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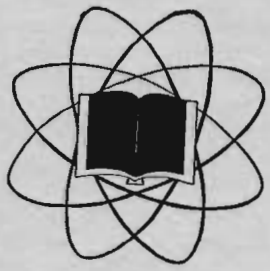

*The fear of the Lord is the beginning of wisdom. Psalm 111:10*

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## EXECUTIVE COUNCIL

# The Journal Of The American Scientific Affiliation

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# *A Theoretical Consideration of the Function of Religion*

Russell Heddendorf, M.A.

### Some Theoretical and Methodological Considerations

In recent years, attempts to study the function of religion have been centered in analyses of the social relations of man in the religious sphere. Such studies have emphasized the normative aspect of religion as an important integrating factor in the society. This view has a wide spread theological support as well as strong theoretical foundation in Durkheim's emphasis of the integrating function of religion. The attempt to more firmly establish this position has resulted in considerable studies concerned with church membership, church and parish relations, and the effect of religion on other spheres of social living. As methods of quantitative research have developed, the area of religion has been looked upon as a useful field for the employment of such methods.

It may be legitimately asked whether religious activity is basically composed of man-to-man relations. Historically, at least, some of the most important religious behavior in society has had an emphasis on "man-to-God" relations. Is it not possible that the chief function of religion lies in this area of behavior? For the methodologist to leave those superempirical considerations to the theologian because he is not a metaphysician is to omit some of the theoretical implications of the study of religion.

Simply then, the theoretical significance of the study of religion has been that it is a necessary aid for the understanding of social relations. This view has been partially supported by the development of current methodological emphases which consider the field of religion to be composed of predictive, controllable phenomena. It will be suggested in this paper, however, that the theoretical importance of the sociological study of religion is that it allows for the study of a form of deviancy and non-social behavior. It will also be indicated that religious behavior is largely directed toward the superempirical implying that it should have a certain theoretical use in the study of unanticipated consequences. Since the superempirical nature of religious phenomena cannot, at present, be adequately studied by quantitative means, the analysis will proceed with the use of historical data.

### Preliminary Considerations

This paper is the second in a proposed series concerned with the function of religion, particularly as it is found in contemporary American Protestantism. This present study is based on a previous paper which reconceptualized the concept of the function of religion. It would seem necessary, therefore, to review some of the conclusions given at that time.

This previous study was centered in Durkheim's concepts of sacred beliefs, rites, and structure, as found in "The Elementary Forms of the Religious Life." In the paper, sacred is conceived as referring to that phenomena in the world which contains the best, least knowable objects. This division is in the form of a continuum in which the highest types of sacred item approaches perfection and the characteristic of being empirically unknown.[1] It is understood that beliefs refer to those myths and dogma which describe the opinion of a group about the knowable, superior aspects of nature, man, and society. Rites is conceived as referring to those normative ways of acting which vary with the type of sacred objects to which they are oriented. The use of the concept of structure by Durkheim refers only to some relationship of those units which are common or less easily identifiable, such as social awareness.

Durkheim's thesis is that the function of religion is to provide for social interaction through religious rites, allowing for the integration of social units. It is implicit, however, that religion provides for social integration only when there is a certain amount of social awareness. What is the function of religion when there is no "assembling of society"? The reason for the existence of religion in a society would have to consider this question.

The view taken in this previous paper was that religion had the function of relating to that part of the sacred which most closely approximates the unknown and changeless. Durkheim hints at this view when he states that it is the object of religious ideas and practices to explain the world.[2] Obviously, there are other complexes of society such as science which are more specialized at explaining some knowable areas of the world. As long as religion reaches to these areas, it will lose its function to the other social complexes as it comes into conflict with them.

By relating to the unknown, religion must do it in an experiential rather than an empirical manner.

Basically, such a relationship should exist only by the use of empirically irrational beliefs and actions. To the extent that a particular group experiences these irrationalities, there will be unity and order because of the delimitation of possible choices available to the group. The universal acceptance of norms controlling the choice of superempirical ends would eliminate group conflicts arising from differences in the individual abilities to make rational choices. These beliefs and norms, therefore, gain an experiential rationality which provides reason for the choice of superempirical ends. It is conceivable that a consequence of religion will be the development of social unity. This does not imply, however, that such a resulting unity is a manifest function of religion. It would seem instead that the function of religion somehow centers in this concept of irrationality.

### The Notion of Irrationality

In his discussion of rationality, Weber sets forth two criteria for its existence: 1) the devaluation of tradition, 2) the systematization of conduct according to rational norms.[3] Weber indicates here that action is not rational if it is merely traditional. Rather, there must be some proof that a particular action will fulfill the necessary requirements before it is accepted as being rational. Such proof may be provided by empirical means, but only when the particular action is empirically knowable. The possibility of error occurring in social action exists because of the development of unanticipated consequences.[4] Empirical methods are concerned only with known values of space and time, but some goals transcend these values and include heaven and eternity. It is religion which directs its attention to these superempirical goals because they are in the realm of the empirically unknown.[5] As a result, religion becomes irrational because it is unable to be empirically proven. Yet, such irrational action is not necessarily without purpose.[6] Rather it is often motivated toward these superempirical ends resulting in consequences which are often beneficial to society. Irrationally purposive action, therefore tends to choose those particular acts which are oriented toward the superempirical goals. As a result, religion is motivated toward unanticipated consequences.

Concerning Weber's second criterion, obviously any form of action which is not in accord with what is accepted as rational normality is irrational. The concept of irrationality, therefore, will vary greatly in the concrete case, depending on the particular definition given to rationality in that time and place. In the Parsonian sense, any action which does not have a meaning accounted for by positive empirical science is irrational.[7] In the utilitarian context, however, it seems that a certain amount of tradition is valued and that action which is considered irrational is basically ritualistic.[8]

It is not the purpose of this paper to dwell on an extended analysis of the meaning of irrational social action. Rather, the foregoing considerations have been limited in the hope that they will merely provide a background to allow for a meaningful working concept of irrationality. For our immediate purposes, we will conceive of irrationality as being composed of the following basic elements: 1) there is a certain reliance on tradition for social action, though it need not be ritualistic. Rather, there seems to be a reversion to tradition because the means provided there are still capable of determining whatever ends may be necessary. Yet, irrationality doesn't necessarily mean that empirical means will not be used.[9] 2) there is a tendency to strive for superempirical ends which exist beyond the superempirical means of validation, 3) because irrational social action is not a pattern of behavior which is prescribed by the rational norms, it tends to constitute a deviant form of social action.

### The Historical Protestant Framework

Though history could provide many incidents which indicate the conflict of rational and irrational forces in the area of religion, the particular religious form chosen for this analysis is Protestantism as it has been made manifest in America. In its development from Puritan spiritualism to contemporary secularism, Protestantism has had different notions of rationality and has tried to fulfill a number of contradictory functions.

In opposing Catholicism, Protestantism devalued the ritualistic tradition in order to establish new social goals.[10] In doing so, it stressed the difference between the real and ideal and focussed on the striving for the ideal superempirical goals which would give new meaning to the social goals. Rationality was proven by experiential rather than by empirical means. In order to achieve such superempirical goals, the group found its norms in its relations with spiritual rather than secular forces. At many times and places in Protestant history, this pattern of thought and action had deviant origins, but in many cases it eventually developed into a dominant form. At this point it could no longer be considered to be truly irrational. With the development of the empirical sciences, however, there is limitation of action to the acquisition of those goals which are empirically valid. Similarly, there is a delimiting of norms to those which are basically secular. With the development of a strong scientific view, there is an emphasis on change and the complete devaluation of tradition.

### The Social Structure of 16th and 17th Century England

With this brief reconceptualization of the function of religion as background, it would now seem appropriate to consider the hypothesis in the light of a specific case history. As the first strong representatives of Protestantism in the New World, the Pilgrims characterize the bridging of the gap between irrational and rational religious behavior. With an origin as deviants

in England leading to the development of a dominant force in New England, they are basically homologous to the expansion of American Protestantism. Further the Pilgrims would seem to represent an interesting study because they develop in a context which is in complete contrast to the group studied by Durkheim.

The general social unrest in England at the turn of the 17th century was greatly manifested in the religious nonconformity of the times. Throughout the period of 1590-1625, with which we are principally concerned here, there was a general revolt against the persisting medieval traits. Though England remains basically rural and agricultural, there is a great increase in urbanization. Developing with the cities was a large increase in industrial production and the establishment of a new mobility in the social structure. A new class of gentry arose out of trading and business enterprises, while the old landed gentry which relied on land rents for their income held an uncertain prestige. The traditional yeomen developed industrial skills to supplant their farming activities. Intellectually, the beginning of the period is typified by the belief that man is subordinate to God in the established hierarchy of the Great Chain of Being, but that the world was created for him. The notion stressed that the hierarchy of the church and society, as the hierarchy of life, was divine and should remain unchanged. At the end of this period, however, these notions were coming under attack. The support of the Copernical theory by Galileo devalued the spiritual importance of man.

In general, therefore, the changing of social values resulted in a social structure which was not unified or integrated. Such a context varies greatly from the small, unified structure of the Australian primitive considered by Durkheim. Yet, it is not enough to state that religion need not have the same function in the context of 17th century England as it does have in the context of Durkheim's primitive society, since it would seem that the function of the religious organization will vary with the particular social structure in which it is dynamic. One means of characterizing a social structure is in relation to the amount of integration-existing among the component parts. In the concrete case under consideration, there is a lack of integration among the organizations. This fact would seem to indicate that in the social structure there would be no established agreement in what constitutes an ideal type of behavior. The ideal type may be institutionalized within the particular organization, but since there is a lack of integration among the organizations, the ideal type need not be accepted by another organization. Within the social structure, therefore, there seems to be a degree of freedom in the defining of the ideal. As a result, a deviant within the organization need not necessarily be a deviant within the total social structure. Where there is a high degree of integration within the social structure, however, a deviation from the ideals of the organization will probably also indicate a deviation from the ideals of the social structure. In a strongly integrated society, therefore, the religious institution would have to provide for behavior which is not deviant so that the existence of the society might not be threatened. In a non-unified society, however, deviant behavior may exist in the religious institution with no threat to the society as long as the deviancy is only in relation to religious action and is not transferred to other areas of the society.

Considering the Pilgrims in the light of the general condition of the English social structure at the time, it could be stated that they were deviants because their definition of the ideal of the religious organization differed from the definition conceived by the Anglican Church. Originally, their deviancy did not bring into question those values which were accepted by the entire social structure. It wasn't until the group indicated their dissatisfaction with life in England that they questioned basic values in the social structure.

### The Concept of Non-Conformity and the Function of Religion

What was the basis for this definition of the ideal by the Pilgrims? The concept of a non-conformist spirit has been applied to the Pilgrims.[11] In essence, this concept emphasizes the existence of life over the existence of organization. Nor is the latter only subservient to life, for it is the belief of non-conformity that organization should originate in life. It is not enough for religious organization to make religious life, rather religious life should make religious organization. It is not the goal of non-conformity to accept or reject any particular type of organization whether it be the dominant one in society or not, since this is only a secondary consideration. Nor is non-conformity a mere protest, since its emphasis would require it to begin a new foundation without necessarily tearing the old one down. The religious non-conformist, therefore, would orient himself to that type of thought and behavior which he sees as constituting the religious life. Obviously, this notion is in opposition to the view held by Durkheim. While he was assuming the primary importance of an organization toward which a group is oriented, non-conformity stresses the importance of the individual and his concern for the right way of living, which may lead into the development of a particular type of organization.

Clark points out that where there is a state church, the meaning of non-conformity will probably be misconstrued as an opposition to that existing church.[12] To say that such opposition exists in the case of the Pilgrims does not provide an explanation of its origin, which had the original purpose, not of opposing the Anglican Church, but of being an expression of the group's beliefs. Nor does the existence of such opposition indicate the reason for the group's definition of its reason for being. If the Pilgrims are seen as

a group opposing the existing Church of England, it would indicate that they were deviating to the extent that they didn't accept the values of the religious organization. This would not mean, however, that they necessarily opposed the values of the social structure. The reason for such opposition would still have to be given and would probably be found in the explanation of the non-conformist's definition of the ideal as life being prior in existence to organization. [13] Once it can be seen that the definition of the ideal differs in the case of both of these religious groups, it may be shown that the subsequent functional requirements would also differ.

Assuming, therefore, that the Pilgrims defined the ideal of religious organizations in terms of stressing the religious life while the Church of England defined the ideal in terms of organization, it could be asked whether such a concern for organization provides for the fulfillment of the function of religion as previously conceptualized in terms of irrationality. In the concrete case of a changing society, the Church of England could not rely on tradition as a means of institutionalizing its values and goals. The need to adjust to the changing social structure would require it to change its values and goals. The need for the religious organization to be integrated with the structure would be particularly great at this time, since religion was closely tied up with every aspect of social life. Nor could the Anglican Church deviate from the norms of the changing social structure, since the need to conform to it would eliminate the possibility of deviancy. The following of a traditional form of behavior removes the need for prediction of future behavior. When behavior is not in accord with traditional patterns, however, the predictability of future patterns may only be understood in terms of empirical goals. In this conformist religious institution, therefore, there would be a tendency to ignore the superempirical goals which have more meaning in the nonconformist organization.

It would seem in this case at least, that the functionally irrational behavior of religion can not be met while the emphasis is on organizational ideals. Nor is it only the case that these organizational needs may not be the needs of the religious institution, for it would seem to be that they are not necessarily the needs of the lower contextual levels. The functional requirements of religion would seem to center in the needs of the individual, but the religious organization could meet these needs only if it defined its own requirements in terms of the individual. This was probably the notion implied by Clark when he indicates that religious organizational forms result from a particular definition of religious life. The religious behavior on the individual level would be limited to that behavior which fills the requirements of irrational behavior. While the functional requirements of the individual and religion may be met on the individual level, an integration of contextual levels is achieved only as long as the definition of required behavior on each subsequent level is in terms of the functional requirements for behavior on that level for which it is functionally relevant. This statement would imply that there is no integration of contextual levels as long as each level strives for that behavior which is required for its own functioning. On the organizational level, therefore, the needs of the group may be met but they do not adequately provide for the meeting of the needs on the lower levels. On the individual level, however, the need is met and may provide for the meeting of the need for life as the contexts become more complex.

The implications of this analysis seem to be diverse. Ultimately, however, it would seem that the religious institution could not perform its proper function and still be completely integrated into the social structure. This statement assumes that the religious institution must be concerned with the fulfillment of the needs of the individual concerning his definition of the "religious life." The larger consideration of the contemporary religious institution will take up this problem. For the present, however, we will return to the case under review in order to point out the conditions which are applicable to the foregoing analysis.

### The Early Historical Development

Many of the issues which led to the movements of English religious non-conformity were founded in the reign of Queen Elizabeth. It was in the Act of supremacy and Act of Uniformity that she established herself as "supreme governor" of church and state and stressed the need for unity with the re-introduction of the Prayer Book of 1552. Such a declaration was a revival of the anti-traditional opposition to Catholicism started by Henry VIII. The elimination of all Roman officials established the nationalism of the state and the close future ties it was to have with the church. As a result, this was a strong attempt to maintain social order by bringing the church with its changing disturbance under the control of the state. Indirectly, there was an attempt to de-emphasize the superempirical relations of the church, for the Prayer Book was basically concerned with establishing a uniformity of ceremonial behavior. Even at this early period, it becomes obvious that the church is being used to meet the needs of the social structure. The extent to which it was successful is indicated by the fact that there was little resistance by the clergy to the new order. Only on the part of the laity did there appear any significant opposition, probably because "they had less to lose."[14] The means by which Elizabeth changed the values and structure of the religious group so that it would meet the rational secular needs of the society were the elimination of

deviant statuses in the form of Roman Catholic officials and controlling those statuses which included in their role-set both church and state roles.

With the accession of James I to the throne, the situation became more complex. The chief opponents to the Anglican Church were now Puritans and not Roman Catholics. His dislike of the Puritans stemmed from his opposition to Presbyterianism in his native Scotland. To him, this new group represented a new form of Presbyterianism which had existed separately from the state in Scotland. It became obvious to the Puritans at the Hampton Court Conference in 1604 that James intended to support the Anglican Church as a means of consolidating his secular power and to provide any necessary changes in its doctrine to prevent it from appearing Presbyterian. This last effort was largely accomplished through the work of eminent state theologians such as Hooker and Andrews who repudiated the traditional doctrines of Luther and Calvin and provided for a new "learned and reasoned basis for the theological position of the Church of England."[15]

The control of church by state led to the eventual belief of the king that opposition to the church indicated opposition to the state. In fact, however, the Puritans felt that their deviancy was limited to the organization and did not apply to the structure as a whole. It was only when faced with the decision that they were secular, as well as spiritual deviants, that they were forced to resolve the deviancy by leaving the group or rebelling against it.

This control by the state indicated its attempt to negate the possibility of unanticipated consequences. Indirectly, therefore, this attempt to predict consequences by means of centralization of power indicated an orientation away from unanticipated consequences and a lack of concern for superempirical goals. It was by the development of an autocratic structure, therefore, that the state was able to have its needs met by the church, since it was able to define what constituted deviancy and the rational needs of the society. The autocracy of the society was characterized by the theory of the divine right of kings by the Anglican Church. Nor was the belief limited to the spiritual organization, for James had stated that, "kings are not only God's lieutenants here below and sit upon God's thrones, but even by God Himself are called gods."[16] Obviously such a theory would eliminate any possibility of irrationality, since the king himself would have complete knowledge.

The lack of integration within the social structure may be seen by the fact that existing within this autocratic system was Parliament and the mechanism for individual self-expression. It was the existence of such an organizational factor which motivated for the development of a pattern of deviancy. The Puritan took advantage of this tool in order to attack the state and the church. In fact, much of the independency and self-governing attitude came from the fact that the House of Commons was controlled by the Puritans.[17] It was only after the strong reign of Tudor regents, however, that the nation could voice the needs of the individual in its attempt to become self-governing.

While the Puritans controlled the Parliament and were striving for the religious rights they desired, they must have thought that they had a religious sanction for doing so. The traditional Protestantism from which Puritanism grew had its roots in the continental Reformation of Luther, and more particularly of Calvin. It was the mode of meeting the individual's needs and allowing for individual interpretation which was set by these men and emulated by their English followers. It was this traditional pattern, therefore, which also motivated for deviancy. For the Puritans, there was not only a historical and political reason for their irrationality, but probably more important, there was a religious reason in the seeking for the superempirical goals offered by God. As long as it was believed that God, and not the king, had perfect knowledge, the action of the Puritans had an irrational source.

Nor were there only religious reasons for striving for unanticipated consequences, since there were organizational factors causing motivation for such goals. The attempt to develop an influential Parliament was an experiment, since before the 17th century Parliament had felt that it only "had duties . . . of supplying financial aid and moral support for royal despotism."[18] Such an endeavor could only have unexpected results, for there was no way in which a prediction of the customs could be made. Though the needs of the English social structure required the prediction of the future in order to maintain a certain integration of the changing system, a system concerned with meeting the needs of the individual may not have such a requirement. As long as the Puritan Parliament system is concerned with the achievement of the needs and freedom of the individual, there is no need to predict the future consequences, since there is no attempt to control them. Hence, this smaller social system does not have the same motivation to anticipate possible consequences as the structural system.

As has been indicated, in this particular case, the Reformation tradition and the peculiar nature of the political system motivated the religious organization to meet the needs of the individual. Yet, there may be other devices which are influencing the religious organization to fulfill the needs of the individual. As long as the religious system related to God, there was little need for the development of a formal organization. To the religious group, God would fill the requirements usually performed by the formal organization. It seems to be only when the activity of the

religious system becomes secular that man must be concerned with controlling his man-to-man relations. The emphasis on relating to the superempirical, therefore, requires that the religious organization meet the needs of the individual.

Similarly, it was the development of an organizational and normative mechanism for the establishment of deviancy which met the needs of the individual. As has been indicated, the culture of the day was characterized by great social mobility as members of the lower classes found new power and wealth. Basically, therefore, these cultural values of new individual freedom and authority gave support to the use of Parliament as an aggressive tool for gaining individual freedom.

### The Role of the Pilgrim in England

As the Anglican Church was used by the social structure to meet the needs of that system, the Puritan movement was used by the individual to achieve those needs of his which hadn't been met by the larger contextual levels. On the individual level, however, there is much freedom in the opportunity to define what constitutes the individual's needs. Once there is freedom to reject the definition imposed by the social structure, there are numerous ways in which the individual may deviate. Not being a part of the general Puritan movement, the Pilgrims are strongly characterized by an individual definition of their needs. There was no organized group indicating how they should act or what they should believe. The group of middle class gentry and yeomen which comprised the original band of Pilgrims found its original need in reading the Bible and interpreting it for themselves. Coming from an isolated area and not in the mainstream of English life, the Pilgrims had none of the political ties which characterized the Puritans. As a result of these two factors, they found themselves to be more strongly inclined to separate from the Anglican Church than the Puritans. For this reason, they identified their need only in religious terms and considered themselves to be chiefly a religious group. The pattern of deviancy developing from these conditions was the establishment of a church at Scrooby in opposition to the Anglican Church from which they separated in 1606; persecution of the Pilgrims from the immediate vicinity of Scrooby followed by pressure from the Anglican High Commission and eventual emigration from the country.

The original founder of the Pilgrim church was William Bradford, a layman who had absorbed the Puritan influence. It should be noted, however, that he represents no organization, nor does he have any religious status. In fact, his state position of Master of the Post made him a servant of the Crown. It was only through his study at the Puritan University that he came into contact with the Puritan teaching of the south. Nor did he return to Scrooby until he had traveled in Europe in the service of an English nobleman. His organization of the Pilgrim church was very informal and centered in the belief that their interpretation of the Bible indicated that there was no warrant for the hierarchical nature of the Anglican Church. Their attitude toward organization and discipline was so fluid that they could state, "We promise and covenant with God and with one another to receive whatsoever light or truth shall be made known to us from His written word."[19] Again it was William Bradford who wrote that, "The true church and the proper government of the same is to be known by the scriptures, and to be measured only by that rule, the primitive pattern, which church and the government of the same is sufficiently described and laid down in the writings of the apostles and evangelists."[20]

These sympathies would indicate that the Pilgrim cause was founded on an individual interpretation of standards and values found in the scripture. The emphasis was on a unified condemnation of church organization as it was manifested by the Anglican Church. The Puritans, however, who were not strongly separatist, stressed the universal acceptance of certain scriptural principles, allowing for no deviation. In the matter of separation, they tended to be noncommittal, allowing for deviating attitudes and actions on the subject. In both cases, therefore, there was a realization that the individual needed a certain freedom and relationship to the superempirical entity of God. The Pilgrims permitted deviation in matters of organization but not in matters of dogma. These particular emphases of the organizational form resulted in differing consequences, not only on the structural level but also on the individual. A consideration of organizational processes and their effect on these particular groups would undoubtedly indicate the reasons why the particular deviancy of each group was stressed. It is not felt, however, that such considerations are within the immediate scope of this paper. The particular reason for the Pilgrims' greater deviancy with the social structure probably centers in this fact of their unified denouncement of certain organizational principles of the Anglican Church.

The religious institution had been under such great change for so long a period of time that it included, at this time, all forms of dogma and their believers, including former papists and Puritan dissenters. As long as they were absorbed by the Anglican Church, however, the less radical Puritans could be tolerated, for it was the organizational framework which was sanctioned by the social structure and fulfilled the necessary structural requirements. It was only when the Separatists, including the Pilgrims, defined the ideal of Protestantism in organizational terms which could not be tolerated by the organization or social structure that their deviancy represented a revolt against the society.

The fact that the Scrooby congregation was located in an area which was largely Catholic and isolated from the mainstream of Protestant non-conformity easily identified the group as deviant.[21] It was by members of their role set, therefore, that the Pilgrims were first defined as deviants because of their identification of the Church of England as a greater enemy than the Catholic majority. It was the deviation from the social norms which initiated local social pressure and the eventual definition of the Pilgrims as deviants by the Anglican Church. It was before the Court of High Commission that Brewster and others were summoned in 1607. As a "law court for the trial of all ecclesiastical causes"[22] it was the High Commission which represented the final denouncement of the Pilgrims on the level of the social structure.

It should be emphasized, however, that the Pilgrims were deviant, not merely because they were defined as such, but also because they considered themselves to be.[23] It could be said that they were voluntary deviants. Since the deviant status of the Pilgrims was not entirely forced upon them by society, they were able to define some of their own needs as deviants. These needs were summed up in the belief "that the lordly and tyrannous power of the prelates ought not to be submitted unto; which . . . would load and burden men's consciences"[24] and also that their desires were set on the ways of God and to enjoy His ordinances; but they rested on His providence, and knew Whom they had believed."[25] It was the desire to be separate from all that represented the uncleanness of man and to cling to all that represented the perfection of God which motivated the Pilgrims in the definition of their needs as deviants. The voluntary nature of their deviancy is emphasized here, for once there is no longer the motivation to strive for these needs, the purpose and action of the groups is changed. They need not be changed, however, when the social structure allowing for this definition of the group's needs remains the same. The organizational factors causing an involuntary form of deviancy will probably differ from the organizational factors causing voluntary forms of deviancy.

The attempt has been made here to indicate that there were organizational factors which caused the deviancy of the Pilgrims as well as their own definitions of the situation. Previously, it had been indicated that there were organizational reasons for seeking of superempirical goals, as well as religious requirements to strive for such goals. Once the Pilgrims decided to leave England because "they could no longer continue in that condition"[26] they were forced to seek unanticipated consequences because of their deviant status. They were willing to go to Holland, "a country they knew not but by hearsay, where they must learn a new language and get their livings they knew not how, it being a dear place and subject to the miseries of war, it was by many thought an adventure almost desperate."[27] Yet, it was because of their belief in the efficacy of seeking unanticipated consequences that they could be sure that though, "such attempts were not to be made and undertaken without good ground and reason . . . their condition was not ordinary, their ends were good and honorable, their calling lawful and right; and therefore they might expect the blessing of God in their proceeding."[28] The assurance of the Pilgrims that they would reach superempirical goals allowed them to assume the deviant status which removed them from the more predictable stability of the English social structure.

### The Pilgrims as Emigrants

The voluntary deviancy of the Pilgrims may be more clearly seen during their stay in Holland. It was here that they received the religious freedom which they had been seeking. There was no attempt to set up any religious or social requirements for the English. Yet the Pilgrims found it necessary to define their trends in deviant terms. Though they had found the religious freedom they had sought, there had been no consideration of the possibility that the group would lose its own identity and existence in this country. Bradford indicates that two of the principal reasons for wanting to leave Holland were that the group was becoming more aged, so that "they would be in danger to scatter, by necessities pressing them, or sink under their burdens, or both," and the children "by these occasions and the great licentiousness of youth in that country, and the manifold temptations of the place were drawn away by evil examples into extravagant and dangerous courses, getting the reins off their necks and departing from their parents."[29] These unanticipated consequences, therefore, were the motivating factors for the continuation of their status as deviants. Similarly, the religious need to seek the superempirical goals of God inspired "a great hope and inward zeal . . of laying some good foundation, or at least to make some way thereunto, for the propagating and advancing the gospel of the kingdom of Christ in those remote parts of the world."[30]

It should be noted here that the needs of the group are now chiefly stated in consideration of organizational rather than individual factors. The desire for individual freedom of interpretation of the Bible and individual opportunity to criticize the Anglican Church is now supplanted by the desire to maintain the identity of the group. Nor are the needs of the Pilgrims defined solely in religious terms, for there is now a concern for broader cultural factors such as the family and the economy. Though there is still a reliance on the superempirical nature of God, the freedom provided by the Dutch social structure allows the Pilgrims more choice in voluntarily making a definition of their needs in terms of the group. It was this particular system, however, with its low standard of living and

unfamiliar culture which acted as a more directly motivating factor for the emphasis of group requirements. These needs centered in the maintenance of the group in a stable economy. For this reason, they joined with merchant adventurers in the hope that a colony could be organized. When leaving England, there was neither opportunity or desire to leave as a unified body. On this occasion, however, there is definite preparation made to see that all who were able to go would travel as a body. Unconsciously, therefore, the change in structure causes a greater emphasis on secular and organizational needs of the group. Since there is still strong motivation for stressing their deviant status because of the fear of losing their group identity, there is still a need to strive for super-empirical goals. As a result, the Pilgrims took upon the trip to America as an unknowable adventure which may be accomplished only with the blessing of God.

It should be pointed out here that as long as there is a strong belief in the providence of God, future consequences will be unanticipated and a self-fulfilling prophecy will exist. This is simply because the relationship with God is seen as a spiritual end in itself and not as a spiritual means to a secular end. As there is a greater emphasis on organizational needs of the group, however, there will be more stress on secular ends with the relationship with God acting as a means to these ends. In this process of change, therefore, the realization of organizational and secular needs lays the foundation for these future changes.

Although many others had previously traveled to the New World and colonies had already been established, the Pilgrims were probably the least prepared of any of the former colonists for the trip. As Bradford states, "We are in such a strait at present . . . to put ourselves upon great extremities, scarce having any butter, no oil, not a sole to mend a shoe, nor every man a sword at his side, wanting many muskets, much armour etc. And yet we are willing to expose ourselves to such eminent dangers as are like to ensue, and trust to the good providence of God."[31] It should be further noted that in addition to the above stated physical shortcomings, there were other difficulties which the Pilgrims encountered. Not only were they not backed by merchants who were wealthy or influential as those who had supported previous colonizing expeditions, but they were also in disagreement with them concerning the agreements by which they were being sponsored. Nor was there only conflict between them and their supporters, for the existence of strangers in their midst helped to promote the disunity which prevailed from then on.[32] It was largely because of this disunity that the Mayflower Compact was written, for threats from some of the strangers indicated to the Pilgrims that they would not consider themselves to be subject to any group and would use their liberty as they wished. It was this contract, therefore, which provided the first secular authority in the group. In it they formed a pledge to "solemnly and mutually in the presence of God and one another, Covenant and Combine ourselves together into a Civil Body Politic, for our better ordering and . . . to enact, constitute and frame such just Laws, Ordinances, Acts, Constitutions and Offices, from time to time, as shall be thought most well and convenient for the general good of the Colony."[33] Immediately following the declaration of this covenant, John Carver was chosen to be Governor for the year.

### The Pilgrims as Colonists

Though the story of Plymouth Colony only begins at this point, the landing of the Pilgrims and the writing of the Compact provides the necessary foundation for the future development of the Colony. The group has defined its needs in secular and group terms, both in the Compact and the contract with their merchant sponsors. The quest for religious and individual freedom has ended and the new goal is the establishment of a successful colony. The religious need to seek God begins to act as a means of achieving the secular ends. Nor is there the same reliance on unanticipated consequences, for there is a need to predict the future in order to maintain the welfare of the organization. It should be emphasized that these consequences result because of the success that the Pilgrims had in the performance of their religious role. It is precisely because they were able to fulfill the function of religion in the particular social structure they encountered that they were successful in their deviancy and reliance on unanticipated consequences. Once established in Plymouth, they find there is little motivation to voluntarily maintain their deviant religious status and the concomitant religious needs. In fact, the formation of their own dominant civil organization required them to conform to a secular, as well as a religious status. The need for conformity further requires them to maintain and emphasize certain social relations. As a result, there tends to be a neglect of man to God relations and the deemphasis of a definition of the religious requirements in terms of the need for "life." Instead, there is an attempt made to use the religious role of the church as a means of satisfying the secular position of the church. Not only were religious dissenters unable to become members of the church, but church membership was used as a means of further stratifying the population of the colony. Additional troubles in the church were caused by confusion concerning various matters of dogma. The variety of ministers chosen by the colony indicates that they allowed deviation in matters of dogma which could be preached. It should be pointed out that such particular difficulties are partially the result of the way in which the Pilgrims had defined their religious needs in England. The fact that they had taken a negative attitude toward organization had prevented them from estab-

lishing an organizational precedent. The result was use of the same methods they had opposed in England because of the existence of a social structure with similar needs. Also, the fact that they hadn't codified their dogma because of their emphasis of individual interpretation resulted in the calling of ministers with differing opinions. As a result, the Pilgrims of Plymouth were without strong spiritual leaders with the exception of some of the laymen who were limited in their powers.

### Concluding Statements

It has been the purpose of this paper to consider some of the theoretical facts which are inherent in a study of the function of religion. In this analysis, it has been indicated that it is necessary to consider the extent to which the group is deviant, the motivation for superempirical goals, the contextual level which is defining the religious needs, and the particular contextual level in which the religious group is found.

It is a consideration of this last factor which provides an insight into the limitations of Durkheim's thesis. Though religion may provide for a unifying of the statuses within a religious organization, it need not have the function of providing unity within the total social structure. It is the deviant nature of the religious organization, therefore, which is characteristic of the lack of unity in the social structure. It is in the communal type of structure analyzed by Durkheim, however, that there is little possibility of deviancy. Nor are the needs of each contextual level different in the communal society, since there is a closer identification of one with the other.

In fact, by fulfilling its function, the religious institution will probably cause a lack of integration within the social structure because it must be socially deviant in fulfilling its requirements. If the religious institution is relatively powerless or the resultant lack of integration is small, the effect of this deviancy will probably be of a minor nature. In circumstances such as existed in 16th and 17th century England where the religious institution is a significant part of the structure and there is a notable lack of integration, pressure may be imposed by the system to have the religious organization conform. Once this occurs, the function of the religious institution is susceptible to change.

The problem here seems to be in the form of a dilemma. What measures must be taken by the religious institution to ensure the fulfillment of its needs without preventing the integration of the social structure? The solution to this dilemma may be found in an understanding of the ways in which the religious organization may continue to meet the needs of the individual while also being required to meet the needs of a larger social system. At first glance, it would seem that the religious organization, with its requirement to fill the needs of the individual, could be well integrated into a democratic social structure with its theoretical purpose of organizing for individual freedom. On the other hand, the religious organization must be deviant or change its function when it is part of a social structure which stresses the needs of organization. Further study in this field, therefore, would have to identify those processes which aid in the development of a sense of freedom on the individual level and allow it to be maintained as this motivation is carried into higher contextual levels, There must also be an identification of those processes which lead the social structure into a requirement of unity for the organizations.

In this case, it has been pointed out that two factors which motivated for the development of individual need were the Reformation tradition and the Parliamentary machinery. Similarly, on the structural level, two secular factors which demanded unity within the system were the existence of an autocratic system and the development of a policy of nationalism. The fact that these two forces existed with such intensity at this time resulted in the future conflict. It should be noted, however, that the Puritan conflict developed because they were not completely deviant in the system, but had strong interests for conformity in some of their role behavior. Conflict was avoided in the case of the Pilgrims, however, because of their identification as deviants within the total structure and their sole emphasis on the religious role. It must be realized, therefore, that this dilemma of the function of religion may be solved, not simply by considering the religious institution, but by analyzing it in the light of the total structure. As a result, the variable factor in any study of the function of religion will be the extent to which religious beliefs and actions may be defined as deviant forms of belief and action. In our contemporary society, if there is reliance on tradition and superempirical ends, the religious institution must either, a) be considered deviant, with the result that it will be looked upon as constituting a varying form of non-conformity, or b) be accepted as rational, with the result that its beliefs and actions will be accepted as the standard for the system. Once the religious institution accepts the changing empirical goals of the system, it loses its functions in such conformity.

As a closing note it should be indicated that, though this study is limited to the function of religion, the consideration of other concepts such as deviancy, unanticipated consequences, and needs and integration of contextual levels will lead to a further understanding of such factors. There is no attempt made here to give some of the implications for future study of these notions. Rather, they are included merely because they are vital to a consideration of the function of religion. Similarly, there is no attempt made to indicate any revelant importance for the study of the function of any other social institution or phenomena.

## NOTES

1. Empiricism in this paper will be conceptualized to refer to a positivistic empiricism instead of an experiential empiricism.
2. Durkheim, p. 428.
3. Weber, p. 80.
4. The concept of unanticipated consequences refers to the notion as developed by R. K. Merton and K. Davis in the bibliographic sources.
5. See K. Davis for a development of the notion of super-empirical goals.
6. Cf. "The Self-Fulfilling Prophecy," pp. 179-195 (from R. K. Merton, *Social Theory and Social Structure*).
7. Parsons, p. 58.
8. *Ibid.*, p. 57.
9. In his reference to "Puritanism, Pietism and Science," (*Social Theory and Social Structure*, pp. 329-346), Merton indicates that the Royal Society resorted to empirical methods for their scientific studies, though not necessarily for their social action.
10. See also Parsons, op. cit., p. 57.
11. Clark, Henry, *History of English Non-Conformity*. Though Clark doesn't apply the concept solely to religious groups, they are his principle examples.
12. *Ibid.*, p. 11.
13. It would have to be shown, however, that the Church of England centered its attention on organization.
14. Moorman, p. 202.
15. Davis, Godfrey, p. 66.
16. Moorman, *op. cit.*, p. 226.
17. Trevelyan, p. 394.
18. Moorman, *op. cit.*, p. 226.
19. Usher, *The Pilgrims and Their History*, pp. 11-12.
20. Bradford, *History of Plymouth Plantation*, Mass. Historical Soc., Col. 1, pp. 3-4.
21. Usher, *op. cit.*, p. 5 and pp. 17-18.
22. Moorman, *op. cit.*, p. 226.
23. Usher, *op. cit.*, pp. 22-23.
24. Bradford, *History of Plymouth Plantation*, (ed. by Eliot Morison), p. 8.
25. *Ibid.*, p. 11.
26. *Ibid.*, p. 10.
27. *Ibid.*, p. 11.
28. *Ibid.*, p. 27.
29. *Ibid.*, pp. 24-25 (a footnote indicates that some of the "licentiousness" probably referred to by Bradford was the playing on Sunday by Dutch children).
30. *Ibid.*, p. 25.
31. Ibid., pp. 50-51.
32. *Ibid.*, p. 44 (it was at the request of the merchant adventurers that these strangers went with the Pilgrims. It was thought that they would be of more assistance in establishing a colony. It is probably quite true that they did, for many of them became the background of Plymouth).
33. *Ibid.*, p. 76.

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# *Enzymology and its Relation to the Genesis of Life*

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A relatively new branch of science, biochemistry, is concerned with the chemistry of life or what makes us *tick* and enzymes are those compounds responsible for this *ticking*. In fact, J. B. Summer, the first to isolate an enzyme in crystalline form (1), defines life as "an orderly functioning of enzymes" and disease as "a disorder, inhibition, or hyperfunction of enzymes" (3).

These very essential compounds are present in all living cells as well as cellular excretions such as saliva, gastric juice, milk, plant sap, etc. In the cell, enzymes are either dissolved in the cytoplasm or are bound to particulate components such as microsomes and mitochondria. Sumner has estimated that "the average concentration of each individual enzyme in a cell is 0.01%. The protein content in a cell, exclusive of structural protein, is about 10%. Hence, the cell could contain 10/0.01 or a 1,000 different enzymes if all this protein consists of enzymes. This figure is probably not too high, since we must remember that nearly every cellular reaction is catalyzed (see definition below) by a specific enzyme and there certainly must be a hundred known metabolic reactions for say, a liver cell." (2) Hundreds of different enzymes have been discovered, many even specific for the species of plant or animal in which they are found. Hundreds more undoubtedly await discovery by man, for the total number of enzymes has been estimated to be hundreds of thousands or even millions (2) For practically every organic compound which occurs in nature, there exists enzymes which bring about some type of reaction such as oxidation, reduction, hydrolysis, synthesis, etc.

Enzymes are responsible for the digestion and absorption of the food we eat, the breakdown (i.e., catabolism) of this food for energy and the building up (i.e., anabolism) of body proteins, carbohydrates, fats, hormones, and even enzymes themselves. Such diverse duties as the detoxification of harmful materials, the calcification of bone, the transportation of oxygen and carbon dioxide by the blood, and the clotting of blood are carried out by different enzymes. These hard workers labor in organized teams and—as in a bucket brigade—one enzyme starts a reaction and passes the product to another enzyme which in turn modifies the product and so on down the line.

Enzymes have been defined as "catalysts of biological origin possessing a high molecular weight." (2) A catalyst is a substance which can change the rate of a chemical reaction without being modified as a result of that action. One might liken a catalyst to a mouse in a girls' dormitory, starting a reaction but not entering into it! Actually, an enzyme is believed to be modified in the course of a reaction but then to reappear in its original form after the reaction is completed. Molecular weights can range from about 13,000 to over 500,000, an extremely large and complex molecule (4). That all enzymes are protein in nature is generally accepted by all workers in the field but the actual structure of the molecules is very complex and still a mystery to man.

An enzyme functions by bringing about a reaction with a lower energy of activation than it would normally possess (2). The rate of a chemical reaction is proportional to the number of collisions of the participating molecules which in turn is dependent upon both concentration of the molecules and their activation (i.e., temperature). At the temperature and pH found in living substances, the rate of many reactions essential to life would be virtually nil without the aid of enzymes. A non-enzymatic duplication of the reactions which take place in nature often require extreme conditions of pH and/or temperature *if* they can be duplicated at all. Sometimes these extreme conditions cause such decomposition of the components that the reaction is impossible without enzymatic aid.

Michaelis and Menton (5) believe that an enzyme acts by forming a transient complex with the substrate (i.e., the substance being acted upon by the enzyme) and thereby changing the activation energy of the substrate so that a reaction can take place under biological conditions. For instance, at body temperature, enzymes enable glucose and fatty acids to be "burned" to carbon dioxide and water! Some enzymes are so efficient that one molecule is capable of transforming over a million molecules of substrate in one minute (9)!

In some enzymatic reactions there is little change in free energy, while others require energy (i.e., are endergonic) and still others supply energy (i.e., are exergonic). In biological systems these latter two

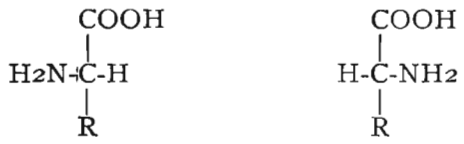
types of reactions are often coupled; the endergonic reaction proceeding only if the exergonic reaction takes place. Available energy for endergonic reactions may be in the form of a "storage battery," the high energy phosphate linkages found in adenosine triphosphate (ATP). Thus, when a reaction requires energy, it may "plug into" a phosphate linkage in ATP instead of an electrial outlet (6). When the phosphate linkage is disrupted, energy is released and this energy may eventually become apparent in the form of a heart beat, an inhalation or a muscular movement.

Some enzymes are composed only of protein, while others are proteins conjugated with a smaller molecule (i.e., prosthetic groups). These prosthetic groups are often vitamins (e.g., thiamine in the enzyme, cocarboxylase). In fact, the importance of many vitamins can be explained in terms of their direct participation in various enzymatic reactions. Some parts of the enzyme molecule are essential for binding the enzyme to the substrate, some for changing the substrate molecule, while others are not at all essential for biological activity. For instance, pepsin will catalyze the hydrolysis of proteins even when all of the free amino groups of the enzyme molecule are blocked by acetylation, while even a very minor modification of other enzymes destroys their biological activity.

A very delicate system of checks and balances controls the action of enzymes in nature. Some enzymes in biological materials are present in the inactive form and must be converted into the active form before they can act upon a substrate. Enzymes can be activated by (a) the action of another enzyme (e.g., trypsinogen, the inactive form, is activated by enterokinase to form active trypsin, an enzyme which catabolyzes proteins in the small intestines); by (b) a change in pH (e.g., at a pH less than 5.2 pepsinogen, the inactive form, is changed to active pepsin, an enzyme that catabolyzes proteins in the stomach which has an acidity of about pH3); or by (c) metals (e.g., hexokinase, an enzyme which catabolyzes the breakdown of glucose requires the presence of magnesium). Enzymes can also be inhibited or inactivated by various substances. In such ways is the action of various enzymes controlled .

Many medicines as well as poisons, affect living organisms by their interference with enzymatic activity. For instance, some of the drugs which stimulate the action of the heart have also been shown to stimulate the action of cellular mitochondrial enzymes, while those drugs which depress the action of the heart also depress enzyme activity (6). Nerve gases affect living organisms by inhibiting the enzyme, cholinesterase. This enzyme is responsible for the hydrolysis of acetylcholine, a compound which is formed following a nerve impulse and which stimulates the contraction of the muscle. When cholinesterase is inhibited, the impulse continues unchecked and control of the muscle is lost. Indeed, it appears that many, if not most drugs and toxic materials affect living organisms by changing the action of enzymes.

There are many interesting facets to the discipline of enzymology, but perhaps the most fascinating of them all is the specificity which is exhibited by many enzymes. Inorganic catalysts are quite unspecific; for instance, nickel will catalyze the hydrogenation of a large number of substances. However, in nature, an enzyme usually acts upon only a very specific substrate or group of substrates. This specificity may be one of the following kinds: (a) The enzyme may be specific only for a certain type of chemical reaction; e.g., hydrolysis, reduction, oxidation, phosphorylation, etc., and therefore, of relatively low specificity, acting upon a rather large variety of substrates. (b) Other enzymes may be specific for certain classes of compounds; e.g., a proteinase will hydrolyze a protein but not a fat or carbohydrate. (c) Greater specificity is exhibited by an enzyme which will only break a bond in a specific position in the substrate molecule; e.g., exopeptidases hydrolyze only terminal peptide bonds of a protein while endopeptidases require neither free terminal amino nor carboxyl groups and, therefore, will split the protein molecule nearer the center. Pepsin and trypsin are of this latter type, but even these enzymes differ in that pepsin will break a peptide linkage involving an amino group of an aromatic amino acid while trypsin will break a peptide bond involving the amino acids, lysine or arginine (8). (d) The enzyme may be specific for a particular substrate; e.g., some carbohydrates will act only upon one specific glycosidic derivative of one of the many sugars found in nature. (e) The most exacting specificity, that of spacial arrangement, is exhibited by some enzymes. This requirement for a substrate of specific spacial configuration may be absolute, as in the case of D-amino acid oxidases which will oxidyze only an amino acid with the D- but not the L- configuration. These two types of compounds are identical in chemical properties and differ only in the fact that one is a mirror image (i.e., optical antipode) of the other!

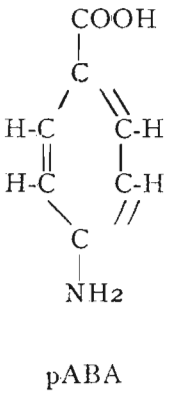


L-amino acid D-amino acid

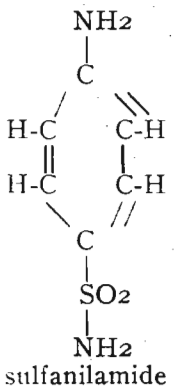
Sometimes this spacial requirement is just relative, the enzyme reacting on one optical antipode faster than on the other. Fischer (7) likened an enzyme-substrate reaction to a key and a lock; they must fit perfectly in order to work.

The action of some drugs can be understood in the light of enzyme specificity. Antimetabolites, which include antibiotics, are so similar to a needed metabolite, which may well be a prosthetic group of some enzyme,

that the antimetabolite can act as an "imposter." An illustration of this can be shown in the case of sulfanilamide, an antimetabolite of para-amino benzoic acid (pABA), a vitamin which is probably a prosthetic group of an enzyme (8). The similarity of structure is evident from the formulae below:




pABA




sulfanilamide

In other words, sulfanilamide is similar enough to pABA to attach to the enzyme but dissimilar enough that the enzyme-prosthetic complex will not react as the normal complex reacts. To expand the analogy of the lock and the key, sulfanilamide fits into the keyhole. but can't turn the lock, and as long as it is in the keyhole, the normal key, pABA, cannot enter. In this manner, sulfanilamide evidently is antagonistic to bacteria which require pABA for existence. The relative concentrations of sulfanilimide and pABA must be considered in such antagonism, for one can "protect" the bacteria from sulfanilamide by an excess of pABA. In other words, the important thing is which one gets into the keyhole first. Other antibiotics, e.g. penicillin and Streptomycin, also appear to be antimetabolites but their mode of action is not yet clear (8).

Enzymes themselves have proven very useful as medicinal agents. Proteolytic enzymes are used for wound debridement (i.e., to rid a wound of dead tissue) and also as an aid to faulty gastrointestinal digestion. Streptokinase and streptodornase, two enzymes found in the streptococcus organism, have proved very efficient in digesting and liquifying pus, clotted blood and dead tissue which can accumulate in inflamed areas. Hyaluronidase or "spreading factor", is an enzyme useful in dentistry. This enzyme breaks down the "cement" between cells and allows fluids to diffuse through the tissues more rapidly. Now instead of the repeated injection of an anesthetic which was often necessary for a "direct hit" of the tiny nerve, the dentist can add this enzyme to enable the pain killer to spread rapidly to the nerve even if the needle is at some distance from the site. Enzymes also are useful in non-medical industries such as cheese, textile and leather industries to mention but a few (6).

Although these biological "workers" are employed by man, still further exploitation is possible. In fact the future of enzymology is even brighter than its past for so much concerning enzymes is still unknown. Not only the complete understanding of the action of vitamins, minerals, drugs, and toxic materials awaits discovery, but the study of enzyme activity, inhibition, and antagonism may well be the key to the control of one of man's most dreaded diseases, cancer.

In conclusion, should we not echo the Psalmist when he exclaimed "I will praise thee: for I am fearfully and wonderfully made: marvelous are thy works; and that my soul knoweth right well" (10)? How can man even suggest that such a complicated system—so complicated that we are *far* from a thorough understanding of it - came into existence without the aid of a very superior being? Suggesting that this all came about from "lifeless" matter and that gradually this "lifeless" material, through the processes of evolution and without the direction of an intelligent being, became a form of "life" is virtually tantamount to suggesting that an intelligible novel would result from the combination of a dog, a typewriter and a pile of blank paper!

Unregenerate man continues to deny the Lord who made him when, now more than ever before, evidence of his creative and sustaining power is at every hand!

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(10) Psalm 139: 14.

# BIOLOGY

**I. W. Knobloch, Ph.D.**

I have been sharing with readers of this column my thoughts on a variety of topics as they affect the development of a philosophy by the student. The views expressed below are quite controversial and I rather imagine that many will disagree with me on this or that interpretation. If anyone feels strongly enough about these matters, they are hereby invited to write down their views and I will promise to include them in a column in the near future.

Sooner or later the student must come to grips with some of the really controversial aspects of modern Science. Some of these are listed below together with *some* viewpoints on each in an effort to promote the development of a philosophy.

### Is Science Evil?

Some people place all the woes of the world at the doorstep of science forgetting that many of the good things of life are traceable to science. Evil is in men's very being and has been with us a long time. Evil started before science did. It is caused by man's essentially evil nature and is not caused by nor can it be cured by science. Its cure, if possible, lies in the province of the humanities and behavioristic studies. Wars existed before science. Science and technology have merely transformed it. Would it not have been treasonable for scientists to forego war work? Shall we destroy science because men are evil? Do we prefer ignorance to understanding and darkness to light? If all men hated error as strongly as do the scientists, the world would be a much better place to live.

### Does Reality Exist?

Reality is anything which can be said to exist. A toothache is real to the person experiencing it. A real thing can be transitory or semi-permanent. The real world can only operate successfully if it assumes that real things such as houses, sidewalks, trains, bullets, food, grass and so forth exists. One must remember that our concepts of reality are derived largely from our senses and these sometimes play tricks upon us. Johannes Muller showed that man's unaided senses give him no reliable evidence of knowledge of the external world. Our sensations do not depend upon the kind of stimulation. For example, light rays, and blows on the head both produce sensations of light in the retina of the eye. Our belief that a chair still exists there is a hypothesis which needs to be tested by looking again at the chair. Matter, the non-realist says, exists as a form of wave and this is not comprehensible to our minds. Nature in her elemental forms of electrons and so forth, is so complex that we lack the ability to form adequate pictorial concepts. Electrons are many steps removed from the direct perception of our senses. The ordinary business of the world is carried on, however, in the belief that a primitive reality exists. The "non-realistic" viewpoint of some physicists should not be discouraged, however, because it may be productive of interesting and important ideas.

### Science and Order in Nature

One of the pillars of Science is the concept of law in nature. Certain relationships have been found to remain constant or fairly constant. Objects normally fall to the earth, water seeks its level, plants with chlorophyll make carbohydrates, are but a few of thousands of examples which might be cited. Nature's laws are built upon the concept of an orderly cause and effect relationship. The present causes the future and not vice-versa. Causal laws are continually being discovered by man and the relationship found to occur regularly seem to be inherent and not capricious chance.

To make sure we are dealing with a cause and effect relationship we use the controlled experiment and we duplicate or even reduplicate our experiments. Controlled experiment helps us to avoid obvious errors. If winter follows the fall of the leaves on the trees is the latter the cause of the former? Obviously not since both are related to temperature drop. What causes malaria mosquitoes? Only in part is this true because the insect carries a protozoan which might cause the disease. Does the moon act as a cause of malaria? Its power to cause tides will create favorable mosquito habitats such as pools and thus we see a causal connection which we might not have thought of at first glance. We wish to make the point here that causal laws are vastly more complex than ordinarily considered.

In many problems, in fact, one cannot ascertain the entire chain of causes associated with a given effect. Our universe is made up of limitless things organized on apparently endless levels. We are discovering that causal law relationships cannot represent absolute truth because we can never examine every aspect of any matter. There are random disturbances or contingencies which our finite minds neglect to take into consideration. However there seems to be deterministic cause and effect relationship in the world. We know this because the laws have predictive value and we can look into the future and make very good estimates of what will happen. Science has made great progress because of faith in the reality of the causal laws.

However, at the macroscopic level, things go wrong, as we have pointed out. Variations and chance fluctuations occur. We cannot always predict events with absolute certainty. Our laws may be called statistical laws. All behavior ultimately must be based on the activities of the atoms themselves or the various particles constituting the atoms. These particles apparently, to our finite minds, act capriciously and randomly. They are apparently indeterministic. Thus

we have a paradox in nature—determinism and indeterminism. How are we to reconcile such a situation?

Let us assume that events are chaotic at the subatomic level. Because of millions of chaotic events occuring more or less simultaneously, the statistical law of chance teaches us that the effects of these chaotic events cancel out each other and we can have a trend, an approximately regular and predictable behavior. Separate black and white grains of sand appear as black and white to an ant crawling over them but they appear as grey when viewed from a distance. In the Kinetic Theory we have statistical regularities appearing at the macroscopic level despite the alleged randomness of the movements of the molecules at the microscopic level.

In conclusion then we must ever be wary of dogmatism in our classical approach to nature via the laws of cause and effect. On the other hand, we note that there is order in nature despite the randomness of submicroscopic particles. Another word of caution might be in order. Since we are, historically, but reading the first page of the "book" dealing with submicroscopic matter, it might be unscientific to assume that the randomness we think is present is really present.

Could it not be that behind apparent disorder there is a type of order not comprehensible to our minds. Order after all, may be a matter of relativity.

# CHEMISTRY

**Walter R. Hearn, Ph.D.**

At the time of writing this column I am still so involved in making arrangements for the Annual Convention that I won't try to do anything but report on activities of A.S.A. chemists from whom I have heard this spring.

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**Floyd F. Rawlings, Jr.**, is now Associate Professor of Chemistry at Monmouth College, Monmouth, Illinois, having formerly taught at several other liberal arts colleges. At Monmouth he teaches physical, analytical, and advanced inorganic courses. He took his Ph.D. in physical chemistry at the University of Washington and has been interested in X-ray diffraction studies of long chain molecules such as *n*-alkyl sulfates and in electrochemical studies on the Kolbe reaction. A member of the First United Presbyterian Church of Monmouth, he has also been active as a church pianist, teacher of adult Sunday school classes, and even in preaching from time to time. "Fritz" has been an A.S.A. member for about eight years but until this year hadn't been able to attend an Annual Convention; he thinks that our idea of getting together with other A.S.A. members at national A.C.S. meetings is a good one. What do you think? How about Chicago in September?

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**Robert B. Fischer** is an Associate Professor of Chemistry at Indiana University, Bloomington, Indiana. Bob's degree is in analytical chemistry from the University of Illinois; he is interested in electron microscopy and the use of other instruments. He worked on the Manhattan Project for several years and has been at Indiana since 1948. Bob is a Fellow of the A.S.A., and was one of those who attended the A.S.A get-together in San Francisco during the April A.C.S. meeting.

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**Elaine Zimmerman** is now an Assistant Professor of Chemistry at Western Michigan University in Kalamazoo, Michigan. Elaine received her Ph.D. from Purdue in January. (congratulations!) after completing research on reactions of titanium (IV) in concentrated sulfuric acid: she now teaches quantitative analysis and a basic studies course in physical science. W.M.U. hopes to offer a Masters degree in chemistry in the very near future. Elaine has been a member of A.S.A. since 1956, is a faculty sponsor of Inter-Varsity Christian Fellowship on her campus, and is active in the local Free Methodist Church.

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**Earl S. McColley** is Coordinator of Laboratory Standards for the Textile Division of the Celanese Corporation of America, P.O. Box 1001, Rock Hill, South Carolina. That means that he is responsible for the standardization of analytical methods and the introduction of new methods in each of the laboratories of the Textile division. He visits each laboratory about once a month and serves as a consultant on analytical problems for the various laboratories. Dr. McColley serves as chairman of the Chemical Methods Committee of the Technical Association of the Pulp and Paper Industry (TAPPI) and the Testing Committee of the A.C.S. Division of Cellulose Chemistry. He writes that the heavy travel schedule required in his present capacity has forced him to give up some of his church activities as a Sunday school teacher and lay preacher. He usually attends the September A.C.S. meeting, so we should be able to get acquainted at an A.S.A. get-together before long.

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**Elmer W. Maurer** is a Chemist at the U. S. Department of Agriculture Eastern Regional Research Laboratory, Wyndmoor, Pennsylvania, just outside of Philadelphia. Elmer has been at the U.S.D.A. lab since 1953, doing research on synthetic detergents produced from animal fats, and has been a co-author on a number of papers from this work in the *J. Am. Oil Chem. Soc.* He is also active in the Wissinoming Baptist Church of Philadelphia, where he serves as a deacon and teaches a Sunday school class. For a

number of years he has also been regularly scheduling and showing worthwhile films for the Men's Bible Class. I had the privilege of visiting in Elmer's home and church during the Federation meetings in April, and was there the night Elmer showed "Red River of Life" to the congregation. Elmer has his M.S. from the U. of Pennsylvania and his B.S. from Iowa State College. He told me he would especially enjoy attending this year's A.S.A. Convention here at his alma mater, but may not be able to, unfortunately.

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**Russell Maatman** is just now moving to the University of Mississippi at University, Mississippi, where he will be an Associate Professor of Chemistry. He has been a Senior Research Chemist at the Research and Development Laboratories of the Socony Mobil Oil Company in New Jersey. Russ took his Ph.D. at Michigan State and has been interested in the field of catalysis, studying the preparation and use of solid catalysts and also kinetics and mechanisms of catalytic reactions. He has published several papers in this field and has several others in the works. Russ also gave an excellent paper on "Science and Biblical Miracles" at the 1954 A.S.A. Convention (J.A.S.A., Vol. 7, March, 1955). He feels that the chief activity of the A.S.A. ought to be the production of papers, and that we ought to do everything possible in the way of refereeing, etc., to improve the quality of papers in the *Journal* and on our convention programs. Better papers should attract more members, who would produce more papers to choose from, and thus make it possible to raise our standards continually. I think he's on the right track with his idea. Russ has been active in the mission program of the Orthodox Presbyterian Church and was also active in the local Christian Day School Association before he made this recent move.

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**Eugene C. Jekel** teaches general and analytical chemistry at Hope College in Holland, Michigan, a liberal arts school sponsored by the Reformed Church in America. He received his M.S. degree from Purdue, where he also became acquainted with A.S.A., becoming a member in 1955. Eugene is active in his local church as a Sunday school teacher and choir member, attends IVCF conferences with Hope students although there is no active Inter-Varsity chapter at the College. Several other A.S.A. members are on the faculty at Hope, so maybe they will be starting a local section soon.

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**Paul R. Godfrey** is Chairman of the Department of Chemistry of Louisiana College, Pineville, Louisiana. Paul took his Ph.D. in the field of biochemistry at Purdue and has published several papers on nutrition and biochemical analyses, but now teaches all of the basic chemistry courses at various times. He has spent twelve years at this Baptist liberal arts college, after being associated with two other Baptist schools, Ouachita and Furman University, in addition to his alma mater, William Jewell. Paul was able to attend the 1957 A.S.A. Convention at Gordon College and says that it really increased his enthusiasm for the work of the Affiliation. He even brought with him to the convention his brother, a Baptist pastor in Maine, who also thoroughly enjoyed it. I know of several of our members who have brought their own pastors to our Conventions, which seems to me to be a wonderful way of spreading the word about what the A.S.A. is doing. Paul serves his local church as a deacon and Sunday school teacher, and for two years has also participated almost every Sunday in the visiting of prisoners in the Alexandria city jail. Paul says that attending A.S.A. Conventions is a bit complicated for his family, since they have five children ranging in age from one to sixteen!

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**Mrs. Lloyd Halladay,** nee Phyllis C. Cook, wrote me one of the most interesting letters I have received from any of our chemists. My letter had been sent to her Ann Arbor address given in the A.S.A. directory so imagine my surprise on getting a reply from her, c/o American Embassy, Kabul, Afghanistan! Phyllis taught general chemistry for a year at Hood College in Maryland after getting her B.S. at Wheaton, and then worked two years as a chemist in an endocrinology research group at Massachusetts General Hospital. This experience so stimulated her thirst for knowledge that she left for work toward her M.S. in biochemistry at Michigan. While there she also took the medical bacteriology course and taught biochemistry and bacteriology. She married Lloyd a year ago and a few months later found herself in Kabul, where Lloyd teaches English under the Columbia Teachers College English Language Program under the U. S. Government's I.C.A. (International Cooperation Association) program of economic aid. Phyllis is now teaching science to the seventh and eighth grades of the American Christian School, finding this a real challenge to her ingenuity since she has no equipment or chemicals to work with. This school is attended by the children of Americans stationed in Afghanistan. Here is a paragraph from her letter:

"The adjustment and education to local conditions has kept us exceedingly busy—earthquakes, leaking roofs, balky servants, etc.—but we are hoping to expand our knowledge into areas of our previous careers. Because of an unexpected accident to our cook, I managed a visit to the Men's Hospital—a rare experience I understand for an American woman—but I struck up an acquaintance with the Afghan eye specialist who did his post-graduate work at Mass.

General Hospital under Harvard University and hope maybe to get another more thorough visit. I had expected utterly nothing and was surprised to see many fairly good instruments and business-like medical procedures. At the Women's Hospital I found quite the opposite, practically nothing and quite a bit of dirt. The American women are doing quite a little sewing for the Women's hospital and the Swiss doctor there is most pleased. The first thought and care is extended to the newborn infant rather than the mothers. For some needed blood tests I was sent to the Central Health Lab set up by W.H.O., where I had a complete blood count, done by Afghans. Techniques were satisfactory but rather primitive. A biochemistry exam was being given to the future medical technicians next door to the hematology lab. Of course, these are all men, as the women are still repressed and 'behind the veil'."

Phyllis and Lloyd are members of the Community Church of Kabul, the first and only Christian church in all of Afghanistan,—and it is only for "foreigners" such as the Halladays. In these troubled days for the Middle East, let us remember to pray for the influence of Christians who have the opportunity to serve in countries in that part of the world. Phyllis was active in Christian service in this country, especially with IVCF at Michigan, where she also taught Sunday school at the Grace Bible Church of Ann Arbor.

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At the time this is being written, **Wallace Erickson** has agreed to make the arrangements for our A.S.A. get-together at the A.C.S. meeting in Chicago. I don't have the details on time and place yet, but I will try to get the word around by postcard. We will also have some small posters up at the registration desks. We should have a large turn-out, and I am hoping to see many of you there even if you don't make it to the Annual Convention in Ames. I have a small backlog of letters to report on next issue, but I would still like to hear from the rest of you. Keep me up-to-date on your activities.

Do you make it a practice to take notes on articles you run across in the scientific literature of interest to the A.S.A.? I do. Or at least I jot down the reference and drop it in my A.S.A. file so I can took it up later and maybe discuss it in this column. Since we don't all read the same journals, if enough of us would get in this habit we could be a help to each other in keeping ourselves informed. Several of you have offered to contribute to this column already, and I hope all of you will feel free to do so.

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I might say that in addition to making arrangements for the A.S.A. Convention I am also seeing a certain amount of re-arrangement of my own schedule, sleeping habits, etc. The reason: Miss Christine Hearn, born on the Fourth of July! Mother and daughter are both doing nicely, and father is learning lots of things every day. Isn't the Lord rich? And isn't biochemistry fascinating?

# PHILOSOPHY

**Robert D. Knudsen, Ph.D.**

### Karl Jaspers On The Meaning Of Science, II

Karl Jaspers says that we cannot know the meaning of science. One cannot even say as an item of knowledge that science is for the glory of God, or that it should be for His glory. If one seeks to grasp what *the* meaning of science is, he must conclude that it is meaningless. Any claim to know the meaning of science must ultimately be destroyed by the fire of criticism, which leads one into a nihilism.

The root of such nihilism, Jaspers says, is not in a specific cause, which would be eliminable by some technique; it is in the absolutization of thought itself. If we think that we can know the ultimate rationale of things, we have absolutized knowledge, the sense of truth that pertains to consciousness in general. This absolutization inevitably disintegrates into nihilism.

In the quicksand of nihilism, however, one is lost to himself. He cannot find a place to stand; yet if he is to be himself, he must have a place to stand.

The very criticism of the claim to know the meaning of science must be seen, therefore, to be impelled by a deeper motive, the impulse of possible true selfhood (*mogliche Existenz*). It is this impulse, not any discernible cause, which is at the root of the discontentment which Jaspers finds when any object of knowledge is taken to be the final reference point.

The direction to the self is not found in the intentional relation to the object of knowledge. Neither is it found in the subjective. The discontentment which arises with the absolutization of the objective or the subjective is the impulse to philosophizing, which arises with the absolutization of the objectivity and subjectivity to that which encloses both, the All-Enclosing (*Umgreifende*). It is only in philosophical transcending—in a turn-about-face-from the objective without losing the objective—that the true direction of the self can be opened.

It is this transcending which distinguishes the realm of philosophy from that of science. If science is directed to the object, philosophical transcendence is the method of rising above the objective while remaining within the medium of the objective. While science provides a body of universally valid knowledge, philosophy does not give a body of knowledge at all. The great systems of philosophy, as they come to us in a form that can be verbally transmitted and learned, are only the *capita mortua* of true philosophizing. Science has its terminus in the object of knowledge; philosophy is the method of transcending above every

objective hand hold, preserving it from being absolutized into an absolute reference point.

Should *the* meaning of anything be known, one would be obliged to submit himself to a single, universally valid norm. But when one is truly himself, he is not bound to something (known) outside of himself. He is not set on a preestablished way. He is free.

Since the thing in itself cannot be known, science cannot interpret itself, gaining a set idea of its purposes and its goals. It is not by the way of knowledge but by the way of philosophical transcendence, which opens the way to human freedom and selfhood, that the meaning can be found in science. This transcendence can occur, however, only in the course of the pursuit of knowledge itself.

(To be concluded)

August 12, 1958.
Westminster Theological Seminary
Philadelphia 18, Pa.

# PSYCHOLOGY

**P. D. Marquart, M.D.**

There is so much being written in liberal circles about self-acceptance, self-realization and self-actualization that we should consider where we stand on these matters among born-again Christians, from a truly Biblical viewpoint At first thought, we remember that the concept of "self" is not in high esteem in our group. The self is something that ought to be crucified. It is the "I" that has been crucified with Christ. However, "nevertheless I live" (Gal. 2:20). When we search for the meaning of "crucified" we find that it could be "rendered inoperative." In a very real sense, the self cannot be killed off, for it is the core of personality. The Bible word for the inner self or "heart," when it is used in a psychic sense. The human heart is bad enough, even in the regenerate person, but we are not told to destroy it. It is rather the "self-life" that ought to die in the course of our Christian life, the activities of the natural self. Too often we merely talk about crucifying the self and continue to walk in our self-centered way, which is the expression of this offensive "self-life." We read the Epistles, which are filled with specific instructions on how to render the self-life inoperative. We decide that we should do something about these matters and then we decide that we will attend to the matter tomorrow.

Moreover, a love and cherishing of our bodily selves is condoned and given as an illustration in Ephesians 5:29. Self-realization through Christ is implied in many passages where promises are given as motivations for the Christian life. For instance, the beatitudes in Matt. 5. are promises of happiness and blessedness, if we do certain things. These promises are available to us now, as well as in the Kingdom.

As to self-acceptance, it becomes apparent that one particular failure in the area of self-acceptance is spoiling the Christian lives of many and making them neurotic. I mean the failure of a child of God to forgive himself after he has sinned and then has applied I John 1;9. Of course, confessing will do him no good if he still is unregenerate. Christ does not wash the feet of those who do not belong to His sheep fold. For the sheep however, the Word of God should be strong authority so that he may know that he is forgiven, regardless how he feels about it. Claiming the promise of I John 1:9 and stepping upon it, thanking the Lord for it, is all that is necessary to know we are forgiven. To keep on refusing to accept the self as forgiven cannot please the Lord, for it is a failure to believe what He says. If others have been injured, the sinning saint should confess his faults "one to another" (James 5:16). This is a secondary and a social matter, for it is "against Thee and Thee only have I sinned" (Ps. 51:4). When these things are done, then we should start "forgetting the things which are behind." (Phil. 3:13). Too many Christians fail to forget or they forget their sins before the remedy has been applied, and that leads to repression and neurotic symptoms. Perhaps Matt. 5:16 is the best Scriptural answer.

# SOCIOLOGY

**Russell Heddendorf, M.A.**

For the average Christian, there is seldom any thought given to the effect which his faith might have on any but those in his immediate reference group. Viewed as a force in society, however, Christianity or any religion may be shown to have profound social consequences. One of these results may be simply stated as the meeting of some need for the integration of society. Rituals, therefore, would have this function because individuals are drawn together and identify things which they have in common. Yet, another need which might be met would be the development of a new set of opposing attitudes and actions in the form of performing a divisive function within the total society. The Reformation is a classic example of this social consequence of religion.

Until fairly recently, the integrative function has been generally accepted. With a greater willingness to criticize classical statements on the subject, however, there has come an awareness that perhaps religion does perform more of a divisive function. Within the restrained discussion which has developed on this point, there has come an attempt to indicate why

a function of religion may never be clearly stated.* The author concerns himself only with our complex western society, for it is in this area that the debate has centered. Five main difficulties, as stated in this article, which hinder the specification of a function of religion could be isolated:

1) There is a need to state necessary conditions to be met by religion, i.e. the belief in a millennial period, thereby requiring a subjective view of God.

2) There are difficulties in stating the needs of a social system to be met by religion, i.e. those which may be effectively met only by religion and no other institution.

3) There is an opportunity to ignore religious practices, thereby limiting the social effect of religion in a society.

4) There is a need to believe religious faith as well as practice it.

5) Religion may perform diametrically opposite functions at one time in a complex society, indicating that religion may not be an essential part of a system but merely "useful" in some areas of society.

Beginning with the last problem, it could be shown that this is a difficulty which exists for any institution in a complex society. Consider the case of the military in our society. There is a need, defined by the military, to maintain an adequate military mechanism. Yet, the economic institution has a need to limit spending which requires the military limit its outlay for defense material, resulting in a contradiction of purposes to be met by the military. Since this is a problem of all institutions, therefore, it is not germane to the sociology of religion but is relevant to the field of general sociological theory.

Problems 3 and 4 are similar in that both indicate that it is not possible for religion to have a unified effect on society as long as it is not meaningful to all in the society. This is one of the most lucid facts indicating the fallacy of the theory of a singular integrative function of religion. This does not, however, prevent an understanding of what the function of religion should be within a social context which is smaller than society.

Though somewhat more unique, the problem stated in 2 is similar to 5 in that it is again a problem existing in other institutions. It is well known that the educational institution performs a socializing function for the child almost to the same extent as the family. The complicating factor for religion, however, is the fact that much depends upon one's understanding of the elements of religion. Hence it is not possible to state what social needs may be met by religion until there is a decision as to what the components of religion are.

Hence, this problem is dependent upon the solution of 1. Probably the most formidable problem in this area is the need to objectify the study of religious phenomena. While there is an opportunity to state differing religious conditions to be met by the institution, an objective study of the social functions of religion is not possible. Christians have outgrown the period of fearing an objective analysis of the bases for their beliefs. Since knowledge of God remains experiential, it is necessary that attempts be made to maximize the empirical understanding of experential religious phenomena on a lower level.

*Religious Institutions in complex societies: Difficulties in the Theoretic specification of functions, Nilan W. Elster, American Sociological Review, Aug. 1952, Vol. 22, No. 4, 387-391.

# LETTERS

Dear Professor Hearn:

I have read your article (The Formation of Living Organisms From Non-Living Systems—W.R.H.) in the June issue of the Journal of the American Scientific Affiliation. I wonder whether or not Darwin should be praised on the grounds which you suggest: that he was reluctant to extend his theory too far. Although he knew that science had thrown no light on the problem of the essence or origin of life, he yet believed that life had been spontaneously generated and would some day prove to be such, because it was involved in his hypothesis of uniformity. (More Letters of Charles Darwin, Vol. II. p. 171).

So far as I can tell by reading the Life and Letters of Darwin, he had settled on the doctrine of uniformity and was determined that everything must be explained naturally. His bias against God who creates was so great, that when reason led him to God he endeavored to destroy reason. (Life and Letters of Charles Darwin, Vol. 1, p. 282) .

I wonder whether Oparin's book faced the problem fairly. Oparin is committed to the position that "life is nothing else but a special form of existence of matter." (Origin of Life. Moscow Foreign Languages Publishing House, 1955, p. 101). He is also committed to the position that Frederick Engels, Lenin and Stalin were right in their dialectical materialism (pp. 14, 18, 19). A person who has this definite commitment which he will not allow to be shaken by anything, can hardly face squarely any problem that would tend to undermine his position.

With every good wish.

Cordially yours,
James D. Bales
Bible Department
Harding College
Searcy, Arkansas

I appreciate Professor Bales' comments and especially his willingness to let them be published in the *Journal* with my reply. I hope that this will stimulate

other readers to continue this discussion or to raise other points by published exchange of correspondence. (Correspondents should keep in mind that the deadline for manuscripts is the first day of the month prior to the month of issue, or November 1 for the next—December—issue.)

Darwin's questions in his letters about whether or not man's mind can be trusted if it has been developed from the mind of lower animals have always struck me as being completely ridiculous. From a scientific standpoint we know nothing at all about relationships between the mode of origin of a mind and the validity of its conclusions. Why should a mind derived from a less complex mind be incapable of drawing valid conclusions? Embryologically it is an observed fact that our brains develop from a single cell and it is obvious that we acquire the characteristics of a mature mind only gradually as individuals. If we can accept the idea that our ontogeny has involved biochemical processes, why should we recoil from the concept of processes in our phylogeny, or feel that we are any less the creatures of God when we begin to understand these processes? I am glad that Prof. Bales has pointed out that theism cannot be negated on this basis any more reasonably than can the theory of evolution. I agree that there is no reason to praise someone for committing that kind of *non sequitur,* but I still think Darwin was remarkably conservative in his statements about the origin of life. It should be remembered that he rejected on scientific grounds the results of Bastian's experiments even though he *wanted* to believe in Bastian's conclusions about *"archebiosis";* this kind of objectivity with regard to one's own position seems praiseworthy to me, whether in a theist or an atheist. I am sorry that such objectivity is not always characteristic of Christian writing on evolution.

I hope this problem of our attitude toward "uniformity" in nature and toward God's "intervention" in "natural" phenomena will be thoroughly discussed at our next joint meeting with the Evangelical Theological Society. Surely some concept of uniformity in nature is as essential to theism as it is to science. I do not see how a scientist can work as a scientist without being mechanistic, or materialistic in the sense of seeking to understand "immediate causes" while operationally disregarding "Ultimate Cause." Dr. John Baillie's 1951 address to the British Association, *Natural Science and the Spiritual Life* (Oxford University Press), deals with this problem in a scholarly manner. A shortened version is found in the pamphlet, *Science and Faith Today* (Lutterworth Press), available through Inter-Varsity Christian Fellowship, and which I highly recommend to readers of our *Journal.* Baillie points out that modern science came into being as a result of a growing determination to banish purposive explanation from scientific procedure, quoting Bacon and Descartes, the first modern thinkers to devote themselves to the problem of scientific method. In their insistence that science be basically inductive rather than deductive, they did not mean that there are no final causes, but only that natural science has no business with them. This limitation "did not mean that there is no purpose in nature, but only that this purpose is not discoverable by empirical methods." Ballie (Principal of New College, Edinburgh) goes on to say that the source of this un-Greek element in the development of scientific method can be traced to the Christian revelation, and more specifically to "the Christian doctrine of creation which teaches that the world is not itself divine but is contingent upon the divine Will."

An article entitled "The Relation Between Science and Religious Knowledge" in the March issue of *The Christian Graduate,* taken from the longer paper by Gordon E. Barnes to the Victoria Institute, analyzes four territories common to science and religion (the day-to-day control of the universe; the origin of the physical and biological worlds, the possibility or impossibility of miracles; the personality of man), and comes to this conclusion:

"In this rapid survey of the contact-points between science and religion it is apparent that the same relation between the two always holds. Where science and religion investigate common territory they do so from totally different standpoints. Religion is concerned with significance and purpose, while science is concerned with structure and mechanism. They, therefore give different accounts which are not mutually exclusive but complementary, and which, taken together, give a more nearly complete picture of the truth than either alone."

One A.S.A. member expressed concern over my discussion of the origin of life, saying that it sounded just like a materialist had written it. Of course it does, if it is trying to be a scientific account! If biology cannot be mechanistic, I cannot see how it can be a legitimate field for science. It may be that I do not fully appreciate the philosophical implications of a materialistic natural science, and it may also be that as a biochemist I am particularly conscious of the difficulties which have arisen from attributing biological phenomena to a non-physical "vital force"; at any rate, I would welcome further discussion of this problem.

With regard to the point raised by Prof. Bales about Oparin's fairness in facing the problem of the origin of life, reference should be made to my paper. I had quoted R. E. D. Clark (*Darwin: Before and After*) as saying that the problem had never been faced by a *materialist,* on whom falls the burden of explaining "how chemical molecules of gigantic complexity came into existence and have been able to arrange themselves in increasingly complicated ways,"

and added that I thought Oparin did face the problem fairly from a materialist viewpoint. He scrutinized the previously proposed theories of continuous spontaneous generation and of the continuity of life, and suggested possible mechanisms for a gradual transition from inanimate matter to living things on the basis of the small amount of empirical evidence available. Granted that Oparin's philosophical position may be atheistic, I do not think it follows that this philosophical commitment necessarily prevents him from an analysis of his own position, let alone of scientific theories, any more than my position as a committed Christian makes it impossible for me to make such critical judgments. I think Evangelicals should beware of implying that personal commitment makes it difficult for a person to be a good (i.e., objective) scientist. I am sure that many readers of this *Journal* have followed with interest the recent exchange of correspondence in *Science* and in *Chemical Engineering News* regarding the influence of religious conviction on the current competition for scientific achievement between the United States and the Soviet Union. Several correspondents suggested that the Soviet Union must inevitably win unless the United States could rid itself of its heritage of "supernaturalistic bias inimical to the development of materialistic science."

*Must* theism always be inimical to science? Surely not!

Walter R. Hearn
Department of Chemistry
Iowa State College, Ames, Iowa

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Editor:

I have read with dismay the attempt to show that *min* in the Bible is to be equated with the term "species." For that seems to be the implication of *The Concept of "Kinds" In Scripture.*

Certainly, as note 24 says, "Moses was not aware of modern taxonomy!", also "The Hebrew words may have less precise meanings than the classification of the chart suggests."

Much harm is done in narrowing the orthodox Christian's view on such questions. "Species" itself is difficult to define.

To take the Bible language, which in this instance may be compared to the language an adult might use to explain phenomena to a child just learning to talk, as if it were meant to be like 20th Century technical terminology is absurd. Too, the method used in the article assumes that the Bible terms are of uniform meaning, which is not always true.

Our task in this passage is not to show what the ultimate truth is (for it is religiously irrelevant). but *only* to show that there is no *necessary* contradiction between natural facts and the biblical narrative.

Genesius defines *min* as equivalent to the *Latin* "species" with emphasis on *form,* that is, "form" that meets the eye. This would mean that God made animals, differing in appearance, of various kinds. Genisius adds, "but also *kind, sort.*" Certainly these are non-technical terms of wide latitude.

The big blunder of 19th Century orthodoxy was the foisting upon trusting Christians the erroneous idea that because God told the creature to reproduce (bring forth after their kind), the Bible taught the *fixity* of species, a totally unwarranted inference.

Surely, we do not wish to keep on repeating such errors.

May God bless us all.

Sincerely yours,
W. N. Potts
1302 Central Street
Jackson, Mississippi

(The Editor changed the writers Hebrew symbols to the italicized *min*)

# LOCAL SECTIONS

### Los Angeles Section Meetings

Los Angeles Local Section A.S.A. met February 28, 1958 at the Moody Institute of Science for a discussion of ways and means of extending the Christian witness to the university campus. Dr. Robert P. Dilworth of the California Institute of Technology spoke on "The Moral and Spiritual Problem on the Campus and How They Are Affected by Today's Emphasis on Science" after which Mr. Fred Gere of the Campus Crusade talked on "An Approach to a Solution." Considerable discussion followed on the differences of the cultural conditioning on the campus as compared to the average evangelical Christian group, and its effect in raising barriers between the two.

Dr. Edgar C. Smith, Applied Science Representative with the International Business Machines Corporation is the newly elected chairman of the Los Angeles Section and Mr. Lewis H. Humphrey of Moody Institute of Science is the new Secretary-Treasurer.

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On the evening of June 6th, 1958, the Los Angeles section of the ASA met at the Fuller Theological Seminary in Pasadena. Mr. John C. Sinclair and Mr. Lawrence H. Starkey conducted a symposium on the nature and origin of life. Mr. Sinclair, a pre-doctoral fellow in Anatomy at UCLA, presented the history of ideas on the nature of life and the environments for organic synthesis. Mr. Starkey, newly appointed Associate Professor of Philosophy, Bethel College,

treated the chemical basis of heredity and the origin of life on the earth. Approximately 40 people were present at this extremely interesting discussion.

### Western New York Section Meetings

It is encouraging to note the enthusiasm in local section activities of the ASA in the Western New York area. On October 5, 1957 they met at Roberts Wesleyan College, N. Chili, N. Y. and planned three meetings for the year to be held at Rochester, Buffalo, and Houghton. At this time Dr. Robert Luckey of Houghton College was elected chairman and Mr. Paul B. Maurer of Eastman Kodak Company was chosen Secretary.

The first meeting of 1958 was held at the Buffalo Bible Institute on January 25th. The topic of discussion was, "To what extent is a scientist responsible for the uses to which his inventions are put?" presented by Mr. Ray Rollins of the University of Buffalo

### Corvallis, Oregon, Group Organizing

The formation of a local section of the ASA in the Upper Willamette Valley of Oregon seems virtually assured. On April 26th, 1958, ten persons met to consider organizing. Mr. Virgil H. Freed, Associate Professor of Chemistry at Oregon State College was elected temporary chairman with specific plans to organize this fall. We wish to extend congratulations to this newest group. The efforts of Prof. Hendrik J. Oorthuys, Secretary-Treasurer of the ASA, have been instrumental in bringing this about.

## NEW MEMBERS

**Barton, Alexander J.,** Shadyside, Stony Brook, Long Island, New York, is Director of Admissions and Instructor in Biology at The Stony Brook School. He earned a B.S. degree in Biology from Franklin and Marshall College and a M.S. degree in Zoology from the University of Pittsburgh.

**Elmore, Austin D.,** 609 N. Walnut Street, Bloomington, Indiana, is minister of the Emmanuel Baptist Church in Bloomington, Indiana. He received an A.B. degree in Botany from Wabash College.

**Freed, Virgil H.,** 713 S. 20th, Corvallis, Oregon, is Associate Professor in Chemistry at Oregon State College in the Agricultural Chemistry Department. He received a B.S. degree in Agriculture and a M.S. degree in Biology from Oregon State College. He is at present a Ph.D. Candidate in the field of Chemistry at the University of Oregon.

**Frye, Laurel B.,** 420 N. Madison, Siloam Springs, Arkansas, is Instructor and Acting Chairman of the Physics Department of John Brown University. He holds a B.S. from the University of Missouri in M.E. and a B.D. degree from Grand Rapids Baptist Theological Seminary in Theology.

**Gardner, John N.,** 170 West Oak Street, Butler, Indiana, is a retired Army officer writing in the field of Philosophy of Christian Education. He holds a B.S. degree in Entomology from Michigan State College, M.A. from Bob Jones University in Bible, and a M.R.E. from Southwestern Baptist Theological Seminary in Christian Education.

**Henson, Joseph L.,** Box 4467, Bob Jones University, Greenville, South Carolina, is a Professor at Bob Jones University where he received a B.S. in S. Ed.

**Houghton, Francis Donald,** 27 Avenue E., Claymont, Delaware, is employed by the Colorado Fuel and Iron Corp., Wickwire Spencer Steel Division as Chief Chemist. He holds a B.S. degree in Inorganic Chemistry which was earned at Massachusetts Institute of Technology.

**Kac, Arthur W.,** 3606 Oak Ave., Baltimore 7, land, is a self-employed physician. He attended Columbia University and received B.A. and M.D. degrees from the University of Minnesota.

**Lerch, Robert Donald,** Box 521, Freeman, South Dakota, is an Instructor of Science and Mathematics at Freeman Junior College, Freeman, South Dakota. He received a B.S. degree from Goshen College, Goshen, Indiana in Physics.

**Lothers, John E., Jr.,** is employed by John Brown University. He received a B.S. degree from Oklahoma State University and a M.S. from Kansas State College in Biochemistry.

**Malsky, Stanley J.,** 180-31 Aberdeen Road, Jamaica Estates, Jamaica 32, New York, is Chief of the Radio-physics Research Section of the Veterans Administration. He received B.Sc. and M.Sc. degrees from New York University in Physics and and M.A. from New York University in Science Education. He is presently a candidate for the Ph.D. degree in Physics at N.Y.U.

**Potter, Raymond S.,** 4635 Careybrook Lane, S. E., Washington 21, D. C., is an Electronic Scientist at the Naval Research Laboratory. He received a B.E.E. degree from George Washington University in Electrical Engineering and a M.S. degree from the University of Maryland in E.E.

**Rothe, Claris D.,** 2511 Hunt, Ames, Iowa, is a Graduate Student at Iowa State College. He has earned a B.S. degree in Chemistry from the University of Illinois.

**Schaffers, Wilhelmus J.,** 1032 Gallery Road, Wilmington 5, Delaware, is a Mechanical Engineer with E.I. du Pont de Nemours and Co. at the Industrial Products Research Laboratory in Newport, Delaware. He received an I.R. degree from Deeft Institute of Technology, Netherlands in Aero and Hydro Dynamics.

**Schenk, George H.,** Jr., 203 Campus, Ames, Iowa, is a Graduate Assistant at Iowa State College. He received a B.A. degree in Chemistry from Valparaiso University and is currently working toward a Ph.D. in Chemistry.

**Statler, Richard L.,** 5016 Leverett St., Washington 21, D. C., is a Physicist at the Naval Research Laboratory in Washington, D. C. He received a B.S. degree in Physics from Carnegie Institute of Technology.

**Sutherland, Patrick K.,** 613 Tulsa Street, Norman Oklahoma, is Associate Professor of Geology at the University of Oklahoma. He holds a B.S. degree from the University of Oklahoma and a Ph.D. degree from Cambridge University, England. Both degrees were received in Geology.

**Tichy, Frank C., Jr.,** c/o University of Liberia, Monrovia, Liberia, is Associate Professor of Science, Education and Biology at the University of Liberia. He received the B.S. degree from Wheaton College in Zoology, and the M.S. degree from the University of Illinois in Zoology.

**Whitten, H. Paul,** 1405 Graystone Rd., Anniston, Alabama, is a Physicist for the Radiological Warfare Division, U.S. Army Chemical Corps Field Requirements Agency, Ft. McClellan, Alabama. He holds a B.S. from Mississippi College and a M.S. from the University of Illinois in Physics.

**Wood, Glen M.,** Box 115, R.F.D., Underhill, Vermont, is Associate Professor and Associate Agronomist at the University of Vermont and State Agricultural College. He earned his B.S. at University of Rhode Island, M.S. and Ph.D. degrees from Rutgers University in Agronomy.

**Worthington, Robert Earl,** 811 Douglas Avenue, Ames, Iowa, is an Associate at Iowa State College. He holds a B.S. degree from Berry College and M.S. degree from N.C. State College in Bio-chemistry. He is currently working on the Ph.D. degree at Iowa State College.