tioning of these brain regions, both in normal children and in those with perceptual and cognitive dysfunction, such as developmental dyslexia. Physiologic methods for differentiating and analyzing the various forms and origins of mental subnormality and psychopathology would seem to be potential outgrowths of the analysis of these higher-order cerebral potentials. There is certainly no doubt that the possibilities for enhancing our understanding of the human brain through recording its electrical actions have barely begun to be exploited. For those who might find exciting and potentially rewarding opportunities for adding to our understanding of the neurological basis of human experience and behavior, these books provide a useful assessment of what has been done so far, as well as point to the vast areas of ignorance which remain to be explored.

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Irrelevance in the Lab

Drugs and the Public. NORMAN E. ZINBERG and JOHN A. ROBERTSON. Simon and Schuster, New York, 1972. 288 pp. Cloth, $8.95; paper, $2.95.

To the scientist who believes that conventional pharmacological research is the major route to knowledge about the human effects of the illicit drugs, this book will be unsettling. For those who firmly believe the criminal law is a necessary response to the illicit use of drugs, the authors—one a psychoanalyst, the other a lawyer—can only be viewed as new devils joining Professors Packer (*The Limits of the Criminal Sanction*), Kaplan (*Marijuana —The New Prohibition*), Grinspoon (*Marijuana Reconsidered*), and others in heresy.

Drugs and the Public is not a research report; it cites scientific evidence only illustratively. It is concerned mainly with how attitudes toward drugs and the institutional structure of the drug law function, that is, what purposes they serve, and what effects they have. The authors' method is one of interpretation and analysis. They conclude that existing public attitudes are functional but damaging and that the social cost of the product—the criminal law and its effects—is very high indeed.

Simultaneously critical, analytical, historical, and action-oriented, their essay ranges over broad territory, moving (sometimes too rapidly and occasionally erratically) from illustrations derived from interviews enhanced by psychoanalytic commentary to testable hypotheses (such as that psychedelic drug use is compatible with being of the television generation because television has taught new cognitive-sensory styles which make ego boundaries more permeable) to reasoning from temporal correlation (youthful hostility to the police occurs because of the marijuana law) to legal commentary to the advocacy of social policy on humane grounds and on economic grounds. If, in all of this, there be a beastie to berate, it is the National Institute of Mental Health, which is found wanting for giving priority to pharmacological rather than sociopsychopharmacological research. The accusation is gently made that NIMH has joined the press and the public in that unwarranted alarmism about drug use which, the authors hold, creates (certain) adverse drug reactions (through stigmatization and alienation). The reader who recognizes that NIMH bases its funding at least partly on peer review realizes that the system for selection of review committees and the processes whereby scientists develop their interests in and convictions about drugs are obscure and are, like other matters raised by Zinberg and Robertson, deserving of greater general understanding.

The authors ask, How much that is useful to social policy can we expect from scientific information as it is conventionally gathered in the drug field? They call traditional biological laboratory work "impeccable but irrelevant." Scientists ought to be spending more time thinking about person, set, and setting as determinants of drug response. (Pharmacologists used to call these variables "nonspecific," which is a sign of how little faith pharmacologists had—have?—in finding regularities there!) They also propose that it is time for a science of subjective states. (If that fine old introspectionist Titchener is listening in his grave, he will be applauding.) These issues are by no means minor. Defined by other workers in somewhat different ways, the general concerns of Zinberg and Robertson are already exerting pressure in current research on how drugs ought to be classified when the purpose is to anticipate the outcomes of personal and social styles of use rather than of medically controlled ones. Unlike some of their colleagues, Zinberg and Robertson do not counsel postponing the revision of classification schemes (as in the U.S. Dangerous Substances Act, the British Misuse of Drugs Bill, or the proposed U.N. [Vienna] Convention on Psychotropic Drugs)—and of the basic law of which they are a part—until further studies are made. To the contrary, they warn that the call for "more research" may be a stall for time that only serves the status quo.

Their proposal for reform in social policy is a dramatic one based on their convictions, convictions that embrace moral and economic considerations. After reviewing alternatives, they recommend licensing. "We need a system that permits drug use but does not encourage it." The system they put forth "is based on automobile operator's licensing and would apply to *all* drugs, not just marijuana." They propose that licensing be done provisionally and revised as evaluation shows the need. Then if bad outcomes from the licensed use of particular drugs are demonstrable over the years, those drugs could be withdrawn without becoming a "symbolic issue"—that is, without embroiling drug users in the kind of total conflict with conventional society that becomes a vicious circle. Zinberg and Robertson do not wish John Q. Citizen (whose identity they conceal by a pseudonym, "Mr. Fry," because they present intimate psychoanalytic data about him!) to suffer anguish, or to be pushed into revolutionizing the drug law without a full awareness of the issues and of how his own attitudes and feelings affect the drug scene as a whole. They prefer that there be an informed consensus on the need for a radical initiative, and their book is intended to contribute to that end.

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Barriers and Achievements

The Life of Benjamin Banneker. SILVIO A. BEDINI. Scribner, New York, 1972. xviii, 434 pp. + plates. $14.95.

Benjamin Banneker (1731–1806) impressed his contemporaries by accomplishments such as preparing an almanac and assisting Andrew Ellicott in the survey of Washington, D.C., without formal schooling and in spite of the barriers placed before any son and grandson of slaves. In the later years

of his life and after his death, Banneker was frequently invoked as an example of racial equality and as justification for the abolition of slavery. Thomas Jefferson responded to Banneker's first almanac (1791) by declaring that he had given proof "that nature has given to our black brethren talents equal to those of the other colors of men, and that the appearance of a want of them is owing merely to the degraded condition of their existence, both in Africa and America."

In the many years since Banneker's death, the retelling of his feats has led to what the author terms "erroneous exaggerations." The image of Banneker created in the last century and a half led Bedini to reexamine the few documents from Banneker's life which still remain and to attempt to put the early American scientist into the context of his own times. This life of Banneker is convincing and, unless substantial new material appears, definitive.

Traditional historical methods, such as using every ingenuity to uncover extant records, have been well employed, but the author's major contribution is the close examination of Banneker's mathematical notebooks which has permitted for the first time a solid determination of Banneker's place among his contemporaries. From this study, the author concludes that Banneker was "a man of modest ability and performance, who, by means of his efforts, contributed a tangible bit to the fabric of science in America."

Perhaps the most impressive features of Banneker's life were not his almanacs but his self-education and establishment of a dignified life in a society which surrounded him with legal sanctions because of his race. He lived alone on a farm; he was harassed by neighbors and even renters of his land. He grew to meet the approaches of others with a wariness and distance, but to those he trusted he showed generous hospitality. At several crucial moments in his life he was befriended by the Ellicott family, who served as his link with the American scientific community, such as it then was. His existence, in spite of his work and productivity, was always precarious.

Some of the information the author has gathered suggests that the psychological elements of Banneker's life might be worthy of further examination. A key person for him was his maternal grandmother, an indentured Scotswoman who, when freed, bought a farm which she worked. Later she added two slaves, but eventually freed them and married one of them. She taught her grandson to read, helped him with simple arithmetic, and gave him encouragement. His own isolated life was similar in many ways to the one she had led, although he never married. His family's experiences, its compromises with white society, may have been the reason his outlook never lost an underlying pessimism. It is no longer necessary to exaggerate Banneker's efforts in order to vindicate his life.

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Origins of Medical Cytology

Addison and the White Corpuscles. An Aspect of Nineteenth-Century Biology. L. J. RATHER. University of California Press, Berkeley, 1972. x, 236 pp. + plates. $8.50. Publications of the Wellcome Institute of the History of Medicine, new series, vol. 22.

Early efforts to understand white blood cells were clouded by doubt and debate. Historian Rather ably analyzes these efforts from their early-19th-century beginnings to the discovery of phagocytosis in 1883. This book gives an intimate and accurate insight into the struggle of a science (medical cytology) to be born.

At the time when the drama began, inflammation was regarded by many as a special form of nutrition—and nutrition theory itself was a battleground of opinions. According to an older idea, certain "globules" are separated from the blood and become intercalated into the fibers then thought to constitute tissue. A newer view, espoused especially by Schwann, held that what leaves the blood is a fluid in which, when it reaches the tissues, new cells arise (by processes which Schwann compared to crystallization).

In the midst of the debate, in 1842, William Addison, the central figure in Rather's account, proposed that neither globules nor cell-forming fluids separate from the blood. Instead, white blood cells (which Addison wrongly derived from red blood cells) leave the bloodstream. In nutrition, he said, these add themselves to the tissues (which were by now supposed, because of Schwann's work, to be built in large part of cells). Addison saw the extruded white cells as likewise able to participate in pus- and tubercle-formation, coagulation, and the like.

Rather details the antecedents and inception of Addison's partly correct idea, the many mistakes it contained, the reactions it evoked when published, the alternatives suggested by others, the impact upon it of the rapidly developing cell theory and the theory of the microcirculation, and finally the liberating discoveries of Recklinghausen (migration of "pus-cells," 1863), Cohnheim (diapedesis, 1867 [also described by Waller in an unnoticed paper of 1846]), and Metchnikoff (phagocytosis, 1883).

Rather's narrative is packed with details; it would not have been adequate without them. A mass of added information is wisely relegated to notes. The indexing of the book is complete, the documentation superb. This reviewer wishes that Rather had chosen inflammation—rather than the semi-meritorious William Addison (no relation to Thomas)—as the hero of the tale. But the book as it stands is an outstanding case study in early and middle 19th-century biology.

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Principles and Devices

Topics in Solid State and Quantum Electronics. Papers from a lecture series, Mar. 1970. W. D. HERSHBERGER, Ed. Wiley, New York, 1972. xvi, 506 pp., illus. $23.50. University of California Engineering and Physical Sciences Extension Series.

The federal government and industry provide support for research in solid state and quantum electronic phenomena. The research leads to a multitude of new electronic devices, exploiting solid state and quantum phenomena often complex and outside the experience of electronics engineers and technologists. University extension services attempt to repair the knowledge gap with extension courses and lecture series (perhaps a hopeless task). The collected lectures by assembled experts make a book, like this one. If the topics are carefully chosen and the author-lecturers conscientious about their work, the book can be a useful outcome, as is the case here.

The topics covered here ranged over