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A VALUABLE TEACHING INSTRUMENT AND
A CULTURAL ACCESSORY TO MODERN RESEARCH: THE
WHIPPLE MUSEUM OF THE HISTORY OF SCIENCE

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ABSTRACT

In 1944, the Whipple Museum of the History of Science was founded by the gift to the University of Cambridge from Robert Stuart Whipple, formerly Managing Director and Chairman of the Cambridge Scientific Instrument Company; he gave his collection of more than one thousand scientific instruments and related objects, as well as a similar number of antiquarian scientific books. The collection has continued to grow, through transfers from University departments and colleges, gifts and purchases. Following the intentions of those

involved in the founding of the Museum, in the sixty-odd years since its establishment, the Whipple has been not merely a 'well-arranged repository of historic scientific apparatus' but has truly served as 'a valuable teaching instrument and a cultural accessory to modern research', contributing to the formation and growth of the fields of history and philosophy of science. Today the Whipple Museum is an internationally known collection and an important centre for teaching and research in material-based history and philosophy of science.

Science has enjoyed a long history at the University of Cambridge, which is said to have had its origin in 1209 when a group of Oxford students resettled in Cambridge. During the past eight hundred years, path-breaking scientific work in a number of fields has been accomplished by those who have studied and worked within the University. Many famous names are associated with Cambridge, including those of William Gilbert (*De magnete*, 1600), William Harvey (*De motu cordis et sanguinis in animalibus* (*On the Motion of the Heart and Blood in Animals*), 1628), Isaac Newton (*Principia Mathematica*, 1687), Charles Darwin (*Origin of Species*, 1859), James Clerk Maxwell (*Treatise on Electricity and Magnetism*, 1871), Francis Crick and James Watson ('A Structure for Deoxyribose Nucleic Acid', *Nature*, 1953), to name just a few.

But the study of the history of science, including the material remains of scientific teaching and practice, was only formally established fairly recently. In 1944, the Whipple Museum of the History of Science was founded by the gift to the University of Cambridge from Robert Stuart Whipple, formerly Managing Director and Chairman of the Cambridge Scientific Instrument Company; he gave his collection of more than one thousand scientific instruments and related objects, as well as a similar number of antiquarian scientific books. In a number of ways, the founding of the Whipple Museum was part of what may be regarded as a larger movement, begun roughly ten years earlier, to establish the history of science as a field of study within the University.

Robert T. Gunther, a zoologist and Lecturer in Natural Sciences at Magdalen College, at the University of Oxford, devoted himself to what he called 'the archaeology of science', working to preserve the material culture of the history

of science at both Oxford and Cambridge; his work and influence in Cambridge played a crucial role in laying the groundwork for the future of the Whipple Museum. In 1934, Gunther wrote to the Cambridge Philosophical Society, suggesting that he conduct a survey of departments and colleges and plan an exhibition of surviving historic scientific instruments within the University. 'The Exhibition of Historic Scientific Apparatus' was opened in June 1936 by Lord Rutherford, who pointedly referred to the desirability of a permanent museum in his opening address. As part of his campaign to persuade the University to establish a permanent exhibition of historical scientific instruments, Gunther published his *Early Science in Cambridge* [1937]. He was also on friendly terms with Whipple, who was well known in Cambridge through his role in the Cambridge Scientific Instrument Company. Gunther recognised that an offer to the University of Whipple's private collection might well enhance the possibilities of establishing a permanent museum of the history of science in Cambridge [Bennett 1994; Bennett 1997, p. 34].

While Gunther was focusing on the preservation of the material culture of science at Cambridge, the History of Science Lectures Committee was established by the Faculty Boards of Biology and of Physics and Chemistry in 1936. Joseph Needham served as the chairman of the Committee, with first Hamshaw Thomas (who also involved in the 1936 exhibition) and then Walter Pagel serving as secretary. The first series of lectures were published in *Background to Modern Science*, edited by Needham and Pagel [1938]; this series was followed by others that, though interrupted during the war, were resumed in 1942 [Bennett 1997, p. 35].

Robert Whipple's offer, and the University's acceptance, in 1944 of his private collection to help establish a museum of the history of science, must be seen against the background of the work of Gunther and that of the History of Science Committee (as the History of Science Lectures Committee was also known). The Museum was not intended to be merely a repository of historic objects; rather, as the plans for the future of the museum make clear, it was linked to 'the allied wider and fundamental question of the future position of the History of Science as a subject of study and research in the University' ('Memorandum', Whipple Museum Papers, C, 33). As the secretary of the

Cambridge Philosophical Society, F.H.C. Butler emphasised in the 'Memorandum' concerning the planned museum, 'it is important that the Museum should be much more than a well-arranged repository of historic scientific apparatus. It should be designed and maintained as a valuable teaching instrument and a cultural accessory to modern research' ('Memorandum', Whipple Museum Papers, C, 33). Following the establishment of the Whipple Museum, many of the artefacts identified and described by Gunther were transferred to it from colleges and University departments. The collection has continued to grow, through transfers, gifts and purchases. In 1997, the Whipple Museum was designated as a pre-eminent collection by the Secretary of State for Culture, Media and Sport, recognising the international significance of its holdings.

Today, more than sixty years after its foundation, the Whipple Museum of the History of Science is important to teaching and research in history and philosophy of science. During the past sixty years, the resources for studying, teaching, and pursuing research in history of science at the University of Cambridge have been greatly expanded in many ways, including the establishment of the Department of the History and Philosophy of Science, of which the Whipple Museum is formally a part. The Whipple contributes in a number of important ways to history and philosophy of science, offering unusually rich resources for (1) study and teaching and (2) research, as well as (3) providing opportunities for students and staff to engage directly in museum work. It is these three areas of the Whipple's mission that will be discussed here.

First, it may be useful to describe the Whipple collections, and place them within the broader context of other University collections, as well as to explain the purpose and key aims of the Museum. The University of Cambridge has existed for almost 800 years, serving as the home and workplace of many, many students, teachers, scholars and researchers. The University and Colleges have collected a wide variety of objects, artefacts, books, manuscripts, specimens, artwork, scientific instruments, photographs and archival material. In addition to the Botanic Garden, Herbarium and world-renowned University Library, there are numerous other important collections, libraries and archives located in Departments, Faculties and Colleges. In addition to the Whipple, there are seven other internationally known museums: the Fitzwilliam, with

its collections of art and antiquities, the Museum of Archaeology and Anthropology, the Museum of Classical Archaeology, the Sedgwick Museum of Earth Sciences, the University Museum of Zoology, the Scott Polar Research Institute, and Kettle's Yard, whose collection includes a house, as well as early 20th century art.

The Whipple's Statement of Purpose formally states that:

The Whipple Museum of the History of Science collections include scientific instruments, models, prints, books and associated material relating to the history of science. The purpose of the Whipple Museum of the History of Science is to preserve, augment, display, interpret and provide access to the collections, making them available for purposes of study and research. Teaching plays an important part in the role of the Museum within the Department of History and Philosophy of Science and the University.

The key aims of the Whipple Museum are: to preserve the material culture of the history of science, augmenting the collections as appropriate; to document, care for, and provide access to the collections; to interpret and research the material culture (and associated practice) of the history of science. The integration of teaching, learning, and research in the Whipple, which depends on access to the collections and to documentation, is the guiding principle of our objectives and activities. This commitment was furthered strengthened by the formal adoption by the University of Cambridge in 2000 of a Museums Policy, which affirmed the principle that the 'University's museums are major foci of University teaching and research. They are also a valuable research and educational resource locally, nationally, and internationally' [University of Cambridge *Reporter*, 6 December 2000].

The collection of the Whipple Museum of the History of Science enriches our understanding of the roles of science in society, and includes material relating to the history of science from antiquity to the present day, in the following broad categories: scientific instruments and apparatus; teaching and demonstration models; pictorial material, including, painting, prints and photographs; books, instruction manuals, trade literature and ephemera; archival material relating to the Whipple collection. There are currently over 6000

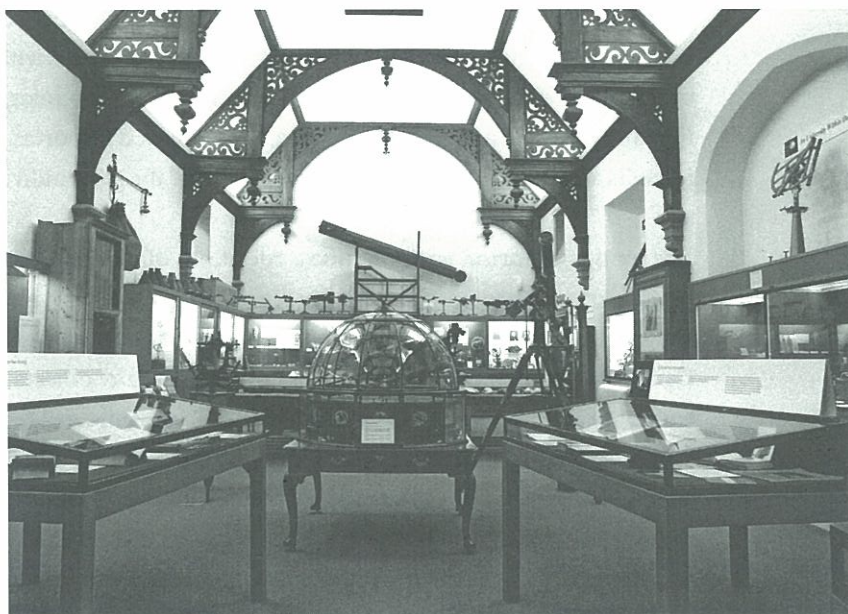
objects in the collection. The great significance of the Whipple collection lies in its overall profile, representing diverse but inter-related scientific activities over a broad span of time, allowing comparative and chronological interpretation and study, illuminating both the general cultural importance of scientific pursuits and the life and achievements of some of the great individual scientists.

The unique historical and scientific associations of much of the material are particularly noteworthy; Cambridge produced some of the greatest scientific work of the nineteenth and twentieth centuries. As part of the University of Cambridge, the Whipple Museum continues to acquire objects and collections with outstanding aesthetic, historical, cultural, scientific and technical significance, for the Museum occupies a unique position as part of a pre-eminent centre of scientific research, teaching, and laboratory work. The acquisitions bequest established by Robert Whipple supports collections development; additional funds are solicited from outside sources, including the PRISM fund, administered by MLA (Museums, Libraries, Archives Council) for the Preservation and Restoration of Industrial and Scientific Material.

STUDY AND TEACHING

The Whipple Museum is part of the Department of History and Philosophy of Science (HPS). For the purposes of undergraduate teaching and examining, History and Philosophy of Science is within the Natural Sciences Tripos; most of the undergraduate students in HPS have a background in science and mathematics. The Department is the only one in the world to have an undergraduate programme connected to a world-renowned museum. In addition to undergraduate lectures and supervisions that relate directly to the museum collections, students are encouraged to acquire hands-on experience of studying and working with the collection. Lecturers in the Department are encouraged to utilise the Museum's holdings; three undergraduate lecture courses in particular focus on the collections of the Whipple Museum and the Whipple Library. The undergraduate essays and dissertation provide special opportunities for students to work in-depth with objects in the museum. Recent undergraduate dissertations utilising material in the Whipple collection have dealt with such diverse topics as the materials used to make telescopes in the seventeenth and eighteenth centuries, family-based firms in the British instrument

[Fig. 1]
Main Gallery
of the Whipple
Museum of
the History
of Science.



trade in the nineteenth and twentieth centuries, and the production and sale of fake scientific instruments in the early twentieth century. A number of other university departments, including History and Music, also use the Whipple collections for teaching, and students from other universities visit the Whipple on field trips organised by their home institutions.

The Whipple galleries reflect the strong commitment on the part of the Museum to contribute to departmental teaching. Lecturers are invited to request that specific material relevant for their teaching is on display. One long-running exhibition, *An University within ourselves*, is directly related to topics covered in teaching about the sciences in eighteenth-century Cambridge colleges; significantly a number of HPS students and teaching officers contributed to the development of this exhibition, partially funded by Trinity College. A new interactive gallery, an evocative *Victorian Parlour* (supported by the Designation Challenge Fund) has recently been opened, having once again benefited from the work of students and staff in the Department. While developed for use in undergraduate teaching, this gallery has also proved enormously popular with other visitors.

[Fig. 2]
The Whipple's
discover gallery.



The high-density display format of *discover* (installed in 2001 as a reorganisation of the previous *Teaching Gallery*) and the recently created *Reserve Gallery*, both supported through funding from the Designation Challenge Fund, serve students and lecturers by providing access to a greater number of objects (and their accompanying documentation) than would normally be on view; in particular, the *Reserve Gallery* has space for hands-on study of museum objects. In both galleries the database of the entire collection, with images, is available. Once again, these galleries are popular with visitors. Some visitors are surprised to learn that the Whipple plays such a significant role in teaching and research in history of science; the galleries actively demonstrate the importance of using material culture for the study of history of science.

In addition, the Whipple has developed a number of websites using Departmental-based research to develop teaching resources. Working together, Dr Sachiko Kusakawa (Trinity College), Dr David Chart, several students and I developed *Starry Messenger*, an electronic history of astronomy available online [www.hps.cam.ac.uk/starry]. The *Starry Messenger* website gives research-based educational information on our astronomical collections.

Aimed primarily towards undergraduate students, the website, developed with funding from Trinity College, incorporates images from the Whipple collections. Developed for use in departmental teaching, the Whipple's *Starry Messenger* has received wider acclaim as an online teaching resource.

RESEARCH

As part of the internationally renowned Department of History and Philosophy of Science, the Whipple Museum functions as a key research resource within the Department and the wider University. The Department of History and Philosophy of Science was awarded a five star rating (the highest) by the Higher Education Funding Council of England in the most recent (2001) Research Assessment Exercise; publications related to the Whipple collections and to the material culture of science contributed significantly to this achievement. Museum publications include exhibition catalogues and versions of public lectures, as well as research.

The Whipple collection is well known through the worldwide research community and features prominently in scholarship in the field. The Whipple is sensitive to the needs of scholars and students and strives to provide ready access to and information on its collection through a variety of means. The Whipple collections database is available to the general public, including students and researchers, at terminals in Museum galleries and the Departmental library.

Undergraduate as well as post-graduate students in the Department have the opportunity to work directly with material in the Whipple collections. In some cases an undergraduate interest in scientific instruments has developed into a PhD project. Three recent doctoral theses grew out of such beginnings: Adam Mosley, *Bearing the heavens: astronomers, instruments and the communication of astronomy in early-modern Europe* [2000]; Kemal de Soysa, *Using Globes and Celestial Planispheres in Restoration England* [2004]; Catherine Eagleton, *Instruments in Context: telling the time in England, 1350–1500* [2005]. In other cases, students with little or no previous exposure to historical subjects (for example, students specialising in philosophy of science) have taken the special opportunity offered to work on the history of the material culture

of science, contributing directly to knowledge of the objects within the Whipple collection. Over the past several years, MPhil students have worked on a range of material in the collection, including nineteenth-century navigational instruments, twentieth-century mathematical models, and science kits produced for home use during the interwar period. In recognition of the very high level of research undertaken by students, the Waterman Prize is presented annually for the most significant work each year on the Whipple collection.

The Whipple has sponsored a number of publications on the material culture of science by researchers in the Department, several of which have been tied to exhibitions. These include *An University within Ourselves: Sciences in Cambridge in the Eighteenth Century* [with an essay by D Bertoloni Meli, 1998]; *Instruments in Print: Books from the Whipple Collection* [Silvia de Renzi, 2000]; *Representations of the Double Helix* [Soraya de Chadarevian and Harmke Kamminga, 2002]; *Your Humble Servant, John Flamsteed: Letters and writings of the first Astronomer Royal* [Frances Willmoth, 2002]. The Whipple co-sponsored the publication of Nick Hopwood's *Embryos in Wax: Models from the Ziegler Studio* [2002], and *Instruments Interpreted* [edited by Liba Taub and Frances Willmoth, forthcoming], a volume of twenty research articles based on Whipple holdings, will soon be published.

MUSEUM WORK: EXHIBITIONS AND TRAINING

The Whipple has an active programme of exhibitions and other activities deriving from the teaching and research interests of the staff and students in the Department. In fact, because of the small number of permanent staff, the Whipple relies on the help of members of the Department and University. This reliance has resulted in a beneficial symbiosis: the Whipple is now recognised as a museum where students can gain professional experience and training. A significant number of students and former students (including many from other departments) have worked on a wide range of projects, both behind-the-scenes and front-of-house. In this way, students are able to put their interest and knowledge in history and philosophy of science to practical use. Some contribute to displays and exhibitions, some work on documentation and research projects, and others give gallery talks and work with visitors. Furthermore, the Whipple Museum is fortunate to be part of a lively centre

for history and philosophy of science, with a large number of researchers and teaching staff, many of whom contribute their time and knowledge to the Museum in a variety of ways. The Whipple is able to offer special opportunities for researchers and educators to share their own work with a wider public.

So, for example, the Whipple inaugurated a very successful series of changing displays, *Case Studies*, which brings the work of the Department into the Museum. Working with the Collections Manager and Curator, students and staff are given the opportunity to present their knowledge and interpretations of material from within the Museum's collection. A number of staff members and research students have presented their work in case studies, which have dealt with a range of material and topics, including magnetic instruments from the Enlightenment period, nineteenth century models of wave motion, and nineteenth century papier-mache anatomical teaching models.

The Whipple's *Case Studies* series has been extraordinarily successful, providing students and lecturers an unusual opportunity to conceptualise and present their research in a new way; it is clear that other students and researchers are inspired by these examples to also become involved with the collection and museum. Not only historians have taken the opportunity to present their work this way; David Chart, a philosopher of science, used the case study format to challenge visitors to think about the use of models in his case study, *Understanding*. The HPS Department-based Cambridge Latin Therapy Group is a graduate seminar devoted to translating Latin texts on the history of science; the group has not confined themselves to printed texts, but has also examined scientific instruments. As part of their translation work they focused on sources relating to medieval and early modern time-measuring instruments, including a manuscript on the use of the navicula sundial and the instructions engraved on a seventeenth-century Rojas dial in the Whipple collection (Wh. 5888). The Cambridge Latin Therapy Group installed a case study in the main gallery, *Instruments of Translation*, and the Whipple sponsored the publication of a booklet addressing their problems and successes in using instruments to interpret texts (and vice versa), demonstrating the value of dialogue between historians of books and historians of instruments.

[Fig. 3]
Seventeenth-
century Rojas
dial in Whipple
collection
(Wh.5888).



Other Whipple exhibitions aim to bring the research interests and work of members of the Department to a wider audience, and also to relate to teaching needs. Some recent exhibitions include: *noise* (jointly hosted by four Cambridge University museums and curated by artist Adam Lowe and HPS member Simon Schaffer; *Instruments in Print* (jointly produced by the Whipple Library and Museum and organised by Silvia De Renzi in 2000); *Representations of the Double Helix* (co-curated by Soraya de Chadarevian and Harmke Kamminga in 2003); *Your Humble Servant, John Flamsteed* (with an accompanying catalogue, by Frances Willmoth, 2002); *Oxygen: A Special Display of Texts, Prints and Objects Relating to the Discovery of Oxygen* (2004); *A Life in Earth Sciences: Brian Harland's Field Instruments Displayed*, as well as the interpreted re-display of the astrolabe collection undertaken by Adam Mosley.

The Whipple Museum serves as the training ground for a large and impressive number of museum professionals and specialists in the field; graduates have gone on to posts in England (British Museum, Science Museum and National Maritime Museum) the United States, the Netherlands, and Denmark, as well as university museums at Oxford, Harvard, Exeter and Utrecht. Summer

internships allow students (from various institutions) to gain marketable skills, as well as deepen their knowledge of the subject, thereby deriving significant educational benefit.

Currently, the Designation Challenge Fund is supporting the development of another research-based website, which is focused on three important areas of the Whipple collection: microscopes, astronomical instruments, and teaching and demonstration models. This website will offer in-depth interpreted access to the collection, for a range of audiences. Two former HPS undergraduates are employed on the project, and a number of other former students are contributing the fruits of their own research efforts to the website. A new website, *Gallery Challenge*, funded by the Higher Education Funding Council of England, targets school students with an introduction to museum work; once again several former students who have worked in the Whipple contributed to the development of this site. Working with the Whipple collections has been an inspirational experience for a significant number of HPS students, who, in turn, have produced projects that will serve as learning and research resources for many others interested in history of science and the material culture of the sciences.

Many of the artefacts relating to the history of science in Cambridge are now held within the Whipple and other University museums. There is a significant proportion of material in colleges and departments; many of these are objects that date from after 1937, the date of publication of Gunther's *Early Science in Cambridge*. These items, which include instruments, apparatus, models and teaching tools, provide crucial evidence for research into the ways science has been taught and practised within several intersecting social settings, including public areas as well as laboratories. In the spirit of Gunther, and following the excellent model provided by Katherine Watson, working with Robert Fox, in *Sources for the History of Science in Oxford* [1994], the Whipple has sought to identify objects relating to the history of science that are scattered across the University of Cambridge. A grant from the Nuffield Foundation's Social Science Small Grants Scheme provided support to enable two former HPS students to produce an inventory of this scattered material. A continuing goal of the Whipple Museum is to contribute to the preservation and study of important scientific instruments and artefacts throughout the University.

The University of Cambridge is an important centre of scientific activity, and has been so for hundreds of years. The material culture of this activity — including instruments, models, books and images — is made accessible to a broad range of people, including students and researchers, by the Whipple Museum of the History of Science. The scientific work of the University continues at a very healthy pace, developing new instruments and tools. The Whipple serves the ‘final resting place’ of much of the scientific work and heritage of the University. Following the intentions of those involved in the founding of the Museum, in the sixty-odd years since its establishment, the Whipple has been not merely a ‘well-arranged repository of historic scientific apparatus’ but has truly served as ‘a valuable teaching instrument and a cultural accessory to modern research’, contributing to the formation and growth of the fields of history and philosophy of science. Today the Whipple Museum is an internationally known collection and an important centre for teaching and research in material-based history and philosophy of science.

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