

# Collections development in hindsight: a numerical analysis of the Science and Technology collections of National Museums Scotland since 1855

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## Abstract

Long term and bulk patterns in both the accessioning and deaccessioning of the Science and Technology collections of National Museums Scotland were revealed within their digital database records. This makes use of bulk analysis of records to show historic patterns which can inform current activities. The current and recent selection of collections for display is analysed to reveal patterns in when these objects came into the collection. The research confirms the value of both past collecting and disposal in the development of strong collections of present and future utility. It shows that both recent displays and a major mid-twentieth century re-assessment of the collection were most likely to value material which had been recently collected. It also reveals a potential tendency for less significant material to be acquired by gift than by purchase.

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## Keywords

Database, collecting, disposal, display, collections development

## Introduction and aims

This paper presents a numerical and historical examination of the development of the Science and Technology collections at National Museums Scotland and its predecessor organisations. This retrospective provides a long-term assessment of past accessions and disposals from the point of view of the present. It serves to increase our understanding of the history of the

collection and provides a new tool which may serve to inform current collections activities both in our Museum and more widely. Specifically, it elucidates trends in the proportion of material collected at a given time which remains in the collections and that which is currently, or recently, on display. Neither collecting nor disposing of objects are new phenomena in collections development, and neither is carrying out a combination of opportunistic and focused collecting. Collections are, and have been, developed through a mixture of gift and purchase, through reactively accepting offers that are presented to the Museum and actively seeking out desired acquisitions. As well as collecting for present display or research we collect for potential future use ([National Museums Scotland, 2017, Collections Development Strategy 2017–22](#)) and our success at this will be judged in hindsight, as we now judge the collecting of the past.

National Museums Scotland traces its history back to several different organisations: the collections of the Society of Antiquaries of Scotland founded in 1780; the Zoological collections from the University of Edinburgh, initially established in 1697 and again in 1812 (though only nineteenth-century material survived to become part of the National Museums Scotland collections); and the Industrial Museum of Scotland, founded in 1854 and soon renamed the Edinburgh Museum of Science and Art before the opening of the first portion of its permanent home on Chambers Street in 1866 and renamed again as the Royal Scottish Museum in 1904 ([Swinney, 2013](#)). This range of origins has resulted in the National Museum holding plural collections, as do many other large museums, rather than a single collection. Not only did the different organisations develop their collections in different ways, but different departments within the same organisation, and even individual members of staff have left their mark on the collections ([Alberti, 2009, pp 91–122](#)).

The focus of this paper is one collection and its historical development, as traced numerically through the Museum's database; this delimited scope enables the numerical results of specific collections development decisions and actions to be seen more clearly than in a combined analysis of all the Museum's collections. Specifically, this paper considers material entered into the Technology/Science and Technology register since it was instigated in 1901 and that nineteenth century material which was assigned to the Technology department when the accession numbers were split between 'Technology' and 'Art'. There is some fluidity between collection departments, which means that the current boundaries of what are now the Science and Technology department collections are not perfectly aligned with material entered into the Technology registers, but the correlation is over 98 per cent and this initial departmental attribution provides the most complete data for analysis. Since 1976, the aviation collections have been numbered separately, and are not included in this analysis.

Museum collections are subjected to a variety of uses; according to the National Heritage Act (Scotland) 1985, objects in the National Museums' collections are to be 'exhibited to and interpreted for the public' and 'available to persons seeking to inspect them in connection with study or research'. In common with many other museums only a small proportion of the objects in the Museum's collections are on display at any one time. Over time, this proportion has not been drawn equally from across the holdings of the Museum: some treasures are almost certain to feature in the galleries, such as *Wylam Dilly* (an 1813 locomotive T.2002.38, formerly T.1882.L.1) and the Main Hall clock (T.1921.20, made for its place in the Museum); others have never, yet, been called upon for exhibition and some are acquired and held more for their potential use in research such as multiples and duplicates of very similar objects. Display is, of course, only one of the ways in which museum artefacts are of present value, and current display is only a snapshot of changing permanent and temporary exhibitions. Objects which are accessed for research or publication are of significant use, but these forms of usage of individual objects in this collection have not been recorded in ways amenable to bulk analysis.

**Figure 1**





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Keeping time for the Museum galleries for nearly a century, T.1921.20 'Working model of a tower clock fitted with Lord Grimthorpe's escapement and striking the hours and Westminster quarters on five tubular bells, to a scale of 6 inches to 1 foot, by James Ritchie and Son, Edinburgh'.

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Analysis of the numbers of acquisitions and growing size of collections has been previously carried out. Bud ([2010, p 254](#)) has analysed the current non-Wellcome collections of the Science Museum in London according to their decade of acquisition.

Gosden and Larson ([2007](#)) carried out extensive analysis of the acquisitions into the Pitt Rivers Museum using the digitised records to show 'patterns in collecting activities' examining closely both the collectors and categories of the collections. The present study is unique in also including a major contribution from historic collections disposal, and that from a period which predates most of the disposals discussed in current literature and debates ([Davies, 2011](#)).

This paper questions how past collecting and disposal decisions have affected the current collection and whether the long term history of the collection shows trends which should inform collections development practice in the present. It examines this through bulk query of the entire collections, rather than the object biographies of a small number of items. Are all methods of acquisition equally likely to lead to collections which are used in future? What is the success of reassessing collections and deaccessioning portions?

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## Methodology

The numerical data in this study are drawn exclusively from the Museum's digital database, Adlib. The database was interrogated in early 2019 for the year of accession of each record; the acquisition method; the legal status of the object; the year and method of disposal; the current location; whether the item is currently on display and whether a previous location is recorded as having been on display. This information about display locations was first recorded in this format in the mid-1990s, so is used to provide a survey of the last two decades of display.

The most significant limitation of this methodology is from the fallacies and omissions of the digitisation of paper records, as well as the incomplete survival (or even generation) of these initial records. Our predecessors mostly had neat handwriting, but there was some misreading during transcription. Sometimes duplicate registers and a card file have all covered the same material and only one of these was used when the records were digitised, so the lack of a deaccession record in the digital database does not mean that no such record exists. The absence of a current location record is taken as a strong indication that the record relates to an object which is no longer in the collection, though a few objects have become separated from their accession number. Material which has been deaccessioned may have either its deaccession date recorded or the date it was physically disposed of, but in most cases the difference between these dates is under a year. Only material with the legal status of permanent collection or deaccessioned was considered; loans were not included in this research project. Around 900 items were accessioned after some time as loans to the Museum, in some cases well over a century; these items are analysed according to their accession year. The 2,052 items which have been renumbered within the wider Museum are not included; many of these are mineral samples now catalogued in Natural Sciences.

Each Adlib record is considered as an individual item for analysis, though physically it may relate to more than one item or separate records apply to very closely linked items such as an object and its box. Different conventions around the use of subpoints at different times mean that some collections of items are catalogued under one number (T.1999.70 'Varnished wooden box containing eighty-two wooden slides of natural history specimens, for use with a magic lantern or solar microscope, unsigned but probably by Carpenter and Westley, pre 1905') and others have been assigned subpoints either for practical reasons or availability of time or volunteers for this level of cataloguing detail (T.1997.67.1 to 72 'One of a box of seventy-two microscope slides, late 19th century') or separate numbers (T.1909.93 to 130 'One of a group of lantern slides illustrating magnetism and electricity'). A former convention that all material acquired from one source at the same time should be assigned one number with subpoints means that disregarding all part records would be more misleading than keeping them in the analysis. (T.1858.270, material from the Great Exhibition of 1851, includes 868 subpoint records ranging from 'arsenic' to 'saws'.) No distinction is made between part numbers assigned at the time of acquisition or later.



**Figure 2**



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One of the slides from T.1999.70 'Varnished wooden box containing eighty-two wooden slides of natural history specimens, for use with a magic lantern or solar microscope, unsigned but probably by Carpenter and Westley, pre 1905'.

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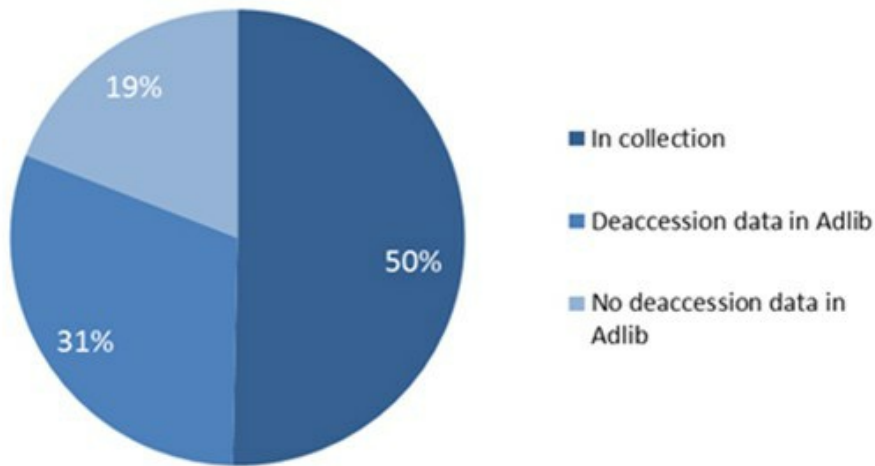
While all these data can be analysed individually or by year, in many cases the number of items in individual classes would be so small that the statistical validity of such analysis would be low. A mixture of analysis groups have been used, ranging from single years to the entire collection. Only limited correlations have been drawn between the ongoing collections development activities and the personalities and staff involved. This is a large potential topic and would be especially fruitful in a more detailed analysis of the specifics of the acquisitions and disposals rather than this qualitative overview of the collections.

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## Results and discussion: overview and collecting

Of the 65,751 records included in this analysis, 33,099 (50 per cent) remain in the permanent collection and have current locations. 20,102 (31 per cent) have been deaccessioned, and the remaining 12,550 (19 per cent) of records do not have current locations. The vast majority of this unlocated material is believed to have been disposed of long since (such as T.1869.63.40 'One of a collection of specimens illustrating preparations of sugar – manufacture of lozenges – a sample of sugar and gum mixed into a paste'). Disposal records can often be found, but these disposals are not currently recorded on the Adlib database.

**Graph 1**



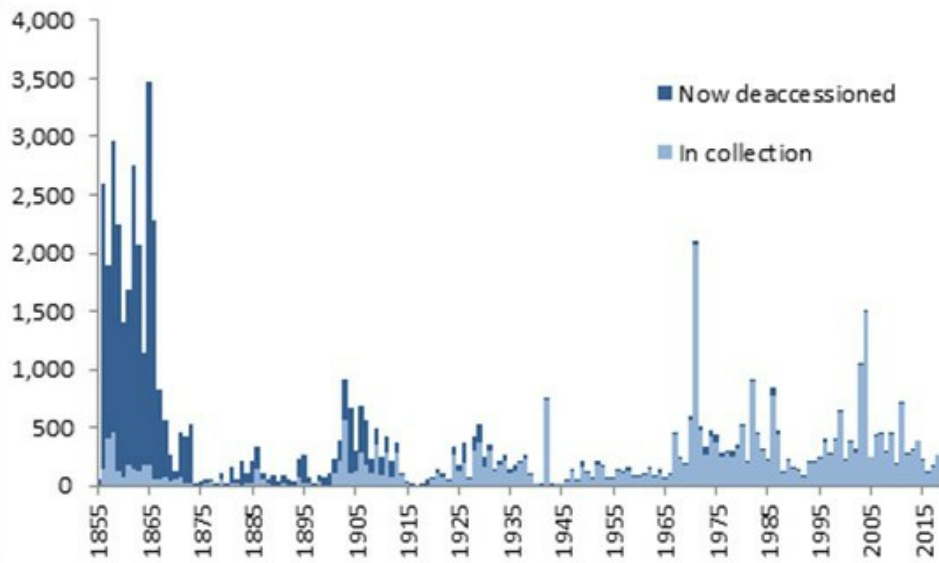
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All Technology department accession records by current status

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A chart of the number of records for each year of acquisition reveals the history of the department within the Museum. In the earliest years there was notably copious collecting, especially leading up to the initial opening of the first portion of the Chambers Street building in 1866, which needed material to display. The Technology department was established as a separate department in 1901 followed by increased collecting, and collecting of a different kind of material. Some individual years display the vagaries of the documentation system and limitations of the analysis used. In 1942, a slightly surprising 741 records occur despite what was otherwise a hiatus in collecting during the war. However, almost all of this was a single acquisition, the pages of a photographic album and scrapbook having recently been given 738 separate part records to facilitate their digitisation. The year 1971 saw the Technology department acquire 1,402 blueprints and technical drawings.

**Graph 2**



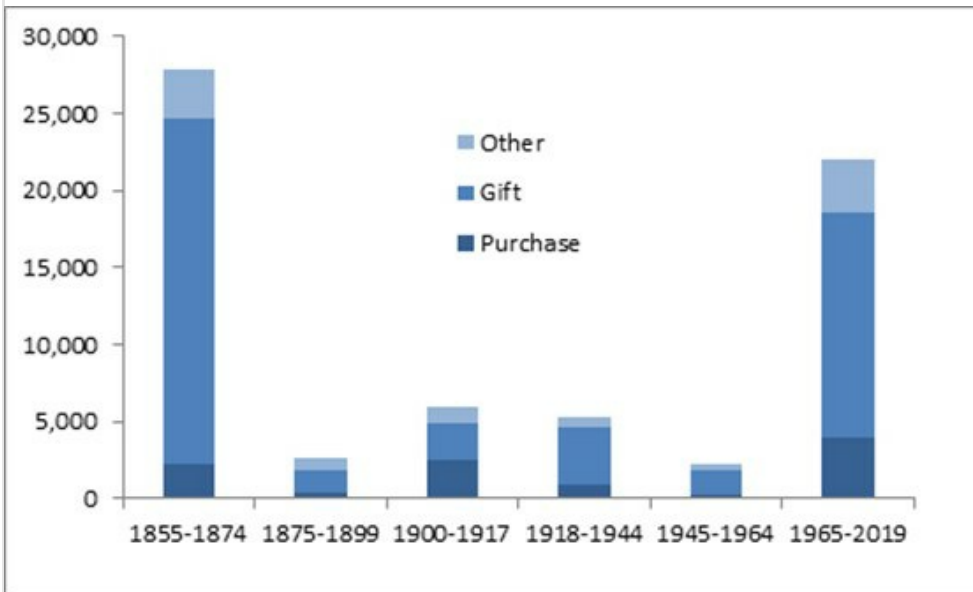
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The number of records relating to acquisitions made each year, indicating whether they are still within the collections or not. The deaccessioned category includes the material without deaccession records on Adlib

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I have divided the collecting activity into six unequal periods for discussion and analysis. 1855–1874 shows the initial peak of extremely active collecting to populate the initial displays, with 27,815 technological items collected over only twenty years. This was followed by a notable pause in collecting technological material which lasted until the end of the nineteenth century, with only 2,675 items accessioned over the next 25 years. This lull in collecting was not Museum-wide: the Edinburgh Museum of Science and Art was still collecting Art and Ethnography while the Natural Science and Geology collections show their own collecting patterns.

**Graph 3**



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Acquisition method and the total number of acquisition records made in each of the assigned analysis periods. 'Other' includes missing data and objects found in the collection as well as a range of less frequent acquisition methods such as transfers, bequests and items made in the Museum. The new Technology department at the beginning of the twentieth century is marked by a notably high proportion of purchases

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In 1901, the Technology department was established, following the appointment as Director in 1900 of Francis Grant Ogilvie, who had a background in Natural Philosophy. Alexander Galt was appointed as the Keeper of the new Technology department. Galt was active in collecting, with an initial focus on educational material and specifically apparatus which was beyond the resources of most schools, a focus that allied well with the Museum's explicit educational role as it was then under the auspices of the Scottish Education Department. A significantly higher proportion (43 per cent) of Technology material was purchased during this period than the overall average of 16 per cent and this was mostly new, rather than historic material. This collecting was not confined to the UK. In November 1903, he visited Pierre Curie in Paris, following this visit by writing to the Société Centrale de Produits Chimiques 'in regard to the acquirement of a sample of pure Radium bromide for experimental purposes, whenever you had such to offer at a reasonable price'. Thankfully for later health and safety, none was available. This collecting shows as a peak in the acquisition record from 1901 up until the First World War. The interwar period shows gradual resumption in collecting activity. Unsurprisingly, the limitations noted on collecting activity were particularly of space and finances. As the Royal Commission appointed in 1928 to examine the National Museums reported:

We understand that the [purchase] grant has remained stabilised at the figure of £2,600 since the year 1886, despite the great increase in prices since that date.

and

In the case of Technology we understand that accessions of valuable objects by gift or otherwise are apt to be lost to the Museum through want of adequate accommodation.

(Royal Commission on National Museums and Galleries, 1930, p 62)



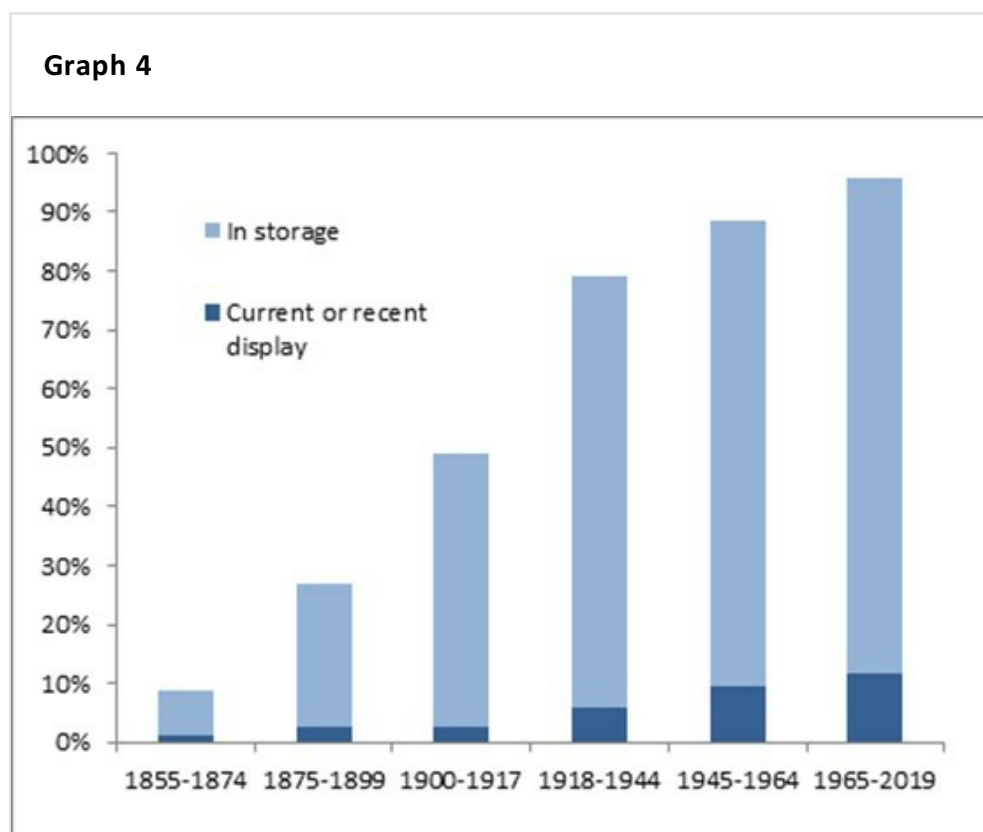
After the Second World War there was a period of about twenty years with many fewer accessions. At this time there was considerable effort devoted to reorganisation of the Technology collections including disposals, as well as the reorganisation and development of the galleries to make them more attractive and modern for educational and recreational use. While the aim of the department remained as described in the pre-war guidebook (Royal Scottish Museum, 1929), to exhibit 'collections illustrating the more important Scottish Industries and the sciences upon which these industries are based', the expansion of science and technology exceeded the available space and a reduced number of industries were displayed showing both contemporary and historic material.

From about 1965, collecting increased again to levels comparable with the early twentieth century, and the rate of collecting has remained relatively stable since, despite significant variations in the kind of material collected as industries and scientific research changed.

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## Results and discussion: deaccessioning

The percentage of material deaccessioned shows strong variation across the collecting periods. Some 95 per cent of the material collected after the Second World War is still located within the collections. Only ten per cent of the nineteenth century collecting survives, while 79 per cent of objects from the interwar collecting period are still in our collections.



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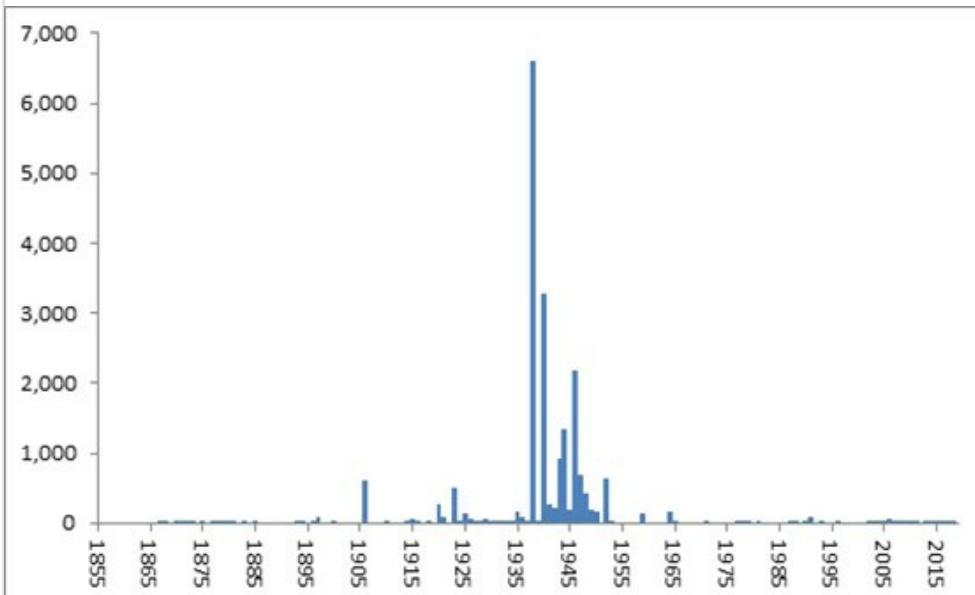
Percentage of acquisitions still in collection, from the six collecting periods of the Technology collection. The portion which has been on display within the last two decades is highlighted

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With the exception of botanical material deaccessioned in 1938, which is discussed below, most of the Technology collection's disposal occurred during the Second World War and particularly in its immediate aftermath. There was concern to ensure that

deaccessioned material was disposed of appropriately and assessed for sale or recycling. Putatively useful material was salvaged, including through the Museum's own workshops, though many 'salvaged' records rather beg the question of how they might have been reused, such as T.1859.362.4 'One of a group of specimens illustrating nitre refining – a sample of refuse mud from the process'. I suggest it would have been the display jar, rather than the mud, which was earmarked for reuse. During the Second World War much of the Museum's collections were evacuated and the Ministry of Health took over the Museum building. 135 items of ceramic, almost all by Wedgwood, are recorded as having been transferred to the Ministry of Health in 1940, presumably for use as crockery in the Museum building.

**Graph 5**

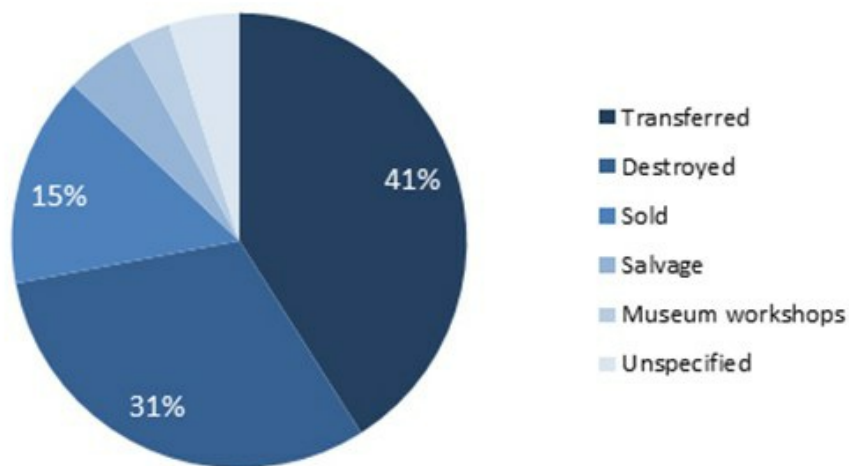


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Deaccessioning activity by year, where recorded in Adlib

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**Graph 6**



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Deaccessions by recorded disposal method. Transferred significantly including the botanical material discussed below

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Most material deaccessioned before 1938 was destroyed because of deterioration or pest damage, including in 1867 the earliest deaccession in the database, of a specimen acquired five years earlier: T.1862.888.30 'Spanish Specimens. Vegetable Products – Cayenne Pepper, *Capsicum annum*. Withdrawn, decayed 4 Oct. 1867'. After this post-war period of collections reassessment the presumption against disposal resumed.

A disposal board was established in 1923, which was called up as needed, less than annually, to consider extensive lists of material proposed for deaccession by the Keepers of the Museum's departments.

There have accumulated in the cellars of the Museum during all the years apparently that the Museum has been in existence, large quantities of material no longer any use for exhibition purposes. Some of it is worthless. In a long minute by Sir Carlaw Martin [Director] of 19th August 1914, it was suggested that authority might be obtained from the Treasury for the clearance of all discarded material by sale or otherwise after relegation [sic] to the stores, say, for three years in order that the Museum's space might not be needlessly encumbered.

Alexander O Curle, Director, 20 December 1922, Disposal board minute book

This wording of this proposal, which later requests that disposal authorisation is not limited only to material which has been stored for at least three years, appears to have caused some concern as in a second letter a few days later Curle explained further:

With regard to the disposal of objects in the Museum it is not my intention to dispose of anything which has any educational or real artistic value and which, consequently, might at some future date, be available for circulation to schools or local museums.

Alexander O Curle, 8 January 1923 (ibid)

These letters and subsequent reports on disposal illuminate the contemporary attitudes behind the deaccessioning. They reveal a very strong emphasis on exhibition and educational demonstrations as the purpose of the Museum which continued into the 1950s. In the Director's report for 1946 this goes so far as nearly a presumption in favour of disposal of the Museum's Technology collections, except where of immediate relevance and use.

The clearance of whole subjects and the curtailment of material in the exhibition series has necessitated serious consideration of the best use to which the very limited storage space available should be put. Large sections of the cellars have been carefully overhauled, and much that has been hoarded since 1856 has been re-examined most carefully and re-classified. Only material clearly of use in our new schemes has been retained; the remainder has been disposed of by sale, by gift to appropriate institutions, or by destruction if obviously of no value.

Royal Scottish Museum, Report for the year 1946, Technology department

Unsurprisingly, the pressures of space and accessibility continued as one of the driving forces behind deaccessioning.

Progress continues to be made in the overhaul of the basement storage, where better cupboards and cases are being constructed from redundant material, so that the reserve and study collections can be made more readily available, and can be studied in greater comfort. The volume of this reserve material has been reduced by a detailed resurvey of the collections and a drastic weeding out of specimens of little or no importance – particularly obsolete industrial samples and so forth.

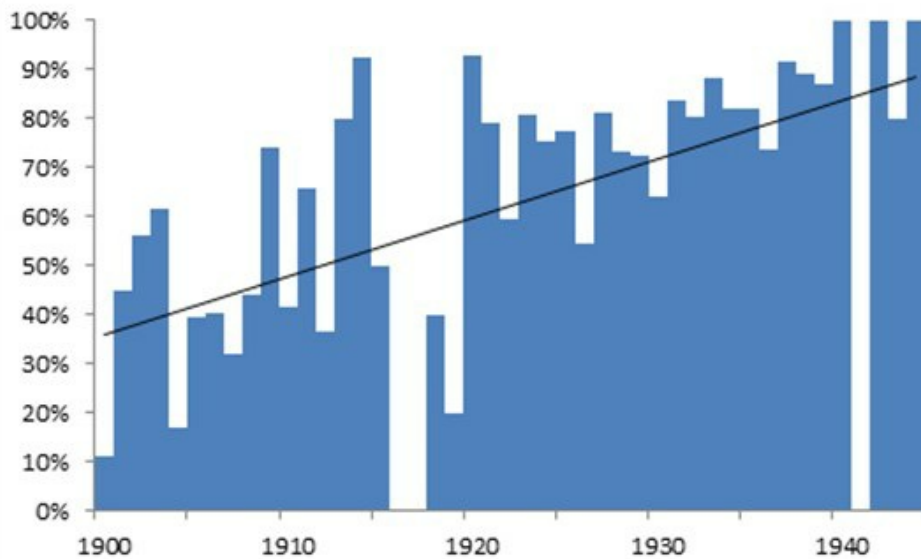
[\(Royal Scottish Museum, Report for the year 1951, Building\)](#)

As far as the departments of Natural History and Technology are concerned, no new storage space has become available since just after World War I.

[\(Royal Scottish Museum, Report for the year 1956, Technology department\)](#)

The retention of material acquired before this period of reassessment and disposal shows a strong relationship with the accession date. Material acquired in the decades immediately preceding the major reassessment of the collections shows a definite correlation between how recent an acquisition was, and whether it was kept. This probably reflected changing practices of acquisition since the material was collected and the type of material of interest, it is also a likely result of an ongoing interest in acquiring and displaying current technology that did not remain of continued interest as it became outdated.

**Graph 7**



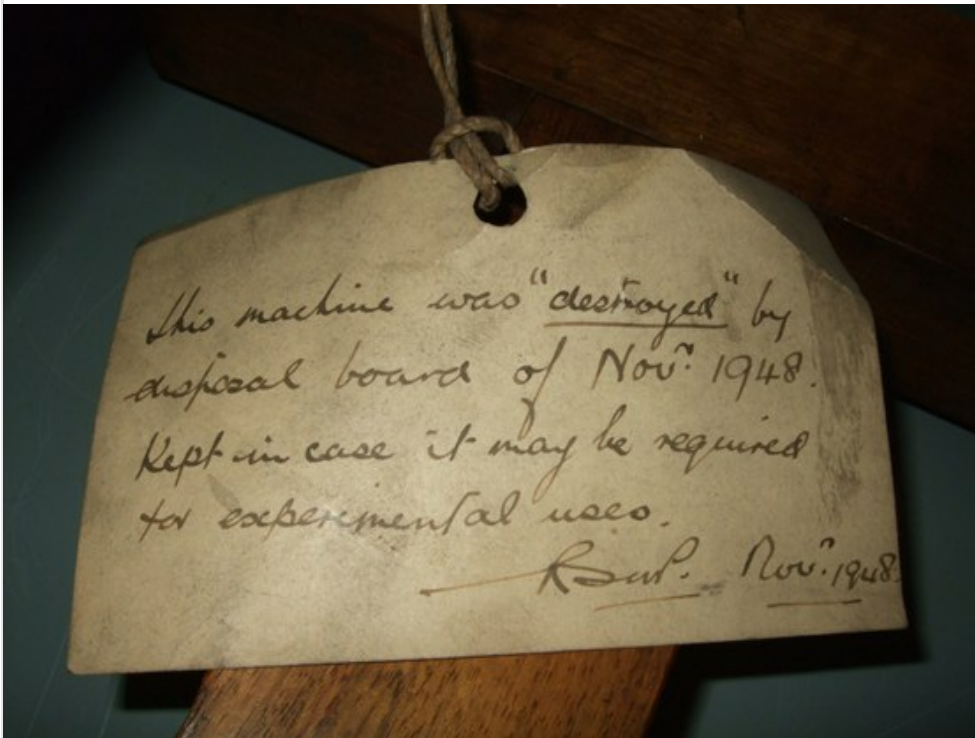
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Twentieth century acquisitions made before the post-war reassessment showing percentage still in the collection with linear trend line. No objects were accessioned in 1917; other years with few records will have low statistical validity

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A small number of items (127) which were deaccessioned are still located within the Museum. Most give the impression of having been accidental survivals, overlooked during a bulk movement of material; several items are marked as having been deaccessioned more than once, either in error or replacements for deteriorated items which were assigned the same number, as occasionally happened. A few model potatoes left the collections and were later reaccessioned and part of an electrostatic generator was destroyed according to the records, but put aside in 1948 by Robert Plenderleith, then Assistant Keeper 'in case it may be required for experimental uses' – which it hasn't been.

Figure 3



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The label on the "destroyed" electrostatic generator but 'kept in case it may be required for experimental uses'

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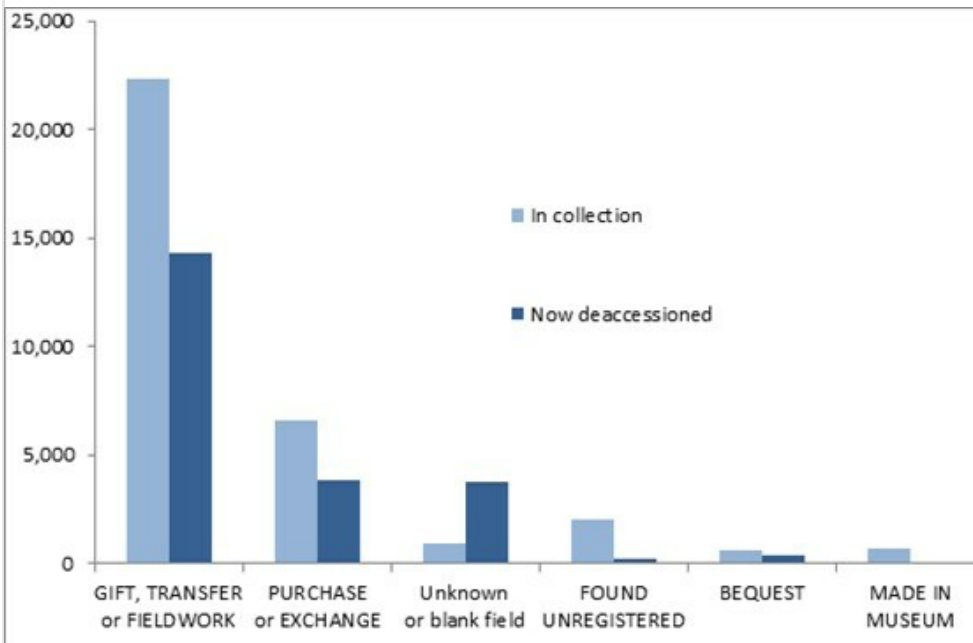
## Results and discussion: disposals by acquisition method

Some patterns show up when analysing the disposals by the original acquisition method of the items in question. The majority of Technology acquisitions were recorded as either gifts or purchases. Fifty per cent of all accessions remain in the collection, but this includes 63 per cent of all purchases and only 47 per cent of gifts. This shows that hindsight over the life of the Museum has judged past accession decisions which related to gifts somewhat more harshly than purchase decisions. The extensive purchases of educational apparatus made in the early twentieth century were an exception to this, as a higher proportion of these were deaccessioned. Only one per cent of our acquisitions were documented as being made in the Museum, but 92 per cent of these remain (however, numerically these are mostly lantern slides for lectures and interactive viewers). This trend may reflect greater consideration, restraint and required justification in acquisitions that require more financial resources, leading to accessions which were well suited to the Museum's requirements and remained of longstanding interest. Or there may be differences in kind between the material which is only available to buy and that which is donated. An alternative hypothesis, that staff were reluctant to deaccession material purely because it had been purchased, is not supported by the large numbers of purchased items which were deaccessioned, nor by mention of this consideration in the deaccession documentation.



	Total	Deaccessioned	In Collection
Gifts	70%	74%	66%
Purchases	16%	12%	20%
Other or no acquisition method	14%	14%	14%

**Graph 8**



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Collections and deaccessioned material by most common acquisition methods. Material with unknown or unrecorded acquisition method is significantly more likely to have been disposed of

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## Results and discussion: botanical specimens transferred in 1938

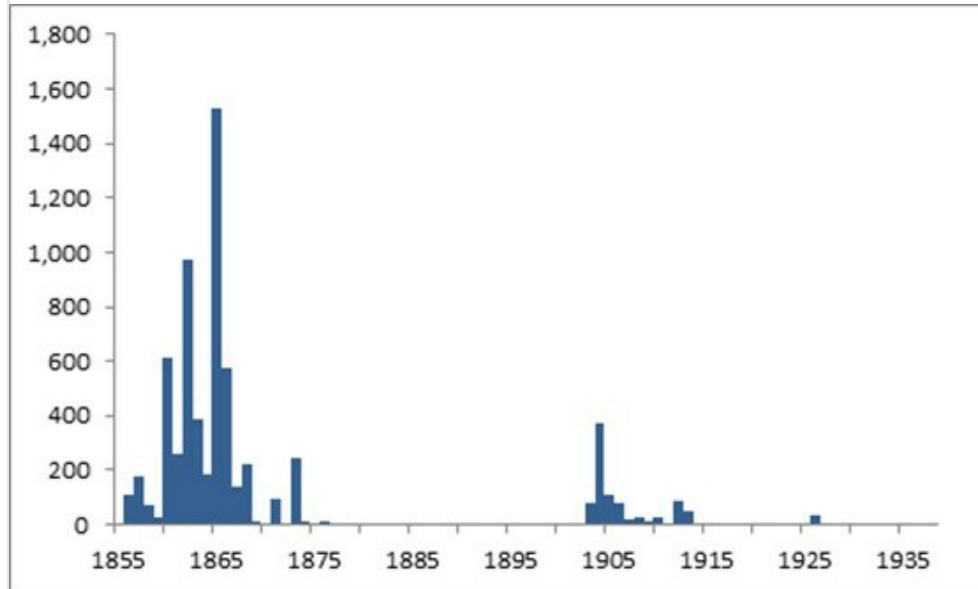
The single largest block of material deaccessioned was in 1938 when the Museum's botanical material was passed to the Royal Botanic Gardens, Edinburgh, following the decision that this was a category the Museum would no longer collect or maintain. This transfer had been proposed a decade previously, but was only then actioned.

The Report of the Royal Commission on National Museums and Galleries, dated 1928 [sic], recommended [para. 60(6)] that the botanical collections in the Royal Scottish Museum should be transferred to the Royal Botanic Garden, Edinburgh. [...] with the sanction of H.M. Treasury, over 15,000 specimens were packed and safely despatched.

Royal Scottish Museum, Report for the year 1938. Para 12

About 6,500 items are marked on Adlib as having been included in this transfer, far fewer than the 15,000 noted in the Annual report for that year. The remainder will be among the records which have not got their deaccession details. The 6,500 records relating to this 1938 disposal align well with the general numerical patterns of acquisition. Of note are a comparative increase in botanical specimens collected from 1860 when Thomas Archer, a botanist, became Director in place of George Wilson, Professor of Technology. In the first years of the twentieth century a redevelopment of displays on economic botany is reflected in collecting, and the interwar years show very little collection of such material, presaging the transfer.

**Graph 9**



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The 1938 botanical deaccession by accession year

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Component DOI: <http://dx.doi.org/10.15180/191205/007>

## Results and discussion: display

In the earliest years of the Museum, material was explicitly and broadly sought with a promise of display. Records of these early exhibitions are not available in a format which is extensive enough nor arranged suitably to be analysed to confirm what proportion of the collections were displayed, but the surviving correspondence and documentation indicates a strong presumption that collections would be on display. Potential donors were assured that their material would not only be displayed, but that it would be credited to them. This promise of display, and the scale of the collecting activity, are reflected in a printed proforma letter sent to exhibitors at the Paris Exhibition of 1867. Nineteenth century photographs of the Museum reveal, in common with other museums of that date, galleries into which objects had been densely packed.

**Figure 4**



EDINBURGH MUSEUM OF SCIENCE & ART.

*In the Paris Exhibition (1867) you exhibited.*

*Believing that a continuous exhibition of specimens of such excellence must be beneficial both to the public & the makers, I am induced to beg you will send to this Museum similar specimen*  
*This magnificent Museum has been established by the Government for the purpose of illustrating the application of Raw Materials and for exhibiting the operations & productions of Industrial & Decorative Art. - All donations are conspicuously labelled & described & the names & addresses of the donors are attached thereto.*  
*If not convenient to present specimens, will you please inform me upon what other terms you can send them?*

*Prof. T. C. Archer, Director.*

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Proforma letter requesting specimens for display.

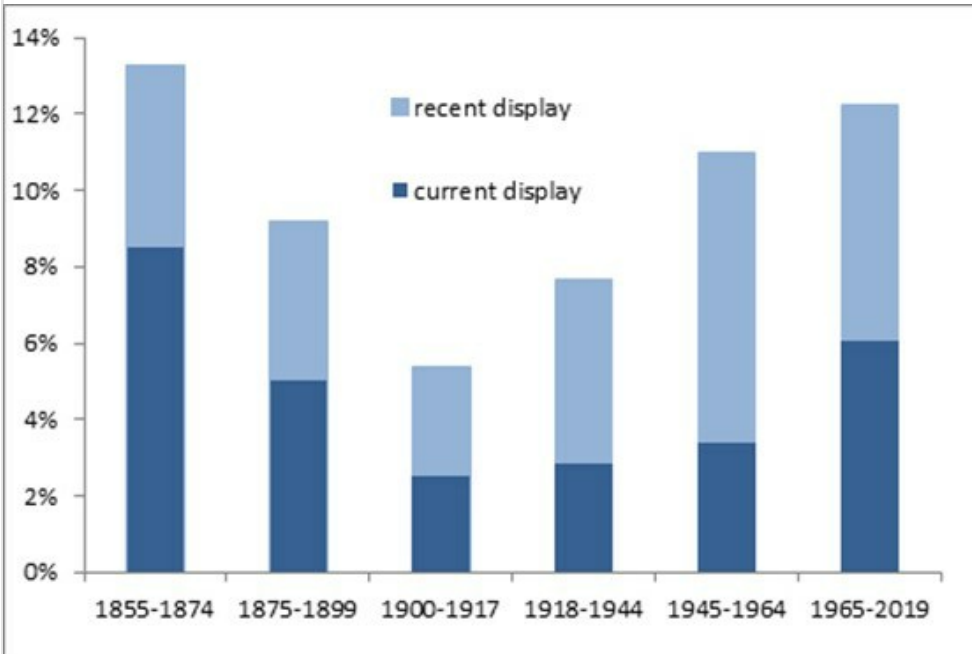
'In the Paris Exhibition (1867) you exhibited .... Believing that a continuous exhibition of specimens of such excellence must be beneficial both to the public & the makers, I am induced to beg that you will send to this museum similar specimen  
This magnificent Museum has been established by the Government for the purpose of illustrating the application of Raw Materials and for exhibiting the operations and productions of Industrial & Decorative Art. All donations are conspicuously labelled & described & the names & addresses of the donors are attached thereto. If not convenient to present specimens will you please inform me upon what other terms you can send them?

Prof. T.C. Archer, Director'

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of the collecting periods are represented in our current and recent displays. The proportion of material collected in the twentieth and twenty-first century which is on display reduces with the length of time it has been in the collection. This could reflect material where the contemporary interest when it was collected has become outdated and it is not (yet) of historical interest. However, the nineteenth century collections do not continue this trend, showing the ten per cent of material that remains in the collection following the stringent reassessment after the Second World War is as well suited to our present exhibition purposes as material collected recently.

**Graph 10**



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Current collections by accession period showing what percentage is on display, or has been within the last two decades

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## Conclusions

This numerical analysis of the Science and Technology collections at National Museums Scotland reveals traces of changing policies, activities and personalities. The collection has experienced a number of different periods of collecting and disposal and both of these aspects of collections development have contributed to the current strength of the collection. The high percentage of the material collected during the nineteenth century that is currently or recently on display reflects the value of the critical re-evaluation of these holdings. Both the current trends in material on display, and the major period of deaccessioning after the Second World War show that material which is more recently collected is most likely to be judged positively. At all periods there has been material accessioned which was later seen as absorbing Museum resources without likely use, as well as opportunities for collecting not taken up and material passed over. Neither past collecting choices nor disposal decisions are all judged positively in hindsight, and hindsight of the 1940s was different from that of the 2010s.

Over the history of the collection there is a trend for purchased objects to be kept and displayed in future to a greater extent than gifts, and a much greater extent than material which has been found in the collections or which was accessioned without the provenance being recorded. This is a potential lesson for current collecting, to ensure that found or donated material is given due critical consideration, and full provenance information recorded.

This paper shows that a strong and useful collection has emerged from a collections development process which involved both collecting and disposing to answer the challenge of how to allot limited storage resources to balance the benefits of continuing and past collecting.

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## Tags

- [Museology](#)
- [Museum collections](#)
- [Curating](#)
- [Statistics](#)
- [Collections management](#)
- [Digital collections](#)

## Footnotes

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