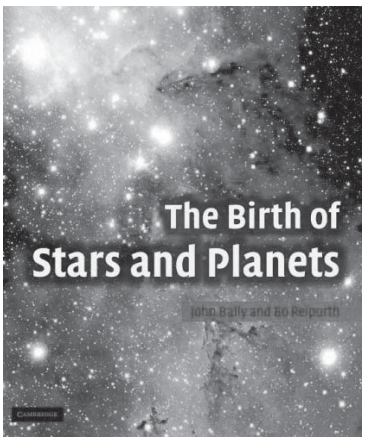
The birth of stars and planets

by John Bally & Bo Reipurth

Cambridge University Press, 2006. ISBN 0-521-80105-2. Pp x + 295, £25.00 (hbk).



The acceleration of our understanding of the Universe within a lifetime is truly extraordinary. One only has to look back from middle age to the books of one's adolescence to see how much has been learned in this short time. Our knowledge in all areas of astronomy and cosmology has been revolutionised, and it can be difficult to keep up with the developments. Images of the Universe, from detailed views of the planets from spacecraft and landers, to deep views of furthest space have stunned us, but sometimes we can adopt a rather complacent view of these, taking the technology and ingenuity for granted.

Perhaps no veil has been lifted so thoroughly as that shrouding our understanding of origins: of stars, of galaxies, and of planetary systems. The development in the last three decades of imaging, especially in the infrared, has enabled astronomers to transform this study, to turn theory into fact, and we now know many more details of this, although very many questions remain.

In *The birth of stars and planets*, John Bally and Bo Reipurth, two active experts in the field, have written a book of marvellous clarity that summarises the current state of our knowledge in a fairly detailed but non-technical way that will appeal to all who have an interest in where it all begins.

The first part concentrates on stellar birth, with chapters on modern instrumentation and imaging techniques, the structure and chemistry of dark molecular clouds, how stars may form within these clouds, whether singly, or most interestingly as multiples and clusters, and then on the behaviour of young stars of different masses. The book is illustrated throughout by many of the finest images from modern observatories, both at ground level and in orbit, and they are beautifully reproduced. Many are full-page illustrations, and it is quite a large book, but it doesn't have a coffee-table feel about it – the illustrations are vital for the understanding of the extensive text. The authors write very well, in a style that is friendly and persuasive, yet authoritative. They are heavily involved in research in the field of young stellar outflows, Herbig–Haro objects, and disks around infant stars. Several images have been obtained through their work using the Hubble Space Telescope, and you get the feeling that you are being taught by those at the coal-face of research.

The second part discusses the formation of planetary systems. It is only a decade since the first extra-solar planets were detected, which emphasises the strides made recently in the field. The formation and development of our solar system, why our planetary neighbours are as they are, and the important messages contained in meteorites are covered in detail. The search for and detection of extra-solar planets is discussed although perhaps not in quite the detail one might wish for. This may reflect the infancy of the research, although it seems that we can estimate that perhaps 5% of Sun-like stars have large planets orbiting close to them as 'hot Jupiters'. The main methods of detection (Doppler shifts of the star, transits and gravitational microlensing) are covered, and exciting developments await us.

The final part deals with star death, the recycling of material, the formation of new clouds, and star formation in other galaxies. The origins of the first stars and galaxies is touched on and also the potential for the development of life elsewhere in the Universe.

There is very little to criticise in this book. There could have been more use of explanatory diagrams to illustrate some points, rather than relying on images, and some of the captions to the illustrations could have been fuller – there was space. There are extensive notes at the end of the book that may have been easier to access within the relevant chapter, rather than turning pages back and forth, and unless supported, it is literally a heavy read, as it is a large book. But the pain is worth the gain. In *The birth of stars and planets* we have a well-written, accessible summary of that story so far, with the promise of more wonders to be revealed. The book can be thoroughly recommended to anyone with an interest in astronomy, and should inspire even those without!

Nick Hewitt

Dr Nick Hewitt is an active observer of the Deep Sky and planets. He was Director of the Deep Sky Section from 1992–2004 and President of the Association 1999–2001.