1

Medical Ontology

A Commissioner of Medicine

A line attributed to the late sportswriter, Red Smith, during an unfortunate lapse in the annals of American baseball, concerns the then commissioner of baseball, the laid back "Happy" Chandler: "Were Happy Chandler alive today," wrote Smith, "this would never have happened." I would like to call attention to certain "unfortunate lapses" in today's medical theory that might never have happened were a commissioner of medicine—a Medical Oversight Board—alive today. This is a commissioner or czar (or board) that periodically reexamines the conceptual foundations of medical science and, in particular, their ongoing fit with the incoming findings from the medical literature and with contemporary developments in the more basic sciences underpinning medical science.

These conceptual foundations drive the medical research agenda and, derivatively, educational policy and clinical practice. Without any periodic review and oversight of them, I will argue, medical science risks lurching forward on conceptual legs borrowed from another epoch, one that may have been right for its time but has since been superseded by events occurring elsewhere in science. Absence of this oversight is especially risky in an applied science like medicine, the validity of whose premises derives from more basic sciences, biology, chemistry, thermodynamics, and physics among them. Momentous shifts in any of these more basic areas after the institutionalization of the received model can threaten medicine's scientific wellsprings.

In fact, this is what happened. Powerful shifts have occurred in many of the areas that contributed to the premises of the medical science we know. Evolutionary biology, nonequilibrium thermodynamics, and condensed matter

physics are cases in point. Their repercussions on ruling medical ideas is the subject domain of what I shall call medical ontology,[1] which I define as the study of the conceptual foundations of medical science. This proposed discipline would provide an arena for raising critical second-level questions.

Here are two: Does the prevailing medical strategy continue to coordinate the full spectrum of findings in the medical literature—experimental, epidemiological, and clinical? Do its bedrock premises accord with what today's basic sciences tell us about the behavior of matter, notably complex systems (like patients), and the nature of scientific explanation—for example, that under certain far-from-equilibrium conditions matter, rather than essentially passive and mechanistic, is active and self-organizing, as a result of which scientific explanation must proceed by holistic downward causation alongside reductionistic upward causation?

The problem is that medical ontology or anything like it has no institutional presence in medicine's "invisible college"—its teaching guilds, professional associations, or the editorial boards of its scholarly journals. In all such contexts, the premises of the received model have been internalized, which means they form the point of departure for teaching and research, not the focus of continuing discussion.

Corporate-funded agencies and charitable foundations sometimes bid to fill this analytic void by scrutinizing dominant scientific ideas. But often they operate out of a social context in which the ideas have likewise been internalized. The endowed money may have originated in sales of pharmaceuticals or biotechnologies, of medical supplies, or medical insurance. Or charitable money may have been donated by a philanthropic "outsider," respectful of the media-acclaimed achievements of "medical science." In such instances, pronouncements are likely to reflect, rather than question, theoretical medicine's mainstream ideas.

Take the Robert Wood Johnson Commission on Medical Education whose July 1992 report, considering research paradigms in medical education, proclaimed a "shift in paradigm." "Molecular Medicine," it said, "encompassing the newer fields of molecular, cellular, structural, and neural biology, . . . has changed [medicine's] world view" (1992, 2). At second glance, however, the "new" paradigm seems to be only the existing paradigm ratcheted down several notches.

The paradigm shift announced by the commission might instead be described as the logical culmination of Abraham Flexner's invigorating reforms in medical education (an early commissioner of medicine?) implemented in North America during the first half of the twentieth century, stressing the part of us that "belongs to the animal world" (Flexner 1913). As physician Hannes

Pauli observes in comments to the commission, rather than changing the prevailing biomedical paradigm, the announced shift to molecular medicine has "entrenched its dominance or even, by consistent omission of newer paradigmatic elements, mythologized it" (Pauli 1993).

Illustrating what I called the absence of a medical oversight board to monitor the ongoing soundness and self-consistency of medical science's prevailing ideas is the unself-consciousness with which the commission report mentions in passing one partial aspect of the "new" paradigmatic complex: "interactions between 'emotional state' and the immune system" (Robert Wood Johnson 1992, 8). Where in today's medical landscape is the agency that asks how an entity pertaining to an informational or noetic modality, an emotional state, can interact with an entity pertaining to an energy-matter modality, the immune system? What is the "mechanism" that mediates this interaction? This type of second-level question has no natural home either in the required courses of the medical curriculum, the textbooks which inform that curriculum, the research laboratories from whose findings textbook materials spring, or the scholarly journals that report these findings.

To the extent that professional associations and journals address the interactions between "emotional state and the immune system"—which would seem to build the mind into the clinical equation—they do so by assuming that for clinical purposes, at any rate, emotional states can, in principle, be explained by reference to their coincident electrochemical events in the brain. "The meaning of a given thought is captured by the shape of its co-responding neurophysiological processes," is the way an early advocate of the reigning ideology expressed it (in Skarda 1987). At bottom, psychology becomes a branch of applied biology—neurophysiology. Medical science is biomedical science; hence, the sovereignty of molecular medicine.

In what school of the medical college are such tacit metaphysical assumptions examined? How can the word "lemon," repeated several times, activate the same enzymes as a lemon? Clearly, thoughts and emotions, beliefs and expectations, intentions and meanings are accompanied by molecules. But *are* thoughts and emotions molecules? Or are mental-emotional states, which to a large extent are subject to a patient's conscious control, *transformed into* molecular activity (for example, hormonal discharge) that, in turn, can induce disease susceptibility?

Here is an option with very different consequences for research, education, and practice alike. It portends an alternative medical model, an antithetical premise set. But for someone in the medical profession just to entertain this option is to step outside the circle of one's professional training, to acknowledge that one's received model—whether called biological medicine or

molecular medicine—is a model. Where in the medical enterprise do we look for this acknowledgment?

Not to Sweden's Karolinska Institute, the home of the widely influential Nobel Committee for Physiology or Medicine. Committee criteria for selecting prize-worthy discoveries have unfailingly mirrored the physicalistic bias written into the phrasing of Alfred Nobel's 1896 will, annually honoring "the person who shall have made the most important discovery in the domain of physiology or medicine." (Nobel Foundation 1991, 5). Compare a Nobel Committee for Psychology or Medicine or, more provocatively, a Nobel Committee for Psychosociophysiology or Medicine (Foss 1998).

Back to the Future

Recently the Pew Charitable Trust and the Fetzer Institute convened a task force on "Psychosocial Issues in Medical Education." Once more, we can recognize the symptoms of model internalization. The word itself, "psychosocial," tells the story. Tellingly, not convened was a task force on "Biopsychosocial" Issues in Medical Education, where the three components identified are understood as synergistically related. Or more pointedly, "Biopsychocultural" issues—to flag the difference between two sorts of behavioral variables that may influence disease susceptibility. One of these, social variables, humans share with animals. Overcrowded living conditions or lack of social support are widely researched examples. Their influence would apply both to a human and a veterinary medical model. The other behavioral variable, cultural values, is presumably unique to humans. Concerning breast cancer, as an example, physician Bernard Greenwood identifies "negative cultural influences and beliefs . . . about cancer, the breast, and women's illnesses in general" (Greenwood 1992, 3). To convene such a task force would be to step outside the college walls.

Because the Pew-Fetzer task force operates within the walls, we can anticipate some of its recommendations. Indeed, prior to publication of the report I sought in print to do so (Foss 1994). Likely to be included, I then predicted, is a call to broaden and deepen the medical curriculum, making it as responsive to the person who is sick as to the body that is diseased. This more clinically oriented and interdisciplinary curriculum, I said, will give special emphasis to specialties like primary care, family practice, community, behavioral, and preventive medicine. The phenomenology or "science" of the doctor-patient relationship and of the clinical dialogue will here emerge as a centerpiece of a reinvigorated curriculum. Acute diseases will likely be coun-

terposed to chronic (that is, biomedically incurable) diseases, for which a separate treatment protocol will be designed, one that rejects the idea of health as the absence of disease. "Psychosocial" issues will more readily come to share center stage with strictly biological issues, the province of biomedical science.

Within this perspective, injunctions now found in the introductory pages of textbooks but often left thereafter to chance and the doctor's good sense, will point the way to a more responsive, "whole patient" curriculum:

> The practice of medicine is an art which is far more than the application of scientific principles to a particular biologic aberration. (Smith 1981, xxxiii)

> The physician should be skilled as a psychologist in human behavior as well as a biologist in human disease. (Thorn 1977, 3)

The incoming student will be invited and trained to be not only a biomedical scientist, "a biologist in human disease," but a skilled artisan, "a psychologist in human behavior." Medical art or craft (psychology), although it may deal largely with what falls outside the domain of pathology strictly considered—"the study of deviations from normal structure—physiology, biochemistry, and cellular and molecular biology" (Robbins 1984, 1)—will nevertheless be accorded a vital place in its own right and not to be compromised. "The physician must relate as much to the person who is ill [the psychology of human behavior] as to the body's illness for which he seeks relief [the biology of human disease]" (Thorn 1977, 2).

In all this, we begin to glimpse the outlines of a curriculum that restores the kind of humanistic balance that critics frequently charge is missing in many of today's top teaching hospitals. This is all to the good, of course. Who does not want a medical system that remembers that human beings are human beings? But at the same time, we also glimpse the outermost limits of reform available within the college walls. As regards theoretical medical science the patient is still a "silent" biological organism, a "homeostatic automaton" (Guyton 1991, 2), and disease is a function of aberrant physiology, "literally abnormal biology" (Price 1992, 2). In place of yesterday's mind-body dualism, whereby the patient's body is the locus of disease over which the mind has no direct influence, come the new dualisms: person-body, care-cure, art-science, illness-disease, psychology-biology. While having a certain face validity, as we will see, these distinctions are often carriers of highly problematic assumptions.

With respect to the reported "interactions between 'emotional state' and the immune system," such recommendations leave things as they were—and

are. The whole patient turns out to be the split-level patient. (Bio)medical foundations remain intact.

To see how intact they remain, consider the prevailing assumption concerning discoveries of biological mechanisms implicated in pathogenesis. Such discoveries are regularly made by today's medical research community and widely publicized in the popular media. Given today's high funding levels for biomedical research, not surprisingly the rate of these breakthrough discoveries increases year by year. Basically, the assumption concerning them is that medical science is bringing us ever closer to a full understanding of the etiological roots of disease. Now, undeniably each of these announced breakthroughs helps fill in another piece of the biomedical puzzle form. But together they bring us closer to a full understanding of the roots of disease only to the extent that we identify medical science with biomedical science. Otherwise, they simply further elucidate the biological dimensions of disease.

Still, the assumption persists. Take a recent editorial in the *New England Journal of Medicine*, "Understanding the Biological Basis of Migraine." Reviewing the previous ten years' findings in the growing body of research studies on migraine, the editorial lists three mechanisms of migraine that have been proposed. "It is fascinating," says the editorial, "to consider that the relative importance of these mechanisms will soon be demonstrated. The answer will be given by highly selective drugs, such as substance P antagonists, which block neurogenic inflammation almost completely without constricting the arteries" (Olesen 1994, 1714). The reader can share this fascination and agree with the editorialist that "Much has been achieved in migraine research in recent years, and major new advances in our understanding of the pain mechanisms, genetics, and therapy of migraine are just around the corner." But this agreement hardly prepares us for the conclusion of the editorial: "It is time for many practitioners of medicine to change their views and to acknowledge that migraine is a neurobiologic, not a psychogenic disorder" (Olesen 1994, 1714).

Where, one asks, is the czar to blow the whistle on this kind of reasoning? Where is the Journal of Medical Science Criticism in which to discuss it (compare the *Journal of Literary Criticism*)? Imagine, if you will, that over the past decade the National Institutes of Health and other official and semiofficial agencies of the medical research community had committed the same scale of funding to investigators, say, of blushing as of migraine. Imagine further that as a consequence a careful reviewer could marshal an extensive body of experimental studies elucidating the biologic basis of blushing. This reviewer could now confidently point to mechanisms of blushing that enabled the design of highly selective antagonist drugs that block cellular and subcellular processes implicated in the production of blushing. Given this capability,

imagine the reviewer concluding: It is time for many practitioners of medicine to change their views and to acknowledge that blushing is a neurobiologic not a psychogenic disorder.

I think we can see the disconnect between the evidence presented and the conclusion drawn. But in the normal course of events, only from outside the college walls—a Task Force on Biopsychocultural Issues—is this disconnect likely to be exposed. Only from this vantage are the abovementioned biomedical foundations likely to be subjected to structural examination, an examination that would permit the possibility that migraine, analogously to blushing, is a psychoneurobiologic condition.

Here, outside the walls, the empirical findings that prompted the Robert Wood Johnson Commission to acknowledge the interactions between emotional state and immune system are recognized as surprising, astonishing really, profound anomalies calling for the most serious reconsideration. Such anomalies pose a fundamental challenge to the first principles of the received model—a foundational challenge. They would remind a Task Force of Biopsychocultural Issues in Medical Education of the growing number of similar "anomalies" that have accumulated in the psychophysiological literature over the past generation, epitomized in the finding from stress theory that a remembered stress releases the same flood of destructive hormones as the stress itself: belief becomes biology.

Yet in the keystone sciences of today's medical curriculum, clinical biochemistry and pathophysiology, such findings either are inexplicable or shoehorned into medical science through the metaphysical back door of a mind-brain identity thesis: psychoneurophysiology becomes neurophysiology.

The problem, I said, is that there is no natural home in today's medical enterprise for raising second-level, upstream questions; for assessing the relative merits of contrasting medical strategies. Medical ontology has no institutionalized presence.

Is this an opportune time to call attention to this fact and to help identify global lifelines along which a new discipline of medical ontology might travel as Western medical science tacks into the new millennium? The bet of this book is that it is.

A Logo for Medical Ontology

Still, the reader may wonder why would anyone, seemingly to make a philosophical point, want to go to the trouble of calling into question the ideology of a widely acclaimed and publicly esteemed enterprise like today's medical

science. Almost daily we hear of new breakthroughs in cancer research, new technologies for use in coronary heart disease, new microsurgical techniques for repairing what ails us? We seem to be in good hands. When seriously ill, in whose hands would you rather be than those of today's highly trained medical professionals? Where would you rather go than to one of today's up-to-date medical clinics or teaching hospitals?

With frontier research being pursued by the best and the brightest at our top medical schools, our federally supported institutes and privately endowed clinics, why would anyone seek to stop the world and hoist a new medical banner, an alternative science initiative for medical research and education? Don't the successes of medical science speak for themselves?

This is a fair question and in the pages ahead I will offer a reasoned answer. My short answer—and the justification for writing (and reading) this book—is, no. In the absence of contending, fully fleshed-out models, there is finally no effective way to measure relative successes against relative failures. What are the failures, if any, of today's coronary heart disease medicine or of our several decades old "war" on cancer? How do we answer these questions? We might measure failures against goals set by cardiovascular or oncological researchers and clinicians themselves. But understandably, these goals will be couched in terms of the very model they operationalize. What we cannot do is measure successes and failures against what would have been achieved had research and practice taken a different turn, been conducted according to a different agenda. In this context, as medical sociologist Horacio Fabrega reminds us, "the important issue becomes the degree of control a cultural group achieves over what it *defines* as disease, so that *what* is being controlled becomes critical in the evaluation of the efficacy of that group's medical care system" (1974).

As the last section sought to show, it is the nature of scientific practice to make the premises of the ruling model self-validating (Foss 1973). Offering little opportunity for self-examination, this practice encourages looking at the premises of others' models, when they are looked at at all, only in terms of one's own. Second-order, foundational questions follow a different logic, are evaluated by different criteria, than first-order, "normal science" questions. And the rationale for writing this book is that in today's medical undertaking there is no institutionalized arena in which to formally raise these upstream questions. Yet minus such an arena, a discipline or profession proceeds unself-critically.

This is compounded in an applied science like medicine, where ultimate scientific credibility is conferred by the body of basic sciences that ground it. An applied science develops sequentially at two levels, directly at its own applied level and indirectly at the level of the basic sciences from which the

validity of its first principles derives. A sequence system starts with what is at hand and builds upon it. Being right (self-consistent) at each rebuilding stage is at a premium.

Yet suppose, meanwhile, the principles of the basic sciences change? Adopting the analogy of rebuilding a ship at sea, suppose that the topmast, built in accord with then-prevailing hull design standards, is found structurally unable to make use of certain ubiquitous wind currents. Now being right at each stage is no longer enough. Had all the information been available at the outset, in particular, new, alternative standards for designing hulls, and had we been in dry dock, we would have a different topmast and be sailing more opportunistically at this stage.

Here is the perspective from which second-order questions arise, the perspective of medical ontology. Because of developments elsewhere, at some point it may be necessary to consider replacing a design that was perfectly right in its time. Never to do so is to fall into what Edward deBono calls the sequence trap. This makes it impossible to use the available information in the best way:

> In a sequence system the final arrangement of available information is very unlikely to make the best use of that information. This is because the best possible use would be made if all the information had arrived at once and the sequence of arrival had played no part. Some method for re-examining and restructuring existing arrangements of information to give new arrangements is essential in a sequence system. (1972, 60)

In the pages that follow I will consider a final arrangement that makes use of all the information, the "modern" information available when today's received model, the biomechanical model, took shape, and the "post-modern" information since made available. The latter includes information that has materialized within medical science itself as well as within the underlying basic sciences that ground it. Making use of all the information at once enables us to project a currently optimum model, one in which the sequence of information arrival plays no part. Against this model we can better evaluate the adequacy of our inherited model.

Such a model possesses certain formal properties. It is a successor to the received model, one that explains what its predecessor explains (and why it does so) plus at least some of what it does not. The proposed alternative reminds us that being right at each stage is not enough; that it may be necessary to go back and reexamine principles that were perfectly right in their time, that conformed with how science then told us the world was.

This upstream undertaking teaches another lesson. Essential is a forum in which to reexamine existing arrangements of information to give both new arrangements and a method for doing so. Like science itself, medical science progresses through the competition of rival initiatives. In medicine this reexamination is properly conducted in the subspecialty I have dubbed medical ontology, the study of the conceptual foundations of medical science. Its logo appears below.

This logo illustrates what is meant by the "open block," cousin to the sequence trap. We can be blocked by openness. This simply means that "where there is a well-established idea or way of looking at things it is extremely difficult to find an alternative way even if one is already available" (deBono 1972, 65). Again, deBono explains: "It is not the ideas that we do not have that block our thinking but the ideas that we do have. It is always easier to find a new way of looking at things if there is no fixed way already established" (1972, 66).

The method used for realizing the goal of this book—to explore the claim that we require a new scientific medical model or strategy, one adaptive to the contemporary disease burden—is to avoid the sequence trap by surmounting the open block. In the pages ahead we will travel the path not taken.

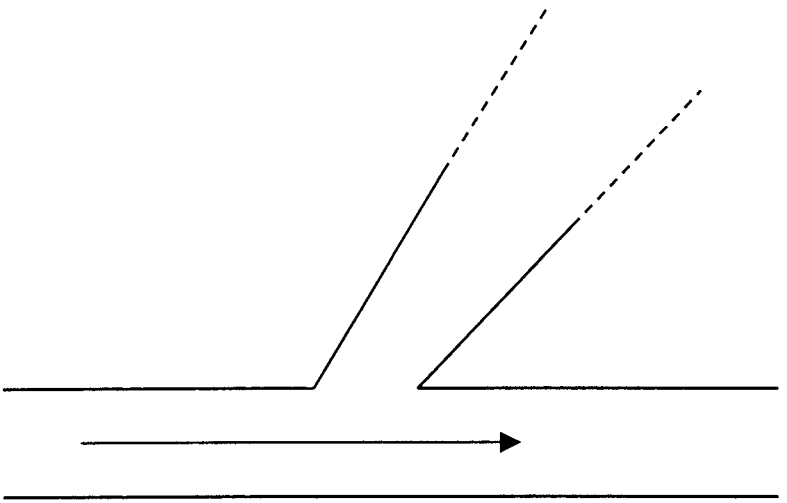

Figure 1.1. Medical Ontology Logo. Here the width of the horizontal path, representing a river channel, is equivalent to the depth of the channel and likewise represents the degree of establishment of that path. Because the wide path is available, water is blocked from taking the other path. (From deBono 1972, 65.)

We will see a model evolve that today's best and brightest would have developed had they not inherited a well-established way of looking at things, had they not been socialized into an existing arrangement of information. The searchlight of well-established ideas is both an advantage and a liability. It illuminates the road ahead while it blinds the backward glance.

Ironically, not the ideas medical scientists lacked but those they ran brilliantly with, culminating in today's powerful centers of molecular and genetic medicine, may prove the Achilles' heel of modern medicine. This is the leitmotif I will sound. I will propose that today's medical ontology task is to return to the point of no return. There, stereoscopically to re-view existing arrangements of information in light of an arrangement that makes best use of information now available. And in that light, to draft a blueprint for rebuilding the ship, mast and all, from the hull up.