

THE RECORDS OF E. W. TITTERTON, NUCLEAR PHYSICIST

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The authors describe the processing of the records of Sir Ernest William Titterton, a prominent nuclear physicist. This large collection, when first brought to archival attention, was in a very disordered state. A somewhat unorthodox approach, determined by the conditions surrounding the transfer of the collection to archival custody, the limited availability of funds, and the availability of contemporary database management computer software, was used to gain control over the wide variety of materials comprising the collection. The role and definition of 'original order' became an important part of the process and there is a brief summary of the various arguments for and against the maintenance of 'original order' and the problems inherent in the preservation of the context and the internal integrity of a collection while creating a collection that can be successfully administered. The problems peculiar to scientific and technological collections, namely the highly technical nature of some of the material and the need to consult subject experts, are briefly addressed.

Biographical note

Sir Ernest Titterton was born in Tamworth, Staffordshire in 1916. He was a nuclear physicist who became known outside scientific circles on two counts. First, he led the group at Los Alamos, New Mexico, which designed the instrumentation and timing required to detonate the first nuclear bomb and is popularly known as the man who 'pressed the button'. Second, he was closely associated with the British nuclear testing done in Australia in the 1950s and early 1960s through his chairmanship of the Atomic Weapons Tests Safety Committee. The Royal Commission into British Nuclear Tests in Australia 1952-1964, under the Chairmanship of the Honourable James McClelland, was most critical of his actions during this period. He also became well

known for his consistent advocacy for nuclear power as a safe and economically viable energy source.

In 1950 he came to Australia at the invitation of Sir Mark Oliphant to take up the Chair of Nuclear Physics in the Research School of Physical Sciences at the Australian National University (ANU), Canberra. He was Dean of the Research School of Physical Sciences from 1965 to 1968 and Director from 1968 to 1973. He remained Department Head until 1970. One of his most significant achievements during his time at the ANU was organising the funding for the 14UD electrostatic accelerator, which was for a number of years the most powerful of its type in the world and established the Department as one of the world leaders in heavy-ion physics.

After his retirement in 1981 he continued active research until a tragic car accident in September 1987 left him a quadriplegic, able to move only his head. At the time of his death in February 1990 he was working on his autobiography with the aid of a voice actuated tape recorder.

The provenance of the records

Titterton was a hoarder. After his retirement he retained his office in the Department of Nuclear Physics and by the time of his accident it had reached the stage where it was almost impossible to reach the desk because of all the clutter on the floor. His daughter had asked him some time prior to this what he intended doing with his records and his reply was that she should throw them all out after his death. Luckily she felt that this was the wrong thing to do and she spent some months during 1988 sorting through the heaps. During this time she approached the Adolf Basser Library, Canberra, for advice on what should be kept. Rosanne Clayton, the Librarian, spent some hours assessing the material and gave her a copy of the Basser Library publication, *Preserving scientific source materials; a guide for owners and advisers*.¹ Concurrently, Professor R. W. Home, Director of the Australian Science Archives Project (ASAP), Melbourne, wrote to T. R. Ophel of the ANU Department of Nuclear Physics, inquiring as to the extent and intended fate of Titterton's records. In August 1988, Gavan McCarthy, Senior Archivist of the ASAP, met with Titterton's daughter at the ANU to further discuss the options available for the preservation of this clearly important set of records.

Early in 1989, Titterton's daughter contacted the Basser Library again. By this stage the office previously occupied by Sir Ernest had been taken over by someone else and his material was scattered over a smaller office, a storeroom and four filing cabinets in a second office. The latter dated from his time as Director of the Research School of Physical Sciences and were the only files that had been relatively untouched. In February 1989 the ASAP began approaching

prospective donors for funds to support the proposed archiving program. Although a clear methodology for the handling of the collection had not been established it was clear that the Basser Library and the ASAP would need to work as a team if a solution was to be found to the logistical problems surrounding the archival processing of the collection.

The collection

The collection is an interesting one in many ways. It touches on some basic archival principles such as provenance and original order; it raises interesting questions about what should be kept; and finally, in terms of gaining administrative control, it has presented a significant challenge, both because of its size and disordered condition and because of the problems common to scientific and technological collections, which contain material of a highly technical nature, not easily understood by anyone other than a subject specialist.

The provenance has been briefly described above. A rough appraisal of the material revealed a large number of journals, some not even opened, of which only one had a sufficiently large run to be worth offering to another library. There were also a large number of trade catalogues for technical equipment, many technical reports, endless multiple copies of reprints of articles by Titterton and members of his department (and it was known that many of these had already been disposed of by his daughter), and a huge number of reprints and photocopies of articles by other scientists scattered throughout the collection. Almost complete sets of reports from some institutions, such as the Australian National Radiation Laboratory, had unexpected gaps. This seemed odd until his daughter revealed in conversation that she had thrown out some of this type of material.

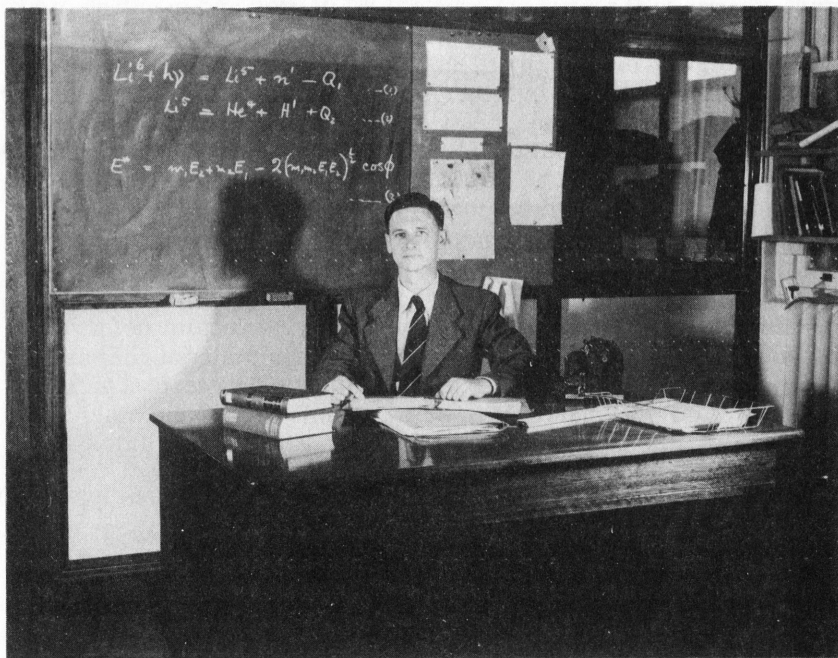
There were, as well, a wide variety of other materials including administrative files, photographs, chronological and subject-based correspondence, diagrams, drafts of chapters of books, notebooks from his student days, notes from his overseas trips, lecture notes, radio broadcasts, press cuttings, reports, conference material, minutes of meetings and plans. The type of material that one may expect to find in a collection of personal records, namely family letters and other items of a purely personal nature such as diaries, were not included in the collection at the request of the family. The collection covers Titterton's career from the early 1930s in England to his death in 1990. When it was first transferred to the Basser Library it occupied about eighty cartons (about thirty-two shelf metres), however the initial weeding of the collection as described above reduced this to fifty-five cartons (about 17.6 shelf metres).

An overall survey of the cartons by the ASAP in April 1991, following the commencement of the item list on cards by the Basser Library, revealed that the collection was a mix of loose materials in

files that were either unlabelled or wore labels bearing no apparent relation to the file contents, and materials in original files or other containers with sufficient information of evidential value that would allow them to be reconstructed to form cognate series. What had to be found was a methodology that would meet the needs and capabilities of the Basser Library and the ASAP. It was not possible for Rosanne Clayton to continue the time consuming task of listing items on the cards and there was not the time or the space to allow the collection to be physically laid out for intensive appraisal, arrangement and description and for the same reasons it was not feasible to move the collection from Canberra to ASAP offices in Melbourne.

How relevant is original order?

From what has been presented about how the records arrived it is clear that they had lost almost any resemblance to the order they had when they were last actively used by Titterton. The boxes containing the material from the filing cabinets were labelled, but the remainder were hopelessly muddled and it might be added that, based on impressions from the first visit to Titterton's office by Rosanne Clayton, 'order' is not a word that would have been associated with his material even before it had been moved!



Titterton in the Chair of Nuclear Physics, Old Hospital Building, Australian National University, Canberra, 1951. (Source: Titterton Collection)

The difficult question facing the team with regard to the arrangement and description of this collection was how an effective and useable arrangement, given the uncertain financial arrangements and severe space restrictions, could be found for the collection while preserving and documenting the actions taken by the archivists during the archival program. The key to this question lay in the interpretation and application of the archival principle of 'respect for original order'. What was the 'original order' or as Colin Smith termed it the 'final active order'² of the collection? How were we to determine if there was 'order'? If there was 'order', how could we reconstruct the collection, given its size and complexity, and still remain within budget?

A brief survey of the literature shows that among contemporary archivists the question of whether or not an attempt should be made to restore them to their 'original order' is a very controversial one.

Graeme Powell³ takes the stand that the principle of original order either cannot or should not be applied to most collections of personal records except where it can be clearly discerned, and that in many cases the material will have been sorted, for example, for a biography. He suggests that unless the original order has been preserved and is significant, perhaps the most useful arrangement is by activity. His ideas were challenged by Chris Hurley,⁴ who feels that any order other than the original one may destroy evidential value imparted to documents by their association with one another, and that original order ensures internal cross-references remain operative and provides a standard form of presentation based on the only principle applicable to all collections. Hugh Taylor⁵ also advises maintaining or re-establishing original order.

Many archivists have adopted a position somewhere in between these two extremes. Kane⁶ accepts the idea of original order but feels that it can be modified if justified in terms of user needs. The question which must be asked here, of course, is 'which' user? Bordin and Warner⁷ feel that original order does not work well with most types of personal records, as a chronological arrangement comes closest to life as it is experienced. However, they also feel that in the case of contemporary records, quite apart from practical considerations of lack of staff, original order is the most useful arrangement, as contemporary records almost always arrive in instalments and no other order makes sense until they are complete.

Gracy⁸ suggests four possible bases on which series may be developed: chronology, topics, functions of the creator and types of material. In his opinion, arrangement by function or activity of the creator is the best way to bring out the evidential value of the records, and comes as close as possible to restoring the probably original order. Interestingly, Powell, who has argued against original order, also feels that arrangement by activity is the most useful. Former Bassett librarians have also agreed with Gracy's approach. Files are grouped by

function to form series and are arranged chronologically within this. Miscellaneous materials tends to be arranged by form (e.g. printed material), and further arranged chronologically.

The Australian Society of Archivists' own book on the subject, *Keeping Archives*,⁹ states categorically that 'the original order must be preserved, or re-constructed if it has been disordered, unless it is absolutely clear that there was no original order and the material has been assembled haphazardly.' However, the dilemmas facing archivists attempting to create order from apparent chaos are not addressed in detail.

More recently, Miller¹⁰ has put forward his somewhat pragmatic viewpoint: largely because rearrangement is so time consuming and often subjective, original order is generally retained unless it is positively detrimental to the uses for which the records are being preserved. Original order is innocent until proven guilty. He goes on to say that if records are received in disorder, archivists have to devise their own system and structure.

It is clear from the earlier description of the Titterton's records that for many documents the original method of storage may have been to put things wherever there was a space. The task facing this archival project was to ascertain if, among the more than eighty cartons of miscellaneous records, there were cognate series of records that had been split and mixed. The answer, of course, lay with the records themselves.

Organising the collection

As stated earlier, when Titterton's records were received by the Bassler Library, the collection measured approximately thirty-two shelf metres. The average size of the collections in the Library at that time was 1.1 linear metres and the largest collection was that of the Geological Society of Australia, measuring about thirteen linear metres; this had been received in regular small consignments over a period of years and had generally arrived in an ordered condition.

The only computer to which the Library staff had access at that time was several years old, with insufficient memory for any modern database (or word processing) program to be able to be used. At this stage it was obvious that the magnitude of the task was greater than could be handled by a sole archivist working part-time.

For about a year, no work was undertaken on the collection while the ASAP raised some funds to allow work to begin. Although the ASAP is used to fundraising for particular collections, this approach has never been taken by the Bassler Library in the past. However, in 1989 the Australian Academy of Science's fundraising arm, the Australian Foundation for Science, was established. The Foundation therefore

took over the responsibility for raising funds to process the Titterton collection.

In the meantime, a rough appraisal of the collection, with the initial aim of weeding out duplicates and clearly non-archival material including some of the books, journals and technical reports was undertaken with the secondary aim of getting some idea of what was in the collection. Collections previously received by the Basser Library had arrived in manageable sized lots and it had been possible to physically sort them into series. However the size of this collection was too great and it was too disordered for this sort of approach to be possible. The Librarian began the process of listing the file titles onto cards and was about one-third of the way through this when in April 1991 she received a very welcome visit from the Senior Archivist of the ASAP and an archival program was established that would best use the limited funds that had been raised and not waste any of the effort that had already been put into documenting the collection.

The ASAP decided on a novel approach to gain control over the material. In the past, material had either been worked on at the ASAP office or the Senior Archivist had worked on collections *in situ* with a laptop computer. It was impracticable for the Senior Archivist to stay in Canberra for the considerable length of time that this collection would have required. Similarly the cost of transporting the material to Melbourne for processing only to pay for it to be transported back to Canberra made this approach undesirable.

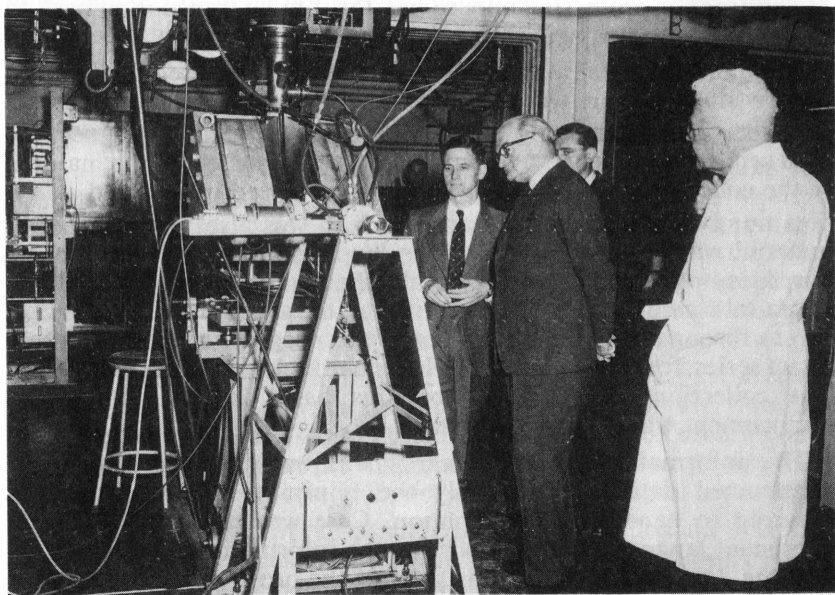
Some of the funds raised by the Foundation were used to employ a library student who worked with the Basser Librarian to list the contents of the remaining thirty-six cartons onto cards. These were then sent to Melbourne to be entered into a database. All the material in the collection, if not already in files was placed in files and all the files numbered within each carton, which was also numbered. The material was filed to correspond to 'appraisal units', which for our purposes were groups of materials that would receive the same appraisal classification. The appraisal units varied in size from single sheets, through sets of subject files and other cogent groupings to larger intact series, for example, sets of files of chronological correspondence. The collection was surveyed on this basis and no attempt at arrangement was made at this stage.

The information from the cards was entered into a specially constructed database with only the minimum number of fields required to handle the information. Care was taken to develop a consistent language when translating the information from the cards into the database fields. At this stage of the program we could assert that general control of the collection as a whole had been established. It was now possible for the Senior Archivist of the ASAP in Melbourne to analyse the collection using the indexing and sorting facilities of the

database software to draw together materials that had been split and mixed.

At a meeting of the team in Canberra a structure for the collection was agreed upon comprising some thirty-four series. Each appraisal unit was then tagged with the appropriate archival series in the database and a report listing the required physical re-arrangements of the files was produced. This job, which included the transfer of the files from the cartons to standard archives boxes, was given to an archives student who completed the task in about two weeks. The collection is now organised in series of manageable size and the lists produced from the database provide enough information for the collection to be administered and access provided to users. An added key benefit of entering the information into a database is that it will not need to be re-keyed when further more detailed work is carried out on the records.

With the funds that remain and with any further funds that are raised more detailed listing and indexing of the series will be undertaken and it will be seen how successful this approach has been. However, our work on the collection has been thoroughly documented in the database and it is a simple task to reverse the process if it is felt that the present series structure does not best capture the 'original order' of the collection.



*Titterton (L) and Sir Mark Oliphant (R) during a visit of the Governor-General Lord Slim to the H.T. 1 Target Area, Australian National University, Canberra, 1954.
(Source: Titterton Collection)*

Problems of scientific and other technical papers

One of the most problematic aspects of the processing of this collection was the vast number of reprints which were scattered right throughout the eighty cartons. The Academy's *Preserving scientific source materials* suggests that:

They should be retained if they are 'associated' or signed copies of obvious historical or personal interest, if they are annotated copies which form an essential part of a research project, if they emanate from a relatively obscure source (perhaps foreign or ephemeral) unlikely to be readily available elsewhere in this country, or if they are part of a coherent collection specially assembled to provide a *tour d'horizon* of knowledge in a particular field or at a particular time.

Titterton was a firm believer in the value and safety of nuclear power. Many of the reprints he collected were on this aspect of nuclear physics. It is likely that they were specially assembled and so should be kept as a *tour d'horizon* of nuclear issues of the 1950s-1980s. What, however, should be done with the other reprints — the ones on scientific subjects whose titles are very daunting to the archivist without specialised subject knowledge? Many of these were sent to Titterton as complimentary copies, others are clearly marked as inter-library loans. It is very difficult to get a feel for such a large collection, even when it is physically accessible. Clearly the process of appraisal will continue as the series are examined in more detail and where necessary scientists with the appropriate skills will be engaged to advise on the importance of these technical reprints.

As mentioned above, Titterton's records present the problem, common to most scientific collections, of how to appraise material whose subject is technical and not easily understood. A useful source in this regard is *Appraising the records of modern science and technology: a guide*.¹¹ On the subject of appraising experimental data, for example, it is suggested that:

Although experimental data themselves may not be of interest or comprehensible to historical researchers, the way in which the data were gathered may indicate something important about the scientist's or engineer's methods. Experimental data records can reveal what choices were made in the scientific and technological process and other aspects of how the scientist or engineer worked. When examining data records, historical researchers generally focus on the method used and choices made by scientists and engineers, rather than on specific data. Examining figures, however, allows historical researchers to see how scientists and engineers interpret data; some individuals are conservative while others get a lot of mileage out of a small amount of data.

Conclusion

The Titterton collection will be of interest to researchers for many reasons but a major focus will remain the material on the benefits and

safety of nuclear power which had been actively collected from a variety of sources over a long period. They are of current interest because of the material they contain on the Maralinga trials. It is hoped that this article will not only alert researchers to their existence and value but also bring to the attention of archivists and librarians how database technology can facilitate the processing of collections and how it is possible to share expertise and resources even when the members of the team reside in different states. The use of FAX machines, the development of electronic mail networks throughout the country and overseas and the availability of truly portable but powerful computers will further aid joint ventures of this type.

ENDNOTES

1. *Preserving scientific source materials; a guide for owners and advisers*, Australian Academy of Science, Canberra, 1987.
2. Colin Smith, 'A case for abandonment of "Respect"' Part I, *Archives and Manuscripts*, vol 14, no 2, November 1986, pp. 154-168 and Part II, *Archives and Manuscripts*, vol 15, no 1, May 1987, pp. 20-28.
3. G. T. Powell, 'Archival principles and the treatment of personal papers', *Archives and Manuscripts*, vol 6, no 7, August 1976, pp. 259-268.
4. C. Hurley, 'Personal papers and the treatment of archival principles', *Archives and Manuscripts*, vol 6, no 8, February 1977, pp. 351-365.
5. H. A. Taylor, *The arrangement and description of archival materials*, K. G. Saur, Muchen, 1980.
6. L. M. Kane, *A guide to the care and administration of manuscripts*, American Association for State and Local History, Nashville, 1972.
7. R. B. Bordin and R. M. Warner, *The modern manuscript library*, The Scarecrow Press, NY and London, 1966.
8. D. B. Gracy II, *Archives and manuscripts: arrangement and description*, Society of American Archivists, Chicago 1977, pp. 4-47.
9. Ann Pederson, editor, *Keeping archives*, Australian Society of Archivists Inc, Sydney, 1987, p. 133.
10. Fredric M. Miller, *Arranging and describing archives and manuscripts*, Society of American Archivists, Chicago, 1990, p. 27.
11. Joan K. Haas, Helen Willa Samuels and Barbara Trippel Simmons, *Appraising the records of modern science and technology; a guide*, Massachusetts Institute of Technology, 1985, p. 60.