

Essay Review

The Legacy of Mirko Grmek's Historical Studies of Claude Bernard

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Mirko D Grmek, *Le legs de Claude Bernard*, Penser la médecine, Paris, Fayard, 1997, pp. 439, FF 160.00 (2-213-60014-7).

The French noun *Legs* can be translated either as “legacy” or as “bequest”. The title of the present volume implies both meanings. The book is, in one sense, an interpretation of the legacy left to posterity by the experimental discoveries and the thoughts of the famous nineteenth-century French physiologist, Claude Bernard. But the word refers also to the bequest that Bernard left to future scholarship in the form of the massive collection of unpublished documents that have been preserved. It is the special contribution of Mirko Grmek to Bernard scholarship to have catalogued this collection, and to have revealed the importance of these documents for a full understanding of the evolution of Bernard's work and his ideas. As Grmek stresses in his preface, Bernard continually returned to the same problems and continually developed his ideas about them. Historians who treat Bernard's views as “fixed opinions, established once and for all” (p. 11), misunderstand the nature of Bernard's thought. Although much of the evolution of his ideas can be traced in Bernard's prodigious output of published lectures and scientific papers, the unpublished papers add many subtle nuances, often coming closer to the earliest traces of his original ideas than do the published versions. The laboratory

notebooks enable the historian to reconstruct Bernard's experimental pathway at the level of the daily interaction between thought and action. Seldom has a scientist of such stature left so full a record of the evolution of his investigative pathway and of his private intellectual pathway as has Claude Bernard. No other historian has acquired so extensive a knowledge of the work and thought of Bernard as has Mirko Grmek during his long preoccupation with his eminent subject.

Le legs de Claude Bernard is a collection of essays, each of which describes a particular episode in the life of, an aspect of the thought of, or one of the experimental achievements of Bernard. After a chapter that summarizes briefly the life and work of the distinguished French physiologist, Grmek discusses the “philosophical credo” that Bernard expressed in the inaugural address he delivered upon his election to the Académie Française in 1869. Grmek draws on the first notes for and multiple drafts of the lecture to show how Bernard's ideas evolved from initial sketch to finished performance.

“The necessity of liberty in the phenomena of life” follows Bernard's long struggle to reconcile the doctrine of determinism on which he believed the experimental investigation of vital phenomena rested, with the fact that living beings also exhibit spontaneity, and that human beings are “fated to be free”. “The birth of a key concept: the *milieu intérieur*” traces Bernard's most important general physiological idea through its long evolution from a “first cluster of ideas” jotted down in a notebook, through the many stages of development

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represented in his pedagogical lectures, to its final, most powerful statement in his posthumously published *Phenomena of life common to plants and animals*. 'Notions of disease and health' analyses Bernard's view that pathological states and physiological states are not "two essentially different modes" (p. 184), but that the former are only disturbances of the latter.

The next three chapters follow the chronology of three phases in Bernard's most important experimental pathway, that which led to the discovery of the glycogenic function of the liver, the artificial production of diabetic condition by a puncture of the floor of the fourth ventricle of the brain, and finally to the isolation of glycogen. One chapter is devoted to Bernard's last sustained experimental venture, the study of anaesthesia in plants, and its relation to his concept of a general physiology. The last three chapters treat of the relations between Bernard and Louis Pasteur, Bernard's assessment of his two prominent German contemporaries, Carl Ludwig and Rudolph Virchow, and the nutritional experiments that Bernard performed on himself.

Each of these chapters uses manuscript sources effectively to illuminate the evolution of Bernard's thought and activity. Collectively they provide a rich portrait of one of the most complex figures in the history of science. It is the best single source available for viewing Claude Bernard as he painstakingly worked out in private what he eloquently professed in public.

There is in this book, however, no overall reassessment of the role of Claude Bernard in the formation of experimental physiology. In his introduction Grmek cites with tacit approval the statement by Bernard's contemporary, Jean-Baptiste Dumas, that Bernard was "not only a great physiologist, he was physiology itself" (p. 9). That claim, consonant with Bernard's own estimation of his importance, cannot be maintained in light of the more complex picture of nineteenth-century physiology that is emerging from recent scholarship. That Grmek has not

undertaken here to challenge such an overstatement is explainable because of the nature of this volume. Most of the chapters were published originally during the 1960s, when he had just completed cataloguing Bernard's massive archival bequest, and when his primary goal was to show how revealing these unpublished documents were about the genesis and further development of Bernard's own views. He has revised the original papers, mainly to take into consideration later writings on these subjects by other scholars, but the original structure and orientation remain mostly intact. The majority of these essays represent, therefore, an earlier stage in Grmek's views about Bernard than does the book *Raisonnement expérimental et recherches toxicologiques chez Claude Bernard*, which he published in 1973. In that magisterial treatment of one major strand in Bernard's network of research enterprises, Grmek presented Bernard's contributions woven together with the contributions of contemporary investigators to form a collective investigative field. Here the focus is on the Bernard who, even when attentive to the work of his contemporaries, always sets himself apart from them.

Even though they were first composed three decades ago, this collection of Grmek's essays on Bernard is still very welcome today. Published in scattered form in various journals and other formats, the originals are hard to find. Their reappearance here in one accessible place will make clear to younger historians of the life sciences how much Mirko Grmek has contributed to a deeper understanding of Claude Bernard. At the same time they leave open many questions for future scholarship on Bernard and on nineteenth-century physiology.

In a review of 'The historiography of the Claude Bernard industry', Ludmilla Jordanova claimed in 1978 that Bernard was one of those "few major scientific figures whose work generates books, articles and reprints at an alarming rate". (*Hist. Sci.* 1978, 16: 214.) Whether or not the rate of scholarly publication on Bernard was excessive at that time, it has since then greatly diminished. Although several articles still appear each year dealing

with some aspect of Bernard's work, there have been far fewer comprehensive treatments of him or his place in the history of physiology since 1978 than before then. Two exceptions are John Lesch's *Science and medicine in France: the emergence of experimental physiology, 1790–1855* (Cambridge, Harvard University Press, 1984), which places Bernard's early career in new perspective with relation to that of his mentor, François Magendie; and Pierre Gendron's interesting *Claude Bernard: Rationalité d'une méthode* (Paris, J Vrin, 1992), which is more a philosophical analysis than an addition to the historical literature. Some decline in interest in Bernard may be due to a general reorientation of history of science away from the "great men" that Jordanova contends had become mythical figures; but Bernard has suffered somewhat more in this regard than other "mythical" figures, such as Louis Pasteur or Antoine Lavoisier, who have been subjects in recent years for major re-evaluations. I would suggest that one reason for Bernard's relative eclipse is that, besides making a series of illustrious discoveries in the prime of his career, Bernard was pre-eminently a deep thinker; but neither discovery nor scientific thought has been at the centre of attention in the recent historiography of science. One of the most refreshing qualities of *Le legs de Claude Bernard* is that Grmek treats the evolution of Bernard's scientific thought as a subject of vital importance, one that merits the effort to follow it through all its subtle stages of development.

Where are the most promising opportunities for further scholarship on Claude Bernard? Concerning his personal trajectory, there is still much room for reconstructing further segments of his experimental pathway. Grmek has thoroughly treated Bernard's investigations of curare, carbon monoxide poisoning, and other studies of the effects of toxic substances. I contributed a detailed narrative of the first five, formative years in his pursuit of a cluster of problems relating to animal chemistry. Ana Cecilio Rodríguez de Romo has extended to 1851 the history of his investigations of the

digestive action of pancreatic fluid that I had followed only through his first major discovery about its function in 1848. (Ana Cecilia Rodríguez de Romo, 'Tallow and the time capsule: Claude Bernard's discovery of the pancreatic digestion of fat', *Hist. Philos. Life Sci.*, 1989, 11: 273–92.) There remains, however, a large corpus of still unexploited laboratory notebooks. Perhaps additional studies of the fine structure of selected portions of Bernard's research trail would produce little new insight about his general experimental approach. To cover the whole of his investigative activity at this level of detail would require an enormous, unwieldy multi-volume work. It would be more rewarding to attempt a reconstruction of the full range of Bernard's investigative enterprise at a level intermediate between the existing accounts based on his publications and the daily level that the notebook records document. Such a narrative not only can tell us more about the origins of his major discoveries, but can elucidate the interactions between the several distinct investigative lines that he maintained through his career, and reveal whether, or how, his experimental style changed over the years.

Mirko Grmek was the first historian to reconstruct Bernard's scientific discoveries through the use of his laboratory notebooks. Grmek introduced me to these documents when I visited Paris as a fledgling Bernard scholar during the 1960s, and he very generously supported my interest in using the notebooks to examine Bernard's early investigations in the field of animal chemistry. During the course of our respective studies of the events leading to Bernard's claim in the autumn of 1848 that the liver produces sugar in an animal which was not previously receiving sugar in its diet, a difference of interpretation has arisen between us regarding an experiment that both of us regard as crucial to Bernard's discovery. In his own retrospective account of this discovery in his *Introduction to the study of experimental medicine*, Bernard portrayed himself as having accepted without question the "reigning theory" that sugar in animals derives exclusively from its aliments. While

searching for the site in which this alimentary sugar is destroyed in the animal, he recalled, he was led inadvertently, through a simple control experiment, to recognize the presence of sugar in the portal vein blood of an animal fed a sugar-free meat diet. This result immediately led him to see that the “theory of the origin of animal sugar that had served as my point of departure was false”. (The relevant passages are reproduced in *Le legs de Claude Bernard*, pp. 225–8.) Grmek identified an experiment in Bernard’s laboratory notebook, performed in August 1848, as the one to which Bernard referred, and concluded that it verified Bernard’s interpretation of the event. In his laboratory notebook, following the description, Bernard commented, “This experiment is exceedingly strange. From it one can comprehend nothing. Would sugar form in the portal vein, by what organ, by what mechanism?” (my translation). In my account of the event (Frederic L Holmes, *Claude Bernard and animal chemistry*, Cambridge, Mass., Harvard University Press, 1974, pp. 423–4), I ventured the view that it was not merely the presence of sugar in the blood, but its presence specifically in the blood of the portal vein, that Bernard could not at first understand. I supported this view with several arguments about the circumstances of the experiment that did not appear to fit Bernard’s later reconstruction of his experience.

In the revised version of his article on the discovery of the glycogenic function of the liver included in *Le legs de Claude Bernard*, Grmek has replied to my interpretation. My arguments, he writes, are “clever, but not decisive”. To two of my most immediate arguments, he gives equally plausible interpretations in favour of Bernard’s own account. My case was not limited to these direct arguments, but rested also on the more general circumstance that Bernard had long been sceptical of nutritional theories, such as the alimentary origin of sugar, which rested only on deductions from chemical properties and that he had already entertained several years earlier the thought that sugar might be produced in the body from other alimentary

substances. Nevertheless, I agree with Grmek that my interpretation is not decisive. Neither is the other account.

This friendly debate is significant, not because Mirko Grmek and I agree to disagree on this one point (there is far more on which we are in full agreement), but because it raises a fundamental question about the limits in the extent to which laboratory notebook records reveal the intimate mental processes of scientific investigation. Since the publication of my interpretation of this nodal event in the investigative career of Claude Bernard in 1974, I have reconstructed similar events in the work of other scientists who were, or are, still living. With them I was able to discuss pages from their own experimental records that appeared to document such turning points. Even this special advantage left unresolved ambiguities in the reconstruction of the key events. Conflicts between memory and the documentary evidence could not always be decided in favour of one or the other. These encounters with the authors of such records have left me less confident that any such reconstructions which go beyond the recorded data itself can be completely decisive. That does not mean that we should desist from attempting to penetrate into the mind of the investigator at such crucial times. Laboratory notebooks provide us unparalleled opportunities to do so. But when more than one historian reconstructs the same historical event, we should not be surprised, or dismayed, that their interpretations will sometimes differ.

The other major opportunity for further scholarship concerning Claude Bernard lies in the broader arena of his relation to the physiology of his time and its later development. Like many creative giants, Bernard was absorbed so totally in his own lifelong projects that he could not realistically evaluate his historical place. When he studied the work or general views of important contemporaries such as Carl Ludwig he did so, as Grmek’s account nicely shows (pp. 365–76), to assess their relation to himself rather than to appreciate their positions for their own sake. He saw them only through the perspective of

Essay Review

his own presumed leadership of the field. To see Claude Bernard more clearly than he could see himself, we need to ask how his work fits into a larger movement which neither he, nor any single physiologist of his time could personally dictate. Historians have often called him the “legislator” of the experimental method of physiology and medicine. The depth of his analysis of scientific method and his meditations on the conceptual foundations of physiology does give them a timeless intellectual interest, but his views on these subjects did not direct the activity of the many physiologists of his time who were collectively constructing a scientific discipline; and they did not shape the future of the discipline. His

experimental career began with the pursuit of problems like those his contemporaries and predecessors had already taken up. It was the importance of his experimental discoveries themselves, not his later reflections on them, that advanced the field. A full appreciation of the impact of Claude Bernard on the growth of modern physiology will emerge, I believe, only when historians turn from the inflated image of a man whom his admirers equated with physiology itself, to studies of the way in which each of his remarkable experimental achievements fitted into and forwarded the broader research streams that comprised an already vibrant field of inquiry when he entered it with such memorable success.