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Abraham Flexner's "Mooted Question" and the Story of Integration

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Abstract

Contemporary medicine is characterized by dualities. They include psyche and soma, subject and object, and, most important, science and humanism. The authors, in exploring Flexner's landmark publication, suggest that the history of curricular evolution has been marked by a quest for the integration of two knowledge bases: science and clinical medicine. They describe this goal as a preoccupation of medical educators, arguing that it was triggered, in part, by Flexner's recommendation for a two-phase curriculum. Their claim is illustrated with an analysis of motives for curricular renewal at one medical school and a review of published reports from educational opinion leaders. They discuss Flexner's conception of integration—namely, that unity could be achieved through methodology and, in particular, through inductive reasoning. They situate this perspective in the context of other purported integrative principles such as bioethics, narrative medicine, and the biopsychosocial model. They conclude by recommending an alternative framework for integration. The authors propose that a synthesis of two separate knowledge domains can be achieved through a common purpose and that, in a clinical context, that purpose is the well-being of the patient. Well-being is defined as the patient's ability to pursue achievable goals and

purposes. It can be brought about by changing medicine's emphasis from the eradication of disease to the restoration of functions impaired by sickness. This idea is congruent with aspects of Flexner's understanding of medical practice, as shown in his statement that the restoration of normal functioning should be the doctor's "goal in action."

In America, one is told time and time again that knowledge must be "correlated." - —Abraham Flexner, *I Remember: The Autobiography of Abraham Flexner*

The comment above is supported by another quotation, taken from a well-known treatise on medicine in America, that reveals a pervasive theme in medical education: "Underlying these efforts [to create physicians for the 21st century] is the fundamental goal of educating future doctors who can competently integrate the new sciences and technology into humane patient care."¹ The desire to fuse a set of elements, perceived to be disparate in nature, into an integral whole has been a preoccupation of the past century. We believe that a concern with such integration—its reach, delivery, purposes, imputed benefits, modalities, operations, and components—has overwhelmed the agenda of medical educationalists. In this essay, we explore the story of the integration of science and clinical medicine by focusing on Abraham Flexner's ideas and philosophy, revealed through his writings—most notably, the landmark 1910 report, *Medical Education in the United States and Canada: A Report to the Carnegie Foundation for the Advancement of Teaching*.² We examine specific statements in that report (also known as Bulletin No. 4) and consider how they may have contributed to the cleavage of medicine into separate parts. We explore how Flexner reconciled the separate domains of medical knowledge; we also point out instances in which he contradicted himself, and we conclude by offering a perspective that has the potential to transcend the dualities that are inherent to medicine.

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Most commentary on Flexner's legacy has been laudatory.^{3,4} On his death in 1959, the *New York Times* tribute,⁵ under the headline "Abraham Flexner is dead at 92; revolutionized medical schools," reads, "Dr. Flexner was an implacable critic of education. Teacher, philosopher, administrator and fund-raiser, he was equally brilliant at finding fault and creating right." In the centenary year for Bulletin No. 4, it is fitting to consider its pertinence as a scaffold for medical education.

A Touchstone Within Bulletin No. 4

We start by presenting a key recommendation found within Bulletin No. 4:

In general, the four-year curriculum falls into two fairly equal sections: the first two years are devoted mainly to laboratory sciences—anatomy, physiology, pharmacology, pathology; the last two to clinical work in medicine, surgery, and obstetrics. The former are concerned with the study of normal and abnormal phenomena as such; the latter are busy with their practical treatment as manifested in disease.^{2(p57)}

We believe that this singular pronouncement has been instrumental in creating and sustaining a schism between two knowledge content areas. The thrust of Flexner's report was an effort to infuse medicine with a scientific ethos—to anchor its foundation in sciences such as physics and chemistry—and to loosen the hold of dogmatism and empiricism. To achieve this, Flexner proposed a curriculum with two phases: The first phase dealt with the physical sciences and the second with clinical disciplines (with a focus on disease). Because each phase was to be two years in duration, this curriculum has been referred to as the "2 + 2 model." This educational blueprint is recognizable in many North American medical schools today.

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The clear and concise recommendation stated above was nevertheless moderated by Flexner. The sentence immediately following it reads, "How far the earlier years [of medical education] should be at all conscious of the latter [years] is a mooted question."^{2(p57)} The *Oxford English Dictionary* defines the now rarely used word "mooted" as "open to argument, debatable, unable to be resolved."⁶ For the reader who is acquainted with Flexner, a man described as uncompromising and imperious, it is jarring to find in his writing an expression of self-doubt. His work, particularly Bulletin No. 4, is characterized by searing certainty. Although he goes on to confess, "A layman hesitates to offer an opinion where the doctors disagree,"^{2(p57)} his hesitation was short-lived. He was sufficiently secure in his educational philosophy to propose a solution to the impasse. We argue that this recommendation, accompanied by the irresolvable question, has exercised such a persuasive influence that it can be considered a touchstone (although some might call it a millstone).

Flexner's Philosophy of Education

Flexner's ideal curriculum was to be taught by using an experiential approach. He endorsed the pedagogy, referred to as "progressive education," proposed by his contemporary, the American philosopher John Dewey. This approach was based on the idea that experience should serve as the governing principle. Dewey ^{7(p19)} writes in his seminal work, *Experience and Education*, "I remarked incidentally that the philosophy in question is, to paraphrase Lincoln's words on democracy, one of education of, by, and for experience." The two key principles underpinning experiential learning were "continuity" and "interaction." The former suggested that experiences in "the now" were inexorably molded by experiences in the past and could not be blind to habit-forming proclivities. The latter suggested that experiences do not occur in a vacuum but, rather, arise from particular contexts, are forged through interpersonal connections, and exist in response to social needs. The outcome of their dynamic interaction was to create an educational approach steeped in the conviction that previously learned skills and knowledge, rather than representing ends in themselves, were better conceived as a means to personal growth. As Dewey wrote, "He [the educator] must constantly regard what is already won not as a fixed possession but as an agency and instrumentality for opening new demands upon existing powers of observation and of intelligent use of memory."^{7(p90)}

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These guidelines became axiomatic for Flexner, and they provided a cohesive framework for Bulletin No. 4. The theory of experiential education gave credence to his disdain for the lecture format, although he admitted to the utility of lectures in certain (limited) circumstances. More important, this theory explains his abiding interest in the learning process rather than in learning outcomes. It animates his desire to inculcate an authentic sense of critical inquiry rather than to oversee a faithful transmission of a packaged body of knowledge. It anticipated many approaches constituting a core of contemporary discourse in medical education, including adult, lifelong, and self-directed learning.

Integration Through "Method"

Flexner's approach to the duality implicit in the debated question is based on the centrality of methodology, that is, the inductive reasoning method. In his opinion, science and clinical disciplines are rooted in identical modes of thought. In conformity with progressive education's emphasis on process, both content areas are considered suitable in cultivating an attitude of the mind propitious to the medical profession. Flexner did not conceive of the basic sciences as an end in themselves or even as a preparatory stage that would survive in splendid sovereignty. Both Flexner 8 and Dewey 7 viewed approaches that were not respectful of the continuity and interaction principles as dead ends; it is interesting that they used the same metaphor—watertight compartments—to describe undesirable dichotomies. Dewey warns, "[P]reparation is a treacherous idea. In a certain sense every experience should do something to prepare a person for later experiences of a deeper and more expansive quality."^{7(p47)} Aware that an unfortunate dichotomy might be a consequence of the "2 + 2" curriculum, Flexner attempted to inoculate against this outcome by explaining that the separate curricular phases would be ephemeral: "The provisional separateness with which medicine has been, for simplicity's sake at first presented to [the medical student] tends thus ultimately to disappear of itself, and the entire field tends towards something approaching unity."^{8(p110)} He expected linkages between the initial phase and the second phase to be forged spontaneously, most completely through the progressive acquisition of analytical reasoning skills.

One might assume that a belief in "method" would have provided a convenient escape for Flexner in the face of his mooted question. Instead, he was conflicted. At one point, he cautions against leaving things completely to happenstance, arguing in favor of teaching an integrative principle: "An active apperceptive relation must be established between laboratory and clinical experience. Such a relation cannot be one-sided; it will not spontaneously set itself up in the last two years if it is suppressed in the first two."^{2(p59)} At another time, he is skeptical of proscriptive formulae and warns against a forced marriage: "Insofar as the early introduction of clinical demonstration seeks to fasten facts, by associating them with their use, it deals with so inconsiderable a body of details that it is bound to be futile."^{8(p277)}

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In Bulletin No. 4, Flexner states, "There is no cement like interest, no stimulus like the hint of a coming practical application."^{2(p59)} Fifteen years later, he writes, "The argument on behalf of mingling clinical and preclinical subjects in order to interest the student is assuredly not convincing."^{8(p112)} His vacillations, between permitting separate content areas to fuse spontaneously and creating conditions for their purposeful mingling, are revealing. Flexner's split mind on the topic is emblematic of the ongoing search for a satisfactory answer to the mooted question.

The Mooted Question's Ineluctable Grip

The imperative for organizing or channeling a correlative understanding of two content domains has come to dominate the thinking of curriculum makers. We explored this by considering the opinions of international educational leaders and by examining curricular evolution in one medical school, the Faculty of Medicine at McGill University. We analyzed the school's motives for curricular reform, inferred from a review of annual course calendars. We found the yearning for integration to be omnipresent, as shown in the following examples. The calendar for the 1939–1940 session states, "The close correlation of physiology, anatomy, and biochemistry with clinical medicine is emphasized—not only in the preclinical years, but later in hospital [and] laboratory."⁹ The second-year course in the 1947–1948 session "covers in a systematic manner the deviations from the normal of the physiologic and biochemical functions. These are correlated so as to explain symptoms and signs."¹⁰ The calendar for the 1968–1969 session anticipates that the curriculum introduced the previous year will result in "increased incorporation of clinical material into the basic science program of the first two years" and that "the continued integration of clinical material throughout the four years should stimulate student interest."¹¹

The goals of the 1975–1976 curriculum were to "enable the student to better appreciate the relevance of the basic sciences to clinical medicine."¹² Nearly 20 years later, the 1994 calendar states, "The new curriculum recognizes the importance of a solid database and a multidisciplinary approach to medical education with interdigitation (integration) of clinical and basic science experience."¹³

The goal of providing explicit and functional links between preclinical and clinical phases appeared repeatedly in these curricula. Key words included "correlation," "interdigitation," "incorporation," and "integration"; the latter has been subcategorized, toward the end of the 20th century, into "vertical" and "horizontal." Although our case study has an "N of 1," we are confident that, should any school embark on a similar review, a belief in the need for integration would prevail. The continued drive for integration is apparent, but its success (at McGill and elsewhere) is questionable. A hint of Flexner's exasperation with the state of affairs is captured in the epigraph at the beginning of this essay.

This incessant quest for the correlation of knowledge domains is also apparent from an overview of reports by opinion leaders. One of the first reports to follow on the heels of Bulletin No. 4 was that published in 1932 by the Commission on Medical Education of the Association of American Medical Colleges (AAMC). It states, "As did Flexner, the Commission stressed the importance of clinically correlating basic science instruction."¹⁴ Much later, in 1984, a panel of the same institution produced a comprehensive document called the Panel on the General Professional Education of the Physician and College Preparation for Medicine (GPEP).¹⁵ GPEP recommendation no. 6 deals with the integration of basic science and clinical education. One of the appendices to the report suggests that "the 'educational moat' between the basic and clinical science years must be abolished." GPEP entertains the idea that clinical problems can provide motivation for learning the biomedical sciences, and it makes an intriguing suggestion: "A pool of basic science faculty should be identified who can serve as 'attending scientists,' much as senior clinicians assume clinical responsibility."¹⁵ As far as we know, this suggestion, if implemented, has not yet been described in the literature. The report, however, does contemplate an integrative strategy for which there is a precedent—the incorporation of basic sciences teaching in the final months of undergraduate curricula.¹⁶ This approach was implemented in 1984 at McGill University and more recently at the University of Pittsburgh. A description of the latter has been published under the alluring title, "Back to the basic sciences: An innovative approach to teaching senior medical students how to best integrate basic science and clinical medicine."¹⁷ Not surprisingly, a review of curricular initiatives from 1906 through 1992 concludes that the theme of integrating the sciences with medical practice has been recurrent.¹⁸

After a century of experimenting with tactics aimed at correlating, contextualizing, and harmonizing, medical educators should have made sufficient progress so as to permit the prioritization of other educational concerns. A more recent report would suggest otherwise. The Association of Faculties of Medicine of Canada (AFMC) is currently immersed in a reflective review of medical education in Canada. One of its key recommendations concerns integration; they are exploring strategies to "teach the basic sciences within clinical contexts."¹⁹

Finally, we consider one additional, highly influential commentator: the U.S. accreditation process. The Liaison Committee on Medical Education (LCME) has developed the standards used to evaluate the quality of educational programs. The published guidelines, under the section on curricular management, state, "There must be integrated institutional responsibility for the overall design, management, and evaluation of a coherent and coordinated curriculum."²⁰ The LCME provides explanatory annotations to assist in the interpretation of its standards; in this instance, the document adds that evidence of coherence and coordination includes "content that is coordinated and integrated within and across the academic periods of study (horizontal and vertical integration)."²⁰ The expectation of undergraduate programs that they provide evidence for systematic attempts at integration is thus seen to represent potent currency in curricular planning and management.

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The concept of "competencies" has, of late, loomed conspicuously. For example, the American Medical Association, in its 2007 document, "Initiative to Transform Medical Education: Recommendations for Change in the System of Medical Education,"²¹ speaks of teaching "core competencies across the medical education continuum in new and expanded content areas that are necessary for practice in the evolving health care system." The AAMC, jointly with the Howard Hughes Medical Institute, recently commented on medicine's scientific foundation; their report endorses a "competency-based approach to learning" and advocates for curricula that are "integrated across disciplines."²² Another publication, part of a series on U.S. medical education, explores various models of integration within clerkships; it identifies medical education's ultimate purpose as "[the production of] students who are broadly skilled in the core competencies that transcend all disciplines of medicine."²³ In our opinion, the idea of "competencies" seems to have supplanted or become conflated with "integration." What does "competencies" mean? There are varied definitions, but most refer to the knowledge, skills, attitudes, behaviors, or values required to accomplish a task or fulfill a role. The term is vulnerable to semantic confusion and must be distinguished from "competence" and "levels of proficiency." Proponents of the competency-based approach may take comfort in the idea that, through a realignment of education blueprints with a focus on roles, all elements necessary for its successful performance, regardless of their affinity to any given discipline, will be miscible and thus automatically considered. The teaching of "competencies" would seem to obviate the need for targeted attention to integrative forces. A competency-based approach can be regarded as a surrogate for integration. It is integration by stealth. Some have claimed that competency-based instruction is the "Flexnerian revolution of the 21st century."²⁴ We are not in agreement. Cogent arguments against the competency-based approach may be found elsewhere.²⁵⁻²⁹ We are concerned that the vocational orientation implicit in its use belongs more to a "pre-Flexnerian" era than to any "post-Flexnerian" era.

Dualism

Medicine is characterized by dualities,³⁰ including illness and disease, psyche and soma, heal and cure, and nature and nurture. Dualism seems to be inherent to objective reality. Richard Bernstein ³¹ explains that objectivism is linked to an acceptance of a basic distinction between subject and object: "What is 'out there' (objective) is presumed to be independent of us (subjects), and knowledge is achieved when a subject correctly mirrors or represents objective reality." The emergence of this agenda—to seek out universal and exact "correctness"—is generally attributed to Descartes' epistemology. For complex reasons, rationalism (grounded in the abstract, general, and timeless) has come to supplant the humanism (which was focused on the particular, local, and timely) that was prevalent in the Renaissance. The historical trajectory of this monumental shift has been outlined by Stephen Toulmin.³² Modernism's systems of thought and practice are marked by dualism. Perhaps the most tenacious expression of dualism in medicine is the hackneyed phrase, "the art and science of medicine." The "art" is generally linked to the interpersonal aspects of the patient-doctor encounter and is manifested through excellence in listening skills. Science, in contrast, evokes ideas of diagnostic and procedural skills that are believed to operate in a world that is rational, verifiable, value-free, and universal. One of the most eloquent statements evoking medicine's duality is Owsei Temkin's ³³: "There is no science of the individual, and medicine suffers from a fundamental contradiction; its practice deals with the individual, while its theory grasps universals only." In a strikingly influential treatise, George Engel ³⁴ proposed applying general systems theory to the "struggle to reconcile the psychosocial and the biological in medicine." Edmund Pellegrino ³⁵ has commented on "an essential contrariety between two fundamentally divergent views of reality" and has identified "salvation themes" (e.g., the teaching of ethics through casuistry) as a potential response. Rita Charon ³⁶ has referred to medicine's "insoluble tensions" and suggested that an understanding of narrative form, with a focus on features such as temporality, singularity, and contingency, can provide a relief to the tension.

So far, we have focused on Flexner's reflections on one duality—that of biomedical science and clinical medicine—but he also spoke about the interface of science with humanism. Humanism in the context of medicine represents the fact that patients are humans—They are endowed with individual identity, an awareness of self, and an array of faculties, sensibilities, and behaviors. In addition, a human is a social being whose personality is shaped by the history, mores, and beliefs of the cultures and society in which he or she lives. The knowledge that encompasses what we know about "personhood" and what we understand about people is found in the social sciences and humanities. It is often qualitative or subjective in origin and is of a nature that defies reductionist methods of analysis.

Perhaps one of the most damning criticisms of Flexner is that, by virtue of his muscular defense of the centrality of science and its positivist epistemology, he catalyzed the erosion of the humanities within medicine. A common view of the Flexnerian model is that it placed medicine indissolubly within the universe of science. To advocates of holistic approaches, stark pronouncements by Flexner that link medicine to the natural sciences are as red flags to a bull. His statements in Bulletin No. 4 are almost taunts. At one point, he says, "[M]edicine is part and parcel of modern science. The human body belongs to the animal world."^{2(p53)} Several pages later, he states, "[I]t matters not in the slightest, from the standpoint of scientific logic, whether the step takes the form of administering a dose of calomel, operating for appendicitis, or stimulating ... a frog's brain with an electric current.... The practicing physician and the "theoretical" scientist are thus engaged in doing the same sort of thing."^{2(p92)}

Criticism regarding Flexner's views on the scope of science was galvanized by his so-called "full-time plan," a proposal advocating that clinical teachers be fully employed by universities. Many worried that, if adopted in an inflexible manner, this plan would create an insurmountable gap between physicians practicing in the community and those laboring within laboratories and clinical teaching units. The issue raised the ire of Sir William Osler. His letter to the president of Johns Hopkins University, published posthumously in 1962, lambasted Flexner for this "subversive" recommendation.³⁷ The fracas initiated by the full-time plan has had sturdy legs. In an essay published in 1992, with arguments buttressed by allusions to the full-time plan, Alfred Tauber bemoans the exclusion of patients' social and psychic contexts. He concludes with the following:

The physician as minister, ministering to the humane needs of the patient, has always been present and crucial to the compassionate care, but the Oslerian face of Janus is now shining more brightly than when Flexner³⁸ envisioned that "science, once embraced, will conquer the whole."

In a 2001 article,³⁹ the same protagonists reappear; the article's title, "Osler vindicated: The ghost of Flexner laid to rest," reveals poignantly which of the two theorists holds sway for the author. The full-time clinician debate continues to fascinate; it represents a key element of a 2006 report entitled "American medical education 100 years after the Flexner report."⁴⁰

Flexner was aware of the possibility that his views might be interpreted as inimical to the humanities. In *Medical Education: A Comparative Study*,^{8(p11)} he wrote,

In respect to the position I have thus far taken, a curious misapprehension not uncommonly arises. The careful scrutiny, reflection, and decision ([that are] the essence of the scientific method) ... are sometimes regarded as in conflict with the humanity that should characterize the physician in the presence of suffering. Assuredly, humanity and empiricism are not identical; with equal assurance, one may assert that humanity and science are not contradictory.

A careful reading of the written record will, we believe, substantiate Flexner's claim. His academic background, his beliefs regarding the propaedeutics of medical education, and his accomplishments such as helping to found the Institute for Advanced Study at Princeton University (with one group focused on humanistic studies) all affirm that he was not averse to the humanities. In the Tylorian Lecture entitled "The burden of humanism,"^{41(p12)} which he gave at Oxford in 1929, he stated that humanism must be concerned with the "worth-whileness" of actions." Flexner may very well have considered the split of humanism from science as a false dichotomy.

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We have seen how Flexner struggled with the gap between science and clinical domains and how he tackled the issue of humanism in medicine. He focused on method: "I have tried to point out, first, that as fact-gathering and interpreting activities, science and humanism are one."^{41(p13)} Inspired by the German educational system, he was indoctrinated with the idea that all sciences share a kinship in scholarship, an idea captured in the German word *Wissenschaft*. Jerome Bruner,⁴² in line with Flexner's emphasis on methodology, suggested that discussions of the contrast between differing modes of thought need to shift from an emphasis on the products of humanistic and scientific inquiry to the processes of inquiry.

An Alternative: Seeking Unity Through Purpose

It is our perspective that the humanities and science, as bodies of knowledge, cannot be integrated. They are irreducibly separate. More to the point: With respect to the care of patients, we believe that physicians do not need to integrate them; they need to be able to apply both kinds of knowledge where each is appropriate. There is nothing unusual about individual persons applying more than one kind of knowledge; architects do it commonly when they use both aesthetics and engineering know-how in the design of buildings. So, we ask ourselves, why have questions regarding medicine's dualities and the urge to seek integration been so persuasive, and the solutions so intractable? We believe that the apparent conflict between science and humanism in clinical medicine has been a consequence of the overwhelming focus on disease theory (which can be expressed as "when someone is sick, it is because they have a disease"). If the goal of medicine is considered to be the discovery and treatment of disease, then the world of clinical medicine stops at the edge of the body. Diseases, from their discovery, have been somewhat abstract: biological entities that are defined and best described by medical science and that are discovered in sick persons when all the other phenomena of illness have been cast aside. In this conceptual frame, the sciences become the priority, and the humanities assume secondary importance—seemingly, being jettisoned. A dichotomy is created and is followed by a perceived need to bridge the gap. On the other hand, if the goal of medicine is understood as the well-being of the patients—defined as the patient's ability to pursue his or her achievable goals and purposes—then all of the knowledge bases that can be recruited toward this end are married in common purpose. An inability to pursue goals and purposes arises from impairments of function, which can occur at any level, from the molecular to the spiritual. Therefore, if the goal is the patient's well-being, with the primary aim being the restoration of function, the clinician's world continues beyond the body into the psychological, social, and spiritual realms, and it requires knowledge from both domains. Common purpose unites these dichotomous spheres.

The eradication of disease continues to be of vital importance, but it needs to be assimilated with, most critically, the restoration of function, which, along with the relief of suffering and compensating for loss, is the essence of healing. An undergraduate medical program crafted to achieve a true synthesis of the humanities and science, through a focus on healing, has recently been described.⁴³ That curricular project is far from being completed, partly because teaching about loss of function, in the basic as well as clinical domains, has not been described in detail in the medical education literature. A critical next step required to move this agenda forward and to begin to apply this alternative framework is the revision and adaptation of medical history-taking and the physical examination to more thoroughly incorporate functional assessment.

Flexner left an indelible imprint on medical education. The debate regarding knowledge integration, which we have argued persists unabated, was in part triggered by his seminal report. This was undoubtedly an unintended consequence. Flexner, at least later in life, was keenly aware of the centrifugal forces pushing the basic sciences and the humanities apart. In his autobiography,^{44(p354)} he reminisces:

I made an effort to view science and humanism as complementary activities. Our ideals, guarded by humanism, are, I contended, themselves open at all times to scientific criticism and analysis, for they too are, ultimately, dependent on knowledge.... This science and humanism form a circle, in which the lifeblood of humanity flows and intermingles.

Although Flexner may have been conflicted about the need to explicitly teach an integrating principle, the value that he accorded scientific criticism and analysis cannot be doubted. Without wishing to diminish the importance of scientific methodology as a unifier, we have posited an additional framework—synthesis via purpose (specifically, personal functioning)—as being appropriate to medical practice.

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The contemporary philosopher Toulmin,³² in imagining a postmodern world, identifies the program of postmodernism as one of humanizing modernity. He suggests that we must strive for a balance between "reason" (the legacy of rationalism) and "reasonableness" (with its link to humanism). He states, "In both science and philosophy, then, the intellectual agenda today obliges us to pay less attention to stability and system, more attention to function and adaptability." With the call to action for a humanist thrust thus framed, we found Flexner's statement in Bulletin No. 4 (in the context of discussing physiology) remarkably prescient: "It is the business of the physician to restore normal functioning; normal functioning is thus his starting-point in thought, his goal in action."^{2(p63)} Flexner's contributions over the past century have been deconstructed, contextualized, and subjected to historical revisionism. We hope that, by the sesquicentennial anniversary of Bulletin No. 4 in 2060, the analysis will focus less on his alleged boost to the hegemony of science and more on the synergy that he saw between science and an "assertive humanistic spirit."^{41(p23)}

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