THE NEW PHILOSOPHY

VOL. LXIV JANUARY–MARCH, 1961 NO. 1

REVIEW

THE MODERN UNIVERSE. By Raymond A. Lyttleton (New York: Harper and Brothers, 1956).

Dr. Lyttleton is a Fellow of St. John's College, Cambridge, Stokes Lecturer in Mathematics at Cambridge University, and Fellow of both the Royal Society of London and the Royal Astronomical Society. His book, the *Modern Universe,* is a popular account written with two ideas in mind.

First:

It is the man-in-the-street who by his more mundane but indispensable work provides among other things the necessary leisure for scientists to devote themselves to study and make discoveries, some of which gradually change the whole character of society. So by way of return there is an element of duty for scientists occasionally to give some account of progress in their subject to those . . . who otherwise would have little opportunity to learn anything of such things.

And second, he believes that:

Almost all that has hitherto passed for knowledge and understanding in other fields, such as political theory, philosophy, and ethics . . . will eventually be relegated to the level of mere rationalization: that is, associated 'explanations' having no real validity. But if this happens and becomes widely appreciated, so that in turn the ordinary man and woman lose faith in these things and the assumptions based on them, what is to be put in their place? The answer seems to be that the only hope lies in science. . . . We shall do better as a community to the extent that we can bring something of the scientific attitude to bear on the unending range of problems that inevitably have somehow to be dealt with. . . . But first it will be necessary to develop much more general confidence in science, and there seems no other way to do this than by making clear something of its achievements.

This book makes good reading and serves the first purpose well. As for the second purpose, even supposing it were valid, no popular account of the achievements of science can impart a real understanding and appreciation of the scientific method. It may impart awe and amazement at scientific achievements so that science becomes a "sacred cow." It also may impart incredulity and even skepticism at conclusions drawn from what appear in the book to be insufficient grounds. The author does his best at the end of the book to allay such fears by assuring the reader that:

> There is no doubt . . . that anyone prepared to take the necessary trouble could proceed step by step from the ideas that he is familiar with to those involved in modern science, and it would be possible for him to see beyond any shadow of doubt that this mysterious universe is . . . as these pages have attempted to explain.

But since:

> an apparently simple thing like the distance of the sun requires something like ten years for a worthwhile modern refined value to be derived,

it is obvious that most of us have to accept the word of the astronomers, and we are in the same position in relation to this type of knowledge as we are to knowledges in social studies and other fields. The only way to appreciate the scientific method is to work through a scientific problem.

But what of the validity of this second purpose? Does the only hope lie in science? Readers of the NEW PHILOSOPHY recognize that the scientific method is valuable and even essential in discovering the laws by which the Lord creates and governs the external universe, and that the scientific method may also have some applications in social studies, language studies, etc., but they will not be panic stricken by the collapse of man-made assumptions and theories in any field. They will be just as much interested as anyone else in studying and improving theories by research and the tools of science, but they know that the real hope for mankind is not science but revelation. They have the firm ground of revealed truth behind all their theories in any field of thought. Revelation does not answer the questions of science or politics, nor does it do away in the slightest with the necessity for man to use his own intellectual powers and experimental techniques in delving into his environment. But it does show the end and purpose of the physical world and human society and the reasons for studying these, and it assures us that there *are* laws governing them, which man may discover.

Setting aside this objection, we can learn from this book facts and theories about the universe, many of which have been discovered and developed since most of us were in school, together with some brief but suggestive outlines of the research that resulted in the discovery of the facts and the development of the theories. Lyttleton also discusses many of the unsettled problems of astronomy. Of particular interest to readers of Swedenborg's cosmological works is the chapter on the age of the earth and methods of determining this. The author draws an analogy between the radioactive method and one of Sherlock Holmes' cases in which he proved by winding up the the dead man's watch that it had been fully wound up only two hours before. Our confidence in the accuracy of the information in the book is increased by reading its pre-sputnik account of how artificial satellites would behave. They actually do behave as predicted.

In the chapter entitled "The Origin of the Magnetic Field?" Lyttleton states that it is now generally agreed by those studying the problem that the cause of the earth's magnetic field lies in the liquid core of the earth. It is believed that there are circulatory currents within this core. The diagram illustrating a possible type of motion in the core is reminiscent of, although not the same as, some of Swedenborg's descriptions of the vortical motion of the finites. This circulation, according to the theory, is caused by the precession of the axis, which in turn is caused by the gravitational attraction of the moon and sun on the slightly non-spherical earth. These currents of molten liquid iron are believed to induce electromotive forces with their attendant magnetic field. The grounds for this theory are clearly and interestingly discussed at some length, but Lyttleton warns that:

> It must be emphasized that the matter is by no means settled yet; what has been outlined above constitutes little more than the first steps with a very difficult problem. But I have brought up this subject in order to give some idea how intimately related these various objects, the Earth, moon, and sun, must be regarded as being. At first sight it might seem out of the question that the magnetism deep down in the center of the Earth could be anything to do with the presence of the sun and moon, yet all this goes to show that it may well be so, and it serves to illustrate how carefully all possible effects must be examined if we are going to get to the root of a complex problem.

We are struck not only by this interrelationship of heavenly bodies but also by this indication that the earth's magnetic sphere results from something like a vortical motion. It is interesting to compare this theory with what Swedenborg says in the *Principia* about the solar space:

> The whole of this immense [solar] crust, together with the enclosed solar space, is not unlike an elementary particle; for in each elementary particle there is an active space, exteriorly to which flow the finites. Thus, both as to figure and motion, this chaos is, on an immense scale, an effigy of each individual part of an elementary particle. Thus is nature similar to herself in her largest as well as her least productions; and thus does she appear in her most stupendous proportions, as well as in her most minute. (Pr. Part III, chapter IV, Vol. II, p. 182, Tansley.)

The chapter on the sun is interesting.

> It used to be a great mystery how the sun kept going, for it was quite clear that it could be no ordinary kind of fire that was responsible for its heat. If the sun were made of coal and were burning so as to give out the present amount of light and heat, it would be reduced to ashes in a very few thousand years. But the Earth is about a million times as old as this, and all the evidence shows that the sun has been shining on it throughout quite as strongly as it still does. No ordinary chemical processes could keep up the supply so long; it requires sub-atomic energy, nuclear energy. The sun is an atomic energy powerhouse in a really big way of business, but it has the process under complete control, with beautifully simple means to turn off the heat a little if things go too fast, and to step it up if they go too slowly. This state of affairs has persisted for several thousand million years, and we can confidently expect the sun to go on shining for several thousands of millions of years more before any possible fuel shortage overtakes it. Indeed, there may even be opportunities from time to time for the sun to refuel itself by picking up more hydrogen as it moves along through space and occasionally encounters large diffuse clouds of interstellar hydrogen. . . .
>
> In a central region extending out to about one-sixth the radius, the material is churning itself about with tremendous violence, called *convection*. It is as though the material were boiling strongly. . . . It is in this central *convective core*, as it is termed, that almost the whole of the sun's energy is generated.

This too reminds us of the quotation above from the *Principia*. The sun's energy is generated, according to recent theory:

> by converting hydrogen into helium, a process that can take place spontaneously at temperatures of the order of ten million degrees or so. . . . Now although ten million degrees may seem, and is a pretty high temperature by ordinary standards, it is now known that it is not nearly high

enough for any elements other than helium to be built up from the hydrogen of which the sun and stars are initially formed. Hydrogen is to be regarded as constituting the primitive material of the universe from which all other elements are somehow formed. This conclusion has a highly important implication, because it means that in its present state neither the sun nor any similar star can produce the heavy elements that are essential for the formation of planets, such as our Earth, in which as we have seen it is the heavy elements that are abundant and the hydrogen by comparison exceedingly scarce.

This was a problem for some time, but it is now believed even hotter places do exist in certain stars from time to time for reasons described later in the book. All this is very interesting to compare with Swedenborg's *Principia* theory of the formation of the planets from a crust formed on the primitive sun. We shall discuss this later in this review.

On the subject of the inhabitability of the planets, little can be gained from this book. It is obvious that Lyttleton takes for granted, and we do not blame him on the basis of his evidence, that no life exists on the moon or Mercury. As for Venus, he concludes his description by stating: "It therefore seems improbable that Earthly creatures or plant life would stand much chance of surviving long on Venus." On Mars the dark lines described by some observers and called 'canals'

have been the source of much speculation. But please do not get the impression that they are actual canals, or that the fine lines even necessarily exist. Towards the end of the last century some astronomers went so far as to believe that they were evidence of vast irrigation systems on the planet, and accordingly proof of the existence of conscious thinking beings who had constructed them. But the consensus of opinion today is that even the reality of the fine dark lines is more than doubtful, and much of the detail allegedly 'seen' by these astronomers, is now considered to have been mainly of the nature of optical illusion. . . . No photograph has even shown any definite evidence of them. Nevertheless Mars certainly has an atmosphere that could possibly support life. . . . But I think the large majority of astronomers if they were forced today to answer the question, 'Is there life on Mars?' would say, that of animal or human life as we know it here on Earth, then certainly there can be none, though there might just conceivably have been in the past when oxygen and water-vapour may have been more abundant. Grim austerity conditions at best prevail on the planet, but plant life of very primitive forms might still exist, such as the moss lichens of the kinds one sees here on Earth on exposed rocks and ancient garden walls. However, it must be admitted that no one can be absolutely certain on this question, because it is not known what diverse forms life might take on to adjust itself to changing conditions if it once existed.

In discussing Jupiter's atmosphere, apparently composed of gases such as methane and ammonia, he points out that only the outer layers of this atmosphere can be seen and besides the distance is very great. Saturn, Uranus, and Neptune are also believed to have deep atmospheres which

are composed mainly of poisonous gases, methane and ammonia, quite inimical to all forms of animal life, and contain no signs of oxygen or water-vapor. So they are about as unpromising abodes for any form of life as can be imagined, and we can be quite certain that they are utterly devoid of any form of life whatever as we know it here, not only animal life but plant life included.

It is heartening to note it is always life "as we know it" that could not exist.

And now we come to the most interesting part of the book, the sections on the Stars and Galaxy and on the Expanding Universe. Here Lyttleton discusses theories of the creation of the solar system and the universe. He has pointed out earlier in the book that 98% of the sun is hydrogen and helium, while the other two percent are made of all the other elements, whereas in the composition of the earth the proportions are almost reversed. In fact less than 1% of the earth is hydrogen and helium, and the other elements make up more than 99%. Thus, he says:

It would be no use . . . simply to suppose that the Earth had been lifted bodily out of the sun, as several early theories such as the tidal and collision hypotheses did, because obviously such an Earth instead of consisting largely of heavy elements would have quite the wrong composition and be formed mainly of hydrogen. It is now known that there are other grave objections to these early theories, the most important perhaps being the dynamical difficulty of getting planets formed from the sun to circle it at the great distances that the real planets in fact move at. It might be possible by means of the effect of a passing star to extract planets from the sun (regardless of composition) that subsequently moved round it more or less skimming the surface, but the mighty Jupiter . . . moves at about one thousand solar radii from the sun, and no one has ever suggested a process whereby such a body could be ejected from the sun and got into a path at all comparable with its present one. . . . [This dynamical difficulty] caused astronomers to look elsewhere than to the sun for a possible source of the planetary material, and the solution that suggested itself was that of another star, perhaps a former companion to the sun, already moving at a distance from the sun comparable with those of the great planets now. Any process such as tidal action by another star, that had hitherto been invoked to remove material from the sun would be equally applicable to the companion star, and thus would get over the difficulty posed by the enormous range of the planetary system compared with the size of the sun. But the composition difficulty would remain.

Let us here pause to recall Swedenborg's *Principia* theory of the formation of the planets. After describing the large solar ocean or solar space containing actives of the first finite surrounded by elementaries, which become compressed into fourth finites so as to form a crust, he says (Vol. II, p. 182, Tansley)

This incrusting matter, being endowed with a continual circular motion round the sun, in the course of time removed itself farther and farther from the active space; and in so removing itself occupied a larger space, and consequently became gradually attenuated, till it could no longer cohere throughout, but burst in some part or other. . . . The solar crust, being somewhere broken up, collapsed upon itself . . . so that it surrounded the sun like a belt or broad circle. This belt . . . revolved in a similar manner, removed itself to a greater distance, and by its removal became attenuated till it burst and formed into larger and smaller globes, that is to say, formed planets and satellites of various dimensions, but of spherical form.

Swedenborg later describes the formation of the terrestrial atmospheres and the fifth and sixth finites, water and solid minerals. This theory may not be subject to the objections mentioned above since the solar space was much larger than the present sun, thus allowing the planets to have large orbits. Also in Swedenborg's theory, the heavy elements are not formed on the planets until after the planets are flung off the sun. However, since in Swedenborg's time nothing was known of the structure of atoms and molecules, his system of finites is only suggestive of general principles, I believe, and cannot be defended except in general. Swedenborg goes on to say that his

philosophy is not without evidence derived from actual observation, for celestial phenomena appear to confirm it. Stars have been known to come into view and after a lapse of time, to grow obscure and become invisible, then again to become visible, and again obscure. . . . Here then we see the origin of the planets actually imaged forth to the eye. We see as it were, the same incrustations arising from the compression of the circumfluent elementary parts, and veiling over the star or sun to which they belong. (*Ibid.,* Vol. II, p. 191)

Swedenborg then mentions several cases of what are now called novae or supernovae. Some of these cases are also discussed by Lyttleton, with the comment that:

> To the continued disappointment of astronomers no instance has occurred within our own Milky Way system since the invention of the telescope, but one might occur at any time. The last recorded instance was in 1604 when a star, hitherto quite unobservable, suddenly appeared, and remained brighter than Jupiter for several weeks; after that it was distinctly visible to the unaided eye for nearly two years, before finally disappearing again.

Lyttleton states that:

> It now looks pretty safe to say that the places where [the temperatures are high enough for the formation of the heavy elements] are in the central regions of certain stars called supernovae. Within our own galaxy such supernovae occur only once every two or three centuries on the average, but they are to be observed far more frequently in other external galaxies simply because there are so many of these objects for supernovae to happen in. A single star has sometimes flared up to become brighter for a few days than all the other thousands of millions of stars in the galaxy concerned put together. There is no doubt of this because it is a direct observational fact. During this tremendous increase in brightness the star actually throws off material into the surrounding space, and has the appearance of ejecting expanding shells of matter. The whole star has quite evidently undergone an internal explosion of unsurpassed violence.

Lyttleton's theory of the origin of our solar system is that a supernova explosion of this kind happened to a star which was a companion of our sun and moved around it in the neighborhood of the present orbits of Jupiter and Saturn. Since

> something like fifty percent of all stars have one or more companion stars moving round them, . . . there is nothing untoward in this hypothesis. Most of the material ejected in the explosion would . . . escape from the sun . . . [but] a small fraction of one percent remaining behind captured by the sun . . . would provide enough to make all the planets. Also, because of the same supernova process, it would be composed principally of heavy elements. The material would initially be at very high temperature, and therefore gaseous in form, and it cannot be supposed that it would immediately condense into planets. What it would do is spread out into a huge flat disc of material surrounding the sun, rather like a gigantic Saturnian ring, but necessarily much further out from the central body (the sun) in comparison. This ring would cool into separate small solid particles, and these would begin to collect together gradually. It can be shown that small aggregates of varying sizes would form to begin with, but that once formed the largest of them would continue to grow much faster, swallowing up some of the smaller concerns too, after the manner of financial corporations under laisser-faire.

Thus we see great similarity between the theories proposed by Lyttleton and Swedenborg, the main difference being Lyttleton's believing in the necessity of a secondary sun to produce the planetary material. Aside from this difference in theory, there is a great difference in the approach of the two men to the solution of the problem. Lyttleton studies the universe as it is and would be satisfied with any kind of an accidental occurrence consistent with known physical laws that would result in the present circumstances. Swedenborg, on the other hand, starts from the premise that God created the planets for man's habitation and so their method of production must be part of the orderly plan of the Creator, operating not only in this solar system, but inevitably in the case of every sun in the universe. Such an orderly process is not ruled out by Lyttleton's theory, even if it is not seen to be required.

Few writers in the past have tackled the problem of the creation of matter. Their theories start with particles of some kind already created. Lyttleton does not evade this issue, and although his treatment is far from being intellectually satisfying, it is stimulating. It is generally accepted that the universe is expanding. This conclusion is based on spectroscopic evidence that the galaxies are receding from us at a velocity that is proportional to their distance, and it is confirmed by the fact that the sky is dark at night, for since galaxies are apparently more or less evenly distributed through space as far as instruments have been able to see, it is assumed that this condition keeps up beyond the limit of observation so that in whatever direction one looked one would sooner or later come to a galaxy. Thus one would expect the sky to appear bright. However, according to the evidence mentioned above, the more distant a galaxy is the greater the rate at which it is receding from us. The recessional speed weakens the intensity of the light we receive from it, and so with increase of speed the galaxies become "decreasingly visible until finally as the velocity of light is approached they are no longer visible at all." Here Lyttleton pauses to reassure the reader that:

All these speeds and distances and large numbers that enter into the description of the realm of the nebulae certainly seem incredible when one first hears of them, but it is to be remembered that they are nowadays mere commonplace facts in the world of astronomy. Their proof depends on scientific principles as well established as those on which the working of modern scientific equipment and machinery depends, and if it were possible to take you, dear reader, by the hand as it were and lead you step by step from the things you are familiar with in everyday life through the various stages that are involved in establishing these things, you would find complete certainty at every point, and end by feeling not one shadow of doubt that the picture that has been described is indeed inevitable. We know this because many highly critical minds have gone over all the various steps time and time again and tested them out and verified them by other means and yet others, and have emerged from it all completely convinced. And so I think would you. Therefore you may rely on it that this is no fancy fairy story but the stark reality, in so far as we admit reality.

However, these are only what we may term the facts, but where the really interesting and even more exciting part of the work begins is when we come to try to interpret the meaning of the expansion.

Two explanations are given. One, called the 'big bang' hypothesis, is derived by extrapolating backward in time until the galaxies are crowded together. This led to

the idea that perhaps the universe originated in a gigantic explosion . . . in which the material that now forms the galaxies was thrown apart with speeds of all values up to the velocity of light itself. The explosion would have to be regarded as a kind of singular initial event in the history of the universe; what it was like before the explosion took place it would not be possible to say. But postulate the 'Big-bang', and with it the instantaneous creation of all the matter of the universe, and then something like the present distribution might follow. . . .

A theory such as this that puts back creation to a singular instant in the remote past is in its nature difficult to prove or disprove (though not necessarily impossible), but to some minds it is an objection that it would imply the removal of the question of the origin of the material of the universe from the realm of science. If the theory were correct, it would mean that we would just have to swallow this and learn to accept that we would never be able to initiate any successful enquiry into how the initial catastrophe (no moral judgment being implied by the word) came to happen. On the other hand many minds, perhaps the majority at present, feel quite the reverse, and seem only too relieved that something may be spared from the fearsome encroachments of science into every domain. This consideration does not of course mean that the explosion theory is necessarily wrong, but it puts the act of Creation, as we might term it, beyond the reach of science. Now in questions of this sort when they are in their early stages of development, and this one is very much so, scientists are forced to use what processes of judgment they can to guide them as between one idea and another. The problem develops a kind of aesthetic basis, and some deeper instinct has to be used to guide us aright and save us from wasting too much time in investigating, or being satisfied with, ideas that in fact are blind alleys. Modern science is so vast and intricate that it is only by cultivation of this instinct, or by the original possession of it, that it is possible to steer a way through and arrive at important results. But it is precisely as a result of this feature that new advances in science, particularly on the purely theoretical side, are so fraught with controversy, because different people's aesthetic senses, which have their roots deep down in emotion and temperament, are apt to guide them in very different ways, and what to one seems a most enlightened mode of approach to a problem will fill another, it seems, with feelings of the utmost repugnance. The present problem has not been free of this element, and bitter controversy has surrounded it with waxing and waning degrees of severity over this past thirty years or so.

I have quoted here at length to show that Lyttleton does admit that scientists in their work are not completely devoid of emotions and bias and that science cannot be isolated from philosophy.

There are some technical difficulties with the explosion theory, and also another kind of difficulty.

Sooner or later, with the exception of a few local systems that form a cluster with our own galaxy, all the rest of the nebulae will have disappeared from sight . . . and space will be practically empty; the several hundred million galaxies that we can still observe will all have gone. This would mean that we see them now simply because we happen to live at this time in a comparatively early stage of the expansion. . . . Does this idea appeal to you? Possibly it has been put into words that are apt to prejudice because it does not appeal to the writer, who at the time of writing does not quite like this picture of what is going to happen, even though it probably will not concern him much what the universe may look like several thousand million years hence. . . .

Quite recently there has been suggested an entirely different picture of the development of the universe that for some astronomers has special attraction, and seems to hold out much more hope of being on the right lines.

If we do in fact feel that the emptying of space is an unsatisfactory prospect, yet we cannot bring ourselves to deny or evade the direct evidence of the radial expansion, may it not be possible to introduce the idea of *continual creation* of matter in the world, going on at the present time and all the time, to just such an extent that makes up for the loss of matter through galaxies that disappear over the horizon? May it not be that it is a property of space that wherever space occurs then matter may appear in it *from nowhere?* . . . That is new material, created from nothing, throughout space.

Compare *Divine Love and Wisdom* 55:

There are those who maintain that the world, with everything it includes, was created out of nothing. . . . From absolute nothingness, however, nothing is or can be made. This is an established truth. The universe, therefore, which is God's image, and consequently full of God, could be created only in God from God. . . . To create what is, from nothing, which is not, is an utter contradiction. But still, that which is created in God from God is not continuous from Him; for God is *Esse* in itself, and in created things there is not any *Esse* in itself.

Lyttleton gives no reason for this insistence that hydrogen is created *from nothing*. Lyttleton goes on, "We have been brought up to think of the permanence and indestructibility of matter—the conservation of matter." But students of Swedenborg's *Principia* were better prepared than others to accept the concept of the interchangeability of matter and energy, and they will eagerly hail a theory postulating continual creation. Lyttleton explains that the rate of creation of matter necessary to replace the loss is so small as to escape notice easily. In a space the size of an ordinary room the rate would be about one hydrogen atom every hundred thousand years.

The principle of conservation of matter, so sacrosanct in science, it must always be remembered is, like any other principle, established only within certain experimental limits, and they are far cruder than the departure from strict conservation that this minute rate of creation implies. It is a permissible development from the existing framework of science that a new realm of observation—the receding galaxies—suggests may be necessary. And this sort of new step is exactly in accordance with the procedure of the development of science.

Lyttleton says that mathematical formulation of this theory indicates that the creation of new matter is the cause of the expansion and the new matter appears at points spread uniformly throughout the whole of space. Thus:

physical science . . . has . . . achieved the great triumph of coming face to face with this hitherto most inscrutable of questions, namely that of the process of creation of matter. It is now plainly on the agenda of science for discussion and eventual solution, if man survives. But please do not suppose that the problem is solved; very far from it. It is only just broached and scientists are still struggling to get the right attitude to it.

The newly created matter "aggregates itself together by ordinary gravitational attraction and forms new galaxies." The universe can be compared to a forest in which new trees grow up as older ones are removed so that the forest will always look about the same.

Similarly in this theory of the universe: only the elements that go to make up the universe have finite ages, that is the galaxies themselves; the universe itself has no beginning and no end. It has always existed. . . . The question of how the universe started does not arise. However far we look back in time the same general situation would hold. . . . Also it would not matter where in the universe the observer happened to be; he would be able to regard himself as at the center of it, and find all the other galaxies streaming away from him in the manner already described with velocity everywhere proportional to the distance. For these reasons this description has been termed the *steady-state* theory of the universe.

Another thing that this theory promises is to some minds one of its greatest sources of appeal. It brings the question of the process of creation of matter right into the center of the scientific arena, a process hitherto excluded.

The explosion theory apparently precludes man's ever learning anything about how it happened.

But how much more hopeful is the second theory! It means that creation may be going on around us all the time; that it may be some fundamental property of space itself; and if this is so then the ingenuity of man may sooner or later come to understand it, and find its relation to the ultimate structure of matter. But we cannot say what more may come with it because at present we have only arrived at the very beginnings of the idea. These as we have said are the sort of aesthetic considerations that urge men of science to prefer one idea to another in its early stages, and the general hypothesis of continual creation is being actively thought about by a number of scientists today, and will probably be thought about by a great many more as its popularity gains. But it will take time.

After showing time and again the beautiful order in the universe, the book ends on a disappointing note:

There is one final question that occurs to us all in response to some deep cosmic emotion when we are confronted at whatever level by the wonder of the universe, and one that has so often been asked before, namely, "What is the meaning and object of it all?" This is the question that down the ages has puzzled all the thinkers and all the philosophers without any real satisfactory answer being found. And now it seems only Science is left to appeal to, and what science says is that there is no indication whatsoever in the whole cosmos that there is any discernible purpose at all.

Even though some deep inner voice says otherwise and prompts us that there must be, we have to be on our guard. These are the very kind of feelings that go so far to undo us when it comes to the steps needed for new advances in thought . . . As we well know, mankind has already been led to so much disaster that he did not wish for by listening to this same inner voice. Ideas or beliefs cannot with value be accepted simply in their own right by a process of vehement adherence to them, and our only hope in any of these matters lies in preserving an impassive calm that enables us to adopt a rational approach at all times, believing in nothing and yet rejecting nothing until we have adequate evidence to guide us, and even then always retaining some element of doubt in our minds that enables us to be ready for the next stage of advancement of thought, however firmly established former ideas may seem.

And it is from this rational approach that has been distilled this seemingly fantastic conception of the universe, in which are occurring these cosmic events on a scale almost beyond belief, were they not so inescapably established, involving the raw materials of the firmament in their most fundamental forms. Here the secrets of nature are being disclosed—as Jeans truly said many years ago, "The story of the atom is written across the sky"—and surely it is the least we can do to take advantage of these gifts of nature in the hope of coming to understand more fully the world in which we live.

It is true that God, the Creator of the universe, has given to man the power and concomitant delight of discovering laws in the ultimates of the material world, and that in the process of discovery an open mind, a rational approach, and an unbiased gathering of evidence are to be recommended. However the "inner voice" that speaks from a firm belief that God created the universe, not from nothing but by finiting his own Divine Substance, a belief that the purpose of the whole of creation both natural and spiritual is that there shall be a heaven from the human race, and thus that every object and law looks toward this end—this inner voice will not lead to disaster but to a true understanding of those external facts that man is able to discover through scientific methods. It will lead him to see that hydrogen atoms are not the "most fundamental forms," and that there *is* meaning to it all. Through Revelation we can come to see the real reasons for "coming to understand more fully the world in which we live."

MORNA HYATT

NOTES FROM READERS

In the "Philosophical Notes" on Pragmatism (October, 1960, pp. 221–224), it says:

"There is a certain element of truth in pragmatism. In this world what is practical is related to man's action *in this world,* and according to Swedenborg that action is use."

As the author of an earlier article on Pragmatism ("American Pragmatists and Pragmatism," October, 1956, pp. 117–123), I was interested in this statement.

For the New Church man this statement has philosophical implications: how can words in *common* usage be translatable or