the subject of three symposia: The first one, on Lake Agassiz, the western part of the system between 10,900 and 8500 years ago, was held in Winnipeg in 1982. The volume reviewed here covers the central part of the system and is the result of the symposium in London, Ontario, in 1984. It will be followed by a volume reporting a symposium on the Champlain Sea, the eastern end of the system, held in Ottawa in 1986.

Quaternary Evolution of the Great Lakes contains 18 papers written by 27 Quaternary scientists. It is dominated by conventional geology (mapping, stratigraphy) but contains some paleontological interpretations (mollusks, ostracodes, pollen stratigraphy) and some freshwater "marine" geology. The papers are organized to deal with the individual lake basins from west to east. The evolution of each basin is summarized by a well-prepared paper, and each summary is followed by reports on recently studied specific sites and on more general problems.

The first paper, by J. T. Teller, is about the Lake Agassiz basin, which once contained the westernmost glacial Great Lake but which is no longer connected to the Great Lakes. Teller speculates about the effects of catastrophic discharges from glacial Lake Agassiz that entered the Lake Superior basin and may have temporarily raised the level of the receiving lakes by tens of meters.

The summary paper on the Lake Superior basin focuses on the warping of the strandlines and on the Marquette glacial readvance, which is a new concept. New knowledge of Lake Agassiz outlets into this basin and the availability of outlets to adjacent basins have resulted in a much-improved interpretation of its history. A second paper, by W. R. Cowan, gives a new interpretation of strandlines near Sault Sainte Marie, Ontario.

The summary of the Lake Michigan basin evolution by four authors contains a discussion of lake level changes caused by hydrologic adjustments to dry and moist climates. Changes of only a few meters in the levels of the later lake basin near the Chicago outlet area make this especially interesting. A paper by Schneider and Need presents evidence for hypothetical glacial Lake Milwaukee, which antedated the last major ice advance in the basin and is not represented by visible strandlines. Such lakes must have formed in all the basins, and evidence of them will emerge slowly. C. E. Larsen discusses the late, nonglacial Nipissing and Algoma Great Lakes and further explores the mechanisms of level change, again stressing hydrologic factors although not excluding conventional differential isostatic rebound and uncovering of outlets by ice margin retreat.

Five papers are devoted to the Lake Huron basin. The summary paper is followed by a discussion of the fossil molluscan assemblages, which show evidence of temperature changes affecting aquatic species and of migration of terrestrial snails across areas exposed during low lake levels. C. A. Kaszicki reports on strandlines and sediments near the Kirkfield outlet of glacial Lake Algonquin; P. F. Finamore reinterprets information on the related Fenelon Falls outlet; and W. D. Fitzgerald presents details of an embayment southeast of Georgian Bay with the aid of pollen and molluscan fossil data.

Four papers concern the Erie basin with its 18 or so former water levels, some shared with the Huron basin. New information on strandlines on the north side of the basin is given by P. J. Barnett, and on the south side higher strandlines are interpreted as of mid-Wisconsinan age by S. M. Totten. Coakley and Lewis in a "marine" geology study revise earlier knowledge bearing on lake levels and present curves of lake levels since 10,000 years ago.

The summary paper on the Ontario basin contains familiar maps (revised) by V. K. Prest and three previously unpublished maps of shorelines in the Trenton area by E. Mirynech. The last contribution is a "marine" geology paper on postglacial water levels by Lewis and Anderson. Lewis and Anderson document a nearly 100-meter rise of Lake Ontario caused by uplift of the Frontenac axis since 11,500 years ago.

The volume has a useful index; the numerous illustrations, mostly line drawings, are of excellent quality; only one or two places named in the text are not shown on maps; and typographical errors are rare if present. The key papers reviewing individual lake basins necessarily are highly condensed summaries of large masses of detail requiring the reader to make frequent reference to the illustrations and tables and hence are not easy to read. The authors have been meticulous in separating fact from interpretation, and in several cases the reader is left to make his or her own choice of hypotheses. There is no synthesis that assembles the information in this book into an up-to-date history of Great Lakes evolution. Nonspecialists may feel that there is more information than they want, but dedicated researchers will be delighted with the extent of the detail. All Quaternary scientists will benefit from this book, the high quality of which is a tribute to the editors and organizers of the symposium, Karrow and Calkin.

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Stellar Development

Birth and Evolution of Massive Stars and Stellar Groups. WILFRIED BOLAND and HUGO VAN WOERDEN, Eds. Reidel, Dordrecht, 1985 (U.S. distributor, Kluwer, Hingham, MA). xiv, 377 pp., illus. $59. From a symposium, Dwingeloo, Netherlands, Sept. 1984. Astrophysics and Space Science Library, vol. 120.

This book presents the proceedings of a symposium held to honor the 70th birthday of Adriaan Blaauw, who is best known for his work on expanding OB associations and the origin of "runaway" stars. The layout of the book is pleasant, with photographs taken at the conference interspersed throughout. An effort has been made to place pictures of individuals adjacent to their papers, which gives the book an immediacy not usually achieved. The volume also contains a reproduction of a painting of Blaauw that was presented to him at the symposium.

The contents of the volume are grouped according to five topics. The first two are the structure of star-forming regions and the stellar content of young groups. The third group deals with the evolution of massive stars and the fourth with star formation in other galaxies. The final group is devoted to Blaauw's life and career, including both his astrophysical research and his roles as director of the Kapteyn Institute, president of the International Astronomical Union, and director general of the European Southern Observatory. A complete bibliography of Blaauw's work is also included. In addition, the volume contains no fewer than three indexes: of subject matter, of astrophysical objects, and of names of persons.

The first two sections, dealing mainly with star formation and OB associations, seem to present a good review of the subject with a good deal of historical perspective, as well as some current research. Star formation in giant molecular clouds is discussed in detail, as well as the questions whether low-mass and high-mass stars are formed in the same places at the same times and whether the initial mass function describes star formation in OB associations.

The section on the evolution of massive stars has remarkably little to say about massive single stars and how they evolve. This is perhaps due to the fact that the researchers in the field who were present at the symposium have moved on to other interests. A theoretical overview could have been presented by C. de Loore or C. Chiosi, but both presented papers on other topics. Observational aspects of the subject are covered to some extent by Garmany in her discussion of the origin of WR stars in the previous section. Most of the papers in this section deal with massive binary systems or

with late stages (that is, supernovae and pulsars). Pylyser, de Loore, and Doom presented a short paper on the evolution of massive stars in the Magellanic Clouds that deals mainly with the dependence of the mass loss rate on metallicity. Chiosi *et al.* presented a paper on the evolution of intermediate-mass stars, which is an extension of Chiosi's earlier work on the role of convective overshoot in massive-star evolution.

The section on extragalactic star formation discusses, among other things, the importance of starbursts in galaxies like the Magellanic Clouds and the question whether star formation is mainly continuous and self-propagating or sporadic and triggered by external disturbances.

This is an interesting book, nicely arranged and easy to use. I think it would make a useful reference for anyone interested in star formation and the short but flashy lives of massive stars.

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Space Ventures in Britain

History of British Space Science. HARRIE MASSEY and M. O. ROBINS. Cambridge University Press, New York, 1986. xxii, 514 pp., illus. $89.50.

Sir Harrie Massey, who died in November 1983, was an important contributor to British atomic and nuclear physics. He was heavily engaged in planning for physics in Britain subsequent to World War II and became an influential figure within the ministries that, among other activities, eventually made the upper atmosphere and near space accessible to British scientists during the International Geophysical Year and in the post-Sputnik years. M. O. Robins entered space science as Massey's scientific officer during the IGY to aid in the massive amount of liaison, policy, and detail work that fell upon Massey as he assumed the complex coordinating roles of chairman of the Gassiot Committee and various rocket and artificial satellite committees. Aware of the need to record what is an important aspect of British science, and with the support of the Science and Engineering Research Council, the two authors in 1981 undertook this survey of their own history.

The result of their effort is a valuable glimpse into how British space science evolved. We are given tantalizing vignettes of the development of the organizational network of scientists and officials within governmental ministries that led to a British capability in sounding rocket research during the IGY and of how that ad hoc network of panels and boards transformed itself into permanent organizations that had to determine how Britain would participate in post-IGY research on satellites.

We are led all too briefly through this early development and transformation and learn about the necessary international cooperation in space research that British science fostered and at first tried to maintain. We are then thrust into detailed chapters on international cooperation through COSPAR and the European Space Research Organization and the difficulties of Commonwealth cooperation, particularly Massey's view (and therefore the British view) of the character and viability of the European Launcher Development Organization and the eventual transformation of ESRO and ELDO into the European Space Agency. The "British view" provided here is a sympathetic but provocative commentary on the problems of international cooperation. It is critical to note that there are many voices yet to be heard on this complex history, and the view presented here, though important, should not be considered definitive.

The chapters on international cooperation are interspersed with topical reviews of the further development of British sounding rockets (the Skylark) and satellites (the Ariel series) and of contributions by British space scientists organized by discipline. Supplementing the text are 100 pages of addenda and appendixes outlining experiments conducted on British and ESRO sounding rockets, organizational charts of the major British space science groups, reprints of published defining documents, outlines of scientific proposals, and memoranda of understanding.

The authors' vision of what is largely their own history no doubt will be digested with delight or some bitterness by many of their contemporaries and colleagues. For the historian it will be valuable, but it poses problems. Robins notes in a preface that he and Massey had access to "excellent documentation held in the archives of the Royal Society," yet there are no citations to archival material in the book. The accounts of important meetings, contracts, events, and processes could well have been derived from original documents but could just as well have come from memory. The historian who would hope to pursue the many lines of inquiry that a work such as this opens up must start almost from scratch. The authors' insights will be of use to historians who wish to understand this history fully, but their book is only a beginning.

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Books Received

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