is the chemist's business to separate out from them invariables—pure substances whose properties are constant (apart from regular variation with temperature and pressure). If any one specific property of a substance is to be altered it can be done only by altering others, namely by chemical combination or decomposition to form a new substance or substances. Sub-

stances are of two sorts ; elementary ones, which cannot be broken down into other substances, and those which can, compounds. Whatever is not an element or compound is a mixture. Boyle's theory is *a priori* in the sense of telling the chemist what kind of things to look for and how, but not in attempting to tell him what must be found.

The chemist's task of separation might have proved too difficult. Everything might have been inextricably mixed with everything else, as plenum theory suggests. But the labours of the eighteenth-century chemists who studied the metals and their compounds with oxygen, sulphur and acids showed it was possible in some cases. This was the death of alchemy and for the time being a nasty blow for the plenum theory.

With the development of quantitative methods a new conception arose, that of definite combining weights. Lavoisier took the conception for granted but others did not. If you stir up a larger quantity of salt with water not only will it dissolve quicker but more will dissolve than if you stir up a smaller quantity. This rule holds up to a maximum when the water is said to be saturated with salt. Up to the saturation maximum the water will dissolve any amount of salt, large or small. Now if solutions of salts in water are taken to be chemical compounds (why not ?), then there are instances where instead of combining weights being definite and fixed, they are indefinitely variable. There are contrary instances when they seem to be fixed, such as the oxides and sulphides of the metals. Berthollet in the opening years of the nineteenth century maintained that even these are not really contrary instances but that the composition of the compounds varies according to the quantities of oxygen or sulphur available for combination. Berthollet had chosen his ground badly and Proust at the end of a long controversy was able to persuade him that in fact some metals form only one oxide and one sulphide of the same invariable composition, others form two, but again each is distinct, separable from the other, and of invariable composition. But Proust's victory was precarious, because plenty of other cases could be quoted that were *prima facie* in favour of Berthollet's view. To the question : " What is now our criterion by which we decide that zinc oxide is a chemical compound and a solution of common salt or oxygen in water is not ? " the answer is in two words—Atomic Theory. This is where Dalton comes in.

It is not likely that, when Dalton made his great discovery between 1802 and 1804, he knew of the controversy between the French chemists, which indeed had only just begun. In any case he approached the subject from a different point of view. He was a physicist whose meteorological interests led him to consider not only the physical properties of gases but also some chemical questions closely related; the composition of atmospheric air and the solubility of its constituents in water. Now the properties of gases, as already indicated, provide the natural approach to atomic theory. In fact the development of the kinetic theory of gases in the nineteenth century constituted, quite apart from chemistry, the culminating triumph of atomic theory after the classical pattern. Newton, though he could make no further use of it, had stated the fundamentals of the kinetic theory of gases (*Principia* II, Prop. 23). "If a fluid be composed of particles fleeing from each other and the density be as the compression [Boyle's Law], the centrifugal forces of the particles will be inversely proportional to the distances of their centres. Conversely, particles fleeing from each other with forces that are inversely proportional to the distance of their centres compose an elastic fluid whose density is as the compression." Dalton, however, did make use of the notion. To follow his argument, visualise the particles of such a compressible fluid and suppose that it is a pure elementary substance. It may be assumed that all the particles will be identical in all respects *including weight*. Next suppose chemical combination to take place between the particles of two such gases. It is obvious that it can occur only by their joining up in pairs, one of each sort; or in threes, one of one and two of the other; or in fours, and so on. These proportions fix the proportions by *weight* in which the elements combine, exactly as the chemist determines them in his analyses. Hence we can deduce the three fundamental chemical laws, of constant, reciprocal and multiple proportions. Dalton having deduced these consequences, then examined the published data and carried out experiments of his own to confirm them.

As writers of the Positivist school have often turned the story upside down and alleged that Dalton arrived at the laws empirically from chemical analysis and then generalised them further into the atomic theory, it is necessary to insist on the point. Roscoe and Harden in their *New View of the Origin of Dalton's Theory* (1896) showed conclusively from Dalton's own statements

that he assumed the atomic theory, then made deductions from it. Indeed it would have been impossible for him to do as Positivists alleged. Analytical methods were extremely crude and errors of over ten per cent. were the rule rather than the exception. In the absence of any criterion of accuracy or any stimulus to try to attain it, that was bound to be the case. Dalton supplied the criterion and the stimulus, so that the new generation of chemists, led by Berzelius and Gay Lussac, took up the task of accurate and systematic analysis. Chemical analysis is not too easy when you have been told how it ought to be done and what result you ought to get. It is extremely difficult when you have to discover both for yourself.

In Dalton's own mind and that of his contemporaries there was a good deal of confusion ; at least, of what we in retrospect can see as confusion because we have taken further steps which they had not taken. Dalton by linking up atomic theory with the notion of chemical combination had greatly transformed it, but at the time he could not see how much nor could he really complete his theory. Taking existing analyses and assuming they were reasonably accurate (they were not) he could make out a tentative scheme of atomic weights. Quite rightly he worked out the simplest scheme he could. There is no point in introducing complications until they are found to be necessary. Hydrogen is obviously the substance with the least atomic weight and is therefore conveniently taken as 1. Then the lowest number that can be reasonably assigned to oxygen is 8, nitrogen 7, carbon 6, and so on (using modern data for ease in understanding). So far Dalton was on safe ground, but it might be necessary to multiply some of the figures. This scheme would make the formula for water HO and for ammonia N_2H_3. It might be possible to produce cogent evidence against these formulae and in favour of H_2O and NH_3 which would mean taking O = 16, N = 14 ; further in order to avoid gratuitous complications, C = 12 and so on. The only thing we can blame Dalton for is that he did not appreciate the cogency of the evidence, but that was partly because of theoretical confusion and partly because there was at the time no criterion of the accuracy of analytical data. Gay Lussac put forward his Law of Combining Volumes from which it is argued that because two volumes of hydrogen combine with one of oxygen to form two volumes of steam, water should be H_2O. Gay Lussac's law is a deduction

from the Kinetic Theory of Gases and has since been accepted, but Dalton rejected it because existing analyses seemed to show that the actual combining volumes deviated considerably from the supposed rule of whole numbers, in this and in other cases. The clarifying of theory and the improvement of practice necessarily went together; theory provided an aim, a criterion of accuracy and, in this case, a convenient notation for practice, but it was the nature of the practice that gave both form and content to the theory. Let me add two illustrations of this.

The naturally occurring mineral oils contain practically nothing but carbon and hydrogen, but contain them in varying proportions. The obvious and simple conclusion is that in this case the law of constant proportions does not hold or that the oil is a kind of solution of hydrogen in carbon. But chemists never for a moment lost their faith that in spite of appearances the oils really contained nothing but definite individual substances of constant composition. It was the atomic theory alone that provided this faith, and this faith that sustained them in the incredibly difficult labour of sorting out these compounds.

The other example is this. Suppose a large class of students, elementary and unskilled, are given an impure salt of copper, told to purify it by recrystallization and estimate the copper, and to go on recrystallising till they get constant results. Some will arrive at this stage quickly and obtain results reasonably close to the theoretical value; others will take longer but attain the same goal in the end. A few may get results that are constant but not in accordance with theory. Some will never attain constancy at all. All these are equally genuine facts of experience, but some experience is dismissed as wrong, some accepted as right. The students who obtain the results that accord with theory are said to be skilful or good practitioners, those that fail bad. Theory is the test of experience, apparently, not experience the test of theory. It will be said that theory is the result and summary of previous experience. Yes, but whose experience? Again it has to be said, the experience of the experts not the experience of anybody, much less everybody. The theory does not lay down *a priori* what ought to be found, but it does provide an aim and a criterion as to when that aim is attained. That the results of the experts are in fact in agreement is ascertained in the light of theory, without which there is no definite criterion of agreement or disagreement. If people

are doing different things they get different results, but when are they doing different things? If the skilled practitioner uses approved methods, his skill and his methods having been tested on previous occasions, and still finds he gets varying results, then his material must be varying; he is not handling a pure substance but a mixture. If a salt is pure it must have a determinate composition and the combining weights of the elements present must agree with those in other compounds. These are criteria derived from theory, but theory inseparable from practice and arising out of it. There is an *a priori* element in theory but also in practice. Not the false *a priori* which tries to set limits to experience beforehand, but one which makes experience possible by providing conditions for attaining it.

The chemical atomic theory is one corpuscular theory among others. It asserts that chemical reactions at the temperatures and pressures used in the chemical laboratory take place between definite *quanta* of matter of different kinds, and it helps to specify the kinds. It goes on to identify the gas molecules of kinetic theory with complexes of definite small numbers of chemical *quanta* and it also makes use of the extension of gas theory to substances in solution. It does no more. It assumes nothing about anything happening under conditions outside the range of the chemist's technique. In particular, it says nothing about that happy hunting ground of the physicist, electric discharges in high vacua. It does not need to assume that chemical atoms are ultimate or simple in any strict sense. Biological science has its own atoms or corpuscular units—living cells, genes, nerve impulses. Certain special technical procedures reveal these different units and for certain theoretical purposes they are taken as units, as entities which exist as a whole or not at all. But they are never supposed to be ultimate or simple.

Moreover most of the assumptions of chemical atomic theory are no more than approximations. No substance ever handled is absolutely pure. Specific properties are not absolutely specific. Atoms of the same element are not all of exactly the same weight; and so on. In this respect atomic theory shares the fate of all scientific theories. They cover a limited range of facts as well as can be desired; they become less accurate and less reliable near the limit of range; outside it they fail partially or entirely. This is inevitable if theory and practice are bound up together, because practice is determined by what the practitioner is trying

to do and by the character of the material practised on. No technique deals with things in general for any purpose, except mathematical technique, which tells us nothing about anything in particular.

It has been assumed traditionally that the properties of the very smallest things, at least the mechanical and spatial properties, were the same as those of the larger, man-size things we see and handle. The assumption works very well down to the magnitude of the larger molecules, begins to be shaky at the level of the atom and fails entirely at the level of the electron. The surprising thing is, not that the assumption failed to work, but that it succeeded at all and that anybody ever thought it would. It has been known for a long time from the Principle of Dynamic Similarity that the mechanical properties of small things differ from large ones; *e.g.* the greyhound supports himself on thin bent legs and runs very fast, the elephant has to have thick straight ones and runs slowly. It has been known for a long time from statistical studies that the properties of an aggregate of a very large number of units are not identical with those of the units; *e.g.* the population of a town has a birth rate and death rate, but not the individuals who are born and die.

As a simplifying assumption to begin with, it was probably useful to take minute bodies as similar in properties to large ones. So far as they can be handled in similar ways they will tend to reveal similar properties. When it becomes necessary to devise different methods of handling, then different properties will manifest themselves. The result has been to show that, down to the order of magnitude of the chemical atom, atomic theory according to the classical model is satisfactory. Below that different notions are needed. The smallest entities of all retain none of the recognisable properties of sensible objects and for them the supposed incompatibility of atomic and plenum theory disappears.

By way of conclusion I would suggest that atomic theory, in becoming scientific, has in no way ceased to be metaphysical. It still appeals to the distinction between appearance and reality and still proposes to use reason to supplement and correct appearance. In becoming scientific, however, the theory has not remained unchanged. It has not been just a process of giving new content while leaving the form unchanged. The chemical notions that have been introduced from chemical practice have changed form as well as content.

VIII

The Logic of Question and Answer [1]

In his *Essay on Metaphysics* (1940), and also in his *Autobiography* (1939), the late Professor R. G. Collingwood developed a logic of question and answer which deserves serious consideration. I believe it is an important contribution to philosophy, but also that it needs to be restated in part, and amplified. It has been expounded almost as if it were an attack on traditional logic; whereas it is a development on quite orthodox lines, though contradicting certain recent misconceptions. The author's statement, too, is not without some suggestions (in the *Autobiography*) that he is in conflict with the traditional theory of contradiction. Any suggestion of this sort must be repudiated. The contradictory or the negation of the proposition *p* is best and most simply stated as "*p* is false," and is neither more nor less. The contradiction of the contradiction, or negation of the negation is simply "*p* is true." This form of statement, however, conceals the fact that "*p* is false" is negative and indeterminate, cannot express any direct intuition, and must be a consequence of other positive and more determinate intuitions. The form "S is P" brings this out better. Where P is a determinate predicate, the contradictory has an indeterminate one, and is "S is anything incompatible with P." Difficulties arise because, except in mathematics, we do not know *a priori* or with complete certainty which predicates are compatible with which. Is pain compatible with good, pleasure with evil, justice with mercy? Is health compatible with disease? As to the last question, with the qualification "in the same bodily organ, in the same respect, at the same time," it would appear not to be; but otherwise apparently it is. A man with blistered feet may be otherwise perfectly healthy and yet able only to hobble along in great pain. Is "S is pink" compatible with "S is red"? Yes, in so far as pink is a kind of red. No, in so far as pink is a very poor kind of red. We say "S is red" is incompatible with "S is green," but how do we know? (see Lord Russell's *Inquiry into Meaning and Truth*, p. 82). "S is red" is found to be compatible with

[1] *Mind*, 1943.

" S is cold " because we happen to live in a world where there are cool red pigments, chemical compounds of no great stability. Suppose we had lived in a world where the only red things were red hot?

Granted these obscurities about incompatibility, contradiction and negation, it is very important not to use them for concocting fallacies, as Hegel did in criticising Kant. Kant had set himself to discover and state the limits of the faculty of understanding, assuming that a limit is that which cannot be transcended. Hegel made the comment that to state a limit is in principle to have already transcended it. Had he been right he would, of course, have shattered the whole of Kant's philosophy. To say " Stone walls do not a prison make, Nor iron bars a cage," is better poetry than logic. To say that, if there is something outside the reach of understanding, that something must really be known somehow, is neither poetry nor logic. It would imply that negation is not really negation but something milder, and it leads by natural stages to the doctrine that double negation has magic virtues not possessed by mere assertion. The criticism springs from just the kind of mistake that on his own theory Hegel should have avoided, namely mistaking imagination for thought and the abstract for the concrete. If you *imagine* a limit you are led invariably to *imagine* something beyond it because every part of space has something outside it. If you then abstract from the objects of imagination you arrive at Hegel's starting-point in his opposition to Kant.

In avoiding these fallacies there is no need to fall into the other of denying any doctrine that has an Hegelian flavour about it. In particular, there is the point emphasised by Collingwood in his earlier books, *Speculum Mentis* and *Essay on Philosophical Method*, that all actual theories are inadequate and so far fallacious in some respects, though less fallacious than previous theories they have supplanted. Further, no error that has ever been seriously upheld is completely erroneous but always contains something of value. All this can be maintained without tampering with traditional logic provided we take into account the negative part of Collingwood's theory, namely his attack on a common misunderstanding of the status of the proposition in logic. The proposition is a convenient abstraction based upon the structure of language, an indispensable but not always reliable guide. So far as logic deals with truth and error, it must deal

with that which is capable of being asserted or denied. The proposition is represented by the smallest linguistic unit which can be asserted or denied. This much is necessary, but it is not necessary to go on to treat propositions as atomic. In the first place every proposition occurs in a context and owes part at least of its meaning and truth to that context. Collingwood's theory of question and answer is intended to describe the kind of context within which valid propositions occur. Even if his account were not correct it would still be the case that only propositional systems exist to be studied, and that single propositions are abstractions whose use is legitimate only as long as it is remembered from what they are abstracted and in what way. In the second place, propositions are complex and sometimes at least their logical properties and relations depend upon their internal structure as well as their external relations. Linguistic structure, though at times it conceals or distorts, has to be taken as capable of revealing logical structure, otherwise the study of logic would be impossible. For language is our sole medium. It can be supplemented by special technical symbols but it is necessary to introduce and interpret them. Nevertheless, linguistic structure is a fallible guide. The extreme linguistic simplicity of " Fire ! " conceals considerable logical complexity ; it is both an assertion and a command.

The doctrine that there are atomic intuitions, atomic truths, atomic propositions, assertions or judgments, and atomic sentences is open from the beginning to grave suspicion as being the revival under new terms of already abandoned theories. The first of these was the composition theory of knowledge sponsored by Descartes, that knowledge consists of discrete items which can be pulled apart and put together again. This theory was accepted by Locke, but quietly dropped when it became unmanageable. The second was the theory of association of ideas sponsored by Hume ; later quietly dropped by him but taken up by others before being finally discredited. With this bad heredity logical atomism would have died long ago had it not been kept going by artificial respiration. It is to be hoped that Lord Russell's difficulties in his recent book (*An Inquiry into Meaning and Truth*, pp. 314–317) will prove the *coup de grâce*. He assumes that unless a single observation by itself provides some information or knowledge, no number or series of observations can do so. This assumption is inevitable if it is supposed that single observations are atomic

intuitions leading to atomic propositions and that all complex or non-atomic assertions are just aggregates of atomic propositions linked by " and," " or," or " if—then." But how could a single separate intuition, supposing there were such a thing, provide any information whatsoever? At least two experiences are needed to recognise a universal, to be able to say " Here it is again ! " This is about the minimum for anything that could be called a proposition. To come to a more developed level of cognition, the minimum of observations that can be used by a physicist is two. By one observation he finds that body X is at place P_0 at time T_0, by another that it is at P_1 at T_1. The two are the least needed to assign a velocity to X, assuming that the body found at P_0, T_0 can be identified with that at P_1, T_1 without additional observations. What it comes to is that empirical information is a function of a plurality of observations or intuitions in certain relations, not of single separate ones by themselves. Neither intuitions, truths nor propositions are to be treated as atomic. Whatever can be true, false, right or wrong must be complex and constitute a systematic whole. The whole may be analysable but not into absolute simples nor into separate units with the same determinate character they have as constituents of the whole. Truth is not a simple quality pertaining to simple entities as such, but a relation holding between or found among entities which form a system of a certain minimum complexity.

There is one further point to mention in this connection, or rather a different way of making the same point. The logical atomists assume that there are ultimate " rigid " or " hard " facts which are data of sense and of sense only without any accretion of thought. If there are facts which are " pliable " or " soft " they explain that as being due to their complexity and try to analyse them into hard facts. The view I would urge is the opposite ; that there are no completely hard facts, but all are more or less soft. The wise man, of course, will seek out the hardest he can find, but he will not find them among the products of analysis of complex facts. Those fairly hard facts we rely on in daily life and those which form the basis of the empirical sciences are all complex and such hardness as they possess is due to their complexity. Simple, isolated, elementary data of sense are very soft indeed, except in the imagination of certain philosophers who write about them but have made no effort to experience them.

So far as the data of sense have a determinate character that character is bound up with their context. Part of the context of human data consists of conceptual processes. There is no need to say more on this point as it is well discussed by Professor Blanshard in the early chapters of his recent book, *The Nature of Thought*.

Lord Russell, in the Introduction to his *Inquiry into Meaning and Truth*, has put the general problem of empirical knowledge which includes the problem of induction as usually stated, in the proper perspective by asking the question, "What is meant by empirical evidence for the truth of a proposition?" But he seems to expect to find particular elements of sense experience to correspond with certain elements of language. This expectation cannot be fulfilled because two such disparate species do not *correspond*, and in any case these two factors are not enough by themselves. The relational system within which truth or falsehood is to be found is not simpler than a triadic system, as Lord Russell himself once insisted (*The Problems of Philosophy*, p. 195 *seq.*). Words correspond strictly only to words, thoughts to thoughts, sensations to sensations, things to things. Yet all are linked up together, by a linkage that can only be spoken of metaphorically, unless we call it simply the truth relation or the relation of transcendent reference.

The theory of question and answer attempts in answer to Lord Russell's problem to specify the form which a propositional complex must take if it is to convey valid empirical knowledge. It may be summarised roughly as follows. Every proposition which contributes to knowledge is an answer to a question and the answer has been obtained because the question was asked. Every question arises out of pre-existing knowledge, which generally consists of propositions, themselves the answers to questions. In order to escape a vicious circle or an infinite regress we must in the end refer back to absolute presuppositions which are not themselves answers to questions. Absolute presupposition, which should not be called propositions, must differ from relative presuppositions, which are propositions, in being neither true nor false in the sense that propositions are. This follows from the fact that we discover whether a proposition is true or false by asking questions. By hypothesis we cannot ask questions about absolute presuppositions (*Metaphysics*, pp. 21–48). I believe that in the matter of absolute presuppositions

Collingwood has allowed himself to be overawed by those fabulous monsters the Vicious Circle and the Infinite Regress into stating a valid theory in a misleading way. I believe we can and must ask questions about everything so that in that sense there are no absolute presuppositions, although there are presuppositions which are not true or false in the same way that ordinary propositions are. But more of this later.

According to Collingwood's theory knowledge consists of propositional systems containing non-propositional elements. The proposition cannot be discarded because it is by definition that which is true or false. But it must be considered in its proper environment, without which it is a fish out of water. The first question to consider about his theory is whether it differs appreciably from the traditional theory of hypothesis and verification. The answer, I think, is that it is on similar lines but in so far as it is more general it is superior. A hypothesis, in the sense of something suggested and awaiting verification or the opposite, is a question to which the answer Yes or No can be given under suitable conditions. If the answer is No another hypothesis has to be found, otherwise the subject matter remains blank, or rather it remains as a vague question instead of a precise one. But hypotheses to deserve the name must be general, of the nature of universal rules. A logic of hypothesis and verification applies only to those rather specialised and advanced branches of knowledge which deal in universal rules. Even so, in any branch of knowledge it does not cover those problems where the answers are particular or individual.

As a first illustration let us take the old one of the bag containing black and white marbles. Granted the assumption that it contains marbles (not beans, snails or anything else), that every marble is either black or white (not grey, green or any other colour), then if the bag contains n marbles we can ask: Are n white, none black? Or $n-1$ white, one black? Or $n-2$, white, 2 black? Or $n-3$ white, 3 black? . . . Or none white n black? Usually only the first and last questions would be called hypotheses and possibly the suggestion that half are white, half black. If the prior assumptions are just as stated, there is no reason to prefer these two (or three) questions that imply a general rule to all the others that do not, unless of course there is only one marble in the bag. It is therefore best to put the

problem in the most general form and not restrict the kind of questions asked.

It might be objected that hypotheses are not questions but supposals. The answer is that, if a hypothesis is by definition that which awaits verification or falsification, supposing, unless it is mere day dreaming, means asking the question " Is it true ? " and trying to find an answer. A hypothesis in this sense is simply a question, but is given a special name because it is a special and important kind of question. The objection, if made, comes of confusing this use of the term hypothesis with the other, which means that which is presupposed or assumed for a special purpose (like the postulates of Euclid) though it is possible not to assume it or to conceive of other alternatives. This kind of hypothesis is supposed in the sense of being taken as if true and therefore not needing any verification.

The illustration of the bag of marbles is useful for another purpose. If our aim is to discover what the bag contains we can do so by inspecting its contents, the whole or a part, and by no other means. The assumptions mentioned and the questions listed are therefore superfluous as they have no bearing on the method of inspecting the contents. All that needs to be known, and it must be discovered by inspection, is that the bag contains a plurality of separable, identifiable and numerable objects, not, for instance, treacle or dust. If it contains treacle or dust the method of inspection must differ from that devised for marbles or similar objects. But whether the contents are marbles or beans, or whatever colour they may be, inspection proceeds on the same lines. Of course any one expecting only black and white marbles might mistake dark blue ones for black. While anyone expecting some nearly black ones and setting out to distinguish them would not make that mistake. But prior information of this kind is relevant just because it bears upon the method of inspection.

Another thing that is wrong with the illustration is that the set of $n + 1$ questions, though it looks impressive, is of no use. Questions to be useful must not only be such as to determine methods of inspection, they must also be reasonably few in number so that they can be asked and answered one by one. At the end of the process it must be possible to conclude that these are all the questions and they have all been answered.

This futile illustration has been used deliberately because it is

just the kind of illustration that has misled logicians into discussing bogus problems. It was, however, valid in the matter of the distinction between hypotheses and other types of question. This point can be taken a stage further. All problems of empirical knowledge are to begin with particular, singular or individual, of the form " What have we here ? " or " What had we there ? " The answer is of the form " We have here a P " where P is a universal or universals. In the natural sciences the particular solution of the first stage may lead to generalisation as a second stage, to an assertion of the form " Every S is P." But even in the sphere of the natural sciences much information remains at the first stage. This would hardly need saying but for the widespread tendency to despise anything not generalised. Thus even historians, who are officially supposed to deal with individual events and actions, have sometimes pretended that their real subject-matter was " forces," " movements," " tendencies " and so on, as though their science were a branch of mechanics.

That the primary problem of empirical knowledge is a problem depends upon the fact that experience is fragmentary and that we are compelled to try to stretch the fragments to cover the whole. The fragments, too, are selected and may not be a fair sample. The problem of generalisation, perhaps better called the problem of determining the genus by consideration of its species, is no more than a part, though an important one, of the whole problem. It is unfortunate that the bias of so many logicians in favour of mathematics and physics has led them to attend exclusively to generalisation and even to special highly sophisticated forms of generalisation. Collingwood, as an archæologist, has a natural bias in the opposite direction which is a useful corrective. The primary question for empirical knowledge, let me repeat, is of the form " What have we here ? " " Here " meaning not only what comes to us by processes outside our control but also what we deliberately set out to find. The tense of " have " should not exclude past or future. The formula covers the hunter's question, " What shall we have for dinner ? " when he starts out ; " What had we here ? " when he finds yesterday's tracks on the ground, and " What have we here now ? " when he hears a rustle in the undergrowth.

However, the best way of considering the problem is to consider it in terms of the process of sampling, of discovering the contents of the sack by examining a handful, as was done by

C. S. Peirce (cf. *The Philosophy of Peirce*, ed. Buchler, 1940, pp. 174–217). Problems about bags of marbles are seemingly of the right form, but, except in the hands of Peirce, have been so tidied up for the convenience of mathematicians as to make them quite misleading. It must be emphasised that until the empirical problem has been solved and the solution generalised mathematical methods cannot be applied. I shall discuss the matter, therefore, in terms of an actual problem of difficult sampling. Had I understood the archæological technique of Collingwood I could have used that for illustration. As I do not, I must refer to humbler spheres of investigation.

A works chemist is asked to determine the calorific value and ash content of a consignment of coal. The actual chemical operations are matters of routine. It is only the process of taking and preparing samples that is difficult. For what is needed in the laboratory is a pinch of finely powdered coal (or rather three pinches for three determinations) which should be representative of the whole bulk of material standing in the sidings in perhaps fifty trucks. The coal in the trucks consists of pieces of various sizes which may be as large as a fair-sized dog or smaller than a flea. The dust and small fragments will probably differ considerably from the larger pieces because certain coal constituents disintegrate more readily than others. The dust tends to contain more ash and have a lower calorific value. There may be stones present which have no calorific value at all, and various other impurities may be present, unevenly distributed. It is not even safe to assume that large pieces and medium-sized pieces are of similar composition. Besides all this there is the problem of moisture. The coal in the seam contains some moisture, which it tends to lose on exposure to the air. On the other hand if there has been a shower of rain the top layer of coal in the trucks will be wet. If there has been heavy rain followed by sun the top layer will be dry, the rest wet, the dust very wet and mostly washed down to the bottom of the trucks. The chemist can simplify his problem by drying all his samples thoroughly; but then they are not representative of what goes into the furnaces, even if they are representative of what left the pit. For the whole contents of the truck go in, wet or dry, and moisture makes a considerable difference to calorific value. He should be able to include a "representative" amount of moisture in his samples, or to exclude it according to requirements.

If the sampling problem is to be solved satisfactorily the chemist must know exactly what it is that is required of him, and he must use his prior knowledge in order to frame the proper questions to determine his procedure. The prior knowledge will consist of his knowledge of the nature of coal in general and of this consignment in particular. For instance, has the consignment all come from one seam in one pit? If so it will be fairly uniform from truck to truck and only a few need be sampled. If it comes from different pits it will be advisable to analyse material from different lots separately. The results can be aggregated and averaged afterwards. Clearly, however, if colliery A delivers 100 tons of coal of a calorific value 15 per cent. less than the 200 tons from colliery B, it would be a mistake to mix samples from the two before analysis. Another question to ask is whether the coal has been washed, picked and screened, or not. If it has, there will be very little dust (unless it is the smallest size delivered), very few stones, and the pieces will be roughly the same size. In that case the material will be reasonably uniform and sampling easy. It will be enough to select a dozen or so pieces (or fragments of pieces) from different levels in the trucks and grind them all up together. After careful and repeated mixing of all the powder a little can be taken for test. If the material is less uniform and a large number of pieces have to be taken there may be more than can be conveniently ground up all together. In that case the pieces must be coarsely ground separately, the total product well mixed and a portion taken for final fine grinding.

Of course, what I have said may exaggerate the difficulties. Usually no very high degree of accuracy in the determinations is called for because coal is not weighed out very accurately for purposes of buying and selling nor for stoking the furnaces. What is mainly of interest is not to know the absolute calorific value but to see that it does not vary greatly, or if it does vary, to know how much. Any efforts that are made or omitted in reducing sampling errors depend upon the final result aimed at. For one purpose sufficient accuracy may be attainable by a quick and easy method, for another a more elaborate and troublesome method may be needed. In case of doubt or special difficulty a systematic examination of the variability of the material will have to be undertaken. For example, separate specimens may be taken from different large pieces of coal, middle sized and small

pieces, and dust, and then all these separately examined to see how much they differ. It may be necessary to examine exhaustively several tons of raw coal to discover how much of it consists of material of different sizes and how much it breaks down in handling. Then, as the result of this investigation, a definite sampling system can be devised, so that correct percentages of the sample shall come from big pieces, from smaller ones, and so on.

If any method of sampling is criticised as inaccurate or misleading it can only be in terms of some alternative method which shows itself to be better or by analogy from experience of sampling some other kind of material. If my knowledge of something is strictly confined to taking and examining such and such samples by a certain method then that is the whole of my knowledge for good or ill. I cannot criticise it unless I acquire other knowledge of some kind to bring to bear on the problem. If some character of the material remains latent whatever methods of examination are used, it is permanently latent and therefore negligible. If it was latent during a first investigation and then appeared during a second one, that must have been because of a significant change of method, and the difference between the two results is a genuine revelation of the character of the material.

There is one last point to be noted at this stage. The result of examining a specimen of any material states no general law in the usual sense of the term. It merely states that *this* lot of coal has been found to have such a calorific value. It might be called a statement of the character of a complex event, or even (*pace* Collingwood) a historical statement. It is, however, a generalisation in a perfectly definite sense in so far as it claims that *any* correctly devised examination would give the same result within specified limits of error, and contradicts any assertion of a different result. One assertion about a pure particular (if there be such a thing) cannot contradict another similar assertion, because the subjects of the two must be different.

There is a question that cannot be entirely avoided at this stage, though it is a side issue, since some logicians have tried to make it the main issue. What is the bearing on this subject of the mathematical theory of error? Every measurement is subject to variation or error. That is to say successive determinations, however much we strive to keep all conditions similar, give slightly different results. The greater the effort to keep conditions constant the less the error, as a rule, but some error

or variability remains none the less. Suppose three determinations of some kind have been made. The actual values found are X_1, X_2, X_3, with say, 2 per cent. difference between the smallest and the largest. Now, given that method and those circumstances the true, real, precise, exact result is X_1, X_2, X_3; just these values and nothing else. It is customary (and useful) to take the arithmetic mean of these, X_m, and return that as the result. It is often supposed that X_m is somehow more true, real, precise, etc., than X_1, X_2, X_3, severally or collectively. This comes from the notion that the process of measurement is like firing at a target, so that although the actual individual determinations are only inners and magpies the mean somehow hits the bull's-eye. The analogy of a target is misleading unless we suppose the target to be an infinite uniform surface and the bull's-eye invisible to the marker, though seen from the firing point. It is quite true that the mean will be central to the values of which it is the mean, but we (as markers) do not know whether the bull's-eye is between the actual hits or not or whether there is a bull's-eye. The mean is a useful arithmetical dodge for handling one number instead of several, and for purposes of generalisation one number is needed. Its claim to greater truth, reality, etc., is that if a large number of similar fresh determinations are made the arithmetic mean of these will probably be closer to X_m than to X_1, X_2, or X_3. There is in fact, a kind of stability about the arithmetic mean which is not possessed by the individual values and to some extent justifies popular belief. This stability, of course, is shared by other kinds of average, but the arithmetic mean enjoys the great advantage of being easy to calculate.

Now when a very large number of values has to be dealt with, particularly if they are rather discordant, it is customary to carry out more elaborate arithmetical calculations in accordance with the calculus of errors. These are extremely useful, but like the simple process of taking arithmetic means are dodges for handling conveniently otherwise unwieldy groups. The calculus of errors must not be supposed to have magic properties whereby it conjures knowledge out of ignorance. There is, however, an important difference between the two types of case. By simple direct inspection of a small concordant group of figures we can " see " without calculation what it is they signify and can " see " that the arithmetic mean (or some other mean or average) is fitted to stand for them and be used instead of them. Direct inspection

of a large or discordant group produces no similar intuition. Hence the need for the calculus of errors and hence the belief that it has conjured up information on its own.

Finally, the theory of the calculus of errors is part of the general mathematical theory of probability. This theory is therefore supposed to hold the key to the mystery of the problems of empirical knowledge. As the mathematical theory cannot be applied to empirical problems until the work of inductive generalisation has already been done and assumed to be legitimate, it is not of primary importance for the empirical problem. If there is a mystery, the key to it is not there.

To return to our proper subject. The question asked was " How do we know the sample is representative of the bulk of the material ? " The answer is " Because we have adopted a method of sampling designed to extract the information required." If there is something we desire to know that is not revealed in the samples the sampling has been done wrong and must be done again in a different way. If it has revealed what was required it has done all that can be expected. The method was determined by two things, our purpose and our prior knowledge. Purpose itself is largely dependent on prior knowledge. It is only because we know something that we can guess there is still something more to be known. Prior knowledge is of two sorts, general knowledge of the kind of material dealt with and particular knowledge of the specimen under examination. The only prior knowledge which is relevant is that which determines the method of examination. The question, " What have we here ?" is closely bound up with the question, " What are we going to do about it ? "

So far what I have said is in agreement (I believe) with Collingwood's statement in terms of question and answer. But after this point his statements about absolute presuppositions seem to me rather misleading. It is quite true (and important) that precise knowledge comes of asking precise questions and in no other way, but the prior knowledge out of which those questions arose may have been, and often was, less precise. It in turn may have been, and often was, the outcome of vaguer questions, and these of vaguer knowledge, and so on, till we get back to initial questions extremely vague and extremely numerous that are hardly more than a reiterated " What have we here ? " Although precise and scientifically valuable experience has to be sought

out deliberately by means of precise questions, primitive experience is to some extent flung at us willy nilly with a minimum of questioning and of presupposition.

There are, of course, absolute presuppositions implied in any kind of experience, but are they not of the type of the Kantian categories? These are not exactly of the nature of assertions. Perhaps it is right to say that they are neither true nor false in so far as truth and falsehood require some empirical content to be true or false about. By hypothesis a pure category has no empirical content. However, granted the categories, the quite vague question, "What have we here?" can be turned into a number (twelve in all if Kant is right) of less vague questions. One of these questions is "What is its cause?" We may fail to discover a cause, but we do not therefore accuse the category of cause of being false nor should we judge it true just because we find one. If we fail to find the cause of anything we have to be content to say the cause is unknown. To put the matter the other way round, until we find the cause of a thing our knowledge of it is incomplete, therefore we are bound to look for a cause. The categories tell us the kind of question to ask but not the answer, nor whether there will be an answer at all. The doubt about the categories is whether the list is complete and whether the items are properly formulated. Do they cover all possible knowledge or merely the knowledge we or Kant happen to possess at the time? We can test them in terms of those methods which have been tried and have been successful. We can never be sure that all possible methods have already been tried. In fact, we can be fairly sure they have not. This, I would suggest, is the amount of truth there is in the doctrine of historical relativity put forward by Collingwood (*Metaphysics*, pp. 49–77. The discussion in the *Essay on Philosophical Method*, p. 190 *seq.*, and especially pp. 194–195, seems to me much better). I would certainly challenge the suggestion, if he really meant it, that we cannot criticise or suggest amendments to the absolute presuppositions of knowledge but only state as a matter of historical fact that A knew so and so and therefore presupposed such and such, while B knew something else and therefore presupposed something different. In so far as A and B had valid knowledge it was because they used methods adequate to their purpose. If their purposes were different, their methods may have been different. So far as actual knowledge goes, namely what has

been acquired from the time of Thales to the present day, I would suggest that the purposes and methods of all investigations have been closely similar, and therefore the presuppositions similar and perhaps exactly the same. It is quite true that different questions are asked at different times, but only because different stages in the growth of knowledge have been reached and the old questions have been answered, at least in part. Even so, the questions differ as species of the same genus differ, the new questions bear a strong family resemblance to the old ones.

The principle by means of which Kant justifies the categories is that, if anything is universally true of all experience, it must be something involved in the conditions under which any experience whatever is obtained. As Peirce pointed out (*Philosophy of Peirce*, pp. 187–189) this principle is equally applicable to special experiences. If there is any valid general rule or any justification for extension in thought beyond the range of the immediately present to be found in any part of experience, *that* rule must be something involved in the conditions under which *that* experience is obtained. The method determines the rule. The question asked or the end sought determines the method. If in any one case the rule fails, then the particular method used in that case was at fault. If the method was at fault either no specific question was put, or the wrong question for that case, or the implications of the question were not adequately pursued. Each case has to be judged on its own merits, not in terms of a general formula; yet each case displays a specific variant of a generic principle and the generic principle is universally applicable.

On the basis of this discussion, I think it can be seen why, although we can say that such and such an inductive generalisation is highly probable, we can never find a valid method for assigning a numerical value to its probability. As the argument is too long to set out fully here, it must suffice to throw out a hint. In order to assign numerical values to the probability of events that have not happened or are not yet known, certain general and arbitrary assumptions have to be made which have no relevance to the special questions and special methods which should be employed to investigate those events. Therefore the result of the calculation is either fallacious in principle or itself merely probable. For instance, a numerical probability can be

assigned to the death next year of any member of a given group of people, on the assumption that in certain respects the future will exactly resemble the past. But if experience teaches anything it is that the future is very seldom exactly the same as the past in any respect. In other words, we can never say "It is certain that on the known data the probability of future events of class E is N," but only "It is probable that on the known data the probability of future events of class E is N." If N stands for a number, the probability of which it is a probability cannot have a number assigned to it.

The foregoing account of absolute presuppositions is different from Collingwood's. He might have accepted it as a partial account, as there must be rules of method, and they must be pre-supposed and *a priori* in Kant's sense. But are they metaphysical first principles, and, if they are, are they the only ones? Collingwood seems to put forward material, as opposed to purely formal, principles. The difficulty is that any proposition which asserts the existence of anything or that anything existing has a determinate character can be denied without self-contradiction, and generally has been denied by somebody with some degree of plausibility. If it is asserted, it has to be defended on grounds of probability in the face of alternatives whose probability is not always negligible. It must be defended, too, on grounds which are empirical in the wide sense of the term. This may seem a curious predicament for metaphysical first principles but, as far as I can see, cannot be avoided. I doubt whether Collingwood's method is a possible one. He says, in effect, that metaphysical first principles are not of the form "*p*" but of the form "A asserts *p*." But if *p* is asserted at second hand it can equally be denied at second hand: "B denies *p*." Sauce for the metaphysical goose is sauce for the metaphysical gander. In any case we are brought back to ask, "Is *p* true?" otherwise there is no interest in what A or B said about it. I doubt, too, whether the argument of his *Metaphysics* is compatible with that of his *Essay on Philosophical Method.*

There are two other difficulties to be mentioned by way of conclusion. They turn on the relations of question and answer. First, is it impossible for the same proposition to be the answer to different questions? If questions could always be formed so that the answer was "Yes" or "No" it would be impossible. But can they? Secondly, not all questions can be answered

unequivocally. The answer may have to be " In some circumstances ' Yes,' in others ' No,' in others still no answer can be given." Or it may be " Granted these presuppositions ' Yes,' granted those ' No,' granted others no answer can be given." Incomplete knowledge is liable to rest at this stage, and while it does it is possible to doubt whether any presuppositions are absolute in any sense.

IX

A Defence of Aristotle's Logic [1]

Lord Russell's admirably conceived and stimulating new book, *A History of Western Philosophy*,[2] contains an attack on Aristotle's logic. Lord Russell has never concealed his poor opinion of this kind of logic and its influence on philosophical thought, but his views are now more fully expressed. I propose to defend Aristotle as best I can, and as part of the strategy of defence to attack certain aspects of Lord Russell's logic, or, rather, certain inferences he draws from it.

The historian of philosophy should endeavour to discern first of all what it was that philosophers set out to do, in terms of the knowledge at their disposal and the presuppositions of their age and circumstances. This may be a counsel of perfection, and is certainly very hard to do for ancient philosophers. Yet it is absurd to condemn Plato or Aristotle because he lacked information we now possess ; it is an error to interpret his words in terms of our presuppositions, not his ; it is at least rash to assume that where his presuppositions differ from ours, we must be right and he must be wrong. It may be that the two sets of presuppositions are just different ; it is even possible that his are right and ours wrong. Fortunately these historical difficulties are at a minimum while attention is fixed on logic. Undoubtedly Aristotle's logic was influenced by his general philosophical outlook and by the general intellectual atmosphere of his day, more especially by prevailing theories of mathematics. But logic is an abstract, specialised subject with a restricted aim. Thus it is possible for a writer of the present day, in the light of present day knowledge and problems, and fully cognisant of current criticisms, to expound a strictly Aristotelian logic. I refer to W. E. Johnson's *Logic*. True, it is a development not just an imitation, but a development on the basis of the original. While I am defending Aristotle against Lord Russell I ask the reader to bear in mind that any important and valid criticism of Aristotle should demolish Johnson equally.

[1] *Mind*, 1946.

[2] Page references A are to the Edition of Simon and Schuster, New York, 1945 ; B to that of Allen and Unwin, London, 1946.

It will be helpful, to begin with, to state baldly what I believe logic to be. I hope my view is not just *a priori* dogmatism and is arrived at empirically by considering what has been done by Aristotle, which he called logic, and by Lord Russell, which he also calls logic. According to my reading, they have introduced certain technical devices intended to eliminate certain types of false reasoning and erroneous statement, certain ambiguities and confusions. The technical devices consist of special linguistic forms. If any assertion is translated out of ordinary language into these forms, then some errors, confusions, etc., liable to be concealed by ordinary forms, are made manifest. The technique is a help towards distinguishing valid from invalid assertions and inferences. They might be distinguished without it, but not so easily. A technical device which is designed and used for one purpose is not necessarily any use for any other ; so that there is no cause for surprise if Aristotle's logic can do one set of things, Lord Russell's another, and neither can do everything. Granted that logic is a linguistic device, it does not follow that it is so purely linguistic as Lord Russell, and many others, say. It may deal with fact as well as with language.

What does Aristotle's logic set out to do ? (1) By translating any assertions into the Subject-Predicate form one can set out a number of valid and invalid transformations, and the relations of implication, incompatibility and independence between the different types. Given that some of Farmer Brown's cows are in his meadow, I can infer " None of them are in his meadow " is false, " Some are not in his meadow " may be either true or false. This provides a check on common fallacies promulgated by making assertions in forms which do not show these relations clearly. This is a useful dodge ; it is ignored by Lord Russell and the logical forms he uses do not appear to do this particular piece of work. (2) As the S-P form expresses relations of class inclusion and exclusion it provides a framework for classification by genus and difference. Again, this is a useful device ignored by Lord Russell. Of course, the forms he uses can do the same thing but no better. These two functions are ignored because thanks to Aristotle (or perhaps one ought to say Plato's Academy), they are too familiar to be visible. (3) The rest of Aristotle's logic is the Syllogism ; the method of deductive inference through a middle term. The syllogism can be taken and is perhaps best taken as a calculus of class inclusion and exclusion. Other types of

transitive relation can be treated as special cases of inclusion and exclusion. The syllogism in *Barbara* is commonly taken as the subsumption of a special type or a particular instance under a general rule. Lord Russell does not deny the validity of the syllogism but says it is unimportant (p. A 202, B 225) that there are non-syllogistic forms of deduction (p. A 198, B 221), and that Aristotle did not pay enough attention to inductive reasoning (p. A 199, B 222).

As to the first accusation, if the syllogism is unimportant all logic is unimportant. To be able to put deductive arguments (if only a few of them) into a form that distinguishes valid from invalid types is to do what logic sets out to do. As to the second, Lord Russell says that Aristotle says that the syllogism is the only form of deductive reasoning, and that this is false. He confesses, however, that some apparently non-syllogistic arguments can be turned into syllogistic form, but he deprecates such treatment as being useless cruelty to arguments. He then quotes an arithmetical instance which really looks rather syllogistic (p. A 198, B 221). Still, on the face of it, all deduction does not appear to be syllogistic. Argument by *reductio ad absurdum* does not look syllogistic ; it does not appear to proceed through a middle term ; how does it proceed ? If Lord Russell knows about other forms of deductive inference, why does he not do for them what Aristotle did for the syllogism—set out the valid and invalid forms ? Or is it a secret too deadly to reveal, like the use of atomic energy ?

The third accusation is manifestly a case of hitting below the belt. If logic is as purely linguistic as Lord Russell says, inductive inference is no concern of logic at all. In any case, Lord Russell confesses that he can make little of it (pp. A 673–674, B 699–700) ; so he should have more sympathy for Aristotle.

The most serious charge brought against Aristotle is that he confuses existential and non-existential propositions by treating " Socrates is mortal " as of the same form as " All men are mortal." The difference is that the first cannot be significant unless there is a man called Socrates, the second can be significant even if there are no men. Now Lord Russell cannot have it both ways. If logic is purely linguistic, it knows nothing of existence and Aristotle has done no wrong. If Aristotle is wrong then logic deals with fact as well as language. I should prefer the second alternative. It seems to me that questions of fact and language

are mostly inseparable. Most discussions that are not trivial deal with both. Syntactic blunders are factual blunders. Whenever the question of existence or non-existence arises (as in "There is a so and so " or " There are so and so's "), the question is not purely linguistic. Granted then that Aristotle has erred, I should argue that the error is only a little one. Aristotle (I would suggest) lumps together " Socrates is mortal " and " All men are mortal " as a technical simplification because for his purpose the distinction between existential and non-existential is not required. One form is better than two if one suffices, as Lord Russell's favourite, Occam's *Razor*, tells us. By treating the individual Socrates as though an *infima species* the trick is done. The trick gave some of the mediæval philosophers a headache, but otherwise has done little harm. Though it is a trick, it is not entirely vicious because Socrates *qua* bundle of universals is a species, the most *determinate determinable*, although *qua* temporal route of events he is not a species. The treatment of " Some men are mortal " as if of the same form as " All men are mortal " can be defended simply by defining the form " Some S are P " as the converse of " All P are S." This trick is perhaps rather harder to justify in principle, but it does even less harm than the other.

Of course, anybody who is determined to draw an existential conclusion from non-existential premises will not be stopped by the syllogism in its traditional form. No rule is proof against a really energetic fool. The conclusion I would put forward is that this lack of distinction between the existential and non-existential proposition is a small blemish in the Aristotelian logic, but one that leads to no difficulties once it is pointed out. But, granted it is a blemish, then the contention that logic is purely linguistic goes by the board.

Undoubtedly there are logical questions which are purely linguistic. A notable instance is one of Lord Russell's own contributions, the theory of logical types. The sentence, " All assertions made in English are false," apparently fails to say anything. Translate the sentence into French and then it says something ; it is capable of being true or false. This shows that the failure to say anything in English is purely linguistic. A linguistic disease requires a linguistic cure, and this Lord Russell has provided. Unfortunately his theory has led some writers to produce nightmare speculations about " Meta-languages," on the hypothesis that language cannot discuss or criticise itself.

On the contrary, that is what the careful use of language is always doing. Discussion properly carried out is simultaneously clarification of fact and of language. There is only one *genus* language, of which English, French, Chinese are *species* according to one rule of subdivision. Arithmetic is a species according to another rule of subdivision, and Lord Russell's types are species according to still another rule. It is no harder to discuss English usage in English than in French. It is difficult (I suppose) to discuss arithmetical symbolism by means of arithmetical symbols; perhaps impossible. Whether or not a species of language can discuss itself depends on the rule for subdivision into species. Now if Type I language be defined as any species of language which cannot discuss itself, then Type II is that which can discuss Type I and (for the most part) itself also. It will be all ordinary, critically considered linguistic usage. Type III is only required to cover exceptional cases by introducing qualifications when unqualified statements cause confusion. If there is no need to postulate Type I as defined, two types may be sufficient. If, then, this theory of types is part of logic (not of grammar), this part is purely linguistic. The theory is not just verbalism, and is undoubtedly useful because it rules out some too easy refutations that have been current; for instance, that the sceptic cannot assert his own ignorance.

If it is assumed that the operational terms "and", "or", "not", "not both", "if-then", "any", "all" have no denotation (as is by no means obvious), and if they can be discussed without introducing openly or surreptitiously anything more empirical (as is not obvious either), and if this discussion is part of logic, then this part also may be purely linguistic. I should not venture to deny that Lord Russell may have done something of the kind in an esoteric work, *Principia Mathematica;* that arithmetic may be, as he says, purely linguistic, and that this kind of logic may be the generic form of which arithmetic is a specialised development. But this has very little to do with what Lord Russell says when he explains his logic in his exoteric works, with what Aristotle does, or with the faults Lord Russell finds in Aristotle.

If anybody claims that his own kind of logic is purely linguistic it is hard not to believe him. In a fashion language means whatever the user intends it to mean. Consequently it would be very rash to say that there can be no such thing as purely linguistic

logic. Having admitted so much on the one side, it is necessary to add on the other side that the framers and users of traditional logic, if they considered the matter at all, would almost certainly conclude that logic is both linguistic and factual. As that is what they meant it to be, either that is what it is or they failed most lamentably to make themselves understood.

Wherever we are using terms with definite denotation, linguistic confusions are also factual confusions. If you are not clear about the usage of the terms " adder " and " grass snake " it is safer not to pick up a snake ; when you are clear you can pick up one with impunity. But logic, it will be said, does not use such terms except incidentally for purposes of illustration ; it deals with forms like " All S is P " or " *p* implies *q*." It does ; but it also uses the terms " true," " false," " exists," " there is a so and so." Now, to say that *something* exists or that *something* is true is to say nothing. We cannot say *that* a thing exists apart from pointing to *what* exists or *that* an assertion is true apart from *what* the assertion is about. Unless this kind of factual reference can be eliminated from logical discussion logic will remain factual as well as linguistic—though factual in a vague general way that is easily overlooked. Lord Russell, in his discussion (p. A 831, B 859) about the assertions " Scott exists " and " The author of *Waverley* exists " is using " Scott," " author " and " *Waverley* " in a purely illustrative way. He could have used other terms, but some definite terms pointing to things of a definite sort he must use or he would not say anything. The difference between the logical kind of discussion and other discussion is that the logical kind is general so that *any* appropriate term will do as well as any other. It is only to this small extent that logical discussion of linguistic usage differs from zoological discussion about the nomenclature of English snakes.

It may be maintained that the logician or pure mathematician is free to invent anything he likes for himself subject only to the limitation of self-consistency—all his assertions must be mutually compatible. Without this limitation he would not say anything. Nevertheless, why the limitation ? It is not in the least linguistic. The distinction between saying something and failing to do so does not lie within the confines of language, but in the relation between language and that which language refers to. It is, in part at least, empirical. Only existence and non-existence are strictly incompatible *a priori*, as Hume points out. For the rest, we discover by

experience that some things agree, combine or cohere with one another and some do not. A thing, we find, may be both cold and black, but not both black and white, in the same place, at the same time, in the same respect. (Grey is, of course, neither black nor white.) The same may be said of hot and cold, *mutatis mutandis*. From observations like this arises the distinction on which is based the notion of compatibility and incompatibility, consistency and inconsistency, coherence and incoherence. They begin (historically) as empirical generalisations, and are later raised to the level of universal axioms. Then they may be taken as *a priori* because they are seen to be heuristic principles. If we conduct our discourse so as to make these distinctions primary, then we get on with our enquiries; otherwise not. Concurrently language develops devices to exhibit coherence and incoherence among matters of fact. Finally, it becomes possible for simple-minded philosophers to call such truths conventional or purely linguistic.

That coherences or incoherences in nature are found empirically, and may or may not, according to circumstances, be treated as instances of logical, necessary or *a priori* connexion or incompatibility is easily seen in the simple case of colours. To say, "The colour of this thing is greenish-blue" makes sense; "The colour of this thing is greenish-red" does not. No device for handling language can by itself serve to distinguish the two cases or show that the colours of one pair are compatible and the others not. Experience of the colours of the spectrum does show the difference and language can then take account of it. This particular point could hardly have been appreciated before the time of Newton; and before his time the names of the colours could not be used as precisely as they can since (*cf.* B. Russell, *Enquiry into Meaning and Truth*, p. 82).

We generally assume that one thing cannot be in two places at once, or two things in one place. Is this empiricial fact, self-evident axiom or linguistic convention? The answer is, surely, all three; but any one predominantly according to the intention of the user. Discussions in the sphere of morals, politics and social theory are constantly liable to confusion because of uncertainty as to whether one is dealing with antagonistic but compatible factors or with incompatibles. Logic cannot discover the difference, but experience may. All this constitutes a serious limitation of logic, and also contradicts Lord Russell's incidental

assertion (p. A 653, B 679) that logical arguments make empirical ones superfluous.

The view here expressed runs counter to that of most philosophers (but not Aristotle and Kant); namely, the view that generalisations from experience are limited to assertions of mere contingency, of how things happen for the most part, though they might just as well happen otherwise, while assertions of necessary connexion are entirely non-empirical. This prevalent view seems to rest on the supposition that probable assertions must be assertions about contingent connexions and assertions about necessary connexions must be themselves completely certain. The supposition might be true, but it is hard to see why it should, once the underlying confusion is brought to light.

In conclusion, Aristotle's logic performs a limited but useful function; Lord Russell's another different one. Nothing more can be asked of either, nor is there any quarrel between them. Anybody who thinks Aristotle did everything has only himself to blame; just as those recent writers who have misused Lord Russell's logic have only themselves to blame. So far as Lord Russell's criticisms of Aristotle are valid at all, it is because his own view of logic as purely linguistic is untenable.

X

Theories of Immortality [1]

Those who have advocated belief in immortality have often spoiled their case by arguing for different theories without realising that they were different. Those who have opposed the belief have been apt to think that when they had disposed of one theory they had done all they set out to do. The first condition for clarity of thought on the subject is therefore to distinguish the different types of theory which have been put forward. This is my primary aim in the following discussion. If, in the course of it, I speak more favourably of one theory and less favourably of others, it must be understood that this bias is incidental to my present theme, which is to examine assertions rather than to assert.

From the time of Plato at least three different theories have been put forward. There may be more than three, or perhaps one of them needs to be subdivided into two or more varieties, but three is enough for a start. I shall call them by the following names: (1) Survival, the continuation of conscious life for a period of time; (2) Perpetuity, the indestructibility of spiritual substance; (3) Eternal Life, the partaking in something strictly non-temporal, having in itself neither before nor after, so here and now as much as hereafter or elsewhere. This last I believe to be the important theory because concerned with quality of life, not with quantity or duration or anything measurable in seconds or centuries. (2) and (3) are theories of the philosophers, in the sense that they require a fairly highly developed intellectual technique for their formulation. They could not have been formulated, at least in the Western World, before Socrates and Plato, though they may have been implicit in religious experience. The theory of survival (1) belongs to popular tradition, though the philosophers have not scorned to take it up too. Along with belief in survival after death may go belief in pre-existence before birth. Outside the Pythagorean and Platonic schools it has not been popular in the West. This is surprising because many arguments for survival apply equally well to pre-existence.

[1] *Philosophy*, 1942.

Before dealing with the three theories in detail there is one thing to be emphasised as strongly as possible, that they are logically independent of one another. That is to say, any one might be true and the others false, any two true and the other false. This is one reason why it is important to distinguish them. Arguments for or against one theory need not have any direct bearing on the others. Apparent logical connections between (1) and (2) will be discussed later.

Survival.—For primitive tradition and for pre-Socratic Greek theory the " soul," is a thin sort of matter, somehow mixed up with the blood and the breath and perhaps with other bodily parts or functions. The whole notion of there being a " soul " in this sense seems to have been the result of having mental images and dreams of people who were absent or dead. Hence animals, plants, rocks, streams, and places have " souls " also.[1] The Eleventh Book of the Odyssey provides the *locus classicus* for the primitive view. (If it is true that this book is tinged with Orphic ideas, that may be evidence that it is late, but equally that Orphic ideas are earlier and more primitive than is sometimes supposed.) The shades of the dead are strengthless and voiceless. Odysseus' own mother does not recognise him nor speak till she has drunk the sacrificial blood and acquired its " life " nor does the prophet Tiresias. The shades are not interested in anything but the living world. The shade of Achilles says: " Seek not to console me for death, glorious Odysseus. I would rather be on earth as the hired servant of another, in the house of a landless man with little to live on, than be king over the dead " (T. E. Lawrence's translation).

For post-Socratic thought the soul should be that which wills, thinks, or is conscious, and should not be associated with spectres. Nevertheless, ideas about survival after death have been strongly tinged with primitive views. At any rate survival is necessarily described in spatio-temporal terms and can hardly escape being thought of as something quasi-material.

The other theories are such that there can hardly be empirical evidence for or against them, but there might be some for or against survival, either from our general scientific knowledge about bodies and minds, or else from the special phenomena studied by " psychical research." Not to spend too much time on a rather minor matter, this question of empirical evidence will be dealt with

[1] Cf. William Ellis, *The Idea of the Soul*, 1940

summarily. Since the evidence is quite inconclusive it is easily done. As to general scientific knowledge; the extreme dependence of mental functions, such as consciousness, emotion, and memory (especially memory) on the normal and smooth functioning of the bodily organism, would make it seem unlikely that anything having enough continuity with previous life to be called the same soul could survive the dissolution of the bodily organism. There is no need to go into the points in detail; they are well known to everyone. On the other hand, it is important to realise that no evidence of this kind is very conclusive. It can always be explained away. In particular, if we suppose that the bodily organism is merely the soul's instrument, all evidence of this kind can be given full weight without in any way impugning the possibility of "psychic" existence independent of the body. The evidence merely shows that a bad instrument spoils the effectiveness of the soul's action. If the piano is out of tune the best musician cannot produce good music from it, but the badness of the piano does not annihilate the music, it only puts if off to another occasion. Even if all musical instruments perished music would still exist in a sense, while there was a musician alive. The instrumental view of the relation of soul and body receives some slight support from the facts of multiple personality, because they suggest the notion of several different personalities being able to "use" one bodily organism in turns. Even this is a weak argument because the differences in the personalities may be simply consequences of partial functioning of the bodily faculties.

The evidence from "psychical research" does not at present seem to be any more conclusive.[1] It has to be admitted that a number of very queer and obscure phenomena have been observed which do not fit in at all well with orthodox theories about bodies and minds and their relations. These phenomena can be interpreted in terms of a theory of "spirits," but they can equally well be interpreted otherwise and with a saving of gratuitous hypotheses. It seems that one must accept either telepathy or clairvoyance as a fact and most probably both as independent facts. Well, granted telepathy and clairvoyance, and granted too the possibility of a certain amount of distortion of the temporal sequence of events, so that what is in the future for one person's experience is not always in the future for another's, it seems

[1] Cf. G. N. M. Tyrrell, *Science and Psychical Phenomena*, 1938, and Harry Price, *Fifty Years of Psychical Research*, 1939.

possible to account for all alleged " spirit " communications. It can perhaps be done by means of telepathy and clairvoyance without temporal distortion, or by telepathy and temporal distortion without clairvoyance. The point is that the " spirits " have never reported anything which has not been already known to some living person or about to be known in the near future or available in written documents or by means of some already existing material evidence. The so-called " materialisation " phenomena, if genuine, tell one nothing about " spirits " of any sort but merely that the material world is an odder place than one had thought. The fullest admission of well-established facts of " psychical research " and even of many dubious facts does not necessitate a belief in survival after death.

If the evidence of " psychical research " be admitted as evidence for survival, and if all the alleged communications from the dead be admitted as *bona fide*, the result is not exhilarating. In the first place the world of " spirits " turns out to be strangely material, for the " spirits " move about in space and operate on material things in some direct way. What is called " spiritualism " is very like " supernatural materialism." Secondly, the evidence opens up a dismal prospect for the future life. Nothing of genuine interest or novelty has ever been communicated and the general level of intelligence seems depressingly low. Lastly, the evidence favours endurance for a limited time and not a very long one, as the most numerous and most plausible communications have been those alleged to come from the recently dead. Those that purport to come from the distant dead are fewer, much less plausible and less informative. Altogether, it looks as though the last word as to the value of survival had been spoken by the shade of Achilles.

Belief in survival is strongly reinforced by the fact that nobody can imagine a future time without himself as conscious and looking on ; though of course he can think of it. But this is not an argument ; if it were, it would apply to pre-existence before birth equally. So far I have said nothing about pre-existence. There are really only two things to be said. First, that anyone who wishes to advocate survival without pre-existence must pick his arguments carefully to avoid those that favour both. Secondly that if the argument is that the soul is a pilgrim and stranger in this world, then pre-existence is a necessary part of the doctrine. This argument is the only attractive part of the theory.

The importance of the survival theory lies, not in its merits as a theory, but in the fact that in one form or another it is traditional and widely held, that Plato chose it to supply the mythological setting of his own theory, and that language intended to deal with the other theories easily lapses into forms expressive of survival. Lastly there is the point that most objections to immortality expressed by thinkers worthy of respect have really been directed against survival.

Perpetuity.—This theory springs from the characteristically Greek view that change, growth, development, origination, or creation is mere appearance and that the real is by its very nature eternal and unchanging. At first this view was a physical hypothesis or dogma intended for scientific purposes or for speculative cosmology. It contains indeed, though concealed by exaggeration, certain useful rules of scientific method. Socrates, or Plato's " Socrates," applied the notion to the spiritual sphere and considered the soul as a spiritual substance, indivisible, indestructible, eternal. The eternity of the soul is ambiguous; it might mean that it was non-temporal like truth, or that it was temporal but coeval with the whole universe, or both. At any rate this is the traditional " rational psychology," the arguments for which Kant set out to demolish. He showed that the arguments were an illegitimate extension of ideas appropriate to the physical world beyond their proper limits. The case is, I believe even stronger than Kant made out, because the ideas illegitimately extended are not very good ones even in their own proper sphere. In fact the whole traditional notion of substance, material or spiritual, is a tissue of confusions. It would need a long book to sort them all out; a bald and dogmatic summary must suffice for the present.

It is a precept of scientific method to record and measure change in terms of something which does not itself change appreciably during the period over which observation extends. This something is a *continuant*, to use the terminology of W. E. Johnson's *Logic*. For linguistic convenience the continuant is usually a substantive, the changes adjectives. This appears to be all that scientific method requires. It does not require anything absolutely unchanging or eternal. It is a matter of indifference whether or not anything is simple, indivisible, indestructible, or coeval with the whole universe. It is important that while some things change quickly and a great deal, others should change slowly and only

a little. If I use a yardstick for measuring, it does its work as long as its changes of length are negligible for my purpose. I know that changes of temperature actually alter its length a little and so do changes of moisture if it is made of wood, but if the limit of accuracy needed is one-tenth of an inch I can ignore all these. There may be secular cosmic processes which change its length continually, but if I am concerned with periods of years I can ignore these too. I know too that there was a time when the yardstick did not exist and a time will come when it will be broken ; that does not disturb me either. We find a model of the continuant, not only in the persistent entities of the physical world but also in the persistence of our own conscious life and memory, against which, as a fairly stable background, changes are apprehended. But this constancy and persistence, like that of the yardstick, are relative, not absolute. There was a time, too, when my consciousness did not exist, like the yardstick, and to-morrow it may be destroyed, like the yardstick.

Eternal Life.—Plato probably intended to state this theory, but as he mixed it up with the other theories his statement is not clear. Spinoza, for the very reason that he repudiated the other theories, succeeded in making a clear statement, perhaps the clearest ever made. Nevertheless, the classical definition, and the one most quoted, comes from Boethius—" Aeternitas igitur est interminabilis vitae tota simul perfecta possessio." That is to say, it is a kind, quality, or intensity of life which can be possessed all at once and completely and which has nothing to do with temporal duration short or long—" one day is as a thousand years and a thousand years as one day." That Boethius did not take " interminabilis " to mean " long duration " is clear from the context (*Consolation of Philosophy*, V, 6, 9–48). To come to Spinoza ; on his view the soul is not an individual substance at all, but is, considered under the aspect of its thinking function, that which is also the bodily organism when looked at under the aspect of matter. In so far as we as thinking beings succeed in the effort to conceive all things as ordered and united together in God, we are thinking God's thought and thereby partake of eternal life. In the fewest possible words—" The mind is eternal is so far as it conceives things under the form of eternity " (*Eth.* V, Prop. 31, Scholium). Spinoza makes eternal life a consequence of knowing God. It might be the other way round, but that would not make a great difference, since thought is judgment

on his view and includes will, and in any case seeking God must come before finding Him.

There is a rather ambiguous saying in St. John's Gospel (Chap. 17, v. 3): " And this is life eternal, that they might know thee the only true God . . ." (" αὕτη δέ ἐστιν ἡ αἰώνιος ζωή, ἵνα γινώσκωσι σὲ τὸν μόνον ἀληθινὸν θεὸν . . .") The subordinate clause might be explanatory, " namely that " or state the purpose, " in order that." In either case knowledge of God and eternal life are linked together. This seems to be the only place in the New Testament where there is a definite expression of the kind of view I am trying to define. However, the Second Collect in the Anglican Morning Prayer says all that is needed. " O God, who art the author of peace and lover of concord, in knowledge of whom standeth our eternal life . . ." The important point is that eternal life is not automatic like perpetuity or mere prolongation of ordinary life like survival but a lifting up of life to a higher level and it is a gift granted to those who seek it.

Spinoza, like Plato, speaks always in terms of intellect. He is precluded from speaking directly of " love of God " because he has defined " love " in terms of Hobbes's psychology. Therefore he uses the compromise phrase " intellectual love of God." It is possibly a happy compromise because it does indicate that there are two aspects to the search for God, affection and understanding and that both are needed. There are two points about the meaning to be attached to the phrase " knowledge of God " that need to be mentioned.

Of course, perfect or complete knowledge of God is not attainable by man and neither Spinoza nor any one else who has used the phrase is likely to have thought it was. Even " the heathen in his blindness " who " bows down to wood and stone " has some knowledge of God. He bows to the wrong thing in the wrong way for the wrong reasons, but he does bow to something which is neither his own belly nor another man bigger and more brutal than himself. He has taken the first step. When Greeks substituted the Olympian gods for the old fertility symbols that was another and a considerable step. When Elijah realised that God was not heard in the storm and the thunder but in the still small voice that was perhaps the greatest step ever made. The knowledge of which Spinoza spoke and which he considered was attainable here and now is not perfect knowledge. It is inferior

to that of the saints in Heaven; it is superior to that of the idolator; it may be sufficient for its purpose.

There is a certain naïvety about Spinoza's attempt, as about Plato's, to scale the heights of Heaven by force of abstract reasoning. But it must be remembered that for both of them abstract discursive reasoning was no more than propaedeutic for "*scientia intuitiva*," which was not abstract, and that both of them realised, though perhaps defectively in their different ways, that *scientia intuitiva* has an emotional aspect (*Eth.* V, Prop. 32 and corol.) Neither of them could fully explain his meaning because the resources of the Greek, Latin, or indeed any language do not run to more than a hint in the right direction. For many thinkers philosophy is a house complete in itself, but for these two the outer court of the Sanctuary.

The theory of perpetuity has been the main source of confusion in the subject of immortality. It is only fair, however, to point out that, although the supposed arguments in its favour were shown by Kant to be no arguments at all, the theory is not itself absurd or self-contradictory. It might be true. In any case it is important to consider it carefully, to distinguish it from the others and to see what it commits us to if we accept it. On this last question it is not easy to give an answer. Plato assumes that only νοῦς, intelligence, or reason persists in perpetuity, everything else belongs to the animal psyche and therefore perishes with the body. This means that sense experience, imagination, memory, emotion, and desire are all excluded from immortality. Since the time of Descartes, however, it has been generally assumed that some or all of these functions belong to the soul, and possibly only the vegetative functions are purely bodily. But what would sense experience be without the physical organs of sense and what is imagination without sense? What are emotion and desire without the bodily functions that go with them? The crucial question though is memory. Perpetuity without continuity of memory is a mere formality.

Plato's doctrine of "recollection" as given in the *Meno* and *Phaedo* is an ingenious prop to the theory, but it definitely excludes the perpetuity of memory in the ordinary sense, as does the Myth in the *Republic*. According to him there is no conscious memory of past lives but an implicit capacity to discern truth or principles is always present. Though the truths are there all the time, experience is needed to make them explicit or consciously realised

and experience dies with the body. Actually the most important argument in the *Phaedo* turns upon the timelessness of truths and the consequent timelessness of νοῦς which apprehends them. This argument properly leads to the theory of eternal life, if it leads anywhere. I believe Plato intended to advocate eternal life and that the theory of perpetuity is an unfortunate confusion due to the influence of Parmenides and possibly the Pythagoreans. His mythological imagery too is derived from the survival theory, and perpetuity may be considered as a sort of half-way house between survival and eternal life.

According to the theory of perpetuity each individual soul is imperishable in its own right and coeval with the whole universe, so that the total number of souls is constant. This contradicts two important features of Christian tradition, that souls are created by God and that immortality is a gift of God. What has been created can be destroyed and a gift can be withheld. A theory of pseudo-perpetuity according to which souls are created but once created indestructible needs no discussion.

Perpetuity and survival are linked together in the sense that if you start supposing (*a*) that something quasi-material lingers on after the dissolution of the body and then (*b*) that consciousness and memory survive, it does not seem much of a jump to assume (*c*) that there is also a metaphysical entity which is inherently indestructible. But the metaphysical theory really introduces an entirely new element and something not implied or even suggested by (*a*) and (*b*), which in themselves say nothing about how long survival goes on, much less that it is necessary and infinite in past and future. Something might survive for a limited time and something else be perpetual.

If the perpetuity theory is to be put forward seriously it looks as though it should go with a theory of monads more or less on Leibnizian lines. Let it be supposed that there are monads which are not entirely self-sufficient but depend for self-expression as " minds " upon co-ordinating a system of subordinate monads to form a " body." This is not an impossible view of the relation of mind and body and there is no need to insist on the pure activity of mind or pure passivity of body, provided it is understood that any kind of activity or passivity is co-ordinate. The mind-monad is not necessarily dependent on one individual body for self-expression, as for Aristotelian or Spinozist theory, but might act through various organisms which need not necessarily

be material bodies of the kind we see and touch. As long as the mind-monad actually uses some kind of subordinate or instrumental system of monads as its organism it will exist in fact; as long as it may find them it will exist potentially. Of course, this is all pure speculation, but it seems a legitimate speculation, though it is difficult to see exactly what a potential mind without an organism could be. The mind of a newborn baby is potential rather than actual, but its potentiality depends upon its organism, its body, which is actually there though not completely developed.

Perhaps it is very unfair to try to put a philosophical gloss upon prophetic or poetical utterances. Nevertheless, it is very tempting to apply some theory like that just suggested to St. Paul's statements about resurrection from the dead and the earthly and the heavenly body (1st Epistle to the Corinthians, Chap. 15). On the other hand St. Paul may have been trying to state the traditional survival theory in non-materialistic terms and in particular to overcome the crudities of belief in the resurrection of the body. Again, he uses the term "death" ambiguously sometimes to mean (*a*) the dissolution of the body, the common meaning, but sometimes to mean (*b*) the destruction of the spirit, as in "the sting of death is sin," and in the Epistle to the Romans "the wages of sin is death." If "death," "sin," and "separation from God" were taken as synonymous terms we should have the negative side of the theory of eternal life. It is certainly not difficult to read this theory also into St. Paul's statements. I shall return to this aspect of his teaching by way of conclusion, but there is still one point about perpetuity to be cleared up.

At the beginning I insisted on the logical independence of the three types of theory and the fact that they can be asserted independently or in combination. There may of course be special reasons for combining them. An argument that I can well imagine being used, since arguments very like it have been, for combining eternal life with perpetuity is as follows. Eternal life by itself might mean nothing but absorption of the finite individual in the infinity of God, and this, though possibly good enough for Orientals, will not do for us Westerners who value personality and individuality above all things. This seems to me a bad argument, for three reasons. (1) If absorption is the end, then it is the end; the Orientals are right and the Westerners wrong. Absorption might count as a fourth theory, though not quite a theory of immortality. (2) The objection to absorption

is that it seems to imply the extinction or annihilation of something valuable in itself. But the theory of eternal life without perpetuity need not imply anything of this sort. " Knowledge of " or " union with " mean gain and not loss. In Aristotelian terms we might say that the " matter " of the human soul is " informed " by the Divine Spirit, or perhaps " transformed ": but in any case nothing is lost that cannot well be spared. The lump of bronze that has become " informed " by being cast into the form of a statue is, if you like to put it that way, absorbed into the statue, but it has lost nothing it possessed except its shapelessness. Of course we meet here one of the fundamental antagonisms, between those who think that " separateness " is " disunion " and something to be deplored, and those who think it is " variety " and something precious ; between the Monists and the Pluralists. (3) In any case, whichever side one takes, perpetuity guarantees nothing. If my personality (P_1) comes to an end to-morrow with the death of my body, and somewhere or other and later on something formally equivalent to it (P_2) carries on its career, and if there is no continuity of memory to link P_1 and P_2, what has been gained by either of them ? If I knew that before my birth there was something (P_0) I have no acquaintance with, what has been gained ? Continuity of memory is just the point where perpetuity fails completely. The survival theory cannot make out a plausible case either because of all our faculties memory is the one most wrapped up with bodily function.

Christian tradition about immortality has been somewhat wavering and confused, partly at least because the three types of theory have been mixed up together. But there is an element in Christian tradition, and especially in St. Paul's teaching, not to be found in the philosophers, except perhaps Plato, which I have not yet mentioned and which might be considered as still another type of theory, or better as a special modification of the theory of eternal life. Spinoza's statement is as different as possible from this other modification. He considered that eternal life is attainable here and now by means of a certain kind and intensity of intellectual comprehension or insight. But Spinoza's way may not be the only way or the best or even a possible way at all. There may be others. The surest way may be through the experience of death—*mors janua vitae*. This does not mean that every one who dies attains eternal life, only that all who have made such preparation as they could can hope to

attain it in such fashion and to such a degree as is possible for them individually. This is not a disguised form of the theory of survival or perpetuity. Survival means that, though John Smith died last week and his body was buried, there is now and will be on future dates, somehow and somewhere, a state of consciousness sufficiently similar to and continuous with John Smith's to be recognisable, at least by himself, as John Smith and entitled to be called by this name. So also, *mutatis mutandis*, for pre-existence. Perpetuity means that, as an irreducible fact in the constitution of the universe, there is always an entity, which may or may not always be conscious, but which, during the time he lived, could in some way be identified with the person John Smith. The theory that death of the body may be the way to eternal life does not imply any of these assertions. That is not to say they are necessarily false or absurd, only that they are not to be inferred from the theory. All that can be inferred is, as von Hügel put it, " the most real relation between the most living realities—the human spirit and the Eternal Spirit, God."

The martyr preparing to face his last physical agony may well see death as the gateway to life. But what about those to whom death comes by way of delirium, madness, or slow decay to imbecility ? This question, like others about immortality, cannot be answered confidently on empirical or *a priori* grounds. We shall each of us know at least one answer when our time comes.

XI

ANTIPHON [1]

Characters: Socrates, Antiphon the Sophist, Charmides, and silent auditors.

Socrates: Good afternoon, Antiphon, you look very well pleased with yourself. Has a rich uncle in Syracuse left you his fortune ?

Antiphon: By Zeus, Socrates, you are mistaken. I have no rich uncle, and if I had he would be sure to live to be ninety-five and then leave his money to the Society for Reforming the Greek Calendar. But it is true that I am pleased with myself, for I have made a great discovery, which settles at one stroke many of the disputes of the learned.

Socrates: That is good news. What is more, the joys of discovery are greatly increased by sharing them with your friends ; while it is said of money that if you lend it to your friends you lose both the friends and the money. Sit down then with us here, Antiphon, and tell us your discovery.

Antiphon: With pleasure, Socrates, but who is to pay me for instructing your ignorance ?

Socrates: We shall all pay what we can, when we have seen your discovery ; for nobody buys a pig in a poke, as they say. I have here two obols to buy my supper with, and shall be delighted to forgo the supper if I can purchase wisdom instead.

Charmides: There is no need, Socrates, for any sacrifice. If you and Antiphon will both come to my house this evening, you may have both supper and wisdom.

Socrates: You are always generous, Charmides ; it is hardly necessary for me to say that I accept your offer with gratitude and I don't suppose Antiphon will refuse. But first, as to this discovery ; out with it Antiphon, my friend.

Antiphon: As you are all aware there is no subject about which the learned, and the unlearned too, are more liable to dispute than as to the nature of the gods. Protagoras, it is true refused to discuss the subject, possibly because he anticipated my discovery. But if so, he has kept it to himself.

[1] Written 1940.

Socrates: What are you leading up to in this cautious way, Antiphon ?

Antiphon: Listen, and I shall tell you. Some say that the gods are many, and in this opinion they have the support of a host of poets and wise men of old. Others say that there is only one God, whether he be called Zeus or by any other name. This opinion is held not only by some of the Greeks but also by certain Barbarians. But of late there have been others who have asserted both in prose and verse that there is no God at all. They say that everything that happens in Heaven and Earth is born of Chance or of Necessity, so that we are all of us, men and beasts and rocks and stars dashed about like the particles of dust in a whirlwind.

Socrates: I have heard this kind of opinion, and it seems to me strange and uncouth. But what is your view, Antiphon ?

Antiphon: That is what I am coming to, Socrates, so don't be impatient.

Socrates: I am all ears.

Antiphon: Well, my opinion, which I can prove to you if you wish, is that nothing that anybody professes to assert about the gods, as to whether they are one or many or exist or do not exist, has any meaning at all. That is to say those who talk of these things are not saying anything at all, any more than asses do when they bray or hens when they cackle.

Socrates: Marvellous, Antiphon ! But may I ask one question ?

Antiphon: You may, by Zeus !

Socrates: You will excuse my laughing, I hope. But it seems comic to hear you say " By Zeus " when you have just explained that it means nothing. Though it is true most people who swear by Zeus or any other god don't mean very much. Well, the question is this: when asses bray and hens cackle do they ever contradict one another or even think they contradict one another ?

Antiphon: My acquaintance with asses and hens is perhaps less intimate than yours, Socrates, but I venture to suggest that they neither contradict nor even think they contradict one another.

Socrates: That is exactly as I thought and I am glad we agree. But tell me, when men assert that the gods exist and others that gods do not, are they not contradicting one another ?

Antiphon: No, Socrates, they do not contradict one another.

They may imagine, mistakenly, that they do and they may even get excited about it, but that excitement is only part of their delusion.

Socrates: This is most surprising. Suppose now that I assert that Antiphon is wise and some rude fellow asserts that he is not wise. Do not I and the rude fellow contradict one another?

Antiphon: Indeed you do, but that is quite another story.

Socrates: How?

Antiphon: In this way. When you assert that I am wise that is a real and genuine assertion and really and genuinely contradicts the assertion that I am not wise, because the assertion is capable of proof or verification. If it is the case that I am wise then my wisdom is manifest to all who care to attend, by my saying things they can test for themselves by their own senses. Whereas if I were unwise they could in a like manner discover the falsity of the things I said. For example, when from my knowledge of astronomy I tell them about eclipses of the sun and moon, or from my knowledge of the behaviour of men I tell them the kind of arguments that will persuade juries.

Socrates: These are great thoughts. As you have hinted there is some connection with certain things our mutual friend Protagoras wrote in his book. But first let me be quite clear in my mind. When men talk and argue, some asserting this and others that, this talk, you say, may be of one of two kinds, either it may have meaning and be genuine assertion, as we will call it, or else it may be meaningless or sham assertion.

Antiphon: I do.

Socrates: And the first kind consists of those sayings that can be verified by means of the perceptions of our senses. For instance when the shoemaker says that a pair of shoes is too small and will hurt my feet, if I persist in wearing them, I find that they do hurt me. Then I realise that the shoemaker had knowledge and his assertion is justified and true. Is that not so?

Antiphon: You have grasped my meaning exactly. But why do you drag in shoemakers and shoes?

Socrates: I am sorry, Antiphon, but I have no soaring intellect like yours. My mind moves slowly and is at its best among humble and familiar things. Now as to the other kind of sham assertions, did you not say that they cannot be either verified or contradicted by the senses?

Antiphon: Yes, that is what I said, Socrates.

Socrates: And these sham assertions are not strictly speaking either true or false and anybody who proposes to assert them is not saying anything, only making a noise. So also any one who professes to contradict them is saying nothing.

Antiphon: That is so.

Socrates: Anything then that anybody either asserts or denies about the gods you say is of this sort.

Antiphon: Yes, that is what I said at first and say again.

Socrates: Excellent. Now what are we to make of the utterances of the poets? When Homer tells how Odysseus after landing on the island of Ithaca was met by the goddess Athene in disguise and by her instructed as to what he should do, does he not appear to be saying something and do we have any difficulty in understanding what he means?

Antiphon: No difficulty at all. But what has this to do with the case? These are just poetic fancies or the invention of simple ignorant folk, like the stories about hobgoblins that nurses tell to frighten children.

Socrates: Possibly; but when the children hear about the hobgoblins they are really frightened are they not?

Antiphon: They are, the little fools. But then children will believe anything.

Socrates: They will indeed. If they believe the stories and are frightened then the stories have meaning, at least for them.

Antiphon: Perhaps, but not for me.

Socrates: You surprise me. When you were a child were you not afraid of hobgoblins?

Antiphon: I may have been, but now I am not.

Socrates: Precisely. When you were a child you believed as a consequence of these stories that things lurked in dark corners and might pounce out on you, and you were afraid. Since then have you not learned by experience that corners are empty, even dark ones; or, at least, that nothing pounces out of them?

Antiphon: I have, but what of it?

Socrates: Only this. Experience you say is the test of truth and falsehood. Experience has taught you that the stories about hobgoblins are false. They are not meaningless for once you thought them true and were frightened, now you know they are false and are not frightened.

Antiphon: I suppose so. But what has this to do with gods?

Socrates: As I was about to say, before you introduced your

friends the hobgoblins, when Homer says the goddess appeared to Odysseus, either he saw somebody or he did not.

Antiphon: Yes.

Socrates: If he saw somebody, so far at least Homer tells the truth. If he saw nobody, Homer speaks falsely. In either case Homer means something and it is quite clear what he means, isn't it?

Antiphon: Quite clear, Socrates; but you fail to understand my point. I agree either Odysseus saw somebody or nobody, and so far the poet is asserting either truth or falsehood. Any fool can understand that. But what I mean is that if he saw somebody he just saw an ordinary person and when Homer goes on to say it was Athene he saw, that is simply nonsense. Homer is saying nothing.

Socrates: Then you think Homer was just mocking us when he put in that about the goddess or perhaps only filling up the end of a hexameter. In fact I must conclude that you suppose Homer is mocking us most of the time, because if you take away the things he says about gods out of his poems, there will be very little left.

Antiphon: You persist in misunderstanding me. I do not think Homer was mocking; for I remember, what you seem to have forgotten, that he was writing for ignorant people lacking our modern scientific knowledge. They imagined that gods and other supernatural beings frequently interfered in human affairs, so Homer had to tell them stories about these interferences or they would not have listened.

Socrates: Thank you for reminding me, Antiphon. I must have a shocking memory, for I had forgotten that science teaches us that everything happens in accordance with constant laws and nothing that happens can be contrary to those laws. Is that not so?

Antiphon: It is so.

Socrates: But ignorant and unscientific people suppose that some things happen according to constant laws, while others happen in a different way. These others they attribute to the action of gods and other supernatural beings.

Antiphon: That is what they imagine.

Socrates: But they imagine falsely, do they not?

Antiphon: Yes.

Socrates: Then Homer is speaking falsely when he says that

the gods interfere in the course of nature and are seen by men in human or other shape ?

Antiphon: Yes.

Socrates: If you agree to this, Antiphon, you would appear to deny what you said at first. Both as to what Homer says about gods and nurses say about hobgoblins, we have discovered that what they say is by no means meaningless but is false. And if it is possible to make a false assertion about God it is also possible to make a true one, if only to assert the falsity of the false one.

Antiphon: You are at your old tricks again, Socrates ! I thought you were, for once, really asking for instruction or I should not have wasted my valuable time talking to you.

Socrates: I am afraid, Charmides, our friend has gone off in a huff. Do you think I have offended him mortally ?

Charmides: I expect so. I have noticed, Socrates, that when anybody comes along blown out with pride you take a delight in pricking him suddenly as if with a pin. Though you are kind to the young who are diffident and do not profess to know much, you have no mercy on others.

Socrates: Perhaps you are right. Partly it is because I have a soft place in my heart for youth and beauty ; but it is partly too a less honourable trait of character. Being ignorant myself, I dislike even the semblance of knowledge in others. As to this problem Antiphon has raised of the existence or non-existence of God, what do you think, Charmides ?

Charmides: I hardly know what to think. It seems clear that most of the old tales about gods told us by poets and others are false, but I should be loath to believe there is no God at all. Because if there is no God, how will the wicked be punished and the virtuous rewarded ?

Socrates: How indeed ! Though it may be that the wicked punish themselves. However that may be, there is another problem that has been put in my mind by this talk. With your permission I should like to discuss it.

Charmides: Go ahead, I am ready to listen or to answer questions as you wish. And I am sure the others are too.

Socrates: Well, this is a matter I could hardly discuss with Antiphon as it would have made him angry, but I don't think it will anger any of you young men as you are not set in your opinions yet. In any case the notions I wish to put forward are

not my own and I am only going to air them tentatively to see what they look like in the light of day.

Charmides: Whose opinions are they ?

Socrates: I hardly know. As you know my memory is not very good and sometimes plays queer tricks on me. Perhaps I dreamt they were told me by some inspired prophet. Possibly it was something in a dream of his told me by my young friend Aristocles the son of Ariston. Dreams are curious things. Some ingenious fellows try to make out that they foretell the future.

Charmides: Yes, I have heard them. There is a lot of mysterious talk about Time as a fourth dimension and about five, six or many dimensions. I don't really understand it.

Socrates: Neither do I. For one thing they illustrate their theories with complicated diagrams, but as these are in two dimensions they are extremely puzzling. For another they talk very fast and loud with lots of new technical terms, till my poor head just goes round and round in half a dozen dimensions. However, it was not dreams we were to discuss but God.

Charmides: Tell us then, Socrates, what was revealed to you in your dream.

Socrates: Well now, what I heard Aristocles say, or dreamt I heard him or somebody say, was that unless there be one supreme God there could be no genuine knowledge of anything ; or rather it would be better to say, that only the man who first presupposes the existence of God can be justified in claiming that he has valid knowledge. Furthermore certain views as to the nature of God are necessarily presupposed.

Charmides: A strange opinion. I should like to hear more of it.

Socrates: Not so strange after all, possibly. But there are one or two things I must explain first, and I hope you will excuse me if I appear long-winded.

Charmides: As you said before, we are all ears.

Socrates: Listen then, good ears. What Antiphon said just now about genuine assertions being such as can be verified or contradicted by experience is true of a great many types of assertion, some of those that are made by astronomers, physicians and other craftsmen skilled in their craft. But he only spoke part of the truth about these assertions and nothing at all about certain others such as those of mathematicians. Indeed one thing which seems of the greatest importance he omitted to mention.

Charmides: What was that, Socrates?

Socrates: This. The man who has knowledge or is expert in any craft differs from the rest of us in that he can ask the right kind of question and so obtain the right kind of answer. That is the truth underlying the talk about verification by experience.

Charmides: Would you explain your meaning by an example? I am not quite clear about this.

Socrates: Certainly. When you are ill and the physician is called in, does he not ask you certain questions. Have you a pain here or there? What have you eaten and drunk?

Charmides: Yes, these and many others.

Socrates: Does he not also ask questions of a different kind that you answer without speaking, as when he feels your pulse to see if it is slow or quick, strong or weak?

Charmides: He does do all this.

Socrates: Is it not by means of his questions that he discovers the nature of your disease and decides on the proper treatment?

Charmides: Yes. I begin to understand.

Socrates: Now even I can ask a sick man questions by the dozen and hear his answers too, but I shall not learn anything by them because I do not know the right questions to ask. Though I happened by chance to ask one of them, I still could make no use of the answer, because I do not know why that question is to be asked instead of some other. Do you see where this is leading to, Charmides?

Charmides: A bit, but tell us yourself.

Socrates: Very well then. A question is asked because of special knowledge already possessed, or it arises out of certain presuppositions, as the orators say in the assembly. Sometimes presuppositions are definitely and clearly before the mind of the one who asks the question in which case we call them assumptions: sometimes they are not clearly apprehended but by suitable enquiry they can be brought to the surface, as it were, and be made explicit. If we examine any of these presuppositions we can see that they are themselves answers to questions and these questions of course arise out of still other presuppositions, and so on.

Charmides: I understand; but the process must have a beginning somewhere.

Socrates: Quite right, my lad, you have hit the nail on the head. At some stage or other there must be absolute

presuppositions which do not arise out of any question and behind which there are no further presuppositions. If this were not so there would, as you say, be no beginning to knowledge and we should be in a ridiculous position.

Charmides: Yes, it would be enough to make a cat laugh.

Socrates: As we are not cats, let us be serious and go on with our enquiry.

Charmides: By all means.

Socrates: The position we have reached then is this. Knowledge consists of answers to questions and questions arise out of presuppositions. Most presuppositions are relative ones because they themselves are answers to questions and have behind them other presuppositions. Since there must be a starting point some presuppositions must be absolute ones on which everything else depends. All this is an account of the structure of some one system of knowledge and knowledge is not always the same, for different men know different things and knowledge may increase. Thus the sciences of astronomy and mathematics as known to us involve certain presuppositions, but our ancestors before the time of Thales, though they knew the position of the Pole Star and the seasons of rising and setting of the Pleiades and so on, had no need of such presuppositions as our astronomers require. So also our remote descendants, who may develop sciences we know nothing about, may require other presuppositions. Therefore you must never say simply, " so and so is an absolute presupposition " but instead you must say, " those who profess such and such a science at this or that stage in its development necessarily presuppose so and so." So it was revealed to me in this dream, and I repeat it to you.

Charmides: I shall do my best always to speak in this manner. But what has this to do with the existence of God ?

Socrates: Wait a bit and you will see. All I have said so far is the merest commonplace.

Charmides: I shall believe it, since you say it is so.

Socrates: At any rate it is merely a preliminary to the doctrine I am about to expound, which is not so commonplace. Now Antiphon like many of our clever young men sought to put aside the question of the existence of God and invented that trick about meaninglessness. Do you realise, Charmides, that although it is extremely easy to make a false statement, it is by no means so easy to make a meaningless one ?

Charmides: No, Socrates, I should have thought that too was easy.

Socrates: Did your teachers not tell you that to every proposition there is one and only one contradictory and that if one of the pair is false the other must be true ?

Charmides: They did, but I am afraid I paid little attention at the time.

Socrates: Then pay attention now. I shall try to make up a thoroughly absurd proposition. Let us say—Triangles are courageous.

Charmides: Nothing could be more ridiculous.

Socrates: I agree. And after a moment's pause to let the cat laugh, I shall continue. Antiphon would say that it is a sham proposition since experience cannot possibly confirm or confute the courageous character of triangles.

Charmides: He would.

Socrates: But suppose we consider the contradictory proposition. It is not, of course, that triangles are cowardly, but the assertion that whatever may be the characters of triangles courage is not among them. This is true. Whether its truth is arrived at and tested by experience or whether *a priori*, as the schoolmasters say, we need not pause to enquire.

Charmides: I understand. If the contradictory of a proposition is true, the proposition is false. Whereas the form of words that is contradictory of a meaningless or sham assertion would be equally meaningless.

Socrates: Precisely, my beauty. I expect you really paid much closer attention to your teachers than you make out, but possibly your memory like mine is a bit shaky.

Charmides: Possibly.

Socrates: Generally it is only geometricians who talk about triangles, and as they are professional men with reputations to lose they are careful not to say anything ridiculous or false, such as that triangles are courageous or cowardly. But everybody whether wise or foolish, educated or uneducated, young or old, male or female chatters about the gods and about other alleged supernatural beings. It should not surprise you then if very many things are said which are both ridiculous and false, as that gods appear in human shape, or deceive men, or do dishonourable actions.

Charmides: It does not surprise me. The surprising thing would be if anybody told the truth and knew it to be truth.

Socrates: Perhaps you are too pessimistic, Charmides. It is a common defect of youth.

Charmides: Then you must cure it, Socrates.

Socrates: I am doing my best, and you must bear with me a little longer on the subject of triangles. The geometricians tell us that triangles are composed of lines and points, that is to say that certain properties of lines and points are presupposed in their science. The properties of triangles that they tell us about we can see for ourselves and see that what is said is correct, but points are by definition invisible and what is said of them cannot be verified by the senses.

Charmides: True, Socrates. But have I not heard you saying something very different about triangles; namely that the demonstrations of the geometricians do not really concern the triangles we see but the form of triangle or the triangle as it is in itself? The sensuous visible triangle is therefore only an imperfect copy of the true invisible triangle. The points then are no different. The true geometrical point is invisible like the triangle, and a visible dot will pass muster as its sensuous copy. Or did I only dream all this?

Socrates: If you dreamt it, Charmides, I have dreamt it many times too. In that case, perhaps we ought to consult those physicians who interpret dreams, for fear that something dreadful is happening to us. Repeated dreams are dangerous, they say. I knew a worthy citizen of Athens who dreamt several times he found a small child crying in the street and comforted it and gave it an apple, whereat the child ran off laughing. It seemed to me all very pretty and innocent, but the interpreter interpreted it to mean that the poor man nourished a secret incestuous passion for his mother-in-law. He was never the same again.

Charmides: What did he do?

Socrates: The only thing possible. He fled overseas to Epidaurus and spent the rest of his days in the precincts of the temple of Asclepius. He did not live long.

Charmides: A sad fate. May Apollo and the Muses save us from the like!

Socrates: "Amen" to that prayer! Let us therefore postpone our visit to the interpreters of dreams and proceed with the argument.

Charmides: By all means.

Socrates: Your dream of this distinction between the visible

figure and the true invisible object of geometrical science, is as I maintain a noble and beautiful one, but there is a small error in your report of it.

Charmides: What may that error be, Socrates ?

Socrates: It is this ; what our sensuous experience imitates is always a figure of some kind and not strictly speaking a line or point. You may make a mark on paper and call it a straight line for purposes of geometrical reasoning ; but it is not like a line ; it is like a thin parallelogram. You may make a dot and call it a point but it is like a small circle or polygon. For the geometrician it is a matter of complete indifference whether or not the things he draws are like things he reasons about or closely imitate them. He makes his drawings merely to suggest to our minds by an easy method what it is he is reasoning about, and if he and we were clever enough we could dispense with drawings altogether, for the purpose of reasoning. If however we wish to apply our geometrical knowledge to planning a building or measuring a field then at the beginning of the process our sensuous experience comes in when we apprehend the field or the site of the building as being like some true geometrical entity, say a triangle or a rectangle, and again at the end of the process when we utilise the results. In between in the actual reasoning process sense has really no place. If this is true of the actual reasoning process, much more then is it true of presuppositions underlying the reasoning process, which are at two removes as it were from sense. Do you agree ?

Charmides: Yes, I think you are right.

Socrates: The conclusion, then, will be that even in a science which can be applied to the world of sense experience the presuppositions of that science are no part of the visible and tangible world, but are purely intelligible entities. This must be true of all sciences ; that their presuppositions are no part of sense experience nor are they derived from sense experience.

Charmides: The first part of your conclusion I agree to. But what is the obstacle to the derivation of the non-sensuous or intelligible from the sensuous ?

Socrates: In this instance a very formidable obstacle. Perhaps I can show it to you by a different kind of example. When a new ship has been launched sometimes it is found to sail badly. Then the captain and the shipwrights discuss what may be the cause of the defect. It may be that the mast is too tall or too short or

stepped too far forward or too far aft. Or perhaps it is something else. I am no expert in these matters.

Charmides: Neither am I, but that is the kind of thing they say.

Socrates: Well then, they try first one remedy and if that is no use another, until, if they are lucky they find the cause of the defect, which means that they know how to cure it. Sometimes they are unlucky and find no means of curing it and then the ship has to be broken up. But in this last event do the nautical experts say that there was no cause of the defect, since they failed to find one?

Charmides: No, they do not. They say they have failed to find the cause, but that there is some cause or other, they are still convinced. Of that I also am convinced, though no nautical expert.

Socrates: And so am I. But they could not learn this from experience. Experience has taught them that some ships sail well and some badly, and that sometimes making alterations in the bad ones turns them into good ones. From experience they can learn nothing more.

Charmides: How then can they learn that there is a cause?

Socrates: Do they have to learn it at all? Is it not a necessary presupposition of the art of shipbuilding? Could a man who did not presuppose this set out to be a shipwright?

Charmides: No, he could hardly have the face to be a shipwright.

Socrates: And what is true of the art of making healthy ships is true also of the art of making healthy men, isn't it?

Charmides: Yes, of the physician's art and something of the kind must be true of all arts and sciences.

Socrates: Agreed. And as for the medical art we have Hippocrates himself on our side. Moreover he has written something germane to my next point in his treatise on the Sacred Disease, as some call the Falling Sickness. Either, he says, all diseases are sacred or none are sacred. Only a man ignorant of medical science will single out one disease to treat it by prayers and incantations, while he treats other diseases by the usual methods of diet, regimen, drugs of known properties or, where it is possible and called for in extreme cases, surgical treatment. Each disease has its own special character and its own special treatment, but there is only one science and art of medicine. Is there one science for scarlet fever and another for mumps?

Charmides: No, Socrates, that would be absurd.

Socrates: There are also many other sciences to which we give different names, each with its own special province and special ways of dealing with the subject matter of its discourse, but they are all parts of one science because there is one system of nature. Unless we presuppose that the whole universe, whatever its diversities, and even because of its diversities, is one system and one order we abandon the possibility of scientific knowledge. If we abandon that we are no better than dog-faced baboons. Perhaps worse, for I am told they are intelligent animals.

Charmides: You sound to me very much in earnest, Socrates.

Socrates: I feel almost like one inspired ; therefore hear me out.

Charmides: Yes, by Zeus, go on.

Socrates: If we have faith in the validity of scientific knowledge of any kind, we must, as I have said, presuppose that there is one order of nature and one only, though it appears to our senses in manifold forms. If that is admitted then we must have faith in one God who creates, orders and maintains in motion the whole universe. This, in the phrase I introduced previously is an absolute presupposition. It cannot be avoided ; it cannot be resolved any further. In this way and this way only we can heal the old quarrel between Heraclitus and Parmenides.

Charmides: Are we to understand that this is truly your opinion, Socrates ?

Socrates: Do you ask the Priestess at Delphi whether the oracles she utters are truly her own opinion ?

Charmides: No, indeed. But then the Priestess is in a kind of trance and you are not: she does not understand what she says and you do: she knows that the god inspires her utterance, and you, I take it, are uncertain. So the analogy is a poor one.

Socrates: It may be as you say. But have you any fault to find with what I have said ?

Charmides: No, I have no fault to find, but I wondered whether you had any, Socrates.

Socrates: What, must I both expound and criticise ? Must I speak for defendant as well as plaintiff ?

Charmides: Why not ? You do it very well.

Socrates: I never could resist flattery, Charmides. I suppose that is because it seldom comes my way. I shall speak on as you are willing to hear, but I must speak as the spirit moves me whether it be criticism, defence or merely explanation.

Charmides: We are prepared for any or all of these.

Socrates: Now when Antiphon or one of his friends tells us that the popular stories about the gods, which indeed comprise all he knows on the subject, are meaningless or sham assertions he is only partly wrong. There is something sham about them, but not quite the shamness Antiphon supposes. The belief that gods are like human beings, only stronger and more mischievous ; that they can be soothed by prayers and bribed by offerings are no part of theology, that is to say rational discourse about God, but are a kind of sham natural science, or irrational discourse about operations of the material world.

Charmides: I don't quite understand.

Socrates: Perhaps I can make myself clear in this way. When a poet, wishing to convey the information that the sea is rough says that Poseidon is angry, I have no objection to make, for I realise I am not expected to take the statement seriously. He puts the matter in these words because they make the roughness of the sea more vivid or else because they fit his metre better. But I expect something different of a ship's captain. When he sees the sea is rough he takes the steps that his knowledge of navigation and seamanship show to be proper. If his grasp of the principles of his science is sound, if his application of them to the circumstances is correct and if he is not too unlucky, he and his ship will survive. If he is unlucky or his knowledge or his method of applying it is at fault, he may perish, but he will have done what he could. In any case the good captain will not waste time and energy in prayers and supplications and propitiatory offerings to the gods for the safety of his ship. I say for the safety of his ship ; for if in the imminent danger of death he prays for forgiveness for his own faults and shortcomings either in the exercise of his profession or in other matters, that is something quite different and is not to be despised. For the rest, it is merely bad seamanship to ask the gods to save you from shipwreck.

Charmides: I think you are right, Socrates, but for one small point. Suppose before the ship sails the captain offers up a pig or some other victim to the gods, then there will be a festival on board, all the ship's company will feast on roast pork, the ship will be decked with garlands, there will be drinking of wine and singing of songs and, as the saying is, a good time will be had by all. If all this happens, does not everybody begin the journey

in good heart with courage to face the storms? Should not a prudent sea captain seek to propitiate the gods in such ways as this?

Socrates: Charmides, you are wise and crafty beyond your years. But what you now speak of is no part of science or any genuine art, but of a false art, that of governing men by deceiving them. For this the orators have coined a word; they call it propaganda. Now the instance you cite is a relatively harmless example. I should not think the worse of a ship's captain who did as you say, but in doing so he would be acting as, let us say, a politician not as a practitioner of his own proper art.

Charmides: I accept the amendment.

Socrates: Good. Let us proceed to put the resolution before the meeting. We are agreed, are we not, that from science comes knowledge of the causes of things. Although it is not the noblest part of science, it is the part by means of which we accomplish our purposes in the world; to preserve health, to navigate the seas, to cultivate the land, to build and to beautify cities, temples and harbours, and so on. But men have always found their knowledge to be incomplete and consequently their control of things imperfect or even non-existent, so that many die of disease, ships are wrecked, crops and cattle perish, houses collapse on the heads of their occupants and other disasters occur because they are not foreseen or cannot be prevented. It is the feeling of impotence where knowledge fails that gives rise to sham science. Thus it is that a woman who fails to attract a man she loves by her beauty or other graces and virtues (the only true means of arousing love) may obtain a love philtre from some old fraud of a witch and put it in his cup. Sometimes the only result is that the poor man is sick, and thinks the wine was bad, as indeed it was. Sometimes he falls in love after all. If so it will be because the confidence she feels enhances her charms, but she will believe it was the potion that did it. Since she knows no true science of love, she falls victim to a sham science. So it is in many other matters. Particularly with respect to the gods, it is much easier to say foolish things than wise ones, because as a rule men only invoke the gods where their knowledge fails them and they feel weak and helpless.

Charmides: Seeing that men habitually talk foolishly about the gods, is there not all the more reason for you to talk wisely, Socrates?

Socrates: All the more reason, if I can. But if others fail is it likely that I shall succeed? At least I can warn men of their folly and the consequences of folly. Tell me now, Charmides, have you not heard some of our clever friends who deny that there is any God at all?

Charmides: I have heard them. Though I did not believe them, I was not sure how to meet their arguments. Have you a way, Socrates?

Socrates: I seem to have heard of one. You know, Charmides, how it happens that sometimes during the night there is a noise in the house. Then the wife will wake up her husband saying she is sure there is a thief about and he must go immediately and find him.

Charmides: No, Socrates, I have no experience of this; but then I am not married.

Socrates: Well, you will discover how it is later on. At any rate when the husband comes back and says there is no thief in the house, do you suppose his wife believes him unless he assures her that he has looked in this room and that, in this cupboard and that chest, in fact that he has thoroughly ransacked the whole house?

Charmides: No, I suppose not.

Socrates: Well, I am like the wife, when anybody tells me there is no God. I say, "Have you looked in the right place, in fact have you looked everywhere, have you thoroughly ransacked the whole universe?" If not, and generally he has not, I say, as the wife says to the husband, "Go back and when you can assure me you know everything and still cannot find God, then perhaps I shall believe you."

Charmides: But is this a fair analogy, between a man looking for a thief hidden in a house and a man looking for God?

Socrates: No, quite unfair, I may tell you in confidence, Charmides; but our friend the atheist does not know that, and we can use the analogy against him. For the man who says positively that there is no God is, in effect, saying that knowledge consists in isolated bits of information each one separate and distinct from the others. A man may find no thief in the kitchen but that does not tell him whether or not there is one in the cellar. There may be a thief in both places or in one or in neither. But scientific knowledge is not like that, it does not consist solely of enumerating separate bits of evidence. It presupposes general principles in

accordance with which the separate items hang together. To deny the existence of God is to deny the existence of any principle.

Charmides: I agree. I suppose you would refute in the same way the more modest suggestion, that is sometimes made, that there is no knowing whether or not God exists.

Socrates: Thank you, Charmides; you have anticipated the next step in the argument. Now we have decided that all these assertions are false—that God does not exist; that we do not know if He exists or not; that it is meaningless to say He exists. You may have noticed that the refutation is really the same in every case. It is our faith that we possess genuine knowledge that does not consist solely of separate and distinct bits of information obtained from sense experience. If Antiphon had been bold enough to deny that faith we should have had a great deal more trouble with him.

Charmides: Yes, I noticed that, and I noticed also that Antiphon's contention that assertions about God are meaningless is just a roundabout way of denying God's existence.

Socrates: Good lad. But do you see that we ourselves are in rather an awkward fix? We say that God exists but we say also that it is much easier to speak falsehood about Him than truth and that men do habitually speak falsely.

Charmides: It is a fix. What are you going to do about it?

Socrates: Very little, I fear. Still it has just occurred to me that something we said when arguing with Antiphon may be helpful.

Charmides: What was that?

Socrates: Do you remember we said that if one knows that certain assertions are false one does at least know the truth of the contradictories. By taking them all together it is just possible that we may find something worth having. The geometricians do something like this when they prove a proposition by demonstrating that all other alternatives are false. But their task is a simpler one than ours.

Charmides: I understand. If God is not many, then He is one. If He does not deceive men, He loves the truth.

Socrates: That is the plan. But we must be careful not to go too fast. It is true that God does not deceive, nor is He deceived himself; it is also true that men deceive themselves. Though we can conclude that God is truthful, we cannot conclude that there is no deceit in the world, only that we must not attribute deceit to God. So also we say God is the cause of good in the world

and not of evil. Still there is evil in the world ; though perhaps the only true evils are the vice, folly and ignorance of men, wherein they turn their backs on God.

Charmides: I should agree with you wholeheartedly, Socrates, but that I seem to have heard a saying of the wise Thales that " All things are full of Gods." Did he not mean that all things that exist are good ?

Socrates: He may have meant that, my dear Charmides, but do you not think it is more likely he meant that all the things God has made are full of the divine power and therefore good ? He could hardly have supposed God to be responsible for the evil deeds of wicked men or have called them good.

Charmides: No, he could not.

Socrates: There are some people who try to escape the perplexities of this problem of evil by saying that evil itself is nothing at all but merely absence of good.

Charmides: I have heard them. Do you think they are wrong. Socrates ?

Socrates: Indeed I do and so will you, I will be bound, when you reflect on the absurdity of the doctrine.

Charmides: But is it absurd, Socrates ?

Socrates: Consider for a moment, Charmides. Do you call pleasure good and pain evil ?

Charmides: I do.

Socrates: And the greater pleasure, the greater good ? And the greater pain the greater evil ?

Charmides: Yes, certainly, Socrates.

Socrates: Well now, according to this wonderful doctrine greater pains are really only smaller pleasures and lesser pains greater pleasures, for pain is nothing positive, just absence of pleasure. I put it to you, Charmides, have you ever had a toothache ?

Charmides: Yes, I have. Not perhaps very bad toothache, as it did not last for very long ; but still quite bad enough.

Socrates: Do you then count a slight toothache as a rather small pleasure, a severe toothache as a very small pleasure, and an almost unbearable toothache as the least possible suspicion of pleasure ? We must not say no pleasure at all ; because however bad a toothache may be it might always be worse still.

Charmides: No, Socrates, that would be altogether ridiculous.

Socrates: Then it is clear that some evils at least are something

in themselves and are not only absence of good. We must admit of course that sometimes what is called evil is just absence of good and that is why the doctrine seems plausible at first sight.

Charmides: I agree then; not all evil is merely absence of good; some evil is positive.

Socrates: That is good, for agreement is not merely absence of disagreement. Now, to return to the atheist. It seems to me we should take the advice the military experts are always giving, and should not confine ourselves to passive defence as they call it, but carry the war into his own country and there utterly rout and destroy him.

Charmides; By all means, Socrates, if you will lead the attack.

Socrates: Very well. First let me get my breath, put my helmet straight and tighten up my greaves.

Charmides: Willingly. Make all the necessary preparations.

Socrates: That is well said, Charmides. For successful attack we must employ craft and subtlety. Nothing is to be gained just by rushing ahead shouting.

Charmides: Of course not.

Socrates: Have you noticed, Charmides, there is something very curious about the attitude of those who would deny the existence of God?

Charmides: Some of them are curious people; but what is this special curiosity?

Socrates: Just this. They assume that if God did not exist everything would be just the same as if He did. They seem to think it is as though God were just one guest at a banquet and the others too drunk to see whether His place was empty or not. This amounts to asserting and denying God's existence at the same time. We ought first of all to put aside this common, inconsistent, half-baked atheism and consider rather the consequences of really and properly denying the existence of God. Would you agree with me, Charmides, that everything which really is, either is good or is evil and that even the things which are usually called indifferent are to be counted on the side of evil, for non-existence is the enemy of existence; and existence as we think, should be good?

Charmides: You go too fast, Socrates, I cannot keep up with you.

Socrates: Well, I shall try to explain. You will agree, I suppose, that, for those who walk, shoes are good and useful?

Charmides: I agree; but I cannot help smiling to see the shoemaker and his shoes come along again.

Socrates: Smile if you like, but do not be rude to the poor man; for we need his help. Shoes, he will tell us, are good so far as they can be worn and do not hurt our feet. Shoes that cannot be worn or hurt are bad, are they not?

Charmides: They are.

Socrates: And to have no shoes is bad too, for those who have to walk far or on stony ground?

Charmides: Yes, that is bad too.

Socrates: Then you admit there is no such thing as an indifferent shoe; it is good or else it is bad. To have no shoes too is not a matter of indifference, but bad.

Charmides: All this I admit, Socrates.

Socrates: Do you agree with me in this too, Charmides, that a good workman is one who makes good shoes, a bad workman one who makes bad shoes—or who makes no shoes at all.

Charmides: I agree, and I go on to say that there is no such person as an indifferent craftsman of any kind. He is good if he makes good and useful and beautiful things; bad if he makes the opposite kinds or none at all.

Socrates: And you, Charmides, are good and not bad, for you answer as you should. But I would ask you to go further still with me and to say that everything which exists resembles the shoe or the shoemaker. That is to say it is good so far as it attains to its own proper perfection or else ministers to the attainment of the perfection of something else. The first kind is good in itself, the second good as a means. Do you say this?

Charmides: Yes, indeed, that too.

Socrates: Then is not everything, which does not so attain or so minister, bad or evil? Thus, if truth is good, falsehood is evil, but so is mere ignorance or absence of truth. Mere inactivity, sloth or nothingness must be reckoned on the side of the bad because it fails to further the good in any way. Is that not so?

Charmides: It is. In warfare those who fail to help their friends are actually helping their enemies. The dead may be reckoned truly neutral or indifferent, but none of the living.

Socrates: Excellently said! Then if God be that power in the world which causes good and prevents evil, to say there is no God is to say there is a power of evil in the world. For, as we have

said, whatever cannot be reckoned on the side of good is on the side of evil and there are no neutrals in the warfare of good and evil.

Charmides: Yes, that is the conclusion.

Socrates: Consider now, Charmides, what follows. Most of us believe that when we strive after what is true and noble and just we shall in some measure attain our end because of our striving and shall not be utterly thwarted and deceived. This is our faith in God. To deny God utterly and completely is to say that the more we seek truth the more we are deceived by falsehood, the more we love what we think noble the more we are entangled in what is base, the more we try to act justly the greater the injustice we commit.

Charmides: Could anybody be so stupid as to say that?

Socrates: Do you suspect a flaw in the argument? If so speak out. I shall not get angry, like Antiphon.

Charmides: Well I have to admit, Socrates, I feel uneasy about our conclusion, that either the world is governed by God who is good, or else it is governed by the power of evil and everything is utterly deceitful. It looks as though there ought to be some possible intermediate state. Yet we have agreed that things are either good or bad and that what might be considered indifferent is, if it is anything, against the good and so evil and, if it is nothing, evil too.

Socrates: Yes, we agreed; and to me it seems obvious enough. Any least thing is more than just nothing. Therefore what is other than good is evil and what is other than evil is good. Do you repent of this judgment, Charmides?

Charmides: Not entirely, but I wish you could reinforce it in some way.

Socrates: How about this? When a sculptor has cast a statue of bronze we say it is good because it has order, harmony, and beauty. Originally the lump of bronze lacked order, harmony and beauty, and possessed the opposites. So far it was bad. It was not shapeless, for no material thing can be shapeless, but had a worse shape. Its shape could not be called indifferent except so far as it was capable of taking other forms; but then that is always possible whatever the shape because any piece of bronze can be melted and recast. The original shape then was bad because worse than the final shape. Observe too that the sculptor has to struggle against the evil shape by thought

and action. He has to conceive the beautiful shape, to make his model and then the mould, to melt up the bronze and pour it into the mould, destroying the evil in it and producing the good.

Charmides: Thank you, Socrates. I am now more confident that we were right.

Socrates: But do you still hesitate to admit that the genuine atheist asserts that the world is governed by the power of evil?

Charmides: I do, indeed.

Socrates: Your hesitation does not surprise me at all. Let me tell you why, Charmides. There are no genuine atheists; though if there were, they would say this very thing we have accused them of.

Charmides: But if there are no genuine atheists, why trouble to attack them, Socrates?

Socrates: Did I not say before, that you were crafty beyond your years, Charmides? Most young men in the eagerness of their spirit are ready to attack anybody and anything. Not so the cautious Charmides, or wily Odysseus. "Wait," he says, "wait and see if the adversary is genuine. If not, we need not blunt our swords on him."

Charmides: Surely that is quite sensible? Why do you mock me, Socrates?

Socrates: It was not genuine mockery any more than the atheism of the common atheist of the market-place is genuine atheism.

Charmides: Please, explain, Socrates, and stop talking in riddles.

Socrates: With pleasure; I am no hand at riddles really. Well, first there are those of us who have faith in God. We believe that the world is divinely governed, or that there is a beneficent power at work helping to bring good things to fruition and thwarting evil things, and specially helping us to act rightly and avoid wrong. For us, though we admit there are evil things, either the evil belongs to that which has not yet, in the course of nature, attained its perfection and is perhaps not wholly evil only incomplete and inadequate, or else it is real evil, the actions of wicked men working against God. Secondly, there might be, though I have never come across them, genuine atheists saying exactly the opposite. They would say that the world is governed by wickedness against which men's feeble efforts towards truth and virtue are doomed to frustration. These are the two proper

and self-consistent alternatives. As nobody seems to be so shameless as to uphold the second openly, those who reject the first, and there are plenty of them, try to find a middle path, though really there is none. Still, there are at least three different kinds of things for them to say which make up the sham atheism we actually come across. We have mentioned them already, supposing them to be real atheism and perhaps misinterpreting them.

Charmides: Will you tell us again about the three shams, so that we may avoid them the better ?

Socrates: Willingly, but I do not promise there are no more than three.

Charmides: We do not ask for any promise. The three will be enough to go on with.

Socrates: The first sham atheism, then, is to assert and deny God's existence by saying that his presence or absence makes no difference. This, I think, is really Antiphon's way of thinking and I need say no more about it.

Charmides: No need, Socrates. What is the second kind ?

Socrates: The second is rather like it, but cleverer. Perhaps Antiphon's new theory he was so pleased with is one form of it. It is said that reality is neither good nor evil, but good and evil is in the imagination of each one of us, a kind of dream. Thus, they reply, to one who says something is good, that he really means the thing pleases him ; for nothing is good in itself and in reality.

Charmides: What do you say to this theory, Socrates ?

Socrates: As you may have guessed, that it is clever but just not clever enough. If anybody produces it in my presence, I say to him, " You consider this theory of yours a good theory, but that only means it pleases you. Now it happens to displease me and my friends, so we propose to forget about it and anything more you have to say on the subject will be as the sound of the waves of the sea in our ears."

Charmides: A rude answer, but effective, I imagine.

Socrates: Yes, a rude answer for rude people. It is the short quick way, not to my mind entirely satisfactory ; but the better way is long and tedious. Do you wish me to pursue it, Charmides ?

Charmides: Just at the moment, Socrates, I think we should prefer to hear about the third kind of sham atheism.

Socrates: This third kind of atheist does not deny the difference between good and evil, but he considers that there is nothing

good in the world except his own precious self. To speak accurately he is not an atheist but a strict monotheist, on the understanding that he himself is God.

Charmides: I can see that some kind of madman might believe this. But surely no sane man could be so impudent—or so stupid ?

Socrates: Very few openly proclaim such a view, though many would like to if they dared. The few who do proclaim it are generally called tyrants and they are perhaps a kind of madmen, as you say.

Charmides: What you have said is very puzzling, Socrates. I should suspect you of making game of us as you do of the sophists ; but I know your mock-solemn voice and you are not using it now. I am sure you are in earnest.

Socrates: It seems that I am doomed to be misunderstood by everybody and in every way. First Charmides says he is puzzled by my present utterances. Then he says I make game of the sophists whom I know to be terribly wise and whom I revere for their wisdom. And as for this mock-solemnity I am accused of, I hardly know what to think. It is true that I sometimes venture to crack a joke or two to enliven a discussion otherwise too severe. But I see no great harm in that even if they are rather bad jokes.

Charmides: No harm at all, Socrates, and your jokes are very good ones, for those who understand them. But my difficulty now is that I only half understand what you say, and, though I am sure you are quite serious, only half believe what I do understand. It is very likely true that most professed atheists are sham ones and also that your three kinds are the most numerous ; but still I find it hard to believe that between the theory that the world is ruled by the power of the good and the opposite one that it is ruled by the power of evil no genuine alternative is possible. I remember now that I said we could dismiss those who doubt the existence of God by the same arguments that we dismissed those who deny the existence of God, and you praised me for it. Perhaps your praise was only flattery and I was wrong.

Socrates: You should know me well enough by now, Charmides, to know I am incapable of flattery.

Charmides: Just as you are incapable of mocking the sophists.

Socrates: Of course. It is a great handicap to be unable to dissemble in any way, when all other Hellenes and most barbarians are so good at it.

Charmides: Yet you bear with your disabilities very cheerfully, Socrates.

Socrates: I do my best, Charmides. But we are neglecting the discussion. You suggest that between assertion of God's existence and denial of it we can put doubt as a third alternative.

Charmides: Yes, that is the suggestion.

Socrates: It seems to me that doubt is only possible in matters that are complicated and unclear. Thus it is possible to have doubts as to the right course of action in the government of cities and the conduct of warfare, because many different actions are possible and many of their consequences hard to calculate. But it is not possible to doubt about the propositions of geometry once they have been explained to us. Is it ?

Charmides: No, it is impossible in geometry, but in those other matters possible.

Socrates: Then if we are right in supposing that there are these two alternatives clearly and sharply distinguished, doubt should be impossible. Really you are asking to reopen the whole discussion, to consider whether after all the goodness of God is absolute, perfect and complete in itself or whether it admits of degrees, and also whether the power of evil, if there is such a thing, is absolute, perfect and complete in itself. Indeed this last is a notion I am very much inclined to dispute. We have confessed, rightly as I think, that evil is not merely absence of good, but does that compel us to assert also that evil can be a power or that there could be absolute, perfect and complete evil ? For if evil is disorder and disharmony there cannot be perfection or completeness in it. What do you think, Charmides ?

Charmides: I am at a loss what to think. But I wish you would reopen the discussion, Socrates.

Socrates: Yes, we ought, as the orators say, to explore every avenue and to leave no stone unturned. But I fear it is getting late. Avenues and stones, perhaps, will wait for another day.

Charmides: They can wait till tomorrow ; but no longer, if you wish to please us.

Socrates: Certainly I do. In the meantime there is one thing that comes out of our discussion that must not be forgotten. Whatever else may remain difficult, unclear, or even false in our ideas about God there is one falsehood we must avoid at all costs.

Charmides: And that is ?

Socrates: Just this, that God's existence or non-existence,

presence or absence, makes no difference. This is the parent of an innumerable progeny of other falsehoods.

Charmides: That I certainly reject, I swear by Zeus.

Socrates: And I by the God of Delphi. Remember this and then the other difficulties may become less.

Charmides: Socrates, I see Antiphon looming up on the horizon. I believe he wishes to accept my invitation to supper even if he has to put up with your company.

Socrates: Oh, he need not be afraid of me. I shall be very meek and inoffensive. In fact I promise to refrain from argument while he is with us.

Charmides: The sight of Socrates refraining from argument for a whole evening will be worth seeing. I must invite as many of my friends as possible. Do you mind if we relieve our feelings occasionally by a little quiet laughter ?

Socrates: Laugh as much as you like. Far be it from me to interfere with the innocent merriment of youth.

XII

Sir Isaac Newton: the Man and his Influence [1]

It was dramatically appropriate that Newton should have been born at the end of the year in which Galileo died. For the Englishman completed the work the Florentine had begun, and, in an age of giants, Newton and Galileo stood head and shoulders above all contemporary men of science. Though when, at Christmas 1642, in the first gloomy winter of the Civil War, a premature and sickly infant was born at the little manor house of Woolsthorpe in Lincolnshire, nobody could have predicted his importance to the world—least of all the astrologers. Before the advent of Newton it was still not utterly unreasonable to think that the stars in their courses might control the fates of men; after him utterly unreasonable. Even the geneticist, arguing on a sounder basis would not have suggested more than respectable mediocrity. For none of Newton's forbears, so far as known, was in any way distinguished; though they were of that sound healthy farming stock, which seems so often to possess a reserve of latent talent. Isaac Newton claimed to be, and was, Lord of the Manor of Woolsthorpe, but the annual value of the manor was only £30; so that his family were in fact working farmers, somewhat impoverished through the improvidence of his father, and perhaps also by the disturbances of the Civil War, though later on in comfortable circumstances. Still, Newton had to go up to Cambridge as a Subsizar—a kind of inferior scholar who performed light but menial services for the Fellows of the College. Nevertheless it is a mistake to think of him—except for these early years—as the impoverished and neglected scholar. He never seems to have thought of himself in that light and was open-handed and generous in money matters. It is also a mistake to make him out the absent-minded and eccentric professor of popular fiction, though he did to a considerable extent live as a recluse.

One of the difficulties in the way of arriving at a just estimate of Newton's character is the paucity of genuine contemporary evidence and the prolific crop of legend. Of course, given a man

[1] *Manchester Memoirs*, 1943.

of unusual character and obviously great powers, who keeps himself rather remote from the public gaze, the soil is ready for the growth of legend. Undergraduate wits were at work in Cambridge and, later, the irrepressible M. Voltaire in London. Fortunately L. T. More's careful and well documented biography [1] is available to eradicate these weeds and to help us to see something, though incompletely, of the kind of man he was. Forget for a moment any stories you may have heard about making a hole in the door for the cat to go through and then a smaller one for the kittens, about boiling his watch in the saucepan and holding the egg in his hand. Forget even the more likely story about leaving the hot supper brought to him at night and eating it cold for breakfast next morning. Forget also the efforts of the hagiologists to turn him into a stained glass figure. Consider instead a few authentic and public facts. At a time of grave political crisis, when the liberties of Cambridge University were threatened by arbitrary and oppressive acts of King James II, Newton took a leading, if not the leading part in opposing the King, though he was not a ready speaker and was easily embarrassed in public. This he did very soon after the tremendous effort of writing his *Principia* in about eighteen months. When the Convention Parliament of 1688 was elected to regularise the accession of William and Mary, settle the succession to the throne and generally order the affairs of the country after the Revolution, Newton was elected member for Cambridge University. It is evident that people trusted Newton as a man of affairs and relied on his judgment, and it is evident that their confidence was not misplaced. We know the bare fact but unfortunately we know nothing of what lay behind it, because we only know of Newton hitherto as a scholar immersed in academic studies, with few friends and apparently very few intimate friends if any, who for years hardly ever left Cambridge except to visit his country home and family.

In 1695 when Montague, as Chancellor of the Exchequer, was striving to straighten out the disordered finances of the country, one of his major tasks was to replace the clipped and debased silver coinage by a new currency of standard weight and fineness and with milled edges to stop clipping. He knew it was no use issuing new coins while the bad ones circulated, because the new

[1] Isaac Newton : a Biography by Louis Trenchard More. Scribners, New York and London, 1934.

ones would just be hoarded or sold abroad. The only thing to do was to recall the whole of the old coinage to be replaced at its face value by new, and to set a time limit after which old coins would not have any exchange value. This meant in any case a considerable loss to the Exchequer in making good the deficiency of silver, also the possiblity of a grave financial crisis during the time lag between recall and reissue. The country was at war. The Goverment had many enemies, only too ready to aggravate a financial crisis if they could. The work the Mint had to do was to melt down the old coin, assay the metal, refine it if necessary, and then coin it ; and all as quickly as possible. It meant handling far larger quantities and working far faster than had ever been done before. Whoever was in charge of the Mint had to be a good organiser, with some technical knowledge of assaying and metallurgy, and above all completely trustworthy, a staunch Whig immune from Tory bribes or persuasions. Montague turned to his Cambridge friend Newton as the man needed and appointed him Warden of the Mint. Again we know very little of the details of the work, but we do know that the work was effectively done and that Newton refused tempting offers intended to get him away from the Mint.[1] After the crisis was over Newton became Master of the Mint, in which position he had a higher salary and much less work. This post he held until his death. After coming to London Newton did little more scientific work apart from what went into the second edition of the *Principia.* It is true he published his *Opticks* in 1704, but probably all the experimental work had been done long before. It has always seemed a mystery why the world's greatest experimental and theoretical physicist, after thirty years devoted to research, should abandon it while apparently at the height of his powers. He did not abandon it just for a time to do a service to the State and help his friends Montague, Somers and Locke ; but for good and all.

To consider the matter we must go back to Newton's earliest published scientific work on optics. This involved him in prolonged controversy with Hooke and others. Unfortunately Oldenburg, the Secretary of the Royal Society, disliked Hooke and instead of acting as peacemaker did the opposite. Controversy should be carried on by those who are, like Socrates, of equal temper, thick skinned, with a robust sense of humour. They will play the game according to the rules. Newton was not

[1] See, however, *Newton at the Mint*, by Sir J. Craig, 1946.

only excessively sensitive but secretive and suspicious of all but the few friends he trusted. He lacked the virtue of suffering fools gladly. L. T. More [1] suggests that the defects of Newton's character may have been aggravated by childhood experiences, when as a baby he was left alone with his grandmother in a solitary house in a disputed region during the Civil War. This is very probable. In any case he had these defects. In addition Newton was always quite sure he was right—justifiably in the controversy on optics, but not always later. Unlike a complete and consistent recluse, such as Cavendish, he did care what people thought about his work and was not indifferent to fame ; in fact in later years he seems to have been too much influenced by flatterers. The nett result was that Newton was frequently and for long periods involved in scientific controversy, hated it, lost his temper and sometimes behaved badly. That was why he thought science a hard taskmaster.

Apart from all this it is almost certainly true that Newton's primary interests were not scientific ; but he was so constituted that if presented with a specific problem which seemed at all interesting and in any way soluble he could not rest until he had found a solution. It is quite clear that he thought little of pure mathematics ; but show him a physical problem in mathematical form, and he could and would solve it with startling ease and quickness.

What, then, were Newton's primary interests ? Remember that his first and principal friend in Cambridge, until that friend's early death, was his teacher Isaac Barrow, a brilliant mathematician who willingly gave up the Lucasian Professorship to Newton so as to be free to pursue his theological studies. Newton's other chief friend, so far as is known, was Henry More, the Platonist, a theologian and a mystic. Remember too, the seventeenth century was a religious age and Newton in any case a serious-minded and religious man. There can be little doubt that his primary interests were religious and theological. Like Boyle, Hooke and other leading thinkers of the day, Newton valued science mainly because he considered that it revealed the works and therefore the nature of God. From the first he devoted a great deal of time and labour to theological studies. In the main he accepted the assumptions of his day. He was however in advance of his time in questioning on historical grounds the

[1] Loc. cit., p. 16.

authenticity of certain passages in the New Testament. He did not publish this work during his lifetime for fear of accusations of heresy; because these passages provided generally quoted scriptural authority for the doctrine of the Trinity. It was probably these doctrinal difficulties that made him refuse to take Orders, though as a layman he felt he could still conscientiously remain a member of the Church of England. The main purpose of his theological studies was to uphold Protestantism and refute the claims of the Roman Church. The historical study of the doctrine of the Trinity was made for this purpose; as also were his elaborate studies of the Book of Daniel and the Apocalypse of St. John. In these matters he was entirely the child of the period. He considered that the writers of these works were predicting events of the distant future (distant at the time of writing) and he claimed to find evidence that the final destruction of the Roman Church was among these predictions.

For Newton's method of interpreting the Book of Daniel, as for his studies of ancient chronology, one cannot say more than that his attitude was essentially that of his contemporaries and that he differed from others chiefly in working things out more systematically and industriously. But against the criticism, sometimes made in recent times, that his interest in the doctrine of the Trinity was a trivial one for a man of science, it is necessary to protest. For Newton, indeed, it was science that seemed trivial, dealing as it does with mere details of the transient world, and theology that was serious, dealing as it does with things eternal. If you have any kind of belief in an immaterial or spiritual world, then the doctrine of the Trinity is an attempt, however imperfect, to give an account of that world and must be taken seriously; especially by one who was endeavouring, as Newton was, to find some completely general law of the subordinate material world. The weakness of Newton's philosophy lay elsewhere, where Leibniz indicated it. Newton's system of the material world was purely mechanical and in his view God is the mechanic who makes and operates the machine. In this he followed Descartes. But can a purely immaterial mechanic have any connection with a purely material machine? Either God is material, as Spinoza said (to be dubbed atheist in consequence), or else the material world is not purely mechanical, as Leibniz said. Most of those who in later times have accepted Newton's system fastened their attention on the machine and

ignored or denied the mechanic, assuming the machine to have made itself ; so that in fact the theory has led to materialism and atheism, far as this was from Newton's intention. It must be said on the other side, that Leibniz's own theory, though immune from this criticism, was unworkable and useless from the point of view of seventeenth and eighteenth century science, while Newton's was supremely workable and useful ; and is in fact still the working theory of all science except certain special departments of theoretical physics. I shall return again to what it was Newton had accomplished, in the meantime a little more about his personal history.

Newton's labours for a year and a half while writing the *Principia* have been described by his amanuensis. He worked almost continuously day and night, with a few hours snatched for sleep and a little food gulped down at irregular and infrequent intervals. His only relaxation was to go and work equally hard in his chemical laboratory. Almost as soon as he had seen the book through the press Newton was plunged into public affairs for the first time in his life, in the conflict of the University with James II, and after as member of parliament. It was just at this time, in 1688, that his friend Henry More died. The next year his mother, to whom he was deeply attached and whom he nursed assiduously in her last illness, died too. It would be surprising if the strain of these years had not affected him. Later, in 1693, he did suffer a temporary mental derangement, something like persecution mania and very likely loss of memory too. It is impossible to say how serious it was (it produced a whole crop of rumours), but to all appearances he recovered quickly and completely, and lived to enjoy a vigorous old age ; such as nobody so negligent of the rules of health is entitled to. By rights he should have been a hopeless invalid at fifty. Still, though he recovered his health he may have felt tired and, particularly, tired of scientific work after the *Principia* was published, and unwilling to undertake anything more. He had of course a problem on hand, only dealt with cursorily in the first edition of the *Principia*, which he worked at for some time. This was the problem of the moon's perturbations, which Newton said gave him a headache and is still a bugbear to the mathematician. The moon's path instead of being a steady and graceful progress, such as befits a lady, is more like the staggering gait of a drunkard. Newton's theory could account roughly for the general character of the path ;

could it account for it accurately by explaining the perturbations, without leaving out any unexplained residue? It was an interesting test case for the theory. It was also considered to be an urgent practical problem because a satisfactory lunar theory, which would enable its apparent place among the fixed stars to be predicted accurately, would solve the outstanding problem of navigation—the determination of longitude. Newton, like all his contemporaries, was aware of the practical possibilities of physical science and eager to promote them. Lunar theory would have provided full time occupation for most men, but not for Newton. So that in spite of this work and in spite of the publication of the *Opticks*, it is true enough to say that after 1687 he gave up the pursuit of science; certainly he started nothing new. Was it that after his illness he had lost initiative? Was it, as he said, that science was a hard taskmaster? Or was it, perhaps, that he knew he had shot his bolt? After all, the universal mechanical system of the world can only be discovered once. The nature of light can only be discovered once. The harvest had been cut by him and carried; might he not leave the gleaning of the stubble to the geese?

There is a further point. Newton worked hard and long at experimental chemistry and then gave it up. He left no record of results, except for what may be gathered from the long *Query* added to the second edition of the *Opticks*. He saw that the short range attractions responsible for chemical combination, cohesion of solids and capillarity must be subject to general laws analogous to the law of gravitation. As these are "elective attractions," however, the laws could only be discovered by investigating the specific differences in the behaviour of substances; and this is the task of experimental chemistry. Newton evidently realised that his efforts had led nowhere. In fact, the day of chemistry had not yet come. The first glimmer of light was due to Newton's friend Boyle, but the true dawn came a century later with Lavoisier and Dalton. The full solution of the problem that baffled Newton is just now beginning to appear with the development of the theory of atomic structure.

Shakespeare retired to Stratford as soon as he had enough money to do so, and apparently thought more of becoming a country gentleman than of all his works; a thoroughly English and, if you like, snobbish attitude. Newton seems to have felt much the same as Shakespeare and was pleased to take the place

befitting a country squire in the social and political life of London. Apparently he felt no regrets for his life of seclusion and scientific research in Cambridge. It must be said too that most of his friends there were dead or had departed, and few of the newer generation were of the same calibre. The University was already settling down to the long slumbers of the eighteenth century.

I must turn now to say something of the *Principia*, always recognised as the greatest single scientific work ever written. The germ of this book, but only the germ, was there in the famous episode of the falling apple in 1666. The episode may have existed only in the imagination of Voltaire, but it was well imagined. The youthful Newton meditating in his orchard at Woolsthorpe considered what it was Galileo had discovered. First of all that any terrestrial body if left to itself, subject to no external force, remains at rest or goes on moving with uniform velocity. If I let go a stone I am holding it is not left to itself but is subject to a force directed towards the earth which alters its state of rest or motion (" force " here means the Newtonian notion: that which alters velocity). If I just drop the stone it approaches the earth at a speed governed by the rule of equal acceleration in equal times (neglecting air resistance). The rule is the same for all bodies. If I throw the stone, I impart another and constant velocity to it and the stone's path (again neglecting air resistance) is compounded of this constant velocity and the same acceleration towards the earth. Its path, as Galileo found, is then a parabola. The new idea that occurred to Newton now was that perhaps the moon in circling round the earth behaves like the thrown stone; like a stone that has been thrown with such violence that although continuously dropping towards the earth its tangential velocity keeps it moving away just as fast as it drops, so that it moves round in a circle, or very nearly in a circle. Newton made some rough calculations and, as he himself said in an account written in 1714, " found them answer pretty nearly." The story about his first disappointment due to using an erroneous estimate of the earth's circumference, and hence of the moon's distance in terrestrial units, is a mare's nest, as I think More shows conclusively. I have no room to discuss it here and must refer any one who is doubtful to his book.[1] Newton had made here the first and therefore most difficult step towards his

[1] Loc. cit., p. 288. See also the notes in F. Cajori's Edition of Motte's Translation of the *Principia*, 1934.

great synthesis, but no more. There were plenty of other steps and twenty years was not too long for them. I can imagine one of our great research laboratories with its team of fifty highly trained workers taking longer—a couple of centuries perhaps.

One such step was to apply the same notion to the solar system assuming the planets are falling towards the sun. Kepler had shown the paths to be elliptical and found a general rule relating speed and size of orbit. It had occurred to several people, including Hooke, Wren and Halley, that any centripetal force was likely to vary inversely as the square of the distance, a fairly obvious surmise from the geometrical properties of concentric spheres. But none of them could solve the mathematical problem of showing that such a force would give rise to Kepler's Laws. Halley, when he went to consult Newton in 1684, found that he had already solved the problem. It was this information that made him urge Newton to complete and publish his theory. There were other problems too. During this period Providence supplied mankind with unusually numerous and splendid comets, apparently as test objects for Newton's theory, and they had to be dealt with.

A very important and difficult mathematical problem had to be solved. For distant bodies such as sun and planets, it could be safely assumed that they behaved like massive points ; but for the earth's action on bodies near its surface it was far from obvious. Newton, however, was able to prove that the earth's gravitational attraction was the same as that of an equal mass occupying its centre of gravity. Still another problem was that of a body beneath the earth's surface (*e.g.* falling down a mine shaft), necessary to show that no absurd consequences followed from the theory under any possible conditions.

For most men this would have been enough to demonstrate that there was a universal system of mechanical laws and a universal force, that of gravitation ; but not for Newton. He threw in the explanation of the earth's figure, the precession of equinoxes and the elements of the gravitational theory of tides, showing incidentally that he had studied the available information on tidal phenomena over the whole known world. He devoted the Second Book to developing the theory of hydrodynamics (and a few other things too) for the principal purpose of showing that Descartes' theory of vortices could not possibly account for the observed laws of motion. This theory of Descartes has been

deservedly forgotten but it was very popular at the time. According to him the planets moved in a manner analogous to floating bodies whirled round in the eddies of a stream. Besides the mathematical theory there is much valuable experimental work in the Second Book. What seem to be the first quantitative experiments on viscosity are there. More important though is a careful and extensive series of experiments made by filling the bob of a pendulum with different materials to show that gravity depends solely on the mass of bodies and is independent of density and of any qualitative differences.

Not content with gathering the crop that had come to maturity Newton also planted what was needed for next season's harvest.

In developing his theory Newton used a private mathematical method of his own, that he had begun to develop during those two wonderful years he spent at home to escape the plague, when he laid the foundation of all his discoveries. But for purposes of exposition he translated everything into the classical geometrical form. The whole mathematical apparatus for this had to be developed and included in the book. It is this work of translation more than anything else that makes the writing of the *Principia* in eighteen months such an incredible feat. He had written the small tract *De Motu* which corresponds to the First Book and may have had the other main points worked out, but almost certainly in his own notation. It would appear therefore that every mathematical proposition in Book II and III of the *Principia* and its proof was worked out *de novo* during that time.

I think it is clear that even if Newton had done nothing else between 1666 and his beginning to write in 1684 but collect the data and work out the mathematics required for the *Principia* he would have been fairly well occupied. There is no mystery about the twenty years' delay. Newton was quite right not to publish until his work was complete ; it is a pity so few are of the same mind. But not only did he not wish to publish anything incomplete, he was also reluctant to publish anything at all. His correspondence with Halley, who bore the cost of printing the *Principia*, shows a curious and unpleasant indifference about the work that can only be excused by the mental and physical strain of his efforts.

There is a further puzzle I must touch on, though I am not competent to deal with it, as it involves difficult points in the history of mathematics. Newton seemed to want to keep to

himself his great mathematical discovery of an algebraic method for dealing with continuously varying quantities, as if it was private property, and yet to claim public recognition as its discoverer. It was this that led to the quarrel with Leibniz in later life, which was carried on even after Leibniz's death. Both these great men behaved very badly ; they not only lost their tempers ; they cheated also. Newton's behaviour was perhaps a shade worse than Leibniz's. It is only fair to say, however, that at first they both behaved properly ; Newton cold but correct ; Leibniz friendly and appreciative. It was only later when they were egged on by unscrupulous and foolish friends that trouble occurred. Newton's secretiveness has seemed to many sheer perversity and far more than can be accounted for by dislike of controversy. Another thing that is difficult to understand is that Newton apparently failed to see that Leibniz's notation, the one now universally used, was better than his own ; for in mathematics notation is half the battle or more. I think some light is thrown on the subject by a remark of Newton's, late in life, to the effect that the new algebraic methods introduced by Descartes lacked the rigor of the classical geometrical methods. This confirms the impression one gets from *scholia* in the *Principia*, where he says that the geometrical method of limits he there develops to do a good deal of the work his *fluxions* could do, is a method that could be shown to be fully exact and rigorously proved after the classical model, but that complete proofs by *reductio ad absurdum* would be extremely lengthy. He shows also that he was highly suspicious of the whole notion of infinitesimals ; a notion he probably thought was necessarily involved in the method of *fluxions*. It looks in fact as though Newton was worried by the same scruples that worried the ancient Greeks, that, if a length is taken to be a numerical aggregate, either it must contain a finite number of finite units or an infinite number of units of zero magnitude. Both alternatives are absurd. Therefore the only escape is to use strictly Euclidean methods, which, in accordance with Plato's view, dispense with the assumption that a length is an aggregate of parts, and to avoid using arithmetical, *i.e.*, algebraic, methods for purposes of proof. The only modification of Euclid required is the use of the notion of continuity and of limiting values. His method of *fluxions*, therefore, he may have considered as no more than a method of approximation, a convenient dodge or short cut to the discovery of propositions, which,

if proved, must be proved by classical methods. If the mathematician's business in his published work is with proof, it is a mistake to publish mere dodges. It is also possible that Newton was one of those rare individuals who have an intuitive grasp of the solution of mathematical problems largely independent of any special notation or formal statement, so that for him notation and details of method were not essential at all. At any rate Newton did not publish his method until after Leibniz had published his very fully, and shown how it could be used. When people began to make a fuss about Leibniz Newton was naturally, though not very reasonably, annoyed.

However, this is really a digression. There are two more comments to be made on the *Principia*. First, that it took a hundred years for the scientific world to digest fully and develop completely the ideas contained in this work. Secondly, what was it Newton had done? He had solved at last the technical problem set by Plato to his pupils in the fourth century B.C.; to find a geometrical construction which would account for the apparent motions of the planets. Newton did it as completely and as elegantly as was possible in terms of the information and ideas of his time. Eudoxus, Plato's pupil, had found a rough and ready solution, afterwards in a revised form known as the Ptolemaic system; Kepler had found a much more exact solution but one that still had to introduce a number of arbitrary and unrelated factors. Newton had reduced it all to two principles; the laws of motion, which are really one law explaining what is meant by inertia and force, how they are related and how they are measured; and then the law of gravity. But he had done very much more than solve Plato's problem, for these are the laws that govern all events that occur in space and time everywhere; the movements of comets, the tides, the winds, the flow of rivers, the waves of the sea, the shapes of mountains and valleys, the wagging of the pendulum, the flight of the bullet, the stability of houses and bridges. When we consider the movements of the compass needle, the flight of the swallow and the running of the deer other complicating factors come in, but Newton's laws are there too, as a universal ground bass on which other changing themes are superimposed. All this is startling enough but it is a purely technical scientific matter. Newton's scientific discoveries had also the effect of upsetting completely some of men's general philosophical conceptions; a large part of traditional cosmology,

already shaken by Copernicus, Galileo, Kepler and others. People had been accustomed to draw a sharp distinction between what happened on earth where things are transient, perishable, imperfect and largely disorderly, and what happens up above in " the heavens " where everything is perpetual, perfect, orderly and divine. It is true some of the more daring of the Greeks of the fifth century had disputed this view, but the weighty authority of Plato and Aristotle was thrown into the scale of traditional belief and men rested secure in their dogmatic slumbers. Now Newton had wakened them up. Instead of the universe being divided into two spheres, earthly and heavenly, men had to choose between two philosophies. Either everything was of the earth earthy and there were no heavens and nothing divine, or else earthly and human things had as good a right to be considered heavenly and divine as anything else. What had been banished for good as a possible view for reasonable men was any kind of supernatural materialism, the view that the spiritual is a specially fine and thin kind of matter which may be supposed capable of anything ; though that is still the favourite theory of the superstitious and the thoughtless. Either we must be thorough-going materialists, in the strict sense of saying nothing at all exists except matter in motion and matter has no intrinsic properties except that capacity for locomotion (a difficult theory). Or else we have to find an alternative. Fortunately there are plenty of alternatives and I need not say more about them at the moment.

I have still to deal with Newton's work on optics and some important points arising out of it. In his day the experimental study of optics was a severe test of mechanical skill, as the experimenter had to grind his own lenses and set up his apparatus himself without external aids of any sort. Newton went further and built himself a furnace to melt up his own glass. Undoubtedly he owed a great deal to his childhood hobby of making models and mechanical toys. For the experimentalist mechanical skill is half the battle ; the other half is seeing what experiments need to be done, asking the right kind of question.

There can be little doubt that Newton's optical investigations sprang from his desire to improve on the Galilean telescope. His first efforts were frustrated by his not being able to produce lenses free of chromatic aberration—there was always a fuzziness of the image due to a fringe of colours, so that increased magnification did not reveal more detail. His enquiry into the mode

of formation of the coloured fringe led to his discovering that ordinary white light is composite, consisting of rays of different refrangibility, which are sorted out by passing the light through a prism. A pure ray of light, that is to say one which is all refracted by the same amount, is coloured and there is a constant relation between colour and refrangibility shown in the colours of the spectrum, from red the least, to violet the most refracted. The experimental evidence for this is set out with masterly completeness and precision in the first part of the *Opticks*, the only part I can deal with here.

Newton in his own work was perfectly clear about an important distinction, not made by anyone before and not always sufficiently appreciated since, between the physical properties of light and phenomena of visual perception. It is the first only which are the subject matter of physics ; the second are the subject matter of physiology and psychology and are of no interest to the physicist as such, except so far as they draw his attention to the defects and limitations of the human eye considered as a detector of light. For physics the eye is just that and no more. In principle it could be replaced by other detectors and all the physical phenomena of light could be studied (though with difficulty) by the totally blind. One source of controversy between Newton and others was their failure to understand this distinction.

The other and more important source of controversy was on the use and abuse of what Newton called " hypotheses " (in contrast with theories and laws). I should like to dwell a little on this matter although it is a difficult one, because Newton was the only " modern " among his contemporaries who were still partly " medieval " in their views. But Newton has often been misunderstood because of the extreme brevity of the statements in the *Opticks* and *Principia*. Newton criticised his contemporaries because they preferred speculation about imaginary causes of the physical phenomena of light to the precise and systematic examination of these phenomena themselves. In fact sometimes they allowed their speculative conceptions to blind them to facts.

Given any limited set of phenomena it is always possible to imagine a number of different alternative mechanisms capable of causing them ; though few people, having thought of one, take the trouble to go on and think of any other. So long as there is no evidence on which to base a decision between alternatives they are strictly superfluous to a scientific account and are

not necessarily better than the justly derided " occult qualities " of the Schoolmen. They are in fact " occult qualities " of a mechanical kind. What is necessary for the scientific account is that it should be based upon the widest, most systematic, and most precise acquaintance with fact that is attainable and should be stated in general terms. To take a case. Anybody who repeats Newton's experiments on the refraction of sunlight, using his methods, will get the same results and will have to arrive at the same conclusion on the basis of that evidence. This is what follows from any properly conducted and properly reported observation. Unless it can be put in the form, that anybody who does so and so will get such a result it is only a historical curiosity of no scientific interest. Of course, an observer who uses more refined methods than Newton can obtain results of greater precision. By using other methods he can extend the observations to radiation beyond the visible spectrum. Such observations add to Newton's work, supplement and improve on it, but take nothing away from it ; it still remains as permanent as anything in science.

Speculations, Newton's " hypotheses," about the possible causes of the phenomena of light on the other hand are less permanent. Very little that anyone in Newton's day had to say about waves or corpuscles as causes of light is of importance now. We can be quite sure too that similar speculation to-day, so far as it deals with matters incapable of experimental test, will be a source of amusement 200 years hence.

The same is true of Newton's system of Mechanics and Gravitation. Newton's laws have been improved upon but not superseded. For all bodies that are not extremely large or extremely small or moving extremely fast, and for all times not extremely long or extremely short, in effect for all bodies and motions he or any one else knew about till the present century, they provide a very close approximation formulated in the simplest way and are still invariably used. The only part of his system that can be said to be superseded or disposed of is the " hypothesis " he found he needed, though he had doubts about it ; the hypothesis of absolute and uniform space. Even that was a masterly simplification. It sufficed for all scientific thinking for 200 years and suffices for most at the present day. Only a few philosophers have been liable to headache on account of it.

Some nineteenth-century thinkers went much further than Newton and roundly condemned all hypotheses or speculative

constructions as radically vicious, simply because they are capable of misuse. That is a mistake. They have an important place as long as they are used for their proper purposes, as props or aids to the understanding and as the means of suggesting the kind of experiment to be done. They are not to be taken as substitutes for fact, but as going ahead of actual known fact and pointing to possible fact. It is through them that questions are asked which experience can answer. If they are well framed some part of them becomes in course of time incorporated in experience. Even if badly framed they may still be useful.

One man (A) thinks that on the other side of the mountains the beds of the streams are filled with nuggets of gold, and therefore he goes to look. He will be quite wrong about the nuggets but he will find out what is there, whatever it is. Another man (B) says that nobody has ever seen the other side of the mountains therefore nothing can possibly exist there. He will not go to look and will never find out anything. A third man (C) is sceptical about A's gold nuggets. Unless his scepticism is positive and leads him to go and see, it is no better than B's dogmatic denial. The more we speculate the better, as long as the speculations are an incitement to find out something new, not a substitute for it. As a very shrewd medical thinker, Wilfred Trotter, said, " It is poverty rather than fertility of ideas that causes them to be used as a substitute for experiment, to be fought for with prejudice or decried with passion. When ideas are freely current they keep science fresh and living and are in no danger of ceasing to be the nimble and trusty servants of truth." [1] It was just because of his great fertility in ideas that Newton was able to see both the uses and the limitations of those hypotheses which less fertile minds tended to misuse.

On this matter of " hypotheses " he was undoubtedly right, though his controversial methods were not always defensible, and in one case at least helped him to persist in a serious error. This was that he thought it was impossible to construct lenses free of chromatic aberration. True, his error led him to construct the first reflecting telescope—Gregory had designed a reflecting telescope but had not made it. The reflecting telescope has been a tremendous success, for which Newton well deserved his Fellowship of the Royal Society, although it arose from a mistake. It is not easy to understand how it was that Newton failed to

[1] *British Medical Journal*, July 26, 1930, p. 132.

discover that different kinds of glass have different dispersive powers for colour, whereby it is possible to make a compound lens of two different glasses with negligible chromatic aberration. He made observations on refraction with a large number of different kinds of material, in the course of which one would have thought he would have come across the phenomenon. Actually one of Newton's continental critics reported an observation which should have given him a clue, but by that time he was thoroughly out of temper and not disposed to listen to what anybody else said. So the first achromatic lens was made by Hall shortly after Newton's death and this opportunity was missed. We can console ourselves with the thought that even the greatest are not immune from error and it can still be said with truth " Show me the man who has made no mistakes and I will show you the man who has made no discoveries."

Newton was lucky in living at the epoch when the scientific world was ready for just such a synthetic effort as he was uniquely capable of making; lucky in finding a teacher, such as Barrow, supremely well fitted to inform and stimulate him; lucky in finding leisure and opportunity to pursue the argument wherever it might lead (as Plato says); lucky in enjoying robust health to carry him through. But when we have discounted all that external circumstances brought to him it remains true that he possessed in the most eminent degree different and distinct powers of mind that are seldom found together at all. Einstein has put the matter as neatly as it can be, and I cannot do better than conclude with the tribute of the greatest theorist of modern times: " In one person Newton combined the experimenter, the theorist, the mechanic, and, not least, the artist in expression."

XIII

SAMUEL ALEXANDER [1]

IN 1900 Höffding, concluding his *History of Modern Philosophy*, suggested that the time for constructing philosophical systems had passed. Someone commenting on this said that, as no British philosopher had constructed a system hitherto (he must have forgotten Hobbes and ignored Herbert Spencer), no British philosopher ever would. This taunt evidently went home, because within a few years Alexander had constructed his system, to be followed in rapid succession by McTaggart and Whitehead. Within thirty years the world was presented with three new philosophical systems, all of them guaranteed all-British. It is impossible for the present generation to assess the relative value of the contributions of these writers or even of the value of the work of the system makers relative to that of other contemporary thinkers whose contributions took different forms. All that one can say is that the opening decades of the present century have been a period of great philosophical activity and that Alexander took a share in that activity which will not be forgotten as long as men study philosophy.

It is, of course, impossible to do justice in one article to a system of thought which the author needed two large volumes to expound, volumes containing no padding or repetition. The merest sketch must suffice. It must suffice, too, to say no more about the circumstances of his life than is strictly necessary to give the background of his thought.

Alexander is the first philosopher to be born in the southern hemisphere, but there is no sign that the influence of the Southern Cross on philosophical speculation differs from that of the Pole Star. However, there is no doubt that Wesley College, Melbourne, where he went to school, gave him a start in life such as at that time very few English schools would have given him. After two years at the University of Melbourne he came to England, never to return to Australia, though he kept in touch with Australian friends. He obtained a classical scholarship at Balliol College, Oxford, in 1877 and at the same time was *proxime*

[1] *Manchester Memoirs*, 1941.

accessit for the mathematical scholarship. For some time, even after winning the scholarship, he hesitated between Oxford, Classical Mods. and Greats, and Cambridge and the Mathematical Tripos, before deciding on the former. It is amusing to speculate whether Cambridge would have turned him into a theoretical physicist, or whether he would have followed his own bent in any case. It is certain that Oxford did not mould him according to any established pattern. But Oxford was a stimulating place for a budding philosopher in the late seventies and early eighties. This was the Periclean age of Balliol. Jowett was Master, T. H. Green and R. L. Nettleship were tutors, and many of the coming men were there or had just been there. Alexander obtained a first class in both Classical and Mathematical Mods. and then in Greats. In 1882 he was elected a Fellow of Lincoln College (the first Jew to obtain a fellowship at Oxford or Cambridge) and for some years followed the normal course of work of a philosophical tutor at an Oxford College. He differed, however, very markedly from the norm of Oxford philosophers. It was not only that he was interested in mathematics, but, worse still, that he was interested in psychology, particularly in its experimental and physiological aspects. The Oxford attitude to psychology then (and for many years after) varied from amused indifference to active hostility. Alexander devoted much time and labour to this study, working in the physiological laboratories at Oxford and later spending a winter in Germany in Münsterberg's laboratory.

His first book, published in 1889, was on Ethics and was an expanded version of an essay awarded the Green Prize in 1887. This work, *Moral Order and Progress*, was a success and went through three editions (or impressions, as it was not altered). It supplied admirably the demand of the period for a treatment of " evolutionary ethics " more satisfying to the intellect than Herbert Spencer's. At that time the influence of Hegel and German Idealism in general was waning in this country. (That the influence developed and has survived to the present day is mainly to be attributed to the *perfervidum ingenium Scotorum*.) In the 1880's, Darwin was more influential than Hegel. That meant that evolution is to be seen not merely as ideal or as a process of thought, but as a concrete historical fact, or, rather, *the* historical fact. For men of Alexander's generation philosophy had no greater task than the making of new bottles or the patching up of old ones to hold this new strong wine.

After the book on Ethics, Alexander published no major work till 1920, but in 1908 produced a small book on Locke, which has been commended by competent critics as a model of what a short exposition of and commentary on a philosopher should be. The book served a useful purpose at a time when Locke was very generally neglected or ill-treated by his own countrymen.

In 1893, Alexander was appointed Professor of Philosophy at Owens College, Manchester, not yet a complete independent University. Alexander played an important part in accomplishing this final stage in academic evolution. He occupied the chair until his retirement under the age limit in 1924. He remained in Manchester until his death and during those fourteen years took more part in University affairs than an Emeritus Professor generally considers necessary. Even an Honorary Fellowship of Lincoln and later of Balliol College could not tempt him to desert Manchester.

It was after the turn of the century that his philosophy began to take shape in his mind. Between 1908 and 1914, by means of lectures and papers in philosophical journals, he sought to lay his views before the philosophical public of this country. These *ballons d'essai* were meant to provoke controversy and succeeded to the extent that their author became involved in lengthy correspondence. The appointment as Gifford Lecturer in Glasgow in 1915 came at the right moment. By that time it was generally known that Alexander had something really fresh to expound; something which appeared highly paradoxical to thinkers nursed for generations in the faith that "*Cogito ergo sum*" is the first word in philosophy—and very nearly the last. Here then was an opportunity for a comprehensive exposition of his system and one of which he made full use. According to the terms of Lord Gifford's will the lectures should deal with Natural Theology. Some lecturers have interpreted these terms with distressing latitude, but the shade of Lord Gifford, if present at the lectures in Glasgow in 1917 and 1918, can have had no misgivings on the main point that they dealt with natural theology (whether or not he approved of the type of theology). The living audience, too, were evidently well satisfied: they were gratifyingly numerous and faithful in attendance. In 1920, after considerable revision, the lectures were published under the title *Space, Time and Deity*. Alexander's later work was mainly concerned with values or "tertiary qualities," as he called them. In 1933 he published

Beauty and Other Forms of Value. A selection of his essays, with a full bibliography of published work and a memoir by Professor J. Laird, was published in 1940 under the title *Philosophical and Literary Pieces.* One of the essays, *Spinoza and Time*, forms a good introduction to Alexander's philosophy for those who know something of Spinoza, and for those who do not to both philosophies.

The total of Alexander's literary output is not large but it fulfils its purpose exactly as he intended it to do. As soon as he was ready he said what he had in him to say without going on, as some thinkers have done, to contradict himself or repeat himself. He took great pains to make his writing as workmanlike as he could. It is in the tradition of Descartes and Hobbes. Nobody can aspire higher than to follow these masters of philosophical exposition.

Alexander's philosophy has been labelled Realism, an appropriate label so far as it indicates that he was not a Phenomenalist nor an Idealist of any usual kind. But if a label is needed, Evolutionary Naturalism is the best. The label perhaps fits Whitehead too, but Alexander is the Spinoza in this kind and Whitehead the Leibniz.

The first reaction of thought to great scientific advances tends to be crude and to exhibit the fallacy of " nothing but." Thus Hobbes represents the first response to the new physics of the seventeenth century—there is nothing but matter in motion. And Hobbes had really very little to say about physics and psychology that Democritus and Epicurus had not said long ago. Spinoza and Leibniz represent the subtler and juster second or third thoughts. The first impact of the Darwinian revolution on nineteenth-century thought tended to a similar crudeness. *Amœba proteus* knows nothing of Justice and Mercy, neither then can *Homo sapiens.* Alexander's book on Ethics contained the reply to this in the endeavour to state objectively the concrete facts about the attitude of *Homo* to his world and *Amœba* to hers, and to display the historical process in which the ethics of the former have grown out of those of the latter (if she has any), without assuming that there is nothing to choose between them.

The evolutionary outlook which Alexander displayed in his early work is characteristic of his later work too. Here there are two further implications of importance. The first of these may be called the reverse aspect of Kant's " Copernican Revolution,"

an aspect that could hardly be seen clearly in Kant's own day. Granted that " reason has insight only into that which it produces after a plan of its own " and that the objects we apprehend " must conform to the constitution of our faculty of intuition," still that reason and that faculty of intuition are part and parcel of the natural world which it is their task to examine. The human intellect is not the indifferent external spectator of a contest in which it takes no part, as the Pythagoreans said, nor is it the creative spirit " brooding upon the face of the waters," as some idealists seem to say. The evolutionary view makes the task of developing a theory of knowledge more difficult in some ways, but it relegates it, so Alexander insisted, to the second place and not the first. For him the first and the main task of metaphysics is to examine with what detachment is possible and with such insight as is available the pervasive characters of the world in which we find ourselves. There is first of all Space-Time itself, the matrix of all that exists, and then there are the categories of experience. These are *a priori* and non-empirical in Kant's sense, in that they are not variable but implied in everything experienced. But in a wider sense they are experienced, as they are essential and universal constituents of whatever is experienced.[1] It is only after this first work has been done, when we can say what the world is like in general, that it is profitable to discuss how we come to know it and by what means our claim to knowledge can be justified. A theory of knowledge presupposes a system of ontology ; not ontology in the sense of a science of " pure being," but in the sense of a systematic description of the general characters of the things that exist. Its results are thought to be dull because it is purely descriptive. " The great fundamental notions of philosophers are not proved, their truth is seen. Proofs are nothing but machinery which helps others to secure the philosopher's vision." [2]

Perhaps it was partly for the pleasure of shocking a generation brought up on the doctrines of the supremacy of mind and the uniqueness of the relation of knowing, that Alexander was so persistent in proclaiming that mind has no natural prerogative ; that knowing is only one species of the general relation of " compresence " which anything actual however humble always has to

[1] *Space, Time and Deity*, I, p. 185.

[2] Lecture on " Spinoza and Time," 1921 : *Philosophical and Literary Pieces*, p. 373.

many other things that are also actual. At any rate this aspect of his philosophy has not met with much approval, though it might have seemed commonplace to Greeks of the fifth century.

The second point, that philosophy must " take Time seriously," would have appeared most paradoxical to a Greek and indeed at any period before the nineteenth century, for Time had only had grudging admission to the outer court of the temple of reality as " the moving shadow of eternity." Taking Time seriously constitutes the very heart of Alexander's theory, namely, his doctrine of Space-Time, where he makes use of Minkovski's revolutionary synthesis of Space and Time. This is the boldest, most original and also the most difficult part of his system. He claimed, perhaps too optimistically, that the traditional difficulties about Space and Time are due to treating them apart, and disappear once they are taken together. Undoubtedly they should be so treated and will be in " any future system of metaphysics that claims to be scientific." We cannot be too grateful for this pioneer attempt to do a hard and difficult piece of work. Even if future generations have to do the work very differently the cause for gratitude will still remain.

Even when Space-Time is considered instead of Space and Time in separation old difficulties still crop up. In particular there is the problem of avoiding the paradoxes of the extreme Newtonian or Leibnizian view. According to the first, S-T is an indifferent container within which bits of matter or events lie immersed. It is necessarily homaloidal, though not necessarily Euclidean, because in and by itself it is absolutely no-thing. On the other hand the bits of matter have only external spatio-temporal relations and no properties of their own, since these properties would have to be spatio-temporal and therefore external. S-T on this view is infinite and uniform but null and void, and matter is merely that which is capable of locomotion. On the Leibnizian view bits of matter or events are qualitatively distinct substances and S-T is only the system of those qualities or adjectives which can for certain purposes be treated as though they were external. Material things or events and their qualities are not in themselves spatio-temporal, and S-T can be no better than *phenomenon bene fundatum* and might be a complete illusion. On this view S-T need not be homaloidal, in fact its properties seem bound to vary as the density of events or things varies. On the Newtonian view things, themselves featureless, are miraculously inserted into

an S-T equally featureless. On the Leibnizian view things which are not in themselves spatio-temporal are for some mysterious reason to be described in spatio-temporal terms.

Alexander constantly insists on what appears at first sight to be pure paradox, but is designed to avoid the greater paradoxes of these extremes and also the subjectivism of Kant's view. For him everything that exists is through and through spatio-temporal. There is nothing that is not a bit of Space-Time, qualitied and differentiated from other bits but still S-T. S-T is in fact " the nurse and mother of all living." Space and Time taken separately are abstractions and as such empty and dead, for Time is the " mind " of space and space the " body " of Time. Even bare Space-Time considered by itself is not mere blank negation, is not empty and is still concrete, *i.e.* it supplies the difference between *this* process and *that*. S-T is Motion, that is to say happening or process, not strictly change because change implies qualitative change other than locomotion. Universals are plans of S-T. They are timeless only in the sense that they are not tied to a particular time or particular times. Qualities—red, hard, fragrant, living, sentient—are not true universals but collective names representing empirical generalisations; they are really " emergents " from S-T, as requiring a certain complexity of organisation, and are not basic constituents. Quality in short is not a category. The categories are the pervasive features of S-T. They are features of external things as " contemplated " by us and also features of our own minds as " enjoyed " by us because our minds are themselves specially differentiated and organised bits of S-T. It is just because the categories are both physical and mental that they are, as it were, open to inspection.

The primary or major categories are existence (which includes identity), universality, relation and order. Those of the next group, substance, causality, quantity, number, are subordinate. The principle of subordination is that the categories within one group all " communicate," in Plato's phrase, with one another and with the higher group but not the higher with the lower group. Thus every substance exists and has causal relations, but all existents are not substances and all relations are not causal. The third and last group of categories is constituted by Motion, which in its various empirical determinations gives rise to the " primary qualities " of things.[1]

[1] *Space, Time and Deity*, I, p. 322 *et seq.*

All the discussion of first principles in the first volume of *Space, Time and Deity* is suggestive and in places extremely illuminating, *e.g.*, the treatment of universals. Nevertheless the general impression left is confusing. (The brief sketch given above will probably be found even more confusing.) The fact is that Alexander's Space-Time seems to be called on to bear too great a burden, in the same way as is Spinoza's Substance. The difficulties were put very clearly by Dawes Hicks in a review in *The Hibbert Journal* (Vol. 19, pp. 567–577). The first is that Time, though indissolubly bound to Space, is somehow to be considered an agent and even a creator. Secondly, as he puts it, " One is at a loss to understand how the single vast entity Motion (which is the same thing as Space-Time) is thought to break up of itself, or to differentiate itself into a system of motions. For it is difficult to see how this problem can be supposed in the least degree to be solved by the argument through which it is sought to show that Time introduces diversity into Space, and Space into Time. Granting for the moment, that Time is an Agent, yet it is admitted that Time " flows uniformly " [1] and the question that needs answering is how from a uniformly flowing Time there results a plurality of pure motions differing from one another in virtue of their velocities." [2] With Alexander's metaphysics, as with any well-conceived system, the difficulties are all at the very beginning. If we can grant the primary assumptions the rest follows.

There are two relatively minor points of criticism which are worth making at this stage, because they illustrate the great difficulty of distinguishing the genuinely pervasive features of things from mere empirical fact. Alexander considers S-T to be homaloidal or uniform, and urges that if mere change of place altered the forms of things there could be no Universals. But all that seems to be warranted is that empirically we find S-T in our neighbourhood to be approximately uniform. If it were to be really wildly non-homaloidal, so that the dog which had the form of a dachshund at the bottom of the garden acquired that of a pug when it entered the house, this might be uncomfortable for the dog and puzzling to its owner, but would not abolish universals even though some of them became more complicated.[3] As far

[1] *Space, Time and Deity*, I, p. 216.
[2] *Space, Time and Deity*, II, p. 47.
[3] Cf. Professor C. D. Broad's criticisms in *Mind*, N.S., Vol. 30, p. 147, also his *Scientific Thought*, 1923, p. 452 *et seq.*

as theoretical physics is concerned it would appear that S-T can be treated as either homaloidal or not according to which set of primary assumptions is selected out of alternative sets. There is another assumption made by Alexander which is a more vital one, that is that S-T is strictly a continuum, and is in fact the basis of all continuity and connexity. Up to 1920, when his book was published, this assumption would not have been seriously challenged ; perhaps by now it is not quite so secure. A quantum theory of S-T does not seem to be necessarily absurd, though it would have to be Leibnizian. Professor Whitehead indeed has made statements that could be interpreted in this way. However, there must be a ground for continuity and connexity somewhere, and if these categories are not rooted in S-T, it is hard to see where they could be in a world that was in all other respects atomic in structure.

A feature of Alexander's thought that should be considered next is his attitude of " natural piety." It is, he says, the attitude of the scientific investigator by which he accepts with loyalty the mysteries which he cannot explain in nature, and has no right to try to explain." [1] According to this the metaphysician has to describe rather than explain, to state what he finds rather than argue about it ; acceptance comes before criticism. As a protest against the tendency to deny the truth or reality of anything appearing to be in any way paradoxical, difficult or obscure, it is a useful one. In philosophy, as in science, there is room for both natural piety and natural impiety. However, the cumulative character of scientific investigation makes the destructive effects of impiety harmless and generally useful. In philosophy impiety is easily overdone and for the last hundred years does appear to have been overdone. The initial forward step must be a product of natural piety ; as when Thales (with, perhaps, excessive piety) said that everything is water. The metaphysician must at least accept the existence of a universe of some sort, and it is his first duty to look for unity, uniformity, simplicity and coherence in the face of apparent disunity, multiformity, complexity and incoherence, but not to commit himself at once to any special theory. On the other hand Alexander's natural piety stops short of the supernatural piety of certain idealists for whom all problems are in principle already solved and all struggles already swallowed up

[1] Article " Natural Piety " in *Hibbert Journal*, July, 1922 ; *Philosophical and Literary Pieces*, p. 299.

in victory. Still, natural piety means that its possessor is prepared to perform an act of faith and that faith can be tested only by its results. Alexander has given us his *credo* and has stated it as carefully and clearly as he could. That is as much as we can ask of him or anyone.

Though his natural piety is needed in the first part of the metaphysician's task, namely the description of the basic *a priori* constituents of the world (Space-Time and the categories), it is needed even more in the second task, that of giving an account of empirical existents, the things we actually find to be present in the world but which might have been otherwise. The first task, like that of sailing a small boat to windward, is rather dull, slow, difficult to do well, but safe; mistakes do not lead to irremediable disaster. Thanks to Kant there is little doubt how one should proceed and in general terms what there is to find, granted certain initial assumptions. The universe is apprehended as a spatio-temporal manifold: there are categories somehow linked with that manifold. There are a number of disputes and doubts, but mainly on matters of detail, and they arise out of the difficulty of obtaining clarity about ultimates. The second part of the task is like sailing before the wind; it seems easy, is fast and exciting but is also dangerous; a single mistake may lead to disaster. What different kinds of constituents do we find in the world? What are minds? How are they related to other things? How are they related to each other and to God? What are the ends of human action? In answering these questions the differences of opinion are fundamental. A mistake in one place may lead to mistakes everywhere.

According to Alexander, the fundamental restlessness which is Space-Time throws up certain differentiations and configurations which have definiteness and stability. These may give rise to further differentiations and configurations of greater complexity possessing a higher degree of orderliness. The atoms and other entities dealt with by the physicist are perhaps the lowest stage, living organisms are a higher stage and conscious beings a still higher. There is thus a process of *emergence*. That is to say entities of a higher stage display new characters not present at a lower stage and not predictable from the characters apparent at the lower. Alexander always credited Lloyd Morgan with originating the notion of *emergence*, but it was certainly Alexander who made the most vigorous and systematic use of the notion.

The doctrine of emergence seems to be necessary to free evolutionary theory from the " nothing but " fallacy.

Mind is an emergent but it is spatio-temporal like every other existent. That which others, " contemplating " from outside, call my body, I who " enjoy " it from inside, call my mind. This is a doctrine that has been maintained before, but perhaps not quite in the form Alexander advocates. Thought, he holds, is a product of action ; it is action working at a higher potential. We do not think first and then act, but think through acting. The artist *realises* what it is he is aiming at only in the making of the poem, picture or musical composition. In the literal sense of *realise* this is almost tautologous. It is true also in the figurative sense where *realise* means *understand clearly*. If the artist begins his thinking with mental images they are simply partial realisations—for Alexander mental images are as much " physical " entities as percepts, though of a peculiar sort with peculiar spatio-temporal relations. The poet's materials throughout are words and the painter's are pigments. It makes some difference if the words are actually spoken or written or the pigments actually spread on canvas and not simply in the artist's head, because his actions are different in the two cases. Otherwise there is no difference. Mind, as such, possesses no special privilege merely in knowing, for that is strictly no more than compresence ; a relation the cup bears to the saucer it rests on. Mind's special privilege is that it consciously " enjoys " its acts instead of merely acting. However, the activities of mind represent the highest level of emergents of which we (as minds) are cognisant, though not the highest level to which the striving of the universe may give rise. Minds, too, are the source of the tertiary qualities —Truth, Goodness and Beauty.

A valuable feature of Alexander's method was his refusal to discuss Truth, Goodness and Beauty separately, in water-tight compartments. These values are, on his view, human inventions but they are, after their kind, real. It is important to remember that for Alexander there is no valid distinction between invention and discovery. Shakespeare, he says, " discovered *Hamlet* in the English Language." Though values are products of mind, they are not peculiar to it, like consciousness, any more than they are qualities of things like redness and hardness. They are produced by the compresence of minds with their objects and by the intercourse of minds with one another in their social relations of

co-operation and competition. Thus, when I say the rose I am looking at is red that implies (1) something that the rose possesses in its own right and which it " enjoys," if it is capable of " enjoyment." The assertion also implies (2) that I am having an experience of a certain kind, and (3) that other people have similar or corresponding experiences (with qualifications and modifications to include the colour-blind and blind). When I say that the rose is beautiful there is no implication corresponding strictly to (1) but there are to (2) and (3). It is because an assertion like (3) is implied that I say the rose is beautiful, not merely that I am pleased by the sight of it, as I would if nobody else were pleased. Similar considerations can be applied to the assertion that it is *true* the rose is red, not white, or the assertion that it is *better* to have roses in the garden than nettles. Truth, Goodness and Beauty are all public, but their publicity is not that of being features of parts of Space-Time but that of being features of the social interactions of human beings. The distinctions between them arise from their connection with different human motives. Truth is that which satisfies *curiosity*: Goodness that which satisfies *sociality*, the impulse to live together in such a way that mutual claims and counter claims are adjusted as well as possible: Beauty that which satisfies *constructiveness*. In each case the value is not apparent until the impulse is liberated from the urgency of immediate need and becomes the subject of contemplation in a disinterested way.

The character of values Alexander considered to be best seen in their highest manifestations and particularly easily in aesthetics, but values of a sort are to be found at a much lower level. Assuming that value is necessarily a relation between the valuer and the valued object, anything which " matters " to anything else may be said to have value for it. It is not purely metaphor to say that cream has value for the cat and even that oxygen and hydrogen have value for one another when they are combined to form water.

In his last book, *Beauty and Other Forms of Value*, Alexander amplified the treatment of values in *Space, Time and Deity*. It is there that his aesthetic theory is to be found. As to this aspect of his philosophy it must suffice for the present purpose to say that his acute psychological insight, combined with wide and discriminating appreciation of literature, painting and sculpture, make this part of his work excellent reading, a compliment that

cannot always be paid to the discussion of Aesthetics. This last book is also of special interest as containing Alexander's last word on Ethics. As Professor Laird has put it, he was one of those for whom " ought " really means " is," though in a very subtle sense. It is not unjust to call him a Utilitarian, but again this must be qualified by saying it is a very subtle form of Utilitarianism.

Finally, something must be said about the theology which is developed at the end of *Space, Time and Deity*. Alexander's views have appeared monstrous to orthodox theologians. For different reasons they have also shocked those thinkers of the present day who deliberately mutilate their philosophies by refusing to say anything about God. The difficulty underlying Alexander's theology is his determination to take Time seriously. Traditional theology has been adjusted either to the Greek view that the whole universe is really eternal and in principle unchanging and unchangeable, or else to the Christian view that the world we know is merely an episode, the stage scenery which sets off the drama of the Fall and Redemption of Man. Only God is eternal; Heaven and Earth shall pass away. In either case God is viewed as strictly eternal, utterly timeless. Time is but a perishing, though a perishing long drawn out. There cannot in that case be a genuine process of evolution, only a kind of play. Some of the actors may be allowed to speak extempore, but the outlines of the plot are predetermined and there is no doubt whether it is comedy or tragedy. In any case God is Producer and Stage Manager. If He is assumed to be taking a part in the play is it not still only " play-acting " ? Some of the Greeks concluded, very logically, that the performance would be repeated, and in fact had been repeated. Alexander was trying to avoid these difficulties as well as others underlying the notions of transcendence and immanence, which he discusses at some length.

The most startling part of Alexander's theory is that the quality of deity is not actual but is only ideal and for the future. It is the next emergent quality that is to arise in that process of striving which constitutes the Universe. At every stage there is a higher emergent which is related to lower ones much as mind is to body. That is to say deity is to mentality as mentality is to materiality (or, perhaps, as mentality to vitality and vitality to materiality). When deity is actualised then there will be a higher stage still to come. Alexander cannot make use of the

Aristotelean notions of form and matter, because that seems to imply a transcendent power which at each stage imposes form on matter. It pre-supposes not only a First Cause but a Final Cause which is prior in the order of time as well as in the logical order.

This is not, however, a complete statement. Answering Professor Broad's criticisms Alexander stated, " What I say is that God as actually possessing deity does not exist but is an ideal, is always becoming; but God as the whole Universe tending towards deity does exist." [1] " God as the whole universe tending towards deity " is not unlike " *Deus sive Natura* " in Spinoza's phrase. But such a God is merely immanent and could not be an object of worship according to Alexander. If the " whole creation travaileth and groaneth " it does so to some end. That end we cannot conceive from the nature of the case, we can only give it a name. The principal innovation in Alexander's treatment is to refuse a substantive form to the name.

Alexander claims that his philosophical method is merely descriptive, this is his Naturalism. Is the claim justified ? There are several points at which the critic may suspect an element of interpretation, that something has been read in beyond what pure description should find. It may legitimately be doubted whether there is such a thing as pure description even in the natural sciences, if description is just acknowledgment of fact. For facts to be known must be selected and they are selected for their value to the selector. Judgment of value therefore seems to be prior to judgment of fact. There is a kind of Naturalist who denies the existence or the validity of value judgments regardless of the self-contradiction involved. Alexander, of course, does not make an elementary blunder of this kind, indeed he discusses value judgments admirably. The question to be asked is whether in doing so he has not tacitly abandoned his initial standpoint. To put this difficulty in its most acute form, which brings us back to what was historically Alexander's starting point, we may ask whether the notion of evolutionary ethics is not strictly self-contradictory. The mere facts as experienced may tell us of a succession of events in time but not whether any one event is better or worse than another. That is an ethical judgment, a value judgment, which, whether you call it *a priori* or not, is at

[1] *Mind*, N.S., Vol. 30, p. 428, also Preface to Second Impression of *Space, Time and Diety*, p. xxiii.

any rate not given in experience and therefore is not found in the evolutionary process, *quâ* fact, but is read into it by the spectator *quâ* moral agent.

Criticism along these lines implies that Alexander's method has serious limitations; it does not imply that the method is invalid or the results useless. On the contrary, Alexander has done the kind of thing that Plato did in his dialogues, namely provided a model of how philosophical discourse along certain lines should be carried on.

XIV

Dochet [1]

The isle of Dochet is only five acres in extent, but its title to fame is not to be measured by superficial area. North America is a vast continent on which its history is spread thin. People and things are new and raw and hard. There is no "atmosphere," neither historic atmosphere nor what the painter calls atmosphere in the scenery. But Dochet is a lovely spot in a lovely setting of soft New Brunswick scenery, where the air has something of that quality of a luminous veil which is called atmosphere. The inhabitants of this country are pleasant mannered and soft spoken. They are long established; they do not boost or hustle. Above all, Dochet's five acres are historic soil, as will be related in order.

In the year 1604 Pierre du Guast, Sieur de Monts, accompanied by his more renowned friend Samuel de Champlain, explored the Bay of Fundy, that cold and foggy water, intent upon founding a settlement. At that date no European lived anywhere upon the continent north of Florida. Quebec, where Cartier and Roberval wintered, had long been abandoned. Fishers and fur-traders had been visiting these coasts for at least a century, but came and went with the swallows and did not stay. The timbers of the *Mayflower* lay seasoning in the shipyard—in a figurative sense, if not actually.

Sailing westward from the Saint John River along the coast of what is now New Brunswick, the explorers sighted four lonely islets, the Wolves, well out at sea, and behind them towards the mainland a maze of islands great and small. Imagine a sunlit morning in June. A faint northerly breeze has dispersed the fog and just gives steerage way. A great tide under the little ship sweeps her in towards the islands. Far to the south the cliffs of Grand Manan are still wreathed in mist. Ahead the coast and islands are clear but raised by mirage into vast incredible precipices. De Monts heads north-westerly for an opening among the islands, Letite Passage, leaving the large island of Campobello on the port quarter.

Campobello, let me mention in parenthesis, is itself a remarkable island well worth studying. It is said to have been first owned and settled by a retired British Admiral, and to be

[1] *The Cornhill Magazine*, 1927.

technically at war with the United States up to the present day. The fiery admiral, annoyed that vile Yankees dared to exist within sight, declared war on them and sank two ships flying the Stars and Stripes. Since then peace has never been signed. Probably the Government of the United States of America is not aware of the predicament, neither are the Campobelloers (if that is the correct word), who are loyal subjects of King George but do their shopping at Eastport, Maine.

But we have left Sieur de Monts in the lurch, threading his way through the intricacies of Letite Passage. The tide bears him irretrievably onwards, while he listens anxiously to the chanting of the leadsman. In places the current breaks into swirls and eddies, where the ship tries to chase her tail like a kitten and makes the helmsman swear. Finally, past islands and islets all densely wooded, they enter the quiet waters of Passamaquoddy Bay. The breeze drops, the bay shines like glass and the explorers look with delight upon the green hills of Deer Island and the fine ruddy cliff of Macmaster Island. The mainland shores quiver in the heat haze and behind them appear blue rounded hills. Passamaquoddy Bay is huge and land-locked, with room for all the navies of the world to ride at anchor. But for the tide that pours in and out every day it might be an inland lake. All round its shores are creeks and delightful havens where the smallest craft can ride out a hurricane. Some of them have charming names, Bliss Harbour, Harbour de Loutre. But what of Dochet, you ask, among these bays and islands? Wait, we are coming to it, slowly and cautiously like Sieur de Monts.

A faint easterly air springs up, the ship no longer feels the tide and there is no choice but to sail before it. In the course of the afternoon the breeze freshens, and rounding Navy Island, de Monts sees before him the great Ste. Croix estuary. The estuary is flanked by fine landmarks, Chamcook and Greenlaw Mountains on the east and Devil's Head on the west. Right in the middle lies the little isle of Dochet. When I say the little isle of Dochet I mean Dochet proper, not what is now called Little Dochet, for that is not in the middle at all and is only a rock with a clump of fir trees on it, like a shaving brush sticking out of the water. When they came abreast of the island, " Restons ici, mes braves ! " cries Sieur de Monts. " Put down your helm; stand by to let go ! "—or French words to that effect.

When they rowed ashore they found the island was all they could wish for—a good beach for boats, dry level ground, good soil,

plenty of timber. From the island their cannon could command both channels east and west, and they would be safe from surprise by Indians (who were harmless had they only known). The place was a good observation post and easily reached and recognised; so there they stayed. One thing only was lacking—a spring of water. There was, it is true, a brook of good water on the western shore, barely a mile away, and that seemed little enough in summer. They discovered many compensating advantages. The island is far enough from the open waters of the Bay of Fundy to be relatively free of fog. Though the tide rises three fathoms or more, the tidal streams are moderate. The beaches abound with clams and mussels, good food for men and better bait for fishes. The clam has a disagreeable habit of squirting sea-water up the trouser legs of him who steps near, but otherwise is harmless. The water swarms with fish to be had for the baiting of a hook—haddock, cod, pollack, hake, flounder, not to mention less edible kinds. Salmon and shad were there too, in those days, though now fished out. In the season there are vast shoals of herring, small, but not to be despised. The limitless forests all round were full of game, and the lakes and swamps of fish and wild fowl. There were no noxious beasts, save only flies and mosquitoes.

They built themselves houses and the indefatigable Champlain planted a garden. The garden was not a success at the time, but the act of cultivation was symbolic. With the first frosts of autumn the sombre woods blazed with scarlet and the air blew cool and delicious. Well might the Sieur de Monts praise " La Nouvelle France " and " L'Ile de Saincte Croix," as they called the island. They had no fears for the winter, thinking perhaps of the winters of their own Normandy.

The winter of 1604 came early and was unusually severe. Floating ice made the use of boats dangerous or even impossible. Water, fresh meat and fuel ran short. The cider froze solid and was served out by weight. In spite of the fringe of trees left by de Monts' orders the northerly winds whistled through their huts. From cramped quarters and bad food, scurvy developed. The remedy that Jacques Cartier learned from the Indians of Quebec had been forgotten.

The tardy spring of these coasts found thirty-five out of seventy-nine inhabitants of Dochet dead and the rest sick and dispirited. In the course of the summer, the Frenchmen explored the coast as far as Cape Cod, but found no place they liked as

well as the Port Royal, now Annapolis, on the opposite coast of the Bay of Fundy which they had seen the year before. So they left little Dochet Island for the fertile Annapolis valley; a very wise choice.

Two years later Champlain visited Dochet again, and found the wheat and vegetables he had planted still growing in the deserted garden. These green ears of wheat, half smothered in Golden Rod and purple Fire Weed, were the pathetic first fruits of a continent destined to be the world's granary. In 1613 the remnants of the camp were destroyed by English seamen.

By the time the Ste. Croix valley was permanently settled by colonists from England and Massachusetts, in the Seventeen-eighties, the memory of this first tragic winter had perished, except for the doubtful tales of Indians. But the name Ste. Croix stuck to the river; the estuary with its two branches, Oak Bay and Waweig River, makes a rough cross. Some old maps, though, show two Ste. Croix rivers, and the island passed under various names.

In the year 1783 the plenipotentiaries of the United Kingdoms of Great Britain and Ireland on the one hand and of the United States of America on the other in their combined wisdom declared the boundary between their respective territories to be the Ste. Croix or Scoodic River. It remained only to discover what river that was. When differences of opinion were expressed on the point, the advice of the Admiral of Campobello (if he was alive at the time) was fortunately not taken; instead a commission was appointed to investigate the matter. The commissioners decided that the river intended by the treaty was the one where de Monts and Champlain had wintered in 1604–5. The question then arose, was this river the present Ste. Croix at the western corner of Passamaquoddy Bay, as the Nova Scotians contended, or was it the Magaguadavic River further east, as the men of Massachusetts maintained with equal vigour? An exploration of Dochet revealed traces of habitation which were very suggestive. The matter was settled definitely by the production of a copy of Champlain's map of the island and river which agreed closely with Dochet and the Ste. Croix, whereas the Magaguadavic, that paltry brook, could boast no such island and no such proportions. As the treaty declared the boundary to be the channel of the river, and as the main channel runs east of Dochet, that island was assigned to the United States. Imagine the Admiral of Campobello clenching his fists!

After the boundary dispute was settled the Isle of Dochet retired into private life. Clio, the Muse, has not given it a glance since, except perhaps for a moment during the war of 1812 when Americans and Canadians, less bellicose than their governments, used it as a depot for trading purposes, so that for a time some called it Neutral Island. But if Clio never glanced at it, another lady did. In the first half of the nineteenth century, of many names given it by dwellers in the neighbourhood and by mapmakers, one name, pronounced Doshay, with the accent on the first syllable, became habitual. Local legends concerning the name were various, but all agreed on one point, that Doshay is an abbreviation of a girl's name, Theodosia. The legends also agreed that she had been young and lovely (they would), but as to who she was and why the island was called after her the legends disagreed. At any rate Theodosia became Dosia and finally Doshay. All might have been well had not a literary gent appeared, decided the name was French and spelt it Dochet, deceiving hydrographers and mapmakers and even honest fishermen and farmers dwelling round about. In this way false learning nearly obliterated the memory of the lovely Theodosia, whose rescue from oblivion is due to the devoted labours of true scholars. Much that learned men bring to light is only dust and ashes, but they find here and there a fragrant sprig of rosemary. I have my own view about the true story of Theodosia and her island, based not so much on minute research as on unerring instinct. It is a very tender and beautiful tale, an Acadian idyll; but I will not relate it here as I am concerned with proven facts only.

Since the time of Champlain, since the time of Theodosia even, the island has grown smaller. The whole coast is subsiding slowly and all small islands are being washed away. Successive maps each show less and less land, particularly at the southern end. The island consists of a core of red granite rock on which is a cap of sandy clay soil which is being eroded. The northern end is rocky and rises steeply from the water. It is probably much the same now as when Champlain was there. On the south side the whole aspect has changed. Of the headland where de Monts mounted his cannon there is nothing left. At present the southern end consists of a steep crumbling slope of clay shelving to a beach of clean sand. Two spits of sand run out to rocky knolls crowned with trees known locally as " nubbles." The two nubbles break up the shore into three delightful little coves. Beyond the nubbles there is a large reef of rocks covered at high water, where seals

disport themselves. The greater part of the island is fairly level and grass-grown, and is only about fifty feet above high-water mark. Round the northern and eastern shores there is a fringe of trees. Near where Champlain planted his garden the United States maintain a light. In a pleasant little house live the light-house keeper, his family, his dog, his six-valve wireless set and, in a separate dwelling, needless to say, his cows. It is an orderly and friendly community where serious crime is unknown. Before the salmon were fished out of the Ste. Croix river, fish weirs were maintained on the shores of the island and the family that owned them lived there. But now dwellings, weirs and fish houses have all disappeared.

If anybody doubts the accuracy of the statements here made, let him read the careful and learned account by Dr. W. F. Ganong (*Trans. Roy. Soc. Canada*, 2nd Series, vol. viii. sect. ii. p. 127). Better still, let him visit Dochet Island some summer. If he is going to America, let him avoid New York City, Niagara Falls, the Salt Lake of Utah and trash of that sort; let him go to St. Stephen, Calais, or St. Andrews, and from there row or sail to Dochet, eschewing vile motor boats, but taking a compass in case of fog. Let him land on the south-easterly side of the island, leaving his boat at the northern end of the beach just where the fringe of trees ends, for there is least soft mud there at low water. But, above all, let him remember the tide, or he may find his boat cruising by itself when he wants to go home. He will be greeted effusively by a fat dog of doubtful pedigree and pleasant disposition. The lighthouse keeper, his wife and mother-in-law will greet him courteously and show him the light and fog signal and will call up the four corners of the North American continent by wireless. Then he may light a great fire of driftwood on the beach, placing it below high-water mark according to law, and cook his bacon and beans and make his coffee, for he will have brought food and water like a prudent man. He may watch the sun go down behind the wooded hills of Maine and the moon rise behind the wooded hills of New Brunswick. Except for the flashing head-lights of motor cars on the roads ashore the scene is the same as Champlain looked upon more than three hundred years ago. When the rising tide has gently extinguished his fire he will go with regret. As he rows away in the darkness the water will break into fire under the bows of the boat and round the oar blades, and the light of Dochet Island will wink at him solemnly, regularly, and with infinite meaning.

XV

LETANG [1]

" EAST by South should just about do it," said our skipper looking at the compass beside him and then turning round to see the last of the squat, friendly form of Sand Reef Light that was fading out in the fog astern.

" Where exactly are we bound for ? " I asked.

" Letang," he replied, " there it is on the chart ; that peninsula. We go through Letite Passage, then round between Bliss Island and Fry's Island. The course I am steering ought to bring us to the eastern end of Macmaster Island, which has a shore you can recognise as long as you can see anything. From there we must work our way against the tide, across the Passage to Green Point Light. After that it is easy, as the tide will be with us and not running too hard."

I gradually disentangled the course indicated from the confusion of islands and inlets presented by the chart of Passamaquoddy Bay and the neighbouring coasts of New Brunswick and Maine. " Is there a town at Letang ? " I asked. The chart, usually reticent about mere dry land, had, at the end of the peninsula, marked a gridiron of streets, suggesting a small town.

The Skipper laughed. " There's an old man who lives at St. George, who once figured out a plan for a great transatlantic port that would put St. John in the shade. It is a fine harbour, with an easy entrance, short and straight in ; good anchorage and deep water close inshore ; nothing much in the way of tidal currents. It would save an hour or two steaming up the Bay of Fundy, and it is sixty miles nearer Montreal too."

" Is there anything there now ? "

He laughed again, " You'll see when we get there."

I looked up from the chart. There was nothing for the eye to rest upon outside the boat. Smooth grey water slipped past the side ; beyond that there was only a luminous greyness around and overhead. There was no sound but the chugging of the engine. I tried to conjure up the prospect that had excited the man at St. George, perhaps a romantic visionary, more likely a

[1] Written 1927.

disappointed speculator in real estate. I imagined the wharves with steamers lying alongside, warehouses and tall grain elevators behind; a liner slowly coming up the harbour with attendant tugs fussing round; a schooner putting out to sea with sails and topsides gleaming white; little ferry steamers and motor boats darting about. I imagined the sounds of a busy port; ships' sirens in several keys; the rattle and grind of cranes; the shunting of trucks; the clanging of the locomotive's bells as a train passes slowly across the streets; cars tooting. Altogether an impressive picture. Filling in the details lasted the tedious, blind passage across Passamaquoddy Bay, till suddenly something loomed up ahead, on the starboard side—red contorted rocks crowned with trees. They were seen for a moment, then faded away as our course was changed.

Then followed a curiously nightmarish interlude; nightmarish at least to anyone not familiar with the coast. Objects suddenly appeared and disappeared, on this side or that or right ahead; objects entirely unrelated to one another or to the intervals, when nothing at all could be seen but fog and water. Sometimes it was wet, weed-covered rocks with the tide rippling past them; sometimes trees crowning a low cliff; sometimes the stakes of a herring weir (*i.e.* trap net) towered above us. Gulls could be heard and perhaps dimly seen. Once the fog cleared for a moment before a puff of wind; we saw three deer grazing on a patch of grass between the trees and the cliff. They stared back in mild surprise until the fog drew its veil between us once more. A dreadful braying noise assaulting our ears informed us that we had rounded Green Point and were passing close under its fog signal. After that the fog was not so dense and, as one could see the shore most of the time, the nightmare subsided into ordinary experience.

Presently, a low shore appeared dimly ahead from which projected a long jetty. The last section of the jetty had collapsed somewhat and was tilted sideways at an uncomfortable angle. We moored to it nevertheless, and stepping gingerly on to it found the planking not so rotten as might have been expected. (The collapse will have been due to pressure from floating ice in winter and not from rotting of the timber.) We walked ashore. This was Letang. It was now clear enough to see the surroundings. A gravel road ran down to the jetty and two cars stood there; evidently the property of a party of tourists who

were fishing vociferously from a boat moored a couple of hundred yards from the shore. Beside the road was a fisherman's hut and near it two fishermen baiting long-lines with pieces of herring. Two houses could be discerned further back among the trees; one empty with broken windows, one evidently inhabited, a flag drooping from its flagstaff. In the bay beyond the tourists' boat a small schooner lay at anchor with a very dirty mainsail set. The probable *raison d'être* of the schooner was shortly discovered further along the shore, where two young men were engaged in quarrying the fine white limestone that lay exposed above high-water mark. This enumeration completes the census of the City of Letang on that particular August day, 1927.

We greeted the fishermen, as among the principal inhabitants and as representing one of the three industries of the place—fishing mining and the tourist traffic. One was a small elderly man with the very shrunken cheeks often seen on the older people in this southern corner of New Brunswick, but his face was lit up by merry brown eyes, and he was talkative. His companion was perfectly silent. He was a youth, of the dark, almost effeminate beauty that is also characteristic of this country. He smiled an inscrutable smile while he deftly and unceasingly baited the hooks and coiled down the line, so that we never knew what thoughts lay behind those dark, heavily lashed eyes, or whether there were any thoughts at all. The old man talked, and baited his hooks equally fast and unceasingly. We asked about the fishing and the reply was pessimistic, after the fashion of the professional fisherman, as contrasted with the amateur. We broached the subject of borrowing a frying pan. At the suggestion of food his whole countenance brightened. He was hearty eater himself, he told us, and liked five meals a day, while he could do with six if time allowed. He had had three already to-day, that is between 4 A.M. and noon. He thought they would last him a bit longer. Not only did he lend us a frying-pan, but he gave us half a pailful of herring. We protested in vain that we had plenty of food with us and anyway the fish would feed two dozen, while there were only seven of us. He also told us how to find the way to the spring to fill our kettle. For hospitality, the existing city is to be preferred to the imaginary. It is difficult to suppose that strangers landing at a big sea-port would be presented with food by the first inhabitant they met, or even be able to borrow a frying-pan.

While the kettle was boiling and the herring were sizzling, there was time to consider whether any future development of the place was likely to be an improvement. At present, man's intrusion was no more than a pleasantly grotesque interlude in the solemn pageant of nature—funny without being vulgar. Any further human efforts could hardly avoid being vulgar and might not be funny. As it is, the hermit thrush still sings hidden in the fir trees ; the squirrels still frisk and chatter ; each spring the bunchberries spread their gay heraldry in the glades—stars argent on a field vert. At the fall of the year the birches and maples dress themselves in gold and scarlet before their long sleep. It is done now exactly as it was two thousand years ago, and as it will be two thousand years hence. God alone can tell that the bird which sings this year is not the same bird that Champlain first heard when he visited these coasts. Measured in mere years or bare centuries the process of nature is unvarying and steadfast. Only men and their works are perpetually changing and destroying. Suppose the trees cut down, bird and beast fled away, the flowers perished ; instead, wharves and warehouses and roaring streets. On the hills round about are the pleasant mansions of the successful rascals, down by the docks the hovels of the unsuccessful rascals ; in between some decent wood-frame houses for the likes of you and me. In spite of all the hurry to and fro and in spite of all the noise, in a thousand years, or two, or three, the houses will be gone along with the wharves and the ships. Birch and spruce spring up in the cracked concrete of the streets ; the original inhabitants creep back one by one ; till once again is performed the full annual ritual of the woods. If man is to be seen at all, it will be our friend the fisherman, baiting his lines by the beach and grumbling mildly at the smallness of his catch.

These thoughts filled me with agreeable sadness, and also with appetite. Dr. Johnson's immortal words seemed appropriate, though spoken on a different occasion—" Amid these melancholy scenes the prospect of dinner is very refreshing." Not only the thought but the fact. While we were thus engaged, the tourists were seen to return from their fishing. The first to land was a small boy who marched proudly along the jetty clasping to his bosom a large haddock almost half as long as himself. At the end of the jetty he turned round to see whether the others were following. The fish slipped through his arms and fell into the dust. The small boy burst into tears. Stooping down he tried to wipe

the fish clean with his hands and then wiped the hands on his clothes. This procedure must have transferred much matter of varied composition from fish to clothes before the rest of the party came up and persuaded him that there were other and better methods of dealing with the situation.

Before we went away, the third industry was to make itself conspicuous; for suddenly the two quarrymen began hallooing. A horse harnessed to a cart was grazing near by where they had been working, and one of them leaped on to the cart and drove off out of sight into the woods with shouts and jingling of harness. From this act and the shouting we realised that blasting operations were in progress. We all scattered to what each one supposed to be shelter and waited. Three shots were fired in succession and fragments of stone pattered through the branches and on the roof of the fisherman's hut. Then the man who had fired the shots hallooed cheerfully, the horse and cart came jingling back and we emerged from our hiding places. The quarrymen possessed also a Ford car of immemorial antiquity as part of their equipment. It was noticeable that it was left undefended to bear the full brunt of the explosions.

The fog, that had lifted for a time, enough for us to examine our surroundings, was beginning to thicken as we departed. Soon nothing was to be seen of Letang but the tilted end of the jetty leering at us in vague outline. Then great white clouds came rolling in from the Bay of Fundy, through the entrance between Pea Point and Chop Head, and blotted out the whole world. For a few minutes we might have been drifting through interstellar space so utterly detached were we. Then a few sounds reasserted themselves; the cry of gulls, the rustling of the tide through the stakes of a herring weir, and the familiar, though still unseen world gathered itself round us again.

کتب خانہ

جامعہ عثمانیہ

۱۔ اراکین مجلس اور مجلس انتظامی
جملہ شعبہ جات نصاب پنج کتابیں ایک ہفتہ تک اپنے پاس رکھ سکینگے
۲۔ اساتذہ جامعہ عثمانیہ و کلیہ جات لکھنؤ و گرینڈ جنڈ اران جامعہ
۱۰ کتابیں ۱۵ روز تک اپنے پاس رکھ سکینگے۔
۳۔ طلبا نین رجسٹر شدہ دو کتابیں بی اے اور انٹرمیڈیٹ
کے طلبہ تین کتابیں ایم۔ اے ال ال بی و تحقیقاتی جماعتوں کے
طلب پانچ کتابیں دو ہفتہ تک اپنے پاس رکھ سکینگے۔
۴۔ مدت مقررہ پر کتابیں واپس نہ ہوں تو طالب سے حساب
ایک آنہ یومیہ فی کتاب دیر لیا جائیگا۔
۵۔ بشرط وسعت کتابیں کرایہ داری کی جا سکینگی مگر اس غرض
کے لئے کتب خانہ میں کتاب کا لانا لازم ہے۔
۶۔ کتابیں گم یا خراب ہو جائیں تو مستعیر پر دہ داری
عائد ہوگی۔
۷۔ کتابوں پر کسی قسم کا نشان سیاہی پنسل سے
نہ لگایا جائے۔
۸۔ قلمی نسخے اور حوالے کی کتابیں
جاری نہ کی جا سکینگی۔