ible scientists are coming forward more and more (if not yet in the degree one would like to see) to condemn the immoral use of scientific knowledge. The atomic bomb forms an obvious example. Far too little was done, and the matter has now passed beyond anyone's control; yet who is to say what might not have occurred had proper guidance been given the scientists by those more expert in ethical matters? Oppenheimer[7] spoke for many others when he witnessed to a sense of sin at the realization of what he had helped to make. There are other grave questions coming up for decision: to name only two, there is the possibility of controlling, to a much greater degree than hitherto, other men's minds and wills; and there is the question of a forcible limitation of world population. I believe that scientists are going to speak out about the moral aspects of questions such as these, and I believe they will be listened to. Obviously those scientists who are Catholics, though only a small minority, may be able to play a considerable part by their personal influence in forming the consciences of their fellow workers: a great opportunity, and a correspondingly great responsibility. Here again theologians must co-operate by explaining clearly the moral principles involved—a work of collaboration which could well take place at conferences such as these. I am sure that in this way much can be done, for as I have tried to show, the soil is good, and only awaits the seed. For good or ill the future lies with science, and I trust that the Church will realize it.

7 Quoted Coulson, *op. cit.*, p. 48.

THE SCIENTIST'S APPROACH TO FAITH*

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THE scientist is first of all a person, set in the framework of family and society. The problems arising from his own make-up, and from the current social scene with its special stresses, will often bulk much larger in his life than anything concerned with science. However, there are some aspects of

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a scientist's life that mould his general approach to Christ, whether he is aware of them or not. The work of the physical scientist, for instance, is concerned with nature, regarded as a closed system—not with God, nor even with human persons as persons. He abstracts from the Cause of nature, and from human causes, and concentrates on the relations between natural facts. This, again, commits him to an interest in the *minutiae* of sense-knowledge which would not be in place in other studies. Philosophers indeed are interested in nature, as well as scientists, but from a different point of view; they ask different questions about nature. The kind of question asked in science, and the kind of explanation expected, determine the method of science and hence to a large extent the ethos of scientists, so it will be worth while to glance briefly at the general notion of explanation used in science. (Perhaps it should be said in parenthesis that I am dealing with science, not with technics—with the understanding of nature, not with its use or adaptation to human purposes.) In what sense is anything explained by the theory of evolution, or the law that light travels in straight lines, or Newton's theory of gravitation, or the generalizations of anthropologists, or the hypotheses of Freud or Jung?

I

An event is considered to be explained, in the scientific sense, if it can be shown to be an instance of a *law*. Thus an eclipse can be explained as an instance of the law that light travels in straight lines. Lightning is explained as an instance of the law that a spark will pass in air if the voltage is high enough. The parabolic flight of an arrow is explained as an instance of the laws of mechanics and of the pull of the earth. The improvement in farm crops and animals by selective breeding is explained in so far as it exemplifies the laws of genetics. And so on. These laws are generalizations, derived from observation, stating the connections that have been found in nature—the factors that are always found together. A spark is always observed when the voltage becomes great enough, and never otherwise; the spark and the high voltage are related by the law that states that they are always found together. Such laws can often themselves be explained, in the sense that they can be grouped together under a *theory*, of which they are special cases; the theory constitutes a principle from which various laws

can be deduced. For instance, the theory of gravitation, that bodies attract one another according to a certain formula, explains in this sense not only the parabola described by the arrow, and the movement of falling bodies, but also the orbit of the moon round the earth, the orbits of the planets round the sun, the paths of comets, and the tides. In science, then, events are 'explained' if they are instances of known laws, and laws are explained in so far as they are deducible from theories.

These explanations are not of the type that we expect in history, or in law cases, or in human affairs generally. For instance, if we seek to explain the course of the French Revolution, we expect an account not only of the economic and geographical factors concerned, but also of what people did, and what their purposes were —what Robespierre did, what Danton did, and what they were aiming at. We want an explanation in terms of agents, acting responsibly as causes of their own acts, for the sake of ends consciously desired and rationally aimed at. So also in a case in law; the accused person is *prima facie* taken to be a responsible being, the source or agent of his actions, which are assumed to have been rational and so to have had some motive. In human affairs, then, we seek explanations in terms of agents and ends; or, to use the philosophical terms, of efficient and final causes.

These explanations are not used in science. They do not, however, conflict with the explanations of science; indeed, we can often give explanations of both types for the same event. If someone falls in a parabolic curve through the air after jumping from a window, the event may be explained both in terms of a rational action designed to effect escape from a fire, or in terms of the same mechanical laws that explained the flight of an arrow. If a train goes too fast round a bend and topples over, the disaster may be explained scientifically in terms of an exact law which relates the maximum safe speed to the radius of the curve, and this law is in turn explained as a consequence of the general theory of mechanics; but the tribunal that investigates the disaster will seek also an explanation in terms of the human agent responsible for the excessive speed, and of his motive. Explanations of the two types are perfectly compatible, because they answer different questions.

We can see now that scientific explanations can never supersede explanations in terms of God as Creator, nor *vice versa*. Whatever

explanation can be offered in terms of scientific law, there remains the question why there should be any law, any order in nature, or indeed why nature exists at all; and this question is answered only by the explanation that God created nature. Conversely, the knowledge that God created nature and its laws does not tell us what those laws are, and to discover them we have to turn to science. For instance, the biological theory that the present living inhabitants of the earth are not of the same type as the original inhabitants, but have evolved from them, is not in conflict with the belief that all things are created by God (whose action lies outside time and is as effective now as at the beginning of the universe); nor does the belief in creation imply any particular belief about the detailed course of nature. Much confusion can be saved if the different types of explanation are clearly distinguished and each of them properly applied to the relevant questions.

The scientist who is not already a Christian, however, is liable to be so impressed with explanations of the scientific kind, internal to nature, that he forgets the need for any cause other than nature, upholding it. In the pre-scientific period, he will say, the movements of the heavenly bodies were supposed to be regulated by divine power; but natural science now offers an alternative explanation of the movements of the stars and planets, in terms of the equations of physics expressing the dynamical properties of matter. Again, the living inhabitants of the earth were supposed to be specially created; but science now offers an alternative explanation of the present types of living creature, in terms of the hypothesis of evolution. We have seen that the two types of explanation—theistic and scientific—are perfectly compatible. But for most men, a successful explanation is the whole explanation; it does not occur to them that a thing may need explanation from more than one point of view. Scientific explanations therefore crowd out theistic explanations, and are apt to be a stumbling-block in the way of a scientist coming to believe in God as creator.

This is perhaps especially true in the field of anthropology and comparative religion. Many scientists take it for granted that any idea of a universally true religion must be given up, because the comparative study of religions has shown that the beliefs and practices of primitive religion are relative to the whole mode of life of the community; hunters, for instance, nomads and agriculturists have different religions corresponding to their special

needs. This is the conclusion reached when one considers the data of religious life from the point of view of correlation—the scientific point of view, that of the scientific anthropologist. But this is not the only question: there remains the question of the *validity* of these beliefs. This is a question of a different kind, beyond the reach of the correlating methods of science and beyond the concern of the anthropologist as such.

Thus the training of the scientist in rational thought is two-edged in relation to religion. The scientist derives, without doubt, from the practice of science a certain discipline of mind, an exclusion of irrelevant emotion, a dislike of empty rhetoric, a readiness to tackle abstract questions, a determination to use the evidence, all the evidence and only the evidence. He learns indeed the primacy of truth, and the absolute need of integrity. He learns to expect an ever-developing understanding. But on the other hand he learns to attend only to a special type of evidence and to look only for a special type of explanation. He is liable to conclude that, since neither the existence of God nor the truth of religion can be verified by the methods of science, neither of them is to be believed. The metaphysical argument for the existence of God is apt to leave him cold; in some versions which appear to appeal to science, he is quick to detect fallacies; and the genuine versions he finds hard to follow, because they need an understanding of causality in a sense not used in science, at least in physical science. Talk of substances and accidents, too, he regards with distaste, because these are not categories used in physical science.

The assent to revelation is also in some ways foreign to the scientific frame of mind. Revelation is a kind of knowledge believed on grounds quite different from scientific grounds. We do not give evidence that directly supports a revealed truth; we believe it on the authority of a reliable and competent witness—on divine authority, that of the Church and ultimately of Christ. When, for instance, we believe that we shall live after death, it is not because we have any evidence bearing directly on the question, but because God tells us so, through Christ and the Church. In this appeal to the authority of a witness, there is some analogy with the method of the historian, who must always make use of the testimony of witnesses, after weighing their reliability; but there is very little relation with the method of science. It is true that scientists have to make use of one another's results, but they

do so as a matter of convenience, not because any one scientist has an insight denied to others; in principle, any scientific phenomenon is accessible to any investigator. A scientist is usually very critical in his own field. He does not believe much in authority, certainly not in self-abandon to the action of another; and though respect is accorded to the theories of the great, they are not regarded as sacrosanct. Again, the attitude of a scientist towards nature is not one of humble docility; it is one of active and energetic questioning, cross-examination, and even third degree; Francis Bacon referred to the experimental method as 'putting nature to the question', which in his day meant the rack. Thus in science authority and submission are out of place. It should be said that Professor Coulson has recently suggested an analogy between a certain receptiveness and passivity of a scientist waiting for the inspiration that enables him to formulate a theory, and the receptiveness of the believing Christian. This seems to characterize the great scientific advances of genius, such as those of a Newton or an Einstein; but it is an open question whether it is part of the experience of the general run of scientists. Yet authority is characteristic of revelation. The soul is feminine to God, as Father Gerald Vann puts it. In science and revelation, the methods of knowing are different and the psychological approaches are different. Science is critical, questioning, and hypothetical; faith is confident, serene and settled. To a man trained solely in science, this must appear as a stumbling-block in approaching the Faith. It is not a real difficulty; the solution is simply that both modes of knowledge are valid, that authority and submission are necessary for one but not for the other.

There is another peculiarity of revelation, concerned with the evidence for the authority of the Revealer, the evidence on which we make our act of faith. How do we recognize the revealing authority as divine? No doubt the answer can be put in different ways; the answer I shall try to summarize is that of Canon Masure, given in a short but admirable work called *La grande route apologetique* (Paris, Beauchesne; 1937). This solution is that faith is the understanding of divine signs: that we recognize divinity by interpretation of the relevant data as signs pointing to their divine source. Such signs are the life of the Church, miracles, prophecies, and the character and life of Christ as portrayed in the Gospels. (These are identical with the traditional 'motives of

credibility'.) Confronted with one of these signs, we treat it not as a bare datum, something to be just catalogued or noticed for itself alone, but as a pointer to something else—to the divinity of Christ or the divine origin of the Church. We recognize the divine character by interpreting the relevant signs. The words and deeds of Christ are signs of his divinity: he is lovable, he is courageous, he speaks with authority, he commands nature, he claims to be God. The marks of the Church—one, holy, Catholic, apostolic—are signs that it is of divine origin and is the channel of divine grace. The theme can be expanded indefinitely in an apologetic; but the point here is simply methodological, concerned with the kind of argument used. The argument is to point to certain data, with an invitation to treat them as signs and to interpret them.

This is not a kind of argument for which a scientist will readily find analogies in science. If he is asked to believe a scientific law, the evidence he expects to be given is a set of observations which are instances of that law. If he is asked to believe a theory, the evidence he expects is a valid deduction from that theory of various laws which he believes on observational evidence. As a matter of fact, interpretation of a kind is involved both in passing from observations to laws and from laws to theory; but it is interpretation of a kind that often escapes the scientist's notice, and is sufficiently different from that used in faith to make the arguments for a scientific belief and for revelation seem different in kind. A hypothetical scientist who knew only scientific method might, I suppose, remain for ever unconvinced.

The Catholic scientist has therefore to make sure that he does not close his ears to sign-language. For this the common school of Christians is the Liturgy and the Bible, with poetry as a powerful aid and propaedeutic. Historically, it is interesting that it was those thinkers of the seventeenth-century who were more affected by science—Bacon, Descartes, Hobbes and Locke—who began the attack on metaphor and imagery, with which Shakespeare and the metaphysical poets worked their magic, in what Mr Cruttwell has called 'the Shakespearean moment'; and it was part of the Royal Society's programme to curb such 'excesses' of language and bring it as near to mathematical plainness as possible; thus science, along with puritanism, was one of the influences that made things so difficult for poetry in the eighteenth century.

Two important points arise here: one concerning the conversion of scientists, the other the development of cradle Catholics who became scientists. The first is that the stage of the argument that consists in recognizing divine signs cannot be avoided. One cannot reach faith by scientific or philosophical arguments. The scientist on his way to faith must at some stage learn to read the signs. Apologetic is useful only in so far as it helps him to do this. Indeed, he may not even become convinced of the existence of God before he sees the sign of Christ and so reaches belief in God and in revelation at the same time. The second point is that the young intellectual Catholic who is keen to find out the fundamentals of his faith may experience a lot of trouble if these different kinds of arguments are not explained to him, and if it is not made clear that faith can be reached at a bound without philosophical proofs of the existence of God, the nature of the soul and so on. He is liable to take an over-intellectual approach, supposing that cast-iron philosophical proofs are the necessary foundations of faith for any honest man, necessary links in a chain which cannot be stronger than its weakest link. The danger then is that, being used to scientific argument, he will not find the philosophical arguments convincing, and will think that his faith is in danger. It is very important that young Catholics should know that faith is not blind trust, nor 'believing where one cannot prove', but is intellectually respectable, a special kind of argument with its characteristic evidence and methodology.

Faith, moreover, is in a Person; it is not just assent to a set of propositions. This too may be something of an obstacle. Scientists are liable to be unperceptive about persons, because their main work deals with nature, not with people; they may be unpractised in thinking about people, and indeed may have never reflected on what a person is and what confidence in a person means. For this the only cure is to lead a wider life: to take seriously one's family and community, and to keep in touch with the fields of literature that deal with people most directly—history, biography, novels, and the poetry of love, both human and divine.

Faith, then, seems to call for a balanced human person, not obsessed with any single mode of thought. The danger of over-specialization in science is not that anti-religious principles can be deduced from science; they cannot. It is that a man whose mind has hardened so that it can only think in the scientific way

becomes unable to appreciate other ways of thought—the way that sees the world as dependent on God, and the way that sees God through the signs given by our Lord. Charles Darwin is the classic example; he confessed that his mind had become a machine for grinding generalizations out of masses of data, and that music and poetry which he had formerly loved had become wearisome to him; so that apart from science he could be interested only in second-rate novels. Evidently the shutters were closed against the supernatural. Blake's couplet, 'May God us keep From single vision and Newton's sleep', expresses this restriction of interest; we need 'the four-fold vision', of which Dr Sherwood Taylor has written in his book of that name.

Because of the different modes of thought and practical attitudes that a complete person needs, there are sure to be tensions in the life of a Catholic scientist, and these may be painfully felt by a scientist seeking faith. There is a tension between accepting authority in one sphere while insisting on direct evidence in another—even though each procedure is appropriate in its own field. There is a tension between relying on one's own activity and initiative in one way, and submitting to the action of God in another. And there is a tension between the desire for clarity in science and the necessity of mystery in religion, even though mysteries become luminous with meditation. But tension and polarity are to be expected, because they are essential to life, inasmuch as life has different aspects that have to be harmonized. Other tensions are equally essential—between action and contemplation, thought and sensation, convention and spontaneity. These tensions are not strains; they are perfectly healthy, like that of a muscle in the poised hand of an artist. They imply an equilibrium of forces—a balance of interests, a poised ability to use the mind in the appropriate way for a given problem, to put on the right thinking-cap. If one line of thought masters the rest and excludes them—if the mind drives steadily down the ruts of a single familiar track—the personality suffers. The scientist's fundamental danger, like the danger of other brain-workers, is obsession with one mode of thought. The solution lies outside science; it is to use the Scriptures, the liturgy and mental prayer; to keep the imagination sweet; and to keep in touch with the common life of mankind, in which the great realities of birth, growing up, love and death become part of one's being.