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The fear of the Lord is the beginning of wisdom. Psalm 111:10

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Science As Community*

WILLIAM G. POLLARD**

The student bodies of land-grant colleges to a great extent have been energized and supported by Christian faith. Discussions of either the unity of science and religion or their differences tend to be limited and dissatisfying. Surprisingly close analogies between them have not been recognized sufficiently.

It is by grace, not knowledge, that one becomes a physicist, just as it is by grace that one becomes a Christian. Each scientific discipline is a different, distinct, and contrasting community into which students are educated, just as the Christian Church is a community. The only way to know the truth of Christianity is to become a fully-committed Christian; the only way really to know the truth of physics is to become a physicist. It is misleading to distinguish between science and religion on the basis of truth vs. opinion, public vs. private knowledge, facts vs. faith, or natural laws vs. intuition, for all of these are present in both science and Christianity. Both have their creeds and heresies, and in both commitment is a precondition for liberation of the intellect and fruitful activity.

It is indeed a great privilege to be called upon to give the opening address of the Academic Symposia commemorating the Centennial of the founding of Iowa State College, . . . the first institution to participate in the benefits of the Morrill Act . . . In a very real sense the Centennial of Iowa State is also the Centennial of the land-grant idea in American education . . .

The role given me by the committee which planned the symposia was that of portraying the integration of science and faith in past and future social development. This is indeed a tremendous assignment, and I shall only be able to approach it in this one lecture from a single vantage point. Yet it is clearly central to the vision which must inspire Iowa State and her sister institutions as they enter the second century of the development of the land-grant idea. During the first century they have, to a greater extent than any other kind of institution, brought science down to the level of the common man and placed it in his service. At the same time they have carried out this task with a student population which, to a greater extent than that of any other institution, has been energized and supported by that sturdy Christian faith of the common American man and woman on which the greatness of America has been built. Even if not explicitly planned to do so, science and faith have in fact worked hand in hand to produce the rich and manifold contributions of the land-grant college to the social development of this country.

In the conclusion of his recent book on the land-grant idea in American education, Dr. Eddy summarized this idea in the following way:

> Born out of America's worship of education, the land-grant colleges strengthened that worship. Partially through their efforts, higher education came to be regarded as not so much a luxury as a national necessity. Before long, America had taken for granted the assumption that each individual, regardless of his economic or social status, should be given the opportunity to develop his innate abilities to the ultimate benefit not only to himself but to the nation. Each man was worth educating as a person and as a citizen in keeping with the Judeo-Christian and democratic belief in his dignity and worth. (Edward D. Eddy, Jr., *Colleges for Our Land and Time,* Harper and Brothers, New York, 1957, p. 285.)

Thus the land-grant college, which in its program is so much concerned with science, is in its ideal equally concerned with faith and firmly rooted in the Judeo-Christian heritage of Western civilization. Yet at the same time science and religion are today widely believed to be inimical to each other, and there is in fact much actual tension between them in contemporary thought. Quite clearly, therefore, a discussion of these two areas of human thought and endeavor is appropriate and even central to the occasion which we are celebrating.

Wherever science and religion are discussed, it is usually the subject matter or factual content of each which is contrasted. Or, on occasion, it may be the techniques, methods, or basis for validation of truth in the two fields which is contrasted. Since my ordination several years ago, I have been under pressure to speak and write on these vitally important issues out of my own experience. For some time my response to such pressures followed this usual pattern of concern with the factual and conceptual content of the two fields. I would strive

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to perceive the unity and coherence between the theoretical picture of reality as I had come to know it through science, and that which I had come to know through theology. Or else I would strive to understand and express the differences in the ways in which truth may be established and reality known in physics and in Christianity.

In all of this activity, however, I experienced a growing sense of dissatisfaction with such approaches. Something important was clearly being overlooked. It was not a matter of lack of success or of failure to deal meaningfully or significantly with the issues involved. On the contrary, I sometimes was able to achieve what seemed to me some real insights into the structure of a knotty problem which had been worrying me and to have the satisfaction of discovering that others found my resolution of it meaningful and illuminating. The real trouble lay elsewhere. Mainly it consisted in the recognition of the seemingly unavoidable circumstance that both I and my hearers were standing apart from our discourse, and viewing it in a detached way from our several vantage points. Each one could agree or disagree, be interested or bored, enthusiastic or antagonistic, without its making a great deal of difference. The subject under consideration was a thing apart, and the difficulty was that there was no obvious or essential way in which it really had to do with any of us. What then about my mode of response to the pressure upon me to speak out of my joint *experience* first as a physicist and later as a priest of the Church? Could any amount of discourse about the contrasting subject matter of physics and Christian theology ever really get at what was evidently being demanded from me?

Commitment

One clue to the problem raised by such questions came to me early, although I did not then understand its full implications. This was the simple fact that all of my writing and speaking on science and religion came well after my full involvement in and commitment to the Church. None of it could possibly have been undertaken by me at all until, in a sense, it was already too late for me to have done anything about it. Christian theology is something which can be fruitfully engaged in only by already fully-committed Christians. This, however, was not in any sense new to my experience. It had previously been just the same way with physics. By the time my first paper in physics was published in The *Physical Review,* I had already sometime since become a fully involved and committed physicist. To be sure, I was young and inexperienced in the field and it was not then clear either to me, my professors, or my fellow student physicists whether I would turn out to be a good or only a mediocre physicist. But by then it had become quite clear both to me and to them that, for better or for worse, I was already one of them.

A thought such as this naturally leads to the question of how it is that anyone becomes either a physicist or a Christian in the first place. The common notion, I suppose, is that one first learns all about the subjects of physics or Christianity, their factual matter, content, methods, and ways of knowing, and then on the basis of all this knowledge decides whether or not one wishes to become a physicist or a Christian. But I am convinced that this widespread popular impression is completely erroneous. I do not really know or understand the process which led me as a young man to become interested in physics and soon to decide that I wanted to be a physicist. But whatever this process was, it was not based on a knowledge of physics. On the contrary, I am convinced that until I had made that decision, I could not even begin to really learn physics. In the same way the process which led me into full involvement in the Church is equally mysterious to me. It certainly was not the result of an exhaustive study of Christianity. Indeed it is now clear to me that only after I had made such a decision did I have a secure enough platform on which to stand to make it possible for me to grapple at all meaningfully or fruitfully with tough theological questions. This, however, is just another way of expressing the central theological affirmation that it is by grace, not works, that one becomes a Christian. To this affirmation I would add that it was also, in a completely analogous way, by grace, not knowledge, that I became a physicist.

This early clue received its needed impetus and clarification from a lecture given by my close friend and associate, Dean Harold K. Schilling of Pennsylvania State University, during a Danforth Foundation seminar for college teachers of science which we jointly conducted several years ago. In this lecture he developed the idea of physics, or for that matter of any science, as community rather than subject. As I listened to his remarkably clear and cogent development of this idea, I realized with considerable excitement that here was the key I had been groping for to the problem which had been gnawing at me. With full acknowledgement of my indebtedness to Dean Schilling for many of the insights and ideas which I have borrowed from him, it is this theme which I propose to explore with you today in the light of my own experience as an active member of two communities of inquiry and understanding: physics and the Church.

Science as a Community

There are a number of ways in which it may be seen that any science is much more distinctively a human community than it is a body of subject matter or a particular methodology. One way is to try to formulate an adequate and satisfactory definition of a given science in terms of its subject matter. This must somehow be attempted at the beginning of an introductory course in the science. The students who have registered for it expect to be told at the outset what the subject is about. The instructor, however, in trying to formulate some adequate statement for meeting this natural and apparently quite proper need generally finds himself in difficulty. How, for example, can a boundary be staked

out in the natural world which will clearly and adequately distinguish physics from chemistry? The deeper one goes into this task the more difficult and complex it is seen to be. Every definition of either subject which recommends itself is soon seen to have numerous loopholes. The fields overlap each other and the boundaries continually shift with new progress in each science. Many who have faced up to this problem have in the end suggested in desperation that the best definition of physics is that it consists of everything done by physicists. From the standpoint of physics as subject matter this definition is facetious, but from the standpoint of physics as community it is profound.

In actual practice little effort or interest is expended on such definitions. In time as the course goes on the students will come to acquire a feel for what physics is. In part this comes from the content of the textbook, lectures, experiments, and examinations as the course unfolds. But this is only in part. Even more important is the character and structure of the life which goes on inside the physics building or the chemistry building. Each is distinctive and recognizable. Although it may be difficult to tell the difference between physics and chemistry as subjects, there is no trouble at all when it comes to telling the difference between a physicist and a chemist. They are clearly members of two different, distinct, and contrasting communities. The student, along with the rest of the university, comes to think of physics as that which goes on in the physics building, whereas chemistry takes place in the chemistry building.

Another way to see science as community is to consider the history of each science. When we do this what immediately stands out is the unity and coherence of the men and women who have been engaged in it. Physics, for example, has changed radically in subject matter content over the years. First it was interested in the laws of motion of bodies; later with the properties of substances, heat, energy, and light. Then in the last half of the last century, electricity and magnetism were the dominant interests. With the discovery of the electron the center of interest turned to atoms and molecules, and more recently to atomic nuclei. Now the growing family of strange unstable particles produced at ultra-high energies is the center of interest. None of the early physicists could possibly have foreseen the course of this path of inquiry. Yet physicists today can still read the papers of Newton, Joule, Hamilton, Faraday, and Lorenz and feel at home with them. Whatever the subject under investigation, the peculiar combination of attitudes, values, judgment, and discipline which uniquely pervades the community of physics is recognizably present. These are clearly kindred spirits and fellow physicists, even though the content of physics has become for us something vastly different than it was for them.

Ancient Greece produced a few isolated instances of genius, such as Democritus and Archimedes, who investigated physical problems. But it did not produce physics. Only when such isolated individual sparks caught fire and spread so as to draw men into a communal enterprise did what we know now as physics emerge. When this happened, a community came into being possessed of a unique power of inquiry into nature. Its members were seized with this power and shared in the dynamic vitality and enthusiasm of it. The spirit of this community has been the same ever since in spite of the way in which the objects of its inquiries have continuously changed and spread. It has throughout commanded from its members a common loyalty, imposed upon them a common discipline, and conferred upon them common rewards and satisfactions. So too it has been with the other sciences which have emerged in the last few centuries. Each owed its birth to the formation of a special community of inquiry peculiar to itself. One man is not enough, no matter what his genius. Only when others catch his fire and his vision and join him to labor in a common quest for understanding does a science come into being.

The same aspect can be seen in the educational process by which each science reproduces itself and maintains itself from one generation to another. This process is very different in nature and character from what is commonly supposed. Many people look upon science as a sort of vast impersonal mechanism which people can be trained to operate as they would a lathe or a locomotive. It is thought to be a self-correcting procedure which automatically generates infallible information about nature by the application to phenomena of a mechanical process known as "the scientific method." Nothing could be further from the truth about science as it is known from the inside to those who live it and do it. Education in a science is a gradual process of incorporation into a community. The process, to be effective, must expose the student to the spirit of the community so that he becomes infected by it. He must, of course, master a large body of factual material and acquire many specialized instrumental and intellectual skills. But much more than this, he must somehow come to share the characteristic viewpoint and attitude toward phenomena of his science. Through intimate continued contact with his professors, he discovers how they react to the frustrations and ambiguities of research, becomes aware of the sources of their confidence in the ultimate fruitfulness of their enterprise, and learns how to subject himself to the rigorous discipline which the enterprise entails. He must hear too about the great personalities in his science, and this must include not only their scientific achievements but also tales and yarns about their foibles, personal peculiarities, and escapades as well. Gradually he comes to share in the sense of adventure, the excitement of discovery, and the hope in triumphs to come which energize the community. Ultimately he reaches the point at which both he and his professors recognize that he has become one of them. He is a physicist, or chemist, or psychologist. Not only does he feel himself to be one, but when he goes to a professional meeting he finds that others instinctively respond to him as such. He has been incor-

porated into the community.

Those who look on scientific education as a purely mechanical process of imparting information and skills often fail to see the importance of research and to argue in favor of dispensing with the thesis requirement. But when we think of graduate education as incorporation into a community, this matter emerges in a different light. For it is only in research that the student can be confronted directly with nature on his own and, under the watchful guidance of his professors, discover whether he too really can possess the intuitions and ingenuity, the discipline, and the confidence and faith which give the community its power to grapple with nature and emerge with new understandings. It is only in carrying out research on his own that the student can feel, and others can realize, that he has indeed become himself one of them, a full participant in the life and power of the community.

These examples will perhaps serve to make it clear what I have in mind when I speak of "science as community." The idea is summed up cogently and effectively by Dean Schilling:

> Science is communal. The science community has the usual attributes that characterize other kinds of communities. It has its own ideals and characteristic way of life; standards, mores and conventions; language and jargon, signs and symbols; professional ethics and moral code; authority, controls and sanctions; institutions and organizations, means of communication and publications; creeds and beliefs, orthodoxies and heresies; politics, pressure groups and maneuverings; schools of thought, divisions and schisms; personal loyalties and rallying cries, jealousies and hatreds; fads, fashions, and fancies. (H. K. Schilling, chapter in preparation for *Teacher Education and Religion,* project publication.)

Science and Religion

A number of the contrasts which are frequently made between science and religion are seen to be either wrong or irrelevant as soon as the true nature of science as community is recognized. Consider, for example, the common assertion that anyone can demonstrate the truths of science for himself, but the tenets of religion have to be accepted blindly on faith. Anyone who has ever taught a science knows how few people there are who can really demonstrate a scientific truth to their own satisfaction. How many, for example, can demonstrate to their own inner satisfaction that the acceleration due to gravity is 32 feet per second per second? A long, hard educational process is required during which a person must freely submit himself to a rigorous discipline and ardently desire and believe in its outcome before he can acquire for himself the power to demonstrate the truths of science to his own satisfaction. Indeed this process is none other than that which we have just described as the process of incorporation into the community. Only by becoming a physicist can he possess for himself the capacity to demonstrate the truths of physics to his own satisfaction. But this indeed is precisely the same case with Christianity. The Church too is a community whose distinctive life and unique power of understanding can only be shared by those who have subjected themselves to the full process of incorporation into that community. Only those who have really done so can know the profound truths to which she bears witness. Only Christians can demonstrate the truths of Christianity to their own satisfaction.

The truth of this simple fact can be seen by considering the problem of popularizing science. There is a radical difference in communication when I as a physicist present a paper to fellow physicists at a meeting of the American Physical Society, and when I give a popular lecture on some aspect of modern physics to a general audience. In the former case a minimum of words suffices for a maximum of communication. Nothing can compare with the high level of appreciation which such an audience has to offer for a really good piece of work well done, nor with the incisive and penetrating criticism which it exercises in response to poor work. But in the latter case no amount of ingenuity or care can achieve any real sense of having really put across the point. Most particularly it is quite impossible to convey to a general audience the peculiar mixture of tentativeness and confidence which physicists instinctively feel about the knowledge they have gained. This situation is, however, in my experience not confined to science. In exactly the same way I experience the same contrast when I speak concerning the Faith to, on the one hand, a group of fellow clergy or theologians, or, on the other, give a lecture on Christianity to a random academic audience. Such experiences have convinced me that the only way to really know the truth of physics is to become a physicist, and the only way to really know the truth of Christianity is to become a fully-committed Christian.

This last point suggests another contrast which is frequently made, namely, that science deals with public knowledge, while on the other hand religion is confined to private, subjective knowledge. This again reflects not so much an insight into the proper nature of either, as it does a prejudice peculiar to the twentieth century cultural context. It is true that when I give a popular lecture as a physicist, I can count on having an audience which is completely sold in advance on the validity, importance, and undeniable truth of the enterprise of physics as a whole. Moreover, the idea that I might speak of a private physics of my own would not even occur to them. I have never yet been called upon by a modern audience to defend myself or explain what possessed me to embrace physics. It is equally true that whenever I give a popular lecture on a theological topic, I can count on having an audience equally convinced in advance that religion, although possibly proper, respectable, and even admirable, is nevertheless a private peculiarity of individual people and therefore essentially unreal and invalid. Here the idea of a catholic faith which is the common public witness of the whole body of the faithful through the ages is alien to contemporary ways of thinking about Christianity. I can almost always count on being called upon by puzzled people to explain what possessed me to embrace such a faith with the degree of seriousness implied by my taking

Holy Orders.

In this sense it is true that in the twentieth century science is public knowledge, and religion is private. But it has often struck me that, had God given it to me to live in the sixth century or even the twelfth instead of the twentieth, the situation would have been exactly reversed. Then when I spoke on Christianity my audience would have been convinced in advance of the complete validity and universal truth of what I represented, and it would have seemed completely natural that I should want to be a priest of the Church. On the other hand, if I then spoke as a physicist no one would have thought it important or real, and it would have seemed quite unaccountable that a man should throw himself whole-heartedly and zestfully into such an enterprise. In the sixth century Christianity would have represented public knowledge and science would have been called private knowledge.

Another way in which these two fields are frequently contrasted is the assertion that science is based on facts whereas religion must be taken on faith. Such an assertion is quite as untrue from the standpoint of the basis on fact as it is from that of the dependence on faith. In the first place I can bear witness from my own experience that I had just as much sheer factual material to learn and digest in my preparation for Holy Orders as I did in obtaining my doctorate in physics. The range of subject matter from modern Biblical scholarship, through church history and liturgics, to moral and dogmatic theology represents a most extensive factual base upon which Christianity rests. It requires prolonged and disciplined effort to achieve a thorough grounding in Christianity.

Faith, on the other hand, is just as essential an element of science as it is of Christianity. This is perhaps a much more difficult point to grasp adequately than the other. The reason, I believe, is the common misconception of science which regards it as a self-regulating mechanism which automatically produces information when the crank of scientific method is turned. Very little faith would, of course, be required for the operation of such a mechanism. But science, as we have seen, is not at all that kind of affair. The investigator confronting nature directly finds nothing resembling the smooth, ordered, lawful behavior depicted by the textbooks. What he finds instead is, in Conant's apt phrase, the downright "cussedness of nature." A crucial experiment successfully performed is a major achievement which only fellow scientists who themselves have met nature face to face can fully appreciate. Scientific research is a tough and unrelenting business. Only those who enjoy a firm and unshakable faith in the ultimate intelligibility of the chaotic torrent of phenomena in terms of underlying laws and universal principles can possibly stand up under it and carry through with it successfully. Often students discover when they leave the textbook stage and try to grapple with nature directly that they simply cannot believe that they can derive anything orderly and dependable and sure from their experiments. When this happens all they can do is change fields. Without such an abiding faith, it is simply not possible to become a part of the community. The acquisition of such a faith is the prime requisite for the process of incorporation into the science community which we described earlier.

It is a mistake to think of apparatus smoothly grinding out data in accordance with the regularity and dependability of natural law. The common experience with apparatus is rather that one could only conclude that it was under the control of gremlins bent on defeating the experimenter. The inexperienced may even develop a psychological block against making a run on even very fine apparatus for fear that it will not really work for them. In contrast there is a wonderfully inspiring quality about the really competent investigator in the sure and confident way in which he can throw a piece of apparatus together, get the bugs out of it with an intuitive feel for them of the most extraordinary sort, and soon have it working and giving data which surely reveal hidden and unsuspected regularities in nature. He is light-hearted and confident about his work and can approach the laboratory with an air of sure mastery which is wonderful to behold. The faith on which this confidence rests is clearly a gift which others may catch from him as they would an infection, but which otherwise cannot in any way be mechanically taught as one might teach a subject or a technique. But this is precisely the reason why physics is in its essence much more a community than it is a subject.

It is much the same with that community of the faithful in Christ called the Church. The world as we experience it directly does not seem at all the kind of world which the Christian God would create and govern. In the torrent of events in which we are all caught up there is such a mixture of evil, misery, cruelty, and injustice that disbelief in the Christian assertions about the nature of the reality which lies at the heart of events is easy. Yet here, too, faith in the God of goodness, mercy, and love—and of wrath and judgment too—who has revealed Himself in Christ, is the prime requisite for incorporation into the Christian community. To those within this community who have been given such a faith, the world takes on a different aspect and is seen with new eyes. It provides them with a firm foundation on which to stand and a fresh vantage point from which to look out upon events. Just as the faith which is essential to the fruitful pursuit of scientific inquiry endows one with the power to uncover and make manifest an underlying order and regularity behind the surface turbulence of events which subjects them to the rule of universal law, so also does the faith which is essential to the fruitful pursuit of the Christian life endow one with the power to know and respond to the hand of God behind the same events which subject them to the rule of His providence and judgment.

Orthodoxy and Heresy

One of the assertions in Dean Schilling's description

of the characteristics of the science community which I have found to cause the greatest resentment is that this community has its own creeds and beliefs, orthodoxies and heresies. Let us see in what way this is true of science. In my own field of physics it is a common experience to receive privately published papers which develop all kinds of strange and bizarre theories about everything from the electron to the universe as a whole. When I was a professor at the University of Tennessee, the department kept such communications in a "quack file." To the non-physicist they have as bona fide a ring as a paper in the *Physical Review*. But to physicists they are immediately recognized as fundamentally different. They constitute in the strict sense of the word unorthodox or heretical physics. In subtle ways impossible to describe clearly to the world at large, they violate everything which has given the physics community power to slowly and painfully acquire real and dependable insights into the nature of things. They are lone wolf enterprises unchecked by the discipline of the community and unsupported by an essential loyalty to the enterprise of physics as a whole. Most often the authors of these papers are completely oblivious to these elements and suffer from a deep sense of persecution. They cannot see why their theories have not been given an equal hearing with those of accepted physicists. They cannot understand why the community consistently and repeatedly rejects them.

Orthodoxy and heresy are words which have acquired bad connotations in modern ears. As a result their nature and meaning has been widely misunderstood. Every community must have them in order to be a community at all. Even a street-corner gang has a collection of crucial loyalties, values, beliefs, and standards which represent orthodox behavior for members of the gang. A heretic who fails to share any of these and rebels against the communal requirement of assent to them must be expelled from the gang. If he is not, the gang will soon disintegrate and disperse. So too with both science and the Church. There are certain essential attitudes, loyalties, convictions, and devotions without which either community would lose its special source of power, vitality, and integrity. These represent the orthodoxy of the community. These are really crucial to the health and welfare of the community. If it fails to preserve them, it will degenerate into a mere institution or organization, powerless and ineffectual.

Every science has had its heretics. For the most part, as in the case of Christianity, they dry up and disappear, being powerless to attract others into their fold. Science is not yet old enough to have produced many heretical offshoots with power to grow into significant schismatic bodies. But this was true of the Church too. It was only in the fourth, fifth, and sixth centuries that the great Arian, Nestorian, and Monophysite heresies arose. There are, however, two very apt examples of such scientific heretical movements today. One is represented by the osteopaths as a schismatic heretical body attached to orthodox medicine, and the other is the science of parapsychology devoted to the investigation of the so-called psi-phenomena which is a heresy of orthodox psychology. A study of either of these two contemporary movements can be very illuminating in revealing the true character of heresy in general. For example, the long struggle waged by the osteopaths in state legislatures to achieve legal equality with medical physicians has many parallels in the legislative history of the struggle for religious toleration. In the case of parapsychology, it would be most illuminating to those who like to think of science as an impersonal mechanism which automatically follows wherever the evidence takes it, to study the reaction of orthodox psychology to this field of investigation. (A study of the group of articles in the January 6, 1956, issue of *Science*, Vol. 123, pp. 7-20, will be found most instructive in this connection.) A number of leading psychologists in writing on the subject clearly indicate that their objections to telepathy and other psi-phenomena are based on something deeper than mere statistical evidence, so that even if the evidence were proved statistically sound and unimpeachable they still would not believe it.

Conclusion

All of this has a bearing on the widespread notion that religion necessarily imposes a rigid straight jacket on the intellect in contrast to science which is intellectually free and unhampered by any authority. In my own experience of incorporation into both communities, such a notion is completely false. In both cases it was necessary first to accept and willingly conform to the discipline of the community and to respond to its authority before the community could bestow upon me its power of liberating the intellect to carry out really fruitful inquiry. The tendency is to completely underrate the toughness and difficulty of really fruitful intellectual activity in either science or theology. Without a firm foundation on which to stand, one simply cannot grapple with experience in the tough and sturdy way which is required for real understanding. But such a platform cannot be had apart from the discipline and authority of the community. A completely free intellect operating in a lone and isolated self cut free from every tie which binds into community is an impotent thing tossed to and fro by every wind and wave. I could not even begin to do physics until I had given myself fully and freely to physics. Neither could I begin to do theology until I had given myself fully and freely to Christ in His Church.

The authority and discipline which every community exercises over its members represents at once the primary source of its power and vitality and at the same time its most fearful danger. When the community is dynamic, vigorous, and full of vitality, its authority and discipline are so gladly and spontaneously accepted by its members that they are scarcely conscious of it. This is the case with science today, and it has been the case with the Church in all of its past periods of greatness. The vitality, genius, and brilliance of the intellectual

activity of the Church during the fourth and fifth centuries matches that of theoretical physics in the nineteenth and twentieth. If one wishes to really understand authority, discipline, dogma, and orthodoxy in the Church in a way which brings out their necessary character and fruitfulness, one must turn to such a period in Her life as that.

The nineteenth century enlightenment had a corrosive effect on the Church, and we are just beginning to emerge from the deadness and sterility which resulted. The great difficulty in talking about Christianity today is that it is this nineteenth century image and vision of the Church which is predominant in the minds of contemporary audiences. When the power and vitality is sapped out of any community so that there is left behind only an empty institutional shell, the imposition of its authority and discipline and the maintenance of its dogma and orthodoxy does become an evil and obnoxious thing, stultifying the intellect and imprisoning the soul. But it is then no solution to simply discard all these elements, for to do so will only leave the community powerless to bestow any powers or capacities at all upon its members.

I trust that this brief review of the elements of science as community may have served to introduce to you an essential aspect of science, and of Christianity too, which is widely ignored and neglected in many contemporary discussions of science and religion. The factual and conceptual content of each of these fields is certainly important and relevant. Indeed, the resolution of the tensions and conflicts between these two bodies of knowledge is perhaps the primary intellectual and scholarly task and challenge of our time. Moreover, it is a task of such difficulty and magnitude that several generations of dedicated effort by the best minds we have to offer may be required for its completion. The point of my remarks here has not been to underrate or gloss over in any way the importance or relevance of this task. But at the same time I am convinced that the task simply cannot be carried out at all if we continue to ignore the surprisingly close analogies between the two communities of inquiry and understanding by which these subject matter contents have been produced. My plea is simply that one must recognize first, before even starting on the task of content resolution, that in its most essential and elemental nature science *is* community and Christianity *is* Christ and His Church. If I have succeeded in even suggesting the possibility of the truth of this assertion in this brief address, I will have achieved my objective.

Science for Liberal Arts and Preministerial Students*

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The teaching of science from a Christian perspective to non-science majors presents a real challenge. The increase in scientific knowledge, the trend toward specialization in the sciences, the wide variation in student background, and the limitations in personnel and budget in the smaller colleges, all create problems for the science teacher. To meet these needs it may be necessary to seek a new approach to the teaching of science, keeping in mind that our knowledge of nature is dynamic and progressive rather than static. Instead of approaching the relation of science and theology from the viewpoint of the historical conflict, we should emphasize the transcendence of Creator over creation, and at the same time the high purpose and goal of man as seen from the perspective of eternity.

The scope of science is expanding today at an almost explosive rate, placing increasing demands upon the teacher who conscientiously tries to keep up with new developments. However, it is possible that we in science education are so occupied with keeping ourselves abreast of scientific developments in an ever-broadening field and with preparing the science majors in our collegiate institutions for graduate and professional training that we neglect the students in our "humanities" curriculums and pre-theological courses. We "prune" our science courses here, "soup them up there," add a two-hour course here and a seminar there so that our majors get "accepted" and we smugly pat ourselves on the back as we draw from the professional schools such ego-flattering comments as, "That little college down there in East Cupcake really turns out some terrific science majors." And all the time this same college is supposedly doing its duty toward the non-science majors by having them elect 12 hours of biology, chemistry, physics or mathematics; these students often "satisfy their science requirements" with a few courses like Astronomy for Beginners, Introductory Mathematics, Bird Study, General Science, and Elements of Geology. They then presumedly are prepared to cope with the rigors of the scientific age, to teach social studies or art to students who have been conversant with neutrons, DNA, and radio-carbon ever since taking a TV science course in the fifth grade, or to deliver from the pulpit sermons which are "enriched with illustrations drawn from current science."

The situation just described may be somewhat exaggerated, and there are certainly many good institutions where this charge could not be laid. However, it would be a good thing if those of us who are involved in

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Christian education would take a critical look at what we are providing our non-science majors from our science departments. Are they taking with them from our laboratories scientific attitudes, scientific principles of problem solving, a Christian perspective of science? Have they learned such basic concepts as the nature of matter, what life is, how life reproduces itself, the nature of energy, and others? Have they gained a healthy view of what science really is as well as what its admitted limitations are? Have we led them to realize that our knowledge of nature is dynamic and progressive and not a static assortment of so-called "scientific laws" to which we ascribe a sort of sacred immutability? Are they taking from our laboratories more than just assorted facts and figures?

Values of Science for the Non-Science Major

What are some of the values to be gained by the non-science major in his brief sojourn in our laboratories? One way to arrive at some of these values is to examine a definition of science. Nobel prize winner Williard Frank Libby (1) has defined science as the ciplined observation of nature and the deduction of natural law therefrom. The scientific method consists in the impersonal recording of natural observations, the reporting of the same, the checking of the observations of others, and the deduction of the broad general principles revealed thereby. All of this is based on the assumption that an observation made at one time and in one place will be reproducible and can be made at another time and place."

One of the implications of this definition is that in science one must be willing to look at facts and measurements with an unbiased mind. It is just as important to be willing to have a hypothesis proved wrong as it is to have it proved correct. Indeed, possibly one should even try to be proved wrong. The body of scientific knowledge is advanced and enhanced just as much by disproving incorrect theories as by proving correct ones. This attitude of striving to be unbiased and of being just as willing to be proved wrong as right is one which can with great value be transferred to disciplines other than science.

Another value of science implied in Libby's definition is the opportunity it affords the student to sharpen his powers of observation and discrimination. Proper scientific training emphasizes accuracy in making and recording observations; it stresses the importance of careful discrimination, logical reasoning, and keen insight. When these traits are cultivated in our science courses they become valuable tools for the student's use in other areas.

Still another value of science is the training it gives in the ability to make logical inductions from the observations made during the investigations. The student learns that these inductions are not necessarily immutable laws, but that they are principles which may need to be modified as he makes more observations and as his observations become more accurate.

In addition to these there would seem to be some other values which the Christian student should find in a knowledge of science. The study of the physical sciences will give the student an understanding of the nature of the physical world about him. A study of the biological sciences will help him to understand the nature of the animal and plant worlds in which he lives and if these courses are taught from a Christian perspective the student will come to see the transcendence of man over the rest of creation. Then as he increases in his knowledge of the fundamental structure of matter, of the nature of life and of the structure and organization of the universe, his appreciation and respect and trust in the one who is the maker and sustainer of all these things, will increase accordingly.

Although this paper is concerned with science primarily in its more limited scope—the biological and physical sciences—it should be pointed out that the values and objectives of science stated above also can be achieved effectively through the social sciences. Furthermore, it is through the study of the social sciences that man becomes aware of his relation to his social environment and the interaction between himself and his fellowmen. Thus through the sciences in their broad sense man is made aware of his total environment and of his relation to it.

This list of values of science does not presume to be exhaustive and there may be some important values which have been omitted entirely. However, they are typical of the types of values which we like to think of as outcomes of our science courses. The question now arises: does the humanities student or preministerial student who comes to our smorgasbord of science offerings to elect a few hours for his science requirement really have the opportunity to acquire the methods and tools which we feel are important outcomes from the study of science? Certainly no one course will meet all of these objectives nor would any hit-or-miss assortment of courses likely cover them. Possibly we will need to give more attention to the matter of the science curriculum and even outline for the non-science major a science course or curriculum which we believe will meet the objectives which we have in mind for him.

Problems in the Science Curriculum

At this point I should like to raise several more questions. First, does the title of this paper, "Science for Liberal Arts and Preministerial Students," infer that the science courses for non-science majors should be different from the science courses taken by our science majors? For example, should we have one biology course for biology majors and one for other liberal arts students? Should we have a chemistry course for chemistry majors and another more watered-down chemistry course for our non-science majors? Or is there some way in which we can meet the needs of both groups by a single course and thus conserve personnel, time, and educational facilities? Second, how can we possibly cope with the current growth and magnitude of science as the

body of scientific knowledge grows and the number of different scientific fields proliferates? It has been estimated that the body of scientific knowledge doubles every ten years. One almost despairs and wonders how it is possible to include anything worthwhile in 12 or 15 credit-hours of science. Still a third question is how to handle the problem of integrating in our basic science courses students with such widely varying backgrounds of pre-college science—some with several years of mathematics, chemistry, etc., and others with almost none. These problems are accentuated in the small college.

1. In the first place I believe it is possible by careful planning and by good teaching to meet the needs of both the science and of the non-science major at the same time even in spite of the great proliferation of scientific knowledge. This may require the elimination of some of our time-honored courses in the sciences and it may mean the substitution of some new courses which we are not currently offering. These new courses, which we could call concept-centered courses, would include the basic ideas and principles that we are trying to get across to all of our students, science majors as well as non-science majors. These concepts, such as the nature and relation of matter and energy, the nature of life, reproduction of life, history of the earth, response to stimuli, etc., not only constitute the type of material that humanities students should become acquainted with, but also form the foundation upon which majors in biology, chemistry and physics should be built. Some entering freshmen will certainly be familiar with many of these basic principles, but the repetition of such foundational material would seem to be excusable.

Another way of helping students attain a broader background in science is by the assignment of supplementary reading. The "paperback" publishers have made available some stimulating titles in the history and philosophy of science as well as some excellent syntheses of recent developments and concepts in chemistry, physics, biology, sociology, psychology, and other sciences.

2. We must continue to up-date our science offerings and revise our curriculum. Someone has likened college curricula to cemeteries which are continually being added to, but from which nothing is ever removed. What very often happens is that a new professor comes into a department and brings with him some course which he particularly likes to teach and which he feels should be in the offerings, and so his course is added. Finally the professor moves on and the course remains in the curriculum indefinitely. Sometimes by careful study and arrangement it is possible, instead of adding a new course, to incorporate some of the subject materials of that course into our current offerings.

3. We need to revise our courses continually. We should remove out-dated material and material which is not fundamental or of lasting value. On the other hand we must work into our courses new material such as the new ideas and results of our nuclear and space programs as well as medical research. Many times the new materials can be incorporated by using them as new illustrations of old principles; sometimes, however, they must be added as the revelation of new basic principles. Too often this revision of courses amounts to little more than writing some of this new material into the margins of our lecture notes or stapling clippings to our notes and adding it as a postscript to our basic lecture. It is of far greater value, even though more time consuming, occasionally to reorganize and completely rewrite our lecture notes in the light of recent research.

4. If we are going to make really valuable the few semester hours that our humanities students and preministerial students spend in our laboratories, we should use our very best teachers at this basic level. It is unfortunate that some colleges and universities put their freshmen teachers to work practicing on the freshmen courses in biology, chemistry, or physics. We should pack into these few hours the very best instruction that our science departments can give. We should do all we can to make these basic concepts simple, clear, and even thrilling. This requires the skill of a first-rate teacher who himself is thrilled with what he has to teach. Furthermore, brilliant young students will turn to the sciences or stay in the sciences rather than another profession only if science is more interesting and exciting than any other profession.

Closely related to this is the matter of team-teaching. If we should go to the concept-centered type of course such as, for example, a course entitled "The Nature of Matter and Energy," we would want to call in our top chemistry professor, a physics professor, and possibly even a biologist who has a radiobiology background. These men would then form a team to draw up the plan for this course and be responsible to teach it. They would possibly call in some other members of their departments as well in the final production of the course. A concept-centered course on "The Nature of Life," as another example, might call in not only biologists but a biochemist, a psychologist, and a physicist; by thus bringing together men from these various fields they would be able to approach this concept-centered course from several viewpoints and would be able to provide a course which would be broad in scope, yet integrated and characterized by a minimum of overlap in material.

5. A still broader concept of this team idea which would considerably enhance the impact of our science courses for the non-science major would be an increase in conversation between the various academic disciplines. There should be more fruitful intercourse between the humanities and the sciences. Sometime ago Dr. James Killian, in addressing a meeting of the American Academy of Arts and Sciences, was stressing the danger of cleavage in academic circles between the scientists and the humanists. He made the following statement (3): "This attitude toward science is described more bluntly in academic circles by well worn observations.

One of them notes that the scientist knows nothing of the liberal arts and regrets it, while the humanist knows nothing of science and is proud of it. The other reports an incident in a liberal arts faculty meeting. When a student named Cicero was reported as having flunked Latin, everybody laughed, but when a student named Gauss was named as having failed in Mathematics, only the science professors laughed." Certainly much tension and misunderstanding and many rash statements by both scientists and theologians would have been avoided in the past had they been more willing to sit down together and openly discuss their ideas together with an aim to understand each other's viewpoints as well as to proclaim their own. It would be of great value for our humanities faculties to know what we are teaching their majors and for our theology faculties to know what we are teaching their preministerial students, and we likewise would profit by knowing what they are teaching and by understanding their viewpoints.

Science From a Christian Perspective

Finally, in the teaching of science to humanities and preministerial students in the Christian college, no matter how the science requirements are organized, the material must be taught from a Christian perspective. This will mean more than occasional sermonizing. It will mean that a Biblical philosophy of science will form a foundation which gives purpose and meaning to the objectives of the various courses in the curriculum. It may be valuable for every science faculty to draw up a statement of its philosophy of science. Such a statement would likely differ for each institution and would reflect the thought and personality of the various science teachers.

Among the postulates which could and possibly should be included in a statement of a Christian Philosophy of Science, I would submit the following as suggestive:

a. God, the Creator, is transcendent over His creation, the ultimate cause in nature, and the ultimate source of truth.

b. God has revealed himself not only through the revelation of Scripture but in nature as well; thus the Word of God and scientific truth have an ultimate unity as a consequence of the unity of their source.

c. Man was created by God and was so endowed physically and rationally that he could comprehend and enjoy the creation; he was commissioned to subdue and assume dominion over the creation and to develop its resources for the good of man.

d. When man rebelled against God, he passed under condemnation; nature also became involved, and presents today, as Erich Sauer (2, p. 57) states, a "mysterious hybrid disharmonious condition, which in its conflict between happiness and unhappiness, wisdom and absurdity, purposeful adaptation and confusion, seems to render equally impossible both faith in God and denial of God." God's plan for the redemption of man includes the ultimate redemption of nature.

e. The Christian carries not only his commission as man to have dominion over material creation, but a new commission as redeemed man to proclaim the Gospel of the new creation in Christ Jesus.

If some such statement of philosophy forms the background of the objectives for our science courses, they will take on a religious perspective that will give meaning and eternal value to our teaching.

What shall we teach of the relationship of theology and science? Is there something of value to be gained by the student in following the history of the conflict between science and theology? How shall we handle the theory of evolution in a Christian college? Here again there is possibly no single answer which will be satisfactory to all science faculties. It is difficult enough to find a good measure of unanimity within one faculty.

It is my own opinion that there is little to be gained by the average humanities student in making a historical study of the science-theology conflict. The value might be greater for the pre-ministerial student. It would seem, however, that it is more stimulating to make a positive study of the relation of science and theology. The student could be encouraged to make such studies as the meaning and method of creation, the place of man in creation, the importance of creation to Biblical faith, the Christian meaning of creaturehood, revelation and creation, the relation of scientific truth to religious truth, the transcendence of God. The more we can emphasize synthesis and harmony and deemphasize conflict between science and theology, the more we will build faith in our students.

As to evolution, we must see that the student knows what evolution is, what it purports to explain and what it does not. We must be thoroughly honest in showing the evidences for as well as against evolution. The student should be made aware of the possible mechanisms for evolution and their limitations. If in our teaching we denounce evolution as an explanation of origins, we must be prepared to offer something better and more reasonable in its place. We dare not "pull the rug" from under our students and leave them with nothing on which to stand.

Summary

In conclusion, our science departments dare not neglect the needs of humanities and preministerial students and leave them to feed on the husks of our science offerings. We should see in this group of students not only an opportunity to enrich their lives and improve their service, but also to be stimulated ourselves. Furthermore, science students will likely continue to be a minority, so here is an opportunity to communicate to a majority of our college graduates some of the concerns and values which we hold as scientists. We must give more attention to planning our basic courses so that, if

possible, they can serve the needs of both groups at the same time. We must continually up-date and upgrade our courses and use our best teaching manpower in the most efficient manner. We must endeavor to approach every science course from a Biblical foundation and give it a spiritual perspective. We must strive to build a positive relation between science and theology and to be thoroughly honest and constructive as to the theory of evolution.

I would like to close by emphasizing that the key to the whole matter is good teaching—excellent teaching—teaching that will impart not facts alone, but enthusiasm for learning; not just knowledge, but the desire for understanding; not only an acquaintance with science, but a romantic experience that will grow ever deeper, richer and more thrilling.

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Heredity and Human Behaviour*

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Human nature is conditioned by heredity, physical environment, and culture. There are many different genetic causes of mental retardation, thus indicating that many genes are necessary for "normal" mental function. Recent research is directed toward the role of genetic factors in human behavior. Some implications of these observations are suggested.

structure of hemoglobin. Many of these techniques are applicable to the investigation of human behavior (5).

A standard method of approach is to select a group

Man's Uniqueness

Man is different from animals in many ways but not in being free from the laws of heredity. Rife (13) lists the unique features of man as a larger brain which enables him to dominate all other animals, language ability so that he can communicate ideas with his fellow men, the use of tools, invention of the making and use of fire, and the ability to be educated and pass on the culture of one generation to the next.

Bases of Man's Nature

What are the bases for these characteristics? Rife (13, p. 115) says, "Human beings are the products of biological inheritance, culture, and physical environment." Man's distinctive features are made possible by his genetic endowment, and certain genetic changes can drastically alter an individual's behavior pattern. One should not disregard the other two influences, however. Someone was asked, "Which is most important in making man, heredity, environment or culture?" and he replied, "Which is the most important leg of a three-legged stool?" It is the purpose of this paper, nevertheless, to deal primarily with the topic of inheritance.

Men are different from one another. They are hereditarily different. Their equality is before the law and their Creator, but not in their hereditary material. Hence, to study the nature of inheritance, we observe the variations in traits that appear among men and try to learn from such differences what are the hereditary factors.

The bearers of heredity are the genes, which act as a "code" to direct the formation of many different enzymes. These enzymes act upon the chemicals supplied through the embryonic environment, and the net result is a human body with certain characteristics or traits. We should realize that one gene may affect several characters, while several genes may have an effect on one character. Snyder (19, p. 8) states, "This point of view is especially important when it is realized that the environmental events intervening between gene actions and finished characters in man may range from such overt occurrences as trauma and infection to the most subtle embryological, immunological, and psychological phenomena."

Much of our behavior is controlled by brain physiology. To the extent that the brain is affected in development or function by genes, to that extent behavior is affected by heredity. To have a brain at all one must have "good" genes (and a suitable embryonic environment). If brain defect may be the result of "bad" genes, the converse is also true, that normal anatomy and physiology of the nervous system require "good" genes. We may learn about normal function by studying malfunction.

Methods of Studying Human Inheritance

The student of human genetics encounters certain problems. He cannot control mating nor standardize the environment. There is a long interval between birth and reproduction, so that the "generation time" is about as long as the research life of the investigator. The large number of chromosomes (46 per cell) makes the locating of genes on specific chromosomes difficult.

Fortunately, important advances have been made possible recently by new techniques (4). Computer programs now permit complex calculations upon large masses of data. Human chromosomes can be identified readily in white blood cells from tissue culture preparations. Biochemical studies have led to the identification of genetic enzyme defects and genetic differences in the

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of persons with a specific problem, such as schizophrenia. The frequency of the same condition among parents, brothers and sisters, and children can then be compared with what would be expected with different patterns of inheritance (1). The effects of family environment would often produce a different pattern, and this possibility can be tested as well. If the disorder being studied is a rare one, and if the affected children often have parents who are blood relatives, this information by itself is good evidence for a simple genetic cause.

The study of twins can also be revealing. Twins are called identical if they have the same sex and are similar in many traits, such as blood groups and eye color. They are labeled fraternal if they show differences. Identical twins are assumed to have the same inheritance from one egg and one sperm, but fraternal twins are the products of two sets of germ cells.

By comparing the occurrence of characteristics in identical twins with the occurrence in fraternal twins, we get a clue to traits which are inherited. If a trait occurs more often in both identical twins than in both fraternal twins, the trait is considered to have an hereditary basis. The text by Stern (20) has a very clear description of the logic behind such reasoning.

If a husband and wife have a child born without a brain, the likelihood of another brainless child is about three percent. However, it turns out that among twins "discordant identical twin pairs are almost the rule, that is, one affected and the other not. Even so, this does not dispose of a familial tendency; it merely shows that environmental peculiarity of some sort is necessary to evoke the reaction to which both twins must be susceptible" (10, p. 75).

A number of different twin studies have been carried out for schizophrenia, a mental disorder which occurs in about one percent of the population. Certain problems in the analysis of twin data have led to criticism of this approach, but Rosenthal (14) concluded that the total weight of the evidence from all studies still strongly favors the hypothesis of a genetic contribution to the etiology of schizophrenia. Among identical twins both members are affected in two-thirds of the pairs, while only one-sixth of fraternal twin pairs show the abnormality in both members.

Some may suspect that a similar environment has caused the appearance of mental illness in both of identical twins. But Stern (20, p. 580) reviews Kallmann's account of identical twins reared apart who both became schizophrenic. One worked in a factory and had an illegitimate child at the age of fifteen; the other was a housekeeper for a good family. The fact that both developed the disease in spite of different backgrounds suggests a constitutional weakness. Shields (17) studied a number of identical twins and found that in some personality traits those pairs reared apart were more alike than those reared together. It is possible that twins reared together develop somewhat different habit patterns in an attempt to establish a personal identity.

Mental Retardation

There are many different factors which can lead to mental retardation. Some of these may be classed as environmental—irradiation of the developing fetus, birth injury, or infection, for example.

In addition there are at least fifty different types of mental retardation which result from genetic causes (2, 16). A wide range of biochemical defects are included, involving the body's use of amino acids, carbohydrates, lipids, or hormones. Some types cannot be described biochemically as yet, but the family history shows them to follow simple laws of inheritance.

We are ignorant of the existence of a gene until we detect a mutation of it. Then we know that all along there was a "normal" gene in place of the new "abnormal" one. Thus, if hereditary changes are identified which lead to mental retardation, we are justified in saying that many genes are required for normal mental function.

An exciting break-through in recent years was the discovery of an explanation for mongolism, also called Down's syndrome. The size of the problem can be seen from the fact that among four million babies born in the United States each year about 8,000 will show the signs of this disorder (12). In 1959, French scientists Lejeune, Turpin, and Gautier identified the cause as an extra chromosome (number 21) in the cells of mongoloids. Normal babies have 46 chromosomes and mongoloids have 47.

What causes the presence of the extra chromosome? Apparently some process which accumulates with age causes non-disjunction, that is, puts an extra chromosome into a germ cell. The chance of having a child with Down's syndrome increases sharply with the age of the mother, reaching about two percent for mothers over forty.

Other mental abnormalities result from unusual numbers of chromosomes (8). Severe retardation accompanied by multiple physical defects results from an extra chromosome in the group numbered 13-15 or an extra chromosome 18. Men who have extra X chromosomes are retarded and have undeveloped sex organs.

Normal Intelligence

Stern (20, p. 590) summarized the studies which have been made on the response of normal individuals to intelligence tests. Identical twins (reared together) differed by only 3.1 points, as compared with an 8.5 point difference between non-identicals. Even identical twins reared apart have only a 6 point difference. A large part of the latter difference occurred in four pairs of twins who also had the most marked difference in amount of schooling. Stern concluded that the twin studies show: (a) that the I. Q. score is modified by differences in environment, and (b) that identical twins, whether reared together or apart, show greater similarity in I. Q. than non-identical twins reared in the same home.

Differences in Behavior

A number of studies have been made on the gross differences in behavior seen in the psychotic disorders such as schizophrenia and manic-depressive psychosis (12, 18). When all are taken into account, there is good evidence for genetic differences in ability to respond to environmental circumstances. Paul Meehl, in a presidential address before the American Psychological Association (9, p. 837), stated his personal conviction that psychologists will be able "to make a unique contribution in the near future, using psychological techniques to establish that schizophrenia, while its content is learned, is fundamentally a neurological disease of genetic origin."

Attempts to find a single biochemical change in *all* cases of schizophrenia have been unsuccessful. But there is growing evidence of unusual biochemical findings in a few psychotic persons (11). A different enzyme defect has been observed in persons who appear normal except for mild speech problems (6). We can expect to find a series of other biochemical causes for *some* cases of behavior disorder.

Another type of behavior problem is criminality. Stern (20, p. 605) concluded a discussion on this point: "The facts on criminality in twins actually show only that identity in genes plus the close similarity in social experiences, at least in early childhood, are more likely to bring both identical twins into prison than two nonidenticals . . . On the basis of present data, one cannot exclude the possibility that the higher concordance for criminality of identical twins is mainly, or even exclusively, the result of their more similar social experiences; nor can one exclude the opposite possibility that their higher concordance is mainly the result of their identical genotypes . . . If the present evidence is insufficient to indicate reliably that criminals are 'born,' it does point to a genetic component for the type of crime committed, if a crime is committed at all."

Some data are available on behavior differences among the general population. In his study of identical twins brought up apart and together, Shields (17, p. 156) found a significant resemblance between twins in both groups with respect to "intelligence, extraversion, neuroticism, and a variety of personal characteristics, ranging from voice and mannerisms to smoking habits." Gottesman (7) tested twins with two personality inventory tests and found an appreciable hereditary effect on certain of the rating scales. When the data were compared with the profiles for various psychoneurotic syndromes, the importance of genetic factors was highest for schizoid/schizophrenic reaction and anxiety reaction. Conversion reaction or hysteria rated the lowest. Vandenberg (21, p. 235) used a different battery of psychological tests and found that "hereditary factors play a role in many areas of human skilled performances, often in spite of the fact that these skills are highly practiced."

The experimental analysis of behavior differences is receiving a good deal of attention in the emerging field of behavior genetics (3, 5). It is clear that gentic factors are involved in behavior differences between strains of fruit flies, of mice, or of dogs. It is equally clear that behavior patterns may be conditioned and modified by early experience. In young animals, for example, there appear to be critical periods during which the basic social relationships can be established most readily (15). Such findings will give us new ideas and methods which can be adapted for the study of human behavior.

Some Implications for the Future

From this discussion, one can see the importance of biological factors in our understanding of the nature of man. The abnormal development of the nervous system or a change in blood chemicals can drastically alter behavior. Furthermore, there may be considerable inborn variability from person to person.

In a number of different aspects of behavior one's genetic endowment probably establishes a "repertoire" of mechanisms for reacting. Early environment is then crucial in permitting or restricting the actual expression of these ways of responding.

a) Such thoughts should sharpen the problem of human responsibility and sin. This does not mean at all that the power of sin is reduced. But it does suggest that our diagnosis of what constitutes sin in another person may not be as accurate as we assume. Is it not possible that for certain behavior problems a medical treatment is more helpful than prayer?

b) Further research into the complex interactions between heredity and environment should be encouraged. "The need for more and more knowledge concerning the genetic bases for human behavior provides the greatest challenge of all to the human geneticist" (13, p. 241).

c) Variability in human behavior is desirable. Certain severe disorders are clearly a problem, but aside from these there is no set of traits that is the best. Diversity should be accepted and encouraged.

d) Much work is needed to find ways of correcting the effects of gross behavior disorders. It is possible that different methods of education are required for different groups of children in order to help each child make the best use of his potential abilities.

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Comment On Behavior Genetics

. . . The work in this emerging field includes that of many scientists who are primarily geneticists as well as a number of psychologists. What seems to be emerging is a breed of scientists who are competent in both genetics and behavioral analysis—a situation which has been rare in the past and has resulted in many statements in genetics textbooks which are behaviorally naive, and a comparable situation in the psychological literature with relation to the mechanisms of heredity. The effect of the increased interest and effort in behavior genetics has not seriously altered our knowledge of the relation of heredity and complex human behavior, but it has resulted in a more cautious attitude about the conclusions which can be drawn from available data.

The main impact has been in the increased interest and activity in *experimental* behavior genetics . . . The important contribution of this emerging discipline, largely within academic psychology departments but also in some biology departments, still lies in the future. What is new then is not a new set of basic questions, nor even startling new methods for answering questions, but rather a greater awareness of the inadequacies of past studies and a concerted attempt to study the relationship between heredity and behavior in as rigorous and sophisticated manner as possible.

Behavior genetics includes studies of animal behavior ranging from simple sensory processes and reflexes to complex perceptual processes and problem-solving behavior. Some recent studies have added a new dimension to the study of heredity—behavior interaction by demonstrating the effect of environment on behavior previously assumed to be immune to specific experiential events. Thus experiences very early in life or even prenatal events have been demonstrated to have an effect on behaviors which were assumed to be primarily determined by inherited mechanisms. Sensory discrimination behavior, including sensory capacity, temperamental variability as exhibited in response to stress, and instinctual maternal behavior, has been reported to be altered as a consequence of early experience, and in some cases behavioral changes have been reported in offspring of organisms subjected to specific experiences. This is not to suggest that interest and activity is not also found in the investigation of the genetics of gross motor activity, emotionality, social behavior, intelligence, etc. Most of these studies are carried out with animals for the obvious experimental reasons, but usually on a background of an interest in understanding the genetics of complex human behavior . . . **Jonathan G. Wegener, Dept. of Psychology, Yale University.** (Comments prepared for discussion of Dr. Mixter's convention paper.)

The East Wind of Authority

WILLIAM J. TINKLE*

Christians were criticized by Thomas Huxley for accepting ideas on the basis of authority. Many people accept evolution as truth on the basis of what renowned scientists have said. They, too, are bowing to an authority, but at a different shrine.

Thomas Henry Huxley (1825-1895) the tireless preacher of good ethics and implacable foe of untenable theology, stated that his motive was "to learn what is true in order to do what is right." This, he tells us (1), "is the summing up of the whole duty of man, for all who are not able to satisfy their mental hunger with the east wind of authority."

This scriptural allusion is based upon Genesis 41:23, in which the king of Egypt tells his dream of stalks of corn which were made barren by wind from the east. Blowing over the deserts of Arabia, such winds became hot, dry, and parching to vegetation. Allusions to the Bible were used a great deal in the nineteenth century but now are understood only in religious circles, if even there. And it must be admitted that Huxley and his followers, by casting doubt upon the veracity of the Bible, have contributed to this ignorance.

Huxley had great faith in the ethical power of truth, as attested by the above quotation. There is indeed some correlation between truth and good conduct, but not many men have been thrust out as preachers of righteousness by learning new facts. One has to wonder if there is not another explanation of Hal Huxley's moral zeal, the fact that he attended church as a boy (2, p. 10).

In England in the middle of the nineteenth century, there probably was some justification for considering authority a withering force. Kerkut explains that education was controlled by the Church, with the aim of making the college student either a priest or a person useful to priests. Students learned to quote authorities without understanding them. Intelligent understanding was not required at all, but the student must not contradict nor even doubt the wording of time-honored masters. But Kerkut goes on to say that his students still quote authorities whom they do not understand; the difference is that now the infallible ones are the high priests of evolution (3, p. 3).

There still are many people, in this country and abroad, who accept a world view which they have not evaluated but have taken uncritically on the statement of people in high places. I do not make this observation about biologists and geologists; they found their conclusions on facts, but in my humble opinion they disregard some facts, especially newly discovered ones. Philosophers and theologians, however, seeing that these scientists employ evolution as a basic truth, do not have the courage to contradict them. In the minds of many people, accepting evolution is simply agreeing with science. This is nothing less than bowing to authority, which Huxley deplored. The same bow is made but at another shrine.

At the same time, these people who cannot feel intellectually respectable if they say "No" to a scientist are turning their backs to a group of the best science teachers in the nation; men who teach that creation is correct and evolution is wrong. Their teaching is approved in that their students go on to graduate school **and** do **well.**

Yarnold comes out boldly for evolution and cites some evidence, natural selection and mutation, but if he gave a full account of genes and chromosomes along with mutation the conclusion would be otherwise. The following quotation leads one to think that his decision was made by following the majority: "The claim that the early chapters of Genesis give a literal account of creation was consequently called in question and has now been abandoned by all *reputable* theologians." (6, p. 48, italics mine). Thus the evolutionists justify themselves and browbeat their opponents. Several times the statement has been made that all biologists accept the theory except the ones who are uninformed or prejudiced (4; 5, p. 59). Many people can not stand against this show of intellectual authority.

In a class in the university the professor said, "The facts of nature are the authority in this course." As one would expect from such a principle, the course was good. Yet facts alone do not guarantee that correct conclusions will be reached. After one has gone out and gathered all the facts he can find, one is just ready to begin the important task, which is to interpret them. Since the facts of nature are myriad, of many types, and have only a circumstantial bearing on some of our problems, it follows that any one of several interpretations is possible.

It is here that the solution proposed by some great man comes to our aid. But if we agree with his solution, perhaps we are not deciding according to all the facts but only a part of them; he has ruled that some of them do not apply. If some facts make problems they may be laid aside, awaiting a further investigation. He makes his theory or law on the basis of the facts which he likes, and we take the easy course of agreement.

Science is supposed to be the impartial interpretation of facts which have been gathered without prejudice. Do we always live up to this high ideal?

In Christianity we have revelation in addition to observed evidence. That revelation is preserved in a unique Book which, unlike the Medieval Church, does not set up unnecessary cosmological systems. Its authority is not like the dreaded east wind but rather the south wind, bringing sunshine and rain.

Let me quote again from Kerkut, whom all ASA members should read: "From time to time one must

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stop and attempt to think out for oneself instead of just accepting the most widely quoted viewpoint" (3, p. vii).

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Psychodynamic Insights In The Bible and Contemporary Psychotherary*

JAMES FORRESTER**

Biblical theology and contemporary psychotherapy stand in complementary relationship to each other. They converge in their mutual concern with the whole person, and the relationship between persons. The tendency of the empiricist to fragment man for study has been counteracted by the recognition that man functions as an organized unit with spiritual and psychological dimensions as well as the physical. Thus both psychotherapy and Biblical theology have much to contribute to an understanding of man, and each contributes to the other. The scriptures, for example, are enriched in meaning when approached with psychological understanding. It is important that the psychotherapist be open to the assets of Biblical theology and that the Christian be open to the assets of psychotherapy.

I want to congratulate those who conceived a program whose major focus is upon modern psychology and its relation to the Christian faith. In bringing the two disciplines of Biblical theology and psychotherapy together, we are looking at one of the critical areas of hope in our time. Despite the vast accumulations of non-human and non-value information through the physical sciences, we still recognize that the clue to the future is in this great "terra incognita" which is human personality and human motivation.

Complementary Relationship

This topic is an ambitious one; I address myself to it with some misgivings. The topic stands at the point of intersection of two disciplines which are separated by centuries. Biblical theology is the most ancient source of wisdom about persons which has profoundly affected Western culture. Contemporary psychotherapy is probably the newest wisdom to be brought to bear upon the complexities of human behavior. Each of these disciplines represents a vast area of possibility which no scholar in an age of exploding horizons can hope to investigate completely in a lifetime. By argument "a fortiori," an address of brief duration can at best be only suggestive. I will be well compensated if I can contribute any insights which will be helpful toward the acceptance of a complementary relationship between Biblical theology and the insights of contemporary psychotherapy.

Is it too much to hope that one discipline would shed light upon the other? Is the contemporary psychotherapist so closed to the value dimensions which come out of Biblical theology that he will deliberately exclude them? Is the contemporary Biblical theologian so prejudiced against contemporary psychotherapeutic insights that psychotherapy can contribute no wisdom to the expansion of his understanding of the Bible or of the human dilemma?

In this address I want to use psychotherapy as a broad term covering the psychological, clinical, and counseling therapies as they are used in social service, the pastoral ministry, and the healing arts. We limit our consideration to psychotherapy as related to problems other than those having a basis in gross organic pathology. We have no concern to isolate a particular emphasis or psychological school, or to settle debates between analysts, Rogerians, directive counselors, logotherapists, hypnotherapists, chemotherapists, or other emphases. We want to address ourselves to the broad understanding of psychotherapy.

Our purpose is to suggest that Christian Biblical theology and psychotherapy are valid and separate wisdoms with areas of proximate insight and concern. The axes of these two disciplines converge in the person. All human existence has psychological and theological implications. The concern is for wholeness and holiness.

Historical Perspective

Traditionally, there have been four disciplines which have been concerned with the welfare of man and the shaping of his personality. Education has directed its service to the minds of men, psychology to his emotions, medicine traditionally to his bodily ills or health, and theology to his soul. Of these disciplines, all but theology have disregarded the axiological aspects of human need. Theology, on the other hand, tended to abstract the soul of man from the totality of his being as if a soul were something atomized and separate from the rest of the person. There is now a general admission that man cannot be so clearly and precisely dissected. All the dimensions of man's being are seen as inextricably involved in interaction. Static and mechanistic views of personality have given way to dynamic and interactional theories.

Psychosomatic medicine has emerged as a legitimate child of an inter-disciplinary rapprochement. With the recognition on the part of clinicians that it is possible

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for the minister to bring some resources to bear on the total well-being of the patient, hospital chaplaincies are on the increase. In most seminaries today, ministers-in-training are required to take clinical courses.

During the opening decades of this century, Biblical theologians resisted with great emotion and much eloquence the reductionist and mechanistic interpretations of personality which characterized some of the psychological "schools." Some of this resistance rose from a sort of intuition rather than by actual perceptive procedures, but war was declared on both sides.

When at the turn of the century Dr. Starbuck began empirical investigations of religious conversion in the context of a culture affected by the "great awakening," he was unable to publish his book in the highly sensitized United States, so he thought it better to have it published in Great Britain. J. B. Watson, who is called the father of behaviorism, predicted that religiously supported morality would give way within fifty years to an expedient morality or an empirical ethic. The totality of human behavior could, from his point of view and from that of his colleagues, be reduced to conditioned reflex responses. Now we admit, after vast experimentation, that sensory motor concepts are of themselves too penurious to account for the complexities of human personality and for man's value structures and motivations.

Freud developed his pan-sexual concept as basic in understanding human motivation. He classified religion as the "universal neurosis." In his *Civilization and Its Discontent* published in English in 1930, he uttered his classic and blanket indictment of Christianity in these words:

> The whole thing is so patently infantile, so incongruous with reality that to one whose attitude to humanity is friendly, it is painful to think that the great majority of mortals will never be able to rise above this view of life. (3)

It must be remembered that psychology began as philosophy. Its method was introspection and discourse. It dealt with material available to consciousness. Then came the application of new insights derived from clinical situations, especially those insights involving the unconscious. The new concepts brought with them certain assets and certain inherent liabilities. Let me suggest three liabilities of which we have now become aware.

Liabilities of Empirical Methods

The first of these liabilities is the tendency to absolutize the scientific methodology, which has the effect of focusing an exclusive attention on all the quantifiable aspects of human behavior. Simultaneously, the non-objective, non-quantifiable value-dimensions of experience are discounted or avoided, and even the unifying core of human experience which we call the individual self is diminished to zero in psychological consideration, or it remains an embarrassment.

Religious behavior was not, therefore, a concern of the psychological approaches which were empirically developed. In psychotherapy, religion was no longer considered as a real factor in the patient. It was neither an asset nor a liability. It was just not significant.

Dr. Robert B. MacLeod, professor of psychology at Cornell University, made the following observation about this diminution of interest in religion:

> Since psychology became an empirical science, there has been little interest in the psychological analysis of religious phenomena. One can count almost on the fingers of one hand the really significant studies that have appeared. For the most part, the psychology of religion has been concerned either with peripheral aspects of religion, the peculiarities or curiosities of religious behavior, or with a more or less moralistic evaluation of the variable in character development. Chapters on religion are more likely to be found in books of the psychology of the abnormal, social psychology, mental hygiene, and psychological development or educational psychology. One looks in vain for such discussion in the standard works on the experimental psychology of the normal human adult. Why this neglect of such an obviously important field of research? (4, p. 10)

The answer is at least in part that an approach to all the complexities of human personality which assumes the only real world to be the world of observable phenomena, has a tendency to fragment men and then to concentrate only on the part of him which is amenable to methodology. It is fallacious to extend conclusions from the sectional analysis of behavioral phenomena to the whole complex of individual motivation.

In extenuation of this situation, one might say that "the price that is paid for any spectacular advance in human understanding, whether in science or in any other branch of human learning, is a narrowing of consciousness, a deliberate exclusion of alternative modes of experience and thought. One has, as it were, to squint and close the other eye in order to look down the microscope" (1, p. 6). That is to say that while we have concentrated on the empirically derived information, we have tended to be unaware of any other dimension. While we have been obsessed with the empirical, we have lost specific focus on the value dimension. Knowledge and wisdom, it has been said in our time, have separated. Yet this wisdom whose price is far above rubies which should concern us.

The second liability in empirical procedure is that many of the personality theorists have reached conclusions about healthy behavior which were drawn from their observation of psychopathological behavior. Some of these conclusions are valid, but, quite apart from the fallacious logical danger, there is a practical danger.

The higher forms of human achievement tend to be seen in terms of rather turgid origins. Through the process of reaction formation, of transformation and sublimation, the lower drives became the motivating force for even the highest levels of human achievement. Environment was the modifying factor; but in this procedure, the creative self was lost and a healthy self was not evaluated.

The third liability is that there developed, paradoxically, a concentration upon the individual as a passive and hence irresponsible resultant of past experiences and hereditary and environmental factors. That is to say, the discretionary function, if any, of the individual was

lost to view. This is actually scientific determinism in which the human freedom of choice is lost, in which right and wrong become blurred, in which any insistence on the Ten Commandments is irrelevant at best or, at worst, conducive to emotional illness.

In the past decade a healthy awareness of these liabilities has appeared among theoretical and applied psychologists, and in the therapeutic field. Men such as Gordon Allport, Angyall, Baruk, Caruso, Frankl, the late Carl Gustav Jung, Maslow, Mowrer, Goldstein, May, Tournier, Ernest White, and many others have swung the focus of inquiry to the non-pathological, self-actualizing individual. These investigators may have taken the first steps toward delivering us from these liabilities. Indeed, one of the interesting symbols in discussion in our time is that of the "higher unconscious" as distinct from Freud's and Jung's lower unconscious or subconscious. But the "person" is being recovered to view.

Assets of Empirical Methods

Now while we point at some of the disadvantages, we must affirm that there has remained from the empirical and clinical approaches to human behavior a great precipitate of assets. Freud, for example, out of his therapeutic enterprise, made an important distinction between the conscious and unconscious determinants of human behavior, a distinction which cannot be discounted. He made us aware of the disguised meanings behind much of the symbolic currency of our communication. He clued us in on the significance of dream material. He emphasized the importance of the emotional development of children in relation to the neuroses of adult life. Whatever we say critically of Freud, we must admit that his theories are still influential in contemporary therapeutic practice and theory.

The behaviorists pointed the way to the insight that some neuroses represent learned patterns of response. When this point of view predominates in therapeutic considerations, the procedure is to "unlearn" the individual and then to "recondition" him in terms of more adequate responses. There is an indication here that the cortical assets are brought into operation to a greater degree, and there are those who follow in the pattern of Dollard and Miller in making good therapeutic use of the educative process.

Then there are the field theories of Lewin and others which lifted the individual from his isolation and studied him in the dynamic context of his "living space" within the vectors of force which converged upon him. From such investigations psycho-socio-dynamic theories of behavior emerged.

The Gestaltists put an emphasis upon the innate propensity in man to perceive whole forms and thus to pass in his perception from the amorphous to the definitive. In achieving insight, so the Gestaltists discovered, there was an accompaniment of anxiety reduction.

Important as these and other hypotheses are, they are too parsimonious to account for all the rich complexity of human responses. Nevertheless, we now have an empirically eclectic possibility which has value in psychotherapy. It is at this level that we begin to discover an exciting correlation between many of the contemporary psychotherapeutic insights and those insights which have been known from Biblical wisdom.

In this maturing process of the psychotherapeutic discipline, personality has, to some extent, been recovered as an active entity in a total and dynamic interactional situation. Religious experience has come into better perspective. Any complete and objective psychological account of human behavior cannot perpetually avoid so universal a phenomenon as religious behavior. However, if religious behavior is only a phenomenon of human experience to be recorded and classified by a human observer who pre-judges its interior meaning to the individual, no satisfactory explanatory concepts or hypotheses are likely to be developed.

There are practical difficulties inherent in the highly individualized and subjective nature of religious experience which make controlled experiments difficult or impossible and hence leave the most likely theoretical constructs without empirical validation. The most probable explanatory concepts are those that can adequately accommodate the meanings which motivate the person observed and classified as behaving "religiously." To say this, however, implies a radical modification of methodology. Brown and Ghiselli in their book *Scientific Method in Psychology* (2) suggest that such a modification of methodology must be determined by three underlying factors: first, the nature of the subject to be studied; second, the nature of the specific problem to be solved; and third, the stage of inquiry at which we have arrived.

From the perspectives of evangelical and Biblical understandings we are forced to question the epistemological presuppositions which are tacitly assumed in the empirical methodology. The all-pervasive scope of the scientific approaches in Western culture assumes that information about the totality of existence may be acquired only by empirical investigation. For the purpose of such investigation then, all the dimensions of existence—if all existence is to be included—must be subsumed under but one category, namely, observable, quantifiable phenomena.

Dimensions of Existence

From the Christian standpoint, there are three dimensions of existence: (1) the dimension of things animate or things inanimate, (2) the distinct Biblical dimension of persons, and (3) the manifest dimension of God. The empirical procedures are adequate to ascertain truth about the universe of things; insofar as people can be objectified (i.e., considered as objects) and quantified, these methods can be applied to behavior. However, "persons," in terms of the "self" which is intuitively grasped as the unifying center of behavioral phenomena in both the intra-personal and interpersonal senses,

evade this kind of methodology. And again, since God as the Creator stands over against all phenomena, He is not discoverable as quantum. "Canst thou, by searching, find out God?" (John 11:7).* Paul wrote also that "the world failed to find Him by its wisdom." (I Cor. 1:21)*.

Let us look at persons. There is no debate about the appropriateness of the empirical method for the discovery of the physical universe, but there is a debate about the uncritical use of such a method with respect to persons. It is important that we be clear on this debate. We can understand people in two ways: objectively and scientifically, or subjectively and intuitively. Some languages betray this insight. The German equivalent of the English verb "to know" is not one word but two: "wissen" or "kennen." In French these are "savoir" and "connaitre." Spanish also has two words. Only in English is there but one.

Paul Tournier, the Swiss physician who has become involved in psychotherapy and in some theological articulation, suggests in his magnificent and timely insight that in knowing persons we must pass from information to communion. You can only *know about* persons from the empirical methods. You *know* persons in relational interaction involving the conative levels of being.

The total discovery of the person, then, is dependent upon the uncovering of one person to another in interpersonal communication; and this uncovering is on a different level from our empirical investigations, although the two would not necessarily be in contradiction to each other. So we can have explanatory theories about people, but we can only know them in personal interaction.

Now consider the third dimension of existence, God. If in the Biblical sense He is noumenal (spirit) and not phenomenal (thing), we can only *know* God in the sense of personal interaction. In His mighty redemptive act in Jesus Christ He has made Himself available for human communion, human fellowship, human knowledge, and human relationship (Phil. 2:5-11). The word *truth* used in the New Testament one hundred times is the antonym of the word *conceal.* "Truth" means what is revealed, so when the word is used in the statement "Ye shall know the truth and the truth shall make you free," it is not the empirical truth, it is not the discursive truth which is denoted. It is the truth of the revelation of God made available through a Person to persons in Jesus Christ.

There is a shift toward a wider epistemological tolerance emerging from the clinical areas of psychotherapy rather than from the experimental areas of psychology. Winkler argues that in any adequate theory of personality, man must be seen as "a person in the philosophic and theologic sense who relates as an individual to the transcendental reality. He can also fail and thereby produce something that could be labelled 'existential neurosis' " (6, p. 288).

The effect of this obvious shift is to bring the insights of contemporary psychotherapy into a more proximate relationship with Biblical insights. Both Biblical and psychotherapeutic concerns are focused upon man as a whole person. Specifically, they are related in some way to man's needs, his motivations, his life and health, his sickness and death, his conduct, his intrapersonal and his interpersonal relationships, his loves, his hates, his guilts, his anxieties, his value structures. The Bible and contemporary psychotherapy speak to us about these needs in proximate ways.

Biblical and Psychotherapeutic Insights

The Bible communicates a wisdom from God which is available to man for his redemption. Contemporary psychotherapy gives us a wisdom from men which is available for the alleviation of emotional disease. We believe there is no contradiction between these wisdoms. They are not identical; but proximate and complementary patterns have appeared which can be appropriated for human wholeness and human holiness.

To sustain this thesis, we turn to the Bible with psychological understanding, and we find that the Bible comes alive with deeper meanings. The Biblical insights antedate contemporary psychotherapeutic insights by many centuries. The stories of the Bible illustrate the whole gamut of the human drama. Turn to the Old Testament and look at the story of the Garden of Eden and you find a full theistic anthropology. We usually search the Bible for its theology and the Bible does speak to us of God and of God's way with men, but we should also be aware of the Bible's anthropology.

Both psychotherapy and Biblical theology must ask the question, "What is man?" The ideas which have most profoundly affected history have stemmed from a specific view of man. For example, Darwin suggested a completely different anthropological understanding of man with respect to his origins than had been current. Freud made new anthropological assumptions. Karl Marx had an anthropology. In American education, John Dewey had an influential point of view because he started with a reconstructed anthropology.

The secular psychotherapist has an embarrassing number of anthropological emphases from which to choose. Dr. Orville Walters has pointed out that there is no mature science of man. He says in "Metaphysics, Religion and Psychotherapy" that "there are only doctrines of man among psychotherapists" (5, p. 250).

The Biblical understanding of man is clearly written in Genesis. "God said, 'Let us make man in our image, after our likeness; and let them have dominion over the fish of the sea, and over the birds of the air, and over the cattle, and over all the earth, and over every creeping thing that creeps upon the earth.' So God created man in his own image, in the image of God he created him; male and female he created them" (Gen. 1:26, 27).

In the second chapter of Genesis there is some elaboration in the seventh verse: "Then the Lord God

*From *The New English Bible.* The Delegates of the Oxford University Press and the Syndics of the Cambridge University Press, 1961. Reprinted by permission.

formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul." There are other elaborations of this basic statement in the Pauline epistles, in the third and eighth chapters of Romans. At least this can be said from the story: man participated in two realms, in a spiritual order and in the world of nature. So man is Biblically construed in his innocence not as a body having a soul, but as a spiritual being in the likeness of God, clothed in a body. (Also see II Peter 1:14.) In the Bible, man is an essential self in the likeness of God, having a phenomenal manifestation or expression which participates in the biological world and in the world of nature.

If man is a "living soul," then he must be a *becoming* being. He must in the process of existence be *going somewhere.* In the pristine situation, what are the alternatives? Man cannot become God; he cannot become a beast or a thing; he might become himself in the fullness of understanding, in the fellowship that was known with God, but man in his freedom made a choice. Man used his freedom to revolt.

There are three psychologically significant things which follow. Guilt leads to self-defeating deceptiveness, and deception leads to ruptured relationship. In the third chapter of Genesis, the guilty pair are deceptive. They are guilty, defensive, self-conscious, and resort to a pattern of disguise. They knew that they were naked, so they sewed fig leaves together and made themselves aprons. They had to dissolve their embarrassment by hiding themselves from one another and then telling themselves the whole thing never happened. They heard the voice of the Lord God, who was walking in the Garden in the cool of the day, and Adam and his wife hid themselves from the presence of the Lord God among the trees of the garden. God became an embarrassment to them, so they denied Him communication.

As you read the story further, you find Adam projecting the blame on Eve. He could not find self-acceptance, so he projected his guilt on Eve. Eve projected both her own and Adam's on the serpent. The effect is a great "aloneness."

In the seventh chapter of the Gospel according to Matthew, there is an interesting statement on "projection" which is psychologically axiomatic. In fact, it can be diagnostic in its value. "Judge not, that you be not judged. For with that judgment wherewith ye judge another, ye shall likewise also be judged" (Mat. 7:1, 2). One of the best clues to the inner dynamics of the difficulties of a human being who is judgmental or projective in his technique is found in the content of his judgment. Very often what is projected on someone else is his own greatest inner problem, the problem he is not facing realistically.

Importance of Relationship

Biblical insights and psychotherapy proximate one another at the point of the importance of relationship. For theology, man alone without God is lost. For psychology and the psychotherapeutic understandings, man who is sick withdraws from relationship. The sick people one meets in the hospital are so often people who are out of communication with other people and they are called "regressed" persons.

For the therapist, these relationships are seen as interpersonal and intrapersonal. For the Biblical theologian, the first and great commandment has three dimensions that are spelled out in Mat. 22:37-39 and Deut. 6:5. The young attorney asked our Lord Jesus Christ, "Which is the great commandment?" Our Lord said, "Thou shalt love the Lord thy God with all thy heart, with all thy soul, with all thy mind, and thou shalt love thy neighbor as thyself." There are three relationships in this articulation of the fundamental commandment. Inappropriate relations lead to anxiety, and inadequate attempts to cover these relations lead to guilts, and thus the spiral to illness is initiated. The Bible, as well as contemporary psychotherapy, points strongly at relationship as the focus of an area of great importance in health and well being. Limitation is the condition of adequate relationship. God, if we allow Him to exist, and our neighbor, if we recognize his existence, are the signs of our finitude and our limitations. There is no one who has unlimited freedom. Paul Sartre says that man is the chronic enemy of his fellow man, and we could add, also of himself.

The Bible is clear. In Ecclesiastes 7:20, we read, "Surely there is not a righteous man upon earth that doeth good and sinneth not." Psalm 143:2 puts it, "No living man is acquitted before thee." In Proverbs 20:9 we read, "Who can say, I have made my heart clean; I am pure from my sin?" And Isaiah sums it up in the 6th verse of the 53rd chapter, "All we like sheep have gone astray; we have turned everyone to his own way." We have operated as if God did not exist. We have operated as if our neighbor had a lesser value than we, as if his rights were to be restricted by our presence. In this way of living is the fundamental tragedy in which we all participate.

In some ways psychotherapy touches upon this point. The late Dr. Gregory Zilboorg, a friend of the interdisciplinary activity of our time, wrote of Freud in these words: "Without knowing it, Freud soon discovered he was studying the psychological reactions of man in the state of sin. He was at once confronted with the anxiety, the sense of guilt, and the sexual conflicts which burdened his mental patients. He discovered that there is no man living who is not burdened with what he called 'the precipitate of the Oedipus complex,' man's perennial sense of guilt" (7, p. 334).

Here is an interesting proximation on the part of a contemporary psychotherapist, one who is now gone, but one who spoke for his colleagues in some areas. Something is basically wrong; and that which is basically wrong is in the area of relationships involving hostility, guilt and anxiety.

Psychological Insights in the Old Testament

There are psychological insights in the Old Testament. Have you ever read the 32nd Psalm from a clinical standpoint? This Psalm begins with a statement of felicity. "Blessed is he whose transgression is forgiven, whose sin is covered." This person has dealt with his guilts so he is "blessed." This is the euphoric state.

Then follows the analysis, "Blessed is the man to whom the Lord imputeth not iniquity . . . " He has no sense of guilt in the presence of God. . . . "and in whose spirit there is no guile." He is not deceiving God, and he is not deceiving himself. Behind much functional disturbance is other-deception, self-deception and, from a theological standpoint, deception of God. Emotionally sick people do not deal in the currency of reality. Many persons who come to the psychotherapist want to be rid of their symptoms, but they do not want to deal with the reality that is the condition of their healing. This man has had therapy in a sense. He is blessed. He has come to accept reality about himself and God.

Continuing with Psalm 32, "when I kept silence . . . " What is this? The clinical picture is one of suppression. ". . . my bones waxed old . . ." Is this clinical and neurotic fatigue? ". . . through my roaring all the day long." Is this compulsive hostility expressed verbally? "For day and night thy hand was heavy upon me . . ." Here is a sleepless person. ". . . and my moisture is turned into the drouth of summer," a symptom of anxiety in the inability to salivate. Then comes the cathartic and therapeutic process: "I acknowledge my sin unto thee and my iniquity have I not hid; I said, I will confess my transgressions unto the Lord, and thou forgavest the iniquity of my sin." Then he gives his testimony which reveals both psychological and theological elements.

In Psalm 19:12 is the question: "Who can understand his errors?" This question is immediately followed by the perceptive statement, "Cleanse thou me from secret faults." This verse suggests an understanding, which antedates Freud, of those dynamic factors which lie below the level of consciousness and which lead to compulsive behavior. Paul senses this also in the conflict of Romans 7. Phillips puts it this way: "My own behavior baffles me" (Rom. 7:14).

A few years ago there came into my office in Los Angeles a man who was a very fine citizen and a deacon in his church. He was distraught; he was the very picture of a distraught person. He said, "Pastor, I am in great distress. After eighteen years of happy marriage, something terrible has happened. This morning I got into an altercation with my wife. I didn't think it was serious, either in substance or intensity, and before I knew it, I had struck her in the face—a thing I had never done, and she fell to the ground. "Now," he said, "we've made it all up, but I need help. I don't understand myself. This was not me." Here was a clinical picture which makes contemporary the question of the Psalmist—"Who can understand his errors?"

The man's great need was somewhere below the level of his awareness. He felt that in some way God could help him, so he sought the help of a clergyman. These are the reaches of the human dilemma which the Spirit of God can find. The Bible speaks its wisdom in ways which are complementary to contemporary psychotherapy on questions of the training of children and adolescents, on questions of marriage, of middle-age, of old age. The Bible comes to us with a new word, "love." The psychiatrist speaks of love and spells it out as well: self-acceptance, no condemnation, acceptance of others, loving out of sufficiency rather than compulsively or neurotically out of need. Menninger says that love is the medicine which the world needs.

Conclusion

We have suggested that there are two valid wisdoms which proximate one another, but which are neither contradictory nor identical. Psychotherapy seeks to bring insight to anxious and disturbed persons for more effective relationships in the context of society. Biblical theology seeks to interpret the life of God in Jesus Christ in the lives of men for their total and ultimate redemption. If there are intrinsic values in the psychotherapeutic and in the Biblical approaches, we suggest that an effective therapist will be open to the assets of Biblical religion and that, conversely, the Christian will be open to the assets of psychotherapy.

There is a danger that some people will make of psychotherapy a kind of cult and that others will make of the ministry a kind of psychological manipulative device. The fact is that in human personality the bio-psychosocio-spiritual vectors intersect one another in ongoing human existence. For the Christian the wisdom of the clinic will stand under the judgment of the ultimate wisdom of the Gospel. There are no secular means by which a temporal man can find life in the bosom of the eternal. There is a wisdom from Him who makes the whole person become the holy person. It is the wisdom of the Cross by which men are forgiven and lifted from alienation to fellowship, from self-condemnation or divine condemnation to reconciliation, from anxiety to peace, from death to life eternal. It is the preaching of the Cross—to the "religious," still a stumbling block; to the Greek, the intellectual empiricist, mere foolishness, but to those who are open to its totality of insight, "the power of God and the wisdom of God."

So we are saved. Let us be open to the valid insights that come by the empirical, the clinical, and the psychotherapeutic methodologies. Let us recognize our need of these, and let us recognize also from the Biblical theological perspectives that man reaches his ultimate fulfillment as he finds an ultimate relationship to the eternal God and discovers a transcendental purpose in his relationship with Him.

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NEWS AND NOTES

ANNUAL MEETING

The eighteenth annual convention of the American Scientific Affiliation will meet at Westmont College, Santa Barbara, California, August 19-23, 1963. The theme of the program is "Expanding Horizons in a Shrinking World." Problems of race, international relations, and relationships between Christianity and the social sciences will be the focus of major sessions. Specialized meetings representing philosophy and the biological, physical, and social sciences will be included in the program. For local arrangements write to Prof. Harold Miller at Westmont College. For program information write to the national office of the ASA, 414 South Broad St., Mankato, Minn.

GRANTSMANSHIP

Many of us have become more and more deeply involved in the art of dipping into the taxpayer's pockets to support research and other forms of scientific education. We joke about "grantsmanship." One other thing has happened. In the last few years, especially since the 1960 Presidential campaign, we have been hearing two ideas with increasing frequency. One is that federal support of education is to be avoided. The other is that federal support of education in religiously oriented schools is to be avoided like the plague.

I disagree vigorously with both these positions if they are taken as blanket statements. I am now in the process of moving from a state supported university, the University of Mississippi, to a new college closely allied to a church, Dordt College in Sioux Center, Iowa. Thus I have done some thinking recently about both these ideas—and lo! I have concluded that it is all right for both state schools and Christian colleges to accept federal money for special projects in scientific education.

What is *right* about federal support of chemical projects—both research and teaching—in state and church schools? I think that in reality the federal government is buying something, namely, the results of research and science teaching. In a sense all grants are contracts. A representative of the Air Force told me that the Air Force was interested in supporting basic science in the free world because basic science is, ultimately, a means of opposing communism. He said the Air Force therefore also supports science *in foreign schools*. Now, there is a point: if we object to federal grants or contracts with non-federal American schools, we ought to object to similar grant or contract work with foreign schools. This is not foreign aid; it is buying something abroad.

Should the federal government buy research and science education? The U. S. Constitution instructs Congress to promote the progress of science by protecting the rights of inventors and authors (Art. I, Sec. 8). The framers of the Constitution considered promotion of science a national matter. Science means more today than it did then, and promotion of science has a broader meaning than the granting of patents. In addition, we today consider science an absolute necessity in all the schools we support—Christian and public—because it is an integral part of life. The federal government supports science for the same reason and to insure that the free world in general and the U. S. in particular have *good* science. Here is one place state and Christian schools can make common cause with the federal government.

What about objections to federal support of special science projects? There certainly can be bad interference on the part of the federal government. Surely overcentralization of power is a curse of our times. Taxpayers in any state know, for example, that the teachers they hire ought to be paid a professional wage. I see no reason for using federal taxes to pay these teachers. Their local taxes, or religious contributions, ought to take care of this matter. But I have a little difficulty visualizing a professor with research ideas successfully proposing them to the *average* school administration. Whoever believes school administrations have the vision to grant large sums to individual teaching and research projects ought to find out how many schools are now donating the grant overhead (now 15-25%) to the project!

There is too much of a tendency to treat all professors equally. What one is granted, all must receive. The idea of an outside granting agency is still essential to our way of doing things, and there is so much science needed that the only outside source that can handle the bulk of it is the U. S. Government.

Does federal control follow federal money? Saying that control follows the money is something of a cliché. Certainly an outside source is not capable of making basic research decisions. This would lead to a poorer quality of results, and everyone concerned understands

that. Even the original proposal for research must by its very nature be made by the investigator, for much of the thinking in a research project is in the proposal. If a government bureaucrat can produce proposals, more power to him: he is producing science. The granting agency *can* influence matters by the way it chooses projects. In principle one might object to the choices that have been made. Yet there isn't any doubt that the choices are made by suitably chosen representatives of the scientific community. From what I have seen the selecting process has been as strong—or as weak—as the scientific community itself.

Do you agree that criticism of overcentralization in education must be more specific than it usually is? Let's get some back talk in time for the next issue, if possible. Remember I'd like to hear from you on any subject even remotely associated with chemistry. Comments, complaints, articles, information about pertinent developments, books of interest, and reports on meetings are all invited. Write me *when the idea comes*—if not sooner! — **Russell Maatman, Dept. of Chemistry, the University of Mississippi, University, Miss.** (After Sept. 1, 1963: Dordt College, Sioux Center, Iowa).

SOCIAL RELATIONS IN MENTAL THERAPY

Frequently the reader views material in this Journal with particular interest because of the strong convergence of thinking from various directions. Such interdisciplinarianism can be mutually helpful. One such pertinent item is the article by Dr. Lindquist in the June 1962 issue (pp. 52-53). In discussing therapeutic methods used in Geel, Belgium, for the rehabilitation of mental patients, he makes some observations which are useful for the sociologist. (cf. the notes on sociology in the Sept. 1961 issue.)

The basic proposition seems to be that "association with a healthy personality will have a healing effect on the mentally ill person." The reciprocity of social relationships has been at the core of sociological thinking for some time. The basic question raised by such a proposition is the nature of transference which provides for the healing effect. Is it the process of transference which is healing, or the object? Johnson has indicated that the rehabilitation institution should transfer norms to the inmates to provide for their acceptance in society (*Social Forces,* May 1960). In the case of mental patients, however, such a provision is inadequate.

Lindquist further states that the ratio of patients to other town inhabitants should be maintained at 1 to 10. If the number of healthy inhabitants were increased, the townspeople would be less aware of the patients and would not know what to do in the case of bizarre behavior. One of the earliest observations of the significance of group size was made by Georg Simmel. He asserts that "the number operates as a classificatory principle within the group" (*The Sociology of Georg Simmel,* trans. Kurt Wolff, Free Press, 1950, p. 105). If this is so, perhaps the ratio of patients to medical personnel should be further studied for the direct therapeutic results which might be involved.

Another significant observation by Lindquist centers in the fact that each patient may give his viewpoint on possible changes in his status. The implication would be that the patient is capable of distinguishing a possible change in his status, very likely because he is aware that he no longer fits in with the inmate group. Belknap commented in *Human Problems of a State Mental Hospital* (McGraw-Hill Book Co., 1956) that prestige mental patients determined possible discharge for a fellow inmate since a patient could not be considered for discharge until he was a part of their group.

The theory behind such a view is based on peer group relationships. A patient is put into a mental hospital because he is "rejected" by his non-disturbed peers. In the future, however, he may also be rejected by other inmates, indicating a possible improvement in his condition. The pattern of acceptance and rejection becomes an indicator of one's potential release from the hospital. In essence, then, Geel becomes a mental institution with an organizational structure far different from that which prevails in our society. Perhaps what is needed is a reevaluation of our hospital structure with the goal of providing an atmosphere which is similar to that of Geel.

Belknap makes several pertinent suggestions to this end. He maintains that modern concepts of psychiatry do not fit well in the hospital environment. They are most suitable for the welfare home where the less structured system provides the proper atmosphere for their use. He also states that mental hospitals should be separated from welfare functions and should be community sponsored with state aid. Such an approach would minimize the bureaucracy which categorizes the patient and treats him with impersonality.

Perhaps most important is the view that ward aides with low status should be given more responsibility. It is they who perform the most significant therapy for the patient. By spending the most time with them, they are most influential in resocializing them to society's values. Johnson would refer to them as "humane enthusiasts" and have them perform the function of bringing the patient into their culture. In essence, this is what is done by the inhabitants of Geel.

Such revised views of our mental institutions stress the need of reorganization. What is needed is a greater development of horizontal rather than vertical structures. The hierarchical bureaucracy of professional personnel is not as efficient as the person to person contact provided by the aides. The results manifested at Geel would seem to justify such a view. The problem is to develop such an organization which would be appropriate for our society.—**Russell Heddendorf.**

ARCHAEOLOGICAL NEWS FROM ISRAEL

This summer will see a quickening of the pace in Israel's archaeological activity. Numerous expeditions from at home and abroad will be delving into the ruins of antiquity. We can expect fresh light on all periods

of Biblical history. To keep abreast of new developments, it may be well to review some representative excavations and finds of recent months.

New Testament Period

Numerous local discoveries, such as tombs from the Roman and Byzantine periods, are continually being reported. Further investigation and restoration of ancient monuments and buildings are being carried out in such places as the city of Avdat, the Roman theaters of Beth Shean and Caesarea, and the ancient mound of Joppa. The following centers have aroused special interest.

Caesarea. Excavations at this ancient Roman administrative center have brought to light many features of the great city that existed in the days of Jesus, Paul, and the early Church. Perhaps the most important find in 1962 was that of two marble fragments from a Hebrew inscription. One bears the name of Nazareth, which appears for the first time outside of the New Testament and later literary sources. Together with a third piece discovered some years ago on the surface of the ground, they bear witness to an ancient synagogue custom of designating each Sabbath by the name of the priestly course that would have been on duty in the temple (cf. 1 Chron. 25:7-18; Luke 1:5). After Jerusalem was destroyed and its sanctuary was no longer standing, the synagogues continued to keep track of the priesthood's "duty roster," arranged in order along with the home city of each course. By this time the 18th course, that of Hapizzez, lived at Nazareth. The complete list has been preserved in Jewish liturgical works from the sixth to the seventh centuries A. D. A reconstruction of the whole inscription, based on the ancient poem, has been published by Prof. M. Avi-Yonah of the Hebrew University (*Israel Exploration Journal,* 12:137-9).

Chorazin. Last year the ruins of Chorazin were surveyed and excavations were carried out in the central quarter of the city near the ancient synagogue. The town was arranged into four quarters and covered about 15 acres. Public buildings were in the central quarter, residences in the west, and industrial installations, such as oil presses, in the south. Excavators discovered three subterranean chambers, one of which may have been used for Jewish ritual baths.

Tiberias. Since December 1961 the excavation and preservation of an important synagogue near Tiberias have been underway. It is located above the hot springs and baths, close to the south wall of the town. The best preserved of the three building strata dates from the fourth century A. D.; it has a lovely mosaic floor adorned with pictures of the Ark of the Covenant, the Zodiac, and such other symbols as the citron, the traditional palm branches, and the ram's horn.

Wilderness of Judah. Spectacular finds in the wilderness areas were made by Israeli expeditions during 1960 and 1961. Over forty manuscripts in Hebrew, Aramaic, and Greek were discovered in caves that served as the last hiding places for Bar Kokhba's partisans in 135 A. D. Some of the papyri were part of his military correspondence; others were personal documents of the residents at nearby En Gedi.

Old Testament Period

En Gedi. Mention of the scrolls which belonged to citizens of En Gedi brings to mind investigations of the ancient mound called Tell el-Jurn located near the famous spring of En Gedi. No traces were found of the settlement from whence the manuscripts came, but very important evidence for other periods emerged. The mound was occupied during the Roman-Byzantine, Hellenistic, Persian, and Late Israelite periods. The March-April 1962 work was concentrated on the Israelite stratum. It revealed that En Gedi had been a center for the balsam industry. Its product was one of the most precious perfumes in the ancient world. The residents of En Gedi were evidently organized into "guilds." Besides implements and vessels especially useful for their craft, a rich assortment of other utensils and pottery was discovered. One pot with a lamp for a cover contained a treasure of silver bars—the means of payment used before coinage.

Arad. The work done here in celebration of the newly settled town of Arad may be the most important archaeological investigations of this decade for our understanding of ancient Hebrew epigraphy and culture. For the Judean and later periods ten strata were clearly distinguished, each covered by a thick layer of loess. The pottery found at each level consisted of an unusual quantity of whole or nearly complete vessels, so Arad provides an excellent collection of Judean ceramics from clearly defined stratification. About 20 ostraca were also found. Since the chronological relationship of these inscriptions to one another is firmly established by Arad's beautiful stratification, it will now be possible to establish a chronological chart of Judean epigraphy with a higher degree of accuracy than ever before.

Ashdod. One of the most extensive excavations in the land of the Philistines is at Ashdod. Last summer digging was done in four areas. In area A, on top of the mound, excavators have gone down through the Roman-Byzantine to the Hellenistic level. Ashdod was then known as Azotus (Acts 8:40). Workers in area D distinguished four Iron Age strata which pertain to the age of Judean domination and Ashdod's independence. The city seems to have achieved its greatest expansion during the reign of Solomon or by the time of the Divided Kingdom. This great city was destroyed by Uzziah (2 Chron. 26:6). In the new settlement which followed some most unusual cult objects were found—zoomorphic images, mostly of domestic animals—of types rare in Palestine but similar to those of Syria and Cyprus. Area C produced a pit filled with characteristic Philistine pottery which promises rewarding future discoveries. Three important strata of Late Bronze Age settlement have been found in area B. The abundance of imported Mycenean and Cypriote pottery testify to strong ties with the Aegean world during that period.

Gath, where is it? Now it is generally agreed that the site known as "Tell Gath" does not represent the ancient Philistine town. In 1961 a trial trench clarified much of the stratigraphy on the upper tell. There were traces of a settlement in the Late Bronze Age, but the earliest fortification at that point dates from the 12th or 11th centuries B. C. The area of Iron Age settlement is far too small for such an important Philistine center (cf. 1 Sam. 27). The suggestion that Tell en-Najila might be Gath has also been eliminated by the results of excavation. A large building discerned on top of the tell has now been found to be a caravanserai from the Middle Ages. Below this building, within a thickness of three to five feet, were found four strata of Middle Bronze Age settlement. Below these are signs that the tell was very important during the Early Bronze period. Ceramic evidence from a few pits and graves testifies that the site did have some Iron Age settlement but was apparently some kind of rural community. Philistine pottery was never found during the extensive surveys made there.

Dr. Y. Aharoni, in his recent *The Land of Israel in Biblical Times, A Geographical History* (Hebrew), has returned to the older suggestion that Gath be located at Tell es-Safi (called Libnah on some modern atlases). The site produced an abundance of Philistine pottery, and its location near Ekron (also a very recent identification) conforms with the Greek version of 1 Samuel 17:1 that, after Goliath's defeat, Israel pursued the Philistines as far as the entrance to Gath.

Inscription. Five miles east of Lachish a pre-exilic burial cave was discovered (No. 9) with inscriptions on the walls of its entry passage. In the most important of these, only 22 out of 32 letters could be read clearly. The text, based upon the restorations made by Mr. J. Naveh, may be translated: "The Lord (is) God of all the earth; the mountains of Judah (belong) to Him, to the God of Jerusalem." "The God of Jerusalem" appears only once in the Old Testament (2 Chron. 32:19); its context concerns the siege of Jerusalem by Sennacherib. From the standpoint of paleography, these inscriptions may be contemporary with that event. Mr. Naveh suggests that the burial cave served as a refuge for Judean soldiers fleeing from the Assyrians, one of whom expressed his hope of deliverance in writing.—**Anson F. Rainey, Israel-American Institute of Biblical Studies, Jerusalem.** (Dr. Rainey is grateful to Mrs. Inna Pommerantz of the Israel Department of Antiquities, who furnished him the latest editions of their new quarterly publication, *Hadashot Arkiologiot;* some of the reports therein have now appeared in English in the *Israel Exploration Journal,* vol. 12, pp. 143-155.)

BOOK REVIEWS

Exploring Christianity: A Guided Tour, by David F. Siemens, Jr. Moody Pocket Books (No. 78), Moody Press, Chicago, 1962. 156 pp., paper, $.59.

Teaching Machines and Programmed Instruction, by Edward Fry. McGraw-Hill Book Company, Inc., New York, 1963. 244 pp., $5.95.

Exploring Christianity looks like an ordinary paperback book from the outside, but it is not. It is actually an "intrinsic program" or "scrambled" book. This new approach to evangelism will interest ASA members for several reasons: For one thing, the author, an ASA member associated with Moody Institute of Science, asked a number of other ASA members to read the initial manuscript and criticize it. Furthermore, this evangelistic approach is directed toward intelligent and philosophically inclined people like our own scientific colleagues and students. Finally, most of us are empiricists at heart and will want to see if this experiment *works*—if it does succeed in drawing thoughtful non-Christians deeper and deeper into serious consideration of the claims of Jesus Christ upon their lives. The author's purpose, as indicated by the subtitle, is to take the reader on "A Guided Tour" into Christianity.

The major difference between an ordinary book and a learning program is that the latter *forces* the student to respond to the material being presented, and immediately "reinforces" his responses in such a way as to "teach" what the programmer has in mind for him to learn. In an intrinsic or "branched" program such as this, different readers work their way through the book by different routes.

For example, to introduce the importance of miracles and fulfilled prophecy as validations of Christ's claims, the author borrows from Peter Stoner's *Science Speaks* (another Moody Press paperback by an ASA author), listing eight Old Testament prophecies about the Messiah and asking on page 42, "What is the probability that, on the basis of chance alone, any one man, living from the time the first prophecy was given down to the present day, would meet all the qualifications presented in the eight verses noted? You may guess, or you may calculate." Six possible answers are presented. If the reader chooses (a) "about one in eight" he is told to turn to page 30, where he finds: "This is a rather poor guess. A quick course in the calculation of probabilities is really in order. You can get this by following out (f) on page 42. Or you can simply choose one of the other answers there. So turn to page 42 again." Choice (f) is "I'd like to know something about the calculation of probabilities before I decide." When the reader then turns to page 71, he is reinforced in a different way. "You have commendable curiosity and interest in

understanding . . . " Three or four pages of instruction then teach him how to calculate the right answer and he is told to turn back to page 42 to choose correctly. When he finally hits the right answer he is patted on the back and then confronted about his attitude toward all this: does he think this sort of evidence is convincing (turn to page 43), does he worry about non-Biblical prophecies in comparison (page 49), does he think Jesus deliberately pulled a swindle by setting out to fulfill the prophecies (page 54), or does he possibly think the prophecies were written after the events (page 57)? And so on through the book, the author-guide turns the reader back to the right path whenever he strays. At the end of his journey, the reader is directed to the New Testament itself for further study, aided by several pages of helpful notes, compilations of Scripture passages on certain subjects, and an annotated bibliography.

Programmed instruction is a relatively new phenomenon, originally designed to teach rote material which is easily broken down into small learning steps. Enthusiasts apparently feel that anything can be programmed effectively, but some of us may have reservations about this. Programs are effective in many cases because the forced response and immediate reinforcement get the student personally involved in material which he might otherwise pass over with only superficial contact.

It seems to this reviewer that in the presentation of the Gospel the programming technique *may* not be at all appropriate. For one thing, the analytical process of breaking such a subject up into small bits may have the deleterious effect of raising many questions before the inquirer himself raises them, distracting him at what may be a very critical time in his spiritual groping. The programmer also must take the risk that, in forcing the inquirer to respond in some way, he may be forcing him against his will and bringing on a negative reaction. It is easy for an imaginative person to resent a program "frame" which seems to him illogical or incomplete and to stop right there without going any further; in an ordinary book one can skip any passages which seem pointless, boring, redundant, or annoying for some other reason, but an intrinsic program has an all-or-none character. Of course, since the goal of evangelism *is* personal involvement, it may be that the risk is well worth taking and that for the proper audience *Exploring Christianity* will prove to be tremendously effective.

No matter how this experiment succeeds, we have here one of those rare cases in which newly discovered scientific principles have been "converted" rapidly to the service of God by an imaginative Christian with the technical know-how. We can be grateful to David F. Siemens, Jr., for setting the rest of us a good example as well as for presenting us with what may become a potent adjunct in our attempts to communicate the Good News. It is possible that the very novelty of *Exploring Christianity* will open many doors, since one may legitimately present it to almost anyone, saying, "Here is a strange new kind of book. I'd like to know what you think of it." At least that's what I intend to do with it, before "teaching machines" become commonplace.

Attention is called here to Fry's book because readers of *Exploring Christianity* may wish to find out what is going on in the rapidly developing field of teaching machines and programmed instruction. Unfortunately, little of Fry's book can be heartily recommended. Pages 181-182 on "Sources of Information About Programs" describe the half-dozen books on programmed instruction (all published since 1959), and about 150 journal articles are cited in the Bibliography. Portions of two linear programs and one branched program are given as examples in Appendices B, C, and D. The only interesting parts of the book are those *not* written by the author. Appendix A, "Classification of Variables in a Programmed Learning Situation," is typical of the rest of the book—padded and puerile. We are given not only the classification itself, with 26 major headings (From A to Z—you guessed it!) and many, many subheadings (Under W. 5. "Type of scoring": *a.* Number right, *b.* Number wrong. *c.* Rights minus wrongs, etc.); but we also have an "Outline of the Classification," a half-page discussion of "Organization of the Classification," suggestions for *using* the classification, and even acknowledgments for assistance in preparing it!

The perpetrator of this pedestrian pedantry is an Associate Professor of Education and Director of the Reading Clinic at Loyola University of Los Angeles. His book should have been edited drastically by the director of a writing clinic—if, that is, it was written for *people*. On the other hand, it may have been "constructed" instead of being written at all, and for some such thing as a "reading machine" with no provision in its circuits for irritation over triviality or redundancy.

If this book falls into the hands of college professors who are already prejudiced against "educationists," their prejudices are likely to be "reinforced." Teaching machines and programmed instruction are probably here to stay, but this dull and repetitious book gives the impression that they are likely to be inherently dull and repetitious themselves. The sample program on number theory by Norman Crowder (Appendix D) and the lively evangelistic program by Siemens reviewed above give us hope for better things from these new developments in teaching methods.—*W. R. H.*

Religion and the Scientific Outlook, by T. R. Miles. Geo. Allen and Unwin, Ltd., London, 1959. 224 pp. $2.95.

The author, a philosopher by training, sets out to answer three questions. The first is whether science has disproved the existence of God. His answer is that no important assertion containing the word "God" is discredited by science. He then asks whether there is any conflict between science and religion. To this he replies that there is no need for any permanent conflict in the two areas.

The third question deals with the possibility of an intelligent persons's accepting some form of Christian

orthodoxy. The author states that some versions ascribing literal truth to the story of Adam and Eve and total infallibility of the historical Jesus must be ruled out, but other versions can be defended.

Some fault can be found with his third answer. He has stressed the point of view that there are such things as religious truths which are not amenable to scientific scrutiny and which must be believed or rejected on faith alone. The story of Adam and Eve does offend the scientific mind, but it is a religious truth and an omnipotent God could have initiated the human species in this way. I believe the author shows a bias here. Regarding the fallibility of Jesus, he is right, of course, if one accepts the King James Version as *identical* with the original scripture. I prefer to believe in a perfect God; I therefore ascribe any unclarities or mistakes in the various versions of the Bible to the shortcomings of copyists.—*Reviewed by Irving W. Knobloch, Professor of Botany, Michigan State University, East Lansing, Michigan.*

Proceedings of the Colloquium on Medical Ethics, Foreword by John W. Klotz. The Lutheran Academy for Scholarship, 801 De Mun Ave., St. Louis 5, Mo., 1961. 89 pp. plus appendices, paper (offset typescript), $2.00.

Dr. John W. Klotz, an ASA member well known for such writings as *Genes, Genesis, and Evolution,* is also Director of Research of the (Missouri Synod) Lutheran Academy for Scholarship. Concordia Senior College was host on May 20-21, 1961, to a Colloquium on Medical Ethics. The purpose was to come to grips with the ethical problems raised by modern medicine and to lay down some general guidelines to assist the Christian physician in making the moral judgments forced upon him every day. Bound in a spiral binding are five papers dealing with various aspects of these problems—legal, medical, ethical, theological, etc.—plus a complete transcript of all discussions, "The Hundred Questions," and a tabulation of about 380 responses received before the conference from Lutheran physicians, lawyers, pastors, and professors.

The idea behind "The Hundred Questions" was to learn the actual beliefs of Missouri Synod scholars; without signing their names, respondents answered Yes, No, or No Comment to such questions as "Is cremation wrong?" and "Is the use of contraceptive pills wrong?" The data tabulated by categories (M.D.'s, city pastors, rural pastors, hospital chaplains, lawyers, etc.) are of interest in their own right. This questionnaire method of stirring up more active participation might be considered for some of our ASA conferences. However, another lesson from this publication is the value of *editing,* not a jot or tittle's worth of which was done; preachers' jokes lose much in the translation from spoken to written form, and off-the-cuff answers to deep and complex questions gain very little. Perhaps there were simply too many questions for a two-day conference. Baptists and others may be surprised to learn that Missouri Synod Lutherans as well as Roman Catholics are concerned about such questions as whether or not an anencephalic fetus should be baptized. The Colloquium may have been stimulating but to read these Proceedings is to feel somewhat frustrated over a piece of unfinished scholarship.—*W. R. H.*

Science and Society, by Thomas D. Clareson. Harper & Bros., New York, 1961. 331 pp., $4.00.

Subtitled *Midcentury Readings,* this is a textbook for freshman English courses. It is an anthology of essays for the general reader on such topics as the nature of science, the scientist and modern society, and science in relation to philosophy and religion. If English department colleagues can be persuaded to use this as a source book for themes and discussions, their students will be the richer for it. Science majors and we ourselves will profit by reading or re-reading these excellent papers by Margaret Mead, James Conant, P. W. Bridgman, J. Bronowski, J. R. Oppenheimer, and other famous scientists and will be glad to have some of them in a more accessible place than the journals in which they originally appeared. For example, Warren Weaver's fine article, "A Scientist Ponders Faith," from *Saturday Review,* Jan. 3, 1959, is in the section on philosophy and religion—juxtaposed between the pantheism of Fred Hoyle ("The Religious Impulse in Man") and the humanism of Julian Huxley ("The Future of Man")! By direct comparison of the magnificent writing in the essays with the three or four pages of textbookish material entitled "Exercises and Theme Topics" following each section, I was reminded of what college students have to go through and resolved to be more kind to them. Students, who generally read nothing else, fortunately do not realize how dull textbooks can be; professors, who seldom read textbooks but often write them, sometimes forget. If we expose our students to excellence, will they demand excellence from *us?*—*W. R. H.*

Careers in Research Science, by Theodore Wachs, Jr. Henry Z. Walck, Inc., New York, 1961. 96 pp., $3.50.

The title of this little book is somewhat misleading because it deals exclusively with chemistry, physics, mathematics, and astronomy; other titles in the Careers for Tomorrow series are devoted to social sciences, biological sciences, and engineering, respectively. This book gives serious high school students helpful and accurate information on what a research scientist does and how to become one. It is garnished with good photographs and references to familiar companies, products, and government projects, and it has a bibliography of guidance materials. A shortcoming of the reading list is the failure to indicate clearly which of the titles are free and which are for sale. To a university professor the content may seem heavily slanted toward industry, but industry does provide the greatest number of opportunities for chemists and physicists.

Differences in the quality of personal satisfaction experienced when a scientist works in industry, in a university, or in a government agency are presented clearly and the personal advantages and disadvantages of each type of job are discussed. To a Christian the lack of emphasis of genuinely altruistic motivation will be apparent. Perhaps the ASA should prepare some career guidance materials combining the accuracy and style of a book like this with a motivational foundation of Christian stewardship and altruism. Such a book could provide the same quality of information but a more stirring challenge to a young person endowed with both intellect and dedication.—*W. R. H.*

OBITUARY

HOLGER CHRISTIAN LANGMACK (1884-1962)

Holger Langmack, a versatile member of the American Scientific Affiliation who lived a long and fruitful life, passed away on March 18, 1962. He was educated in Denmark (M. Ed., Skaarup Seminarium, 1910) and began his career by teaching physics and mathematics. He had the honor of introducing the Boy Scout movement to Denmark, organizing its first troop in the year 1908 and two years later expanding the movement to the national level.

He founded and directed the Kolding Ny Realskole before immigrating to the United States with his recently-married wife, who like himself was a skilled gymnast and whom he met at the 1912 Olympics where, as a representative of Denmark, she placed second in gymnastics.

His American career began with the teaching of Danish gymnastics and physical education in Hutchinson, Minnesota (1913-1915). This was followed by physical education teaching positions and professorships at Seward Junior High School in Minneapolis, Minnesota State Teachers College, the University of Minnesota Summer School, New Jersey State Teachers College in Trenton, Savage College in New York City, and briefer appointments at such institutions as Cornell and Temple Universities. He also served as physical culture specialist at Battle Creek College (1926-27) and at the U. S. Naval Academy in Annapolis (1927-28). From 1928 to 1954 he was specialist in physical culture and character education at Paul Junior High School in Washington, D. C., during which period he also lectured at the University of Maryland, George Washington University, and the U. S. Army Parachute School at Ft. Benning, Georgia. After his retirement in 1954, he devoted much time to his life-long interest in the unification of science, philosophy, and Christianity.

The most prominent publications of Mr. Langmack are his books entitled *Football Conditioning* (NY: A. S. Barnes Co., 1921), which presents a progressive exercise program based upon Danish gymnastics and carries an introduction by Knut Rockne, the famous football coach at Notre Dame University, and *God and the Universe* (NY: Philosophical Library, 1953) which outlines the story of creation using mathematical symbolism and concepts of relativity and absoluteness from the fields of physics and biology.

The following statements from the tribute to his memory presented by his friend, Dr. Spencer Miller, Jr., former Undersecretary of Labor (under Eisenhower), at his funeral indicate the great respect in which he was held by his friends:

When I first met Holger Christian Langmack I was immediately attracted to him by his dynamic energy, the catholicity of his interests, the spiritual depth of his thought, and his utter dedication to the service of Almighty God. As our acquaintance developed into a loving friendship I came to value his intellectual integrity and his moral courage in addition to the four other qualities of his sterling character . . .

No movement for human betterment was alien to his spirit. Our last such pilgrimage together was the Annual Presidential Prayer Breakfast in Washington and the Annual Conference of International Christian Leadership. What an inspiration it was to him and Ida and what a joy for him to meet so many Christian leaders the world around. They recognized in him one of their own. When I introduced him to Billy Graham and Abraham Vereide his eyes sparkled as he met these two great spiritual leaders and outstanding examples of God-guided lives.

To Washington he carried a draft letter to the President of the United States which outlined a plan to meet the threat of atheistic communism by the establishment of an *Academy of International Freedom under God.* It was a unique and profound conception. It would have heartened President Kennedy and Holger had he been able to present this inspired idea in person to the President . . .

Holger was a born teacher; his passion was to share with others the truths that he had come to know and treasure. He loved his pupils and they loved him. Today there are literally thousands of men and women who are leading better lives because of their contact with and instruction by this God-guided teacher.

It was this love of his students and the love of this country —the land of his adoption—and the study of the religious foundation of this good land that prompted him to place upon the wall of his classroom of the public school in Washington where he taught for so many years the amended oath to the flag. Each school day he and the children would arise, salute the flag, and repeat the oath:

"I pledge allegiance to the flag of the United States of America and to the Republic for which it stands, One nation *UNDER GOD,* indivisible, with Liberty, and Justice for all."

When after some years it was pointed out that this was not the official oath, he went to President Franklin D. Roosevelt and urged that these two words be added to remind our youth and all who recited this oath that the United States was indeed a religious nation. Congress subsequently made this amended oath the official oath to the flag. He was too modest to claim credit for this action, but we can all thank God for his vision and his initiative. What a legacy he has left by this act alone!

On the lapel of his coat he wore a gold yoke-fellow button—the symbol of the universal ministry as developed by Dr.

Elton Trueblood. He could subscribe whole-heartedly to the six-fold discipline of this ministry because it was the pattern of his life. When Our Lord said, "Take my yoke upon you," it was a symbol of our shared burden. The yoke is not an extra weight to bear but is actually a means of support to ease the load.

. . . His life was Christ centered. He never seemed so truly himself as when he was praising and thanking God by song or the spoken word. In all he has written over a hundred songs of praise . . .

At the close of his book, *God and the Universe,* are two lines of his which are the testament of his faith and his belief in the Victory of Christ:

"Soon angels we—as they—shall be
Ah, then—God's smiling face we see."

LETTERS TO THE EDITOR

MENTAL ILLNESS

In regard to Dr. Grounds' article on mental illness (Dec. 1962) and especially in regard to the question of the relationship of mental illness to sin and guilt, I wonder if statistics show less mental illness in "shame" cultures, such as exist in Japan, than in "guilt" cultures. (See Ruth Benedict, *Chrysanthemum and the Sword,* for a description of Japan's "shame culture.") I have been under the impression that mental illness is just as prevalent here as in the U.S.A. even though relatively speaking there is no adequate concept of sin here . . .

Here in Japan I have often heard that doctors in mental institutions try to keep their patients from all contact with any religion because they believe it causes or aggravates mental illness. Could it not be that the mentally ill tend to be insecure and in striving for security tend to turn to religion, and if so would not religion tend to help, not hinder, (recovery of) the mentally ill?

Frank Cole
Tshinomaki, Japan

EVOLUTION

In your editorial comment in December on p. 126 you ask, "Is it not possible that God may have worked through a biological process of natural selection? . . . Is He involved only in momentary or sudden fiat acts?" The answer, of course, is in the affirmative. God could have worked through any process and at any rate of speed that He might choose . . . The point, however, is not whether God *could* have brought the Universe and Man into existence through a biological process of natural selection but whether He *did* do so or not. The historical record is given to us in Genesis I and as members of the ASA we have all signified our acceptance of the Bible as the Word of God.

The account in Genesis is history and not poetry. The RSV indicates which portions of the text are poetry and which are prose according to the Massoretic text. Genesis I is clearly prose; according to the historical account God reconstructed the world and created Man in a period of six days. In 1953 I wrote to the Professors of Oriental Languages in seven of our leading Canadian, American, and English Universities regarding the translation of the Hebrew word "yom," as used in Genesis I, when accompanied by a numeral. They all replied that it should be translated "as commonly understood," that is, a day of 24 hours. This was reported in the JASA at the time (March, 1953). According to the Bible, therefore, God reconstructed the earth and created Man in 6 days. Of course the 6 days may be "interpreted" as long ages or as anything you like, but the only reason for so doing is to accommodate the materialistic doctrine of evolution.

The modern theory of Neo-Darwinism or synthetic evolution is built upon the concept of natural selection and random mutations. Random mutations are little more than chance occurrences and as most mutations are inferior to the original stock, this would imply the survival of the unfit. On the other hand, natural selection could only select and never originate new species. It is hardly likely that the Creator of the Universe would resort to such a clumsy, slipshod method to bring about the world in which we live with all its order, beauty, and complexity.

Man was created "of the dust of the ground." It was a sudden leap from the dust to Homo sapiens, in the image of God. How could this simple statement be interpreted as the gradual reconstruction of an ape or some other creature into that of a man?

One must accept or reject the Word of God; since Jesus Christ has confirmed the Genesis account (Matt. 19:4), to reject this passage is, in effect, to reject His testimony. As our Lord Himself said, "Do not think that I will accuse you to the Father; there is one that accuseth you, even Moses . . . For had ye believed Moses, ye would have believed Me for he wrote of Me. But if ye believe not his writings, how shall ye believe My words?" (John 5:45-47).

John R. Howitt
Toronto, Canada

I agree that God *could* have created living things through a process of extensive evolution; however, since He is Truth, He *could not* have used the evolutionary process and at the same time declare that He accomplished creation through a series of fiat acts. What could be more clear than His declaration of the creation of the "kinds" in Genesis 1, or what more definite than His careful attempt to state the exact geographical location of the Garden of Eden (Gen. 2:10-14)?

I heartily agree that natural selection based on vari-

ation is a valid biological force, . . . but it is my firm conviction that many evangelicals show a great deal of disrespect for the Word of God when they try to picture God as doing something which His own written words (Gen. 1-2) clearly exclude. I know that some argue that God could not state His process in terms which the early peoples could understand, but that puts God in the position of leading people to believe an erroneous idea. That argument also seems to declare an omnipotent God unable to accurately convey the account of creation to the peoples whom He created. Surely God is master of language as well as of biological processes.

My primary reason for writing is my observation of the devastating effect which a loose handling of the Genesis account of creation has upon young people here in North Carolina. The attitude so often is that if it is all right to allegorize a few chapters, should we perhaps not do the same to other chapters—and therefore we must not take the Bible too seriously. This is an actual attitude prevalent around us, and greatly enhances Satan's blinding influence upon the unregenerate.

Dan E. Wonderly
Wingate College

I know a woman who was about to give up her faith because of the teaching she was receiving in a university, but she settled for the compromise of theistic evolution. Was her faith strengthened? It would have been strengthened much more if she had looked more deeply into the evidence for evolution and discovered the defects. We as scientists trying to improve spiritual health should not look for pain relievers but for cures.

William J. Tinkle
Eaton, Indiana

I am quite disgusted with the constant harping on evolution and Christian dogma. We've had two hundred years to talk about this particular topic, and nothing has changed of any consequence in the thinking of extreme conservatives, middle of the roader's, or liberal Christians. Furthermore we haven't even dented the scientific community with our feelings. To put it briefly, I hope that the ASA can find a more challenging spirit in the sciences than the problem of evolution.

Kenneth W. Allen
University of California, Los Angeles

. . . the editor states, "The ASA has no official position on evolution, or any other issue." This seems to say that the ASA does not stand for anything. If we do not stand for anything, we will never make much impression either on the scientific or the religious world.

A great deal of what is written on evolution does not convey exactly what is being discussed because the terms have too broad a meaning. "Evolution" is used in a multitude of connections. It would not be unusual to speak of the evolution of the automobile. The first step in restricting the term is to say "biological evolution."

Even that doesn't limit the discussion to the actual point of controversy. Evolution originally hinged on the problem of "origin of species." That problem cannot be solved until we agree on the definition of "species." At present biologists string all the way from "splitters" on one end to "lumpers" on the other. The position of the splitters is easier to illustrate and most articles I have read have been written by them. As I understand them, a red carnation is a different species from a white one; a fruit fly with red eyes is a different species from one with black eyes; a Chihuahua dog is a different species from a Mastiff; an African Pigmy is a different species from a Caucasian. I doubt if the most old-fashioned fundamentalist would take issue with the evolution of all dogs from a common canine ancestor so long as it did not take a million years, or the evolution of all humans from a common ancestor in a reasonable time . . . .

Knobloch in the same issue (p. 116) says: "There are organisms here which probably did not exist fifty years ago." I doubt if the fundamentalists and literal interpreters of the Bible would quarrel with any evolution that would form a new species in fifty years. I doubt that anybody would question what Knobloch says: ". . . speciation, (the formation of new species by mutation, hybridization, etc.) is a 'fact' . . . "

Wherein then resides the conflict? Some believe that millions and millions of years ago a large protein molecule came into existence. The atheistic evolutionist would say by chance, while the theistic evolutionist by the act of God. Then the protein molecule evolved into a one-celled organism. These organisms increased in complexity through the untold ages and split into the vegetable and animal kingdoms. The final step in the animal kingdom was man. This all required billions of years. If this be evolution, here is the irreconcilable conflict. The Bible . . . as God's Word, cannot be twisted enough to permit such an interpretation of the origin of man.

According to the Bible man was created by God personally in his image, which implies a physically perfect being. The history of mankind begins with the pair that God so created. The evolutionary theory as pictured has no place for this. According to the Bible man sinned and fell from his Edenic estate, and his body began to die. In order to be saved, man had to be redeemed from the consequences of sin. Then Christ, the Redeemer, paid the penalty for sin and redeemed man. According to evolutionary theory man never fell and needed no Redeemer. All this is foolishness to the logically minded evolutionist.

Tinkle's fears have a real basis. Thousands of high school and college students are losing their Christian faith on the strength of what they are taught in biology, geology and related sciences. The ASA was founded to try to prevent this tragedy. I, personally, have been in the ASA almost from the start. I can see a gradual drift towards the "intellectually popular" concept of the biological evolutionary theory. We are losing our purpose

for being and are getting into great confusion. Most articles in the JASA now are on a great variety of subjects that have very little pertinence to our purpose for existence.

Oscar L. Brauer,
San Jose, California

In the debate between creationists and theistic evolutionists . . . , I have noticed a tendency on the part of some creationists to be overly dogmatic about the interpretations of difficult passages of Scripture. On the other hand, I have been greatly disturbed to see some theistic evolutionists speaking as if we can adjust interpretation without bounds to any conclusion of science . . .

I cannot escape the conclusion that some theistic evolutionists feel that God's revelation in nature is clearer than his verbal revelation. Admitting that there are some figurative elements in the Genesis creation account, the facts that the New Testament treats Adam as a literal being and that the genealogies go from Adam to Jesus lead me to believe that one cannot do justice to God's written word by denying a literal Adam and Eve. If Adam, one end of the line, is figurative, how can we escape the conclusion that the entire line, including Jesus at the other end, is figurative?

So far, I have found no article in the JASA defending this theistic evolution theory which has dealt in a serious way with such specific problems. Could we have something along this line? (I am aware that some theistic evolutionists do not deny a literal Adam. This is a separate issue.)

Frank Cole
20 Hiyori Cho
Tshinomaki Shi
Miyagi Ken, Japan

Editorial Comments: The September issue will carry several articles relevant to evolution.—D. O. M.

"OLE MISS"

In my December letter to the editor concerning the Ole Miss situation I referred to the white population of this state and "intermarriage." I had reference to *intermarriage between* families *within* the white population, hence *intramarriage* within the white population.

Russell Maatman
Associate Professor of Chemistry
University of Mississippi

THE AMERICAN SCIENTIFIC AFFILIATION, Inc.

The **objectives** of the American Scientific Affiliation are to investigate the philosophy and findings of science as they are related to Christianity and the Bible and to disseminate the results of such studies. The ASA was organized in 1941 and incorporated in the State of California in 1943.

Members of the ASA have at least a baccalaureate degree in some branch of the biological, physical, or social sciences and are currently engaged in some kind of scientific work. These requirements are defined broadly to include such disciplines as mathematics, history, and the philosophy of science and such vocations as engineering and practicing medicine. **Fellows** hold a doctoral degree in science or have its equivalent in experience, have actively participated in ASA activitities, and have been elected to their position from among the members. **Associates** are actively interested in the objects of the Affiliation but are not required to have scientific training. Persons in all three categories of membership subscribe to the following statement:

> The Holy Scriptures are the inspired Word of God, the only unerring guide of faith and conduct. Jesus Christ is the Son of God and through His atonement is the one and only Mediator between God and man.

Publications of the ASA include the following:

American Scientific Affiliation NEWS, edited by F. Alton Everest (Director, Science and Production, Moody Institute of Science), 947 Stanford St., Santa Monica, California. Issued four to six times each year, this includes news items of interest primarily to members.

Modern Science and Christian Faith, (2d ed., 1950, 216 pp., $4.50). This symposium edited by F. Alton Everest, deals with relationships between Christianity and nine fields of science.

Evolution and Christian Thought Today, (2d ed., 1960, 222 pp. plus illustrations, $4.50). Edited by Russell L. Mixter of Wheaton College, this symposium by thirteen authors was first issued in the Darwin centennial year to assess relationships between the theory of evolution and contemporary Christianity.

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Local Sections have been organized to hold regional meetings, promote Christian fellowship, and provide for stimulation of thought across the boundaries of the scientific disciplines. For information about local section activities, write to the persons listed below or to the Executive Secretary:

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Northern Delaware Section: Dr. J. Robert Martin, Paper Mill Road, Route 3, Newark, Delaware
Southern California Section: Prof. Oliver G. Titrud, Los Angeles Pacific College, Los Angeles 42, California
Washington-Baltimore Section: George H. Fielding, 5 Holiday Drive, Alexandria, Virginia
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