in the second part of the report. The lakes are Mälaren, Sweden; Neagh, Northern Ireland; Maggiore, Italy (with more than half the drainage basin in Switzerland); Constance (Bodensee) in the Federal Republic of Germany, Switzerland and Austria and the Laurentian Great Lakes of America. There are also shorter sections on Lake Lugano, Italy, and lakes in the Netherlands, and a note on the proposed Morecambe Bay Barrage.

Though much remains to be done, the scope of the investigations now under way and of the proposals under review offer hope for the future. Sometimes there seems to be a confusion of ideas and the verbosity of some parts of the report does not help. The book contains many signs of hasty production. From the title it seems that it is a compilation, which may explain the lack of editorship. Though rapid publication was needed, the secretariat of OECD should have done better in 18 months, especially with the help of the preprints it had before the symposium started. There are too many careless slips. Tables and figures may or may not be numbered and may or may not have captions. Photographs of lakes, some of which are very poor, appear once or twice without any indication of what parts of them and their surroundings are shown. In the text of the article on Lough Neagh references are given to published papers and unpublished documents in the usual way, but there is no bibliography at the end of the article.

J. W. G. LUND

WATER MEASUREMENT

History of Hydrology

By Asit K. Biswas. Pp. xii+336. (North-Holland: Amsterdam and London, 1970.) 117s; Hfl. 50; \$14.

It is surprising that, for a science so basic as hydrology, this is the first book dealing solely with its development. Not that attention to the subject has been lacking, for there are quite a number of papers dealing with certain periods of progress and several books that attempt to cover the history of hydrology in a chapter or two. Now much of this material, and more unearthed by the author himself, has been brought together in a single volume. Here theories about the origins of springs and rivers can be traced from the age of Aristotle to the seventeenth century when Perrault, Mariotte and Halley scotched the concept of a subterranean cycle and, by experiment, confirmed the correctness of the pluvial theory. Ideas about the assessment of flow in open channels can be followed from the Romans' assumption that cross-sectional area of channel was the only control of discharge, to the last century when Manning devised his formula. Something can be learned of the development of instruments for determining rainfall and evaporation, and about the foundations of hydrogeology which are covered through mention of the works of Darcy, Dupuit and Forchheimer.

The book is well produced, written in an easy style and is adequately illustrated. More space could have been devoted to the period during the last century when the first country-wide instrument networks were being installed, and the role of the meteorologist in this development might have been mentioned. On the other hand, it is difficult to find errors of fact and omissions of references. One that could have been brought in was the answer by Barrington¹ to Heberden's (not Herberden) rainfall results from Westminster Abbey. Then there are some minor points like the Bishop of Llandaff becoming Llandoff, and hydrologic replacing hydrological, for which the author can be forgiven. But one thing that he should be aware of is the irritatingly short chapters that appear almost as inserts here and there and the rather arbitrary way that the chapters divide up rather than

bring together the material he is presenting. Nevertheless, Dr Biswas should be congratulated for producing a volume of interest to all scientists concerned with water. He should also be congratulated in producing it since 1964—others might have spent a lifetime over the same task and achieved less.

JOHN C. RODDA

¹ Barrington, D., *Phil. Trans. Roy. Soc.* 59, 359 (1769).

SUPERNOVAE BEFORE PULSARS

Supernovae and their Remnants

Edited by Peter J. Branczisz and A. G. W. Cameron. (Proceedings of the Conference on Supernovae, held at the Goddard Institute for Space Studies, NASA, 1967.) Pp. viii + 240. (Gordon and Breach: New York and London, January 1970.) \$21; 175s.

THIS book reports a conference which took place on November 2–3, 1967. In one respect this was a very unlucky piece of timing, just before the discovery of pulsars which are now widely accepted as supernovae remnants; but from another point of view this report is singularly important as a landmark in astronomy, neatly packaging the pre-pulsar knowledge of supernovae, and offering a chance of comparison between the theories held at the end of 1967 and the observations of new phenomena from pulsars which have been flowing in ever since.

The surprise which the discovery of pulsars caused is brought back to mind by A. G. W. Cameron's paper on the expected properties of neutron stars in which he concludes that "a neutron star will become a dead object rather rapidly", with the corollary that they would probably be undetectable.

The Crab Nebula is, naturally, the subject of a large portion of this volume, but there is a thorough discussion of other remnants in our galaxy and of supernovae seen in other galaxies, as might be expected from contributors such as Zwicky and Minkowski. The papers on theoretical models of supernovae explosions remain largely unaffected by recent observations, and still show some wide discrepancies between theories and observations. But the volume is of a generally high standard; all of the contributors are well known in their field, and the editorial work seems to have been unusually painstaking and accurate, many of the papers having been updated to some extent during the preparation of the book.

Although the gap between conferences and the publication of their proceedings seems to be increasing (and some proceedings would be better left unpublished), the unique position of this volume in the context of the revolutionary impact made on astronomy by pulsars ensures its historical importance, and its excellent presentation will make it widely used as a source guide of basic importance to both theoretical and observational astronomers.

JOHN GRIBBIN

SPINS AND SOURCERY

Particles, Sources and Fields

By Julian Schwinger. Pp. iv + 425. (Addison-Wesley: Reading, Mass., and London, September 1970.) 140s.

PROFESSOR SCHWINGER is well known, not only as the man whose Nobel prize-winning calculation of the anomalous magnetic moment of the electron is one of the great triumphs of relativistic quantum mechanics, but also as a lecturer of great flow and persuasiveness. His book reproduces on the printed page those carefully constructed sentences long familiar in the lecture hall, and the audience might be said to be represented by the odd character, Harold, who pops up from time to time to ask a conveniently leading question.