

in it. It would have been useful if the contents page of Vol. I had been included in Vol. II. I hope that the contents pages of volumes I and II would be added to volume III. I must add that the binding is of poor quality. Finally, the book is priced at Rs. 600 which I

feel is expensive, and may put off some readers.

Avinash Khare, Institute of Physics, Sachivalaya Marg, Bhubaneswar 751 005, India.

Elements of Cosmology

A Lucid, Direct Style that Goes to the Heart of the Subject

N Panchapakesan



Elements of Cosmology

J V Narlikar

Universities Press India Ltd, 1996

ISBN 81 7371 043 0

pp. 95, Rs. 65.

To begin at the beginning one has to go to cosmology. Starting literally with a bang, the standard model explains events that happened in the early universe but left tell tale marks which can be observed at the present time: the Hubble law, the synthesis of light elements, the separation and cooling of radiation which began a thousand years after the bang. The discovery of this relic radiation was the biggest triumph of this model which also resulted in the killing off of the rival *steady state theory*. It is ironic that J V Narlikar, a strong proponent of the earlier steady state theory and its later avatars, has emerged as one of the most successful expositors of the big bang model.

Thirst for information about cosmology continues to be as great now as it ever was. The first series of articles to be published in *Resonance* was on cosmology by the author of the book under review. The publication of this book by JNCASR of Bangalore is therefore not surprising. It is one of a series of 'high quality educational monographs written by leading scientists and engineers in the country..... which are short accounts of interesting areas in science and engineering addressed to students at the graduate and postgraduate levels, and the general research community'.

In answer to the query 'What is new?' from readers familiar with Jayant Narlikar's other books on cosmology the author explains in the preface, "since the unfamiliarity with the general theory of relativity hampers the understanding of basic cosmological issues I (have) used the rather unusual method of discussing the subject within the framework of Newtonian gravity and mechanics". It is also 'up to date at the time of writing' (1996) and includes cosmological models, their physical properties and observational tests. A brief account of the alternative model of quasi steady state cosmology by Hoyle,

Burbidge and Narlikar put forth in 1993 is also included.

The book has five chapters (though they are not called chapters) beginning with a quick survey of the large scale structure of the universe. After definitions of units and quantities used in the subject, the structural hierarchy – galaxies, groups, clusters, superclusters and great walls are described. Hubble's law, Doppler shift as well as energy available in the form of different kinds of radiation are then described.

The next two chapters describe the big bang model and the history of the universe based on it. To avoid general relativity the author bases his model on Newtonian gravity and introduces conventional topics like red shift, luminosity distance and formulates the Friedmann models. The history of the early universe including the inflationary universe is then discussed ending with the decoupling of radiation and matter.

In discussing the observational tests in the fourth chapter the author's experience in defending the steady state type models comes to the fore and we have a very lucid account expounding the different points of view on the subject. In the very short fifth and last chapter (five pages) a quick survey of the present challenges (problems at the frontier) is presented. Approaches to the formation of large scale structures like galaxies and clusters on the theoretical side as well as identification

of specific areas in which observations might prove decisive are discussed.

At the end of the first four chapters four to six simple exercises have been included. These should enable the motivated reader to understand the ideas quantitatively. There are about eighteen figures and a few tables which clarify and help to visualize the contents. In the three main chapters three to four problems are actually solved which should persuade the reader to try the exercises on her own. There is an appendix giving mathematical, astronomical and physical constants to help with the exercises and there is a helpful reading list and a list of some pioneering papers for those wishing to learn more about the subject and its history. There is also a small but useful index.

The book is not a popular one, in the usual sense, as there are plenty of mathematical equations. It is aimed at undergraduate and senior students with a good knowledge of mathematics and some vector analysis. Such books can be a useful supplement to the conventional courses in second and third year B.Sc. classes, similar to case studies in management teaching. It will also be of interest to engineers who want to learn about cosmology but not just in a popular way; and there appears to be quite a few such individuals if my personal experience is any guide.

This book is written in the lucid, direct style



one has come to associate with the author. It goes straight to the heart of the subject and manages to cover a lot of ideas and material including some very recent ones. Some ideas have had to be introduced in a somewhat ad hoc fashion, like the cosmological constant and grand unification, but this should be acceptable to the general reader. The printing and getup are quite attractive and the price is

a real bargain. The JNCASR deserves a pat on the back. I would warmly recommend it to students and the general reader.

N Panchapakesan, Department of Physics and Astrophysics, University of Delhi, Delhi 110 007, India.

The Language of the Genes

Linking the Past and the Future

Amitabh Joshi



The Language of the Genes — Biology, History and Evolutionary Future

Steve Jones

Flamingo, An Imprint of Harper Collins
Publisher, 1994

pp.xiii + 347, £4.50.

“Kamaal-e-wahdat ayaan hai aisa ke nok-e-nashtar se tu jo chhede

*Yaqaen hai mujhko bahe rag-e-gul se qatra
insaan ke lahu ka”*

(So strong is the unity underlying each living form, that I well know

That if you prick a flower’s vein, from it red human blood will flow)

Sentiments such as the one encapsulated in the above couplet by Allama Iqbal may well be dismissed as a poetic expression of the search for the Absolute. Yet, at the level of genes, all living organisms do in fact share a

common underlying unity: despite the many differences between a human being and a simple bacterium, our hereditary material (DNA) is made up of the same molecules and, by and large, does similar things in similar ways. Theories explaining how organisms evolve, explain the evolution of every type of living thing from viruses to plants to humans. This is why genetics today is much more than just another branch of biology. Indeed, genetics now has ramifications for disciplines as diverse as agriculture, medicine, anthropology and behavioural studies. In *The Language of the Genes*, Steve Jones, himself a distinguished geneticist, has given a lively and eminently readable account of modern genetics and the many ways in which it affects not just our material well being but also our self image as humans and, potentially, how we look upon other groups of humans who differ from us in various ways.

Jones starts off by developing the metaphor of “the language of the genes”, emphasising the point that our genes contain in their