

ESSAY REVIEW

A Bibliography for Historians of Geology**ROBERT M. HAZEN**

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W. A. S. SARJEANT. 1980. *Geologists and the History of Geology*. 5 vols. New York: Arno Press. £250.00. ISBN 0 405 10469 3.

The bibliographer's task is not easy. He must clearly define the scope of his compilation, seek out and accurately record all sources related to his subject, and organize and present these references in a convenient format for his users. In practice this task represents years, perhaps decades, of labour. Yet, with the ever-increasing rate of publication in the sciences, bibliographies are essential for the researcher. The thanks of all workers interested in the history of geology and geologists, therefore, must be extended to Dr Sarjeant for his massive bibliography of works on the history of the earth sciences.

A bibliography can be judged on the basis of five criteria: scope, completeness, accuracy, organization, and presentation. This review will address each of these criteria in turn.

Scope

Sarjeant states 'this bibliography attempts to bring together details of all those works written in languages using the Latin alphabet which deal with the history of geology'. References in French, German, Italian, Spanish and Scandinavian and Slavic languages are included along with English sources from the United Kingdom, Canada, Australia, and the United States. Histories of geology, mining, and related fields, covering all periods, from the earliest times through to 1978, are represented. Virtually every published source, be it book, journal, pamphlet, or newspaper, about the lives of geologists and their work is fair game for Sarjeant. In addition to biographies, memorials, historical analysis and bibliographies of individual geologists, Sarjeant has listed articles and texts on many aspects of the history of geology and related sciences, geological societies, explorations, and 'events significant in the history of geology'.

The scope of Sarjeant's bibliography is unusually broad. It is a significant achievement to list biographical data on even a small fraction of the tens of thousands of geologists who have contributed to the science. It is all the more remarkable to add thousands of topical references on various aspects of the history of geology. A bibliography of this scope can be used by all historians of science, as well as geologists seeking historic background information.

There exists a difficulty in any historical bibliography in clearly distinguishing history, the record and analysis of past events, from other publications. Virtually all scientific works include some reference to earlier work, and all gradations exist between science and history, as well as between current events and history. Is a 1906 account of the San Francisco earthquake 'historical'? Are the several historical chapters in Lyell's *Principles of Geology* really history or are they an integral part of Lyell's science? Nevertheless, *Geologists and the History of Geology* is one of the most important bibliographic tools available to the historian of geology.

Completeness

Sarjeant states that 'the bibliography is not comprehensive; it could not hope to be so' but that 'The coverage of items in Australian, British, Canadian, and U.S. publications may well approach 85%'. (A figure closer to 60% is cited for the German language.) I believe that the 85% figure is inflated, even if the vast newspaper obituary literature is ignored.

Consider the specific example of economic geology and mining in the United States. Sarjeant lists three general histories (by Winchell, 1894; Parson, 1947; and Simons, 1965). No mention is made of the treatises by Richard (1932), Young (1970), Binder (1974), Lingenfelter (1974), Whiteman (1971) or several other books on American mining history. None of the many accounts of the California gold rush is listed, nor are reports of other western mining efforts (e.g. Raymond, 1870).

Information on editions is incomplete and sometimes misleading. Lyell's *Principles of Geology*, which has several historical chapters, is listed under the 1872 eleventh revised edition, though all earlier

editions also had historical sections. Volume III of Sarton's (1947) *Introduction to the History of Science* is included, but volumes I and II are not.

Data on the histories of scientific societies, museums, and the petroleum industry (listed in two separate sections) appear to be more complete than listings of more general topical works. These portions are among the most original contributions of the bibliography and will be widely used.

A section on 'Events Significant in the History of Geology' is eclectic and perhaps the weakest part of the entire work. Its 28 pages include a seemingly unsystematic selection of works on the lunar landings, earthquakes, scientific expeditions, volcanic eruptions, deep-sea drilling, and the 'monkey trials'. Most references are to contemporary accounts and do not appear to be 'historical' in any sense of the word. For example, only two Apollo 11 references appear and these are from 1969 and 1970. None of the dozens of later books and articles, which are far more 'historical' in terms of analysis, are mentioned. The majority of reports on earthquakes and volcanoes are from within a year of the event, and only a tiny fraction of the thousands of such accounts are listed. (Not one of the dozens of descriptive pamphlets of the Boston, Massachusetts, earthquakes of 1727 and 1755 is noted, for example.) This section is incomplete, is not historical, and will be of little use to any reader seeking a systematic bibliography of these events.

The largest single section of the bibliography, comprising two of the five volumes, is devoted to biographical works on individual geologists. This section will be the most widely used by geologists and historians, and it is the best (and, in many instances, the only) source of biographical bibliography for the majority of persons listed. Each of close to 6000 entries of names of geologists includes a biographical sketch of a few lines and a listing of biographical and bibliographical sources.

Two aspects of this generally excellent section are disturbing. In addition to geologists, a few prominent individuals who influenced geology are included. Several of these persons, such as the writers Ruskin and Goethe, and 'monkey trial' participants William Jennings, Bryan and Clarence Darrow, are not scientists. Mendel, Brahe, Halley (but not Copernicus or Galileo) are included along with several other famous scientists in fields peripheral to geology. In each case the inclusion seems arbitrary, and the biographic and bibliographic data add little to what is available in standard sources (*Dictionary of Scientific Biography* or *Dictionary of American Biography*, for example).

A second aspect of the section on individual geologists that will undoubtedly raise some eyebrows is the selection of *living* geologists. Many eminent geologists and mineralogists who have been recipients of awards and other honours are not included. Recipients of the Wollaston Medal, the Clarke Medal, the Roebling Medal and the Day Medal are not well-represented, even though biographical sketches of these scientists appear in professional journals. Directors of the Geological Surveys in Great Britain (Sir Kingsley Dunham) and the United States (Vincent McKelvey and H. W. Menard) are not included, even though extensive biographical information was published after their appointments. Sarjeant has, however, included himself as one of three living historians of geology on the basis of a few obscure autobiographical sketches. In sum, the bibliography of living geologists is both inconsistent and incomplete.

Accuracy

In a brief examination of 50 titles selected at random only one minor error was detected. Sarjeant has provided sufficient information to track down even the most obscure references, and has transcribed his data carefully.

Organization

Most bibliographies are divided into two parts – a list of references with identifying numbers or symbols for each reference and an index with brief entries followed by a list of appropriate reference numbers or symbols. This system is simple to use and saves space, and it is possible for the bibliographer to include a given reference under as many index headings as required. The Geological Society of America uses this scheme in the *Bibliography of North American Geology* and has succeeded in condensing 50000 annual references to 15 cm of shelf space (23 cm tall).

Sarjeant's bibliography of 30000 references, which occupies 33 cm of shelf space (25 cm tall), is organized in a completely different way. There are *ten* sections in the bibliography; five contain references and four are additional indices (plus an introductory section). References are organized alphabetically *by topic or biographee*, as in an index, but with rather vague or eclectic subject headings. This approach may work well for biographies or obituaries of individual geologists, but it necessitates

the pigeon-holing of some rather diverse studies into narrow or otherwise ill-fitting categories. How does one classify Greene's (1961) *Death of Adam* or Rudwick's (1972) *Meaning of Fossils* into a single category? In the usual two-part biographic format several entries, some topical and some biographical, would be used for each, but Sarjeant's approach is more restrictive and cumbersome.

In many cases multiple index entries are obligatory (for example, works with several biographical sketches). Sarjeant is constrained to list some references (e.g. Fenton & Fenton, 1952) more than 25 separate times, thus greatly increasing the length of the bibliography. In other cases the rationale behind multiple listings is not obvious; E. S. Dana *et al.*'s (1918) centennial history of the *American Journal of Science* appears in twenty separate places (with several variants of authorship and pagination), for example. Such wasteful and costly redundancy has needlessly increased the length of the bibliography by more than 10% (close to 500 pages).

The use of multiple bibliographic sections in five separate volumes is inconvenient. A systematic search for historical studies on evolution requires looking in all five sections under such headings as 'Histories of Allied Subjects - Biology', 'Accounts of Voyages and Events - Alberta "Monkey Trials"' and 'Geologists - Darwin'. In other words, any reader unfamiliar with Sarjeant's unorthodox classifications must scan the bulk of the five volumes to use the bibliography effectively.

Presentation

One of the most perplexing aspects of *Geologists and the History of Geology* is the poor quality of presentation. The entire bibliography was printed on computer paper, photographed, and then published by reproduction on to high-quality, acid-free paper. This procedure should lead to an attractive, well-formatted, and easily readable product.

Unfortunately, Sarjeant's bibliography was first printed using cloth ribbon and a computer printer with broken type faces, rather than carbon-ribbon, letter-quality printer, now widely available. The resulting impression is indistinct and blurred. Little reduction was possible, and there are only 12 characters per inch (7-1/2 lines per inch) as opposed to most bibliographies, which are readable at 20 characters/12 lines per inch. The information density of Sarjeant's work is thus only 40% of other bibliographic works. Furthermore, the extensive use of double spacing, and long sections with partially blank pages (e.g. pp. 297-338), compounds the problem. A bibliography is not a reading book. Wasted space in printing means wasted library money and shelf space. What Arno Press has produced in five volumes at £250.00 should have been in no more than two volumes at less than £80.00 given the present state of bibliographic art.

Conclusion

W. A. S. Sarjeant's *Geologists and the History of Geology* is the largest and best source of information on historical writing about geology. It is monumental both in scope and presentation. It will certainly remain the principal bibliography on history of geology for many years. It is regrettable, therefore, than in organization and presentation the work is poorly conceived. A more condensed work with the same information content would have been less expensive, less cumbersome to use, and thus more accessible to the historian and geologist alike. It is to be hoped that future bibliographers will learn from both the good and the bad attributes of *Geologists and the History of Geology*.

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