Book Reviews

Science and Ethical Values

There seems to be a law of the degradation of information that runs roughly as follows: The more widespread a story is, the less likely it is to be true. Everyone will immediately think of his pet examples; mine happens to be the tale that Einstein's Relativity Theory arose out of the Michelson-Morley experiment. In this slim and well-written volume, **Science and Ethical Values** (University of North Carolina Press, Chapel Hill, 1965. 113 pp., $3.75), which deals with important and topical ideas, Bentley Glass, the distinguished investigator of human genetics, attacks another of those widespread falsehoods, and perhaps the most pernicious one: that science has nothing to say about ethical values. Glass writes: "This view I wish to challenge, since it is my belief that by examining critically the nature, origins, and methods of science, we may logically arrive at the conclusion that science is ineluctably involved in questions of value, inescapably committed to standards of right and wrong, and unavoidably moves in the large toward social aims."

Of the three essays that make up the book, the first seems to me the most successful. It is, as it were, a natural history of value: "I have tried here to show that ethical values do grow out of the biological nature of man and his evolution." These values are relative with respect to the *specific situation*—just as the mutation that produces winglessness in flies is detrimental to the flies in an ordinary situation, but becomes supremely adaptive on the treeless, windswept island of Kerguelen—and with respect to the *level*, whether molecular, cellular, of tissues and organs, the individual, the population, the community, or the biome. The values at different levels of biological organization may, and in fact often do, conflict. "Resolution of these conflicts of ethical values is one of the gravest human problems." An example is the widely discussed conflict between the humane goals of modern medicine on the one hand, and the fact that natural death of the individual can have strong evolutionary value on the other hand. Or again, procreation is not an absolute good, either for the species or the child, if the parent has a defective dominant gene like that which produces retinoblastoma, or if there is little chance that the child will be nourished adequately.

The author agrees that, after pushing the study of evolutionary values to the furthest end, one does come up against the deeper question, "Are there other values outside of evolutionary fitness, other values less relative, perhaps?" But within the limits he has set himself, he does not go much beyond the statement of the question itself, and a brief comment apropos the values involved in the banding together that makes human society, compared with the organization of insect hives in which there are only castes. "The values inherent in co-operation and co-ordination, promoted so blindly but so perfectly on the level of the cell by the chemical organization it possesses, promoted so perfectly and so blindly in the insect society by their inherited instincts and their mutual recognition of their fellows, must in the society which is based on learning be imposed by force or be nurtured by conscience. Religion that exalts these values, that declares that 'all men are brothers,' and invokes the force of human kindness and of brotherly love to cement these bonds, clearly plays a great part in the preservation of this type of society."

Instead of leaving it at this point, the author might have elaborated another, much needed lesson (somewhat as Charles Frankel did in *The Case for Modern Man*). For it is perfectly clear that the mechanisms of internal consolidation and externalized divisiveness and aggression, generated long ago by small, tribal groups and incorporated into our classical religions, may well not suffice for the types of societies for which they are now supposedly doing work—that is, on the level of modern nation-states armed for overkill. Indeed—and here is a crisis of which some of the best theologians are clearly aware—the adaptive value of certain teachings (including the acceptance of absolutistic prescriptions, and the free hand to exterminate competitors regarded as heretical or infidel) which were perhaps appropriate for the original, small, beleagued groups, may be turned into lethal disvalue if applied at a level for which they were not meant, just as the values of virtual permanence guaranteed to genetic material by its great chemical stability would turn to disaster if it produced permanence of the individual itself. These matters deserve frank and detailed consideration; the natural and social sciences, among other fields, should now be able to help illuminate such problems.

In the second essay, the author attempts to show in terms of his own special scientific pursuit "the nature of the stupendous ethical problems that will face mankind in the very near future as man begins to apply his knowledge to the control of his own reproduction and future evolution." Glass foresees that perhaps within two decades genetic clinics will be able to detect in prospective brides and bridegrooms the possibility of dominant or recessive hereditary disorders for a hundred or more types. Then of course the two questions will arise: What should we tell the prospective couple, and to what extent should we enforce the advice with the power of law? In this chapter, in connection with genetic damage due to fallout, the author allows the one interruption in his calm tone: "A pathological fear of Soviet dishonesty and trickery has made us specious and dishonest on our part [in our efforts for a permanent weapons test ban]. This road may lead America to world tyranny. It cannot lead to true world leadership or world peace."

A number of points are touched on: The need for ever-faster adjustment to change and improvement of educational methods; the subjectivity of scientific activity; integrity of science built into the very context of science as a social

activity (for example, the dilemma of referees who see confidentially an unpublished version of work in their own field); and the obligation of the scientist to communicate to the general public the advances and syntheses of science. (One corollary which Glass and all of us might draw from the last discussion is: "Never publish with a press that does not provide an index.")

The book ends with the following remark: "The problem of the future is the ethical problem of the control of man over his own biological evolution. The powers of evolution are left in his hands." Ominous though the statement is, this book itself should provide many readers with a primer of wise counsel for meeting that future.

GERALD HOLTON
Department of Physics,
Harvard University

Research Résumé

Solar System Radio Astronomy (Plenum Press, New York, 1965. 428 pp., $17.50) edited by Jules Aarons, contains 18 lectures that were presented at the NATO Advanced Study Institute of the National Observatory of Athens. The lectures were on the following topics: Solar characteristics (by G. Righini; and J. F. Denisse); The quiet sun (by J. Castelli and J. Aarons; M. Pick; O. Hachenberg; and C. Caroubalos); The disturbed sun (by D. J. McLean; J. W. Warwick; A. D. Fokker; O. Elgaroy; M. Anastassiades; and O. Hachenberg); The interplanetary medium (by A. Hewish; and V. R. Eshleman); The moon (by H. Weaver; and G. Pettengill); and The planets (by H. Weaver; G. Pettengill; and an abstract by D. Ilias).

The lectures are essentially an advanced course in solar system radio astronomy, and the book is an excellent reference for students and research workers in this field. The editor of the book, who was also director of the program, has made a remarkable choice of lectures and authors. Outstanding radio astronomers from most of the leading groups working in solar system radio astronomy in Europe and the United States are well represented. Unfortunately research workers from other countries did not participate, but many of their results are presented. Although most of the material in this book has been previously published, it appeared in widely scattered articles. Several of the chapters contain new research results. An attempt was obviously made to emphasize those research areas not covered by recent review articles.

Thirteen of the 18 lectures directly concerned with the radio emission from the sun are well selected and clearly written. The two lectures on the moon and planets, by Weaver, are comprehensive and contain much unpublished material. Pettengill's lectures on radar studies of the moon and planets are an excellent summary by a major contributor to the subject. The two chapters on the interplanetary medium contain recent studies, one using radar and the other natural emission, of the ionized component of the interplanetary medium. Eshleman's lecture is of special interest because he discusses the successful radio technique used in the recent Mariner fly-by observations of the atmosphere of Mars.

The book contains many excellent graphs, diagrams, drawings, tables, and photographs (see cover on this issue of *Science*), and the balance between the quantitative, analytical material and the descriptive, pictorial material is good. All the lectures contain comprehensive references up to mid-1964. It should be a well-used reference in the field of solar system radio astronomy because it supplements many recent review articles.

FRED T. HADDOCK
Radio Astronomy Observatory,
University of Michigan

The Common Liver Fluke

Basically a literature summary, **The Common Liver Fluke: Fasciola hepatica L.** (Pergamon, New York, 1965. 267 pp., $12), by E. M. Pantelouris is intended to provide "for the research worker, a thorough review of the extensive literature on the subject and a comprehensive bibliography, as well as practical details of techniques for handling material; [and] for the veterinarian, biologist and agriculturalist, an account of our knowledge about this important animal and the disease it causes and of the way in which this knowledge has been accumulated" (from the preface). Sections on the biology of the liver fluke: structure and physiology; pathology, chemotherapy, and immunology; ecology and control; appendices—the whole based on 664 references (extending to 1964)—indicate the broad scope of the work. Coverage is not exhaustive, however; although there is a chapter on human fascioliasis, information on its treatment is incomplete. (In a current volume on clinical parasitology, for example, one may find approximately a dozen references to various aspects of human infestation which are not included in this book.)

The text is quite readable throughout, and although I noted few typographical errors, there are some apparent discrepancies in nomenclature: *Glabra* (*Galba*?) (pp. 20, 21, and 23); *Pseudosuccinella* (*Pseudosuccinea columella*?) (pp. 31 and 258); and Ward 1817 (1917) (p. 16). Although the content of the text cannot be extensively criticized here, another shortcoming is the somewhat imprecise treatment, relative to the evidence cited, of certain of the material that deals with glycolysis and the Krebs cycle (pp. 106 and 107). A feature that will please many workers is the inclusion of much eastern European literature. Most readers will immediately note the consistent use of "cercarium" and "metacercarium." The indices appear workable, and although most of the figures are informative, some lack clarity or are inadequately labeled (notably Figs. 19, 21, 37, 56, and 62) and may perplex certain readers. Figure 64 is poorly reproduced.

Unfortunately, the reader's confidence may be shaken by the relatively numerous, but by no means disabling, irregularities associated with referencing. There are approximately three dozen citations in the text which cannot be immediately identified or are missing from the reference list, and the lack of method and pattern in distinguishing between an author's publications of the same year is frequently evident. There are minor irregularities in the spelling of some names and in the order, but the references themselves appear accurate and useful.

It is significant that enough information on the biology of a single nonschistosome trematode is now available to allow its presentation in book form—a distinction that probably cannot be claimed for any other such species at this time. Nevertheless, despite what is at hand, areas that require