19. E. Merler, J. Gatien, G. DeWilde, *Nature (Lond.)* **251**, 654 (1974).
20. E. S. Vitetta and J. W. Uhr, *J. Exp. Med.* **139**, 1599 (1974).
21. E. Abney and R. M. E. Parkhouse, *Nature (Lond.)* **252**, 600 (1974).
22. U. Melcher and J. W. Uhr, unpublished observations.
23. H. Spiegelberg, *Contemp. Top. Immunochem.* **1**, 165 (1972).
24. E. S. Vitetta, U. Melcher, M. McWilliams, J. Phillips-Quagliata, M. Lamm, J. W. Uhr, *J. Exp. Med.* **141**, 206 (1975).
25. E. S. Vitetta, C. Bianco, V. Nussenzweig, J. W. Uhr, *J. Exp. Med.* **136**, 81 (1972).
26. S. A. Goodman, E. S. Vitetta, J. W. Uhr, *J. Immunol.* **114**, 1646 (1975).
27. S. Strober, *ibid.*, p. 887.
28. E. S. Vitetta, M. McWilliams, J. Phillips-Quagliata, M. Lamm, J. W. Uhr, *J. Immunol.* **115**, 603 (1975).
29. G. Jones, G. Torrigiani, I. M. Roitt, *ibid.* **106**, 1425 (1971); M. McWilliams, M. E. Lamm, J. Phillips-Quagliata, *ibid.* **113**, 1326 (1974); A. D. Bankhurst and N. L. Warner, *ibid.* **107**, 368 (1971).
30. E. Rabellino, S. Colon, H. M. Grey, E. R. Unanue, *J. Exp. Med.* **133**, 156 (1971).
31. E. S. Vitetta and J. W. Uhr, in preparation.
32. S. M. Fu, R. J. Winchester, H. G. Kunkel, *J. Immunol.* **114**, 250 (1975).
33. B. Pernis, J. C. Brouet, M. Seligmann, *Eur. J. Immunol.* **4**, 776 (1974).
34. P. G. Spear and G. M. Edelman, *J. Exp. Med.* **139**, 249 (1974); E. A. Goidl and G. W. Siskind, *ibid.* **140**, 1285 (1974).
35. H. B. Dickler and H. G. Kunkel, *ibid.* **136**, 136 (1972); F. Paraskevas, S. T. Lee, K. B. Orr, G. Israels, *J. Immunol.* **108**, 1319 (1972); A. Eden, C. Bianco, V. Nussenzweig, *Cell. Immunol.* **7**, 459 (1973); A. Basten, J. F. A. P. Miller, J. Sprent, J. Pye, *Nature (Lond.)* **235**, 178 (1972).
36. R. J. Winchester, S. M. Fu, T. Hoffman, H. G. Kunkel, *J. Immunol.* **114**, 1210 (1975).
37. S. D. Litwin, T. H. Hutteroth, P. K. Lin, J. Kennard, H. Cleve, *ibid.* **113**, 661 (1974).
38. S. M. Fu, R. J. Winchester, H. G. Kunkel, *J. Exp. Med.* **139**, 451 (1974); H. G. Kunkel, personal communication.
39. W. A. Bonner, H. R. Hulett, R. G. Sweet, L. A. Herzenberg, *Rev. Sci. Instr.* **43**, 404 (1972). In this technique, cells can be stained with a fluorescein-labeled antibody to a particular class of surface immunoglobulin. Labeled cells are then passed through a cell sorter, which separates the labeled cells from the remainder of the population. The separated cells can then be tested for their capacity to confer immune responsiveness to an immunologically incompetent recipient.
40. L. A. Herzenberg, K. Okumura, L. A. Herzenberg, in *Symposium on Suppressor Cells in Immunity* (London, Ontario, in press).
41. C. Hanley, K. Knight, T. Kindt, W. Mandy, personal communication.
42. J. A. Gally and G. Edelman, *Nature (Lond.)* **227**, 341 (1970).
43. H. Metzger, *Adv. Immunol.* **12**, 57 (1970).
44. D. H. Katz and B. Benacerraf, Eds., *Immunological Tolerance* (Academic Press, New York, 1975).
45. P. P. Jones, S. W. Craig, J. J. Cebra, L. A. Herzenberg, *J. Exp. Med.* **140**, 753 (1974).
46. E. S. Vitetta and J. W. Uhr, in preparation; T. L. Vischer, *J. Immunol.* **113**, 58 (1974).
47. R. E. Cathou and C. T. O'Konski, *J. Mol. Biol.* **48**, 125 (1970); K. J. Dorrington and C. Tanford, *Adv. Immunol.* **12**, 333 (1970).
48. D. E. Isenman, K. Dorrington, R. H. Painter, *J. Immunol.* **114**, 1726 (1975).
49. These studies were performed with the technical assistance of Y. Chinn, U. Hisle, S. Lin, H. Siu, and R. Summers. We thank Drs. U. Melcher, S. A. Goodman, M. McWilliams, J. Phillips-Quagliata, and M. Lamm who collaborated on many of the experiments described in this article. We thank Dr. S. Strober for allowing us to see preprints of his manuscripts and for critical discussions on B cell differentiation; and we thank Drs. H. Eisen and J. Forman for comments concerning the manuscript. Supported by NIH grants AI 11851-01 and AI 10967-03.

The Need for an Ethnomedical Science

The study of medical systems comparatively has important implications for the social and biological sciences.

Horacio Fabrega, Jr.

Diseases and the disruptions that they occasion have long attracted the interests of scientists who study nonliterate people. Physical anthropologists have contributed information with regard to the basic characteristics of man. By means of cross-cultural epidemiologic studies, social scientists have added substantially to an understanding of the causes of disease. However, disease has not had any special appeal to anthropologists interested in culture theory. As an example, a comparative approach to disease has never gained any momentum in cultural anthropology (*1*). Ethnomedicine, the study of how members of different cultures think about disease and organize themselves toward medical treatment and the social organization of treatment itself, has been viewed as one of the various "domains" of culture. In actual practice, enthnomedicine as an area of inquiry has been either bypassed and neglected or handled indirectly.

There are many reasons for this neglect of ethnomedicine (*2*). The real problem has been that a truly social formulation of disease and its related phenomena has not been pursued. In order to make use of disease in a theory about social groups, a broad definition of disease that accommodates the many meanings people can give to disease is needed. Heretofore, a largely descriptive and relativistic course of action that emphasized cultural patterns has been pursued. At the same time, there has not been sufficient description of the medically relevant behaviors of sick persons nor of processes of treatment. Both of these facts have made difficult the development of useful concepts and generalizations in ethnomedicine. The inchoate state of ethnomedicine reflects and contributes to a lack of appreciation of the essential connection between ethnomedical questions and those that involve human evolution and social adaptation. Moreover, neglect of ethnomedical science has meant that the insights about disease and medical care that are available from comparative studies have not been fully used to examine contemporary problems in the practice of medicine in our own society.

The Special Logic of Biomedical Diseases

The study of different ways in which people orient to and cope with disease brings into sharp focus questions of epistemology and ontology as they pertain to disease and medical care. One is forced to ask, for example, what is a disease? What does this central medical term signify? In Western cultures, "disease" is what physicians and biologists study. The whole medical complex in Western nations, which includes knowledge, practices, organizations, and social roles, can be termed "biomedicine." Biomedicine thus constitutes our own culturally specific perspective about what disease is, and how medical treatment should be pursued; and like other medical systems, biomedicine is an interpretation which "makes sense" in light of cultural traditions and assumptions about reality (*3*).

Terms such as "diabetes," "rheumatoid arthritis," or "multiple sclerosis" seem deceptively simple. Careful analysis will disclose that they represent a complex set of physiologic, chemical, and structural facts. Furthermore, such diseases can implicate a host of social and psychological factors although, in a strict sense, they are not seen as necessary features of the disease. In biomedicine, disease signifies an abstract biological "thing" or condition that is, generally speaking, independent of social behavior (*3*). When examined logically, disease in biomedicine usually refers to undesirable deviations in a cluster of related physiological and chemical variables (for ex-

The author is professor of psychiatry and adjunct professor of anthropology and sociology, Michigan State University, East Lansing 48824. This article is adapted from an address delivered on 29 June 1973 at the Mexico City meeting of the American Association for the Advancement of Science.

ample, blood pressure, blood sugar, and so forth). An implicit assumption, supported by observation, is that many of the values of key variables that reflect physiologic and chemical processes in man conform to narrow ranges that are common to the species as a whole (*4*). Verbal reports or behavioral changes, or both, constitute signals of biomedical disease and, in some instances, actual ("pathognomonic") indicators (for example, types of pain, a migraine complex, or certain sensory and motor changes). On the whole, these behavioral changes are not viewed from a social standpoint; rather, they are abstracted out of social behavior.

In light of these factors, the meaning of "psychiatric diseases" is problematic in biomedicine. Such diseases are often framed in terms of mental structures that cannot be directly observed and hence must be inferred from social behavior. Moreover, many psychiatric diseases are actually defined in such a way that social behavior is an integral part, that is, part of the intension of this disease. These factors set apart psychiatric disease and it would appear that they constitute reasons for the fact that psychiatric diseases are problematic in contemporary medicine (*5*). However, psychiatry's continued emphasis on social behavior cannot be faulted once the generic attributes of disease and the fact that social behavior is an elemental component of human adaptation are considered.

Insights Drawn from Ethnomedicine

A working assumption in the social and biological sciences is that the characterisitics of man were forged in a simplified, hunter-gatherer form of social setting (*6*). Groups classified as hunter-gatherers were small and migratory and the relationships between members were highly interdependent; environmental pressures were experienced jointly. All facets of human life had a social and shared basis (*7*). The effects of disease were visible to other members of the group and the latter shared in the tribulations of the diseased (*8*). This means that an occurrence of disease did not simply incapacitate or eliminate an individual in some mechanical sense, but rather it affected the individual's capacity and performance as a participating member of a highly interdependent group. At this point, when it affected the social behavior of an individual, disease came to have relevance in the group. Social behavioral changes, then, involving verbalizations about internal states, interference in physiologic and social functions, and changes in appearance and demeanor, served as indicators of disease among nonliterate groups. The modifications of adaptive behavior that were woven into disease must be seen as culturally layered on to the more ingrained social changes which higher primates show when diseased (*9, 10*). They are continuous with the adaptive changes that all animals show during disease, changes which are a product of evolution (*11–13*).

All nonliterate groups have articulated beliefs and explanations about disease (*14*). Rather than viewing these beliefs as naive and superstitious, they must be seen as adaptive and "designed" to resolve the crisis and uncertainty surrounding disease by explaining the causes of disease and rationalizing treatment. In addition, they also pattern the expectations of the sick person and of those around him, resulting in a host of altruistic behaviors. This, then, is the meaning of disease in an adaptational frame of reference and a generalization would be that occurrences of disease are significant at the point when they interfere with the social behavior of the individual.

Ethnomedical studies indicate that, in a logical sense, disease among nonliterates is directly tied to the social behavior of the person and to his ability to function and it also has heavy social implications (*15, 16*). Of course, the social distinction that we make between mental versus nonmental disease is not necessarily made among such people (*17*). All types of disease raise social and personal questions about the individual and his immediate group. Thus, disease and medical care are directly woven into the social fabric. In our culture science has provided us with disease forms which, on logical grounds, are not connected to the social fabric.

The social basis of disease among nonliterate people should remind us that social conventions, however directly, form part of all definitions of disease. This has been the case in the past in our own culture. The intertwining of philosophy, values, and social attitudes with disease can be understood by reading the history of medicine (*18*). Even physiologically "pure" disease entities can quite easily change in meaning in line with scientific conventions that in the last analysis constitute a social consensus (*19*). Although biomedical disease may no longer be indicated in social behavior, conventions about human functions, together with empirical norms, set the cutoff points for deviations in biological variables which go into making these diseases (*3*).

The social character of disease is revealed by the fact that its elements consist of changes in the way people function, behave, define themselves, and/or report their feelings. Deviations from the typical are what prompt people to seek medical help and to follow or reject the advice. Furthermore, such deviations serve as the basis for allowing observers (be they scientists, shamans, or others) to construct what they judge to be meaningful regularities in line with sociocultural conventions, whether they are chemical, physiologic, or supernatural. These regularities become codified as disease entities and groups then certify and legitimate them.

The many different meanings that can be given to disease challenges the researcher to develop a generic definition. Key semantic attributes of a generic "disease" include self-centeredness, harmful, impairment, discomfort, deviation, undesirableness or unwanted, giving rise to a need for corrective action, and unplanned for or unexpected actions. Such attributes must obviously be seen in the context that man is a social and biological being and that through behavior he must adapt to his physical and social environment. With regard to deviation, the values of the measures that are usually involved deviate from both the norms created by the individual's past performance (personal norms) and the norms set by the relevant subgroup to which the person belongs (group norms) (*20*).

Although definitions of disease are based on social and historical factors, they underscore the practical directives that are implicit in all medical systems. Disease may be viewed as an entity that groups (societies, cultures, and so forth) partially shape and make operable using as raw material problematic changes that take place in members of the group. These changes (*4*) are themselves affected by the characteristics and environment of the group. However, in naming and classifying diseases, the group more directly manifests the perspective which its medical system has attained. Disease is "created" in this way so that it may be eliminated and controlled (*21*). The criterion for both the definition and elimination of disease rests on the group's cultural conventions, level of social organization, and form of ecologic coupling. By means of biomedicine modern societies have achieved unparalleled success in these efforts. These successes naturally provide one justification for and payoff of a medical system. The biomedical paradigm of disease which evolved for particular purposes—to control and/or eliminate disease in social systems—has succeeded dramatically and has required a strict and rigorous definition of diseases which needs to be heeded. The very "success" of biomedicine may be the reason for our reluctance to seek alternatives and different approaches to the generic disease,

questions for which other logical schemes may be more appropriate. We may ask: Is it possible to develop other paradigms for the study of human maladaptation, the generic disease, and how do social systems deal with it?

An Ethnomedical Approach to Disease

Despite the fact that there probably are physiological changes that all people would link to disease, the "whole" of disease is inevitably seen as a change in a person's functioning and receives a socially valid explanation. In view of the behavioral and social dimensions of this generic disease, one may ask if it is possible to construct or uncover a more general social paradigm. This involves working toward a new analytic system about the generic disease that would complement the practical biomedical system. Its purpose is captured in the following question: Can one find order and regularity in the forms of disease when a social frame of reference is adopted? To answer this question bioculturally involves searching for a set of more or less universal indicators of disease which are rooted in social categories; it also involves probing fundamental aspects about man as both a physiological and cultural being.

One example of a behavioral paradigm of disease that is serviceable in comparative studies could focus on the physical activities and tasks in which people routinely engage and which occupy them during their daily lives. A list of these tasks and activities could provide a basis for determining one of the many loads of disease. Such a list could even be used to construct a grid or map that would serve to quantify the effects of disease at any one point and across time. In other words, the various tasks and actions would serve as coordinates of the grid, and when systematically organized this grid would help to define types of behavioral interference, with these construed as curtailments in energy expenditure. The following are illustrations of activities and tasks that could be used: sleeping, walking, talking, listening, lifting, carrying, performing household tasks, and so forth. Tasks that involve the care of the body (for example, bathing, dressing, grooming, and so forth) and the performance of basic biologic functions (for example, feeding, elimination, and sexuality) should also be included since they involve elemental uses of the individual's store of energy and reflect his range of activity as well. A broad and representative set of actions and tasks of this type could be used to map the progress of any culturally specific disease and, when supplemented by ancillary data might allow one to specify and quantitate the typical course of a disease.

Biomedical diseases are defined on the basis of deviations and malfunctions of the chemical and physiologic systems of the body and any number of processes and structures can be implicated in disease. However, when viewed in terms of which tasks and actions are curtailed, biomedical diseases produce only a few hindrances. A number of what are now seen as different disease processes, when evaluated in terms of a task action paradigm, will probably be found to be very similar; that is, through a process of behavioral analysis and diagnosis of disease, highly discrepant chemical and physiologic alterations will be brought together and shown to conform to a smaller class of interferences in functioning, each of which may have distinctive time paths. In a more practical sense, when matching the social interferences of a disease with the demands and requirements placed on the individual by the social group, the cost of a disease to the individual or group can be computed. In using a paradigm such as this one, a researcher can appreciate the energetics of the patient's adaptation during disease. Other behavioral paradigms for the comparative study of disease have been outlined elsewhere (*22*). For example, social role behaviors and the changes in experience associated with disease have been suggested. What social scientists term "symbolic" attributes of behavior could be given more attention and there is no reason why useful logical schemes based on comparative data about disease and behavior could not be developed. The application of such schemes in empirical studies would yield data that could be used to develop prototypical disease forms and "careers" which would signify how symbolic behaviors are comprised, and such diseases would complement those derived from a task action scheme.

Behavioral paradigms of disease are seen as devices for codifying and measuring a person's social functioning. The social behavior correlates of all kinds of interruptions in functioning are delineated, regardless of the individual's culture. It is irrelevant whether outsiders judge that the alterations in behavior are caused by changes in sugar metabolism, toxic effects of an infectious or neoplastic disease, anxiety and depression, or, for that matter, the effects of preternatural influences. What is relevant, however, is the time-related changes in which the form of social functioning is altered or interfered with, and/or the changes in the way the person uses social symbols. Information on how the interruption in functioning by an individual is judged by the group constitutes a second stage in the analysis of the generic disease and also requires consideration of other institutions of the group and how they interrelate and function.

Clearly, any number of behavioral dimensions may be employed in the effort to articulate a suitable social paradigm of disease. One should, however, entertain the possibility that a relatively culture-free language can be devised (or discovered), and that its examination may reveal something fundamental about the way man functions and shows his dysfunctions (*9, 23*). What needs to be discovered is the sequence of changes that occur in disease, with disease formulated as a social and behavioral entity. Diseases vary in manifestations, and a useful way to code and quantify them has been by means of such concepts as severity, intensity, or degree. Socially, one may judge the severity of disease as it affects behavior or as a sequence of shifts in the way social duties and obligations are neglected. By studying the way in which a disease spreads and ramifies into various behavioral spheres one might find a "social grammar" of disease. A long-range aim of ethnomedical inquiry might be to discover such a grammar of disease.

The expressions "language" and "grammar" of disease are used in order to stress the idea that during an occurrence of disease there is a kind of communication of its social import and that this communication is rooted in human evolution. In short, there may be a genetically programmed symbolic code inherent in the way in which disease occurs in a group. Thus, a group's theory of disease, a cultural trait, can alter in only limited ways the outward appearance or morphology of how disease is expressed behaviorally. A "communication" about the social importance of disease also implies that its occurrence represents a matter of uncertainty to the group, and that a variable amount of information is contained in that occurrence. In a sense, the group's theory of disease offers a reading of this information, but groups differ in terms of the type and the amount of information that they extract. The information that is extracted from an occurrence of disease reflects the functioning of the group's system of medicine and it also conditions the kinds of problems that exist in the system.

In summary, a general and theoretically fruitful formulation of disease involves judging it as an occurrence or happening that involves an individual. This occurrence can be formulated as an example of a biomedical type. The individual may

have pneumonia, acute rheumatic fever, or schizophrenia. This "language" of disease has proven to be effective in controlling the chemical, physiologic, and anatomic components of disease. For social analyses, however, this language is not effective. The occurrence of disease also comes to be an example of a cultural type, whether it is "a cold," "bad blood," or "an evil influence." It is this culturally specific category that prompts and then directs treatment-related actions for the individual. This language of disease allows a people to make "social sense" of disease and to maintain social order. However, the reliance on cultural definitions of disease has culminated in a relativism that has stultified efforts in ethnomedicine. Finally, the occurrence of disease can also be seen as a form of behavior interference. Through the empirical and analytic studies that are undertaken by means of this language of disease, a comparison of disease-related occurrences could lay the groundwork for the development of an ethnomedical theory of disease.

An Ethnomedical Approach to Medical Treatment

As medical care is viewed comparatively, one is compelled to search for similarities and to develop a generic frame of reference. Treatment, for example, typically follows a "disease state" in which the person himself performs the diagnosis or those around him do. The concepts and meanings which the culture provides are the resources that members of the group use when explanations are required. If the person decides, with or without the advice of others, to seek help outside the family, neighborhood, or local knowledgeable persons, he will eventually interact with someone who is regarded in that culture (or a relevant segment of it) as a medical practitioner. If the request for help is accepted by the practitioner (and this itself may be negotiated on a variety of grounds, not only economic, skill, or available time), there is typically a moral bond created between the practitioner and the patient. This bond rests on an agreement, which is usually implicit and requires a measure of trust, and both of them are culturally structured. Insofar as elemental suppositions about personhood are implicated in a group's definition of disease, the treatment that is prescribed in a medical system tends to threaten the social essence of the sick person. This heightens the bond between the practitioner and patient. The patient usually comes to a dependent status in this relationship. Diagnosis, a process which can take time (and may be involved in the search for help), is an attempt to establish a consensus for purposes of action. Diagnosis involves communication between the practitioner and relevant parties (not exclusively the patient). The negotiating process may reveal to the practitioner aspects of the social relationships and behaviors that, in fact, caused much of the disease (as the patient often sees it). These same communications tend to be used to evaluate and measure the course (and level of seriousness) of the disease. The precise techniques are culturally varied. They may involve "pulsing" the patient in order to communicate with the gods or to ascertain the status of the person's inner soul as in Zinacantan (*24*), divination or exorcism to establish the degree of strength of a witch or his spell as embodied in the disease (*16*), or obtaining x-rays and blood chemistries in order to uncover the level of functioning of the impersonal body (as in Western societies). In each case, the problem confronting the practitioner is that of evaluating the genuineness and value of alternative sets of information that bear on the problem as he defines it.

Frequently, the practitioner must have discussions with outside consultants (for example, through prayers, phone calls, and so forth). An interesting empirical question becomes whether, how, why, or to what extent these discussions on the sick person's behalf eventually prove beneficial to the patient. What one may choose to term as "beneficial effects" ultimately rests on whether the patient is prepared to accept the interpretation of the problem, presented either directly or indirectly by the practitioner, and also on the subsequent relations between the patient, his family, and the practitioner himself. To a large extent, then, it is probably an agreed upon social consensus which includes the practitioner and the sick person (or his surrogates), that is required for a medical action to be judged as beneficial or helpful. Potential conflicts between practitioner, patient, and family become particularly important when the premises and understandings of the problem are essentially unshared, as they may be when individuals have available to them and actually use more than one system of medicine.

The preceding generalizations point to the importance of behavior for an understanding of medical care. More explicitly, one way of conceiving medical treatment is to see it as an involvement of two fundamental processes: (i) the attempt to alter human conduct—to change another's way of behaving and (ii) to comfort (that is, minister to) the person suffering from personal difficulties that are occasioned by disease. In a rather basic sense, medical practitioners, regardless of their culture, have to persuade people to do such things as take medicines, alter personal habits, agree to submit to dangerous procedures, acknowledge negative personal attributes, modify their relations with others, accept and reorient to bodily constraints, return for a follow-up visit, comply with and participate in formally structured ("ritualistic") exchanges, check and report on bodily functions, and so forth. These activities often involve convincing another that a particular new form of behavior is desirable and useful; at the same time, it often demands that the practitioner comfort or help with the personal difficulties occasioned by the realization that the "old" image, identity, habits, or ways are wanting and require modification. As stated earlier, these essentially behavioral readjustments implicate a number of persons and involve key social relationships.

One way to sharpen and test ethnomedical generalizations about medical care would be to develop a model of illness behavior. A behavioral paradigm for disease is a device for recording and measuring occurrences of disease so as to facilitate ethnomedical analysis. Illness behavior, on the other hand, is seen here as the sequence of treatment-related actions that an individual takes during the time that he considers himself ill. Such actions are based on his evaluation of the importance of the disease as it affects his resources and life circumstances. A model of illness behavior is an abstract and systematic statement of how treatment-related actions unfold and how these actions might be explained.

An elementary decision-making theoretic model that uses microeconomic principles has been formulated and rigorously critiqued (*3*). Such a model offers a framework for understanding how individuals process information about disease and make decisions on medical care. It can help to integrate ethnomedical data that involve topics such as (i) criteria of well-being, (ii) medical beliefs and attitudes, (iii) beliefs about bodily structure and functions, (iv) beliefs about causes of illness and the process of healing, (v) values placed on suggestions for medical care, (vi) decision-making during the course of a disease, (vii) tendencies toward self-diagnosis and self-medication, and (viii) cooperation with medical advice. Ultimately, a suitable model of illness behavior would pave the way for fruitful comparisons of medical care practices. However, such a model would be more powerful if it were to be used with socially useful paradigms of disease. Together, devices such as these could lead to a truly comparative ethnomedical science that would furnish the empirical information that is needed to ground and test fundamental propositions about the relations between disease and social systems.

Practical Implications of an Ethnomedical Science

Until the last one to two hundred years, social behavioral changes have served as the critical indicators of disease. In addition, the implicit targets of the system of care have included the person, family, and the group. During this period medical care has been geared to maintain the functioning of the individual and of social order. These are important generalizations that any theory of disease must embrace. The shift away from social behavior and the placing of emphasis on the individual as "patient" have paralleled man's greater "scientific" control of disease. However, in solving many of the problems of disease, biomedicine has also created new ones. An obvious one is an increased and aged population. Another involves our iatrogenic diseases.

Many of the problems in contemporary medical care that involve the relation of doctor to patient are outgrowths of the contrasting meanings that are given to disease by the participants. Formal attributes of disease may be shared; for example, that it constitutes an undesirable deviation or state involving the person; but not others related to the individual's functioning, such as why it came, what it means, and how it has upset the individual's equilibrium. Differences in orientation mean that a false consensus prevails between the doctor and the patient. This type of consensus can lead to the use of a set of key terms in the relationship, but they actually mean very different things to each person. Clearly, a more socially oriented paradigm regarding disease and treatment might help put the doctor-patient exchanges into a more meaningful light, thus rendering them more productive. Other dilemmas, such as those involving many malpractice suits, can be seen as a partial outcome of conflicts of definitions about disease and medical care. Thus, people expect medicine (a social institution) to do social and behavioral things, but our system of medicine is no longer as well geared to this aspect of disease since its organization now seems to rest on a "nonsocial" definition of disease. A mixing of the "language" of biomedical disease with that of social maladaptation can thus generate problems, something to which medical planners may have unwittingly contributed by taking for granted the technical facets of medicine and then too readily turning complex social phenomena into disease entities (for example, homosexuality and alcoholism) in the absence of compelling criteria. It is interesting indeed that in contemporary society one can have a disease and not feel ill and one can feel ill and be told he does not have a disease. And, of course, disease and illness are both frequently seen as different from social maladaptation. Many of the problems in contemporary medicine and in society at large are partially the result of the fact that, in probing and breaking apart the generic disease, science has yielded new and logically different ways of interpreting human adaptation. The comparative study of medical systems brings to light the sources of these problems. A social perspective toward disease and medical care that is securely grounded in generalizations drawn from ethnomedicine might lead to guidelines that are less problematic than those currently competing in modern society.

Special problems in contemporary medicine take on added significance when viewed in light of a comparative approach to medicine. Thus, physicians working in public health programs in underdeveloped countries attest to the fact that individuals do not usually seek and accept medical care unless they show significant clinical evidence of disease. To the extent that such care could lead to improvements in functioning, its avoidance constitutes a social problem. However, this type of problem exists, even in contemporary medical practice. For example, in those instances when continuity of care is of the essence, treatment "failures" often result which are ascribed to ignorance, lack of understanding, or poor motivation on the part of the patient. Generalizations from ethnomedical data would suggest otherwise. In other words, failure to comply with medical regimens can be explained partly as a result of the fact that such regimens must be implemented when there is no biologic compellingness of disease. Biologic compellingness of disease equals those evolutionarily derived and genetically encoded routines and programs which when activated have as their outcome behavioral changes. Indeed, the difficulty of inducing "preventive" health behaviors stems from the same kinds of considerations: the need to motivate a person toward *medically relevant actions* in the absence of a "behavioral disease"; that is, in the absence of elemental signals and motives that make the pursuit and acceptance of medical care compelling and "natural." Quite obviously, social and cultural factors can modify these "inherited" dispositions which become active in the event of disease, as any physician who has tried to treat a member of another culture or of different religious sects (for example, Jehovah's Witnesses) knows. Usually biomedical care is deemed inappropriate in the light of the individual's own definition of "his" disease and, of course, there can be outright refusals of any treatment. This in itself provides evidence of additional controlling influences on behavior which need to be taken into account in medical care. Ethnomedical analyses thus underscore a contemporary problem in biomedicine: How to train, motivate, and condition individuals to handle their physiological and chemical systems, even when these are not overtly (behaviorally) diseased, with the compellingness which natural selection has conditioned them to deal with the generic disease (*12, 25*). An interesting generalization would seem to be that in moving away from social behavior as a basis for defining disease and organizing medical care our system of medicine has created the problem of learning how to apply its newly derived insights (*26*).

Toward a Theory of Human Disease

The importance of human disease is revealed by the attention that it receives in both the social and biological sciences. It is striking, that in spite of its centrality and fundamental relevance to an understanding of man and his special institutions, no theory of human disease has been developed. There are many reasons for this, some of which have already been discussed (*3*). One of them might be that disease is primarily a concern of "applied" disciplines whose principal interests are control and elimination. A related one seems to be that disease is implicitly taken into account or explained in other general and influential theories (such as, for example, the synthetic theory of evolution in biology, role theory in sociology, and the various personality theories in psychology). Hence, no need may be felt for an additional theory that would deal, however exclusively, with disease and its interrelations with social systems. There are, of course, many scientific theories that incorporate differing aspects of disease. Yet invariably, the meaning of the central concept, namely disease, is biomedical and, as pointed out earlier, this definition of disease may not be suitable for the kinds of problems which require explication (*27*).

By a theory of human disease one can mean a set of related lawlike propositions or generalizations by means of which one is able to explain such things as (i) what disease is and the criteria that social groups draw on in order to define it; (ii) the understandings people have about disease; (iii) the immediate behavioral effects of disease and its long-term effects on the group; (iv) the social forms that disease takes on; (v) the kinds of organization inherent in the responses to disease; (vi) the institutions that social groups develop in order to deal with disease systematically

and productively; (vii) the developmental changes and/or stages that may take place in the way in which medical orientations, behaviors, and institutions of social groups unfold across time; and (viii) the relative success that groups enjoy in controlling disease given their own definition and that of an informed outsider.

These separate problem areas should be seen as interconnected. Phenomena that pertain to one area correspond to, implicate, or relate logically to phenomena in that of another. The interconnected nature of the problem areas can easily be visualized. Definitions and understanding of disease partially shape the behavioral forms of disease and they quite naturally also dictate medical practices. These practices logically entail, order, program, and regulate certain forms of social relations. And what gets exchanged in them eventually has a feedback on disease that affects how it is viewed, treated, and evaluated, and how the behavioral form of disease itself comes to be structured. The social relations implicated in diagnosis and treatment, when viewed in their totality, underlie and partially shape or pattern the pathways of disease occurrences in the group at large. Furthermore, these relations and pathways themselves energize and challenge and are constrained by macrosocial arrangements and structures which have a historical and ecological basis and which directly affect and have a feedback on disease and medical care. The preceding factors determine which disease forms "exist," what their toll is in the group, how they affect the person, how heavy are the burdens of disease, how long and how "well" people live, and how successful treatment is. The sum of these factors accounts for the "value" of the group's theory of disease and system of care and for the group's balance in the environment. Finally, as groups change, so do their medical institutions and the relations that they have with other institutions in the group. As an example, certain forms of maladaptation remain a concern of the medical profession, whereas others shift to new evolving institutions in the group. These processes need description and analysis.

A theory of disease should succinctly describe and also explain medical phenomena in a group by drawing on concepts and generalizations that are relevant to each of the substantive areas of meaning touched on above. A theory of disease should also enable one to cogently compare attributes of disease and related medical phenomena as they are observed in different groups. The desideratum that a theory of disease should facilitate comparison raises more pointedly the matter of a suitable set of concepts and generalizations by means of which the theory can operate. It is such a set of analytic devices that an ethnomedical science should generate.

Summary

Ethnomedicine is an intellectual area which embraces theoretical concerns that are relevant to both the social and biological sciences. The relation which exists between disease, social behavior, and human adaptation constitutes the primary subject matter of ethnomedicine. This relation is examined in terms of man's unique capacities for symbolization and culture. Since ethnomedical generalizations explain how social groups deal with a generic disease, they can be used to examine contemporary problems which involve the organization and practice of medicine as well as problems that stem from relations of the medical system with other subsystems in the group. Recasting contemporary social problems in this way may help to clarify their roots and sources (*13, 28*). In focusing on fundamental properties of disease in man, ethnomedicine can also help to clarify the effects and meanings of disease and thereby make its control more rational. A theory of disease, an ultimate aim of ethnomedical inquiry, will serve as an explanatory device with wide-ranging applications.

References and Notes

1. S. Polgar, *Curr. Anthropol.* **3**, 159 (1962); N. A. Scotch, in *Biennial Review of Anthropology*, B. J. Siegel, Ed. (Stanford Univ. Press, Stanford, Calif., 1963), p. 30; H. Fabrega Jr., in *ibid.*, p. 167.
2. The success of Western science and related factors have produced a form of ethnocentrism, with biomedical diseases seen as the only real ones. This may have had the effect of rendering the search for new paradigms about disease partially illogical and inappropriate. In addition, the special meaning which disease has in biomedicine as well as compelling personal experiences with disease have led observers to see much of the data of disease as somehow hidden and private, and hence not easily accessible. The success which ethnoscientists have had in analyzing "folk" domains of knowledge has in large part been made possible by studying the material that was visible or easily rendered in writing. This allowed analysis and comparison of the material by means of criteria which were easily separable. Kinship terminologies, the color domain, and ethnobotanical systems are classic examples. The view that much of disease is inside the person and hidden from view, and indeed the sheer complexity of problems tied to disease seem to have dissuaded cultural anthropologists from pursuing a rigorous comparative approach to disease. B. Berlin, D. Breedlove, P. Raven, *Am. Anthropol.* **70**, 290 (1968); B. Berlin and P. Kay, *Basic Color Terms* (Univ. of California Press, Berkeley, 1969); A. Wallace, *Science*, **135**, 351 (1962).
3. H. Fabrega, Jr., *Disease and Social Behavior: An Interdisciplinary Perspective* (MIT Press, Cambridge, Mass., 1974).
4. When viewed anatomically, biochemically, and physiologically, the human body is often seen as "common" to *Homo sapiens*. This seems to imply that any disease which is framed in terms of the body's systems can be found in any social group and will possess a singular form and course. In fact, biomedical diseases are built out of negative deviations in the values of observed variables, and which of these deviate in a group, and in what fashion, reflect physical, social, and cultural factors. Such diseases and their "natural histories" are thus not invariable or universal. In a proximal sense, the functioning of the apparatus is affected by such things as climate, altitude, level of physical activity, and items which are ingested and serve as food and water. Many of the effects of these factors are readily affected by cultural influences. The genetic constitution of a population, which in a distal sense affects the "constitution" of group members, also reflect social and cultural influences. Finally, the actual cutoff points which are used to mark deviations in physiologic variables should in principle reflect native conventions about well-being, health, and adaptation. Otherwise the researcher runs the risk of applying his own standards indiscriminately, forgetting that they have been generated in a quite different social context. What is considered as a biomedical disease in a native group, then, to some extent will and should reflect attributes of the group considered as a social and cultural structure. See (*3*).
5. Since psychiatric diseases are connected to social behavior, they say something social and hence vital about the person. This means that psychiatric disease can reflect negatively on an individual's social competence since any disease in our culture is to some extent seen as a breakdown in an individual's function. Thus, there are special consequences of being psychiatrically ill in contemporary society. The social effects of disease-labeling are not confined to psychiatry as the literature amply demonstrates, but psychiatry clearly bears the heaviest burden. There are complex reasons for this, including the relative ignorance about etiology and the low level of control which has been achieved over these diseases, both of which are changing rapidly. The social dilemma of psychiatry is mirrored in the point made earlier: in contrast to diseases which are the focus of other medical disciplines, indicators used to define psychiatric diseases are still connected to social behavior which, in turn, aggravates the problem of labeling. Many nonpsychiatric diseases, as an example, have had in the past negative social colorations but they have managed to partially shed them as their underlying chemical-physiologic mechanisms were made clear. E. Goffman, *Stigma: Notes on the Management of Spoiled Identity* (Prentice-Hall, Englewood Cliffs, N.J., 1963); Z. Gussow and G. Tracy, *Hum. Organ.* **27**, 316 (1968); F. Schofield, A. Parkinson, D. Jeffrey, *Trans. R. Soc. Trop. Med. Hyg.* **57**, 214 (1963); W. Copeman, *A Short History of the Gout and the Rheumatic Diseases* (Univ. of California Press, Berkeley, 1964); T. Scheff, *Being Mentally Ill: A Sociological Theory* (Aldine, Chicago, 1966); H. Fabrega, Jr., *Arch. Gen. Psychol.*, in press.
6. R. Lee and I. DeVore, Eds., *Man the Hunter* (Aldine, Chicago, 1966); S. Washburn, *Social Life of Early Man* (Aldine, Chicago, 1966).
7. M. Sahlins, *Stone Age Economics* (Aldine, Chicago, 1972); E. Service, *The Hunters* (Prentice-Hall, Englewood Cliffs, N.J., 1966); J. Woodburn, "Hadza Conceptions of Health and Disease" (1-day symposium on attitudes to health and disease among some East African Tribes, East African Institute of Social Research, Makere College, Kampala, Uganda, 1959); *Hunters and Gatherers: The Material Culture of the Nomadic Hadza* (British Museum, London, 1970).
8. L. Cipriani, D. Cox, L. Cole, Eds., *The Andaman Islanders* (Weidenfeld and Nicolson, London, 1966); L. Marshall, *Africa*, **39**, 347 (1969).
9. G. Berkson, *Am. J. Phys. Anthropol.* **38**, 583 (1973); *Folia Primatol.* **12**, 284 (1970).
10. J. V. L. Goodall, *In the Shadow of Man* (Fontana, London, 1973).
11. Natural selection comes to bear on individuals who show different degrees of adaptation and/or interference in function. That is to say, disease was and still is a selective factor in human evolution. The foregoing points regarding the social behavioral basis of disease imply that this selection operated in a behavioral mold. In short, one may infer that a "whole" comprised of disease-behavior constituted the locus of selective forces in human evolution. Groups adapted and persisted partly because they were able to deal with disease and did so on social and behavioral grounds. The essential connection between the systems that comprise the individual is a factor which no doubt underlies and has underlain whatever effectiveness has been inherent in earlier systems of medicine. J. Z. Young, *An Introduction to the Study of Man* (Oxford Univ. Press, New York, 1971); J. A. King, in *Behavior Genetic Analysis*, J. Hirsch, Ed. (McGraw-Hill, New York, 1967), pp. 22–43; E. Mayr, *Populations, Species and Evolution* (Belknap, Cambridge, Mass., 1970); A. Dinnerstein, M. Lowenthal, B. Blitz, *Perspect. Biol. Med.* **10**, 103 (1966); G. Engel, *ibid.* **3**, 459 (1960); B. Ortiz de Montellano, *Science* **188**, 215 (1975).
12. R. Dubos, *Man Adapting* (Yale Univ. Press, New Haven, Conn., 1965).
13. J. D. Frank, *Persuasion and Healing* (Johns Hopkins Press, Baltimore, 1961).

14. E. Ackerknecht, *Bull. Hist. Med.* **14**, 30 (1943); F. Clements, *Univ. Calif. Publ. Am. Archeol. Ethnol.* **32**, 185 (1932); C. Hughes, in *Man's Image in Medicine and Anthropology*, I. Galdston, Ed. (International Universities Press, New York, 1963), pp. 157–233; W. Rivers, *Medicine, Magic and Religion* (Kegan Paul, London, 1924).
15. S. Glasse, "Social effects of kuru" (unpublished report) (Department of Public Health, Territory of Papua and New Guinea, 1963); E. Vogt, *Zinacantan: A Community in the Highlands of Chiapas* (Harvard Univ. Press, Cambridge, Mass., 1969).
16. V. Turner, *Lunda Medicine and the Treatment of Disease*, publication of the Rhodes-Livingston Museum, Livingston, Northern Rhodesia (Government Printer, Lusaka, Northern Rhodesia, 1963).
17. R. Edgerton, *Am. Anthropol.* **68**, 408 (1966); → H. Fabrega, Jr., D. Metzger, G. Williams, *Soc. Science Med.* **3**, 609 (1970); P. Newman, *Am. Anthropol.* **66**, 1 (1964).
18. L. King, *The Growth of Medical Thought* (Univ. of Chicago Press, Chicago, 1963).
19. A. R. Feinstein, *Clinical Judgment* (Williams & Wilkins, Baltimore, 1967); *Ann. Intern. Med.* **69**, 807 (1968); *ibid.*, p. 1037.
20. These guidelines are by no means airtight. Unemployment might qualify as an instance of a generic disease. From the standpoint of what is functional in social groups, of course, this is interesting. Other examples might be what we have called "genetic diseases," which appear to weaken the relevance of personal norms. Thus, it seems prudent to allow guidelines such as these to serve as possible necessary features of disease, leaving for future work the task of refining the definition. See (*3*); T. Parsons, *The Social System* (Free Press, New York, 1951); A. C. Twaddle, *Soc. Sci. Med.* **7**, 751 (1973); M. G. Field, *ibid.*, p. 763.
21. A corollary to the point that groups construct disease and treatment-related procedures needs to be appreciated. The meanings of disease, which societies themselves generate, enter into shaping the behavior of persons who become diseased and this has interesting implications. A trivial one is that behaviors generated by the presumed causes of disease have changed dramatically. Patients no longer report feeling the pounding of evil agencies or hardenings caused by evil winds; instead, they talk about cancerous growths, about the sugar or minerals in their systems, about their nerves or sexual conflicts, and about their needs for special medicines. One also notes that the sense of unity and holism out of which man had approached his living in the world—a unity made clear and poignant through ethnomedical inquiries—has been somewhat altered by intellectual systems that partition him into many separate spheres (for example, the mental, bodily, and spiritual). The expressions of disease among nonliterates is influenced by their holistic orientation, and, as a result, the link which we draw between "organic" versus "functional" pathology is very much blurred. The fragmentation of the individual, which is an ideological feature of modern society, affects the expressions of "contemporary" diseases and causes dilemmas. Maladaptations of the individual tend to conform to (or are partially enacted in terms of) the individual's own model of what he has, and if he believes (or is told) that this is a special type of disease his behavior will reflect this model. In modern American society this has created problems in medical management (see section on Practical Implications of an Ethnomedical Science). See (*3*).
22. Because behavior may be used as the medium out of which to fashion a paradigm of disease, this does not mean that any disease forms which are developed are "psychiatric" entities. One is driven to raise this objection because in our cultural logic of disease, classes of phenomena, for example, social behavior as opposed to physiological and chemical changes, are by convention differentially entitified, differentially explained, and also differentially valued. Alterations in behavior might be seen as consequences of social factors that involve personality changes whereas physiological and chemical changes might, on the other hand, be seen as somehow more connected to genetic factors. The dualistic orientation of modern biomedicine has, of course, made possible important insights about disease, but at a price that leads to compartmentalization and affects what one observes and does not observe. In forming a linguistic mold which tends to reduce phenomena, dualism thus affects every facet of medical experience including that of physician, patient, and researcher. The important point is that in a holistic frame of reference, behavior and maladaptation per se are important loci of analysis. E. Mayr, *Am. Sci.* **62**, 650 (1974); W. T. Powers, *Behavior: The Control of Perception* (Aldine, Chicago, 1973); E. O. Wilson, *Sociobiology: The New Synthesis* (Belknap, Cambridge, Mass., 1975).
23. The important developments in the forging of the human social language of disease are obviously lost. Consequently, anthropologists and ethologists who study other animals are in a strategic position to study this language. Observations of nonhuman primates more and more reveal the social and behavioral order which exists in these groups. Matters of vital concern to the individual and group are responded to and communicated about; and when these social activities are carefully analyzed they are seen to possess a biological rationale for the group. Given the centrality of that which we term "disease," one must assume that within these groups something akin to a social language of disease is reflected in the exchanges that occur between members of the group; in a word, disease alters or changes the status of social relations between members in patterned ways. In a sense, these patterned changes in behavior and adaptation constitute protodisease forms, and out of them man has refined his own, using his capacity for symbolization. D. M. Rumbaugh, *Psychol. Rep.* **16**, 171 (1965); C. Bramblett, *Am. J. Phys. Anthropol.* **26**, 331 (1967).
24. H. Fabrega, Jr., and D. Silver, *Illness and Shamanistic Curing in Zinacantan: An Ethnomedical Analysis* (Stanford Univ. Press, Stanford, Calif. 1973).
25. F. M. Burnet, *The Impact of Civilization on the Biology of Man*, S. V. Boyden, Ed. (Univ. of Toronto Press, Ontario, 1970); C. H. Waddington, *The Ethical Annual* (Univ. of Chicago Press, Chicago, 1960).
26. A related problem in medical care involves patients whose medical complaints cannot be easily rationalized in terms of biomedical principles. These patients are themselves referred to as problem patients. Other patients have their own competing "languages" of disease and hence make poor use of biomedicine (whose language they do not understand). Competing languages of disease and an associated fragmentation of the individual also mean that disease cannot be easily rationalized socially and religiously as it can be in nonliterate groups since in our culture disease no longer has a logical link with religion. Besides creating problems in medical management, it can also make the handling of some terminal diseases awkward. Examples of problems such as these can be multiplied. See → H. Fabrega, Jr., R. Moore, J. Strawn, *J. Health Soc. Behav.* **10**, 334 (1969); O. Von Mering and L. Earley, *Hum. Organ.* **25**, 20 (1966); S. King, *Perceptions of Illness and Medical Practice* (Russell Sage Foundation, New York, 1962); A. J. Rubel, *Am. Anthropol.* **62**, 795 (1960).
27. H. Fabrega, Jr., *J. Nerv. Ment. Dis.*, in press.
28. Obvious practical benefits of the study of disease and medical care comparatively have not been emphasized. They include, as an example, the understanding that results from the study of (i) the effects of environmental factors on human physiologic functions; (ii) etiological mechanisms of rare and isolated diseases; (iii) pharmacologic influences of plants, herbs, and other medicines used by a native people; and (iv) the role of symbols and persuasion in medical healing and in behavioral change. A. M. Kleinman, *Inquiry* **16**, 207 (1973); T. Swain, Ed., *Plants in the Development of Modern Medicine* (Harvard Univ. Press, Cambridge, Mass., 1972); A. C. Alpers, *Am. J. Trop. Med. Hyg.* **19**, 133 (1970); P. T. Baker and J. S. Weiner, Eds., *The Biology of Human Adaptability* (Oxford Univ. Press, Oxford, 1966); G. W. Lasker, *Science* **166**, 1480 (1969).
29. This article is based on work supported by General Research Support and Biomedical Sciences Support grants awarded to Michigan State University.

NEWS AND COMMENT

Meeting on Unity of the Sciences: Reflections on the Rev. Moon

An international conference on the unity of the sciences has inspired some earnest soul-searching among leading American scientists invited to participate. The cause of second thoughts among some of the scientists is the man behind the conference, the Reverend Sun Myung Moon, a South Korean evangelist and leader of an international religious organization which has been the center of increasing controversy in the United States.

The conference, the fourth devoted to a discussion of problems in the relationships between science and values is scheduled to be held 27 to 30 November at the Waldorf Astoria Hotel in New York. The sponsors say that some 360 scientists and representatives of other fields from the United States and abroad have accepted invitations, which include an offer to pay expenses. The list of advisers on the letterhead is long and impressive. A number of Nobel prizes figure in the pedigrees.

Symptomatic of the disquiet is the recent withdrawal of two of four conference "section chairmen" who were deeply involved in planning and organizing the conference. The two were economist Kenneth E. Boulding of the University of Colorado and Columbia University sociologist Amitai Etzioni. On the other hand, the other two section chairmen, Alvin Weinberg, retired director of the Oak Ridge National Laboratory and now head of the Institute for Energy Analysis in Oak Ridge, Tennessee, and Eugene P. Wigner, a Nobel laureate in physics and emeritus professor at Princeton are carrying on. In addition, Robert S. Mulliken, another Nobel laureate remains as "honorary chairman." (Both Boulding and Etzioni have given permission for position papers they prepared to be used at the conference. Boulding's replacement as chairman is political scientist Morton A. Kaplan, of the University of Chicago.)

Those who are sticking with the conference generally take the same view. They say that the subject is an important one which gets too little attention. At previous conferences, they say, a full spectrum of opinion has been expressed, the quality of