

Reviews

Social Behavior from Fish to Man. By WILLIAM ETKIN. With a chapter by DANIEL G. FREEDMAN. ("Phoenix Science Series.") Chicago: University of Chicago Press, 1967. vi+205 pages. \$2.45.

The study of evolution is one of the few areas in biology which are still open to unrestricted creative imagination. Because the past can never be re-created and because we are continually uncovering new facts that have some relationship to evolutionary history, it is inevitable that new interpretations will be made from time to time, and equally inevitable that no two individuals will ever completely agree in their reconstruction of the past.

The field of evolution of social behavior is particularly unrestrictive to a creative mind. Behavior leaves no fossils, although it may leave artifacts; and every attempt to re-create man's past is based on the assumption that former hominid species that we know chiefly through fragmentary skeletons acted essentially in the same way as their living descendants. This is a dangerous assumption to make, because we know from modern genetics that the gene pool of any species is an unstable system with built-in mechanisms for change. Any speculation regarding man's prehistoric behavior is therefore at best an untestable hypothesis, and its usefulness can be judged on the bases of the facts available to the author and the skill with which he marshals this evidence to justify his reconstruction.

William Etkin's book *Social Behavior and Organization among Vertebrates* was originally published in 1964, in an attempt to summarize the facts of vertebrate sociobiology for the benefit of social scientists and their students in fields other than biology. This volume consisted of chapters by several leading biologists on specialized subjects, with approximately the same number of chapters by Etkin, in which he attempted to provide continuity and an overview of the field. The present paperback, *Social Behavior from Fish to Man*, is a reprint of Etkin's chapters in essentially unchanged form, with an additional new chapter on "Man's Social Behavior" by Daniel G. Freedman.

Etkin's chapters represent an objective and enlightened view of vertebrate sociology and its relationship to human behavior, based on the facts that were available to him in the early 1960's. The chief criticism that one can make is that many new facts have come to light since that day, and, while Etkin's conclusions may still be sound, the evidence for them is no longer valid. For example, Etkin bases many of his ideas regarding human behavior on a comparison between wolves as pack-hunting animals and rhesus monkeys as an example of a food-gathering society. In 1967 the *American Zoologist* published an extensive symposium on the behavior of wolves which brought together more new facts on this species than had been published in the previous twenty years; and one of the crowning achievements of the science of sociobiology in the past few years has been the large number of superb field studies on the social life of a great variety of primates, including the rhesus monkeys.

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Like Etkin, Washburn and other anthropologists who led the modern study of primates were at first motivated by the hope of tracing the human nuclear family to other primates. With the possible exception of the gibbon, in which both males and females are so aggressive that the largest social group is a mated pair and their young, nothing like the nuclear family exists in other primates. In baboons, for example, there are a large number of males organized in a dominance hierarchy, but females in estrus may pass from male to male with no resultant fighting, and there are no permanent consortships. However, in these and other similar primates there are long-continued associations between a mother and her successive offspring, and as more studies are made, more organization of these large groups may become apparent. If there is anything that is characteristic of primate societies in general, it is long-continued association between younger and older individuals. The young primate may be born, live for several years, become a parent, and grow old and die in the same social group.

On the basis of limited information then available, Etkin attempted to find traces of a nuclear family in the wolf pack. While wolf groups may occasionally be reduced to two individuals, the typical social organization is a pack of five to twenty or more individuals, including adults of both sexes, who cooperate both in hunting and in bringing back food to the young. However, the pack is not a group of nuclear families. There is no evidence of any permanent consortships, nor does there appear to be any fighting over females in heat. Not all the available females have young, and at least in the pack of the Brookfield Zoo studied by Ginsburg, the dominant female prevents other females from mating by attacking them, while the dominant male does no mating at all.

The point is that animal societies have evolved in a very large number of divergent ways and that these do not necessarily lead toward the "one perfect society" which has evolved in man. Rather, human evolution has taken its own peculiar course, and while many of the elements of human behavior may be similar to those in other animal societies, we have our own peculiar combination of them. The nuclear family has been evolved independently in many vertebrate species, particularly birds, but still must be regarded not as an inevitable outcome of evolution but rather (in our case) as a human biological or cultural invention.

Etkin sees pre-cultural man as forming a food-gathering society rather like that of rhesus monkeys. With the invention of tools this was transformed into a pack-hunting society, and he implies that this must have produced a change in social organization which made these early societies more like those of wolves than macaques. While the activity of group hunting does involve a division of labor between males and females in historically known primitive human societies, it does not do so in wolves. Furthermore, we now know that some primates, such as chimpanzees, sometimes kill other smaller species for food as well as gather vegetable food. Anthropological evidence indicates that man is a highly adaptive species and makes a living in any way suited to his environment and within the limits of his technology. The Australian aborigines, for example, were both food gatherers and hunters. It is likely that preverbal man, like modern primitive man, found his food in a variety of ways. One of the striking facts that is beginning to come out of modern field studies of animal

societies is not only the great variation between species but also the wide variation in behavior between local populations of the same species. The social behavior and organization of an animal species do not conform to a fixed type but vary considerably within the limitations imposed by genetics and ecology, and this was probably true of our remote ancestors as well.

Freedman's chapter, entitled "A Biological View of Man's Social Behavior," is a new one, written not so much from a comparative viewpoint as a biological study of a single species. His approach is an evolutionary one, and he concerns himself chiefly with those aspects of man's social behavior which rest upon evolved capacities, that is, which have an evolutionary history. This useful concept avoids the old and now-sterile controversy concerning whether behavior is inherited or acquired. One of the problems with the older dichotomy of innate versus learned behavior is that these concepts assume that behavior can be *created* either by genetic processes or by learning processes, whereas in fact such processes act to modify and organize behavior, not to create it, and do not act independently of each other. Thus, all human behavior is organized and modified by both genetic factors and learning processes.

Freedman then raises the question of whether cultural inheritance is completely independent of biological inheritance and suggests that one factor leading to cultural diversity between small isolated island populations is that genetic differences are almost certain to arise under these conditions.

Freedman's evidence for the existence of evolved capacities is most convincing in those aspects of social behavior that arise early in development, such as the smiling response, and is somewhat less so with respect to adult social behavior. For instance, he cites the well-known fact that females mature more quickly than males in all phases of development and concludes that this makes it easier for males to keep the females in a submissive posture. Any preadolescent male in a graded school system, coming into contact with gigantic females of the same age, could assure him that early maturity of females does not make them easy to dominate. Freedman makes a considerable point of the fact that adult males are, on the average, physically capable of dominating females. Along another biological dimension, that of age, it is also true that mothers are even more capable of dominating their children and usually maintain this dominance well into the adult life of their children.

Many authors have speculated about the evolution of the conspicuously and permanently enlarged breasts of the human female, and Freedman suggests that they may act as sexual releasers. It is also possible that a simpler explanation is in order, namely, that visual differentiation between adults and young and between the sexes facilitates a higher degree of organization and differentiation of labor between the different members of a human society.

While Freedman has obviously read widely in the anthropological literature and is aware of the amount of variation that exists in human cultures, he still shows some tendency to assume that what takes place in our culture is universal in all mankind. For example, he regards the sexual jealousy frequently observed in our own society as evolved behavior. This may be true, but among other primates there is little indication of this phenomenon. In a baboon society a female in estrus may pass from the dominant male to a subordinate one

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with no hint of fighting between the two. On the other hand, rivalry between males is a regular feature of the mating behavior of herd animals, such as domestic goats and cattle. It is not impossible that sexual jealousy has a cultural origin through ancestors who developed their ideas about the proper behavior of males by looking at their own domestic animals. Indeed, there are human societies, such as the Eskimos, in which there is little if any suggestion of sexual jealousy and possessiveness, although Freedman would suggest that there may be genetic selection against sexual jealousy among these people.

In the past many authors have looked to the social behavior of animals in order to justify as "natural" the morals and customs of man. The late Ernest Thompson Seton thus justified monogamy as opposed to polygamy and tended selectively to emphasize supposed cases of lasting pair bonds. Like other modern authors, Etkin and Freedman do not try to support human morals by appeals to the "natural." Rather, the importance of their work lies in the progress they have made toward an objective description of the sociobiological nature of man, thus giving us an understanding of human behavior which is impossible if only cultural factors are considered.

In short, the study of the social life of non-human animals leads not to ethics but to a better understanding of the bases of human behavior and the extent to which it can be usefully and satisfactorily modified. Because of language and culture we always have the possibility of deliberately changing our social customs and institutions, either for better or for worse. However, we need to know the biological foundation of our behavior in order to bring about satisfactory changes. To take an obvious example, human beings are enormously variable because of genetic differences between individuals and populations. It follows that any general social organization must allow the possibility for individual variability in behavior in order to work satisfactorily.

On the other side of the coin, we can no longer use man's "animal nature" to excuse the darker side of human conduct. The vast majority of animal societies studied under natural conditions are organized so that individuals generally exhibit peaceful and supportive behavior among themselves. It is only when these societies become disrupted and disorganized (usually by human interference) that destructive violence and maladaptive behavior begin to appear. Behavior in animal societies has been evolved so that it will promote mutual survival under the kind of conditions usually met with in the long history of the species. We might do well to begin to ask ourselves what are the conditions and situations which prevent the normal flowering of human behavior.

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RESPONSE: Letter from Freedman to Scott dated June 5, 1968.

Thanks for sending me the advance copy of your review. I think it's quite good, but anyway here is my rejoinder on the review of my chapter. I'll do this somewhat formally, since Burhoe may wish to publish it:

1. My point about females maturing more quickly is that, at a comparable level of *sexual maturity*, the male is always older. In fact your point about preadolescent males and their female age mates bears out what I'm saying.

The preadolescent and adolescent male *at the same age* as the female is outclassed, and in all cultures I've ever heard about he tends to seek out *younger* females when courting. Perhaps my wording wasn't clear, but you missed my point there. (This leads to the further point, important for education, that boys apparently do better in all male classes [Freedman and Omark, unpublished] because when mixed the females are more verbal, more goody-goody, and set a tone and pace not congenial to many boys. All-boy classes have been described as "working in a boiler factory," but boys accomplish much more than in the quieter, mixed classroom.)

2. Regarding my favorite subject, female breasts, you suggest that yours is a *simpler* explanation. Why is the evolution of breasts as a "visual differentiator" a simpler notion than their evolution as a "sexual releaser"? To the contrary, it would seem that the closer one's explanation is to courtship, the more parsimonious the evolutionary case (cf. G. C. Williams, *Adaptation and Natural Selection* [Princeton, N.J.: Princeton University Press, 1966]).

3. Concerning baboons and jealousy, you are probably referring to Hamadryas males as displaying no jealousy. Among gelada baboons a harem is jealously maintained, and one need not and probably should not resort to *imitation of herd animals* as an explanation of human jealousy. I consider it psychologically naïve to believe that so basic and violent an emotion as jealousy has its basis in some long-deceased goatherd's empathetic observation. With regard to the Eskimo's mythical lack of jealousy, Peter Freuchen makes it clear that there is a vast difference between an Eskimo male volunteering his wife to a visitor out of hospitality and his murderous reaction toward someone making him cuckold.

I don't mean to convey by this defense that there isn't a great deal in the chapter that should be amended, because there is. It is just that in these instances I think I was probably on less shaky ground than elsewhere. In any case, yours is the first serious response I've had on the chapter, and I find it edifying to at last be joined in a debate.

DANIEL G. FREEDMAN

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Evolution and the Christian Doctrine of Creation: A Whiteheadian Interpretation. By RICHARD H. OVERMAN. Philadelphia: Westminster Press, 1967. 301 pages. \$7.50.

In its form and intention, this substantial treatise by Richard Overman (it is much longer than its 301 pages would indicate, inasmuch as the type is very small) is a model for books of its type—and, one would hope, an encouragement for others to undertake the sort of thing he has done. That he may not have succeeded in his intention at all points, or that one might differ sharply with parts of his work, does not detract from the essential correctness of his approach.

Overman seeks to bring theology and scientific thought to bear on a single topic or problem, with a full historical analysis of the roots of both and a constructive synthesis which summarizes his own suggestions for understanding the problem (in this case, evolution and creation) in a manner that does justice to

both scientific knowledge and theological tradition. Obviously, such a design could fill several volumes, and Overman is able to do his work in one only by drastic compression at times. Nevertheless, his aim of extending himself by providing a full analysis of the scientific issues and their history as well as a full historical discussion of the theological issues is the only adequate method for working out an acceptable confrontation between contemporary scientific thought forms and Christian theology.

Besides his explicit task of relating science and theology on the issue of creation, Overman accomplishes two by-purposes. On the one hand, he hopes to demonstrate that man can hold to "a modern understanding of our evolving world" and also entertain a belief in God, and, in addition, find God in his conscious experience. Overman is unabashedly modern in his knowledge and in his conception of the world; one of the chief criteria which the critical reader will apply to his book is whether the author succeeds in affirming his belief in God without lessening the consistency of his modern understandings.

On the other hand, Overman joins a growing number of younger theologians who are publishing works which demonstrate that the work of the so-called process philosophers, chief of whom is Alfred North Whitehead, is a significant base for theological reflection. John Cobb's *A Christian Natural Theology*, Schubert Ogden's *The Reality of God*, and C. J. Curtis' *The Task of Philosophical Theology* are other works which set this same tone. We are witnessing the beginnings of what promises to become a "trend," if not a "school," of thought among some younger men who are now putting the building blocks together which may form a new theological synthesis. The fact that Whitehead's philosophy emerged directly out of his scientific inclinations suggests that the work of these theologians as a whole will be relevant to the attempt to hold together modern understanding of the world and belief and experience of God—and therefore this "school" should be of continuing interest to readers of this *Journal*.

For Overman, the question of the Christian doctrine of creation and evolution is really the question of whether purposiveness and subjectivity can be conceived as intrinsic to the world. Past efforts to understand the evolving world

have been handicapped by overstressing some one mode of explanation—the Old Testament writers attributed too much to the causal efficacy of God, Aristotle over-emphasized the inherent purposiveness of nature, and modern neo-Darwinians tend to attribute too much to efficient causation. Instead, we must try to understand biological evolution, using both the objective categories of modern scientific thought and the subjective, personal categories of Biblical thought. In what follows I shall try to show that nature itself includes final causation as well as the efficient causation which scientists have studied so fruitfully for centuries; also I shall try to show that the purposes of a real God are partially determinative of every event, so that the search for understanding nature becomes a search for the content and relative importance of these three modes of causation [p. 9].

The real foil, over against which Overman places his own position, is a Newtonian view of matter which cannot sustain categories of subjectivity or purposiveness. Overman's thesis depends on the inadequacy of Newtonian thought almost as much as it rests on Whitehead's adequacy. That inadequacy, Overman argues, becomes clear as we observe at several points (e.g., the at-

tempts of the neovitalists, Maupertuis, Asa Gray) that evolutionists were compelled to speak of subjectivity and purposiveness in order to account for their data. But the Newtonian doctrine does not allow the idea of final causation, inasmuch as it rests on the twin assumptions that knowledge is based exclusively on sense experience and that entities in the world are mere objects devoid of intrinsic value (the doctrine of "simple location"). The preoccupation with sense experience renders any notion of causation "unscientific," whereas the latter relates entities only externally and accidentally, holding that these entities are discrete particles "scurrying through space." Physicists have known for over half a century that this Newtonian view is inadequate, but, Overman holds, biologists have not freed themselves from Newtonianism.

Whitehead's metaphysics resolves this dilemma for biologists by rendering intelligible the idea of final causation, as rooted in the "urge of organisms" to "acquire an increase of satisfaction." At the same time, Whitehead enables the Christian to accept evolution and still hold to his belief in and experience of God by affirming that a concept of God (as the source of order in life) is necessary, whose causality and purposiveness is exercised through his supplying the initial aims to each actual entity and thereby providing order and purpose to the subjective aims which are intrinsic to each entity.

Overman's position, then, is tied directly (and exclusively?) to Whitehead's system and its own peculiar neologisms. It rests on the indispensable presuppositions (1) that subjectivity and a kind of purposiveness are intrinsic to every actual entity in the world and (2) that the unfolding of this subjectivity and purposiveness is unintelligible without a concept of God which accounts for the existence of each entity and the development of its subjective aims. If these two presuppositions are granted, Overman is able to correct the errors of the Old Testament (Whitehead's God allows for contingency and the freedom of the world's actual entities), of Aristotle (Whitehead demonstrates that nature by itself cannot supply the order which enables its inherent purposiveness to overcome chaos), and of the neo-Darwinians (Whitehead's system indicates that efficient causation by itself cannot account for the "advance" in the evolution of life). Furthermore, Whitehead corrects Newton by allowing subjectivity in *intrinsic* place within matter, positing *internal* relations between entities, thereby enabling for the first time a viable concept of *life* which can support the work of biologists.

From this brief summary, it is clear that a judgment on Overman's argument depends upon the answers one gives to a number of questions: (1) Is it adequate to suggest that the Christian doctrine of creation narrows down, in the final analysis, to the affirmation that there is purposiveness in the world and that this purposiveness is rooted in God? (2) Is it true that subjectivity and teleology are requisite presuppositions for the biologist's work?

These two questions seem most crucial, in this reviewer's opinion, to Overman's work. On the first, Overman seems to be on solid ground. The doctrine of creation seems, on the surface, to deal more with the question of the world's origin and its continuing dependence on God as its source. Origins and dependence, however, lead one ultimately to the question of purposiveness. Nevertheless, Overman does play down the question of origins in his discussion, and he fails, generally, to demonstrate that evolution in the Whiteheadian key deals adequately with either the scientist's skepticism concerning divine origins

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of the world or the believer's certainty on the question. Furthermore, in what may be the greatest defect of his study, he glosses over the substantial reflection which classical theologians devoted to these questions.

On the second question, one might entertain more serious doubts. Overman displays an impressive grasp of the scientific data (he has received a scientific education), and yet he is quite unconvincing in his suggestion that "the world is incomprehensible unless we use the category of final causation in explaining the entire history of our universe, including biological evolution on the planet Earth" (p. 165). He does acknowledge that scientists object to the concept of final causation, but he rather lamely dismisses these objections by asserting that "some evolutionists discuss human evolution in terms of the purposes and ideals which guide civilization" (p. 166). This *assertion* (Overman does not really *argue* the point) is a dubious one. The great works on evolution by men like Dobzhansky or Dubos do not operate with a notion of final (or divine) causation. Indeed, they are clearly able to exclude it—even though Dobzhansky himself is a theist (see his *Mankind Evolving*).

Even a philosopher-poet like Loren Eiseley rejects *final* causation. Overman's implication that Newtonian thought is a serious obstacle for biologists, thus entailing a need for a system like Whitehead's, is misleading. Biologists are perfectly able to do their work without Whitehead—and so are the anonymous evolutionists who discuss human civilization (it is a very great leap at this point for Overman to join cultural evolutionists and biological evolutionists in the same argument). At the most, one can say only that it is *not unintelligent* or *unreasonable* to affirm Whitehead's system as a projection of reality which is compatible with evolutionary theory. But one can under no circumstances say it is a *necessary* projection, and if Overman's repeated references to Newton's inadequacies mean to imply such a necessity, one would have to demur. There is a sense in which Overman seems to subscribe to the thesis that, "whereas all others have failed, Whitehead has succeeded." After all, the European biologists, whom Overman refers to often, are doing their work on a modified Kantian base. Furthermore, much more emphasis must be given to the fact that evolutionists are able to discuss the process of development through the mechanisms of natural selection with no reference to final or divine causation. In Overman's favor, however, one must say that, despite these scientific accounts of natural selection, the apparent thrust of life in the evolutionary scheme does raise, rather naturally, the question of final cause. For those for whom the question is an inescapable irritant, as it presumably is for Christians, Whitehead is certainly an option. But we must be clear that this does not mean that a "modern (evolutionary) understanding of our evolving world" *does* "include belief in the reality and effectiveness of divine purpose" (pp. 8-9). At this crucial point, Overman has *assumed* precisely what his book *cannot* legitimately assume but, rather, must prove. He demonstrates that for Whitehead a modern understanding includes belief in the reality and effectiveness of God. But he has not demonstrated that evolution *as such* includes such belief.

At this point, the cogency of Overman's discussion (and Whitehead's) of final (and divine) causation is called into serious question even for the Christian. After all, today the doctrine of *divine providence* (which is what creation really means for Overman) is probably the most difficult of all traditional beliefs to hold and to experience. Direct encounter with God is more possible

and plausible, it seems, than *providence*. The dominance of good over evil, purposiveness over ultimate chaos—these are scarcely “evident,” and, along with them, “providence” is not clearly discernible. Does Overman’s (and Whitehead’s?) abstract discussion of how final and divine causation may be conceived within each *individual* actual entity make providence more plausible? Hardly. If one brings *with him* a conviction of divine providence, Overman (and Whitehead) make that conviction intelligent and explainable. But no aggregate of individual actual entities to whom final and divine causation is intrinsic—no matter how large that number is—adds up in these days of skepticism to providence (or final causation) writ large in the continuum of life’s evolution from primeval slime to contemporary human civilization. Indeed, the natural query is: If final causation is so intrinsic to every *actual* entity, why is it not more apparent in the greater movement of huge societies of entities? This strikes hard at the cogency of Overman’s work. In light of his stated aim, it means that his Whiteheadian system does make prior belief in final causation plausible but does not necessarily justify Overman’s hope that belief will be recovered by a secular age. Overman stands, therefore, in the tradition of faith seeking understanding, rather than understanding facilitating faith. That tradition is a venerable one and needs no apology. But one must be clear about what possibilities are open to this tradition as well as those that are closed to it. For those biologists who need a metaphysics for their work, Whitehead may be the answer to Newton’s inadequacies, and he makes God’s causation a viable concept. But what of those who apparently need no metaphysics or those for whom Kant is the foundation?

Besides these two major questions, a number of lesser questions might be raised. Overman has overlooked some important American theologians who dealt at length with evolution, for example, Newman Smyth. When he discusses modern theology, he tends to focus upon neo-orthodox thinkers, with little attention to thinkers like Schleiermacher (whose significant treatment of the doctrine of creation in terms of its psychological and ontological meaning as *dependence* would tend to buttress Overman’s own position). As for Overman’s interpretation of Whitehead, there are some questions which the experts may puzzle over: whether the author is correct in following Cobb’s modification of Whitehead to define God as a “person,” whether he is correct in interpreting Whitehead as freeing us from the necessity of speaking symbolically or analogically about God (p. 277). In regard to the scientific materials, Overman generally neglects the “wets” who do molecular biology, in favor of the Darwinians and the contemporary Germans (one wonders how the concept of final causation would fit into the molecular biologist’s view at all).

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The Cosmos of Arthur Holly Compton. Edited by MARJORIE JOHNSTON. New York: Alfred A. Knopf, Inc., 1967. xxxvi+468 pages. \$10.00.

My Life and My Views. By MAX BORN. New York: Charles Scribner’s Sons, 1968. 216 pages. \$4.95.

These two books make an interesting contrast. Both are collections of essays written by Nobel Prize-winning physicists on non-technical subjects which are

of great interest to them. In *My Life and My Views*, Max Born has collected a series of three autobiographical essays originally published in the *Bulletin of the Atomic Scientists* and six essays on science and society previously published in German. In the other book, Marjorie Johnston, with the help of four associates of Arthur Holly Compton, has assembled an extensive collection of Compton's writings on subjects of interest to the general reader. The selections range from an enthusiastic letter to his father in 1909 written at the age of sixteen, asking permission to build and fly a 27-foot glider, to a lecture given two months before his death in 1962, describing the place of mankind in a scientific age. Also included is an informal sketch of an autobiography, personal reminiscences about some of the great scientists with whom he had worked, and a large number of essays on the relation between human values and science.

Max Born has always been interested in the more general aspects of science: "I never liked being a specialist and have always remained a dilettante, even in what were considered my own subjects. I would not fit into the ways of science today, done by teams of specialists. The philosophical background of science always interested me more than its special results." He argues convincingly that physics, which has revolutionized our concepts of space, time, matter, and causality, is the real philosophy of the twentieth century. In the chapter, "Symbol and Reality," Born discusses the important role which physical models have had in science and how our concept of reality was changed when physical models were abandoned by the new quantum mechanics. Compton has not viewed science from the deep philosophic understanding that Born has, and there is little of this aspect of science in his writings.

Both men, however, were seriously concerned with the relation between science and society. Born tells a marvelous story from his days as a student of the German mathematician David Hilbert. At a party, "when Galileo's trial was discussed and somebody blamed Galileo for having failed to stand up for his convictions, Hilbert answered quite heatedly: 'But he was not an idiot. Only an idiot could believe that scientific truth needs martyrdom; that may be necessary in religion, but scientific results prove themselves in due time.'" Since the days of Galileo, science has come to have at least as much effect on society as society has on science, and both Compton and Born are concerned about the quality of the effect which science is having on society. In an essay written in 1938, Compton shows that the social consequences of the discovery of X-rays were greater than those of World War I. He concludes with this comparison: "Finally you must have been feeling the great contrast between these two important events of the world war and the discovery of X rays. The values of one are largely destructive, whereas the values of the other are almost wholly constructive. It is for this reason that the contributions of science remain as permanent human assets, while the scars of war are eventually healed over and forgotten."

This innocence was lost to science with World War II. Compton played a major role in the development of the atomic bomb in the early planning stages and as head of the plutonium research group at the University of Chicago. In 1945, along with Fermi, Oppenheimer, and Lawrence, he was part of a panel which was asked to report on the feasibility of a demonstration of the atomic

bomb which could bring the war to an end without using the bomb against a live target. The panel decided that there was no alternative to direct military use. The book presents a personal memorandum of Compton's which outlines the pros and cons of the various alternatives. Compton had clearly thought deeply about the issues, but unfortunately this account does not make apparent the reasons for his final decision. In later years Compton viewed nuclear weapons as a temporary necessity to protect the free world from Communism.

Max Born was never directly involved in the development of nuclear weapons, but his concern about them dominates much of his book. Born is deeply troubled by the new developments in warfare with the vastly more powerful weapons and the concept of "total war" in which an entire society is mobilized to destroy another society. Indeed, the tone of his book is one of profound sadness. In the last chapter, "What Is Left To Hope For?", Born sees only a slight possibility that man will come to his senses in time to avert catastrophe.

Max Born sees the source of these problems in the breakdown of traditional ethical principles, caused in large part by new developments in science and technology. Can science point the way to some new ethical principles? Born thinks not: "Human and ethical values cannot be based on scientific thinking." Unfortunately, that is the extent of his comments on the subject. The discussion of this, as well as some other points in the book, is brief to the point of superficiality.

The Cosmos of Arthur Holly Compton discusses the relation between science and religious values in more detail, although not always with more insight. The essay, "Science and the Supernatural," is a thoughtful exposition of Compton's religious faith and understanding of God. Compton feels that science cannot discuss questions involving sensation, emotion, meaning, or purpose. But science has clearly had an important part in shaping his religious views. We often are told of people who profess a certain religion but do not practice its teachings. With respect to a theology based on science, I believe we have, in the cases of Born and Compton, practice without profession. What in fact gives these books their special value is that Max Born and Arthur Holly Compton have used their deep understanding of science to give us a clearer insight into the important problems facing mankind.

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Teilhard and the Creation of the Soul. By JOSEPH NORTH, S.J., S.S.D. Milwaukee: Bruce Publishing Co., 1967.

This is another interpretation of Teilhard's system, of which there are many, some rudimentary, some learned. Father North's study can claim distinction on two counts: first, it focuses attention on the doctrine of the creation of the soul, which in Teilhardian thought is part and parcel of the evolutionary process; second, it presents a wealth of evidence from Roman Catholic authorities setting forth the dogmatic, traditional views of the past and their slow erosion or modification by theologians eager to do justice to process philosophy and science and yet remain within hailing distance of the truths of revelation.

The style is simple and direct and occasionally borrows illustrations from comic strips of newspapers, but this topical material should not blind the reader to the mine of information brought forth in the footnotes on orthodox formulations and their modernization by scholars fully conversant with the methods of modern science and their substantive results. To the intellectually emancipated reader much time seems to be lost on discussions of "monogenism" versus "polygenism," on the exegesis of the first chapter of Genesis, on the possible meaning of creation out of "nothing," on Lamarck and orthogenesis, on the creation of the soul as stipulated in dogmatic formulation, and on the problem of evil and its overcoming at the Omega-Point. However, the documentation of historical texts, manuals of scholastic theology, modern works on evolution, copious articles on various aspects of Teilhard, as well as the approach to Teilhard by "Rahner's hypothesis of hominization" will repay the patient reader. He will find who is for Teilhard and who is against him. He will find where Teilhard has been ambiguous and open to different interpretations and where a rich company of Catholic and Protestant scholars are incorporating his radical evolutionary views into their systems.

The workings of the sophisticated Catholic mind will become apparent, that mind which declares that a certain dogmatic formulation is "certain," but certain within historical conditions of knowledge of science and the development of doctrine, and not so certain and therefore open to reconsideration and even rejection under new advances of knowledge and the further development of doctrine.

This solid work is a detailed, scholarly discussion not only of *The Phenomenon of Man* but of "the phenomenon of woman" (pp. 277-85)—but we shall not satisfy the reader's curiosity at this point.

The long line of arguments and counterarguments presented in this scholarly volume provides evidence for the conclusion: "In a dynamic universe, 'creation is cosmogenesis' applies to the soul too. . . . God created the human soul, each human soul, and immediately. But not separate from matter . . . God's creative concern for man is not diminished by our seeing the formation of the human *body* as terminus of a billion-year-long gradual rearrangement of forces put into inorganic matter from the beginning. Just as little is his power and wisdom lessened by our seeing the emergence of the human *soul* too as a natural step in the ever-increasing complexification of forces present from the beginning" (p. 261).

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God Is Not Dead. By AUSTIN FARRER. New York: Morehouse-Barlow Co., 1966. 127 pages. \$3.50.

This little book is another largely successful attempt to relate science and religion, with the fundamental assumption that "physics deals with the force-relation between everything and everything else; theology deals with the dependence-relation which ties everything to God" (p. 21). The author does not belong to the company of theologians who believe that science has

nothing to say to theology: "On the contrary, the aspects which a religious approach heaps together will include aspects on which science has cast a brilliant and an unforgettable light" (p. 25). A brief survey of astronomy, biology, and evolution is given to indicate that the God of Nature "has woven nature up from the bottom." From the point of view of philosophical idealism, which seems to be Farrer's own foundation, the author tries to do justice to a process view of reality when he states that God thinks the whole universe in an evolutionary order of physical, biological, and spiritual laws emerging in time. He holds on firmly to reason when he affirms that "the works of God are not irrational, they are endlessly intelligible; but that means there is always more and more for us to understand in them" (p. 87). It is his hypothesis that the wisdom of the divine mind created the world as apparent in both the world order and human mentality and that the two are coherent.

An interesting discussion is given to the question of experimental verification in science and religion. Farrer believes that in religion the only experimental verification lies in the devotion of heroic souls to the will of God, with the proviso that "the Christian conscience has acquired certain sensitivities to which the First Century was a stranger" (p. 119). Furthermore, "we are bound to rid St. Paul's pages of elements which we can only regard as First-Century period junk" (p. 119).

This little work, written in an admirable style free from scientific and theological jargon, will repay careful study.

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