in Dublin, and optical designs, mountings and accessories from the advanced German workshops. Tebbutt used the Fraunhofer or German mounting for his principal telescope, the 20.3cm Grubb refractor.

But two local developments held the hope of spurring indigenous manufacturing enterprise in a field in which Australia's scientific reputation ran high. Angelo Tornaghi, an Italian instrument and telescope maker who arrived in Sydney to supervise the installation of the Negretti and Zambra instruments for the new Sydney Observatory in 1858, stayed on to establish a scientific instrument, optical and clockmaking business in Sydney and to make a 5cm transit telescope and ring micrometers for Tebbutt. In addition, H.C. Russell, one of Sydney University's first graduates and Australia's first native son to head a major scientific institution on his appointment as Government Astronomer of New South Wales in 1870, was a strong advocate of local manufacture. Keenly interested in telescope and instrument design himself, he engaged the Sydney firms of Morts Dock Engineering and Atlas Engineering to manufacture telescope mountings for Sydney's Observatory. Neither thrust, however, stimulated large local manufacturers to interest themselves in this line of work. Clearly Tornaghi and his work are subjects for further reasearch.

Nonetheless, Tebbutt and his remarkable comet sightings, his work on double stars, lunar and solar eclipses, and major and minor planets attracted professional and public interest and he was a household word in his long lifetime, his letters and articles in the Sydney press communicating his discoveries, and his detailed observations and recordings flowing into the international astronomical literature. Significantly, it was characteristic of lively nineteenth century popular interest in science that a private astronomer and intellectual who espoused that "the heavens presented a vast clock accurate to the minutest fraction of time" could command the wide attention and admiration of the community. As Governor Brisbane had at his Parramatta Observatory in the early 1820s, so John Tebbutt at Windsor between 1856-1916 stamped Australia firmly on the astronomical map.

Dr Bhathal sees this book as a prelude to a larger biography of Tebbutt, a major player on the scientific Colonial scene. As such it should have considerable appeal to school and student audiences, while, with its appendices of selected Tebbutt correspondence, comets observed, sketch of the Windsor Observatory and its program, and glossary and bibliography, it should also be of value and interest to scientists and historians.

Ann Moyal.
Communications Research Institute of Australia, Canberra.

Science Parks: An Experiment in High Technology Transfer *by Lesley Grayson* (The British Library, London, 1993), pp. vi + 144, £ stg. 50.00, ISBN 0-7123-0788-5.

This book is one of the British Library's Science Reference and Information Service science policy titles. It can be best described as a 'guide' to and review of recent literature on science parks — a hybrid bibliography and commentary.

The book has four main chapters which deal with the following topics: the science park in context (Chapter 1); the development and management of science parks (Chapter 2); the overseas science park experience (Chapter 3); and, do science parks work? (Chapter 4). There is also a shorter fifth chapter which is a commentary from the United Kingdom Science Parks Association (UKSPA) on their experience of science parks. The focus of the report is largely on the UK science park scene.

Each of the four main chapters opens with a review of the literature relating to the respective theme of the chapter. Following this review, which is typically about 10 pages long for each chapter, comes an extensive annotated reading list. The book as a whole makes reference to some 357 works which comprise the reading list. Reference is also made to other related material. The aim of the guide is to "enable the reader to make his/her own judgement as to whether science parks work and to assess their potential for helping regenerate the UK industrial base to improve our industrial competitiveness and boost local and regional economics" (p.v).

Chapter 1 deals with the science park in context and as such deals with definitions, aims and objectives, origins and university/industry linkages. The policy framework in the UK and the European Community is also outlined. This chapter makes some valuable observations. For example, it points out that public sector investment has been and continues to be a significant feature of investment in UK science parks. Likewise, it observes that there are a variety of motivations behind science park ventures with technology-led development being only one of many.

Chapter 2 deals with the development and management of science parks. Its focus is on the property-development aspects of science parks and the different resources available to management (e.g., planning, funding, finance, and buildings). This chapter also addresses the characteristics of science park companies but only briefly.

Chapter 3 looks at the science parks experience in Europe, the United States, Japan and Australasia. The country reviews are inevitably brief and as a result they gloss over much of the complexity surrounding each case. However, the reviews point to the diversity of responses from each country as well as the wealth of different case studies which are available. Australasia receives less than one page of commentary and about a dozen entries in the reading list.

Chapter 4 addresses the question of whether science parks work or not. This chapter is perhaps the most challenging in the report. It draws on some of the criticisms made in a recent book by D Massey and others, *High-Tech fantasies: science parks in society, science and space* (Routledge, London, 1991). Basically, this chapter establishes that there are considerable grounds for doubts about the contribution of science parks to high technology development, technology transfer and high technology growth.

Counterbalancing the critical aspects comes Chapter 5 which is effectively a commentary from the UKSPA. This commentary is an attempt by the supporters of science parks to 'set the record straight' as it is claimed that many important themes have been misunderstood by the 'academic' critics.

The author has done a good job in identifying relevant literature and categorising it under the appropriate headings. The commentary is also adequate

but it has some limitations. First, the commentary is not very closely referenced to the reading list supplied with each chapter. Hence, the reader is often left guessing which source made the telling criticism or observation. The reader is left to deduce this from the titles and summary associated with each reading list entry. Second, the commentary and approach taken by the author misses a good opportunity to see science parks in their historical context. Broader questions are not directly addressed (but often alluded to) and consequently, this has the effect of undermining a better contextual understanding and analysis of science parks. The criticisms are never allowed to develop beyond middle-level policy analysis and this is precisely where such a review/commentary could have contributed to broader and long term thinking.

The reader is left to make up his or her mind on whether science parks work. The linear model of innovation is identified as a problem area. Science parks were founded, as the critics argue, on the basis of this simplistic model. However, this theme is only alluded to and the UKSPA's response that the criticisms are themselves "based on a misconception of the innovation process" (p.122) does not advance our understanding very far. This central problem could have been explored further. In addition, nowhere in this book is the critical issue of the nature of high technology squarely addressed. Technology parks are supposed to encourage high technology but just what high technology is or its essential characters are not seen as prominent issues. Some of the references point to the information-intensive nature of high technology and it is a pity that this them was not given more attention.

Likewise, there are some tantalising observations that the most successful science parks are only capitalising on existing locational attributes, presumably high technology activity which was well underway before the parks were set up (p.107). Unfortunately, this central observation is not developed further. Such fundamental assumptions seem to avoid scrutiny in the report. A broader focus on the phenomenon of high technology growth itself would have placed science parks in a better historical context. This lack of broader context leads to a failure to identify why there is so much interest in exploiting information (viz. high technology) at this point in time and the perceived role that science parks play in promoting the large-scale industrial transformations in an information economy.

Despite the numerous missed opportunities to identify deep-seated policy problems in this text, the defensive chapter by the UKSPA is revealing in itself. This chapter makes the significant concession that "the initial enthusiasm for science parks and a lack of understanding of their rationales has sometimes led to exaggerated expectations of their benefits and under-estimation of the time needed to achieve results" (p.120). The final defence of the UKSPA is that because so many countries have adopted the science park model, it is difficult to argue that they all could have got it so wrong (p.123). This begs the question of the political role of science parks in securing concessions for proponents of high technology. In my opinion, the UKSPA's defence of science parks is an attempt to back-track and re-interpret the failed and misguided enthusiasm of a past era. The game has moved on.

In summary, this book provides a good review and listing of relevant literature on science parks. It has its limitations, however. The fact that readers are left to deduce their own conclusions leaves many important questions and issues not addressed. It does highlight the considerable gulf between the critics and

proponents of science parks which cannot be easily explained away by 'misunderstanding'. It is a pity that this text did not exploit the opportunity and capitalise of these issues. The book price puts its out of the reach of most academics, reachers and students. It should have a market as a reference source for technology policy institutions, science park administrations, universities and local governments.

Richard Joseph
University of Wollongong

For the Public Health: the Hunter District Water Board 1892-1992 *by Clem Lloyd, Patrick Troy and Shelley Schreiner* (Longman Chesire, Melbourne, 1992), pp.xii + 364, $29.50, ISBN 0-582-87686-9 (pbk).

After a deserved tribute to John Armstrong's valuable *Pipelines and People*, a history of the Hunter District Water Board commissioned by the Board for the general reader in 1967, Lloyd *et al.* state that the different focus of their study is to explore "changes in administrative practice and style in a public service institution over one hundred years; and the nature and organisation of work in a statutory authority which delivers vital public health services." Or, as Paul Broad, Managing Director of the Hunter Water Corporation which replaced the Board after an even century in 1992, succinctly and accurately puts it in a Foreword, they have penetrated the "soul" of the organisation.

The early chapters explain why Newcastle with suburbs, although a major and fast-growing coal port, with a press highly critical of odours and filth, entered the 1880s without a permanent water supply or effective sewerage system. Students of local history will recognise factors which have delayed all manner of improvements : absentee owners and land grantees, a profusion of impecunious municipalities and the belief that Newcastle was a hardy "man's town."

Now that the disused Walka pumping station, operating 1887-1930, is recognised as a fine example of industrial architecture, it is worth recalling its origin as the source of the first limited water supply system using the Hunter River to supply reservoirs serving Newcastle and Maitland. This municipal system was absorbed by the Hunter District Water Supply and Sewerage Board created in 1892 as a statutory authority responsible to a Minister and Parliament. Another Act in 1938 changed its name to the HDWB giving it autonomous control over funds and works.

Chapters 8 and 12, entitled "Work practices and rituals," are based on an imaginative use of oral history and well-digested knowledge of a great variety of tasks.

A distinctive administrative style emerges in a number of ways. A structure dividing professional, clerical and indoor from mechanical, manual and outdoor staff persisted once the latter had been inherited from the PWD. This meant administrators had higher status and control and also shaped emerging industrial relations leading in 1921 to separate wages and salaried divisions of the HDWBEA. But generally the Board was considered a good employer.