Journal of the History of the Neurosciences
2001, Vol. 10, No. 2, pp. 218–239

0964-704X/01/1002-218$16.00

BOOK REVIEWS

Rodney Cotterill. *Enchanted Looms: Conscious Networks in Brains and Computers*. Cambridge, UK and New York, New York: Cambridge University Press, 2000 (first paper edition); 1998 (originally published). xiv + 508 pp. $27.95 (cloth); $16.95 (paper).

René Descartes was not the first person to suggest an explanation of how the structures in the brain were related to the production of the phenomena of consciousness, but he is the most notorious. For him, it was the pineal gland that seemed to have the all-important role in regulating the fluids in the brain which Descartes believed animated the body through the networks of neurons operating like hydraulic pipe works. In more recent times, neuroscientists have continued in their hope to explain consciousness, but have largely steered clear of addressing it directly, perhaps because consciousness has been seen as more of a metaphysical trap than a legitimate scientific topic. Still, many researchers are confident that a sufficient scientific understanding of the brain will bring with it an explanation of consciousness. A problem with most explanations proposed by scientists and philosophers is that they fail to develop a reasonably comprehensive and holistic conception of consciousness that is even worth the trouble of scientific and philosophical arguments over its relation to known phenomena or coherent theories. I am enchanted to say that such a comprehensive and holistic conception has finally presented itself which can be related to many of the significant aspects of neurocognitive phenomena.

Enchanted Looms sets itself the ambitious goal of explaining consciousness. The author attempts to do this by an equally ambitious bottom-up methodology of building on a staggering number of isolated experimental results from research in cognitive neuroscience and computational neural networks. The resulting structure and style of the book is a bit odd, and even frustrating at times. Through most of the book it is difficult to detect an argument, much less get a sense of where it might be going. This is partly because the author does not present an outline of his argument until the final chapters, and partly because of the complexity of the subject matter. Like the synaptic pulses which concern him, Rodney Cotterill's book seems to bounce among the various structures of the brain and their relation to various cognitive phenomena in a seemingly chaotic fashion. Even when he gets to the main argument, there are plenty of digressions and asides to frustrate even the most patient reader. But by the end of the book it is clear that Cotterill has presented an explanation that is more than just another plausible narrative summation of research, and has managed not to sacrifice any of the richness of what might be considered the most holy of humanist concepts (though he appears to be indifferent towards the sacrifice of free will).

The greatest challenge to writing a book that explains consciousness is to give ''consciousness'' a definition that can be both explained and made to satisfy a majority of readers as being a reasonably comprehensive definition. Unlike similar attempts from philosophers, such as Patricia Churchland's *Neurophilosophy* (Churchland, 1989), Cotterill does not take his definitions of consciousness from the philosophical tradition, though he does acknowledge their influences. Nor does he make the all too easy claim that the subjective experience of consciousness is inaccessible, and thus to focus on the ''observable consequences'' of consciousness, or treat the brain ''as-if'' it were conscious, or to eliminate consciousness altogether as folklore. Instead, Cotterill wants to actually explain what the brain does to give us the subjective phenomenal sensations we associate with being conscious. Instead of developing an elaborate definition, he tries to stick close to the ordinary use of terms like

''imagination,'' ''wakefulness,'' ''awareness,'' ''attention,'' and ''unconscious'' in weaving his own patchwork understanding of consciousness out of a far-flung collection of scientific research brought to bear on the everyday experiences of conscious phenomena.

Initially, this results in a strange sort of tour through the classic results of cognitive neuroscience in an attempt to demonstrate how the brain performs numerous tasks that contribute directly and indirectly to those properties most commonly associated with consciousness in what might be called ''folk'' psychology. Several hundred pages into the book, one starts to get the feeling that this is all the book has to offer – an enormous collection of more or less isolated phenomena and experimental results which are somehow supposed to add up to human consciousness because there is nothing left of the folk concept to be explained.

Thankfully, this is not the case. Chapter nine, ''The Midwives of Reflection,'' announces that the previous chapters were really just laying the ground work for the main argument. It is here that Cotterill finally reveals how all those interesting tidbits of neuroscience are going to come together to provide an explanation of consciousness. And what an explanation it is! First he provides a definition of the phenomena which is altogether reasonable:

> It would seem that conscious awareness is possible if temporal changes in sensory input (or in internal patterns of signals) can be detected while the signals resulting from that input are still reverberating in the system. And we could go on to note that such detection will permit the system to capture correlations between cause and effect so rapidly that their significance for the organism can immediately be appreciated, and also immediately used to modify the organism's repertoire of responses (pp. 333–334).

There is plenty of elaboration of what this means, but in short it says that we are continually aware of our sensory inputs, as well as aware of a schema of bodily motor activity which we are currently attempting to perform. And moreover, we are constantly projecting the possible future implications of those two structures, and comparing them to our memories. This enables us to recognize when the action we are about to perform is going to have undesirable consequences, and thus allows us to abort or ''veto'' that action in favor of another action schema. It is conscious choice tied directly into a constant real-time perception of the world, combined with our own embodied motor activities.

What is so wonderful about Cotterill's thesis is that he provides a simple yet powerful definition (rather close to that presented by William James, actually), where the elements of this simple definition can be identified with concrete mechanisms known to be working in brain structures which are interacting with each other according to appropriate dynamics, and this is able to account for an incredibly broad range of mental phenomena. It also acknowledges that what the brain does is intimately tied to the environment – mostly it is using sensation to modulate the activity of the body in its constant investigation of the world. Thus, consciousness is not disembodied. Moreover, consciousness is not just some epiphenomenal accident of evolution. In fact it is causally significant, and the key to the cognitive superiority of those higher mammals which have the necessary brain structure to support consciousness. Whereas lower creatures are stuck taking just those actions which their brains have learned and selected as appropriate for given sensory states and biological goals, the conscious creatures imagine all sorts of consequences of their current actions with respect to their intentions, and make choices about what to do. And this happens at time scales ranging from microseconds, in the case of the motor control adjustments of a tennis racquet angle or the controls of a car in traffic, to minutes, hours or days, in the more ''rational'' deliberation of such life choices as which car to buy or career to pursue that can actually modify the intentional structure of future actions. What more could one ask for?

I believe that many readers will find a rich set of interesting implications to be drawn from Cotterill's explanation. Unfortunately, his own speculations about such things as free will

and conscious computers are not as well thought out as the rest of the book. As far as I can tell, he sets out to present an explanation that is consistent with a mechanistic and deterministic explanation of brain function. That is a fine criterion, but successfully deriving such an explanation does not necessarily prove that the mind is a purely deterministic mechanism, nor does it necessarily follow that if it were, then, a computer could become conscious by simulating the brain's structure. Cotterill's own explanation seems itself to depend upon a kind of simultaneous inner-activity between parts of the brain that even parallel computers do not have.

Since most of the readers of this journal are presumably historians, it is worth mentioning that the book is full of short historical asides, but offers no interesting takes on that history. As a collection of citations to the neuroscientific literature, organized around cognitive phenomena, the book certainly offers a great deal of information. However, due to its wandering structure, it could be quite difficult to find just what one is looking for, which diminishes its value as reference book. And while comprehensive in its treatment of consciousness, it sacrifices thorough explanations of many phenomena and specific experiments, which diminishes its value as an introductory text. I would recommend that those comfortable with the literature of cognitive neuroscience skip chapters four to eight, or at least read chapter nine before putting this book back on the shelf – that is the chapter that makes the whole book worthwhile.

Peter Asaro
Departments of Philosophy and
Computer Science
University of Illinois, Urbana-Champaign
Urbana, Illinois 61801
U.S.A.

REFERENCES

Churchland PS (1986): *Neurophilosophy Toward a Unified Science of the Mind-Brain*, Cambridge, Massachusetts, MIT Press.

François Delaporte and Patrice Pinell. *Histoire des Myopathies*. Paris: Éditions Payot & Rivages, 1998. 274 pp. Ill. FF 145.00 (paper).

This story merges with the enterprise of the classification of neuronal diseases during the second half of the nineteenth century. Guillaume-Benjamin Duchenne de Boulogne, by means of his technique of investigating nerve and muscle with localized electrical stimulation, made a decisive and pioneering contribution to the identification of muscular atrophies. He was closely involved with François-Amilcar Aran's publication (1850) on progressive muscular atrophy (PMA) which served as the point of departure. Their shared notion of essential muscle disease was soon abandoned in favor of a neurological basis for muscular atrophy. This was the first phase of the classificatory schema that Jean-Martin Charcot would give to the progressive spinal atrophies among which amyotrophic lateral sclerosis (ALS – 1874) was a classic exemple. In 1868, Guillaume Duchenne had described pseudo-hypertrophic muscular paralysis or myosclerotic paralysis. But it took Charcot's confirmation in 1871, with the results of an autopsy of an analogous case (Eulenberger and Cohnheim, 1863), to establish the classificatory notion of essential muscular lesions, the myopathies, independent of any lesion of the nervous system. In 1876, Ernest von Leyden had already described the hereditary form of PMA while Wilhelm Erb had identified a juvenile form in 1884 and Louis Théophile Landouzy and Joseph Jules Dejerine, the facio-scapulo-humeral form of the progressive atrophic myopathy. Charcot (1885) saw the entire spectrum as different expressions of the same type of morbid entity, essential progressive myopathy. For a certain time, this unified view engaged consensus along with the common feature of heredity.

Nonetheless, the pathophysiological problem of the defect in muscular nutrition and the accompanying metabolic disorders remained, particulary with regard to the evidently important role of glucose. With the emergence of endocrinology – at the turn of the twentieth century, especially in the United States – the project developed. The resemblance of the myopathies to the alterations in certain endocrine diseases led to research on

disorders in the metabolism of glucose, creatine, and adrenalin. This in turn opened the way to various treatments for the myopathies. But one by one, the hopes were dashed.

A new approach appeared in the 1950s that took into account Mendelian heredity. This was completely distinct from the end of the nineteenth-century notion of ''neuropathic heredity.'' Systematic studies of large populations of patients established relationships between clinical forms and characteristic modes of transmission. The deployment of molecular genetics – which had already identified different genes associated with myopathies – led to a new classification based on these new elements. The authors note that the new system consists of ''three different board genetic entities: Duchenne myopathy, with a sex-linked mode of transmission, facio-scapulo-humeral myopathy, with a dominant mode of transmission, and girdle myopathy, with autosomal recessive transmission.'' This classification can only be taken as provisional while the identification of the genes involved is far from accomplished. But genetics now permits pre-natal diagnosis. Progress should lead to gene therapies – as well as a new understanding of muscle physiology.

The authors' epistemiological approach obscures at times the factual history of the myopathies.

Michel Bonduelle
15 Boulevard des Invalides
F75007 Paris
France

Hans Schliack and Hanns Hippius, eds. *Nervenärzte: Biographien*. Stuttgart and New York, New York: Georg Thieme Verlag, 1998. x + 188 pp. Ill. DM 148.00 (cloth).

Biographies conveniently organize complex historical trajectories into amenable, discrete units. As collective memories, they shape disciplines by furnishing historical contours and by providing them with a recognizable identity. Webb Haymaker's famous *Founders of Neurology* (1953) explicitly served this function in its title and expressed it implicitly, but even more drastically, with a revision after seventeen years, which both added new ''founders'' and also took away some of their honorary title. The German equivalent to the *Founders* – Kurt Kolle's *Grosse Nervenärzte* (1956) does not admit such demotions. The first volume assembled twenty-one portraits and two more volumes added another forty-three heroes to the gallery by 1963. Now, thirty-five years later and at the end of the twentieth century, the German professors-emeritus Hans Schliack (neurology) and Hanns Hippius (psychiatry) join to choose from the next generation, the fourth volume of this collection.

Although not labeled as such, Schliack and Hippius' book is intended as a sequel to Kolle's series, as they make clear in the opening paragraph of the preface and by concluding the book with an appendix of Kolle's work. While an honorable commitment, to continue Kolle's series is a risky task. Kolle's collection was an international enterprise; leading neuroscientists presented figures from the world's neuroscientific heritage as examples for post-war and post-Nazi Germany: Gordon Holmes wrote on John Hughlings Jackson, for example; John Fulton on Harvey Cushing; Miecyslav Minkovsky on Ivan Pavlov; Karl Kleist on Carl Wernicke; and Théophile Alajouanine on Pierre Marie. The editors of the present volume decided to scale back their ambitions and confined their sequel to the German-speaking world.

However, alternatives are worth contemplating for a moment. A volume faithful to Kolle's concept would now, above all, have to document the shift of the neurosciences' center of gravity away from Germany. How many Germans would be included in an international collection of post-war neuroscientists, if confined to just twenty essays? Kurt Goldstein, certainly yes; Richard Jung or Viktor von Weizäcker, maybe. Looking back on the twenty first century, we see the intellectual diminishment of neuroscience in post-war Germany as a lasting consequence of National Socialism. Beyond murdering many neuropsychiatric patients and some physicians, beyond pushing a small but important percentage of neuroscientists into emigration, the Nazi-regime resulted in an ongoing intellectual isolation of post-war Germany. Most of the volume's subjects, all directors of university clinics, published only occasionally in languages other than German.

Schliack and Hippius open their sequel with a section on founders of neurology, adding Moritz Heinrich Romberg and Hermann Oppenheim to Kolle's series, which had a slight bias on psychiatrists. They continue, after a brief chapter on Alfred Erich Hoche, with portraits of Kurt Goldstein, Ludwig Guttmann, Willy Mayer-Gross, and Hans Hoff in a section on emigrants. Goldstein is certainly the outstanding figure of this collection and the essay by Yves von Cramon sketches a warm and lively picture. The chapter on Ludwig Guttmann, the pioneer of paraplegia rehabilitation and the founder of the Paralympics, is a surprise, but pleasantly exciting. Careless editing, unfortunately, undercuts the article on Mayer-Gross, a fascinating figure from the psycho-dynamic philosophy circle at the psychiatric clinic in Heidelberg: the book leaves Mayer-Gross in Dumfries, Scotland, until his death; in fact he lived and worked in Birmingham for ten years from 1951. The thirteen essays of the book's main section cover Gustav Bodechtel, Klaus Conrad, Gottfried Ewald, Rolf Hassler, Richard Jung, Ernst Kretschmer, Kurt Leonhard, Gerd Peters, Heinrich Pette, Karl Schneider, Erik Strömgren, Wilhelm Tönnis, and Viktor von Weizsäcker.

Biographical collections provoke quibbling about selected names. Every reader has a personal list of favorite figures; I might have included Walter Rudolf Hess, Paul Schilder, or Hans Prinzhorn, rather than some of Schliack and Hippius' choices. However, two omissions transgress this realm of idiosyncratic decisions: Karl Kleist and Oswald Bumke are neither included in one of Kolle's volumes nor in the present. Kleist, with his detailed investigations into neuropsychological localization in the spirit of Carl Wernicke, ranks certainly among the most eminent neuropsychiatrists; Bumke, Emil Kraepelin's successor in the chair of psychiatry at the University of Munich, was quite active as an editor and public consultant, and also attended the stroke-striven Vladimir Ilyich Lenin in Moscow. Further desiderata of the book under review are an index of names linking the otherwise isolated articles, and a more coherent way of referencing publications by the portrayed and those about them.

How to arrange the biographies is another systemic problem of such collections. Schliack and Hippius combine historical and systematic approaches. In some openly addressed ways, and in many more that are hidden, National Socialism organizes the volume. It awkwardly opposes a section "emigré neuroscientists" to one on "mid-century neuroscientists," as though the emigrants were no longer active by mid-century; the word "great" has vanished from the title in the change in editorship; Ewald is included, whose main contribution was his protest at a 1940 meeting in Berlin against the plans for euthanazing neuropsychiatric patients. Many such details become intelligible only when considered against this historical background. The editors, it seems, sensed some of these problems and solicited two special contributions, one on "a contested psychiatrist" (Hoche, who justified in 1920 the juridical arguments for euthanasia from a medical point of view), and one on "neurology and psychiatry during National Socialism" by Bernd Holdorff and Paul Hoff. The editors' half-hearted remedy does not work, however, because it addresses crucial questions insufficiently, and more importantly, it justifies avoiding these questions in the rest of the book. There was indeed some debate during the 1920s about Hoche, and his book certainly paved the ground for murderous directions in psychiatric treatment. But he is no longer controversial and has turned into one of the many ambiguous figures in psychiatry's tangled history during the twentieth century. A chapter on Ernst Rüdin, instead, who was a pioneer of psychiatric epidemiology and in the vanguard of psychiatry as racial science as head of the famous *Deutsche Forschungsanstalt für Psychiatry* in Munich after 1933 and "Führer" of the New Germany at many international psychiatric conferences, could have examined the various roles of psychiatry during National Socialism in the context of the modernization of scientific psychiatry during the twentieth century. Rüdin is bashfully alluded to in the present volume in passing, in the biography on Erik Strömgren, who came to Rüdin in 1935 for a quick training in psychiatric epidemiology before starting his field work on the Danish island of Bornholme. (And why include one Danish psychiatrist in this otherwise all-German collection?). The final chapter, on neurology and

psychiatry during National Socialism, tries to reconstruct in a mere eight pages the history of racial science, sterilization, and euthanasia, plus the history of emigration. Such a brief overview cannot go beyond a quick rehearsal of some essentials. Unfortunately, the authors do not count new research strategies and therapeutic approaches among such essentials. Since coverage of the years between 1933 and 1945 is scarce in the other chapters, we still have to wait for descriptions of the development of shock-therapy or neuro-endocrinological research elsewhere, and of the role of the scientists who appear here in them.

Collections of biographical sketches live in their anecdotes; Haymaker's *Founders* started from informal story-telling at an American meeting. Essays like those by Johannes Dichgans on Jung or that by Detlef Ploog on Conrad draw up fascinating accounts of fascinating persons. The more obtuse reading of some of the other portraits mirrors the difficulty of framing an institutionally successful life (or prolific work) coherently. Gershom Sholem once reminded the late and melancholic Kurt Goldstein of the need for external help by referring to the wisdom of a medieval Jewish physician, who signed his letters with "physician, but not for himself." Schliack and Hippius' collection of biographical sketches documents vividly as many problematic constellations from the neurosciences of the twentieth century as it honors persons with a biography.

Cornelius Borck
Zentrum für Human- und Gesundheitswissenschaften
Institut für Geschichte der Medizin
Freie Universität Berlin
D-12203 Berlin
Germany

Charles Colbert. *A Measure of Perfection: Phrenology and the Fine Arts in America*. Chapel Hill: University of North Carolina Press, 1998. xvi + 441 pp. Ill. $59.95 (cloth); $27.50 (paper).

Andrew Jackson's election to the presidency of the United States in 1828 launched a new era in which the common man became the standard bearer of a new nation. An identity crisis was inevitable; even though the common man was lauded, it was important that some were more common than others and some method of establishing gentry was needed.

Into that milieu came Johann Spurzheim, a disciple of Franz Gall – an anatomist whose interest was the localization of cerebral functions and his theories became the basis of phrenology. Spurzheim evolved as an entrepreneur and came to the United States to foster and encourage his students of phrenology. Phrenology offered a method of identifying those who might prosper in a particular endeavor. It could identify intellects and those who could not be trusted in society. It lent itself to the establishment of experts with little effort; many schools of phrenology emerged to teach an objective measure of diagnosis. As Colbert notes, phrenology offered to delineate causes to explain natural phenomena; much of its appeal was due to it teaching an individual how to adapt and prosper in times of rapid change. It was natural for phrenology to impact art. In the early United States, there was more emphasis on portrait painting and sculpture as the culture evolved its identity. Those artists looked to perfection in the images of the head and it was here that phrenology offered a measure of perfection.

Phrenology was widely practiced until the latter decades of the nineteenth century. In spite of detractors suspicious of any benefit, it offered much to medicine, to religion, and to art. *A Measure of Perfection* provides deep insight into the influence of phrenology on the developing identity of art in the United States. A background in art history would make the book easier to read, but Colbert's style of writing could be hardly recommended as a textbook for an advanced art history class. Organized into eight chapters, there is a well-presented introduction and extensive reference notes, and the index is ample. Discussed is a "who's who" of nineteenth-century American artists: John James Audubon, Thomas Cole, William Sidney Mount, Hiram Powers, William Rimmer, and William Story to note a few. Chapter one, aptly titled "A Plausible Rascality," gives an overview of phrenology, introduces the reader to those artists influenced by phrenology, and sets the stage to move through the next several decades of history. Chapter two discusses how phrenology

might assist in developing insight into the artist's character and identify those with an aptitude for some art form. Clark Mills who later created the now famous Equestrian Statue of Jackson in Washington, D.C. was a simple plasterer until he happened into a free phrenological demonstration. He was diagnosed as an artist, even though he denied aptitude for sculpture. The third chapter is a critique of ancient sculpture in the nineteenth century and discusses how phrenology made better artists in contemporary times. A full chapter is devoted to faces and is followed by a chapter on how phrenology influenced the molding of a national character in the face of the decline of social strata induced by Jacksonian democracy. Chapter seven contains a discussion of the artist Hiram Powers and his influence in the changing perception of nude figures in art in the period after 1840. The final chapter – ''Increase and Multiply'' – discusses influences in architecture and introduces the reader to the Fowlers, noted American phrenologists. Their influence persisted and was diminished only by progress in medicine and particularly the emerging knowledge of physiology of brain function started by Gall and nurtured by David Ferrier, Paul Broca, John Hughlings Jackson and Charles Sherrington. By the last quarter of the nineteenth century, phrenology had passed its hey-day; as put by Oliver Wendell Holmes, phrenology was very much like ''telling the number of bank notes inside an iron safe by feeling the knobs outside.''

Charles Colbert has produced a magnificent work and a significant contribution to the history of art in the United States. He illustrates well the pervasive influence of phrenology on the culture of this country in its infancy. This book should find a prominent place in the libraries of all art historians, of those interested in phrenology from whatever discipline, and particularly those medical historians who wish to extend their knowledge of the influence of medicine into remote corners.

William L. Brannon
Department of Neuropsychiatry and
Behavioral Science
University of South Carolina School of Medicine
Columbia, South Carolina 29203
U.S.A.

Michael Bliss. *William Osler: A Life in Medicine*. Oxford, UK and New York, New York: Oxford University Press, 1999. xiv + 581 pp. Ill. $35.00 and £28.95 (cloth).

While praising Harvey Cushing's Pulitzer Award winning 1925 biography of William Osler, noted medical historian Michael Bliss contends that an updated re-examination of Osler's life is necessary in the light of new primary material and the need for a more objective, historical scrutiny of both his career and his medical world. Despite his willingness to deflate the long-held heroic imagery surrounding Osler, Bliss states that he was unable to find serious flaws in either Osler's work or his character. ''His [Osler's] was a life that stands up almost too well to critical dissection, even microscopic scrutiny'' (p. xiii). This volume is based on an extensive examination of primary sources located in major repositories in the United States, Canada, and Great Britain, including original documents by Osler, his family, friends, and colleagues.

Bliss presents Osler's life in the traditional chronological fashion, yet the major professional moves in his career easily divide this book into four sections. The first follows Osler's early Canadian years through his medical education and then his first major medical professorship at McGill University in Montreal. Next, Bliss leads the reader to Philadelphia and the University of Pennsylvania where Osler establishes himself firmly as one of America's leading physicians and medical educators. The account of Osler's years at the Johns Hopkins University School of Medicine in Baltimore is as much about the emergence of American medical practice and education as it is about the man himself. Finally, the section on Osler's Oxford career is a touching tribute to his lifelong contributions to the medical profession and the harsh realities of World War I.

Throughout this beautifully written volume, Bliss masterfully combines lengthy quotes by Osler with the author's fine prose to create a most readable book. Time and again, Bliss provides word pictures that take the reader to specific places and events in Osler's life. The reader is with Osler and his medical students doing post-mortem examinations at McGill and Penn or

attending his regular lectures in the main amphitheater at Johns Hopkins. There is Osler sitting at lunch with William Welch, Howard Kelly, William Halstead and other Hopkins' leaders planning the opening of the new medical school and a revolution in American medical education. The reader joins Osler's clerks or guests for dinners at his homes, both in Baltimore and at the "Open Arms" in Oxford. Bliss shares the emotion Osler must have felt while on his numerous European trips when he sat in on lectures by Louis Pasteur, Rudolf Virchow, and heard Robert Koch proclaim that he had finally found the cure for tuberculosis. What must it have been like the night of 2 May 1905 when over six hundred of North America's leading physicians gathered at the Waldorf-Astoria Hotel in New York City to bid Osler a fond farewell as he left for Oxford?

Bliss takes the reader inside Osler's Victorian world. As a major figure in three countries, he met and interacted with some of the late nineteenth- and early twentieth-centuries' most prominent figures. Osler listened to talks by Mark Twain and Oscar Wilde, spent part of a day with Charles Darwin, and conversed with Thomas Edison. Among his numerous patients, Osler saw Congressmen, a president, Prince Edward, and such literary lights as William and Henry James and Walt Whitman. General George Pershing and Herbert Hoover dropped in for lunch one day in Oxford. This parade of important individuals continued throughout Osler's career.

While Osler is typically viewed as an internist, Bliss also examines his work as a neurologist. During his early English medical studies, Osler met the British neurological pioneers William Gowers and Victor Horsley. Osler corresponded with the young neurologist, Sigmund Freud, about cerebral palsy and worked in Julius Cohnheim's lab, brain slicing with Karl Weigert. On one of Osler's European trips, he heard lectures by Charcot. Osler's chief medical mentor while in Philadelphia was S. Weir Mitchell on whom Osler based his famous essay "Aequanimitas."

The author does an excellent job discussing the broad scope of Osler's intellectual and professional interests. Bliss clearly describes Osler's love of great books, classical Greece, literature, and history of medicine. Besides his seemingly all-consuming workload as a medical practitioner and educator, Osler found time to serve as president of the Association of Medical Librarians, the Classical Association, while diligently working to acquire rare books for the Bodleian Library.

While Osler almost always appears in a favorable light, several other individuals receive, at times, harsh treatment from Bliss. William Welch is depicted as a disorganized, hands off administrator. William Halsted, while praised as a great surgical innovator, is shown to be a cocaine addict who was a bad teacher and drove off a number of his colleagues and residents. Bliss criticizes, using Osler's words, the hero of American medical educational reform, Abraham Flexner, as being ignorant, overemphasizing medical research at the cost of clinical education, and supporting a full-time medical school faculty concept that would severely damage medical education. The author's harshest comments are directed at Bill Francis, the first Osler librarian, who, according to Bliss, misused his position to foster the worship of Osler rather than the scholarly goals Osler had for his great rare book library.

By comparison, the author has extremely positive comments about most of the people who interacted with Osler. Howard Kelly is described as an extremely hard working professional whose strong Christian faith fostered his work in community public health. Harvey Cushing is depicted as a fitting successor to Osler as the model of an ideal physician. Osler's wife, Grace, is shown to be a strong woman whose position as head of the household permitted Osler the freedom to succeed in his professional goals.

Perhaps Bliss' main success in this biography is to show the human and humane side of William Osler. The author cleverly discusses Osler's unique sense of humor, both in his publications under a pseudonym and his love of practical jokes. The author stresses Osler's love and enjoyment of children, almost making it seem that he should have been a pediatrician. Above all, Bliss demonstrates how much Osler loved the profession of medicine at its highest level, by his dedication to his students and support of medical educational reforms, his numerous scholarly publications on diverse medical topics, and his parti-

cipation in a myriad of medical societies. Osler represents the best of the medical world of his age and anyone interested in understanding that world should start by reading this excellent work.

Jonathan Erlen
Falk Library of the Health Sciences
University of Pittsburgh
Pittsburgh, Pennsylvania 15261
U.S.A.

Samuel H. Greenblatt, ed., T. Forcht Dagi and Mel H. Epstein, contrib. eds. *A History of Neurosurgery in its Scientific and Professional Contexts*. Park Ridge, Illinois: The American Association of Neurological Surgeons, 1997. xiv + 626 pp. Ill. $90.00 (cloth).

This book's bulk will be the first thing readers notice. Its six hundred and forty pages weigh in at over two pounds, and its thirty-six authors collaborated on twenty-nine articles spread among five sections. The editors' apologies to their families and co-workers for the time this project took away from home and office are no mere editorial rhetoric or courtesy. The conception and execution of this project surely tested their wit, ingenuity, and patience. If readers mistake this book for a ''coffee table history,'' however, they will miss reading a substantial and important work.

In ''The Historiography of Neurosurgery: Organizing Themes and Methodological Issues'' (pp. 3–9), Samuel Greenblatt, the book's editor, writes that neurosurgery is a profession based on neurological and scientific techniques. The profession grew as surgery differentiated itself from medicine, and as surgeons interested in the brain and spinal cord identified with each other and organized themselves around common interests and goals. The neurological and surgical underpinnings of the profession were in place by about 1875: cerebral – especially cortical – localization, general and local anesthesia, and antisepsis (followed by asepsis in the 1890s). Although there had been much neurosurgery before 1875 (see Section II: Surgery of the Head and Brain Prior to the Late Nineteenth Century) and development of neurology and neurophysiology before then (see Section III: Gestation and Birth of the Specialty), the growth of professional neurosurgery is essentially a twentieth-century phenomenon. Paul Broca, John Hughlings Jackson, David Ferrier, William Macewen, and Charles Sherrington all contributed significantly to the scientific and surgical foundations of the field, but, according to Greenblatt, Harvey Cushing, whose work was the impetus for the 1920 founding of the Society of Neurological Surgeons, began the specialty.

The fourteen essays of the book's fourth section, ''The Evolution of Modern Neurosurgical Techniques and Technology,'' delineate the many areas within the field: ''Neurosurgical Techniques: An Overview''; ''History of Neuroanesthesia''; ''Localization Techniques: Neuroimaging and Electroencephalography''; ''Intracranial Tumors: The Evolution of Treatment''; ''History of Neurovascular Surgery''; ''The Management of Head Trauma''; ''Hydrocephalus and the Development of Pediatric Neurosurgery''; ''History of Degenerative and Traumatic Diseases of the Spine''; ''History of Pituitary Surgery''; ''History of Stereotactic Surgery''; ''History of Pain Management''; ''History of the Surgical Treatment of Epilepsy''; ''The Neurosurgeon's Interest in the Corpus Callosum''; and ''The History of Psychosurgery.'' Although each essay treats a single topic, common themes relate them to each other.

Robert Wilkins's essay on neurosurgical techniques (pp. 193–212) is a good example of the high level of research and analysis found in each essay. Even the most casual of historians is aware of the antiquity of trepanning and can imagine its technique. In this essay, Wilkins describes in some detail the care with which physicians attempted this procedure and shows how the emergence of a new technology, in this case metal, changed not only the craft with its cutting tools but also hemostasis with clamps. The rise of cerebral and cortical localization raised a serious problem for these surgeons: how could they operate on a specific region of the brain without leaving large holes in the patient's skull? This necessitated the development of imaging techniques from X-rays to MRI that allowed for greater diagnostic and surgical precision; these topics are examined in such essays as Dean Gobo's on

localization techniques, William Feindel's, et al., on the surgical treatment of epilepsy, or T. Forcht Dagi's on stereotactic surgery. In this one example can be seen the interplay among basic science, technology, and surgical skills. The remaining essays in this section are similar insofar as they demonstrate how surgical needs drove innovation through the adaptation of older techniques and the adoption of newer ones. These accounts, however, are not just the listing of new tools or techniques; they tell the story of the intellectual pursuits of the men who developed them.

The fifth section is devoted to organizational and philosophical issues. Edward Laws's essay on ''Schools'' of Neurosurgery and Carl Hauber's and Chris Philips's on the growth of organized neurosurgery in the United States trace how in the late 1910s and early 1920s, neurosurgeons recognized their shared interests and began to organize themselves to promote those interests. The field grew, and by the 1970s not only had the small pioneer band grown, but so had the number of societies serving the discipline and the medical specialty. Black, et al., give a rapid tour of neurosurgery beyond the north Atlantic countries. Dagi's description of the philosophical issues in neurosurgery concludes the book's narrative. Given that neurosurgery, perhaps more than any other medical or surgical discipline except pharmacology, comes closest to touching that which makes us human, the philosophical section should have added more material on the brain-mind question. The earlier section on psychosurgery might have explored more about these issues, too. (Cartesians will be upset that there was no discussion of surgery of the pineal gland.)

The last section contains the book's critical apparatus. Each essay is fully referenced; at the end of the book, however, readers are rewarded with James Tait Goodrich's excellent bibliography and biography of the key books and players in the development of neurosurgery. Besides the index, there are listings of birth and death dates of prominent neurosurgical figures, a cumulative index of cited references, and a list of illustrations and their sources.

For whom was this book written? Neurosurgeons? Historians? At a meeting a few years ago of the American Association for the History of Medicine, I overheard in the buffet line this snippet of a conversation between two clinician-historians: ''I always love coming to these meetings because it's the only place where I don't have to apologize for writing history.'' Greenblatt's introduction and the historiographical issues contained in it reminded me of that chat. As mentioned above, Greenblatt first presented the basic definitions, scientific discoveries, and neurological scholarship that had to be in place for the profession of neurosurgery to emerge and to develop. He then added an apologia for writing a history of neurosurgery. Seeing his audience as primarily fellow neurosurgeons, he reviewed the arguments about why physicians should know the history of medicine. Knowing history is vital, he argued, for ''we define ourselves – as individuals and as groups – through our histories'' (p. 7). He then presented other reasons – some familiar, some new – for understanding history. The oldest and most familiar justification is that history humanizes scientists, especially by exposing them to social values. This view has a long pedigree whose elements can be found in C. P. Snow's ''two-culture'' debate, the probable mission of the History of Science Society at mid-century, or even the rationale for general studies programs in the late 1940s. Another reason, for example, is that history helps current practitioners because it gives perspectives and provides analogies from the past to current work. Greenblatt then proposed a new rationale: ''using historical analysis as part of the process in doing current investigative work'' (p. 7). To do a decent literature search requires using older material in a specialty so broadly defined and so rapidly changing as to be unintelligible in its presuppositions to the modern neurosurgeon. Penfield's work on cerebral localization from the 1950s and 1960s is used as an example; the underlying assumptions that were unstated but understood then are today unstated but unrecognized. Is cortical functioning localized or holistic? Are the philosophical underpinnings for or against localization derived from theology or from computer science? Reading Penfield properly requires some historical expertise.

Greenblatt's apologia and proposal deserve comment. Was Harvey Cushing more humane

because he wrote medical history? Will medical students who respond to required courses in medical history by voting with their feet be more likely to be insensitive to their patients? These older ideas are still around, but they are impossible to evaluate, and therefore are useless. Greenblatt's idea, however, could be evaluated, and it would be useful if a neurosurgeon took his suggestion and wrote up how it influenced his or her work. The clinician-historian at the meeting, however, had a good insight. Among neurosurgeons, the editors thought an apologia was in order, but among historians, none is needed.

What will historians gain from reading this book? First, the material raises interesting historical questions. The development of new techniques is traced, but what accounts for their acceptance? How are neurosurgeons persuaded that a newer technique is a better technique? Through a series of cases or through randomized clinical trials? How has the mechanism of persuasion in this field changed over time? Or, historians would notice the preponderance of men in this institutional history and would try to understand the specialty's growth in terms of gender and race. Also, what are the roles of deference, power and authority in the formation of specialties? Looking at the specialty's ''creation mythology'' illustrates this point. According to Greenblatt, it happened at the 1919 meeting of the American College of Surgeons. Cushing had just finished reading a paper on his improved brain tumor statistics and William J. Mayo, the chairman of the session, ''declared, 'Gentlemen, we have this day witnessed the birth of a new specialty – neurological surgery' '' (p. 4). The neurosurgeon and historian are interested in what Cushing did, but the historian is also interested in what Mayo said. Was it orchestrated or spontaneous? Was this birth part of a larger process going on in American medicine? Were there dissenting views? These are but some examples to show that Greenblatt and the other contributors have provided a stimulus to historians.

Second, historians will also use this work as a massive reference work. The histories of the neurosurgical subspecialties are well covered and the informative appendices are especially valuable.

Third, in later years, the book itself will serve as a primary source in which historians will be able to discern patterns of growth and behavior of the field that are unrecognized today.

In conclusion, readers should not be put off by the volume's heft. It contains a wealth of information, not only about the facts and figures of neurosurgery but also and especially about the people who have created and continue to create this field. Neurosurgeons will discover much they did not know about their past, and if the editors' goals are met, they will have gained in the reading a greater sense of who they are as a group. Historians will also be indebted to the editors. The editors have served by providing a record and historians by providing new insights and questions. Do not leave this book on the coffee table: read it!

Thomas P. Gariepy
Program in the History and
Philosophy of Science
Stonehill College
Easton, Massachusetts 02357
U.S.A.

Paul Churchland. *The Engine of Reason, the Seat of the Soul: A Philosophical Journey into the Brain*. Cambridge, Massachusetts: MIT Press, 1996 (first paper edition); 1995 (originally published). xii + 329 pp. Ill. $38.50 (cloth); $21.95 (paper).

Paul M. Churchland and Patricia S. Churchland. *On the Contrary: Critical Essays, 1987–1997*. Cambridge, Massachusetts: MIT Press, 1999 (first paper edition); 1998 (originally published). xii + 349 pp. Ill. $37.00 and £25.50 (cloth); $17.95 and £12.50 (paper).

Many years ago, when we were graduate students at the University of California, San Diego, my fellow philosophers-in-training and I called Paul Churchland the ''used car salesman of philosophy.'' We actually meant that as a compliment. We believed Churchland was so eloquent and so persuasive that he could talk anybody into

believing any argument, no matter how ridiculous. He is one of the few people I know who talks as he writes, in full and flowing paragraphs. I do not think he actually breathes at all.

My opinion of Churchland has not changed much over the years. Even to my now jaded eyes, he is a beautiful writer who does philosophy proud. The question is whether there is any substance behind the gleaming appearance. My response is, yes, there is; Churchland is one of the truly original thinkers in philosophy. He is one of the few with a bold vision and is unashamed to share his exciting view of the world with as many listeners as possible.

In *The Engine of Reason, the Seat of the Soul*, Churchland brings his vision and his enthusiasm for his vision to the more-or-less lay reader. And his vision is of how our brain creates us, creates persons with ideas, fears, hopes, dreams, and experiences. It is a vision inspired by recent (and not so recent) advances in connectionism and parallel distributed modeling in cognitive science. It is the vision of vector-coding.

Churchland hypothesizes that our brain encodes its tastes, textures, smells, sights, and thought by mapping the various possible aspects of each percept into a multi-dimensional phase space. For example, we can taste bitter, sweet, salty, and sour. Everything we taste, we taste in terms of how much it has of each of these components. Your morning coffee (if you take it black) activates your bitter taste sensors strongly, while it does not stimulate at all the sour ones. In contrast, my Aunt Leta's bread-n-butter pickles stimulate the sweet and sour sensors quite a lot, but the bitter and salty ones only a little bit. We can break each taste down into component activations of the four dimensions composing our taste "space." Hence, we can map each taste as a point (or vector) in an abstract four-dimensional state space.

We can follow a similar process, Churchland thinks, for color processing, olfaction, and all manner of perceptual processes. The only thing that really varies among our cognitive procedures is the size and dimensionality of the various abstract spaces. Moreover, once our brains have learned to identify particular regions or points in state space with particular stimuli, we get a way to recognize objects in our world. Even when things present themselves in fuzzy or confused form, as long as our brains can tell that they are close to some prototypical vector, we can identify them as the things they are. Such is the power of vector coding and vector processing.

In addition, if we could figure out that the vector spaces are the brain uses, then we could build machines to imitate or instantiate brains. Even better, if we could figure out vector processing in the brain, then we would know how the brain creates consciousness, language, art, morality, and science! Few have more proselytizing zeal than Churchland, a true born-again neuro-computationalist. He sees vector-computation everywhere. For some, this is what makes him so infuriating. For others, this is what makes him so original.

Churchland's ideas are broad, bold, and brash, if untested. It is good and important that we take an approach to understanding the brain and push it as hard as it will go. I am less sanguine that Churchland will prove right in the end. More likely, I suspect, as complicated an engine as the brain is, only some representations will be vectors; others might be coupled oscillators; and still others might be best modeled by first order predicate logic. Nevertheless, we can only push an idea until it breaks before we will find out exactly what its power is.

On the Contrary supports and extends the philosophical side of Churchland's program. (I hope not to fall into the mistake of thinking that Pat-and-Paul are one intellectual being, but even though both Patricia and Paul are listed as co-authors, Pat is the single author of only one chapter, so I think of this book as largely an exposition of what Paul Churchland holds true). This is not a book written for the lay-person. Indeed, its audience are those already steeped in the academic debates surrounding Churchland's claims, for it is composed of essays that the Churchlands have written in direct response to others' claims and counter-claims. It is a dense and detailed book, but one well worth reading if you already have the necessary background.

On the Contrary defends Churchland's views that folk pyschology is radically false and should

go the way of talk about phlogiston, that scientific theories of consciousness are unproblematic and just around the corner in neuroscience, and that radical transformations in points of view are a natural and important part of science. Tucked in and around these themes are pointed criticisms of John Searle, Roger Penrose, Frank Jackson, Clark Glymour, and other recent complainants of Churchland's vision of the power of computational neuroscience.

Churchland's take on folk psychology follows almost immediately from his views concerning how brains represent the world. If knowledge and thoughts are represented in terms of activation vectors in the brain, then how we normally describe ourselves to one another in our everyday lives is hopelessly wrong. We do not have anything resembling sentence-like beliefs, desires, hopes – the so-called propositional attitudes – in the head. We are simply wrong about how things are when we introspect. At times, Churchland appears to confuse folk psychology with scientific psychology, so it is not always clear what the impact his arguments should have on mind studies as they are currently done.

Churchland's views on consciousness reflect his boundless faith in the current trends in neuroscience. Consciousness is yet another biological phenomenon and explaining it will be just like explaining anything else: we look for correlations between conscious states and brain states. Enough correlations add up to an identity. Voilà! The problem of consciousness is solved! Insofar as you are antecedently convinced of consciousness's mundane place in the material universe, you should find Churchland's discussion right on and quite entertaining.

Finally, Churchland celebrates Feyerabend's radical philosophy of science. Paul Feyerabend is famous, or perhaps infamous, for arguing that science proceeds best by a proliferation of ideas and theories. "Let a thousand flowers bloom." The best will remain in the end. Churchland sees his approach as fitting into the Feyerabendian spirit for he is articulating a radical new way of understanding mind. (His insistence that propositional ways of describing mental life has to go fits only uneasily with his desire to emulate Feyerabend, but philosophical inclinations do not always fit easily with one another.) Time will only tell whether his flower shall bloom.

Valerie Gray Hardcastle
Science and Technology Studies/
Center for Interdisciplinary Studies
and Department of Philosophy
Virginia Technological University
Blacksburg, Virginia 24061-0227
U.S.A.

Alison Winter. *Mesmerized: Powers of Mind in Victorian Britain*. Chicago: University of Chicago Press, 2000 (first paper edition); 1998 (originally published). $17.00 (paper).

During the 1840s, Great Britain became, in the eyes of some contemporaries, the "Island of Mesmeria." The practice of mesmerism had become seemingly ubiquitous. It was practised by well-known figures in various walks of life: among them, Charles Dickens, Alfred Russell Wallace, and Augustus de Morgan. Many other eminent Victorians showed at least a passing interest in the phenomenon. Mesmerism was not, however, merely a preoccupation of the elite. It became a true mass movement with lecturers touring the breadth and length of the country to demonstrate the wonders that could be performed through its use. Under its influence, one individual seemed to cede control of his or her body and actions to the will of another. While in this state, amazing cures were accomplished. The mesmerized person might lose all sensibility and become oblivious to injuries inflicted upon the body thus opening up the prospect of painless surgical operations. At the same time, however, the mesmerized subject seemed to acquire abilities that verged on the supernatural. The mesmerized individual could seemingly diagnose disease in herself and in others. She might even be able to observe events occurring in distant places.

When historians have sought an understanding of these events, they have tended to see mesmerism as a precursor for what became known as hypnotism, or as a step towards the discovery of the unconscious. The tendency has, in other words, been to place mesmerism within a lineage

or genealogy rather than exploring the cultural ramifications of the phenomenon. Alison Winter's monograph seeks to provide an account of mesmerism as a symptomatic aspect of the mid-Victorian period – one that casts light on a remarkable range of the preoccupations of the time. She locates mesmerism in the context of contemporary concerns about the physiology of mind, and of the relations between mental states and physical forces. Because mesmeric practices often involved the diagnosis and treatment of disease, questions of medical authority were raised by its popularity. The adjudication of the sometimes extreme claims made for mesmerism also provoked debates about who was competent to arbitrate on such matters of fact. The still fragile status of scientific expertise was in the process brought into sharp focus. Issues of class, gender, and race, perhaps predictably, were also drawn into the mesmeric maelstrom.

Winter argues that in all spheres of life mesmerism served as a catalyst for contemporary concerns with the issues of how ''influence,'' in its varied forms, could pass from one individual to another. An important subtext to this story is the transformation in the course of the nineteenth century of interpersonal influence from a physical substance (some mesmerists thought it could be bottled) to a purely psychological effect. The influence that a mesmerist seemed to exert on his or her subject was apparent. Such displays of control could reinforce established notions of deference and subordination. But when mesmerism, for instance, revealed that a working-class man could exert his will upon a middle-class woman, the implications were alarming. Still more disturbing were occasions when mesmeric subjects, such as the notorious O'Key sisters, seemed to cast off the influence of the mesmerist, and turn the phenomenon to their own ends. In her final chapter, Winter seeks, perhaps a little tendentiously, to show that mesmerism provided a template for understanding the exertion of other forms of influence – such as that exerted by a conductor over an orchestra or by a political orator over his audience.

Although some of her claims are open to question, this is a fascinating and impressive study of a practice that claimed to cast light on the relations between mind and matter, the physiological and the spiritual. Although the vogue for mesmerism was short-lived, the episode exposed several of the most enduring concerns of the period. Winter shows that the mesmeric moment undoubtedly illuminates the social history of the Victorian epoch.

L.S. Jacyna
Wellcome Trust Centre for the
History of Medicine
University College London
London NW1 1AD
United Kingdom

Ingrid Andrea Schuster. *Heinrich Boening (1895–1960). Giessens letzter Ordinarius für Neurologie und Psychiatrie*. Giessen: Wilhelm Schmitz, 1999. 185 pp. Ill. DM 78.00 (cloth).

How is history made?
Do people themselves make history, or do historical forces find their actors? Ingrid Schuster's biography of Heinrich Boening presents a (prototypical) actor – the occupant of the final combined professorship in neurology and psychiatry at the University of Giessen. Boening's life serves as an example of the professional training and the academic and administrative career of a twentieth-century German academic physician. Schuster pays attention to the political and the social conditions in Germany that Boening had to overcome in his professional career. Boening as a person is not part of her analysis. In the book, Schuster describes the life and the professional career of Heinrich Boening through the German Reich, the Weimar Republic, the Third Reich, and the foundation of the Republic of Germany. In exemplary fashion, Schuster illustrates the circumstances of Boening's professional development during the different historical periods and is particularly interested in the various expectations and demands Boening faces.

Boening spend his childhood and youth growing up in the German Reich. Schuster thoroughly delves into Boening's daily school life, going so far as to describe the courses he studied and the problems he faced for the entrance examination.

After high school, Boening went on to study philosophy and medicine in Innsbruck, Münster, and Jena. In examining Boening's university studies, Schuster seeks Boening's motives for breaking off his study of philosophy and switching to the study of medicine. Schuster also places great emphasis on the curriculum and the political and social circumstances when considering Boening's professional career, placing special attention on his internship with Hans Berger in Jena.

With the arrival of National Socialism, political problems too presented themselves for Boening. Because of political reasons linked to National Socialism, he was not only to be denied the professorship in Giessen that he aspired to, but he would also lose the directorship of the hospital in Stadtroda. Boening was thought to show too little conviction for the reigning ideology of the time. Schuster points out that Boening finally owes his appointment to the Giessen professorship to his Swedish wife, an ''Aryan'' foreigner. Once there, the resourceful Boening enjoyed so much success in furthering his career goals, that he was able to lead the University of Giessen through World War II as its administrative director. Despite holding a major office during the Third Reich, Boening was not affected by the de-Nazification by the Allied Forces, once again due to his Swedish wife who was considered a persecuted foreigner. This is how Boening retained his position as the administrative director throughout the foundation of the Republic of Germany and the re-establishment of the universities. He died while in office in 1960.

Schuster's book demonstrates good research and shines especially in providing the historical context of Boening's career, by conveying a great deal of information and by giving attention to the social situation. What is particularly strong about this book is Schuster's ability to probe behind seemingly apparent issues, to analyze political relationships, and to identify the most salient circumstances that contributed to Boening's career. Schuster's analysis is supported by meticulous documentation and by precise historical methods that use previously unreleased sources and oral interviews with those who knew and worked with Boening. All of this work leads to a well-rounded impression of the different stations that Boening had to pass through on his way to the Giessen professorship as well as the different expectations towards Boening in his different fields of duty. Boening in Schuster's view is a man of work, of duty, and of obligation. Boening's private life is only hinted at in this biography.

It might not be the actual goal of a historical study of the last holder of the Giessen professorship to present the ''person behind the office.'' But a few human traits would surely have become a neurologist and a psychiatrist like Boening. For that purpose, Boening's biography could have supplied even dramatic points of interest, that are unfortunately only suggested by Schuster: to lose both legs at the age of five would surely have shaped Boening's personal development, as well as his father's sense of justice to forbid the other children from playing games in which Boening could not participate. The secondary benefits brought on by the disability would become an immense burden for Boening and his family. Feelings of guilt, a constant striving for maximum performance, and trying hard to overcompensate in the sense of Adler can all be seen as important determinants of Boening's intrinsic values. It should not come as a surprise that Boening was not to be impaired much by his disability in school or in his job. It also is not surprising that Hans Berger – Boening's superior and mentor in Jena and described by Schuster to have a melancholy personality of the Tellenbach type – found a congeniality of souls in Boening.

We learn very little about Boening's wife in the three passages where she is mentioned; the marriage took place in order ''to prevent the would-be traveler from travelling on.'' Promising is the story of how his Swedish wife saves Boening, at first from persecution by the National Socialists and then from the de-Nazification committee. The Swede represents the Aryan for the first group, and the persecuted foreigner for the second. One would have liked to hear more about her. But Schuster reveals nothing but her name. Their daughter is not mentioned except only in the appended *curriculum vitae*. It is indicative of this biography that at the end of Boening's work-packed and duty-bound life, we are not even told

the name of his long-wearing and lethal malady, not even to mention his cause of death.

And then again, it might only be this psychiatrist's wish to know more about the personal side of Boening, that deems a lack of personality in Schuster's work. But as a historical study of an academic career, Schuster's work is quite accomplished.

Not quite two hundred years ago, the rather unknown author Jacob Michael Reinhold Lenz described the human being to be an automatic machine with the function of filling the gaping hole in society. The rest of one's life is spent in fulfilling this obligation. It appears as if Lenz had the life of Heinrich Boening in his mind as it is portrayed in Schuster's analysis. Nevertheless, the work at hand provides a solid basis for an equally captivating and – from this psychiatrist's point of view – a more interesting, personal, and humane approach to Heinrich Boening. We await the sequel.

Jürgen L. Müller
Department of Psychiatry
University of Regensburg
Universitätstrasse 84
Regensburg D-93053
Germany

Nicholas J. Wade. *A Natural History of Vision*. Cambridge, Massachusetts: MIT Press, 2000 (first paper edition); 1998 (originally published). xvi + 466 pp. Ill. $58.00 and £39.95 (cloth); $29.95 and £20.50 (paper).

Nicholas Wade's *A Natural History of Vision* covers a well-documented range of topics including light, color, subjective visual phenomena, motion, binocular vision, space and visual illusions – all using the original, primary sources from Democritus (400 B.C.) to Hermann von Helmholtz (1867). Wade invites both visual science researchers and the lay reader to explore a fascinating chapter in the history of science called ''the observational era of vision.'' The captivating journey leads the reader to the roots of our present understanding of visual phenomena. Wade's suggestion that our daily experiences – such as feeling pressure or a blow applied to the eyeball (p. xiv) – might have initially shaped theories about the visual system is very attractive. The ''world is as it is perceived'' writes Wade, inviting the reader to explore the source of natural visual phenomena. Initially, physics and physiology were used to interpret natural phenomena. The ''opened avenues of experimental'' work in vision was marked by the invention of instruments for systematic studies (e.g., stereoscope), leading to a turning point in the history of vision and the emergence of experimental science (p. xiii).

The natural history of vision ''involving records and interpretation of natural phenomena'' (p. 1) started in ancient Greece. Democritus (ca. 400 B.C.) described light as being inseparable from the visual system as the physical optics was confused with the visual perception and color science was based on ''an analogy with the four elements'' (p. 117). Later on, the physical properties of image formation in the eye (dioptric vision) was described by Johannes Kepler (1604) and the prismatic experiments of Isaac Newton (1672) on the color property of light contributed to separate physics from the visual phenomena. However, the ultimate distinction between a stimulus and sensation was only achieved after refraction laws were understood. The functional anatomical aspects of vision, were undertaken by Galen (ca. 175) who defined the retina or netlike tunic as an ''outgrowth of the brain'' (p. 89) and for him, the lens was the ''principal instrument of vision'' through which ''the visual spirits were allowed to interacted with animal spirits in the cerebral ventricles'' (p. 89). Felix Platter (1583) identified the retina as the receptive organ, and Newton (ca. 1682) proposed a mechanistic interpretation of vision: ''light produced vibrations in the retina, and these were conducted to the brain along the optic nerve'' (p. 89). Afterward, Claude Nicolas Le Cat (1744), George Palmer (1777), and John Elliot (1786) incorporated Newton's concept of ''vibratory motion of both light and the retinal response to it'' (p. 119). The retinal structure was only studied in detail at the beginning of the nineteenth century with the achromatic microscope developed by Ludolf Christian Treviranus (1837) who drew the first

representation of this neural layer. Following that period, experiments on color mixing lead to a physiological interpretation of color vision. For example, Robert Young (1802) conceived color vision as ''limited to a number of sensitive particles'' equal to ''the three principal colours, red, yellow, and blue'' and Johannes Müller (1838) proposed that ''light and color are actions of the retina, and its nervous prolongation to the brain'' (p. 126).

Vision, as opposed to optics and ophthalmology, became an experimental discipline rather late. Ernst Heinrich Weber (1834) introduced psychophysical methods to study visual discrimination, and Charles Wheatstone (1838) introduced the stereoscope to study depth perception and its relationship with retinal disparity. Johannes Müller's *Handbuch der Physiologie des Menschen für Vorlesungen* (1834) marked a turning point in the natural history of vision. He described for the first time instruments for the manipulation of space and time based on physical principles. The integration of physics and psychophysiology toward the understanding of vision was later undertaken by Hermann von Helmholtz and presented in his three-volume *Handbook of Physiological Optics* (1867).

The structure of the Wade's book is clear and well-organized. Each visual phenomenon – according to the classification by Ptolemy (second century) – is treated as a separate topic in its historical context. Although not intended to be comprehensive, in most cases, the historical context helps the reader to understand some of the original source material. The book helps non-specialists explore the origins of contemporary concepts in visual neuroscience. Wade introduces an artistic dimension to his book by including engraved portraits of natural philosophers, further helping the reader's imagination in this travel. At the end, Wade gives a brief account of what happened in the study of visual phenomena with further scientific and technological developments that took place during the post observational era. Readers will not be deceived by Wade's invitation to travel to the origin of the study of the visual phenomena. Students of vision are likely to use the *Natural History of Vision* as a source of inspiration and knowledge and, by accepting Wade's invitation, they may well be converted into budding historians of science.

Adrián G. Palacios
Faculty of Science
University of Valparaíso
Gran Bretaña 1111, Playa Ancha,
Valparaíso, Chile

David Park. *The Fire Within the Eye: A Historical Essay on the Nature and Meaning of Light.* Princeton, New Jersey: Princeton University Press, 1999 (first paper edition); 1997 (originally published). xiii + 377 pp. Ill. $47.50 and £33.50 (cloth); $17.95 and £11.95 (paper).

As a young child, I remember sitting in my father's office at Niels Bohr's Institute for Theoretical Physics in Copenhagen and smelling the aromatic tobacco of Professor Bohr's pipe preceding his avuncular visage through the doorway. This vivid multi-sensory image has stayed with me over the years, reinforced by a gradually acquired understanding of the magnitude of Bohr's contributions to modern physics. For this reason, I was particularly pleased to find a portion of what I consider to be Bohr's most apposite quotation on the history of science in the concluding chapter of David Park's book. The full quotation reads, ''There is no quantum world. There is only an abstract quantum physical description. It is wrong to think that the task of physics is to find out how nature is. Physics concerns what we can say about nature'' (Petersen 1963, 12). In other words, the ''abstract quantum physical description,'' that is, the mathematical language of quantum mechanics, cannot accurately describe ''how nature is.'' Bohr tells us that the language of quantum mechanics exists in a different realm than external reality and is part of ''what we can say about nature.'' This is a profound historiographic observation and one explicitly recognized by David Park. The words and symbols used in scientific documents appear to have unambiguous meanings because they refer to recurrent natural events that we also observe. However, since the words and symbols of historic science are actually part of ''what can

be said about nature,'' they are more a product of perception than reception. That is, they are formed by observation of a recurrent natural event filtered through the complete model of the world of the society in which they occur. As such, the words and symbols of historic science cannot be known completely. David Park provides a stunning illustration of this problem by examining past descriptions of the star Sirius. We see the color of Sirius, the brightest star in our sky, as blue-white, yet documents from Babylonia and Rome call it respectively, coppery and red, while the astronomical lists of Ptolemy classify Sirius as ''somewhat yellow'' (*hypokirros*). As Park points out, the color of Sirius cannot have changed during this period so what is going on? He concludes that, '...the world may not have looked to them the way it looks to us'' (p. 34).

Though rarely this obvious, the words or symbols used to describe any scientific observation have an ineradicable uncertainty that derives from the way that they relate to the external events they specify. In essence, the price that is paid for communication with others is the inability to unambiguously describe the natural world. This seemingly inescapable conclusion has profound consequences. For example, it means that pronouncements about the ''end of science,'' or claims that science explains ''reality,'' cannot be correct. Any final scientific truth or description of reality must be unambiguous, yet any such truth can only be expressed in a language – mathematical or natural – that is structurally ambiguous. This perspective does not figure prominently in the recent popular debates on the nature of science (Weinberg 1996), but it does demonstrate the value of historical and historiographic analysis for issues of contemporary concern. Though these conclusions are not part of Park's argument, nor can they be attributed to him, I found his explicit recognition of the problem of the meanings of words and symbols in historical science to be the most impressive aspect of an otherwise excellent book.

What David Park has done is to give us an eclectic work of immense erudition and mischievous humor. Using the idea of vision and light, he takes us on an idiosyncratic and illuminating (sorry) tour of the development of Western science from the pre-Socratic philosophers of Miletus to the rudiments of quantum field theory. The book uses no mathematics and leads the reader by the author's depth of understanding and the force of common sense fortified by incisive analogy. His path from ancient Greece to modern science is anchored throughout by the personal stories of the many contributors to our present knowledge. Many of these are well known, some are not, but the biographical interludes add context and atmosphere that is often lacking in books on the history of scientific ideas.

The choice of vision and light as organizing principles for the book allows an unfettered investigation of the entire field of Western natural philosophy. Park considers three major questions: what is it that we see, how do we see it, and how does the nature of light relate to these two? By examining what it is that we see, Park can consider the nature of objects and how the visible universe is related to the world of ideas. This lays a firm foundation in the pre-Socratic and classical Greek tradition for the origin of recognizable Western science. The idea that natural events have natural causes, rather than purely supernatural ones, is essential for what we today recognize as the scientific method. Observation and hypothesis linked in a recurring cycle is fundamentally a classical Greek idea. The survival and advancement of Greek natural philosophy in the Arabic civilization provides an often neglected bridge to medieval and Renaissance European thought. There is very little in this book with which I would take issue, but Park's treatment of the medieval scholastics is one. He characterizes them as a hurdle to be overcome on the path to an enlightened science. It is true that their rigid religious methods and language make them seem almost comical by modern standards, but if the meaning of their words is interpreted contextually, their contributions to the evolution of ideas of space and time are seminal. For example, John Duns Scotus took an essential step toward modern physics when he proposed that time could exist in the absence of movement, thus freeing it from being simply a property of objects (Alluntis, Wolten 1975, 263).

By surveying the different notions of how we see, Park presents some of the history of anatomy and physiology. Relating light to what and how we see allows a detailed discussion of the evolution of modern physics. Park's excellent presentation of the difficulties encountered in the last century trying to explain the fundamental nature of light prepares the reader for the mental gymnastics needed to comprehend the implications of quantum mechanics and quantum field theory. This part of the book is particularly well done. Nineteenth-century physics is most often presented from the perspective of its contribution to modern ideas and, as a consequence, it is uncommon, even among physicists, to be aware of such interesting facts as the completely mechanical origin of Maxwell's equations.

Along the way, Park answers questions about the nature of common phenomena that most readers could not have understood as children and are too embarrassed to confront as adults. These include how a rainbow is formed; why light does not go around a corner but sound does, when both are waves; why our eyes see such a small part of the electromagnetic spectrum; and how it was discovered that there was an electromagnetic spectrum beyond visible light.

All in all, this is a marvelous and entertaining book. There is something for everyone. Professional historians and historiographers, physicians and physicist can enjoy the book. Most of all, though, this is a book for anyone interested in the world around them, and how our ideas about it got to where they are today.

David A. Steinberg
The Såa Institute
Fiddletown, California 95629
U.S.A.

REFERENCES

Duns Scotus J; Alluntis F, Wolten A, trans. (1975): *God and Creatures: The Quodlibetal Questions*, Princeton, Princeton University Press.

Petersen A (1963): The philosophy of Niels Bohr. *Bulletin of the Atomic Scientists*, September: 8–14.

Weinberg S (1996): Sokal's hoax. *New York Review of Books*, August 8: 11–15.

Howard I. Kushner. *A Cursing Brain? The Histories of Tourette Syndrome*. Cambridge, Massachusetts and London, UK: Harvard University Press, 1999. xii + 303 pp. Ill. $29.95 and £20.50 (cloth); $16.95 and £11.50 (paper).

From the outset, Howard Kushner shares his hopes that his histories of Tourette syndrome will offer the medical researcher, and even perhaps the clinical practitioner, a tool to understand the cause of this evasive disorder. He suggests that this ambition to produce a ''useful'' historical work lies in the clinical insights he acquired through studying the history of Tourette syndrome. For, when exploring the history of the disorder, a ''recurrent theme'' emerged which led Kushner to the belief that the syndrome was an auto-immune disease – that is, antibodies produced as a result of streptococcal infection (such as rheumatic fever) could turn on one's self and damage the basal ganglia in a way that creates the symptoms defined as Tourette syndrome. This breakthrough compelled Kushner to begin in 1994 a collaboration with Dr. Louise Kiessling of Brown University School of Medicine in order to further develop this auto-immune theory of Tourette's through clinical research (p. x).

On the other hand, Kushner also admittedly *began* his research with certain convictions concerning the cause of the disease. He explains that his work on Tourette syndrome was preceded by ''a decade's immersion'' in neurochemistry and neurobiology after which his ''mind was . . . 'prepared' to understand the possible organic factors of Tourette's,'' (p. x) and that he has ''no doubt that Tourette syndrome is an organic disturbance brought about by malfunctions connected with signaling in the basal ganglia'' (pp. 192–93). He also acknowledges that his clinical research with Kiessling on Tourette syndrome has, understandably, influenced his thinking about the nature of the disease.

This mental dance that Kushner describes between his clinical and historical researches provides a tantalizing backdrop for his book. It also leaves Kushner with a formidable challenge: can he balance his clinical and historical judgments in a way that produces an objective historical account, or do his contemporary scientific

convictions immoderately distort his historical vision? I claim the latter. And, even if Kushner's clinical research was, as he suggests, inspired by his historical readings on Tourette syndrome, his final *account* of that history fails to convey how or why his mind was changed. Regardless, I believe that the discriminating reader will find Kushner's book of great interest and value. In addition to being an intensively researched work on the syndrome – describing the fascinating multiplicity of causal theories that have been used to explain it over the past century – this book contains several insightful and stimulating historical arguments. I will further elaborate on these criticisms and virtues of Kushner's work.

Kushner's narrative of Tourette syndrome depicts a battle between two broad, competing categories of etiological thinking on the disease – psychogenic and organic. After a couple of introductory chapters, the main story begins in 1885, when Georges Gilles de la Tourette, a Parisian neurologist and a student of Jean-Martin Charcot's, extracted a constellation of tics and unusual behaviors from the broad disease category of movement disorders then known as ''chorea,'' and defined it as a new disease. At the time, a rheumatic etiology for chorea was arguably established, whereas Tourette promoted his disease as a neurosis that resulted from hereditary degeneration. It was a move that created a whirl of controversy, even within Charcot's circle, in the decades that followed. Kushner sets the tone for his book by probing the sources of this intriguing debate.

But rather than analyze this debate in terms of its own historical context, Kushner largely resorts to imposing his current belief system to understand the reasons for the dispute. He ultimately claims that the separation of Tourette syndrome from Sydenham's chorea was ''artificial'' (p. 21), i.e. ''wrong,'' since both diseases have a common organic, most likely rheumatic etiology, and argues that there was profuse evidence even at the time, although it was ignored, that these tics were often preceded by a streptococcal infection. Kushner claims that ''this *fixation* on psychological theories of degeneration often led to *ignoring* clinical data that may have raised interesting alternative questions, especially in relation to the work of Koch and Pasteur, on the possible role of infection in these disorders'' (pp. 39–40, italics mine), essentially dismissing Tourette's arguments and supporting those of his opponents. The outcome is a treatment of the debate that lacks both historical sensitivity and explanatory power. Kushner offers the reader no compelling reason as to why or how – given the mighty rise of bacteriology in the late nineteenth century, the alleged evidence that streptococcal infection was linked to Tourette's disease, and the overlap of symptoms between rheumatic chorea and Tourette's tics – the new disease survived well into the twentieth century as a *psychogenic* one.

By contrast, Kushner recounts the ascent of his own organic, infectious theory as a victory of accumulating evidence and reason. He states that ''psychiatrists would continue to pursue [psychogenic] explanations, which were not unreasonable given the general state of neurological science in the 1930s,'' but that ''such a strategy seemed more difficult in light of increasing evidence of the role of encephalitis [one example] in the production of tics.'' The psychogenic theory of Tourette syndrome ultimately crumbled, Kushner insists, when this evidence ''made it much more difficult for psychoanalysts to ignore an underlying organic cause of convulsive tics'' (pp. 99–100). He applies the term ''evidence'' routinely when writing about organic, infectious theories of Tourette syndrome but describes the basis for all psychogenic arguments as ''assumptions,'' ''beliefs,'' ''claims,'' and ''judgements.''

As a result, Kushner's treatment of psychoanalytic theories of Tourette syndrome often reads like a mockery of early twentieth century psychiatry. It offers little insight into the rich, intellectual world of Freudian and post-Freudian thinking, leaving the reader at a loss as to why, for example, the concept of tics as masturbatory equivalents that were even thought to lead to orgasm – absurd to most contemporary physicians – could possibly be compelling to so many individuals less than a century ago.

A particular problem emerges when we recognize that Kushner is rather heedless when the *organicists* of his narrative commit the crime of allowing themselves to be guided by unresearched claims about the causes of Tourette syndrome. In

a chapter dazzlingly entitled ''The Triumph of the Organic Narrative,'' Kushner introduces Arthur Shapiro – arguably the most important proponent of an organic understanding of Tourette syndrome and the most vociferous antagonist of psychogenic claims – with the following text: ''Shapiro was convinced before he ever met a Tourette's patient that most psychiatric disorders that were treated as psychogenic were really organic . . . [His wife] Elaine Shapiro recalled in 1965 when 'this first patient' walked into his office, 'I know that Arthur was absolutely convinced, he didn't have a shred of doubt that psychology played practically no role' '' (p. 170). Nevertheless, Kushner renders this rather striking example of *a priori* reasoning on the part of an organicist irrelevant by explaining that ''the Shapiros' insistence on an organic etiology of Tourette's essentially rested on their clinical experience'' (p. 173), after which he applauds them vigorously for opening the doors for later, strictly organicist research on the disorder.

I would suggest that Kushner himself is guilty of the same reasoning that he uses to dismiss psychogenic theorists throughout this book. Perhaps this is best described in Kushner's own words: ''Captives of the assumptions of psychoanalysis, [they] could conceive of no alternative to psychoanalytic therapy'' (p. 132). Thus, ''practitioners felt obligated to explain away rather than to engage in analysis of any contrary evidence'' (p. 40). And yet, the impossibility of extracting ourselves entirely from our current perspectives is obvious to every historian. Owsei Temkin, in his classic essay ''The Usefulness of Medical History for Medicine,'' considered the problem in the following way:

> In spite of all admonitions, we tend to exclude or overlook alleged facts which cannot easily be integrated into our prevailing theories. This tendency is all the greater if we are confronted with a work written at a time when controlled experiments and statistical evaluations were practically unknown . . . Hence it comes that old observations and cures are usually appreciated only after we have rediscovered them in our own way . . . Old books . . . must be approached with an open mind and just therein lies their usefulness. In trying to do them justice we educate ourselves and cultivate that truly scientific objectivity that is more often presumed than possessed. They help us to see beyond the limits of prevailing theory and may even sometimes reward us with a new comprehension of an old truth. (Temkin 1977, p. 80).

Kushner falls short of offering us an objective appreciation of old observations on the history of Tourette syndrome, and, by excluding or overlooking much of the historical understanding of the disorder, he does not help us to see beyond the limits of the scientific theories that he embraces.

These criticisms aside, Kushner's work is nevertheless remarkable in several ways. His second chapter, ''The Case of the Cursing Marquise,'' represents a thorough and insightful discussion of how a single clinical case-study of compulsive cursing, embodied by the Marquise de Dampierre and described in an 1825 publication by Jean Marc Gaspard Itard, acquired an ''emblematic status'' of the disease. Kushner describes how, as an ''efficient and compelling vehicle, a sort of short-hand description of the onset and course of the disorder itself'' (p. 11), the case of the cursing Marquise later became a standard way to introduce Tourette syndrome to readers of journal articles and other literature on the subject throughout the twentieth century. Moreover, he argues that the multiple re-tellings and interpretations of the Marquise's story over time teach us about the nature of the history of psychiatry and neurology. This chapter is even more fascinating in light of the fact that Tourette diagnosed the Marquise *retrospectively* by reading Itard's sixty-year old text, and in fact, Itard only examined her briefly.

Kushner makes another welcome contribution through his comprehensive treatment of the differences in the ''national styles'' of Tourette syndrome research, including a thorough survey of literature published in French, German, and Italian, and some interesting accounts of the debates that emerged during international conferences on Tourette syndrome. Kushner presents the various cultural and political meanings that certain etiological stances embodied for researchers of different nations – proposing that ''criticism of

what was characterized as the American construction of Tourette syndrome . . . began to take on nationalistic and almost conspiratorial overtones,'' (p. 208). He notes, for example, the comments of the psychoanalyst Lucien Israël, who made explicit connections between interpretations of Tourette syndrome and early anti-Semitic and then Nazi ideology. Kushner also provides a thought-provoking, if somewhat sketchy, argument that certain discrepancies between prevailing explanations of the disorder embraced by the United States and France reflect a difference in the stratification of medical power in the two nations. Kushner contrasts a strong ''grassroots'' ideal, embodied by the Tourette syndrome Association, that powerfully influences the direction of biomedical research in the United States with a cultural tendency in France to defer health decisions more readily to ''experts.''

In the end then, Howard Kushner's book represents a valuable contribution to the history of psychiatry despite flaws in certain parts of his argument. We are lucky to have this book in the corpus of our knowledge about the history of psychiatry.

Erika Wojciuk
Program in History of Science
Princeton University
Princeton, New Jersey 08544-1017
U.S.A.

REFERENCES

Temkin O (1977): *The Double Face of Janus and Other Essays in the History of Medicine*. Baltimore, Johns Hopkins University Press.