see some agreement to the contrary. A third is philosophical; the putative universalism of the Kohlberg system, it is argued, conceals an essentially ethnocentric bias, wherein the pinnacle of moral perfection amounts to little more than upper-middle-class American high-mindedness. However these arguments are ultimately resolved—and I suspect the resolution will go against the Kohlberg school—they involve issues so profound that the failure to treat them systematically gives the reader a misleadingly optimistic view of the state of progress in the field.

Experimental social psychology and Piagetian structuralism have between them divided the study of morality during the last decade. Their limitations are now more evident, and one senses that more pluralistic methods and outlooks may soon hold sway. The two essays I found most interesting are by Martin Hoffman and Robert Hogan, and in both cases the authors draw their data and ideas from diverse sources. Hoffman offers a wide-ranging account of the early development of altruism, giving particular attention to the importance of empathy (an emphasis shared by several other contributors). Hogan attempts to place moral development within the larger framework of personality theory. His essay is marked by extraordinary catholicity of reference, not merely from within psychology but from sociology and philosophy as well. The very excellence of these papers reminds us, paradoxically enough, of the essential thinness of secure learning in this field. We see two strong minds struggling toward some synthesis of knowledge, when the findings that would support the effort are often unavailable. Many of the known answers are partial or in doubt, and what is worse, most of the important questions have not yet been asked.

Reading this volume carefully, particularly the detailed and searching commentaries by Jessor and DePalma that conclude the book, one is poignantly aware that all the energy and commotion of the last decade have not yet advanced our knowledge substantially. One is led to wonder why it is that so many psychologists feel themselves entitled to instruct legislators and educators and the world at large about the proper cultivation of "morality." One wants to advise them to return to the works of Reinhold Niebuhr, who understood so well why psychology cannot do the work of morality, and why it is one form of the sin of pride for psychologists to believe otherwise.

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The Utilization of an Animal

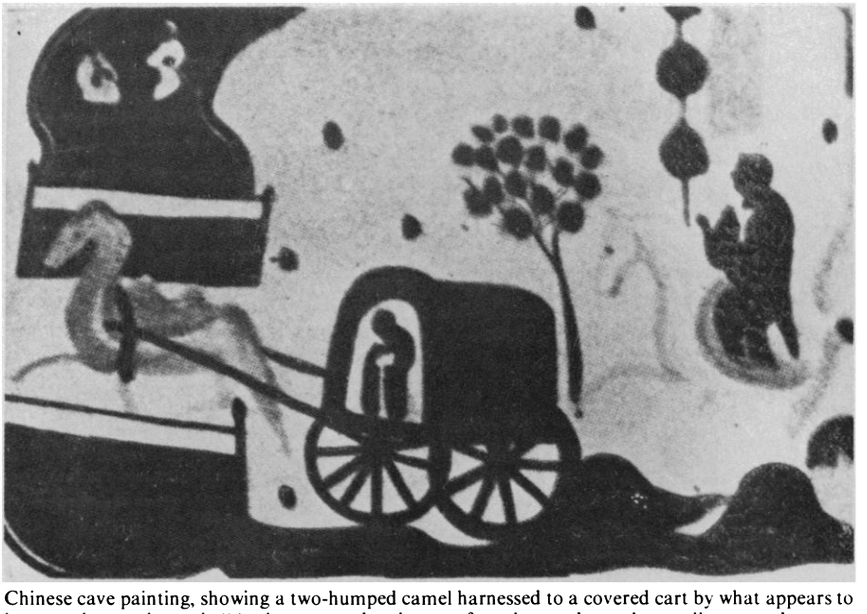
The Camel and the Wheel. RICHARD W. BULLIET. Harvard University Press, Cambridge, Mass., 1975. xvi, 328 pp., illus. $16.

Richard Bulliet's *The Camel and the Wheel* excites and delights as it untangles the record of that grotesque—at least to the unappreciative Western eye—but important beast. Bulliet uses every historical tool and draws on a variety of other fields, including archeology, technology, anthropology, art, biology, and philology, as he traces the history of the camel from its earliest known origins to the present.

Bulliet writes with a felicitous style and exhibits mastery of his subject and sources, and the questions he poses are provocative. He starts with the central fact that the camel replaced the wheel in the Middle East and North Africa beginning about the 4th century. Was this retrogressive? The chief contributing factors relate to technology, economics, and even public policy; for Roman fiscal law favored the camel in the eastern Mediterranean and the camel, in comparison with wheeled vehicles, carried more for less, faster, and without the expense of roads. These factors contributed to a decline both in maintenance of roads and in harness and wagon manufacture, which compounded the advantages of the camel as a pack animal.

The author next raises the question why the change occurred when it did. To answer it he takes up the subject of the origins and domestication of the camel and concludes with a discussion of the significant technological development of the North Arabian saddle and its military and commercial ramifications. This saddle resulted in a shift of power to the camel breeders par excellence, the Arabs, and their integration with urban society. Along the way Bulliet subjects the whole range of physiological, environmental, and cultural factors in domestication and utilization to analysis: What is the relationship of the one-humped dromedary to the two-humped Bactrian? Where did domestication begin and how did the use of the camel spread? What is the significance of differences in camel husbandry in South Arabia, North Africa, or in Iran, where the one-humped meets the two?

Bulliet places the most probable site of camel domestication in South Arabia and the most probable time a number of centuries earlier than the widely accepted 11th century B.C. appearance of the camel in North Arabia and Syria. His hypotheses are based on evidence derived from early figures, drawings, and impressions, historical literature beginning with Genesis, lin-



Chinese cave painting, showing a two-humped camel harnessed to a covered cart by what appears to be an arch over the neck. "At the present day the use of one-humped camels to pull carts and wagons is quite restricted. . . . As for the two-humped camel . . ., it has traditionally been used on at least a small scale to pull carts or wagons throughout its geographical range from the Crimea to Peking. . . . This type of utilization goes back to the earliest known period of two-humped camel domestication in the third millenium [sic] B.C. . . . Were the camels harnessed [then] in the same manner as they are harnessed today, or has the technique of harnessing changed? [This is] a question of major importance [because of] the likelihood that what barred the one-humped camel from entering the transport economy of the ancient world as a draft animal was the state of harnessing technology." [Reproduced in *The Camel and the Wheel* from Needham and Wang, *Science and Civilisation in China*, vol. 4, part 2 (Cambridge University Press, 1965)]

guistic analysis, folklore, and critical examination of various other hypotheses. He conjectures that camels were first domesticated for their milk by seafarers along the South Arabian coast and then came to be used as pack animals for changing settlements. The author never loses sight of the relationship between the camel and the camel breeder and their relation to larger society. Key factors in his analysis are camel saddles and packs and utilization of camel products. One might wish for a comparative discussion of social structures of the various camel breeders, but perhaps unfairly, for such a discussion would change the scope and the focus of the book.

Bulliet also discusses the camel as a draft animal, raising the possibility of the Tunisian camel harness design and single-animal harnessing as the prototype for the European harness. In addition the book touches on other aspects of the subject, including more recent Western experiments and failures. The Australian one has ended today with an ecological threat posed by the camel in its reversion to a wild form. Bulliet concludes with the final victory of the wheel over the camel in this century, and the reader is slightly saddened, after having gained a new esteem for the ship of the desert, by what appears to be the final outcome of this process. Bulliet is to be commended for his appreciation of the complexity of the historical problem and his ability to delineate clearly all aspects of it.

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Interdependences

Insects, Science, and Society. Proceedings of a symposium, Ithaca, N.Y., Oct. 1974. DAVID PIMENTEL, Ed. Academic Press, New York, 1975. xxviii, 284 pp., illus. $15.

The occasion was the centennial celebration of the first department of entomology in the United States. Edward H. Smith, the new chairman of the department at Cornell University, organized the program and dedicated it to the department's founder, John Henry Comstock (1849–1931). Eleven speakers were chosen by the faculty to represent the best of the science and its administration, both nationally and internationally. The theme that emerged was that multidisciplinary approaches are rapidly being developed for insect pest control and basic insect biology.

In his introduction to this volume, David Pimentel describes the special role of entomology in meeting the challenges of human overpopulation, food shortages, fuel shortages, and environmental degradation. At the focus of its applied mission is pest management. According to L. Dale Newsom, this is an ecologically based strategy for regulating pest populations at levels below economic-injury thresholds by use of the best tactics available.

In a historical sketch of Comstock's varied interests, Howard E. Evans concludes that the old master would have been delighted, but not surprised, to see the modern array of control strategies that depend on sound studies of insect taxonomy, physiology, and ecology. Comstock sensed the unity in insect biology and control. Yet his legacies and that of the first integrator of techniques, Dwight Isley, were swept aside by the advent of DDT. For over two decades, chemical pesticides dominated pest control because they were cheap and dependable. The ecological and evolutionary consequences were seen only dimly until pest after pest evolved resistant populations and the environmental hazards were dramatically publicized.

Neglected during the pesticide era and now among the tactics being refined are the selection of crop plants resistant to insect attack, biological control of pests by natural enemies, and disruption of pest reproduction. Each of these is delineated with textbook clarity in papers that provide excellent introductions to the subjects. Mano D. Pathak gives a lucid account of heritable qualities of plants that confer resistance to insect feeding. He further adds an account of those instances in which insects have coevolved to overcome the plant's defense. The complex trophic relationships among predators, parasitoids, and their hosts are described by Powers S. Messenger, who points out that unexpected features in population dynamics may hinge on seemingly minor details of behavior and species interaction. Wendell L. Roelofs defends a new role for chemicals in pest management, namely, as species-specific sex pheromones useful in attracting pests to traps or in disrupting their mating.

The development, integration, and application of these and other strategies require extraordinary organization and financial support. John J. McKelvey, Jr., describes international efforts to coordinate programs in a presentation enhanced by interesting sidelights. Directly to the point are the cost/loss analyses of Waldemar Klassen. He describes a series of federal programs in pest management totaling more than $100 million a year.

The contributions of Richard D. Alexander, John S. Kennedy, T. R. E. Southwood, and Edward O. Wilson emphasize basic evolutionary and ecological theory. Wilson outlines the traits of social insects and the role of kin selection in social evolution. The selective advantages of chorusing behavior in acoustical insects are reinterpreted by Alexander in terms of individual rather than group benefits. Kennedy evaluates the adaptive functions of migration for *r*-strategists. A fine summary of population dynamics in theory and in fact is provided by Southwood.

A human endeavor of great complexity and far-reaching importance is taking shape in the pest management field. The gap between theoretical biology and practical applications is closing fast. This book is a benchmark in the revival of the study of insect biology in relation to human welfare. Let us hope that the interdependences seen so clearly by Comstock will not be obscured again.

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Books Received

Advances in Cryogenic Engineering. Vol. 20. Papers from meetings, 1973 and 1974. K. D. Timmerhaus, Ed. Plenum, New York, 1975. xii, 518 pp., illus. $39.50. A Cryogenic Engineering Conference Publication.

Biochemical and Biophysical Perspectives in Marine Biology. Vol. 2. D. C. Malins and J. R. Sargent, Eds. Academic Press, New York, 1975. xvi, 360 pp., illus. $30.

Explorations in Child Psychiatry. E. James Anthony, Ed. Plenum, New York, 1975. xx, 500 pp. $25.

Fiber Deficiency and Colonic Disorders. Papers from a conference, Chicago, May 1974. Richard W. Reilly and Joseph B. Kirsner, Eds. Plenum, New York, 1975. x, 186 pp., illus. $19.50.

Ion Implantation in Semiconductors. Science and Technology. Proceedings of a conference, Osaka, Japan, Aug. 1974. Susumu Namba, Ed. Plenum, New York, 1975. xvi, 742 pp., illus. $49.50.

Kinetics of Enzyme Mechanisms. J. Tze-Fei Wong. Academic Press, New York, 1975. xiv, 294 pp., illus. $20.25.

Lemur Biology. Ian Tattersall and Robert W, Sussman, Eds. Plenum, New York, 1975. xiv, 366 pp., illus. $22.95.

The Life-Giving Sea. David Bellamy. Crown, New York, 1975. 320 pp., illus. $15.95.

Lunar Mineralogy. Judith W. Frondel. Wiley-Interscience, New York, 1975. xii, 324 pp., illus. $18.95.

Man-Environment Interactions. Evaluations and Applications. Papers from a conference, Milwaukee, May 1974. Daniel H. Carson, Ed. Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1975 (distributor, Halsted [Wiley], New York). 3 vols., illus. xiv, 198 pp.; xiv, 288 pp.; and xiv, 212 pp. $50. Community Development Series, 22.

Methods in Membrane Biology. Vol. 4, Biophysical Approaches. Edward D. Korn, Ed. Plenum, New York, 1975. xx, 298 pp., illus. $22.50.

(Continued on page 1320)