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BOOK REVIEWS

The biology of moral systems by Richard D. Alexander. Aldine de Gruyter, P.O. Box 110240, D-1000, Berlin 30, 1987, pp. xx+301, DM 68.

Socrates asked, nearly 2500 years ago, an elemental question, "How does one live?" All books on man, written subsequently over the centuries, concern the fate of this question, and efforts to answer it. Within one generation, Plato linked moral philosophy with mathematical disciplines. Aristotle's *Ethics* came soon after. In our own land, moral injunctions were among the first ancient commandments on human living (*vide Isa Upanishad*).

Kant, the pre-eminent philosopher of morality arrived at the conclusion that there were no foundations to morality. More recently the Hastings Institute of New York has made renewed efforts at understanding the basis of morality and ethics in man.

Ethics today is not the same as it was in Socrates' or even in Kant's time. New ethical questions have arisen out of technology and science: abortion, euthanasia, technological prolongation of life, and indeed, the whole technology of war and weaponry has endowed a new face to ethics and morality and calls for new concepts and new definitions. What is the contribution of science, particularly biology, in answering Socrates' question in the modern context? How can philosophy aid in understanding man as a product of biological evolution?

Richard Alexander's quest is to find, if possible, a biological answer to this fundamental inquiry. Alexander is a biologist, committed to the concept of Evolutionary Darwinism, which in essence means the supremacy of Natural Selection as the 'organizing principle of modern biology'. Alexander feels that part of the answer to the question why it has not been possible to meet the crisis of modern living lies in the fact that moral behaviour as an outcome of Natural Selection has not been adequately appreciated by philosophers particularly and laymen generally.

Alexander tries to develop a theory of moral systems consistent with evolutionary theory from biology. This is not easy. The human species is characterized by 'group—against-group within species' competition which is unique to man and any attempt to explain morality must take into account this 'intergroup' competition.

Moral choices are individual choices born out of philosophical reflection. To try and make them universal or societal is to deny their uniqueness. Alexander's claim that evolutionary understanding changes attitudes towards moral systems may be valid, but he should be the first to admit that evolutionary understanding can make little or no claims to changes in moral choices, which is what he is looking for in the context of the present

dilemma of man. Biology does not offer magic solutions to moral problems. Nor does philosophy, for that matter. The basic premise that human moral systems arose out of biological evolutionary processes may appear comforting to some and altogether sterile to many but we don't seem to have, at the moment, an alternative theory: philosophers don't appear to have any either.

Alexander's plea for including the biological approach in understanding man, his life and his society is blameless. However, his wisdom finally surfaces when he talks of adding evolutionary biology to the perspectives derived from other areas of human inquiry, like philosophy, social sciences, humanities and (aha!) religion. There Alexander cannot be faulted. For one who declaimed earlier that "Gods were invented to extend the notion of inequality among men" (shades of Marx!) this is a strange but notable admission.

However, a grave omission. Alexander's tacit endorsement of Keith's two codes of human morality (indeed it is not Keith's but Herbert Spencer's), Amity and Enmity, leaves much of recent work on the human brain out of this inquiry. The finding by Maclean that the human brain is a triune complex of co-existing components—instinctive, emotional and reasoning—is a profound one and no biologist dealing with an analysis of moral systems can afford to ignore this essentially biological discovery relating to evolutionary biology. Modern definitions of moral (or immoral) behaviour must take into account these new facts.

That Alexander has devoted a great deal of time and effort to the study of biological basis of morality in man should be acknowledged. That he has been unable, to the extent one would have thought necessary or possible, to reconcile the philosophical views of morality with those of biology would perhaps be his first admission. But then, Alexander lacked the necessary credentials for such an analysis; nor indeed did he set himself to this task.

Alexander's 'Original mission' would perhaps have met with greater success had he devoted deeper attention to philosophical thought, including that of the East, it appears clear as one nears the end of the book. One expected less hesitancy and incertitude from such a diligent student.

Primacy of the human individual and of personal dispositions is a fundamental truth but this should be set in the context of human society with which meaningful individual life should be in consonance. Individual perceptions must be shared, not only with other people but also with all nature, to the extent of making them "somebody else's". Indeed, the question remains, "How does one live"?

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The role of behaviour in evolution edited by H. C. Plotkin. The MIT Press, 55, Hayward Street, Cambridge, Mass. 02142, USA, 1988, pp. viii + 198, $27.50. Indian orders to Affiliated East-West Press Pvt. Ltd., 25, Dr. Muniappa Road, Kilpauk, Madras 600 010.

In 1980, the British Museum (Natural History) organized an exhibition labelled 'Man's place in evolution'. Among other things, it mildly questioned the current concept of organic

evolution and thereby caused much consternation in the biological world. All that it said was, "if the theory of evolution is true...". Two expressions in this statement were highly offensive to the pundits: "theory" and "if true". That Darwin's edict could be regarded as anything other than a *fact* was heresy. That doubt could be cast on its *truth* was sacrilege; it was an unpardonable sin. *Nature* devoted several of its valuable pages to a discussion which, I like to think, was in the nature of a watershed in the understanding of evolution.

The result has been a remarkable upsurge of activity. A significant development is the moving in of non-biologists, physicists and philosophers particularly. It has been all to the good of our understanding of this grand phenomenon of nature, for evolution is too important to be regarded as the sole concern of the biologist.

Among the new concepts thrown up by the ferment is the role of behaviour. That evolution has produced changes in behaviour of organisms, even as part of their phenotypic expression, is well appreciated. That the organism can actively contribute to evolution by its behaviour is something new and not contemplated by early evolutionists. Indeed, it was the physicist Erwin Schrödinger who in 1956 directed attention to this. E. Mayr suspected something of the kind was happening. But it was C. H. Waddington that gave it a name and a frame. Organisms, he said, don't just sit on the receiving end: they actually contribute, select, generate, modify and construct. They are instruments of providing outputs. "Exploitive system", Waddington said it was.

The role of behaviour in evolution puts together six essays in support of this concept. Edited by H. C. Plotkin, Psychologist at the University of London, it presents the thoughts of four others on the role of behaviour. Plotkin himself has written two of the essays: a prefatory one introducing the concept, and another later one with special emphasis on learning as a possible causal role in evolution. "Evaluation of the role of behaviour in evolution and any incorporation of behaviour in a casual role requires an expansion of orthodox neo-Darwinism into a more complex theoretical structure". This is essentially because behaviour, while it is a part of the phenotype, is still different from it.

David Hull is quite clear. Any evolutionary theory to be truly adequate must apply not only to fruitflies and humans but also to slime molds and blue-green algae. It should not only explain eye colour, it should also try and account for cultural and conceptual evolution in man. Put to this test, Darwin's theory, and even the synthetic theory which emerged later, were found wanting. Botany was always Darwin's pain. He sought to assuage it by ignoring it, but sure enough, it has come back to haunt his successors. Hull's alternative concept of replicators—interactors—lineages in place of genes—organisms—species introduces a more natural and functional division. Evolution needs to be viewed as a hierarchical process and the character of this hierarchy is captured more vividly in this new concept. That the gene acts both as replicator and interactor, that the organism is both an interactor and replicator, that the species is not only representative of lineage but it is an interactor too, is the essential message of the new concept, powerfully illustrated in conceptual evolution in man.

Robert Brandon who, like Hull, is a philosopher, deals with selection. Selection, which figured prominently in the thoughts of Darwin and evolutionists that followed him, has had

a checkered, even turbulent, history. As an interaction between phenotype and environment resulting in differential reproduction, it has never been found to be adequate. What is selected? Who selects? And what are the levels of selection? We have come a long way since Darwin. Selection is not only among organisms: it is at all levels, from RNA-DNA through groups, populations and species. Selection has acquired a flavour which Darwin and his cohorts never imagined or meant. Darwin's 'metaphor' broke down on the rock of the fixity of the external environment and the need for the organism to fit into it. Natural selection would still be valid provided the rigidity of the environment is loosened and the organism allowed to influence this loosening by its behavioural output. Here is its relevance not merely as a passive adaptor but as an active initiator.

F. J. Odling-Smee is a biologist and has a more direct approach. Descent, and modification of descent, are the two components of evolution, and any valid theory must account for both phenomena. The modern synthetic theory which calls for the acceptance of the one-way process as the basis of natural selection is inadequate to explain many cases of organisms influencing changes in the environment. The salt-and-pepper moth (*Biston betularia*) is found not only fortuitously against a background which assures its survival, but perhaps *chooses* the appropriate background. The organism is not a passive object benumbed by the superior forces of the environment; it is an active participant in evolution, not only in changing itself but also in changing the environment in which it is placed. The result is what Odling-Smee calls "Organism-Environment Co-evolution".

The role of behaviour in evolution is concerned with evolutionary change. Its main preoccupation is the transmission of the message that the organism is dynamic and makes a contribution to environmental change and thus to evolution. However, one thing it is not. It is not about speciation. It almost never talks of origin of new species. Evolution to Plotkin and his colleagues, is change. The force of Darwin's theory lies not only in change; it primarily is occupied with change *leading to new species*. As long as behavioural change does not lead to the 'origin' of new species, it must remain of limited interest.

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Concise encyclopedia of biochemistry. Walter de Gruyter, Box 110024, D-1000, Berlin 30, 1983, pp. 519, $29.90.

This work is an English translation by Mary Brewer and Thomas Scott of the original German language edition titled *Brockhaus ABC Biochemie* edited by H.-D. Jakubke and H. Jeschkeit, published in 1981.

As the title aptly employs the word 'concise', the work falls between voluminous encyclopedias which are out of the reach of students and a host of dictionaries which just give a single line definition or explanation of terms.

Let me briefly mention an entry in this book. Central dogma of molecular biology is presented in an eminently succinct way (p. 84). It reads: "the fact that genetic information can be transferred from DNA to proteins, but not in the reverse direction. The discovery

that RNA can code for the synthesis of DNA does not alter the validity of dogma". A small diagram supplements the above statement.

There are sufficiently lengthy (2 to 4 pages) explanations on all the important topics. For amino acids (p. 22), there is a table on minimum daily requirements of essential amino acids for human beings, as also a clear flow chart (on p. 24) on the metabolic reactions of amino acids. Under carbohydrates we see a clear figure (p. 72) giving the three phases of carbohydrate metabolism. Under enzymes included is a selection of technical and medical applications of enzymes (Table 2 on p. 142). On pp. 151 and 152 are given very clearly the evolution of human hemoglobin chains (fig. 1) and the phases of molecular evolution (fig. 2). A short, yet very clear presentation on kinetic data evaluations (pp. 242–243), on principles of the Merrifield synthesis on peptides (p. 336), biosynthesis of isosinic acid, etc., to cite a few, are among the host of clear explanations of the terms. All the diagrams are clear and accurate.

Discussion on cancer research (p. 68) needs much revision as more data are available on intercalators and minor groove-binding drugs. Ames test and its later modifications for carcinogenicity testing of chemicals, etc., needs inclusion. (p. 121, fig. 1 needs indication of minor and major groove areas). Likewise, the discussion on viruses (p. 498) needs elaboration.

On the whole, this is an excellent book and would meet the demands of under-graduate and graduate students in life sciences to look out for information which is accurate, yet not a lengthy description. In this perspective, it meets the ever-increasing trend in entrance and other examinations where a student is asked to write short answers to a lengthy list of short questions. The work should also interest faculty members in related sciences to get a quick and concise explanation of terms employed in biochemical discussions.

I am not aware of any other similar objective work of the kind discussed here. It is unique and I wonder how useful it would have been, had it appeared in our student days!

Perhaps, the only drawback is its price. If this could be brought out as a paper back edition, then the fruits of such a magnificient work can really reach the intended audience.

I wish the future edition of this work includes, for at least the major entries, references to the most recent review articles in the area. Single letter abbreviation for amino acids (Table 1 on page 21) be included. Structures of minor and major groove DNA-binding drugs, T-cell receptor, etc., recently becoming available deserve inclusion. The reviewer hopes that the publishers would bring out similar works in other areas of life sciences *viz.* molecular pharmacology, molecular immunology/virology, etc.

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