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Modern Science and the Dehumanization of Man

by

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The denial that man possesses a capacity for metaphysical or spiritual knowledge typifies much of what passes for philosophy in our times. Yet it is no new phenomenon. To go no further and, as we shall see, one can go considerably further—it is already fully explicit in the thought of empirico-rationalist philosophers like Sir William Hamilton in the first half of the nineteenth century. Hamilton taught that all metaphysics must be rejected as illegitimate because through its very structure the human mind can know only what belongs to the physical and finite world of time and space. Human knowledge can refer only to this world. It must be empirical. It cannot be metaphysical. Even if there are realities of an order that transcends the world of time and space, the human mind cannot know or experience them because it cannot reach beyond the world of time and space. Man has no faculty or organ of intelligence by means of which he can perceive the realities of such an order. Since Hamilton expounded it, this kind of argument has become commonplace. It forms the basis of what is known as scientific or rationalist humanism. What is not so often emphasized or even pointed out is that the type of outlook—of epistemological outlook—which it expresses not only contradicts the claims of the religious intelligence to the effect that metaphysical realities both exist and can be apprehended. It also directly fosters the dehumanization of man and of the forms of the society which he builds in its image. I will attempt to clarify.

By the time Hamilton was writing in the first half of the nineteenth century our society was already well enmeshed in that process by means of which the strenuous activity of hard-headed industrialists and bankers, possessed by a single-minded devotion to making money and to extending their power through the production and use of complicated machines and other devices, was turning England's green and pleasant land into the black country of Charles Dickens. These men were crude, unbred, self-assertive people, pushers to the top, greedy and ambitious, excellent speculators and organizers, wizards of the factory and of the counting-house, with little or no time or patience for normal human needs or such old-fashioned pursuits as the chase, idleness, or the bed. Their great achievement in the nineteenth century was to standardize the factory slum as the normal type of urban dwelling and to extend the area of human and natural desolation at a rate never before reached. There is no need to dwell on the consequences of their success—on the mile after mile of workers' dwellings placed back to back

where people dragged out their existence in conditions of foulness and filth never known in the serf's cottage of the Middle Ages; on the deprivation of the most elementary facilities of sunlight and fresh air, and the cutting of all links between the city and country surrounding it; on the systematic defacement of the countryside itself, the spread of disease, the spread of noise, the cultivation of a taste for ugliness of the most vulgar kind, the wholesale disparagement of life's most basic needs. We who live in the throes of what we call the ecological crisis—which is primarily a crisis about man and not about his environment—are only too familiar with these consequences; and in any case to lament this growing contamination has been a persistent and seemingly ineffective pursuit at least since the time of the Romantic poets. All that need be said here is that as a result of the activity of these people and of their twentieth-century successors a new type of world has come into existence, the world of the modern urban industrial state.

In this world—the world of the artificial environment, of the sophisticated manipulation of machines and techniques—the human element is gradually being eliminated. What this world represents is a new type of order, a new inorganic order, one not created by God but invented by man—one that is, in fact, precisely an externalization of man's desire to make his own world without God. Briefly, one can say that in terms of western civilization what this new order has replaced is the type of society of the mediaeval world. The society of the mediaeval world was an organic integrated society. It was a kind of sacred order established by God in which everything, not only man and man's artifacts, but every living form of plant, bird, or animal, the sun, moon, and stars, the waters and the mountains, were seen as signs of things sacred (*signa rei sacrae*), expressions of a divine cosmology, symbols linking the visible and the invisible, earth and heaven. It was a society dedicated to ends which were ultimately supra-terrestrial and non-temporal, beyond the limits of this world. Indeed, a great deal of effort in the mediaeval world went into preserving and fostering and nourishing the sense of realities which we now call supernatural. Throughout the length and breadth of this world, visible images of these realities were set up and venerated, in icons, crosses, churches, shrines, in the collective ritual. They were the endless pursuit of monasteries, as of the saints and holy men who moved among the populace as naturally as birds among the leaves. Even when these saints and holy men retreated into solitude, everyone living in the world was aware that the woods and hills, the wildernesses and caves surrounding his home were peopled with these men ready to give counsel and benediction. The highest type of activity in the mediaeval world had nothing to do with what is practical or productive or efficient as we understand these terms. The highest type of activity was that of contemplation; and although the summits of this contemplative activity may have been reached by but a few, yet the realities among which these few lived were an undisputed and central fact of common awareness. At the same time, this awareness did not eclipse man's sense of his status as a creature of earth, shaped out of the earth and returning to it, his whole inner being nourished and enriched by his organic contact with nature and with the breath of the Spirit that had fashioned him as nature's masterwork. The mediaeval world also of course had its injustices and cruelties, its deprivations and ugliness, its suffering and sickness. It is not a question of idealizing

this world, still less of proposing a return to it. It is one simply of indicating its overriding spiritual orientation and pursuits.

It is this type of world along with its overriding orientation and pursuits which we have destroyed. Our society is man-made, not a divine order. It is one in fact which represents a projection of the human mind that has cut its links with the divine and with the earth; and in so far as it has any ideals these are purely temporal and finite and concern only the terrestrial welfare of its members. A Dr. Caird, later to be Master of Balliol, writing in the 80s of the last century [i.e., the 1880s], depicts, in a language well suited to them, the situation and attitude of mind that characterize our world as compared with the mediaeval world which it has replaced. "It is the peculiar strength of modern times," wrote Dr. Caird, "that it has reached a clear perception of the finite world as finite; that in science it is positive, i.e. that it takes particular facts for no more than they are; and that in practice it is unembarrassed by superstition, i.e. by the tendency to treat things and persons as mysteriously sacred. The first immediate awe and reverence which arose out of a confusion of the absolute and universal with the relative and particular, or, in simpler language, of the divine and the human, the ideal and the real, has passed away from the world."[1]

It could hardly have been expressed more succinctly, or more crushingly. And it is of this type of mentality that our modern technological world is the social embodiment. Modern technology is this conception harnessed and put to work for us. It is this which has licensed the technical mind to desecrate the whole social context, the entire planet, and to send out squads of scientific-technical experts to chart, dissect, ransack, and ravage dispassionately, on the basis of empirical evidence and experiment, and if possible by the intervention of mathematics or other specialist methodology, the total fabric of human and cosmic life—outer space and inner conflict, art and history, public opinion and private guilt, education and health—one has only to look at the hundreds of magazines and journals in the science departments of universities and polytechnics to get an idea of the vast proliferation of this specialized interference and scrutiny. Everything is drawn into this vortex of specialization and submitted to its processes. Nothing is sacrosanct. Nothing belongs any longer to the sphere of the gods or to the sphere of the supernatural. There is nothing and nowhere which must not be investigated and if possible exploited. Neither the ocean bed nor the stars can escape. Nor—so long as they can be shown to be efficient in the sense of being the best and most effective means for achieving a certain measurable purpose—can these systematic invasions be stopped or repudiated. If efficient technical means for achieving something exists or can be produced, then these means must be put into action irrespective of what this thing is or of what the cost may be in human terms. Even those who were at first the victims of these processes—the industrial proletariat—have been seduced by their glamour and regard them as the magical talisman which will bring them all they

[1] E. Caird, *Hegel* (Edinburgh and London, 1883), p. 112.

need in life. As for the élite of our technocracy—those who manipulate its inexhaustible gadgetry of machines, devices, techniques, the computers and cybernated systems, the simulation and gaming processes, the market and motivational research, the immense codifications necessary to sustain and enlarge their empire of sterilized artificiality—their prestige is virtually unassailable because on them the whole edifice depends for its survival and prosperity. Moreover, if they are readers of Teilhard de Chardin they can add ideological grist to their pragmatic mill, for he will have taught them that it is through the consolidation of the "noosphere," that level of existence permanently dominated by the mind of man and its planning, that our species will execute its God-given task and fulfill its destiny.

There is, however, a price to be paid for fabricating around us a society which is as artificial and as mechanized as our own, and this is that we can exist in it only on condition that we adapt ourselves to it. This is our punishment. The social form which we have adopted cuts our consciousness to fit its needs, its imperatives tailor our experience. The inorganic technological world that we have invented lays hold on our interior being and seeks to reduce that to a blind inorganic mechanical thing. It seeks to eliminate whole emotional areas of our life, demanding that we be a new type of being, a type that is not human as this has been understood in both the religious and the humanist ages—one that has no heart, no affections, no spontaneity, and is as impersonal as the metals and processes of calculation in which it is involved. And it is not only our emotional world that is deadened. The world of our creative imagination and intelligence is also impoverished. The most average characterless type of mind is quite sufficient to master and apply the various skills, scientific and other, needed to run our society. At the same time, the objects which we now make or manufacture require little or no imaginative effort on our part; they are all the result of rational planning and design, of technical skill and efficiency, and we produce them—are forced to produce them—with the least possible personal struggle or commitment, entering into and becoming through producing them part of their objective, impersonal, and pitiless nature. For these products—machines, commodities, organizations, programs—are themselves totally lacking any imaginative quality: they mirror nothing which is not material, they are symbols of nothing, they are entirely consumed by their own lifeless and inorganic indifference; and man who must spend his days among them is reduced to a similar state.

Indeed, what goes by the name of work for the vast majority of the members of our society rots the very soul and body. It is work which takes no account whatsoever of the personal qualities of the individuals engaged in it; it has no direct connection with what a particular person really is or with that by virtue of which he is himself and not someone else; it is purely external to him and he can change it—if there is anything available—for an alternative which is equally impersonal and exterior. In relation to our work, the vast majority of us in our society are equivalent to mere "units" or objects or commodities, interchangeable, and are condemned for all our working lives to purely mechanical activities in which nothing properly human exists and

whose performance is not in any way consistent with our inner and personal aptitudes and identities. When it is remembered that if an individual does not fulfill the function for which he is destined by nature and which is his vocation, but is forced to perform some other function not essentially connected with him, then he will produce in himself a dislocation and disharmony which affects the whole society to which he belongs, something of the sickness of our state may be grasped. For in our society, this is not the exception; it is the rule; and in these circumstances the dislocation affects not merely society, but the whole cosmic realm itself. It is superfluous to stress that this cosmic disorder, reflecting the radical dehumanization of our society, and incurable apart from a total re-personalization of the conditions of work in our society, is already well advanced. As the conditions of work in our society cannot be re-personalized or re-humanized without a dismantling of the whole present scientific industrial structure, we have something of the measure of the task that lies ahead.

The dismantling of the present scientific industrial structure, even if it can be envisaged, involves of course a great deal more than the mere destruction of its external features, and it will not be achieved either simply by a return to nature or by the cultivation of one's own garden. One of the things we have to recognize—are being forced to recognize—is that the form of society we build around us is the mirror of our own inner world; it is the extraversion of our inner world. In it the state of our consciousness and our attitude to the fundamental realities of human existence take shape and are given an external form. A society can be an image of integration and beauty and significance. It can also be an image of disintegration and ugliness and fatuity. Which it is will depend on ourselves. If we have fabricated a society whose forms now dehumanize us, this is because prior to such a fabrication on the external plane we have already given assent to thought-forms which deny and cripple the growth of our humanity. Correspondingly, if we are to remake our society in the image of an integrated humanity, we must first be clear in our minds what it means to be human. The first step in the task before us is one of clarification. And a preliminary aspect of it consists in conducting a kind of inquest or post-mortem examination or autopsy to discover what has gone wrong, what has happened in the sphere of our consciousness that has made us construct around ourselves the frightful dereliction in which most of us are now compelled to live. We must trace something of the stages through which the mental and material ground has been prepared for the emergence and growth of our fractured, inhuman society.

I said that our type of society, which has replaced that of the mediaeval world, is one whose ideals, if they can be called that, are purely temporal and finite and concern but the material welfare of its members. The form it is thought that this society should take is not the consequence of any supernatural revelation, but is simply the result of empirical and inductive methods of reasoning based primarily upon the observation of individual needs and characteristics. These needs and characteristics are regarded as ultimately mortal: the ends of life are seen as contained within its mortal span and as measurable in terms of the purely temporal

and finite standards of this world. By the end of the eighteenth century the change in outlook between mediaeval times and modern times was virtually consummated: for all practical purposes this world was by now regarded as the only reality, the be all and end all, the one place where, as Wordsworth put it, man can find his happiness if he is ever to find it. There was a feeling of optimism in the air, a sense of moving forward into the future under the aegis of a new divinity, the Reason, which by now was extending its empire over the whole western consciousness. Man was naturally good. The world was a good place to live in. It could be a much better place if only its natural resources and man's ability to put them to his use could be exploited more fully and efficiently. And this could be done if you knew how to do it. It could be done if you could develop techniques, the technical means.

Here I would like to make a digression to dispel a common misunderstanding. It is often said that the mediaeval world also had its techniques and that these were not developed because no one knew how to develop them. It is not quite so simple as this. It is true that the mediaeval world had its techniques. But these techniques deliberately were not employed or developed beyond a certain point—the point at which they would begin to impede or prevent what was far more important: the realization of an over-riding imaginative view of life. Here the primary concern was religious, not technical, and technical processes that upset the over-riding conceptions of harmony and beauty and balance were, quite simply, rejected. This may seem strange to us today. We have become so used to the technical mastery of the West that we often go so far as to characterize the western mentality in general as active and practical, and to contrast it with the contemplative spirit of the East. In fact we go even further and see a direct lineal connection between the spirit of Christianity with its emphasis on the Incarnation and hence, it is supposed, on the reality of matter, and the emergence of the modern scientific mentality and its concomitants, the exploration and exploitation of nature; and we contrast this materializing spirit of Christianity with the more transcendentally-minded spirit of Hinduism or Buddhism or even of Islam, for which matter tends to be regarded as a kind of illusion, lacking all subsistent reality.

This view is of course a gross over-simplification and in many ways is the reverse of the truth. Until the modern age, it was the East which had the concrete "experimental" mind, not the West, and it was the East and not the West which possessed the mastery of techniques and technical processes, whether these had material or magical purposes, or purposes directly connected with the realization of the spiritual life. The idea of "method," whether applied to material or spiritual techniques, is above all an Eastern idea. It was from the East that ancient Greece, in the years of her decline from the second century onwards, borrowed her various technical devices: before this, although possessing considerable scientific knowledge—including, moreover, a knowledge of machines and their utilization—there had been persistent refusal to deduce or exploit the possible technical consequences. The Roman spirit, it may be said, was different from that of the Greeks, and sought to take advantage of concrete situations

by the most effective practical means available but even here the main technical processes—the refining of gold and silver, glass-making, the tempering of weapons, pottery, ship construction, and so on—were of Eastern origin.[2]

This lack of technical concern in the West or, rather, this refusal to admit technical exploitation except in a very limited sphere, was emphasized, not undermined, by the spirit of Christianity. The period from the second century A.D. to the fifth century A.D. which saw the rise of Christianity, and which in Buddhist India was marked by astonishing developments in the artistic, political, and military fields, was marked in the West by a technical decline so great that the Emperor Julian the Apostate could accuse the Christians of ruining the Empire's industry. One of the architects of St. Sophia at Constantinople was quite capable of making a steam-engine (some one thousand two hundred years before James Watt "invented" it), but he used his skill only to make the house he was living in shake as though there was an earthquake in order to get rid of an unpleasant neighbor living on the top floor. Except indeed for architecture—and nearly all large-scale architecture had a religious motive—the West in the mediaeval Christian period demonstrated a singular lack of technical will or mentality; and when in the twelfth century there was some renewal of technical interest this again was stimulated through contact with the East—through Jews, the Crusaders, Venetian and Genoese merchants, and through translation from the Arabic. The West has developed technically in direct relationship to the decline of the Christian consciousness, for the simple reason that the "secularization" of nature, which permits it to be regarded as an object and so exploited technically, is in direct contradiction to the sacramental spirit of Christianity, wherever and whenever this is properly understood, as it was at least to some extent in the mediaeval world. Yet even after the breakdown of Christian authority in the West, technical development was slow: it was not until the eighteenth and nineteenth centuries that people began to think on any effective scale that the utilization of machines and gadgets in order to produce concrete results of a quantitative nature was a preoccupation not beneath the dignity of man. And they began to think this because they had accepted as true a philosophy which proclaimed that basically man was a two-legged terrestrial animal whose destiny and needs could best be fulfilled through the pursuit of social, political, and economic self-interest and the provision of an ever-increasing number and variety of material goods.

Hence the call to a type of human being whose role was to be regarded with increasing respect. I refer to the scientist. For the world's resources, natural and other, could not be exploited significantly unless there was a great development in the means of exploitation. So, perhaps for the first time in history, scientists—and especially scientists who would apply their knowledge—were to move into the center of the social and economic scene. By applying their expertise to achieve positive concrete results, by raising the level of man's material well-being through the exploitation of the world's natural resources, they would be in the forward van of

[2] See Jacques Ellul, *The Technological Society* (New York, 1964), pp. 27ff.

humanity's march of progress towards a better and happier future. Scientists began to take the place of priests, initiating not of course into the kingdom of heaven but into the brave new world of more consumer goods and limitless economic growth. It was by courtesy of the scientists that the industrialists and bankers of the nineteenth century bulldozed their way to fortune and produced the devastation of the modern industrial world.

It is in a sense quite just that scientists should have been given and should have retained this exalted status in our society because it has been largely through their efforts that the worldview underpinning this society and man's place in it has been promoted, propagated, and maintained as the dominant view down to the present day. Here of course Francis Bacon is a key figure, for it was Bacon who laid down the guidelines, moral, aesthetic, and psychic, for the "new philosophy." When Bacon concluded that his *novum organum* should apply "not only to natural but to all sciences" (including ethics and politics) and that it is to "embrace everything," he opened the road for the all-inclusive scientific takeover of our culture and for the urban industrialism which is its brainchild. In Bacon's program is to be found a prescription for the total scientivization of our world, from the practices of the laboratory, often themselves of an indescribable cruelty, down to those, no less sinister, of the modern police state. But if Bacon is the presiding genius, the *buccinator* of this take-over, it was others—Galileo, Descartes, Newton—who perfected that mechanistic vision in accordance with which our modern world has been built. It was they who marked the advent of a new conceptual universe, who formulated the purely quantitative attitude to nature which first appears in Galileo's new approach to terrestrial mechanics and who fostered the illusion that knowledge of the world could be obtained through the application of mathematical techniques—indeed, that what could not be caught in the net of numbers was non-science, non-knowledge, and even in the end non-existent.

It was not Galileo, however, but Descartes who formulated most decisively the philosophical principles of the new science, its dream of reducing knowledge to mathematics, and of the new mathematical cosmology. Breaking the last tenuous links between God and the world He has created, Descartes virtually exiles God from the world—or, rather, exiles the world from God. For Descartes, God is no longer symbolized by the things He has created; his thought does not leave room even for the scholastic idea of analogy between God and the world: there are no *imagines* or *vestigia Dei in mundo*—except what Descartes calls the soul and which he identifies purely and simply with the human reason and the sparse complement of clear and distinct ideas with which God has endowed it. The Cartesian world is but a strictly uniform mathematical world, a world of geometry in which there is nothing else but extension and motion; and if God had any reasons for creating it, these are known only to Himself and we have not and cannot have the slightest idea of them or of any other divine or teleological realities, for the simple reason that, according to Descartes, we possess no faculty through which we are capable of apprehending them. This of course meant the expulsion from scientific thought of all considerations based on value, perfection, harmony, meaning, beauty, purpose, for these

considerations are now regarded as merely subjective and so as irrelevant to a scientific understanding of the real "objective" world—the world of quantity, of reified geometry, of a nature that is dead, alien, and purely functional. With the Newtonian mechanistic synthesis, this new attitude is virtually achieved. The world-picture, with man in it, is flattened and neutralized, stripped of all sacred or spiritual qualities, of all hierarchical differentiation, and spread out before the human observer like a blank chart on which nothing can be registered except what is capable of being measured. For Newton, the celestial spheres are a machine; for Descartes, animals are machines; for Hobbes, society is a machine; for La Mettrie, the human body is a machine; eventually for Pavlov and his successors human behavior is like that of a machine. Everything, including the mind of man, is aligned on the model of a machine constructed out of dissections, analyses, and calculations. And a worldview founded on the model of a machine brings after it a mechanistic world. The machines of the dark satanic mills of our urban industrial society are eloquent reflections of the philosophy of Descartes and his peers and successors; and the mentality (also satanic) that degrades men and women to work with such machines is one which is the necessary and logical consequence of this philosophy.

At this point I would like to forestall a possible criticism. It might be said that the mechanistic worldview of Newtonian physics has long since been discarded by scientists themselves, relegated to that rubbish-dump of exploded theories which constitutes the history of modern science. The quantum and relativity theories proposed at the turn of the twentieth century might be cited in support of this, cited in support of the claim that the scientific worldview has radically changed. In addition, it could be pointed out that philosophers of science like Ernst Mach or Henri Poincaré—to mention but two of the more intelligent positivists—have shown that the theories and explanatory concepts of science are no more than convenient intellectual tools by means of which scientists handle their data and reduce it to comparative order, and that they should be valued for their utility and convenience only and not as statements of truth about reality. Mach certainly, and Poincaré probably, would go on to say that there are no ultimate truths about reality in any case, although those of science are as near as any we are likely to get. And more recently, other philosophers of science such as Michael Polanyi have spoken of how impossible it is for the scientist not to be influenced by purely subjective factors such as what he expects to see, what other people have persuaded him he should see, and so on—factors which mean that measurements of temporal and spatial intervals are not just given to the mind but are given to a particular mind deeply and inextricably involved with its own subjective personal prejudices and requirements.

In short, it could be argued that scientists themselves now admit that the best of their theories are but hypotheses, and that these, far from being reached inductively on the basis of objective data, as the old-fashioned empiricist would have it, are for the most part simply postulated as the most probable explanation or interpretation of certain data in accordance with a specific model which the scientist in question happens to have accepted. Thus, Le Verrier

postulated by purely mathematical means the then unknown planet Venus, or more recently Watson and Crick proceeded in a similar manner when developing their theory of the genetic code. All this, it might be concluded, means that the old closed, rigid, cast-iron mechanistic picture of the universe, in which man was seen as a mere cog in a vast cosmic machine, has now gone forever, and that science, the new science, is open, flexible, indefinite, and much more aware of its limitations than was previously the case. Indeed, it is even thought, both by some scientists and by some theologians, that it might now be possible to reconcile science and religion in a new religio-scientific conception of things.

Some of this is no doubt true, just as it is no doubt true that many scientists, aware of the crushing inhumanity of their discipline, are desperately looking for something which would appear to allow the human and even the religious element to be affirmed within it. For a whole range of phenomena in atomic physics and astronomy the old machine model is inadequate and scientists working in these areas are forced to revise their observational methods, to invent new and more flexible models, and to develop more subtle mathematical procedures for construing their experimental data. But, first, though these modifications have taken place in relation to these areas, nonetheless the old physics is still to all intents and purposes the physics of an equally wide range of phenomena, of all those phenomena which belong to what might be called our local environment, of ordinary space and ordinary time. Where the so-called life sciences are concerned, scientific thought is in fact more crudely mechanistic than ever. In biology, the cell is a "chemical factory," ribosomes are directed by a "programming machine," RNA is like "a worker in a multi-copying industry who duplicates the program of an automatic machine on the keyboard of a key punch," and so on. "In science," as Joseph Needham puts it, "a man is a machine, or if he is not, then he is nothing,"[3] and as if to confirm his words, and to illustrate what I have already said to the effect that the type of mind needed for science can be the most average and characterless from the point of view of normal human intelligence, Francis Crick, the Nobel prize-winner, discoverer of the bihelical structure of DNA, can write: "I myself, like many scientists, believe that the soul is imaginary and that what we call our mind is simply a way of talking about the function of our brains"; and can add: "once one has become adjusted to the idea that we are here because we have evolved from simple chemical compounds by a process of natural selection, it is remarkable how many of the problems of the modern world take on a completely new light."[4]

The real reason, however, invalidating the claim that the modern scientific outlook is fundamentally different from that of Galileo and Descartes and Newton and so is more

[3] Joseph Needham, *Man a Machine* (London, 1927), p. 93. Cited at p. 184 of Theodore Roszak, *Where the Wasteland Ends* (London, 1973), a book to which I am here indebted.

[4] Francis Crick, *Of Molecules and Men* (University of Washington Press), pp. 87, 93. Cited by Roszak, *Where the Wasteland Ends*, p. 188.

susceptible to humanization goes much deeper than this continuing adherence to the machine metaphor. Scientists may well dispense with this metaphor and adopt some other in its place. That is not fundamentally very significant. But what they cannot do, without admitting their total bankruptcy and irrelevance, is to dispense with the assumptions on which modern science itself is based. And by assumptions I mean epistemological assumptions. Modern scientists may protest that their theories are mere hypotheses, more or less useful and convenient. They may admit that the old empiricist epistemology—according to which knowledge can be obtained only by observation—was inadequate and even false, and that into any act of observation or any formulation of theory enter factors—hereditary, cultural, subjective—which the scientist cannot specify and of which indeed he may be largely unaware. But—at least not without making nonsense of their work—they cannot reject the very premises of scientific thought itself. And these premises, these underlying assumptions, are the same today as they were for the scientists of the seventeenth century. And the reason why scientists, however much they may wish to, cannot humanize science is because inhumanity is built into these very premises on which modern science itself is based.

It is here that we approach the crux of the matter, or what might be called the question of questions for our generation. It may seem presumptuous to try to reduce the premises of what is called scientific knowledge to a few sentences. But I think it can be done. Basically, scientific theories, or hypotheses, or explanations—what in common ill-formed language are still called scientific truths—are statements which either can be verified with reference to empirical evidence or experiment or at least cannot be shown to be false with reference to such evidence or experiment. In other words, scientific knowledge presupposes two terms or poles. The first is the faculty capable of formulating scientific statements; and the second is an "objective" world of phenomena that supplies the raw material of evidence and experiment against which these statements can be directly or indirectly checked. This is not to say that these two terms are symmetrical or of equal importance. It is only to say that they are posited as the prerequisites of scientific knowledge. Without either, there could be no knowledge as modern science understands the word. In fact, it is quite clear that the two terms are not symmetrical or of equal importance. It is the first—what I have called the faculty capable of formulating scientific statements—which is decisive. It is decisive not only because it is the formulating agent but also because it is the faculty which observes and which provides the criteria determining what is observed, as well as of the relevance or irrelevance, the compatibility or incompatibility, of the information it amasses as a result of its observation. Indeed, it is this faculty alone which is the supreme arbiter of scientific knowledge. It is therefore crucial, if one is to assess the value of this knowledge, to know what this faculty itself is, and how it works; for what it is and the laws that govern its structure will determine the whole character of its formulations.

Here I might revert to the opening paragraph of this paper. For the faculty by which modern science is so exclusively determined is precisely that which philosophers who deny man's

capacity for metaphysical or spiritual knowledge assert to be the sole faculty of knowing that man possesses. It is the faculty of the reason. The question before us therefore is one of examining and determining the characteristics and limitations of the reason; for the one thing scientists cannot do, if they are to claim that their knowledge amounts to anything at all, is to say that it is not a rational knowledge. Again it may appear presumptuous to try to describe the characteristics of the reason in a few sentences. But again I think it can be done.

The reason is that faculty which is capable of dissecting, analyzing, and classifying material which is given to it and of forming conceptions by means of analytical or analogical logic, measurement, and mechanical connection. This is to say that the scope of the reason is limited to the material it receives and to the conceptions which refer to this material without necessarily arising directly from it. The reason knows this material only according to how it appears to it and not as it is in itself, and similarly it knows the conceptions only as logical possibilities and not as realities in themselves. As for this material—the data with which the reason operates—this it derives from a source outside itself. It could—granted that this is a possibility—receive this material from "above," through direct illumination from God or through supernatural revelation; or it can receive it from "below," through sense-impressions of the phenomenal world. In either case, it is this material which constitutes the "facts" with which the reason works. But if it closes itself to receiving these facts from above—from God or through supernatural revelation—either because it denies the possibility of receiving them from this source or because it has not the capacity so to receive them, then it will be compelled to derive them exclusively from below, from the phenomenal world. In this case its conceptions will refer to the finite and temporal world alone, to the world of change and impermanence. It is this world which will then constitute what it calls reality—which will then be for it the real world.

Moreover, in interrogating this world—in interrogating the "facts of nature"—what the reason perceives will be only that which its own limitations allow it to perceive, and what it receives by way of information will be only, so to speak, echoes of its own voice. Indeed, the conceptions it formulates as it analyzes and classifies sense-impressions according to its criteria and according to its inherent mode of operation will represent nothing more than a display of ventriloquism in which the so-called external world is the dummy. The reason is not, and cannot be, a neutral element on to which objects can project themselves in such a way that they reveal their own intrinsic nature. Rather it is the opposite which is the case: that the reason imposes its inherent nature on the objects which it observes. This is to say that, when the reason turns exclusively to the phenomenal world for its information, not only do its conceptions refer solely to the finite and temporal world, but also they refer merely to those aspects of it that are susceptible to measurement and mechanical connection. Any aspects of it not susceptible to measurement and mechanical connection must in the nature of things transcend the limits of what the reason can observe and so cannot form any part of the knowledge which it formulates. In addition to this, as its raw material must now be derived from a world of change and

impermanence, the knowledge it formulates cannot itself be other than changing and impermanent, and consequently it will be led to deny the validity of all knowledge that is other than changing and impermanent—that is stable and eternal. In the end it is compelled either into a position of pure relativism, to a position of saying that every opinion is equally false or equally true; or—in order to escape from this relativism—to establish some official authoritative body to prescribe what is to be maintained and what is to be denied, what is allowed to be thought and what is to be rejected as in conflict with the authorized official version of things. It is no accident that among the most cherished of the present theories of modern science one is that of evolution, another is that of relativity, and a third is that of indeterminacy—although all three will sooner or later be jettisoned on to that rubbish dump of discarded theories which, as I said, constitutes the history of modern science; for all modern scientific theories are in the end not the product of empirical observation and experiment but the inevitable logical consequence of the premises on which modern scientific thought itself is based; and, these premises being what they are, the supercession of these theories is as inevitable as their original appearance. It is no accident either that the age of modern science is the age *par excellence* of the totalitarian ideological state.

For modern science has its starting-point in a revolution in consciousness, or revolt against heaven, that has resulted in the reason first ignoring, then denying, and finally closing itself to the source of knowledge which is above it; and this has meant that it has been forced to turn for its knowledge exclusively to that which is below it—to the "external" world of sense-data and sense-impression. As a consequence, the conceptions of modern science—that which constitutes its knowledge—are of the type whose features I have just described. They refer, that is to say, only to what is temporal and finite and they reflect merely the logical and mechanical criteria and characteristics of the innate structure of the reason. As I have remarked, the reason is not a neutral element on which an object can imprint its identity and so reveal its essential or inherent nature. When you take a photograph of a person, certain inherent qualities of that person are eliminated from the photograph by the very nature of the material on which the image is projected. To go no further, a photograph of a person eliminates the actual physical warmth of that person, or the softness of his skin, not to mention all his mental and emotional qualities. In other words, the material of the film interposes itself between the person photographed and the living reality of that person; and the kind of knowledge you can form from a photograph of a person will be purely abstract and have little value when compared with a direct knowledge of the living reality of that person—that reality which is precisely what the photograph has excluded.

A similar process takes place when the reason turns exclusively to the facts of the so-called external world for its information: it is compelled to eliminate from its perception of those facts the qualities of which, because of its inherent nature, it is incapable of receiving the imprint. This is to say that it cannot avoid imposing its own laws on the material it perceives. In fact, these laws act as a selector conditioning what it perceives and what it does not and cannot perceive. In

other words, the reason cannot avoid interposing itself between us and the objects it purports to examine. Nor is the situation altered by the addition of instruments between the reason and these objects: however sophisticated and sensitive the instrument, the information it conveys cannot transcend or escape the inherent limitations of the actual observing faculty itself, which in this case is the reason. In other words, the kind of knowledge the reason is now capable of forming on the basis of its observation—what we call scientific knowledge—is but a reflection of the intrinsic limitations and characteristics of the reason itself and of the presuppositions it has adopted, and has little or nothing to do with what things are in themselves, in their living reality. Indeed, all the reason can now do is to shut man up in himself and fetter him to his own prejudices and opinions and condemn him to rest satisfied with what at best are but the external appearances of things. What things are in themselves, in their living reality, is something the reason can never know. It is something consequently that modern science can never know.

Modern science, since it is based on and limited to the sphere of the rational, can never reach a knowledge of anything in itself, no matter how much it concerns itself with experiment and observation or how far it carries its function of dissection and analysis. This is the situation to which modern science has condemned itself and in which it continues to be inextricably trapped. And it is because those qualities which essentially make a human being what he or she is are neither temporal nor finite, or such that can be measured or analyzed by the reason, that it may be said that an inhumanity is built into the very premises on which modern science itself is based. In other words, to reduce man to the level of what the reason can perceive or understand about him is to dehumanize him. When further it is remembered that the qualities which essentially make every single living thing what it is similarly transcend the sphere of the rational, one begins to get a measure of the terrifying mutilation which the scientific worldview represents. I am not denying or denigrating the legitimate function of the reason or saying that there cannot be a science of phenomena. Far from it. But when the reason is set up as the supreme arbiter of human knowledge and denies or ignores principles and qualities which transcend its competence, then it necessarily degenerates into a mechanical, inhuman, and godless faculty; and the picture of the universe it projects and the character of the world it fabricates in accordance with that picture are equally mechanical, inhuman, and godless. Needless to add, this picture also represents an appalling lie.

None of this would be very important if modern science, like chess or trapeze artistry, was but the pursuit of a few specialists. Unfortunately, this is not the case. Whether we like it or not, the scientific attitude has permeated and vitally affected virtually every aspect of our public and private activity and thinking. It is not simply that our governments pour millions of pounds annually, through schools, universities, research projects, and multitudinous other ways, into its promotion and dissemination. It is more serious than that. The scientific conception of knowledge has become virtually equated with the only way of knowing there is. Not only does it dominate its own offspring, such as the social sciences and anthropology—a bastard progeny if

ever there was one—but it has invaded also the classical fields of the humanities, a fact which makes a proper understanding of poetry, for instance, almost inaccessible to the modern student. Philosophy has long since capitulated and now has become identified with little more than such peripheral and graceless mental gymnastics as logical analysis or even mere information theory.

Far more serious, however, and more insidious, is the capitulation of the one discipline which should from the start have exposed the limitations of the modern scientific mentality. I refer to theology. Here it is sufficient to remark that, taking refuge in a fiction, proposed by Aquinas and reaffirmed by philosophers such as Kant, to the effect that although the reason can have no direct apprehension of the realities of revelation in themselves, nevertheless its mode of cognition and its conclusions are quite valid with respect to the phenomenal world—the world of nature—theologians for the most part have lulled themselves into a completely false security. Even worse, they have felt obliged to modify their own doctrine where this has run counter to the various theories which scientists have put forward from time to time about the origin of the universe, the evolution of man, and so on. Because of this one is treated to the absurd spectacle of theologians trying to bring Christian doctrine up to date or to remake it in accordance with the spirit of the times or with the contemporary mind, totally forgetting that this up-to-dateness and this spirit and this mind are merely the determination of a science which by definition is destructive of the religious intelligence and its norm. The result has been that theologians have largely failed to make any radical or effective critique of scientific epistemology, have failed to elucidate the appalling consequences of making the reason the supreme and sole instrument of knowledge and to explain why this has meant a progressive falsification of our understanding both of ourselves and of the world about us. In view of this failure it is not surprising that so many students of our universities end up with no better ideology than some form of Marxist-Leninism, itself a translation into political terms of the most banal aspects of nineteenth century bourgeois scientific theory. When this same hotchpotch of rationalist-materialist banalities is taken over by—or, rather, takes possession of—the masses, then society is turned into a prison camp in which everything that gives human life its value is systematically attacked and lacerated. It should be added that it is beside the point for scientists themselves to plead, as they are often in the habit of pleading, that they are but humble practical men and women quietly getting on with their research and making no claims to setting the standards of knowledge or to any special authority, and that if others exploit the results of their research for commerce, war, or other unwholesome purposes, they are not to be blamed. That exaltation of the reason which is a prerequisite of scientific research already in itself represents a self-assertion and an arrogance that preclude all genuine humility, which must be based on truth and not on a lie; and—short of denying their integrity as human beings—scientists cannot disclaim responsibility for the consequences which, as they are fully aware, their research must inevitably set in motion. And it must be said that more and more scientists not only do not disclaim this responsibility but accept it agonizingly and with great fortitude.

At this point—if not indeed at some much earlier point—it might be objected that the picture I am painting is too bleak and that things are not so bad as I make out. First, it could be said that even if in general terms the sketch I have made of the effects of submitting to the categories of the scientific mentality is true with reference to certain spheres of activity, none the less in other spheres there have been such positive gains that these offset, if they do not totally outweigh, any disadvantages; and that in any case these disadvantages themselves can be corrected when we have a little more knowledge about them. In particular, it might be claimed that the gains in the field of medicine are so vast that these alone justify the whole scientific experiment of the last few centuries. I do not think it is so simple. The world of modern science is a single interlocking whole and it is impossible to abstract one aspect of it as if this aspect could exist independently of the other aspects. It is impossible to do this because any one process, however beneficial it may seem in itself, is inextricably involved with a thousand other processes and depends upon them. If you want a product such as a car you have to have all the rest as well, from the dereliction of the oil-rigs and refineries and the motorways down to the lead poison, the carbon monoxide, and the noise that ruins the life of our cities and the deadly boredom of those whose work it is to put these machines together. In any case, it is entirely spurious to sing the praises of, say, modern medicine when the type of society which has produced it, and which it presupposes, is one which has done so much to deprive man of the basic elements on which his health depends.

But, more seriously, it may be questioned whether the scientific takeover is quite so totalitarian as I have suggested. In the sphere of the intelligence and the imagination, there have always been those who have repudiated its pretensions: poets, for instance, such as Blake, who discerned so clearly to what the thought of Bacon, Locke, Newton was leading; or Yeats, who hated this science and called it “the opium of the suburbs”; or David Jones, who knew so well that when man’s work is merely utilitarian it is also sub-human and how in the technological world man’s capacity to make—his function as *poeta*—is brutalized out of recognition. The testimony of these three alone—and there are many others—is sufficient to indicate that the creative intelligence and imagination—necessarily anti-scientific—have not been extinguished. Moreover, the smell of the rose is still as much the smell of the rose for us as it was for Plato and, in spite of all, our lives are still punctuated by moments of grace and beauty and love that go far beyond all I have been talking about. In this sense, everything is still in its place and nothing has been lost. Indeed, since the worldview of modern science is basically false, it cannot ultimately affect the truth of things, however much it may appear to do so. The norm of human and natural existence always remains. But when this is said, we must still remember man’s seemingly inexhaustible capacity for being taken in by a lie, and so for turning his life into a kind of illusion. We must still remember that the social order we have built about us—our present—is one predominantly determined by the categories of this false philosophy and its practical application, and that the difference between our world and that of the human and natural norm is growing greater, not smaller, every day. Indeed, it has now become so great that it is virtually

impossible for the one to understand the other. We have all but lost the capacity to measure how far we have in fact fallen below the level of the human and natural norm.[5]

For modern science has its origin in a loss of memory, a forgetfulness by man of who he is. By an ineluctable logic inherent in this origin it proceeds along a course each step of which is marked by a further fall by man into deeper ignorance of his own nature and consequently into deeper ignorance of the nature of everything else. Progressively divorced by this ignorance from the roots of his being, man, so long as he persists in this course, is doomed to advance blindly and at an ever-increasing pace towards total loss of identity, total loss of control, and eventually to total self-destruction. Nothing can stop this process except a complete reversal of direction. And nothing can initiate a reversal of direction except a recovery by man of an awareness of who he is: the cure must go back to where the sickness started. To such a recovery modern science itself can contribute nothing: a science whose very categories exclude a recognition of the essential qualities of human nature clearly is not in a position to make man the subject of its investigation with any hope of telling us anything very important about him. Only a religious understanding—one that transcends the sphere of the rational—is capable of recognizing those qualities and so of assessing their significance for the living of a human life.

[5] Modern science is now a worldwide phenomenon, and it has radically altered, even indeed threatens totally to displace, the patterns of life and the values which until its advent had characterized not only European civilization but every civilization as well. Non-Europeans have been induced to believe that the acceptance of the methodology and techniques of modern science whose mastery and manipulation can produce certain effects in the practical sphere does not lead inevitably to the disruption of the spiritual universe to which their own civilizations owe all that is sacred and human about them. They have been lulled into a state of passive acquiescence to what is really a western imperialism of a far more vicious and totalitarian nature than they have experienced in any other form.