REDUCTIONISM AND HOLISM IN MEDICINE

The issues of reductionism and holism in the biomedical sciences have received increasing attention in recent years. These issues include both clinical medicine and the basic biological sciences, such as biochemistry, genetics, and physiology, as the subject areas in which they arise. The manner of approaching a patient and his or her illness has been characterized as either reductionistic or holistic, and has resulted in vigorous debates in the literature. Reductionism in the basic sciences has been understood both as a substantive thesis and as a methodological principle of research. The substantive thesis has produced an extensive debate in philosophy of biology, and has drawn on the more general issue in philosophy of science known as 'theory reduction'.

The essays in this issue of The Journal of Medicine and Philosophy touch on these points and constitute a diverse set of positions. Dr. Engel's essay, with which this number begins, develops his well-known biopsychosocial model of medicine and shows how the insights of this model can be applied to a specific case of patient care involving a myocardial infarction. Professor Hull's paper introduces the reader to a debate concerning the relation of the science of biology (and genetics in particular) to the science of chemistry (biochemistry and molecular biology in particular). This debate is briefly summarized by Professor Zucker and serves as background for his theses that reductionism has had beneficial results in human genetics, and that a reductionistic approach is by no means necessarily anti-humanistic. Professors Maul and Munson, in their respective and independent articles, argue that medicine as a science is not reducible to the basic sciences, which are but a part of medicine. Professors
Kopelman and Moskop present a summary of five principles underlying “holistic medicine,” which they then subject to critical scrutiny. It may be useful in this introduction to review some of the main arguments presented in this collection of articles and attempt to place them in context. I shall begin with Dr. Engel’s contribution and proceed seriatim to each of the other essays.

Dr. Engel’s paper outlines what he terms a “systems approach” to medical understanding and clinical practice. This approach involves his “biopsychosocial model” which has been developed by him in detail in several earlier articles. (See his essay for references.) The systems approach and the biopsychosocial model are not antiscientific; in point of fact Dr. Engel maintains that his approach is an extension of “the scientific method to aspects of everyday practice and patient care previously not deemed accessible to a scientific approach.”

Dr. Engel’s essay indicates how the three aspects of a systems approach interact in the context of a specific example: Mr. Glover’s myocardial infarction together with the events leading up to it and subsequent to its occurrence. The three aspects are (1) hierarchy, in the sense that each system is at the same time a component of higher systems, (2) interactive feedback, both at one level and among levels, and (3) the development of the hierarchical, interactive system over time with inputs and outputs occurring constantly at different levels. Engel shows how initiating causes in these complex causal chains can begin from any level, and how they ramify and oscillate through the intersystemic connections. More than a theoretical paper, Engel also suggests how the systems perspective of the biopsychosocial model can and does (in terms of his example) affect patient care.

Engel closes his essay on a note of caution. Just as the biomedical model has become the “folk model” (to use Fabrega’s term [1975] term) and “has come to constitute a dogma,” Engel is concerned that counter-dogmas are being proposed as inappropriate correctives to the biomedical model. These counter-dogmas are “holistic” and “humanistic” medicine. They qualify as dogmas for Engel because they “eschew the scientific method.”

Dr. Engel’s points will be readdressed in the concluding essay by Professors Kopelman and Moskop. Before the force of the arguments pro or con “holistic” medicine can be appreciated, however, it will be useful to examine several distinctions not as yet considered. The papers by Hull, Zucker, Maull, and Munson conduct such an examination of the terms “reduction” and “reductionism,” and it is to those essays that I now turn.

Professor Hull notes that an actual example from science where reduction is currently taking place can be found in genetics. His contribution is an excellent review article covering recent debates about reduction in the philosophy of biology. He ranges from Nagel to Polanyi in providing an overview of the extant literature, and summarizes an ongoing debate between Schaffiner, Hull, Ruse, Wimsatt, Goosen, and others (see his article for the extensive references). To a large extent the issue involves subtle distinctions on which there is not yet much reflective literature, such as the difference between theory replacement and reduction by a closely analogous theory, and the issue of theory individuation. In the work of Kuhn (1970) and Lakatos (1970), the focus of inquiry in philosophy of science shifted from a concern with static, atemporal ‘snapshots’ of scientific theories to a dynamic picture of science. Lakatos especially stressed a notion of a family of related theories he termed a “research programme.”

The debate cannot be summarized in these brief introductory remarks. Suffice it to say that I believe that a resolution of the problems will wait on a fine-structured but general analysis of theory similarity and theory individuality. Hull appears to agree in the sense that he notes that “reduction . . . is a temporal process” but “the logical empiricist analysis is notoriously atemporal.” I think what is at issue here, though associated with the temporal developments of science, are logical problems of identity, partial identity, and difference. I also continue to disagree with Hull in that it seems to me that, suitably amplified, the conditions of a Nagel-like reduction are still good criteria for ascertaining whether a reduction has taken place. (See my [1967] and [1974] for details.)

Professor Zucker’s article brings together some of the issues raised by Engel and by Hull. He discussed holism and reductionism in medicine using genetics, particularly human genetics, as his example. Zucker summarizes some of the debate on reductionism in genetics cited by Hull, and also foreshadows the issue of a reductionistic medicine discussed extensively in the following two essays by Maull and Munson, characterizing as reductionistic medicine the view that “all disease is physiology gone astray.” Zucker also touches on the holistic medicine movement, considered in detail by Kopelman and Moskop in the last article.

The main thrust of the historical sections of Zucker’s paper is to
illustrate in outline how a classical genetics moved toward a more reductionistic form of genetics. This involves an exploration of the linkages between cytology and genetics, and between genetics and biochemistry (e.g., that Tay-Sachs disease is a consequence of a deficiency of the enzyme hexosaminidase A). These historical developments underlie the emergence of a rationally based discipline of genetic counseling. Zucker does not discern any forceful arguments which would support a thesis that an anti-reductionistic, holistic, and humanistic medicine (in contrast to the reductionistic medicine which resulted in the emergence of genetic counseling) would be more caring or less directed in its concern and treatment of a client.

Professor Nancy Maull directs her attention to the “practical side of medicine.” She begins by making an important distinction, often latent in discussions about reductionism in medicine, namely between (1) a reductive medical explanation and (2) branch reduction. In the former type of explanation concepts and principles from biochemistry might be used to explain a disease, though why such a condition is a disease rather than a variation in a process may not be biochemically explicable. In branch reduction an entire branch of science, e.g., physiology, is fully and totally explained by biochemistry. In the light of this distinction Maull elaborates her central thesis:

In its reductive explanations medicine borrows causal concepts from other fields. As a result, it shares certain (reductive) explanatory goals with those fields. However, because medicine has additional and distinctive goals as well as a special subject matter and special problems, the scientific field of medicine is ultimately irreducible. Alternatively, and this is the formulation I prefer, the simplistic ideal of reducibility obstructs the exploration of the complex relationships that actually exist between medicine and other “more encompassing” scientific disciplines.

Maull employs to good effect two examples from the biomedical sciences, one from oncology (current theories of carcinogenesis) and the other from hematology (sickle cell anemia). In treating these examples she notes that a “borrowing up” of concepts from biochemistry occurs, but also that a “borrowing down” happens. This latter movement involves a focussing on an area because of a medical problem, namely sickle cell disease, which then leads to further inquiry concerning the disease’s molecular genetics and biochemical mechanisms.

Most crucial to Maull’s argument is that what characterizes the domains of inquiry of biology and medicine involves important differences. “By virtue of its central concern with disease,” she writes, “medicine orders its domain according to normative distinctions between the abnormal and the normal” [my emphasis]. Diseases are studied causally “in order to solve therapeutic problems.” Moreover, she adds, therapeutic actions such as methotrexate administration (an antileukemic drug often having significant side-effects), raises new problems thus altering the domain of scientific investigation. In the case of methotrexate, one question is how to prevent the anemia which is often a sequella of methotrexate therapy. Maull finds support for her position in some of Collingwood’s theses concerning the distinction between a “theoretical science” such as biology and a “practical science” such as medicine. It should be added that these issues of the normative character of medicine and the value-laden aspect of disease, have been discussed in the literature by a number of authors, such as Boorse (1977), Engelhardt (1977), and Wartofsky (1977).

In a somewhat similar vein to Maull, Professor Munson independently argues that medicine’s character as an “enterprise” indicates that medicine is not reducible to a science (or to its constituent sciences such as biochemistry and physiology). For Munson “medicine is an autonomous discipline with its own aims, constraints, and framework of basic commitments.”

Munson begins his argument by considering Forstrom’s (1977) views which are based on Braithwaite’s characterization of science. Munson argues that though Forstrom’s account is valuable, it only shows that medicine is scientific — not that it is per se a science. The argument proceeds, not by presenting a set of necessary and sufficient criteria for any body of knowledge to be a science, but rather by employing some paradigm cases of science (which are termed ‘core cases’) and by judging whether medicine is sufficiently like or unlike these paradigms to be considered a science or not. This requires that we scrutinize some ‘fundamental features’ which are the relevant points of comparison, and for Munson these are: (1) the internal aims, (2) the internal criteria of success, and (3) the internal principles regulating the conduct of the discipline’s activities. He uses each of these three categories to argue for a difference or differences between medicine and science.

Munson’s view concerning the normative aspects of science and medicine is interestingly different from Maull’s position. For Munson, science has a normative aspect, e.g., in that it requires honesty in reporting data. (Such a view is not novel and has been discussed by
Bronowski (1965) and by Merton (1968).) Medicine, for Munson, has a special and unique moral component, namely that a physician, acting quae physician, "is committed to promoting the health of any individual accepted as a patient" [my emphasis]. Munson contends that this normative principle is not a consequence of his characterization of the aims of medicine, which holds for populations and not necessarily for specific individuals, pointing out that this distinction is supported by various dilemmas often faced by clinical researchers.

Munson applies these views about the normative character of medicine to the question whether medicine can be reduced to biology, which he construes along the lines of a problem in theory reduction (see Hull's article for a discussion of this notion). I will not try to summarize his arguments here, but do want to point out that Munson disagrees with the thesis (defended in a sense by Maull above but also developed earlier by King (1954), Engelhardt (1977) and others) that the disease concept and the notions of 'normal' and 'abnormal' are value-laden. He does not argue for this view here, and though he refers to Boorse's (1977) essay which does develop a value-free account of the concept of health, Munson does not fully accept Boorse's view. Munson provides an interesting argument to the effect that though all the cognitive concepts in medicine may be correlated with concepts from biology, why some conditions are described as diseases and others not may not be correlateable. (It seems to me that this is just the point that Engelhardt and others are making, but I shall leave it to the reader to determine if Munson is successful in his argument here.) For Munson, medicine is more that its cognitive content and, as such, in terms of its aims and its moral rules, remains autonomous.

Munson closes by outlining four results which are consequences of his arguments. These results are relevant to the issue of reductionistic/holistic medicine and also for medical practice. I shall not attempt to summarize them, and urge that they be read carefully in their entirety.

Professors Kopelman and Moskop's essay is an examination of a number of facets of the contemporary holistic health movement. It seemed to me that this issue would be incomplete without an article which had as its aim a clarification of the various relations between this movement and the philosophical issues raised by the earlier essays. Kopelman and Moskop attempt (1) to "distinguish certain common themes in the holistic health/medicine literature," (2) to "suggest differences between these [themes] based upon a commitment to scientific methodology," and (3) to "determine what relationship this movement bears to positions in philosophy of biology (and the social sciences) also called holism." They also provide some critical assessment of the underlying principles and their implementation in the holistic health care movement.

The themes, which Kopelman and Moskop first develop in an expository way and to which they return later in a more critical examination, are certain common tenets found in the holistic health literature. These they determine to be five in number: (1) a positive and integrative concept of health, (2) an individual responsibility for his or her own health care, (3) a characterization of the role of the health care provider as a teacher-helper of the ill individual, (4) a view of illness as a consequence of multifactorial causes, involving behavioral, social, and environmental factors in particular, and (5) a stress on 'natural', non-invasive means of curing illness and promoting health.

Holistic health, the authors note, tends to be eclectic, sometimes to the extreme of involving many practices which are questionable on scientific grounds, such as Reichian therapy and reflexology. Kopelman and Moskop suggest that we can be both holistic and scientific, and they propose three criteria for distinguishing between "holistic medicine" (scientific) from "holistic health" (not necessarily scientific).

In their section on (weak) parallels between holistic health and philosophy of biology/social sciences, Kopelman and Moskop touch on some of the issues that concerned Hull in his essay, and to some extent Maull and Munson in their articles. Kopelman and Moskop note that a difficulty exists in examining the analogy between holistic health and holism in philosophy of biology/social sciences because the terms 'whole' and 'part' are not well-defined. One should add to their references on this matter the excellent analysis of these notions by Nagel (1961, pp. 380–397).

It is perhaps the critical part of Kopelman and Moskop's essay which will be the most valuable and also the most provocative. The authors direct their attention to what they perceive as worrisome consequences of the five tenets of holistic health described above. It would be inappropriate for me in this introduction to attempt to paraphrase and condense their thoughtful arguments concerning untoward implications of holistic health; I anticipate that individuals with different perceptions may want to evaluate the situation differently.
BIBLIOGRAPHY