Anthropology of Psychedelics

Flesh of the Gods. The Ritual Use of Hallucinogens. PETER T. FURST, Ed. Praeger, New York, 1972. xvi, 304 pp., illus. $10.

This is a collection of ten excellent essays on hallucinogens. Each essay stands on its own merits. The essays are informative, but they do not combine to produce anything more than a collection of ten good articles printed together.

In a long introduction, Peter Furst says that the book is intended "to provide the psychedelic phenomenon with some of its essential cultural and historical dimensions" (p. xv). A statement in the introduction (p. viii) addresses a principal concern of several of the articles:

> Anthropologist Weston La Barre (whose approach to the origins of religion is thoroughly naturalistic and strongly oriented toward the Freudian view of man) attributes this phenomenon to a kind of cultural programming for personal ecstatic experience reaching back to the American Indian's ideological roots in the shamanistic religion of the Upper Paleolithic and Mesolithic hunting and gathering cultures of northeastern Asia. If La Barre is right —and the cumulative evidence tends to support him—this would take the practice and, more important, its philosophical underpinnings back at least fifteen or twenty thousand years, an estimate that if anything may be too conservative.

Evidence that psychotropic plants were used in the Old World in ancient times is provided by the two articles by R. Gordon Wasson, "The divine mushroom of immortality" and "What was the Soma of the Aryans?" Wasson is convinced that Soma was a mushroom known as the fly agaric, *Amanita muscara*. He believes also that its use began in Siberia with hunting and gathering shamans and from there spread south to India, thence west to the Mediterranean and to Europe.

The essay "Ritual use of *Cannabis sativa* L.: a historical-ethnographic survey" by William A. Emboden, Jr., adds significantly to the time perspective for Old World use of psychedelics, suggesting that the use of *Cannabis* dates back perhaps 6000 years. The record of the widespread use of marihuana in Africa and its ritual use in Mexico will come as a surprise to many. James W. Fernandez reports that the Fang people of Gabon use four narcotics with hallucinogenic properties in their Bwiti religion. These are *Tabernanthe iboga, Alchornea floribunda, Elaeophorbia drupifera*, and *Cannabis sativa*.

As Furst writes in the introduction (p. viii),

> Although . . . the Old World probably contains no fewer hallucinogenic species than the New, it is a fact that the New World outstrips the Old by ten to one in the number actually employed by its human inhabitants.

Beginning with research into the use of peyote (*Lophophora williamsii*) and other plants used in the peyote ceremony (1937) in Oklahoma, Richard Evans Schultes has continued and expanded his field research through Mexico, Central America, and tropical South America until he has become the unquestioned authority on the psychotomimetic plants of the New World. His article "Hallucinogens in the Western Hemisphere" is a valuable summary. Schultes reports that hallucinogens occur in at least ten different plant families and at least 30 different species. He identifies and explains the uses of plants from Canada to Chile. This is a marvelously succinct, yet comprehensive, review.

In his report entitled "Tobacco and shamanistic ecstacy among the Warao Indians of Venezuela," Johannes Wilbert describes the methods by which tobacco becomes a psychotomimetic substance for Warao shamans. He concludes with a comparison of tobacco and other hallucinogens and joins La Barre and Furst in seeing "an archaic shamanistic substratum underlying and to some extent uniting all or most aboriginal American Indian cultures" (p. 83). Gerardo Reichel-Dolmatoff in his article on *Banisteriopsis caapi*, a hallucinogen employed by the Tukano Indians of the Amazon region of Colombia, devotes a large part of his space to an analysis of the symbolism of the visions produced by the drug and reproduced on ceremonial houses. Most could be classified as related to procreation.

Douglas Sharon's article entitled "The San Pedro cactus in Peruvian folk healing" impressed me especially because Sharon does not seem as eager to depict a purely aboriginal religion as some of the other authors are. Even though he became an assistant shaman or curandero adept in the use of the hallucinogenic cactus *Trichocereus pachanoi*, he recognizes that "contemporary folk-healing practices in northern Peru are syncretic in nature, combining many Christian elements with older beliefs surviving from pre-European times" (p. 115). In contrast is the article by Furst on the peyote religion of the Huichol of Mexico. Writes Furst (p. 137):

> La Barre . . . has suggested that the contemporary Huichol peyote rituals are "probably the closest extant to the pre-Columbian Mexican rite," a judgment that my own studies confirm. . . . In any event, the symbolic religious complex that has the peyote quest as its sacred center appears to be the only survival on a major scale of relatively pure Indian religion and ceremonial, without substantial admixture of Catholic elements, in Mexico today.

I suppose any argument is blocked by his use of "relatively pure" and "substantial." Lumholtz (1898 to 1904), Diguet (1907), Klineberg (1934), and Zingg (1938) provide evidence to justify saying that the Huichol, like the Peruvians, combine many Christian elements in various ways with peyotism, however.

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Historical Lectures

Science and Society, 1600–1900. PETER MATHIAS, Ed. Cambridge University Press, New York, 1972. viii, 166 pp. + plates. $10.50.

In 1968, the distinguished Oxford economic historian Peter Mathias was asked to organize a set of lectures on the subject of "science and society." The six talks that resulted are reproduced with full bibliographical apparatus to form this book. It is something of a tribute to the discipline of the history of science that such a group of informative and respectable talks on this well-worn theme can be gathered without resort to the standard, dreadful set of clichés. Yet any editor's effort to make a coherent entity out of these disparate talks would be doomed from the start. There is still no consensus on which problems of the "external relations of science" require most attention. Hence, although one may admire individual essays and marvel at the variety of topics subsumed under the title, this book does not provide a balanced picture of the state of the art today.

The most sophisticated talk opens the book with a synthesis of recent discussions pertaining to the emergence of science in 17th-century England. After summarizing the results of R. K. Merton's classic study of the Puritanism-science ethos, P. M. Rattansi skillfully grafts onto it the more recent

work singling out the importance of Renaissance Hermeticism as a source of scientific values. The Hermetic philosophy of raising man's dignity by hailing his ability to discover magical powers, developed first in Italy, is shown to have been successively absorbed and transformed in England by Bacon, Boyle, and the Cambridge Platonists to meet the shifting requirements of 17th-century Protestantism. Rattansi's argument is complex and subtle and has the ring of truth about it. The effortless introduction into his story of the content of scientific theories is also a convincing argument for discarding the distinction between "external" and "internal" history of science which Mathias clings to in the introduction. The next speaker, A. R. Hall, seems to disagree with Mathias in his contribution, "Science, technology and Utopia in the seventeenth century," which turns on the separation between "internal" scientific progress and "external" technological change and literary expression. Both articles seem cogent despite their apparent contradiction on a higher plane.

In another useful essay, entitled "Who unbound Prometheus?," Mathias meticulously reviews the known links between scientific change and technological innovation in the 17th and 18th centuries, concluding that the role of scientific attitudes of rationalism, independence from tradition, experimentation, and accuracy were more significant for technology than was specific new knowledge uncovered by contemporary science. As if to offer a counter example, D. S. L. Cardwell argues in the next essay for the relevance of hydro and steam technologies to the concepts underlying thermodynamics. His exposition is too truncated to permit these relationships to be appreciated fully, but the reader is referred to a longer work by Cardwell for elaboration.

The last two articles are confined to topics strictly within England. On the basis of a few significant statistics from the York County Hospital, E. M. Sigsworth challenges the view that hospitals were "gateways to death" where diseases were caught and spread rather than checked and where surgery was often lethal. The evidence, sparse as it is, certainly calls for a reexamination of standard views. R. M. MacLeod's closing talk on "the endowment of science movement, 1868–1900" recounts an important phase in the gradual acceptance by government and society in Victorian England of the need to pay stipends to scientists for their occupation, rather than to award them medals and accolades after their work has proved significant. Failure to grasp this necessity was a serious block to developing research careers in science, hindering science from taking its legitimate place alongside other respectable professions. MacLeod's article, thoroughly steeped in untapped sources, demonstrates the possibilities of this approach for the study of science-society links.

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The Kidney

Developmental Nephrology. WALLACE W. MCCRORY. Harvard University Press, Cambridge, Mass., 1973. xiv, 216 pp. + plates. $12. A Commonwealth Fund Book.

This compact monograph is dedicated to the manifold processes involved in the structural and functional development of the human kidney. Quite properly, the focus is on the tubular units, nephrons, and collecting ducts. The review of their developmental history is conducted under five chapter headings: embryologic development, development of renal function in utero, quantitative measurement of renal function in infancy and childhood, renal function in the postnatal period, and cellular processes underlying growth and development.

The opening chapter describes human nephrogenesis in a setting of comparative mammalian nephrogenesis, both descriptive and analytical, and for its data and interpretations McCrory has relied heavily on Jean Oliver's 1968 monograph *Nephrons and Kidneys* (Hoeber). Included is a reproduction of nine plates of Oliver's exquisite reconstructions of microdissections of developing nephrons. As elsewhere throughout the monograph, attention is directed to important unresolved problems, in this instance (i) the mechanism of junction of nephrons and collecting ducts, (ii) formation of glomeruli, and (iii) the mechanism for segregation of the nephrons to the cortex and branches of the collecting system to the medulla.

The inaccessibility of the human fetus obviously accounts for the paucity of direct measurements of fetal renal function and related roles played by the placenta and amniotic fluid in water and solute exchange. Accordingly, any investigator is confronted with the uncertain validity of extrapolation of data derived from other mammals, notably the exteriorized sheep fetus. Chapter 2 assumes a cautious stance in this regard, to wit: "The reliance on data in other mammals for a description of the pattern of functional maturation of the kidney in man is obviously hazardous" (p. 77).

In contrast to the unknowns of embryonic and fetal life, the continuing structural and functional maturation of the kidney of infant and child is more directly documented. Chapters 3 and 4 summarize current understanding. Particularly interesting to this reviewer are the data, summarized in chapter 5, on developing cellular patterns of enzymes, nucleic acids, and structural proteins. Delineation of these patterns goes far toward revealing the mechanisms of compensatory hypertrophy following uninephrectomy.

McCrory not only has admirably synthesized current knowledge of the structural and functional development of the human excretory system but has submitted thoughtful and stimulating reappraisals of "concepts of the pathophysiology of many childhood renal diseases." Clinicians and researching embryologists and physiologists will find the monograph a valuable asset. A bibliography of just under 400 citations and a brief, but adequate, index round out this scholarly treatise.

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Meteorology

Atmospheric Energetics. JACQUES VAN MIEGHEM. Clarendon (Oxford University Press), New York, 1973. x, 306 pp., illus. $24. Oxford Monographs on Meteorology.

Measurements of meteorological quantities are practically all in some sort of time-averaged form, and meteorological problems can be approached appropriately only with the use of the governing equations in Reynolds form (time-averaged). Books on atmospheric dynamics, however, have mostly been written in the traditional line of approach, namely by the introduction or derivation of the governing equations and analysis and solution of these equations under various assump-