

**From Physics to Metaphysics.** Michael Redhead. Press Syndicate of the University of Cambridge, The Pitt Building, Trumpington Street, Cambridge CB2 1RP, UK. 1995. Price £9.95. 92 pp.

In this book which is almost a verbatim report of the 1993 Tamer Lectures delivered at Cambridge, Michael Redhead has reaffirmed objectivity of science while agreeing that science is fallible. He is opposed to the relativists, the social constructivists and the irrationalists who would prefer to dilute the claim for objectivity of science. He is also critical of the half-way stands of the positivists and the empiricists, and argues in support of the realists and the rationalists, defining realism in a narrow way whereby the phenomenologists and the idealists may be assumed also strictly to be excluded from the category of realists, disregarding also the thesis of some that rationalisms of all kinds must eventually lead to agnosticism.

Redhead considers key concepts from Einstein's special relativity theory, statistical mechanics and quantum mechanics to discount the arguments that seek to involve subjectivity or human consciousness in interpretations of these fields. Modern physics, he argues, may have a different realistic content than classical physics but it is realistic all the same. For example, there are the well-known difficulties associated with the ontology of an individual quantum system, or the baffling issues of the non-locality and measurement problems in quantum mechanics. Violation of Bell inequalities by quantum mechanics leads to interpretations that require that quantum mechanics violate local realism. In this book Redhead does not consider the non-locality in quantum mechanics as arising out of the violation of Bell inequality in detail. Rather, he endeavours to outline his arguments, adduced by himself earlier from the point of view of the contradiction known as the Kochen-Specker paradox which, as he shows, appears also to involve another kind of non-locality. This notwithstanding, Redhead then goes on to show how realism can be salvaged for quantum mechanics by invoking his Principle of Ontological Locality (OLOC) in combination with several other assumptions such as the rule that the value of a function of an observable is equal to

the function of the value of the same, or that it is impossible for an observable to have a value which has zero probability of being revealed by measurements, etc.

As explained by Redhead, violation of OLOC effectively implies the impossibility of reducing wholes into parts, i.e. it argues in favour of a holistic world-view and denies micro-reductionism. Violation of locality, which involves action-at-a-distance, is forbidden by local realism as envisaged by Einstein's special theory of relativity. Redhead argues that the Kochen-Specker contradiction can be thought to arise by violation of OLOC rather than due to an action-at-a-distance, thus salvaging realism while pointing to the inadequacy of reductionism of wholes into parts.

Redhead extends the holistic argument further in the next chapter and shows how, therefore, the search for a Theory of Everything (TOE) is inappropriate, for it amounts even now, with the progress as it is in constructing the physics of the heterotic superstring, to chasing a rainbow which recedes from one as one tries to approach it closer.

While Redhead tries, thus, to salvage objectivity and rationalism for science he also sides with those who believe that there may be areas where objective science may not be used, as, for example, in understanding certain aspects of the human mind. He is not alone in thinking this way. Brian Josephson has also argued that quantum mechanics may not be used to explain, for example, aspects of consciousness. On the other hand, there are scientists who argue that the conflict between science and religion is a lovers' quarrel, so that as time goes on science and religion would eventually converge and overlap. These latter scientists, when they rely on arguments such as the strong cosmological principle would then face the criticism of philosophers like Redhead, who, rather than uniting science and religion in a common irrationalism and anthropocentrism, would rather combine the efforts of physicists and metaphysicists in a common complementarity grounded in realism. However, the final judgment as to the extent of scientific-objective rather than purely scriptural or subjectivist evidence for esoteric phenomena such as extraordinary states of consciousness that defy space-time causalities, should remain postponed until researches in consciousness studies have

progressed sufficiently to delineate the essential truth about such claims. Such a state of affairs has not arrived as yet, for a large part of human brain, for example, is still an area of the unknown as far as objective-science is concerned. Redhead himself is not averse to agreeing that what he calls 'fringe science' may not be rejected until definite evidence can be shown to exist falsifying such claims.

As with his earlier book *Incompleteness, Non-locality and Realism*, in this book, written in a rather popular vein, Redhead again brings to bear his quite original and systematic insight into issues related to the Philosophy of Quantum Mechanics, so that the presentation of his views is accompanied with a clarity of vision which is remarkable for its cogency as well as depth. His claim that he has given the rather mystical distinction between the late David Bohm's ideas of the Implicate and Explicate orders, 'a precise mathematical formulation in terms of the OLOC principle, and its violation', rests in fact on solid grounds.

This book is essential reading for all those who want to keep themselves abreast of progress being made in the metaphysics of modern science.

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## New journal review

**Gondwana Research.** International Geoscience Journal, Vol. 1, No. 1, October 1997. International Association for Gondwana Research, Department of Geosciences, Faculty of Science, Osaka City University, Osaka 558, Japan.

The name 'Gondwana' is of Indian origin and given to a system of continental deposits ranging from Carboniferous to Jurassic forming one vast conformable sequence. It was first recognized and named after the ancient Gond Kingdom of Central India, south of the Narmada river. The Gondwana System is famous

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for its coal measures, the chief source of energy. Later, similar sequences were recognized in all the southern continents like, South Africa, Australia, South America and Madagascar which led to the belief that all these continents originally formed parts of one supercontinent which broke and individual fragments drifted away to their present position.

The name *Gondwana Research* given to the new journal under review would at first sight conjure a picture of a journal devoted exclusively to Gondwana System and its coal measures. The scope of the journal as declared by the editors, however, is considerably vast extending to the assembly of Gondwanaland and its precursor megacontinents, geological history of continents and continental assemblies related to Gondwana, growth of the Asiatic continent by amalgamation of Gondwana crustal fragments, metamorphism, magmatism and mineralization processes related to all these phenomena which are presently of global interest and form the themes of international projects.

The editors of the new journal, Yoshida of Osaka University of Japan and M. Santosh of the Centre for Earth Science Studies at Trivandrum considered that the present is the right time for providing a common platform and a common media for the publication of results of research conducted by international agencies on the evolution of Gondwanaland. It is good to see that this initiative has come from India, the country which first initiated study of the rocks of the Gondwana system and identified an ice age at the commencement of the system.

The editors envisage contributions from International Geoscience community covering a wide spectrum of topics like geology, geomorphology, structure, petrology, geochemistry, stable isotopes, geochronology, economic geology, exploration geology, resource planning and evolution, geophysics and environmental geology. Four issues are scheduled for each year. The present volume is the first

number issued in October 1997. Journal subscription is not mentioned but it is expected that it will be reasonable and within the means of individuals and institutions from developing countries. The editors have enlisted the support from a large number of earth scientists of international reputation to serve on their Advisory Committee.

The first number starts with an article on Himalaya, the northern frontier of East Gondwanaland by K. S. Valdiya. The paper makes a passing reference in a few sentences to drainage reversal in the Late Eocene. The subject requires a more detailed treatment. Denudation chronology is a much neglected field. Himalaya can be expected to figure prominently in future issues of the journal. Focus should be on newer aspects and not a mere repetition of what is already known. Three papers deal with structural aspects of the Precambrian basement in Vietnam, Antarctica and Sri Lanka. Papers on Sandur Schist Belt (Manikyamba and Naqvi) and Kondapalli Layered Complex (Leelanandam) and a few others deal exclusively with Precambrian and have little relevance to Gondwana. They would be more appropriate in a journal devoted to Precambrian Research rather than one on Gondwana. Three short papers draw attention to granulite facies mineral assemblages from Kerala and Andhra Pradesh. The last section of 25 pages forms 'Gondwana News Letter', the official Newsletter of the International Association of Gondwana Research and presents short notes on items of ongoing research, progress reports of projects, conference reports and concludes with a list of interesting publications related to Gondwana research. Most papers listed however, deal with Precambrian geology and hardly any relating to Gondwana proper. The journal, if it has to justify a separate existence, should give more attention to the study of Gondwana stratigraphy, patterns of sedimentation, palaeo-geography, palaeo-climate and

such other aspects which have not been covered by other journals. Apart from description of local geology, the journal should highlight aspects of palaeo-geography, faunal evolution and changing pattern of climate which are topics of global significance. The journal should strive to present exciting developments in Gondwana geology.

Coal is the most important economic mineral resource of Gondwana. Yet, coal geology has not received any special attention. The new journal *Gondwana Research* should lay special emphasis on all aspects of the study of coal. If it does this, it can play a vital role in the economic development of the countries included within the Gondwana Supercontinent. Journal should not merely aim at academic excellence but must also develop concern for the welfare of the people. A complexity of problems specially relating to the shaping of environment await solution. If the new journal concerns itself on these aspects, it will have performed service of some real value.

Having made these suggestions, we must pay a deserving tribute to the editors for the high standard of production they have aimed in fashioning the new journal. The printing style, cover page, the quality of paper, excellence of illustrations, including those in colour, the binding and all these which make a good book are high class affording great pleasure in handling and in going through the interesting articles which have been presented in such fine style.

The journal is welcome as it is sure to add to our knowledge, stimulate interest and open up new venues of investigations. The editors will have to exert their utmost to provide a long and useful life to the journal.

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