

Seeking the Elusive: the Stories of Science Writers

Dr Bill Palmer

Associate, Curtin University

bill_palmer15@hotmail.com

Over the past twenty years, I have researched the lives of scientists to open up their motivations and personalities to teachers and students and to reveal some of the difficulties in life which these men and women faced. I will be featuring the changing historical methodologies available to researchers as the internet makes so much more information available. The pathway chosen is 'the road less travelled', so examples will be given of the lives of little known science textbook writers and interesting features relating to better known scientists.

A Variety of Historical Themes

For nearly twenty years, I have been interested in and have written about the history of science. In fact one of my first substantive essays in my education year in 1960 at Exeter University was a biography of Michael Faraday, who remains for me someone who approaches the ideal scientific life. My next attempt at a biographical essay had to await the bicentenary of the death of Antoine Laurent Lavoisier and this contributed to my ideas about my doctoral thesis. Over the years the themes of the thesis *A study of teaching and learning about the paradoxical concept of physical and chemical change* and the investigations into characters in the history of science intertwined. During the writing of the thesis, I followed up the lives of both scientists and scientific text book writers. After the completion of the thesis in 2003, I had time to follow up on some of the scientific text book writers, about whom I had written in a few paragraphs within the thesis, but whose lives appeared to demand greater attention. This explains the escalation in the numbers of historical themes after 2003. As well as biographies of scientific writers as individuals, there were some case studies of groups of writers and comparisons between them, an increasing emphasis on the analysis of the textbooks that they had written and a return to the themes of physical and chemical change in a variety of historical contexts such as ballooning and student experiments from chemistry manuals. In general, because of the isolation from other libraries, except for the Charles Darwin University Library which had only a limited selection of books relating to the history of science, I purchased copies for my personal library mainly from Ebay. This meant that I now possess a strong reference library, which allows instant access to many eighteenth and nineteenth

century science textbooks. When I required access to a greater variety of eighteenth and nineteenth century science textbooks, I visited collections at Deakin University, Melbourne University, The State Library of Victoria, Sydney University, Flinders University and a neat little collection at the Department of Education at The University of Tasmania (Hobart). I also visited collections overseas in the United Kingdom (The British Library and The Bodleian Library) and in the USA at Cincinnati University Harding University, Searcy and The Chemical Heritage Library, Philadelphia.

For the three articles on the topic of “children's alternative conceptions of physical and chemical change obtained from historical sources” I now have about 200 chemistry manuals completed to varying degrees by students in their own handwriting, which is a historical archive for student misconceptions of physical and chemical change or indeed of many other chemical concepts.

Table 1.

Science Writers and Years in Which Articles First Appeared

Science writer	Year of article	Science writer	Year of article
Antoine Laurent Lavoisier	1994	An autobiographical chemical education,	2006
Johann Josef Loschmidt	1995	James Rennie	2007
Carl Wilhelm Scheele	1998	Mary Amelia Swift	2007
Henry Edward Armstrong	1998	Gustavus Detlef Hinrichs	2007
Ida Freund	1999	C.P. Snow	2008
Jane Marcet, Almira Phelps and Mary Somerville	2001	T. H. Huxley and physiography	2008
Jean-Baptiste André Dumas & Antonio Montero	2003	George Washington Carver	2008
Richard Watson, Bishop of Llandaff	2004	Robert Williams Wood	2009
Robert Wilhelm Eberhard Bunsen	2004	William Franklyn Hudgings	2009
John Henry Pepper	2004	Almira Hart Lincoln Phelps	2010
Edward Livingston Youmans	2005	Henry Enfield Roscoe	2010
Elizabeth Fulhame	2005	Joel Dorman Steele	2010
Emanuel Haldeman-Julius	2006		

Overall I have written some forty or more articles on the history of science in about eighteen years, considerably more if different versions of papers prepared for different conferences are included. Table 1 lists the scientists and science text book writers about whom I have written over the period.

Sources

The remainder of this paper will indicate the methods that I have used to find out information about the lives of science textbook writers and scientists. Autobiographies and books and letters written by authors themselves with contemporary records and letters concerning these authors are the primary sources of data. Biographical material and a range of later opinions about the authors comprise the secondary literature. It is the aim of biographers to include as much material as is possible from primary sources.

The other major division is between printed material and material sourced from online; online material usually substitutes for printed material, where the printed material is unavailable or difficult to obtain and the amount of materials available online is continually increasing. In order to start on a biographical article about a particular scientific textbook author, some feature about the person's life needed to attract my interest. Initially the reason was to celebrate some particular anniversary, such as the 200th anniversary of Lavoisier's death. Other reasons have been to provide information about female authors, to follow an Australian connection such as those of Pepper, Armstrong, or Rennie, or simply because there was some special instance in the authors' life which made their achievements particularly remarkable, such as the partially-sighted Youmans work on the Chemical Atlas or the practical jokes and experimental brilliance of Robert Williams Wood.

Biography From Hard Copy Sources

It is a considerable help if there is an existing biography or better still an autobiography. However there are a whole range of sources of biographical information. For American authors I have purchased over time the complete 15 volume set *Dictionary of Scientific Biography*. For UK authors the 60 volume *Oxford Dictionary of National Biography (DNB)* can be obtained on line through the State Library of Victoria. My collection also contains a wide variety of one volume dictionaries of scientific biography such as *Chambers Dictionary of Scientists* (Millar), *Readers Guide to the History of Science* (Hessenbruch) *Biographical Dictionary of Scientists* (Williams) or *Asimov's Biographical Encyclopedia of Science and Technology* (Asimov). There is surprising variation between these different dictionaries with some scientists being mentioned in one source but not in others. Occasionally facts appear to vary between different dictionaries as when Scheele's date of birth appeared to vary as different documents were consulted. The variation eventually appeared to be due to the change of 11 days when changing from the Julian to the Gregorian calendar. Sometimes encyclopaedias can be useful, for example the *Encyclopedia Britannica* where I have the first edition (reprinted copies) and sections on chemistry of some other editions; the online 1911 edition (LoveToKnow Classic Encyclopedia project) is of particular use as the following URL gives brief biographies of some interesting chemists:

<http://www.1911encyclopedia.org/Category:Chemists>. Another interesting and useful Encyclopedia in my collection, *The Economy of Nature explained and illustrated on the Principles of Modern Philosophy* (Gregory, 1798) provided me with information about Richard Watson, Bishop of Llandaff, not available elsewhere and also with an eye-witness account of the early balloon ascent. Another encyclopedia, *The academy of science and art or new preceptor containing a complete system of useful and accomplished education as well as general knowledge*, in the collection has a major section on chemistry. A variety of such works ensures a way of checking on the knowledge commonly available in some particular period.

The collection also has strength in histories of science, particularly in chemistry which includes Taton's 3 volume history of science series, *The History of Chemistry* (Thomson, 1830-1831), *A History of Chemistry from the Earliest Times to the Present Day* (Meyer, 1906), *A history of chemistry* (4 Volumes) (Partington, 1965), *The Great Chemists* (Farber, 1961), *The development of modern chemistry* (Ihde, 1966), *Ideas in Chemistry: A History of the Science* (Knight 1995) and *The chemical tree: a history of chemistry* (Brock, 2000). These and many others provide differing views on the main characters in the history of the sciences; they often fall short on detail on the writers of science textbooks. For textbook authors in the USA the two books by W. D. Miles are extremely useful *American chemists and chemical engineers* (Volumes 1 and 2) as is *The Biographical dictionary of American science: the seventeenth through the nineteenth centuries* (Elliott, 1979). For women scientists and authors, the collection is also well stocked with *Ladies in the laboratory? American and British women in science, 1800 - 1900: a survey of their contributions to research* (Creese, 1998), *Notable women in the physical sciences: a biographical dictionary* (Shearer and Shearer, 1997), *A biographical dictionary A to Z of women in science and math* (Yount, 1997) and *Women in chemistry: their changing roles from alchemical times to the mid twentieth century* (Rayner-Canham, 2000). Additionally my library has a variety of bound volumes of journals of the 18th and 19th centuries which can be searched for relevant articles, when looking at the publications of scientists. Finally there is a collection of about a thousand school textbooks covering all the science disciplines from 17th to 21st century: they are mainly from Britain and America originally collected to follow the origins and usage of the expression 'physical and chemical change' but now mainly used to critique the works of science textbook writers. Apart from books there is a large collection of more recent journals.

On-Line Searches in the History of Science

When searching for information about some particular scientist or science textbook writer, the first search tends to be Google and/or Google scholar. Search terms are varied and searches are continued until there are several pages without result. Additional searches are carried out using Bing Search Engine, Cuil Search Engine, Ixquick Metasearch, Metacrawler and Dogpile. The results of these searches are cut and pasted onto a results sheet, recording information so that a search could be repeated or referenced easily. It may be necessary to go back to a library stocking a journal and photocopying an article where the internet site requests prepayment. Recently I found The Bielfeld Academic Search Engine which appears to be quite

quick and useful, though mainly refers to other sources such as Google Scholar. <http://www.base-search.net/>.

Scirus is a comprehensive scientific research tool on the web. With over 410 million scientific items, it allows researchers to search for not only journal content but also scientists' homepages. <http://www.scirus.com/srsapp/>

The State Library of Victoria affords any resident excellent home access to their databases, which are remarkable as I had imagined that after retiring I would have found access to databases difficult. As most of my searches are historical, I find JSTOR the most useful of the databases. Earlier searches using Google Scholar or other public search engines often provide the titles requiring prepayment and these can sometimes be obtained through the databases. The most useful and commonly used databases in my research are JSTOR, Academic Search Premier and MasterFILE Premier (EBSCO). The site also provides access to *Oxford Dictionary of National Biography* and also to *The Times* archive and the archives of a number of British regional newspapers. It is thus the resource which makes continuing research in this field outside a university possible.

Additionally for searching specific historic journals the following sites are useful.

<http://www.bodley.ox.ac.uk/ilej/>

Blackwood's Edinburgh Magazine: Gentleman's Magazine; Notes and Queries: Philosophical Transactions of the Royal Society (UK) can be searched.

<http://www.sciper.org/searching.html>

Science in the nineteenth century periodical (Sciper) offers a simple keyword search, to 15 individual British periodicals including *Punch*.

<http://quod.lib.umich.edu/m/moa/>

The Making of America (MOA) digital library of primary sources in American social history allows about 23 nineteenth century journals and some books to be searched.

Individual journals may be searched at a related site.

<http://memory.loc.gov/ammem/ndlpcoop/moahtml/snctitles.html>

Other more specialist search engines allow searches in Home Economics and Agriculture.

URL <http://hearth.library.cornell.edu/> and <http://chla.library.cornell.edu/>.

HEARTH is a core electronic collection of books and journals for Home Economics and related disciplines. The Core Historical Literature of Agriculture (CHLA) is a core electronic collection of agricultural texts published between the early nineteenth century and the middle to late twentieth century.

For general educational information, ERIC (The Educational Resources Information Centre) provides unlimited access to more than 1.3 million bibliographic records of journal articles and other education-related materials. <http://eric.ed.gov/>

To find online books, there are a number of different possible strategies. For full text books generally Project Gutenberg provides many books on line though I have not found it useful for my projects. <http://www.gutenberg.org/catalog/>. On the other hand I have used The Internet Archive, which is a non-profit, digital library of Internet sites including historic science textbooks often in a range of editions and formats. I have found this invaluable when looking at the range of textbooks written by an individual writer. <http://www.archive.org/>. Additionally I have CDs of the textbooks of some writers, two of Victorian science books and one of 150 chemistry

textbooks; these supplement the hard copy library. The CDs have been purchased from Ebay suppliers at comparatively little cost. Also Book Google is an increasingly valuable source of full-text books, though quite a percentage of the books are available only as a few chapters or less. Other sources of book information or even of complete sections of books are commercial book sellers, such as Amazon, and I have accessed quite a lot of material for articles through their sites.

Newspapers can reveal a lot about some writers. The British newspapers such as *The Times* (accessed through The State Library of Victoria) have been helpful in reviews of books or obituaries. Similarly *The New York Times* has provided a lot of information about individuals I have written about through their well set-up archive site, for which a small payment is usually needed. It has provided useful information about E. L. Youmans, J. D. Steele, E. Haldeman-Julius and W. F. Hudgings who all spent part of their lives in New York.

Library catalogues, such as the World Catalogue, provide listings of all the books in the world (at least in theory). Variations between standards in contributing libraries make it less than ideal, but useful nonetheless. <http://www.worldcat.org/>. The COPAC library catalogue gives free access to the merged online catalogues of many major University, Specialist, and National Libraries in the UK and Ireland, including the British Library <http://copac.ac.uk/>

There are many other useful sites, which relate to associations and societies to which I belong, such as the Royal Society of Chemistry, that have particular privileges for members <http://www.rsc.org/Library/index.asp>. Finally there are some specialist sites which are useful only for particular projects and do not relate to more general searches. For example, I have been in correspondence with the University of Rochester (USA) to obtain copies of letters from one of J. Dorman Steele's friends that throw light on Steele's ideas in writing his textbooks.

Seeking the Elusive

Increasing amounts of previously elusive material is now available via the internet, so the elusive becomes more commonplace and available to all. However seeking out this material is not straightforward, and the indicators above give some indication of how the raw materials may be obtained. However these materials need to be sorted and shaped to fit the needs and interests of the audience. This remains the challenging task!