a massive bombardment by comets and other debris, life arose in a relatively short time-scale. Is it unique to our planet? Mars is obviously the place to look and, despite the negative results of the Viking mission, recent developments, discussed in two articles by Mukhin, indicate that it is still worth another look.

This is a weighty and expensive book, but very thorough and informative, with a large number of articles which stand out in quality and depth of coverage. I have minor quibbles over the use of different typefaces throughout — it is no longer difficult to produce even conference proceedings in a uniform style — and on the small size of the diagrams in Schwarz’s article on RNA. These add an unnecessary degree of difficulty for those inexpert in molecular biology. On the positive side, many of the references, though interestingly not those dealing with extra-solar-system topics, include the titles of articles. This procedure, common in the planetary sciences, is worth considering by the major astronomical journals. — Tom Millar.


The ubiquitous presence of magnetism in almost all astrophysical objects, from the Earth to our Galaxy, raises the question of how that field is maintained over long periods of time. Magnetic fields in fluids tend to decay as a consequence of electrical resistance, the temporal behaviour of the magnetic field being determined by the famous induction equation of magnetohydrodynamics, a combination of Faraday’s, Ohm’s, and Ampere’s laws for a conductor. The result is that, in the absence of internal fluid motions, magnetic fields decay on a timescale that is proportional to the square of the size of the object. In laboratory objects, this leads to very short decay times. By contrast, the enormous scale of astronomical objects ensures that this self-same decay process is a very long one. Indeed, for a galaxy the decay time is so long that the field we now detect might possibly be the primordial field, if it were not for the belief that small-scale motions (turbulence) strongly reduce the actual diffusion time. In fact, fluid motions play a crucial rôle in maintaining cosmical magnetic fields, be they in a galaxy, in the Sun, or in a planet’s interior. This is clearly the case in the Sun, where observations of its surface have long revealed a cycle of magnetic activity. The maintenance of astrophysical magnetic fields by internal fluid motions, in opposition to the dissipation of magnetic energy by ohmic heating, is the cosmic dynamo. In one form or another, a dynamo is believed to operate in the Earth’s core, in some planets (e.g., Jupiter and Saturn), the Sun’s interior, and in the spiral arms of galaxies, maintaining and modulating the magnetic fields entrained within those plasmas.

In this IAU symposium, held at Potsdam in 1992, the editors have organized the material so that each main topic has a review article written by a researcher active in the field, together with a number of shorter papers discussing related aspects. A broad mix of theory and observation is achieved. About half of the book is devoted to solar and stellar dynamos and related aspects. Magnetic fields in accretion disks, galaxies and the interstellar medium are then discussed. So the balance of the treatment is weighted towards large-scale dynamos, though the last full section of the proceedings is devoted to the geodynamo, a stimulating comparison being drawn between the Earth’s and the Sun’s dynamos. Finally, one of the editors, Dr. F. Krause, has contributed an interesting overview of the early history of dynamo theory. — B. Roberts.