[M.C. Lourenço, 2005. *Between two worlds: the distinct nature and contemporary significance of university museums and collections in Europe*. PhD dissertation, Conservatoire National des Arts et Métiers, Paris]

6. Where are we now? University collections and the three missions: research, teaching and public display

> "I feel they [contemporary 'novelties'] hold nothing essentially new and are really no more than timid variations [...]".
>
> Jorge Luis Borges (1978)

Three developments have become increasingly apparent during the past two decades: a) many university collections[140] do not seem to be used much, if at all, for teaching and research, b) more universities seem to be disposing of collections and closing museums, while at the same time c) many universities are developing alternative organisational and management models to merge collections into newly created museums (many that have not done so yet appear to be considering such steps for the near future). At first sight these trends seem inherently contradictory, but they are closely intertwined.

In many ways, the past five years have been vertiginous for university museums and collections. On the one hand, the 'crisis' of the 1980s regarding first generation university collections became more acute. On the other hand, after a period of relative expansion, second generation collections and museums are now seemingly going through an impasse. Finally, the university itself has also changed significantly.

University museums are going through a stage of concerted, collaborative and intense debate – a debate that is far from closed. The main challenges comprise: increasing alienation from teaching and research, lack of funding, lack of staff and career paths for staff, inadequate professional standards (including major ethical issues), lack of a clear management structure, and lack of a clear identity and strategy. In this chapter, I will discuss these developments with the aim of reviewing the present situation of university collections in relation to the three missions: teaching, research and public display. Data were collected during field work and retrieved from the literature. Teaching and research will be examined (both for first and second generation collections) and recent trends in public service will be outlined.

6.1 Putting the 'crisis' in its place

The 'crisis' of university collections is often presented in a simplified way, in a cause and effect relation with the decline of use for teaching and research or other reasons (for instance, lack of awareness towards collections by university administrators). The 'crisis', however, is probably less *about* collections and more *about* universities.

When discussing the challenges faced by university collections, it is impossible to ignore the challenges universities are confronted with today. Universities are dynamic institutions. They are dynamic because they are driven by the advancement of knowledge in science, engineering, the arts and the humanities. Universities are also dynamic because they mirror and adapt to changes in society and European universities have been facing major reforms during the past two or three decades. They have adapted courses to the needs and demands of the job market and redefined their mission in more utilitarian and vocational terms. They are also increasingly asked to contribute to local and regional economic development, for

[140] In this dissertation, the term 'university' is taken in its broadest sense and to mean all European higher education institutions, including for example the *Fachhochschulen*, the polytechnics, military academies and the *grandes écoles.*

instance by establishing stronger links with local industries. Some courses have recently faced a decrease in the number of students as a result of demographic factors or low public appeal. Possibly more than ever before, European universities are also being asked to compete in the international arena, particularly with North American universities. Everything and its exact opposite are being asked from universities today: to be elitist and democratic, to specialise and be universal, to produce research and deliver jobs, to compete globally yet focus locally.

European universities are being solicited to deliver this convoluted and grand scientific, economic and social agenda, yet at the same time government funding per student has decreased – in some countries (e.g. UK), it has almost been halved over the past 20 years (Boylan 2003)[141]. According to *Le Monde*, the annual budget of the Université d'Orsay-Paris XI for 2003 only covered 81% of the operational costs. In January 2003, Orsay closed for two weeks to save heating fuel and water. Similar actions were announced by the University of Toulouse Paul Sabatier[142]. Budget cuts in Halle-Wittenberg amounted to 10% in 2004. For the first time in its history, Germany is debating whether higher education is a universal right (P. Wegener, *pers. comm*. 6 June 2004). Today, from Riga to Dublin, European universities are going through a double crisis: a crisis of identity and purpose and a crisis of resources. The reasons for the university 'crisis' do not appear to be primarily scientific, but first and foremost political and economic.

Departments – and often complete faculties – are being eliminated and new ones created, while entire universities are merging. In the UK, where these dynamics are more visible at present, Cardiff University merged with the University of Wales' College of Medicine in August 2004. Less than three months later, the two Manchester universities merged into one 'super' university. According to a December 2004 survey by the BBC, one out of every five universities closed or down-sized departments during 2004 or plans to do so in 2005, including chemistry at the Anglia Polytechnic University; chemistry, music, cognitive science and creative writing at Exeter, French and Spanish at Kingston; and agricultural sciences at the Imperial College[143]. The same survey indicated that other disciplines and departments are being created – new subjects such as risk and stochastics at the London School of Economics and digital media at the University of Gloucestershire, as well as more 'classical' subjects such as physics and chemistry at the University of Durham; environmental sciences at the Imperial College; applied physics at the University of Newcastle and zoology at the University of Paisley, Scotland. Eliminating courses and creating others is not new. What seems to be new is a progressive discontinuity in the century-old ideal of the university as an institution that delivers a universal range of subjects. Present-day UK universities seem to be specialising in strategic areas of knowledge, a tendency that has also become visible elsewhere, for example in the Netherlands.

Undoubtedly, university collections of *all* sizes and types may suffer. This is an important point because there seems to be a widespread belief that only university collections that are no longer used for present-day teaching and research suffer from neglect. A university may neglect or even want to discard a collection of geology, a collection of archaeology, history of medicine or art. The Robert Koch Museum, a historical museum devoted to the life and work of Robert Koch at the Humboldt University Berlin, is currently facing an uncertain future as the University sold the building in which it is housed (W. Donath, *in litt.* 12 July 2005). Even collections in well-funded universities are not immune, e.g. Harvard University (Temin 2003). In fact, a university may want to discard a collection even if it is actively used for teaching and research.

---

[141] For the moment, the majority of European universities have no student fees (or only symbolic ones) and when charged, they are 10 to 20 times smaller compared to those in the USA.

[142] *L'université d'Orsay ferme quinze jours faute de moyens*. LeMonde.fr, http://www.lemonde.fr/web/article/0,1-0@2-3226,36-306698,0.html, accessed 13 February 2003.

[143] *University confirms subject cuts*. BBC website, http://news.bbc.co.uk/1/hi/education/4105961.stm, accessed 21 December 2004.

The current 'crisis' of university collections is impossible to dissociate from a more general 'crisis' of universities. The roots of the latter are primarily economic and political and caution is therefore needed when attributing the current challenges and problems that university collections are facing to purely scientific circumstances. The clarification of this point is important before moving on to the discussion of the use (or non-use) of university collections.

6.2 First generation collections: research

> "For most people, the destruction of books has universally come to be thought of as a symbol of barbarity. The burning of the library of [Catholic University of] Louvain, Belgium, by the German army in 1914 was, for example, see around the world not only as an act of terror but also as an act against posterity. (...) The 1992 destruction of the main library in Sarajevo during the Balkan wars (...) was seen by many as one of the conflict's most tragic incidents (...). Even if we justifiably bemoan the anti-intellectualism of much of modern society, Western culture at its best cherishes books and libraries as symbols of civilization, humanity, and intellectual freedom. It is therefore striking that we by and large do not see threats to other accumulations of knowledge and potential knowledge in the same way."
>
> Warren D. Allmon (2005: 1)

> Anything bigger than a cell is not getting funding, and it does seem that many scientists perceive taxonomy as a quaint Victorian pursuit.
>
> E. Pauls *in litt* 10 August 2003

During the second half of the 20th century, first generation university collections underwent a considerable decline in use for teaching and research. In the literature, the decline in natural history and medical collections is usually said to have started in the 1950s and that in archaeology and anthropology in the 1960s. However, a distinction should be made between collections resulting from research (e.g. master's and doctoral theses, monographs resulting from or associated with field work) and collection research. Data indicate that the decline is more pronounced in the former than in the latter. Unless stated otherwise, I refer below to collection research, i.e. to the use of existing collections for research.

During the initial stages of this research, 54 university museums and collections from Belgium, Denmark, Finland, Italy and the UK were asked whether there was *any* research being done on their collections at the time (see appendix A2). Positive replies amounted to 17 (out of 37 respondents) of which one from a natural history museum. A selection of replies from first generation collections reads as follows:

> [Just] students' studies. No real scientific research as such (there has been in the 19th century).
>
> D. Verschelde, Zoological Museum, Rijksuniversiteit Gent (Belgium), 6 December 2000

> [Only] occasionally, due to lack of researchers interested.
>
> M. Loneux, Musée de Zoologie, Université de Liège (Belgium), 8 December 2000

> There has been. Presently not.
>
> M. Jangoux, Musée de Zoologie Auguste Lemeere, Université Libre de Bruxelles (Belgium), 11 December 2000

> There has not been any research done on the collection. It is a teaching and learning resource, and as such it is in constant use [for teaching] by academic staff and students.
>
> J. Nichols, Bones and Models Collection, Faculty of Health and Social Care University of the West of England (UK), 14 December 2000

> Research has been done in the past on some of the vertebrate material though by whom and where published I do not know.
>
> P. Court, Biological Collections, University of Bristol (UK), 15 December 2000

> No research. Unfortunately, the situation of the invertebrate collection in Louvain is dramatic! Moreover, the geological department will be closed next year.
>
> L. Hance, Invertebrate Palaeontology Collection
> Université Catholique de Louvain (Belgium), 26 February 2001

Among first generation collections, those of natural history – including zoology, botany, geology – are undoubtedly the most severely affected for two reasons. Firstly, natural history collections represent the majority of university collections and, secondly, their storage requires considerable space.

The 'crisis' of natural history collections has been discussed at length for the past 25 years (e.g. Ricklefs 1980, McKitrick 1981, Olson 1981, Bryant 1983, Alberch 1993, Mares 1993, Seymour 1994, Winker 1996, Herbert 2001, Maigret 2001, Godfray 2002, Dalton 2003, Krishtalka 2003, Miller *et al.* 2004, Wheeler 2004, Wheeler *et al.* 2004). This is not the place to make the case for the relevance of taxonomy and natural history collections for science in particular and contemporary society in general – their importance has been sufficiently underlined before (e.g. Bartholomew 1986, Nicholson 1991, Cato & Jones 1991, Cusset 1995, Tassy 1995, Nudds & Pettitt 1997, Brown 1997, Krishtalka & Humphrey 2000, Ray 2001, Jonaitis 2003, Suarez & Tsutsui 2004, Allmon 2005, Mares 2005). Neither will I comment on the importance of natural history collections for contemporary anatomists, veterinarians, physicians, molecular biologists, ecologists, archaeologists, toxicologists, virologists, conservationists and environmentalists and, more broadly, for agriculture, public health and safety, climate studies, and a range of other areas. Moreover, I will not repeat that natural history collections are routinely used for molecular biology studies as storehouses of DNA (e.g. Houde & Braun 1988, Graves & Braun 1992, Leeton *et al*. 1993, Payne & Sorenson 2003, Hewitt 2004) and ancient DNA (e.g. Pääbo 1993, Poinar 1999). I will not argue that by continuing to assemble genetic resource collections of tissues, blood and molecular extracts (proteins and nuclear acids) natural history museums "fulfil a moral imperative to conserve ex-situ as much information as possible about the genetic diversity in our world before it disappears" (Sheldon 2001: 331) or that some of the best collecting is still in museum drawers – millions of taxa remain undescribed or under-described or described so long ago that re-description is badly needed. New type specimens, new taxa (including higher ones, like traditional 'families' and 'orders') are constantly being discovered among specimens languishing in museums for decades (e.g. Whitfield 2002).

Finally, I will not emphasise that "regardless of how much information in museums is data-based or how many specimens are scanned and high-resolution images posted on the World Wide Web, the ultimate value of collections resides in specimens. They will remain the ultimate arbiters in questions of identification or character expression for the researcher and they will remain the unique draw for children and adult visitors alike" (Wheeler 2004: 578) – and this statement equally applies to archaeological and anthropological artefacts and many medical collections. Natural history collections are relevant for a multiplicity of theoretical and applied purposes, as some universities in both Europe and the USA will probably come to realise in the hardest way possible (i.e. after they neglected their collections or disposed of them entirely) in the decades to come.

The reasons for the decline in the use of natural history collections for research are complex in their ramifications (scientific, social, economic and political) and have been discussed extensively in the literature. Reasons frequently mentioned are: a) recent developments in biology – molecular biology, but also ecology, ethology, population studies – having strongly eclipsed 'whole organism' research and teaching in universities, coupled with the pressure to carry out commercially supported applied research (e.g. Shaw 2002); b) the costs of

maintaining large collections of specimens; c) opposition to collecting of certain vertebrate groups (e.g. mammals and birds), which, according to some authors, may amount to social and political misunderstandings and lacks a scientific basis and credibility (e.g. Winker *et al*. 1991, Remsen 1995, Patterson 2002, Krell 2004); d) a misguided competition between molecular biology and taxonomy (Wheeler 2004), as if the former has arrived to replace the latter, plus a series of associated misconceptions such as the view that DNA bar-coding will replace specimens, when bar-coding simply "generates information, not knowledge" (Ebach 2005: 697); and e) a desire to follow the latest trends and hypes (Heads 2005).

For the past two decades, these factors have generated a deplorable low regard for natural history collections – at best associated with amateurism and 'stamp collecting' (Bateman 1975) and at worst with dusty and useless materials. A low regard that, according to Mares (2003), university museum professionals themselves are partly to blame for. The impact of this low regard on daily academic life was explained by Professor Pietro Passerin d'Entrèves, director of the Zoology Museum at the University of Turin:

> Students do not show any interest in systematics, although systematics is still taught as part of the Biology degree [at the University of Turin]. Sometimes I have a PhD student working with me – in conservation or ecological studies of course – and he or she comes up with some interesting taxonomic result. Therefore I encourage him or her to publish. And they ask me 'And where do you suggest we can publish this?' and I say 'Clearly this is a subject for XXXX [a systematics journal]' and they become very distressed, do not want to have the thing published in that journal and sometimes even suggest to mask the paper under the cover of conservation to have it published in a conservation journal because of the [Scientific] Citation Index[144] [...] Myself, I do systematics of insects. Now I'm at the top of my career, but in my promotion from associate to full professor there was a colleague in the jury who said that what I did 'was low profile because it did not cost much money'. That's how things go at the moment for systematists. And of course collections suffer".
>
> P.P. d'Entrèves, interview 4 April 2003.

The long-term consequences of the low regard for university collections of natural history are hard to anticipate but they are already visible and significant. Several departments have recently been closed due to lack of students (in geology, palaeontology and mineralogy, for example in the Netherlands and Belgium), others have been restructured and changed name, ties between museums and departments have weakened and in some cases were broken, and disciplines that used collections as a main source for teaching and research were removed from graduate courses or became optional[145]. In some universities, staff occupying traditional collection-based careers and functions – such as the curator-professor, the taxidermist, the naturalist – retired and were not replaced, while in other cases these careers were discontinued[146]. The constant need for space and the management of buildings also put pressure on museums and collections, with collections being dispersed due to the sale of

[144] The Scientific Citation Index is a database that keeps track of which articles in scientific journals cite which other articles. The journals are ranked according to the controversial 'impact factors', which in practice means that some sciences rank higher than others. For example, and on average, medical journals have higher impact factors than mathematical journals and molecular biology and conservation journals have higher impact factors than taxonomy or systematics journals. The Scientific Citation Index (and its equivalent for the arts and humanities) has a huge influence on the way published scientific research is perceived and evaluated and, therefore, on research assessement processes and career progression in universities, and ultimately on university collections. See more at http://isiwebofknowledge.com/, accessed 20 June 2005.

[145] At the University of Lisbon, systematics was eliminated in the 1980s (or rather 'buried' under the rather illustrative designation of 'History of Biological Thought and Systematics') and in several other European universities it has become optional in biology degrees (such as at the University of Pavia). Palaeontology is no longer taught in the Netherlands as a degree, across Europe the discipline of mineralogy is today practically extinct from higher education curricula, the majority of mineralogy university collections is orphaned for university teaching (though not necessarily for research).

[146] In Portuguese universities, the position of 'naturalist' was eliminated in the 1970s. At the time, naturalists were given the choice to be integrated in research careers, which many did. However, the assessment of research careers rarely comprises or rewards collection-based work. The same happened to the position of *conservatore* in most Italian universities. Today, a few naturalists and *conservatores* are still in function, but are nearing retirement.

buildings or pushed into attics, the ultimate 'black hole of universities' (university attics are known for their formidable gravitational fields – everything going in yet nothing escaping). For literature on the 'crisis' of university collections of natural history, see e.g. Black (1984), Hounsome (1986), Mares (1988, 1999, 2003), Mares & Tirrell (1998), Clercq (2003), Gropp (2003), Simpson (2003a,b), Kriegsman (2004), and Hutterer (2005).

In 2003 alone, at least 14 university museums in the USA were under threat of being closed (E. Farber, *in litt*. 13 January 2004) and almost half were effectively closed or had their collections dispersed, including important natural history museums at the universities of Arkansas and Nebraska. In 2000, the University of Cincinnati invertebrate palaeontology collections were transferred to the Cincinnati Museum Center (formerly the Cincinnati Museum of Natural History) (Sumrall *et al.* 2000). In 2004, the University of Vanderbilt (Nashville, Tennessee) discarded their palaeontology collections – some to a local museum, some to another university (University of Tennessee at Martin) and the destiny of the rest remains unknown (J. Hecht, *in litt*. 7 April 2005). The American Association of Museums (AAM) considered the situation to be serious enough to issue – for the first time in the history of the organization – an official Position Statement on University Collections (see appendix A10).

In Europe, the situation is also serious and should raise the concerns of the museum sector more than has so far been the case. In several collections visited, the conditions of storage have to be seen to be believed: lack of space, specimens packed in boxes from floor to ceiling unopened for decades in windowless, damp cellars or attics, specimens severely damaged by pests – few meet minimum standards of accessibility to researchers or to the public. Hundreds of thousands of specimens and artefacts cared for by one person or no one at all. It is difficult to even think about collection-based research when such basic needs and conditions are lacking.

Research collections, particularly those in natural history, are so intrinsically associated with the act of researching that curating *de facto* means researching. Their mere existence does not necessarily generate research. In the absence of active curating for whatever reasons, collections become unreliable, their scientific quality erodes over time and collections inevitably enter a spiral of decay from which they can only escape with difficulty. Their alleged 'irrelevance' becomes a self-fulfilling prophecy.

In the previous chapter, endangered collections and disposals due to closures of departments in the Netherlands, Germany and Belgium were briefly mentioned. A particularly illustrative example is the University of Amsterdam (UvA), which in the past 20 years practically eliminated its natural history collections or intends to do so in the near future:

a) 1983: Geology was abolished as a discipline (collections were orphaned) (Clercq 2003);
b) 1988: the Botanical Garden was de-accessioned (a private Foundation for its maintenance was created) (Ursem 1994);
c) 1993: it was decided to donate one-third of the geology collections to the Amsterdam Zoo – transfer effective in 2002 (Clercq 2003);
d) 1998: the *Pinetum Blijdenstein* (arboretum of conifers) was 'sold' to the Botanical Garden Foundation;
e) 2002: a letter of intentions between UvA and the National Museum of Natural History (Naturalis) in Leiden was signed, foreseeing the transfer of 90% of the Zoological Museum's collection (13 million specimens) to Naturalis in 2006 following a recommendation from the Royal Dutch Academy of Sciences that systematic zoology in the Netherlands should be centralised (W. Los, interview 11 May 2003); note that, at the time of writing, actual transfer has not yet been decided;
f) 2003: a part of the remaining two-thirds of the geology collections were dispersed among Naturalis, the local natural history museums of Maastricht and Nijmegen, and the

Geological Service of Indonesia in Bandung – the rest was disposed of (Clercq 2003)[147].

Other universities are transferring and reorganising collections internally – for example separating them from the departments or confining them to a mere exhibition role. I will address this point in the section devoted to the third mission.

Despite future consequences, particularly in the training of geologists, botanists, zoologists, anatomists and palaeontologists, it is important to put the 'crisis' of university collections of natural history into a broader perspective.

Firstly, a great deal of what is said here applies equally to non-university museums. The 'crisis' of natural history collections is a worldwide phenomenon[148]. Moreover, a general lack of resources and interest, coupled with increasing competition in a super-crowded cultural market, has resulted in vulnerable situations for many local and national museums. Regardless of the discipline, background yet essential duties of museums – such as research and preserving collections – are especially affected. Recently, the Director of the Department for Museums and Fine Arts at the Ministry of Science Research and Arts of the Land Baden-Württemberg (Germany) is reported to have "unequivocally expressed the view that for museums, collecting, preserving and research is 'out'. Moreover, the whole museum business 'has to become cheaper'" (Krell 2004: 569). If we add to this general atmosphere the 'crisis' of universities, the problems of so many university collections should not come entirely as a surprise.

Secondly, disposals of university collections of natural history are not new[149]. Reliable accounts of institutions discarding collections are elusive, but word of mouth accounts are so numerous that it is reasonable to conclude that they are not uncommon. In 1970, zoological collections from the University of Bologna were transferred to the museum of the Istituto Nazionale per la Fauna Selvatica (Ozzano dell'Emilia) (Roselaar 2003, O. Negra, *in litt*. 4 April 2005). In 1977, more research collections were transferred, and the University of Bologna was basically left with display material only (Scaravelli & Bonfitto 1993). In 1972, zoology collections of the University of Siena (1900-1930) were transferred to the Accademia dei Fisiocritici (Roselaar 2003). The collections are now in the Museo di Storia Naturale of the Accademia and are managed by the city of Siena. In 1979, the University of Turin transferred its zoological collections to the Museo Regionale di Scienze Naturali (P.P. d'Entrèves, interview 4 April 2003). As far as collections are concerned, a major human-made tragedy of recent times was the division of one of the oldest universities in Europe, the Catholic University of Louvain (Belgium, 1425), for purely political reasons. The 1968 split into Université Catholique de Louvain and Katholieke Universiteit van Leuven resulted in an often arbitrary division of heritage, books, archives and collections (Aubert 1998). When collections are divided, the result is smaller than the sum of each parts[150].

---

[147] Transfer session at Naturalis, attended by the author, 28 April 2003.

[148] In Europe, perhaps the first major natural history museum to be gravely hit was the Natural History Museum in London (a non-university museum). In 1990, the Museum announced job cuts due to redundancy and a "revolutionary restructuring of the Museum's scientific activities" (Anonymous 1990b, see also Anonymous 1990a). A combination of two reasons was given: externally the lack of Government funding and internally the failure to recognise the importance of collection-based research. During the years thereafter, the situation has improved considerably (Thackray & Press 2001).

[149] Apart from disposals, there is also the problem of some professors seeing collections as their personal property. I was told of several cases of professors who retired and took 'their' collections with them.

[150] In the USA, in 1968, the Belmont Report, a major national survey of museums done by the American Association of Museums (AAM) reported that: "Although *universities have tended to discard* their natural history collections because of the present-day emphasis on molecular biology rather than taxonomic biological training, there are more science museums than any other kind on American campuses [today]" (Belmont Report *in* Kolsted 1988: 408, italics added). In 1957, the California Institute of Technology (CalTech) sold its vertebrate palaeontology collections to the Los Angeles County Museum (Glowiak & Rowland 2003).

Stagnation, lack of resources and neglect are not recent phenomena either. The Ashmolean Museum stagnated a century after its opening and ceased to make any significant contribution to the Oxford curricula (MacGregor 2001). Even during the Golden Age (1800s-1940s), there were reports of natural history university collections not being used for teaching and research. In 1924, Frank C. Baker noted: "There are more than two hundred university and college [natural history] museums in the United States. Of these, not more than a dozen are functioning in a satisfactory manner and the great majority are of little or no value as an aid to actual instruction. [...] collections may be found in many institutions today, dusty and neglected, mute witnesses of a great and vanished past" (Baker 1924: 81-82). In a similar vein, Alexander Ruthven, director of Museum of Natural History at the University of Michigan (Ann Arbor), reported neglect, lack of interest and funding, and faculty colleagues referring to the museum in depreciative terms. He noted that one university administrator had said to a local newspaper that the university should cut expenses by eliminating the museum, it being "an unnecessary department" (Ruthven 1931: 65) and, more to the point, "the Secretary of the University was accustomed to ask each new curator when the museum would be finished so that the staff could be dismissed"[151]. In its official website, the Museum of Natural History at the University of Florence bluntly declares that "In the first half of the 20th century, the museums loose their autonomy, [...] becoming mere 'appendices' to the Institutes and furthermore, were often robbed of their funds, space and personnel"[152]. When going through early 20th century correspondence of museum directors and their annual reports, one often finds evidence of miserable working conditions.

A third aspect that helps putting things into perspective is that the alleged 'crisis' may not be as simple and straightforward as some like to suggest. Funds are indeed scarce, but I have come across several zoology, palaeontology and geology collections that are actively used for teaching and research, where specimens are actively exchanged and high quality collection-based scientific papers and PhD-theses are produced at a regular pace. Among these are both small and large collections, e.g. the Zoology Museum at the University of Cambridge, the Herbarium at the University of Leiden (part of the *Nationaal Herbarium Nederland*), the Botanical Garden and Herbaria at the University of Leipzig, the Animal Sound Archive at Humboldt University Berlin, the Berlin-Dahlem Botanical Garden and Museum at the Free University Berlin, the Botanical Garden at the University of Leiden, the Botanical Garden and the Laboratory of Human Palaeontology at the University of Turin, the Oxford University Museum, the Muséum national d'Histoire Naturelle in Paris, the Manchester Museum (University of Manchester), and the Zoology Museum at the University of Amsterdam[153]. Many of these museums are publishing in high-standard scientific journals (see appendix A11). In other cases, curators recognised that their collections were not being used due to decades of dormancy, with specimens being packed in boxes and lack of appropriate curating, expressing the hope that once collections were catalogued and become wider known, their use would intensify (C. Violani, F. Barbagli, C. Rovati, interview 24 March 2003). Important natural history collections of historical value are also used for research into the history of science, for instance Aldrovandi's Herbarium at the University of Bologna (A. Magnalia, interview 13 March 2003), the Museo di Storia Naturale at the University of Pavia (F.

[151] Signs of neglect can probably be traced even further back. Kolhstedt (1988) pointed out that in their early years (i.e. early 19th century), university and college collections of natural history "had an uncertain status on campus; acknowledged as somehow significant, they rarely had permanent allocations of space or guaranteed maintenance from year to year" (Kohlstedt 1988: 417). She transcribed a report dated 15 March 1812 from the Princeton University Archives in which one professor stated: "With respect to the cabinet of curiosities [natural history collection] [...] The state in which I found it was really discouraging – the room was covered with dust; while such curiosities as were perishable were (many of them) past all recovery [...]" (Kolhstedt 1988: 412).

[152] Museum of the History of Science, University of Florence, in http://www.unifi.it/msn/history/hifr_eng.htm, accessed 7 September 2002.

[153] Apart from the quality and scope of its collections (c. 35,000 holotypes and the collection is particularly strong in insects and molluscs as it covers the whole world), the Zoology Museum at the University of Amsterdam is active in post-graduate teaching, theoretical and applied research, has *c.* 700 visiting researchers per year and is active in collecting. It raises 50% of its budget from external funds (Dutch Science Foundation, the European Commission, and other sponsors, mostly industrial) (W. Los interview 11 May 2003). Note that the University of Amsterdam plans to dispose of 90% of this Museum in the coming years.

Barbagli, interview 24 March 2003), the collections at the Sedgwick Museum, University of Cambridge (M. Dorling, interview 12 November 2002) and at the Musée de l'Ecole des Mines in Paris (L. Touret and J. Touret, interview, 21 June 2002), among others.

In short, as far as the use of natural history university collections for research is concerned, the situation is somehow confusing, partly because conditions are rapidly changing and partly because some facts seem contradictory. On the one hand, there is a worldwide 'crisis' in the use and funding of specimen-based research, the reasons and consequences of which have been extensively addressed in the literature. Many university collections are neglected, dormant, face severe conservation problems and some are being transferred and reorganised, 'selected' in function of the third mission, dispersed or simply thrown away. On the other hand, many university museums and collections seem to be unaffected by the 'crisis' (or perhaps have overcome it) and are active in research and teaching. The key to their success seems to have been innovative adaptation to current research policies and funding, opening up new research fronts in conservation, ecology[154], bio-informatics, molecular biology, and applied science, while simultaneously maintaining taxonomic research. International cooperation in systematics is especially important and many university museums have established fruitful partnerships to enhance collection research and accessibility. In the case of museums that have been dormant for decades, the inevitable first step to improve collection-based research is to start almost from scrap by reducing backlogs and making collections known and accessible for researchers – this is currently being done at the Museums of Natural History at the Universities of Tartu, Estonia, and Pavia, Italy. At the same time, there are examples of university collections and museums that – although the collections are significant and active in research and teaching – are threatened with closure. This seems to confirm that at the root of the problem are reasons that are not of a scientific nature and thus transcend the issue of use or the lack of use. Clearly, in many instances thoughtful reflection and long-term vision is required. In many cases, selection is beneficial and can greatly enhance use. It should be noted, that today universities may no longer have the staff adequately qualified to assess, select and eventually de-accession collections.

The situation of other research collections does not seem to be as severe, possibly because the 'crisis' is not generalised, but also because trashing a collection of rocks 'feels' substantially different to trashing a Etruscan vase or a musical instrument from Papua New Guinea.

In anthropology, the use of university collections for research seems to have been declining since the 1960s (e.g. Collier 1962, Parr 1963, Sturtevant 1967). It is interesting to note that French students in May-June 1968 demanded "access to [anthropology] museum collections and introduction to their study" (H. Balfet, in Sturtevant 1967: 639). Sturtevant (1967) conducted a survey of three major anthropological journals in the USA, UK and France and found that, in the previous year, 65 papers were published on ethnological topics. Of these, only five dealt with material culture and of these, three were based on field observations and made no reference to collections. He concluded: "the overwhelming majority [60 to 63 out of 65] could have been written if there were no museum collections at all" (Sturtevant 1967: 632). In the course of the present study, I observed that – with few exceptions – university collections of anthropology and ethnology are little used in research or advanced teaching and students are seldom encouraged to use them for monographs or theses – in the words of one curator-researcher, "par manque d'information et manque d'intêret" (M. Girotti, interview 1 April 2003). The reasons include the decline of classical concepts such as 'primitive cultures', coupled with a shift towards cultural anthropology, increasing importance of social and familiar relationships, and a shift from an individual-paradigm to a society-paradigm (Sturtevant 1967, L. Peers interview, 21 November 2002) or from the

[154] Many of these initiatives are within reach of smaller university museums. For example, the Natural History Museum at the University of Tartu has developed a collaborative project between ecologists and taxonomists to build a genebank. The genebank (including DNA sequences from specimens identified by experts and deposited in public herbaria) is important for ecologists for the identification of fungi on plant roots (U. Kõljalg, *in litt*. 18 July 2005). See at *UNITE*, http://unite.zbi.ee/, accessed 20 July 2005.

artefact to social organisation (Saville 2002), comparable to the post-1950s shift from the organism-paradigm to the population-paradigm in the natural sciences.

In physical anthropology, the decline in the use of collections for research started in the 1950s. During the early 20th century, osteometry based on both museum collections and living people was a major field of study. In the 1950s, sub-specialities such as human genetics and primate ethology – which only employ limited, if any, use of collections – became popular and classical osteometry and anthropometry almost vanished (Sturtevant 1967). Research on human palaeontology, palaeodemography and palaeopathology still depends on skeletal material, but – unless significant in size and scope – older collections rarely constitute proper samples of ancient populations (Sturtevant 1967). There are hundreds of anthropology collections in European universities, the majority of which is only used for limited palaeopathological, forensic or genealogical research. Such collections pose a major challenge to universities. Their uncertain future due to the closure of departments and institutes and the lack of staff raise serious concerns. Contrary to other research collections, these are not collections that can easily find a 'second life' through public display and neither can they be disposed of in a 'normal' and simple way. University staff ought to be increasingly aware of the legal and ethical issues in connection with the preservation, research, teaching and display of collections of human remains. Countries that have not yet done so, should undertake a complete national survey of physical anthropology collections within their higher education institutions, museums, research laboratories, and academies of sciences. Although I do not necessarily agree with the idea of concentrating university collections in a single location (centralised archives of research collections), in this case the idea is not inappropriate.

One would assume that some disciplines – e.g. archaeology – would be predominantly collection-based. However, the situation of archaeology collections seems to be similar to that of anthropology collections (Morgan 1972, Davies 1984, Hawkes 1982, Saville 1999). According to Saville (2002), archaeology has gone through three major epistemological periods. The 'three age system', its subdivisions and the recognition of regional variation within these periods has led to the artefact playing a fundamental role in establishing "chronological horizons and [defining] archaeological cultures in space and time" (Saville 2002). This was the first period and the role of collections in teaching and research was significant. In the second period, artefacts were perceived as evidence of "technological development and typological sequence through time" (Saville 2002). Collections were therefore crucial to understand activities such as hunting and trade through time. For the past 25 years or so, "attention has focused on social, political and economic interpretations of artefact types and groups, on raw material exploitation and acquisition, and on insights into ritual activity […] using secondary data rather than working directly on collections" (Saville 2002)[155]. This was further aggravated by a general decline in the number of museum archaeologists in the UK. Of the universities visited, few conduct archaeological excavations of their own, but archaeological collections in Germany (e.g. University of Halle-Wittenberg, University of Leipzig), Finland (e.g. University of Turku), France (e.g. Egyptology Collections at the Institute of Egyptology, University of Strasbourg Marc Bloch), Sweden (e.g. University of Uppsala) and even the UK (e.g. Petrie Museum of Egyptian Archaeology, University College London) appeared to be used for teaching and research. In fact, in countries like the

[155] Note that these theoretical insights based on secondary sources can only be arrived at because primary sources were previously studied. As Saville (1999: 194) put it, there was a time when "there existed the time, expertise and resources to enable objects to be properly documented, studied and published" (Saville 1999: 194). Similarly, Wheeler (2004) noted that most contemporary molecular research in the life sciences would be of little value to science without the background knowledge that is available because collections were studied, documented and published. Indeed, "without [the] historical background knowledge of interesting anatomical structures or behaviours, […] molecular phylogenies would have little or no interest to science. […] Molecular phylogeneticists are in essence spending the intellectual capital that has been banked by morphologists since the sixteenth century" (Wheeler 2004: 573-574). What will happen to these contemporary research trends if this intellectual capital is undermined by decades of gaps in documenting and studying collections, by the absence of regular revisions, monographs and catalogues, or by discarding collections altogether?

UK, where the decline had been more acute, "the situation is increasingly turning around again [...] so perhaps the alienation phase is drawing to a close" (A. Saville, *in litt*. 7 January 2003), which seems to confirm that the use of collections is driven by fluctuating trends rather than actual scientific motives. The cause-effect association between lack of use and lack of scientific relevance is not only unsound but likely to be dangerous, leading to *ad hoc* decisions about the fate of collections.

6.3 Second generation collections: research

> "The community of scholars consists of two groups – one may even say two parties. The university chairs are mostly occupied by people who like to call themselves historians, and in the museum offices you meet the curators. The historians strive especially from the general to the particular, from the abstract to the concrete, from the intellectual to the visible. Curators move in the opposite direction, and both mostly never get further than half-way – incidentally, without meeting each other."
>
> M. Friedlaender, quoted in Hester (1967: 246)

For second generation collections, research problems seem to be somehow simpler: there has been no decline in use because there never was much, if any, use. As Lindsay (1962: 242) stated, "The problem with the science museum or the history museum is not that the historian has turned away from it, it is that the historian has never been induced to recognise it in the first place".

Generally speaking, historians of physics, medicine, biology or technology do not use objects as primary sources of information. Although objects seem to become increasingly relevant – at least in the history of scientific instruments, where methodologies such as experimental history and 'performative' historiography of science are becoming important (Sibum 2000), little of history research is object-based or makes significant use of three-dimensional sources. In general, historians mainly work with words – they consult books, articles, letters, and other archival sources. The divorce between 'word' and 'object' is not limited to university collections or to the history of science, encompassing research in anthropology, history of art, social history, among others. It has previously been discussed by Hester (1967), Fleming (1969), Greenaway (1984), Lubar & Kingery (1993), Corn (1996), Kingery (1996), among others.

Fig. 6.1 – Collection of history of medicine, Karl-Sudhoff Institute, University of Leipzig, a second generation university collection, incorporating c. 5,000 objects. The collection is used for research in history of medicine (six PhD students doing collection-based theses at the time of visit). See Beutler (2002) (photo reproduced with kind permission)[156].

[156] See website with online catalogue at *Medizinhistorische Sammlung* http://www.uni-leipzig.de/~ksi/ksi600.html#Medizinhistorische%20Sammlung accessed 20 July 2005.

At the core of the word *vs*. object divide is the 'sacredness' of the written word in western culture, as if written words glow with objectiveness and truth. Ultimately, this 'sacredness' is the reason why we hold books in high regard and feel shock and outrage when libraries are destroyed. The divide is reminiscent of timeless prejudices of mankind, the notion that the world of ideas is intellectually superior to the world of manmade things, of abstract being superior to concrete, of theory being superior to practice, of pure research being *better* than applied research or engineering. In fact, the word *vs*. object debate seems to be the 2,500 years spirit *vs*. matter revisited in the museum context (Lourenço 2002).

In addition, there may be other divides. Given that the majority of collections of historical instruments and equipment are saved and assembled by professors of physics, medicine, mathematics, the individual professors may feel marginalised in their own scientific departments. One respondent in charge of a university collection of scientific instruments, who wished to remain anonymous, said "I am a pariah in my own department [of physics] and I have been persistently marginalised in my career in favour of colleagues who do condensed matter physics or particle physics" (Anonymous, *pers. comm*. 2003). Similarly, Pasquale Tucci, full time professor and director of the Osservatorio Brera at the Institute of Applied Physics (University of Milan) explained that "[…] the standards and career evaluation process are the same, but we have to work twice as much as other colleagues to get to the same position" (P. Tucci, interview 25 March 2003). This is strikingly similar to the low regard that some natural history curators say they feel from other colleagues in departments of biology or earth sciences. However, in physics or mathematics the situation is even more paradoxical given that many scientists and engineers are often among the first to say that 'traditional' historians (i.e. coming from 'the humanities') lack the appropriate scientific training to do history of science.

For second generation university collections, the consequences of these divides are multiple. Firstly, they are rarely used by students, teachers or researchers, and the majority is confined to the third mission (public display), when not in storages or decorating offices or corridors. Secondly, many curators and keepers have received inadequate training in scientific material culture (Taub 2003), which may limit their research to "the mechanics of compiling lists" (Fenton 1995: 225). Thirdly, given that preserving, studying and interpreting second generation collections depends on the voluntary initiative of professors, if they are not stimulated by their own scientific departments, collections may be at risk.

There are several exceptions. Among second generation collections, there was collection-based research in several of the museums studied – for example, the Musée des Arts et Métiers, the Theatre Museum at the University of Bristol, the Jardin des Sciences project at the University of Strasbourg Louis Pasteur, and the Museum of the History of the University of Pavia. Bennett (1997) explained how the collections of scientific instruments at the Whipple Museum (Cambridge) and Museum of the History of Science (Oxford) played an important role in teaching and research in the history and science and were at the basis of the creation of the corresponding academic departments of history of science. Both the Oxford and Cambridge collections continue to play a significant role in teaching and research, and this engagement is conveyed to the general public[157]. Similarly, the Gabinetto Volta (Museum of the History of the University of Pavia) – where there is an associated Chair in the History of Science – has played a remarkable role in teaching and research in the history of science resulting in rich web-based resources accessible to the scientific community and the general public alike. These include 3D animations of physics concepts, developed around the Volta collection, from a) a historical viewpoint, b) an operational viewpoint, and c) qualitative and

[157] For example at the time of the visit (November 2002), the Whipple was presenting a small temporary exhibition – *Representations of the Double Helix* – conceived and developed by molecular biology researchers, Soraya de Chadarevian and Harmke Kamminga, from the University's Laboratory of Molecular Biology. The Museum of the History of Science holds regular collection-based demonstrations for the general public (the so-called *Table Talks*), among other object-based special events and educational programmes.

quantitative approaches (F. Bevilacqua, interview 20 March 2003)[158]. Such interpretations of collection-based research for diversified audiences require considerable scholarship, which is often not recognised as such in academic careers.

Fig. 6.2 - The Whipple Museum (University of Cambridge) stimulates students from the Department of History and Philosophy of Science to develop collection-based research. This may involve writing an essay and developing an exhibit for the permanent exhibition. One of the so-called 'Case Studies Showcases' is depicted here (detail on the right). The student arranged the showcase, selected the objects and wrote the labels. The essay is displayed next to the showcase (photo reproduced with the kind permission of the Whipple Museum).

Fig. 6.3 – Display in the new *Science of Surgery* gallery of the Hunterian Museum at Royal College of Surgeons, including public interpretation of teaching techniques in contemporary surgery (photo Hunterian Museum Archives, RCSE).

Is it possible that second generation collections are more likely to be used for teaching and research when they are associated with a department of history of science or have a supporting post-graduate course of history of science? Or is it more likely to be a matter of

[158] See the resources at Gabinetto Volta, in http://ppp.unipv.it/web/, accessed 9 July 2005.

individual initiative? Or both? This is an issue that deserves comparative studies between European countries.

6.3.1 Preserving the distinct nature: documenting and researching the history of teaching and research

There are three aspects related to research into second generation university collections that have not been given sufficient attention by historians and university museum curators alike: the role of tangible marks of teaching and research, the role of contextual documentation, and the role of university workshops.

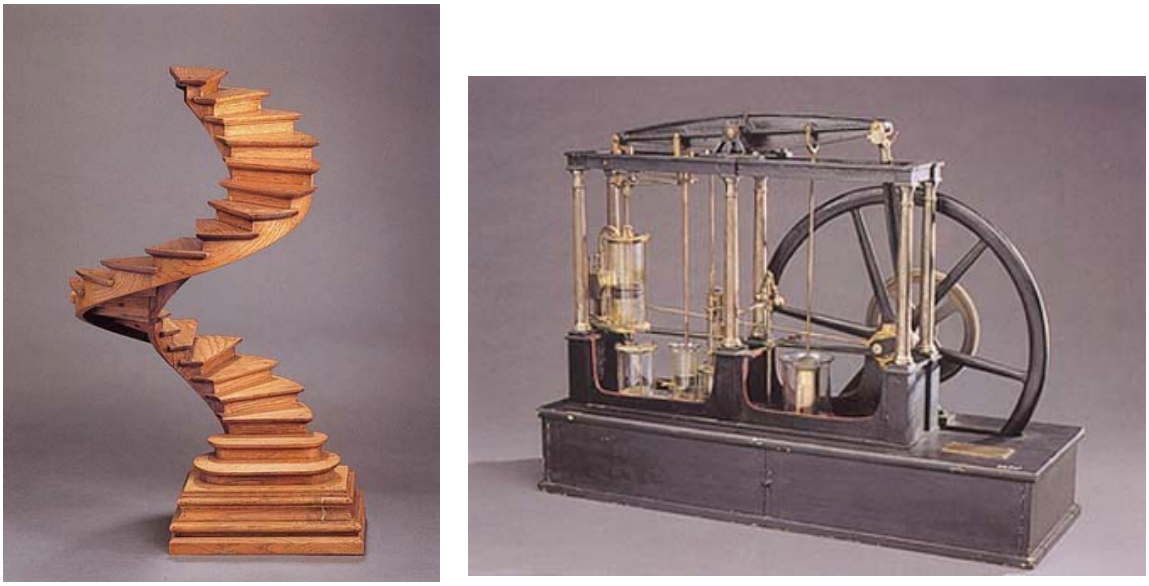

Fig. 6.4 – Two historical models from the collection of the Musée des Arts et Métiers, CNAM, Paris. Models are common in teaching collections, both in the past and present-day. On the left a model of a spiral staircase by Delespeaux, 1867 (Inv. No. 7885) and on the right a demonstration model of James Watt's steam engine by Clair, early 19th century (Inv. No. 5094-I). Images published in Ferriot *et al*. (1998: 39, 83) (H. Maertens, reproduced with the kind permission of the Musée des Arts et Métiers).

Second generation university collections are historical collections of teaching and research objects. Before these objects suffered loss of context and were incorporated in a collection, they were used for research and teaching – typically, integrated in a laboratory apparatus or a classroom demonstration. These objects were intensely used and re-used by researchers, lecturers and students, adapted and improved and cannibalised until there is practically nothing left of them. Many were acquired from commercial instrument makers and adapted for a variety of purposes in the workshop of the department or institute. Others were conceived and constructed in these workshops. Except for a few self-sufficient demonstration models or machines, they were hardly ever used in isolation and usually integrated multiple apparatuses with specific research and study purposes. As discussed in chapter 4, these practices date back to the 18th century cabinets of natural philosophy and continue until the present in university departments of condensed-matter physics, geophysics, biochemistry, ophthalmology, radiology and nuclear medicine, among many others.

Traces of this (often decades-long) process are visible in instruments and equipment – objects bear the tangible marks of teaching and research. More than documenting scientific principles and concepts, the story these objects have to tell is the story of *learning and knowing about* scientific principles and concepts. More than the history of physics and medicine, they are material evidence of the history of knowledge in physics and medicine.

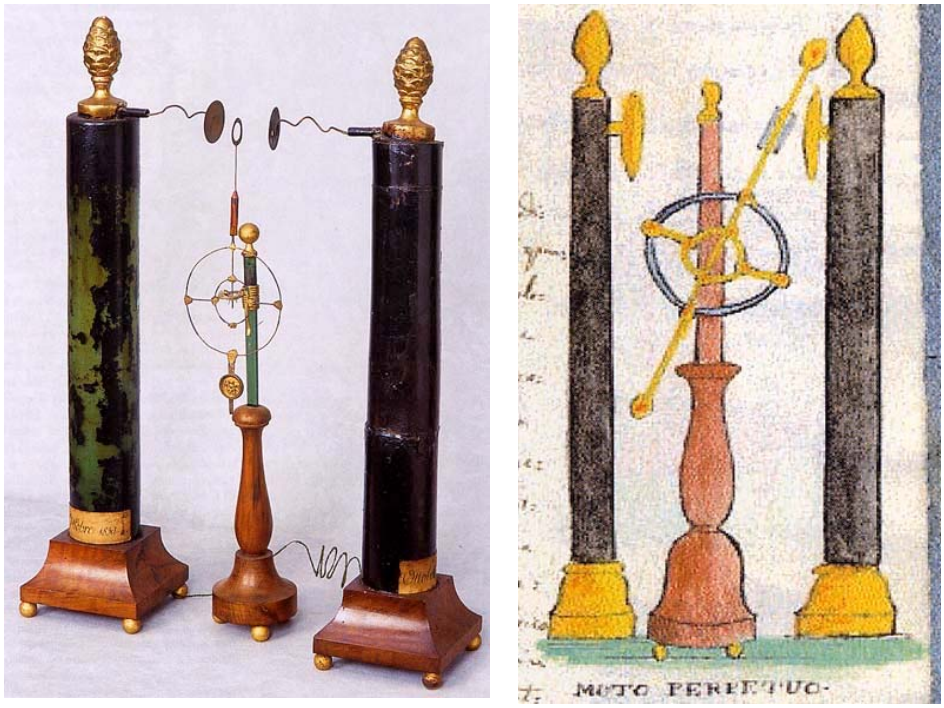

Fig. 6.5 - The Zamboni Pendulum (1830, Inv. No. 249), Museum of the History of Physics, University of Padua, here depicted alongside a drawing done by one of Giuseppe Zamboni's students (*Ms*. Zamboni, 1840; Collezione Beltrame). The student wrote *moto perpetuo* ('perpetual motion') on the drawing. These images were published in the catalogue of the exhibition *Bagliori nel vuoto* (Peruzzi & Talas 2004) (Reproduced with the kind permission of the Museo di Storia della Fisica, Università di Padova, and G. Beltrame).

Instruments and equipment can be displayed and interpreted in an infinite variety of ways and for innumerable purposes. However, the museum has the responsibility to move forward from a certain 'antiquarian' view of collecting[159] and document, for future research and public interpretation, the context in which equipment was used. Documenting the context includes awareness of the marks of teaching and research objects may bear, their study and their preservation. Documenting the context not only comprises assembling catalogues and manuals of instruments (which is standard procedure), but also directories of professors, contents of courses, syllabuses, teachers' class plans and notes, students' notes and drawings (fig. 6.5), apparatuses schemes, laboratory results, correspondence between professors, etc. – documentation that professors and researchers often take with them upon retiring or, when it stays in the laboratory, is among the first things to be dispersed and lost.

Documenting the context also includes listening to and recording researchers, students and teachers who have used and adapted the instruments. One example of a contextual approach to documentation is the Archivio Scientifico e Tecnologico at the University of Turin (ASTUT), created in 1991. The Archivio collects scientific and technological objects, but also "the whole context", such as personal documents, furniture, relevant architectural elements (lamps, drawers, closets' handles, etc.), books, photographs, videos and oral history by researchers, teachers and students, with the aim of documenting the material evidence of teaching and research at the University of Turin and local laboratories (M. Galloni, interview 3 April 2003)[160].

[159] Object is viewed *per se*, particularly beautiful ones.

[160] The University of Turin has made an internal regulation the compulsory report of any obsolete equipment across all academic departments to the Archivio before it is disposed of. Even if, due to lack of space or other reasons, the equipment is not incorporated by the Archivio, staff goes to the laboratory and documents, usually on video, the last hours of use of a given instrument complemented with *in situ* explanations by researchers. Although the Archivio rarely develops exhibitions (as Professor Galloni put it, "we consider ourselves a study

Documenting the context also implies an increasing awareness of the role of technicians and craftsmen in university workshops. In the present as in the past, instruments are adapted or built from scratch to fit the needs of a particular experiment, faulty instruments are repaired, parts are removed from obsolete equipment and inserted into other instruments, and replicas are made (fig. 6.6).

Fig. 6.6 – On the left an instrument to determine the mechanical equivalent of the calorie, acquired in 1930 from the famous German instrument maker Max Kohl by the Faculty of Sciences, University of Porto. On the right (behind another instrument) an exact 1:1 replica made in the workshop of the Department of Physics by an in-house technician. Both instruments are today part of the collection of the Museum of Science, Faculty of Sciences, University of Porto (original Inv. No. 1138/1929 and replica Inv. No. 2727/1962) (photo reproduced with the kind permission of the Museum of Science).

These workshops and their technicians/craftsmen have a significant responsibility for the diversity and distinct nature of second generation university collections. However, unless they are famous instrument makers like Musschenbroek for example, they do not seem to attract much attention from curators or historians of science. Holland (2002) has called for more research into in-house instrument makers and their role in the development of scientific research.

6.4 First and second generation collections: teaching

Arguments and reasoning brought forward in relation to research collections, equally apply to teaching collections. Because much of university teaching is *de facto* teaching *for* research, teaching collections are often difficult to distinguish from research collections. A decline in collection-based research in a given discipline is most likely accompanied by a decline in collection-based teaching. As D.J. Mann, collections manager at the Oxford University Museum, put it: “all students learn now is ecology – and this requires field observation, not museum specimen observation” (D.J. Mann, interview 18 November 2002). At the Marischal Museum (University of Aberdeen), a museum of anthropology, archaeology, and fine arts, the

archive”), these materials are often used for the public interpretation of the history of research, both in exhibitions developed by the University of Turin or other entities, as well as in publications (M. Galloni, interview 3 April 2003). See Slaviero & Galloni (2000).

classroom that exists near the exhibition is regularly used for teaching. When asked whether professors used objects in their classes, the answer was "They rarely handle objects – they usually come for our slide collection" (A. Taylor, interview 3 December 2002).

The decline in the use of teaching collections can occur for reasons other than strictly scientific ones. Teaching collections are assembled and organised according to the level of studies and given sections of the curricula. Except in advanced levels of studies – where teaching and research collections may indeed be remarkably similar – the organisational criteria of teaching and research collections are often different even in the same museum. Teaching collections typically have simpler organisational criteria, ones that make a given point more immediately evident to students. At the Petrie Museum of Egyptian Archaeology (University College London), the research collection (which is also the main collection) is organised typologically (ceramics, beads, etc.), but the three teaching collections are organised chronologically and by excavation site (S. MacDonald, interview 25 November 2002). At the Marischal Museum, the main collection is organised geographically, but the teaching collections are organised thematically (Victorian collection, Roman collection, etc.) (A. Taylor, interview 3 December 2002). At the Musée de Louvain la Neuve (Université Catholique de Louvain), an art, archaeology and anthropology museum, the general collection is organised thematically (art, pre-history, etc.) and by historical periods, but the collections used by students of archaeology and history of art are organised by materials and techniques (engravings, wood, ceramics, etc.) (B. Van den Driessche, interview 25 November 2004)[161].

These strong connections with particular courses and curricula define the distinct nature of teaching collections and have obvious implications in use. If a discipline (e.g. mineralogy or geology) is eliminated and the department closed, teaching collections become automatically redundant – the same does not necessarily apply to research collections. At the Oxford University Museum, mineralogy has not been taught for 30 years and mineralogy teaching collections are now considered 'historic', yet there still exists collection-based research (M. Price, interview 19 November 2002). It is also possible that, when a department is closed, both teaching and research collections are discarded – this happened at the department of geology at the University of Amsterdam in 1983 and at the Catholic University of Louvain in 2002. In the case of Amsterdam, collections were transferred to other museums, but in Louvain the fate of the collections is unknown, as far as I have been able to determine.

Often, the mere fact that a given discipline changes status in the university can impact on the use of collections for teaching. For example, at the University of Pavia the discipline of systematics was compulsory, but recently it became optional for biology *laurea* students due to a national curricular reform (C. Violani, interview 24 March 2003). Although seemingly a detail, this amounted to an effective change of status and impacted both the use of collections for teaching (which diminished as a result of the decrease in number of students) and the perceptions that the university has of collections.

Reasons such as "exigencies of teaching", "the diminished status of geometry in some universities" and the "increasing diversity of mathematics" (Gray 1988: 68) have led to the decline in use of mathematical models in the 1940s. However, Gray added: "I know of places where they are used and places where they are not" (Gray 1988: 68). There are professors of mathematics who still use these models or versions adapted to contemporary times – examples were found at the University of Milan and the Martin-Luther University of Halle-Wittenberg. For more on the history and typology of mathematical models, see Fischer (1986).

[161] In these examples (Petrie, Marischal and Louvain-la-Neuve) the teaching collections are also handled by the general public. This is common in university museums that follow the three missions.

Fig. 6.7 - Two images of a collection of c. 65 models for the teaching of geometry from the late 19th century to early 20th century, on display at the Giuseppe Peano Library, Department of Mathematics, University of Turin. These models were extensively used until World War II, but then put aside and stored in a locked closet. In the late 1980s, they were found by G. Ferrarese, Professor of mathematics, who studied, restored and catalogued them and arranged for their display in the library. See Ferrarese & Palladino (1998) and Giacardi & Roero (1999) (photo reproduced with the kind permission of the Department of Mathematics, University of Turin).

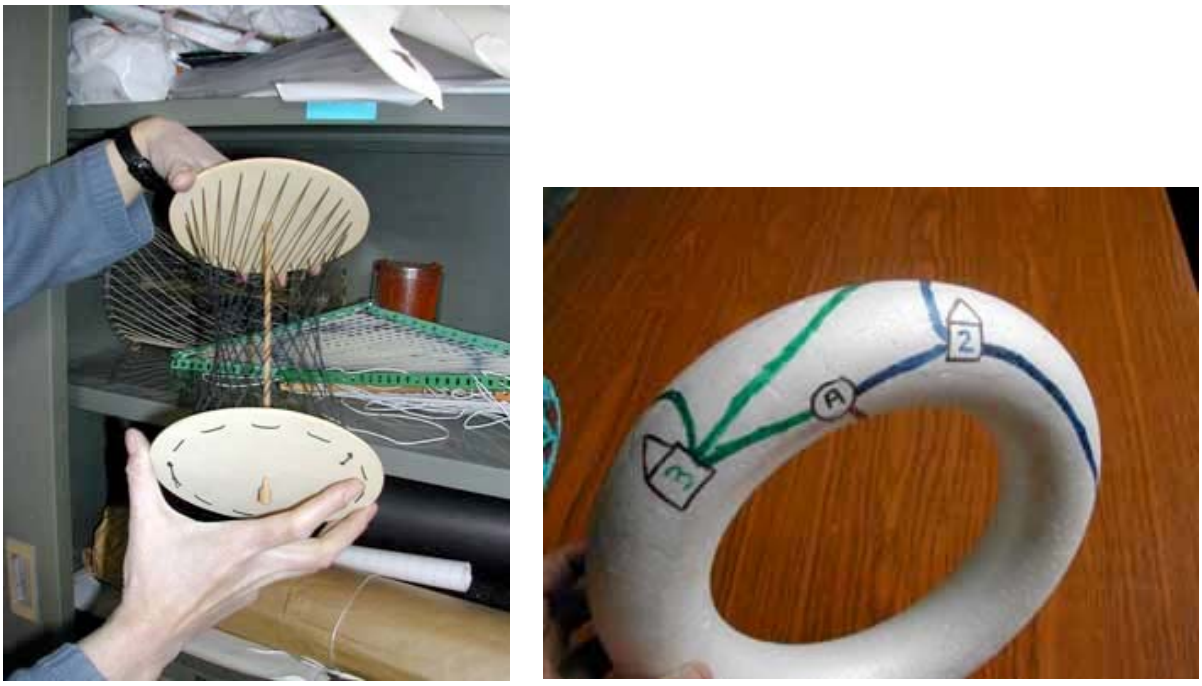

Fig. 6.8 – Teaching collection of models at the Department of Mathematics, University of Milan. The collection is intensely used today in topology courses by Professor Maria Dedò. Left image: a model for the teaching of surfaces and right image: a torus to explaining the solution of the classical 3-houses problem. Object-based teaching in mathematics has led Professor Dedò to develop a permanent exhibition of mathematics in the Department[162], as well as exhibitions for other museums (e.g. the exhibition *MathMilano* [2003-2004] at the Museo Nazionale della Scienza e della Tecnologia Leonardo da Vinci, Milan).

[162] The exhibition *Simmetria, giochi di specchi* opened to the public in 2000. See website at http://specchi.mat.unimi.it/, accessed 20 July 2005. See also Dedò (2001).

A teaching collection can also become less used or be put aside altogether due to its replacement by other collections of more explanatory power. An illustrative example is the transition from wax models to the study of real body parts in anatomy in the 19th century. When preservation techniques improved, interest in wax models declined because learning from 'real' anatomical preparations was considered more beneficial and accurate (Giacobini 1997)[163]. Similarly, pathological collections were often organised by dividing the total effects of one disease in a single person, in other words, separating the organs: "Students became confronted by ponderous arrays of post-mortem material consisting of large groups of the same organ showing different pathological changes" (Duggan 1964: 283). When the concept of disease changed in the 1950s, it became more important to have associations of organs from the same body together. Thus, collections lost demonstrative value and became obsolete for teaching. Clearly these collections are of great importance for understanding how our knowledge about health and disease evolved through the ages.

Fig. 6.9 – First generation teaching collection of history of art and architecture at the Faculty of Theology, Martin-Luther University of Halle-Wittenberg. The slides are catalogued and used in conjunction with the collection of artworks and a collection of prints and books held at the faculty library. Many of the architectonical elements in the slides are from buildings that no longer exist, making them even more valuable for study. This collection has been in use for teaching since the 19th century (photo reproduced with the kind permission of the Martin-Luther University of Halle-Wittenberg).

The use of teaching collections can also decrease due to the introduction of modern technologies or visual aids. A typical example is the introduction of photography and slides in higher education courses in the history of art – in fact the two are almost contemporary events. The advantage of first hand observation of originals, instead of reproductions, has been a constant claim in 20th century history of art teaching (Read 1943, James 1960, Rosenberg 1964-65, Robertson 2000). However, two-dimensional images can enhance learning by allowing observation and comparison of remote, inaccessible or lost artworks. Often, history of art, (cultural) anthropology and archaeology courses developed slide collections together with collections of artworks and artefacts – an example is the

[163] This led to the gradual and inevitable decline of wax models for teaching to the point that when a student said something stupid it was not uncommon for the professor to promptly ask: "Where did you learn anatomy – in wax models?" (G. Giacobini, interview 31 March 2003).

archaeology and history of art teaching collections at the Faculty of Theology, Martin Luther University of Halle-Wittenberg (fig. 6.9).

New technologies also opened new possibilities to the field of architecture and the so-called graphic arts, resulting in a decline in the use of collections of models, *maquettes*, and plaster casts for teaching. Perhaps more surprising is the decline in the use of teaching collections in faculties of medicine, reported at least from the mid- to late 1940s (Duggan 1964). Although many professors maintain that dissection is more important than ever, not only for the teaching of human anatomy but also for more subtle lessons which it can convey on the meaning of being a doctor, computerised scans and three-dimensional software are now of widespread use in faculties of medicine and often are replacing handling specimens for study altogether (J.-C. Neidhart, O. Guedel, interview 19 May 2004, Zuger 2004). More worrying perhaps is the status of the study of human anatomy as a whole, which seems to be in trouble in some curricula. Recently, Frank Gonzalez-Crussi, a retired pathologist and historian stated that "Much of the traditional [human] anatomy curriculum is irrelevant to medical practice and might easily be eliminated" (F. Gonzalez-Crussi, cited in Zuger 2004: 1). Apart from the effect a statement like this (which is not consensual) has on the perception of anatomical and pathological collections, one cannot help wondering whether first-hand observing, handling and studying specimens at elementary graduate level is not more beneficial for future medical doctors and surgeons than learning about human bones and tissues through software.

Undoubtedly, collection-based teaching frequently results from persistence in personal contacts between museum staff and university departments – "we *do* have to convince them" (T. Buttrey, pers. comm. 14 November 2002). However, I have encountered many examples of first and second generation collections being used for teaching, possibly even more than for research – for example at the Museum of History of Science at the University of Oxford, the Whipple Museum at the University of Cambridge, the Herbarium at the University of Leipzig (fig. 6.10), the Zoology Museum at the University of Cambridge (fig. 6.11), the Department of Earth Sciences at the University of Cambridge, the Musée de Louvain la Neuve at the Catholic University of Louvain, the Ashmolean Museum at the University of Oxford, the Gabinetto Volta at the University of Pavia[164].

Fig. 6.10 – A teaching herbarium (*Studienherbar*), one of the herbaria of the University of Leipzig. Note that the herbarium sheets are covered with plastic to resist intensive student handling. The name of the specimen is presented at the back of the sheet – in this case *Ligustrum vulgare* (Oleaceae) (photos reproduced with the kind permission of the Botanical Garden and Herbaria, University of Leipzig).

[164] Note that the museums cited as active in collection-based teaching were also cited as active in collection-based research. This is probably not coincidental and once one collection is actively used, it becomes active in both.

Fig. 6.11 – The Museum of Zoology, University of Cambridge has a teaching lab inside the Museum – where students are given practical demonstrations, observe and handle specimens from the collection, and have practical assessments (exams). A student can actually be seen on the left picture. As a teaching aid, a separate desk is provided with reference books and papers for student use. Right image: one of the desks where a fossil is being studied by a student (photos courtesy of the Zoology Museum, University of Cambridge).

Fig. 6.12 - Art students at the Tartu University Art Museum, October 2003 (photo reproduced with the kind permission of the Tartu University Art Museum).

Furthermore, when collection-based teaching does occur, it may transcend the disciplines represented in the collection. For instance, apart from natural history collections being frequently used by art students (as found in practically every collection visited), professors of English Literature use the numismatics collection at the Fitzwilliam Museum (University of Cambridge) (M. Blackburn, interview 14 November 2002), and arts and crafts courses use the Ashmolean collection of musical instruments (J. Whiteley, interview 20 November 2002). More traditional teaching links do also occur, as in the optional seminar 'Egyptian Artefacts' (UCL's degree in History), taught at the Petrie (S. MacDonald, interview 25 November 2002) or art students using plaster casts at the Art Museum of the University of

Tartu (Estonia) (fig. 6.12). The MSc in Material Anthropology and Museum Ethnography at the Pitt Rivers is another example of collection use for training (in this case, museum anthropologists) (L. Peers, interview 21 November 2002). Clearly, there are many possibilities for university museums and collections to increase the use of their collections for both teaching and research.

6.5 The third mission: The tendency for integration

Museums are being renovated and recreated in European universities. The Museum of Musical Instruments at the University of Leipzig is currently moving to a renovated building. The Utrecht University Museum was renovated in 1996 (fig. 6.17). The renovated Musée des Arts et Métiers was inaugurated in Paris in 2000 and so was the Palazzo Poggi Museum at the University of Bologna. In July 2003, the renovated Manchester Museum (University of Manchester) opened to the public and in October the same year the Helsinki University Museum opened in the restored *Arppeanum* building[165]. The Fitzwilliam Museum (University of Cambridge) inaugurated its renovated courtyard in June 2004. The Groningen University Museum was renovated and opened to the public in June 2004.

Fig. 6.13 - Entrance to the new Hunterian Museum at the Royal College of Surgeons, London (photo Hunterian Museum Archives, RCSE).

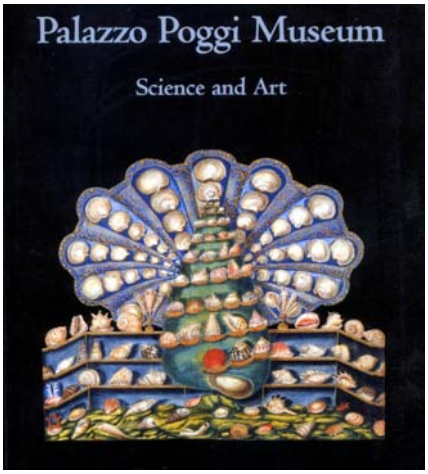

Fig. 6.14 - Cover of the catalogue of the Palazzo Poggi Museum, created in 2000 and presenting some of the most significant historical collections from the University of Bologna. See a description of the Palazzo Poggi Museum, innovative in its integrated approach to science and art in Tega (2002).

[165] The new Helsinki University Museum was awarded the Museum of the Year Prize by ICOM-Finland in 2004.

In 2005, the new Museo di Fisica at the University of Naples opened in January and the new Museum of Evolution at the University of Uppsala in February. The new Hunterian Museum at the Royal College of Surgeons of England (London) was inaugurated last February (fig. 6.13). Both the new Museum at the Royal College of Surgeons of Edinburgh and the Museum of the English Rural Life at the University of Reading opened in July. The new Museum of the North at the University of Alaska Fairbanks (USA) will be inaugurated September 2005. The Sainsbury Centre for Visual Arts at the University of East Anglia is being expanded and will open in the autumn, while the renovated Museum of Human Anatomy at the University of Turin will also be inaugurated in autumn. The renovated Laboratorio Chimico at the Museum of Science, University of Lisbon, is due to open in 2006 (fig. 6.15).

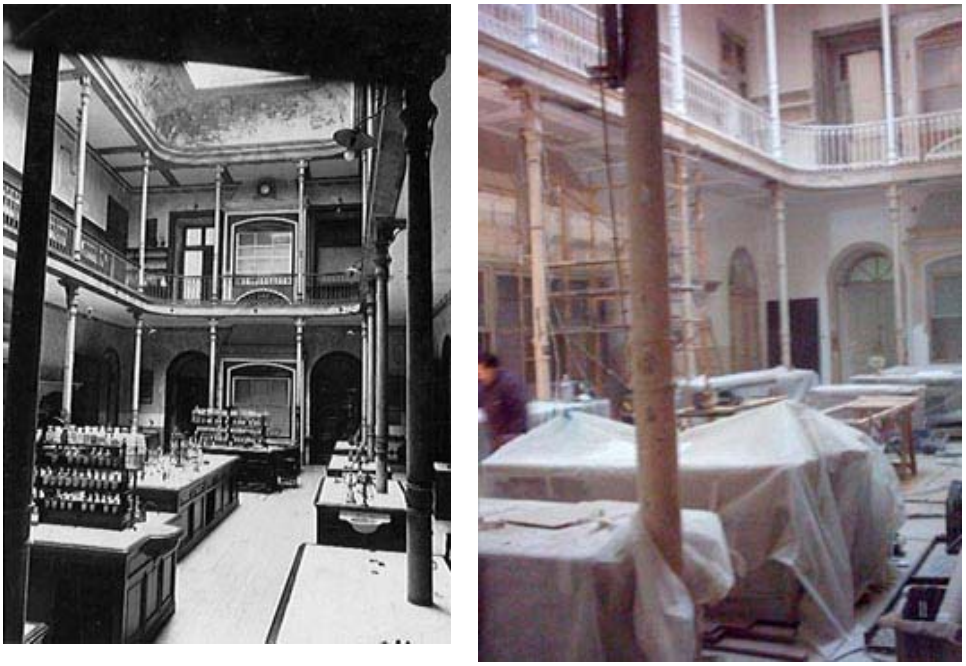

Fig. 6.15 – The 19th century Laboratorio Chimico of the University of Lisbon which includes an amphitheatre (to the right of both images) is part of the Museum of Science. Chemistry classes were taught here until 1998. As seen in the right image, the Laboratorio is currently being restored and is due to open in 2006 (photo taken in February 2005). The photograph on the left probably dates from the early 20th century. Today, these early laboratories of chemistry are rare in European universities as the majority were readapted while research and teaching evolved. In some cases, only the walls, a working bench or a chimney are left. See Ramalho (2001) and Santa-Bárbara (2001) (left photo: Museum of Science Archives).

Fig. 6.16 – Restoration works at the 18th century Laboratorio Chimico, University of Coimbra in February 2005. The Laboratorio also includes an amphitheatre. During restoration, a couple of 16th century architectonical elements (window and pulpit, not depicted) were discovered (reproduced with the kind permission of the University of Coimbra).

More university museums are at a project stage. The Ashmolean Museum of the University of Oxford plans a major renovation for the coming years. The Musée de Louvain-la-Neuve has a project for a new building. New projects exist for the collections at the University of St. Andrews and the Museum of Natural History at the University of Pavia. In 2003, the Museo di Storia Naturale at the University of Florence initiated major structural reforms that are ongoing. Patras University in Greece also has a Science and Technology Museum at project stage (Theologi-Gouti 2003). The University College London will re-house its archaeology, art and library collections, including the Egyptology collections from the Petrie Museum, in the new Panopticon, due to open in 2008[166].

Fig. 6.17 - Utrecht University Museum, created in 1936 and renovated in 1996. The Museum integrates first and second generation collections: history of medicine, dentistry, physics, natural history, university history and student life, and art collections. The Museum also includes the *Oude Hortus* (Old Hortus), seen on the left (photo S. de Clercq).

After having gone through a process of collection assessment, selection and (sometimes) disposal as described earlier in this chapter, many universities have reorganised their museums and collections. Although different countries are at different stages in this process, the emerging tendency is clear: universities are increasingly integrating collections in a single museum or under a single management structure. The aim seems to be threefold. On the one hand, universities are seeking less expensive and more efficient management models for buildings, collections and staff. On the other hand, they aim at providing a 'second life' to 'orphaned' or 'dormant' collections, particularly first generation collections. Lastly, being increasingly aware of the importance of establishing bridges with society, universities are seeking 'windows' on the local community and the public at large.

[166] Panopticon means 'all-visible' in Greek and it act as UCL's 'window on the world', providing a new entrance to the university campus" (MacDonald in press). See more at the Petrie Museum's website, http://www.petrie.ucl.ac.uk/index2.html, accessed 10 July 2005. See also e.g. Morris (2002).

Fig. 6.18 - The Gustavianum Museum at the University of Uppsala, created in 2000. The name of the Museum derives from the building – the Gustavianum – which dates from 1620. The Museum preserves and interprets the history of the University of Uppsala from 1477 to the present**,** comprising first and second generation collections of Egyptian archaeology, history of science and medicine, numismatics and art. The Museum also includes the Anatomical Theatre, built in 1663 under the supervision of Olof Rudbeck the Elder (photos F. Galli, reproduced with the kind permission of the University of Uppsala).

One common structure or museum is easier to coordinate and manage than 20 smaller museums scattered throughout the university. One common structure or museum is more visible both within the university and to society. One common structure is more likely to receive public funds from the cultural heritage sector (read: ministries of culture or equivalents, typically the funding bodies of museums). As the director of one university museum said, “Today, there seems to be more money for collections from ‘culture’ than from ‘science’ ” (W. Los, interview 11 May 2003)[167].

From the perspective of university heritage, these integrative projects present challenges and risks, but at the same time provide a remarkable opportunity for recognition. If the new projects manage to balance meaningful public interpretation with the relevance of collections for future research and teaching (balance between the three missions) and if they are provided with the conditions (funds and staff) to do so in a sustainable and long-lasting way, then university collections may well be able to achieve their potential – possibly more fully so than ever before.

6.5.1 The different forms of integration

Although the process that led to recent developments was essentially the same across Europe – evaluation of collections and users, often accompanied by selection – and the tendency to integrate collections is also widespread, the form that this tendency assumes varies significantly from university to university.

[167] Most of the funds for these projects come from the private sector, the European Commission, local or regional authorities, ministries of culture and the heritage sector in general. The financial contribution of universities is minimal. For example, in the case of the Utrecht University Museum, the University only assumed 15% of the total costs of renovation (S. de Clercq, interview 5 May 2003). The renovation of the Musée des Arts et Métiers was included in a series of major cultural initiatives commissioned by President Mitterrand (*Grands Travaux*) and funding was provided through special subvention. Typically, higher education institutions provide the space and continue to assume staff and operational costs, while other funds need to be found elsewhere.

Universities that already had museums may have chosen to expand and renovate these. Collections scattered around different departments were thus integrated in existing museums, either because they were orphaned, not used for teaching and research or simply because departments did not want to keep them any longer. At the University of Utrecht, several research and teaching collections of medicine and natural history were integrated in the Utrecht University Museum. The Helsinki and Groningen University Museums also integrated first generation collections (and museums). At the time of writing, there is hope that the anthropology collections at the Institute of Medical Anthropology, Humboldt University Berlin, will be transferred to the Museum of the History of Medicine/Virchow House due to imminent transfer of the Institute (U. Creuz, interview 10 June 2004).

Sometimes, when museums did not exist, they were purposefully created. The Palazzo Poggi Museum at the University of Bologna, created in 2000 (though the building dates from the 16th century), assembles historical collections of natural history, history of physics, archaeology, and medicine, among others. The Gustavianum Museum, also created in 2000, gathers all significant historical collections from the University of Uppsala (archaeology, history of physics, medicine, numismatics, art) except natural history, for which a new museum – the Museum of Evolution – was inaugurated in February 2005.

In some recent projects, collections are not necessarily assembled under the same roof. For example, the new museums for the Universities of Strasbourg Louis Pasteur (*Jardin des Sciences* project) and Montpellier I, II & III (*MuseUM* project) encompass the coordinated integration of mission, strategy and activities of several museums and collections without any significant movement of collections. Likewise, the new Museo dell'Uomo at the University of Turin (still at project stage) aims at integrating the Museum of Human Anatomy, the Cesare Lombroso Museum (a criminal anthropology collection), the Museum of Anthropology and Ethnography and research collections from the Laboratory of Human Palaeontology.

In other cases, museums and collections have remained independent, but were provided with a common 'umbrella' structure. This has been the case in most universities in the UK, which with few exceptions have maintained museums and collections within the departments, but created special committees and units within the university structure to manage them – for example the University Museums and Collections Services at the University of Reading, the University of Dundee Museum Services, the Museums and Heritage Committee at University College London (fig. 6.21), as well as similar cross-departmental units at the Universities of Oxford, Cambridge, Manchester, St. Andrews, among others. This was also the approach followed by the majority of Italian universities when they began creating museum systems in the late 1990s and early 2000s (see chapter 5): museums and collections stay in departments and institutes, but the *sistema museale* assumes a coordinated management and part of the financial responsibility[168]. For example, the museum system at the University of Bologna is provided with a status equivalent to a department, it is given autonomy and its own statute[169], has an appointed director and a dedicated annual budget, which is divided by the museums and collections on a quota basis, depending on surface area, staff and number of visitors (F. Bonolì, interview 12 March 2003). Other universities have also developed formal or informal 'umbrella' structures – e.g. the 'Groupement de collections de l'Université Claude Bernard' in Lyon, among others.

[168] Compared with Pavia, Florence, Padua or Turin, the University of Bologna developed a hybrid system: some collections are at the Palazzo Poggi Museum and some have remained in departments and institutes. Clearly, there are no prescribed recipes; each university is a singular case that needs to be evaluated carefully.

[169] The *Regolamento di Costituzione e Funzionamento del Sistema Museale d'Ateneo* (see at www2.unibo.it/musei-universitari/statuto.htm, accessed 13 January 2003). The Regolamento lists 17 museums and collections at the University of Bologna.

Fig. 6.19 – The restored Museo di Anatomia Umana, University of Turin, to be inaugurated in September 2005. The Museum was created by Luigi Rolando in 1830 and the architectural similarities to a cathedral are striking. Today, the Museo is part of the Museo dell'Uomo project, aimed at integrating several museums and collections from the University of Turin (photos: A. D'Angelo (left) and C. Cilli (right), reproduced with the kind permission of the Museo di Anatomia Umana).

To whom these museums and structures respond in the university hierarchy varies from case to case. This may be a crucial factor in ultimate success or failure. Humphrey (1992a,b) and Birney (1994) suggested that the higher the authority level of the administrator immediately above the museums and collections, the greater the probability that universities will be making budgetary decisions based on the museum's actual nature and importance, thereby improving overall recognition and efficiency. In Italy, the different museum systems tend to be under the direct jurisdiction of the rector or the vice-rector. At the UCL, the museums and heritage committee is under the University Council (fig. 6.20). At the University of Lisbon there is no formal coordination structure yet the directors of the two museums – National Museum of Natural History and Museum of Science – both respond to the rector of the University of Lisbon[170].

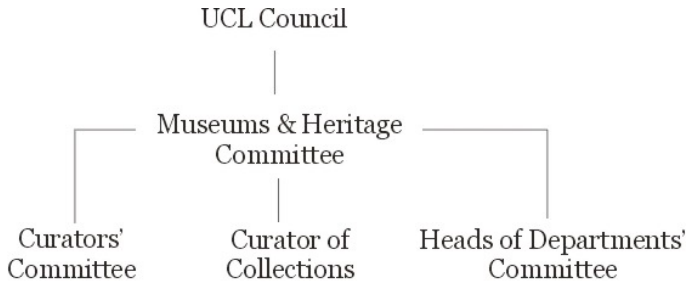

Fig. 6.20 - Simplified flow-chart of museums and collections at University College London (implementation dating 2000). The Museums and Heritage Committee is chaired by the Vice-Provost and composed of one Pro-Provost (usually the one responsible for UCL's finances) and three external advisors. This Committee is in turn supported by two sub-committees: a) the Curators' Committee, where all curators are represented, chaired by the Curator of Collections and b) the Heads of Departments' Committee, which is chaired by a Head of Department on a rotating basis. The Curator of Collections reports to the Museums and Heritage Committee and simultaneously acts as a bridge between the two sub-committees.

[170] A pro-rector is responsible for the museums and some steps have been taken in the direction of a common management structure.

In other universities, the common structure was positioned under non-academic or administrative units – for example at the University of Aberdeen the Marischal Museum was positioned under the Directorate of Information Systems (fig. 6.21) and at the University of Amsterdam two important museums – Allard Pierson Museum (art and antiquities) and *De Agnietenkapel* (university history) – were placed under the University Central Library.

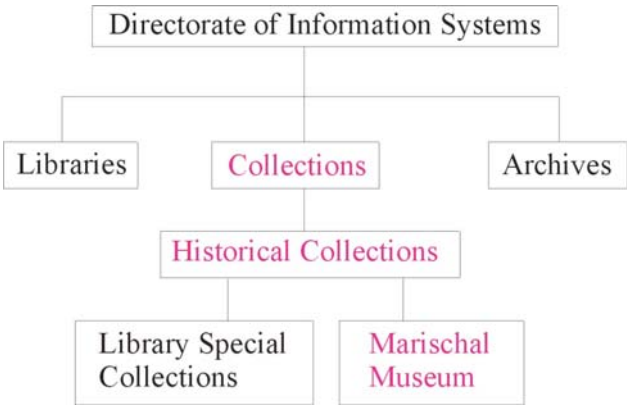

Fig. 6.21 – The Marischal Museum's (anthropology, archaeology, fine arts and numismatics) current positioning within the structure of the University of Aberdeen.

Given that the sheer number of scattered collections continues to pose challenges regarding security and preservation, some universities are seeking increased responsibility from departments and faculties when physical transfer is not possible or desirable. The appointment of "individuals who are responsible, on a full-time basis" for these collections had been one of the recommendations of the UK surveys (Merriman 2002: 79). At Utrecht University, the Utrecht University Museum has a formal 'inspection role'[171] over collections scattered elsewhere in the University, particularly collections of significant value such as the collection of veterinary medicine (located in the faculty of the same name), the collection of cartography (located at the faculty of geography) and the anatomy museum (at the faculty of medicine) (fig. 6.22). In practice, this means that departments or faculties regularly report to the Museum on the state of collections.

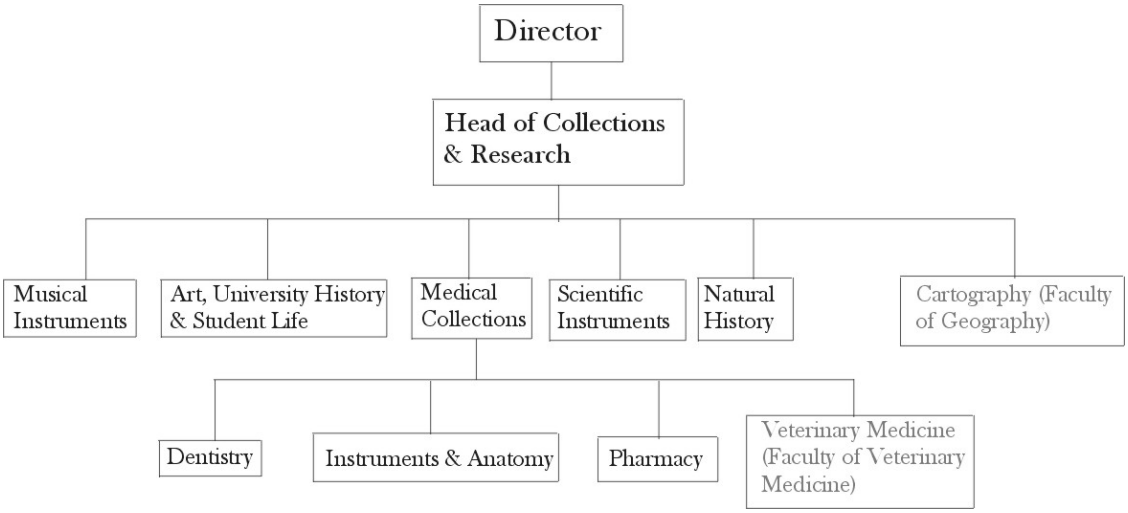

Fig. 6.22 – Flow-chart of Utrecht University Museum (section of Collections and Research). Grey on the right indicates collections located outside the Museum's premises over which it has a supervisory role (only the more important shown). The Director has a seat in the Council of Directors of Faculties and Central Services, meeting monthly to discuss common issues.

[171] The designation was recently scaled down to 'advisory role' (J. Schuller, interview 8 May 2003).

Structures that pose the biggest concern are *ad hoc* foundations and associations to run museums, collections and staff. This has become prominent on the agenda of some Italian, French and Portuguese universities. Increasing the eligibility for external funds and a more flexible management seem to be the two major objectives. Although the legal terms of these foundations vary from country to country, caution is needed to avoid alienation and transfer of ownership of collections and buildings, as well as guaranteeing stable and attractive staff career paths. In this respect, universities ought to look carefully into previous experiences, both in the academic world (e.g. the already mentioned Botanical Garden of the University of Amsterdam, 'privatised' in 1986, and the Haren Botanical Garden of the University of Groningen, 'privatised' in the 1990s) and the museum sector at large (e.g. foundations and outsourced management in some Italian and Dutch national and local museums)[172].

In short, university museums and collections may greatly benefit from a centralised structure responsible for coordination and responding directly to the rector. Such a structure may promote collaboration and the development of common policies and coordinated strategies[173], provide a single voice for (unequal) museums and collections within the university (especially if the structure is represented in the university executive bodies), facilitate management, increase visibility and increase the likelihood of external funding. Furthermore, this structure may oversee orphaned or isolated collections scattered through departments that for a variety of reasons have not migrated to museums.

Nevertheless, it is the public who benefits most. Instead of 20 interlocutors, each with a different phone number, website and opening hours, both school groups and general visitors will profit from the existence of a liaison structure – providing information (locations, events, programmes, collections), coordinate bookings and facility rentals for special events, receive and forward requests for scientific services (e.g. loans of objects and images), handle public relations and press releases, etc. This is already being done in several European universities today. Moreover, many of these structures provide web portals with resources such as searchable collection databases[174]. University museums have been discussing the role of the general public for a long time and it is difficult to understand why it took so long to implement even the simplest coordination structure for public access.

6.5.2 The migration to the 'third mission': dilemmas and risks

The migration to the realm of 'historical heritage' and the redefinition of university collections exclusively in terms of the 'third mission' (public display) pose bigger challenges to first generation collections than to second generation collections. After all, collections of medical and scientific instruments, historical teaching collections of mathematical models and university memorabilia *are* historical heritage. For some first generation collections – like research and teaching collections in ethnography, art or archaeology – migration to the third mission is unproblematic, although it may involve a shift in the role of the object (e.g. an ethnographic artefact changing from being a 'document' to an 'artwork').

---

[172] The creation of non-profit organisations ruled by private sector legislation for a multiplicity of purposes – including R&D – is not uncommon in European universities, including for the public understanding of science. In fact, the science centres *Heureka* at Vantaa (Finland) and *Exploratório Infante D. Henrique* at Coimbra both resulted from associations/foundations of which the respective universities were founding partners. A similar structure appears to be under discussion for the new science centre *Ahhaa* in Tartu (T. Siild, interview 10 October 2003).

[173] Including the much needed collection policies at university level, at present limited to UK and Italian university museums and not universally applied there either.

[174] Particularly rich web portals are those from the University of Alberta Museums (http://www.museums.ualberta.ca/), the Museums and Collections @ Macquarie (http://www.lib.mq.edu.au/mcm/) and, in Europe, for example the University of Dundee Museum Services (http://www.dundee.ac.uk/museum/), all accessed 10 July 2005.

Fig. 6.23 - Specimens from the teratology collection (birth defects) at the Musée Testut-Latarjet, University of Lyon Claude Bernard (reproduced with kind permission).

For other first generation collections – particularly teaching and research collections in natural history and medicine – migration to the third mission poses major challenges, not in the least because in practice many are to a great extent being excluded. Although feasible, public interpretation of embryology research collections is difficult and raises many questions, including ethical ones. The same goes for research and teaching collections in human anatomy or physical anthropology. Many university collections are valuable for research and teaching and have only limited if any value for the 'third mission'. It is unlikely that the cultural heritage or private sector will fund long-lasting maintenance and preservation of these collections (see appendix A9), therefore funds need to be found elsewhere. Perhaps more worrying, migration to the third mission implies a gradual dilution of the differences between first and second generation collections, which in turn will result in a substantial change in the role of some natural history and medical research collections.

The idea of 'historic' natural history collection is problematic to say the least, because, unlike a scientific instrument, a natural history specimen does not lose its original purpose. In the words of a curator-researcher of a 400 year old herbarium: "Contemporary research is our priority, we are *not* a historical herbarium; being a historical herbarium would mean death" (B. Gravendeel, interview 29 April 2003). Another curator agreed: "Historical value is secondary to taxonomic value – even when the specimen is hundreds of years old" (S.A. Ulenberg, interview 11 May 2003). Change of role is a risk because many new projects are being funded by the cultural heritage sector, which does not necessarily pursue a teaching and research agenda. This can be severely aggravated if first generation collections are physically separated from their main users or placed under a non-academic unit, such as a public relations division, a library, or the university's central administration.

For the past 30 years or so, many teaching and research collections have been separated from their natural users. Across Europe, laboratories, lecturers, researchers, students, equipment, etc. moved to modern facilities, state-of-the-art campuses usually on the outskirts of town, while collections typically remained in old buildings in city centres. In itself, keeping museums in city centres is not an illogical idea. Initially, staff may have hoped that this might enhance and broaden their activities, increase working conditions (e.g. more space because departments left) and boost regard among colleagues. However, the separation often turned out to create difficult situations.

The case of the University of Lisbon is both typical and illustrative because it has two different museums and both underwent similar processes of gradual migration to the third mission, coupled with physical separation from their parent-departments during the 1990s. The collections of the National Museum of Natural History (officially created in 1919) are first generation collections assembled in departments in close association with research and teaching in zoology, mineralogy, geology and botany. The collections of the Museum of Science (officially created in 1985) are the result of the accumulation of historical equipment from the departments of physics, mathematics, chemistry and derived sciences. Originally, both museums were created within the Faculty of Sciences. In the late 1980s, the Faculty (departments) began a gradual move to a new campus outside the city centre, while the museums stayed in the old building in the heart of Lisbon. At the same time, the museums were 'upgraded' to the central administration (*Reitoria*) and both directors began to report directly to the rector.

The impact of the process is still difficult to evaluate, but it seems to have been substantially different for each of the museums. While for the Museum of Science the process was greatly beneficial and it was able to enhance public activities and events, diversify audiences, improve public service and raise external funds with moderate success, for the National Museum of Natural History the migration to the 'third mission' was problematic and it is still searching for its purpose and audience. As the Director of the Botanical Garden (part of the National Museum of Natural History) explained: "All of a sudden there we were – alone and empty. Emptied of life, our main purpose, emptied of everything". He described the dilemmas raised by the new situation: "I felt very much divided between the Department [of Botany], where I was professor, and the Garden, which I directed, when the time came to separate the waters. I took active part in the decline of all of this because in the 1980s I encouraged my staff to go with the department. [...] The life of universities is in colleges and departments: it's the students, it's the lectures, and it's the research. I wanted my Faculty to progress, I wanted theses, and I wanted good researchers. The Garden is important, but I felt it didn't count anymore for the University. Besides, why would I need researchers if I no longer had laboratories?" (F. Catarino, interview 12 April 2000). Along the same lines, the Director of the Geology and Mineralogy Museum explained: "We *upgraded*, but the price has been too high. We used to be fully integrated in the research of the department, now research is fragmented, on a project basis and frequently not collection-based" and, more to the point, "In the department, we were obliged to do research. Today, nobody cares – if we crossed our arms and sat doing nothing the whole day, nobody would ask us why we aren't producing any science – as long, of course, as we keep the doors open to the public. It's a whole different way of thinking and it's costing us a lot to adapt" (A.M.G. Carvalho, interview 24 April 2000).

Similar dilemmas have been felt elsewhere in Europe. The École des Mines in Paris moved from the Jardin du Luxembourg to new facilities in Fontainebleau (in the suburbs of Paris) in the late 1970s, leaving behind the Musée. The Musée underwent a considerable decline in the use of collections for teaching and research and seems now confined to the roles of historical preservation and public display, coupled with research into the history of natural history (where it is active, including in active partnerships at the European level). Separation processes may have paradoxical and ironic aspects. Given that first generation collections continue to be needed and used, researchers and lecturers often develop new collections in the new locations rather than using the ones left behind. Teaching collections were created at the new École des Mines in Fontainbleau – some of them almost exact duplicates of the collections owned by the Musée (J. Touret, interview 21 June 2002). At the new Faculty of Sciences of the University of Lisbon, teaching and research collections in zoology, botany and geology continued to be created and used in the new laboratories, while the collections of the National Museum of Natural History linger dormant and practically unused (C. Lopes, interview 29 August 2001). The same happened at the University of Turin when the zoology collections were de-accessioned to the Museo Regionale in 1979; the department continued to assemble collections: "Yes, of course we do [create and use collections]. We keep most of the collections inside the laboratories or in researchers' offices. They are catalogued, exactly like

in a museum – and we have exactly the same problems that we used to have with the Museum collections [before 1979]: lack of space and pressure to throw many things away" (P.P. d'Entrèves, interview 4 April 2003).

Integration of collections, together with physical separation, has been tried before. For instance, in the 1960s there was a project to integrate all public exhibitions of Harvard University museums into one single exhibition facility; the project was later abandoned (Williams 1969). In 1928, four museums previously scattered throughout the University of Michigan, Ann Arbor, were placed under the same roof in a new building. This was one of the first migrations of first generation collections from departments and possibly one of the first university museums integrating multidisciplinary collections under a single director and professional management. In the new museum, a distinction was made between the 'research museum' and the 'exhibit museum': the former acted as a catalyser for research, maintaining the links with departments elsewhere on campus, while the latter consisted of an integrated exhibition of selected specimens from the four museums, aimed mostly at students and providing a general understanding of "the origin and structure of man and its biological environment, and of the planet on which he lives" (Reimann 1967: 38). The model was abandoned in the 1950s, mostly because links with the departments were not strong enough to keep the 'research museum' alive and to prevent a decline in the use of collections for teaching and research (Reimann 1967). As a result, the collections returned to the departments. Today, the Museum of Zoology at the University of Michigan is one of the most productive university museums in systematic research[175].

In conclusion, the landscape of university museums and collections is changing as a result of the 'crisis' and impasse of the 1980s and 1990s. The tendency seems to be towards an increasing integration of collections under the same roof or under a common structure. This has advantages for the university (more rational management of resources, a single public relations gateway), collections and museums (increased visibility and autonomy, opportunity of a coordinated single voice, illegibility for an increasing diversity of funds, protection of small or orphaned collections) and the public (a single access point). This is not to say that no risks are involved. The main risk of this integration is a redefinition of the role of university collections exclusively in function of the third mission, i.e. public display. This, coupled with the physical separation of first generation collections from their primary users, may further alienate university collections from academic life, diminish their present and future roles for science and education and dilute their history and their identity.

Today, physical separation is being avoided by universities who only recently began substantial reorganisations and therefore had the opportunity to learn from past mistakes made elsewhere. Two years ago the University of Tartu was considering the physical separation of collections and departments, but today the idea has become quite the opposite: "We are moving towards more formal and physical proximity between researchers, students and collections to stimulate the use of collections for teaching and research, while at the same time keeping the balance with the needs of public display" (U. Koljalg, Director of the Natural History Museum, University of Tartu, *pers. comm*. 1 July 2005). Often, knowledge about how the university operates is paramount. In 2002, as a result of a profound internal (and external) restructuring, the Manchester Museum at the University of Manchester conceived the staff position of so-called MAJAs – Museum joint appointments with cognate academic departments – to create stronger links at strategic level between the Museum and the rest of the University. Recently, Carol Mayer, curator at the Museum of Anthropology and professor of museum anthropology in the department of anthropology and sociology at the University

[175] A survey of three volumes (2000, 2001 and 2002) of two peer-reviewed international journals in the field of systematics – *Cladistics* and *Systematic Biology* – was carried out to determine which university museums were publishing results of research in systematics. The survey comprised a total of 147 articles in *Systematic Biology* and 72 articles in *Cladistics* and only addressed the provenance of authors – not the substance of papers. A summary of the results is found in Appendix A11. The Museum of Zoology at Michigan Ann Arbor is among the university museums that publishes most in the two journals.

of British Columbia, Canada, discussed the professional dilemmas that both worlds raise – "[…] the challenge is how to stay credible and connected in both [worlds] when each has a different set of expectations" – while at the same time giving an inspiring account of the richness, depth and meaning offered by curating *and* teaching (Mayer 2005: 179). In university museums, the balance between the three missions is a difficult one, requiring collaboration, innovation and passion.

For the moment it is too early to assess the implications of recent reorganisations because the majority date from the past five years and some are still under debate[176]. More research would be welcome in this respect although ultimately the model adopted will always depend on the type of collections, their use, the management of buildings, the age of the university, the campus location (in town or suburbs), and the existence of other museums in the area – there are no universal recipes.

6.5.3 The next generation university museum

Keeping the balance between the three missions – teaching, research and public display – is the key for meaningful new university museums. Not only are collections still *relevant* for teaching and research, but they are indeed *being used* and their potential for research and teaching in a multiplicity of new fields is formidable. This certainly depends on resources, but first and foremost it depends on individual initiative, vision, openness to new methods and subjects and careful strategic planning in order to ensure that arbitrary reorganisations do not eradicate relevance for science and education.

Third generation university museums have an extraordinary opportunity to position themselves at the very heart of the university, tear apart disciplinary borders and aim at an integrated public interpretation of the history of past and present knowledge. They would be perceived as everybody's business, not just the business of the department A or B, or worse – professor X or Y. Collections would be a research and teaching resource for any student or researcher of any subject – from art to zoology, from physics to sociology, from history of medicine to statistics, from chemistry to astronomy. The materials resulting from their research would be explained *in situ* for the general public. Third generation university museums would also have access to knowledge produced *now* in other departments of the university, which would also be interpreted for the general public. They would be focused not only on *what* we know, but on *how* we knew yesterday and *how* we know today. They would be key actors in collaborative projects between universities and non-university museums – not showcases, but true gateways between the university and society, a focus of cohesion and exchange for the university and a place of meaningful interpretation of past, present and future knowledge for citizens.

This would represent a significant step forward from the present *status quo*. For this potential to be achieved, new university museums cannot be merely close to the university, as if they were 'historic' or 'decorative' appendices – they need to be truly embedded in it. They need to be properly funded and staffed by qualified and interdisciplinary teams and fully integrated in the university long-term strategic plan – and then, they would indeed become significant recruitment tools for future students. Merely historical and decorative appendices will not attract many and certainly not the bright and inquisitive minds.

6.6 Summary: Between two worlds

When discussing the challenges faced by university collections, it is impossible to ignore the challenges universities are confronted with today. University collections are not necessarily

[176] A compilation of good practices, coupled with an evaluation of the pros and cons of each model would be most useful. However I am unsure if universities are conducting any evaluation of the new organisational models – they obviously ought to, as well as publish the results.

subject to the same rules and developments experienced by other museums. Regardless of its size or autonomy, there is a permanent and intrinsic vulnerability in every university museum or collection, because collections are small and the university is big. Any change within the university can have significant impact on collections and the changes universities have recently gone through have certainly not been small. The main source of instability of university collections is the university itself and, ultimately, the reasons are economic and political.

Although the performance of university museums and collections depends, to a large extent, on the initiative and vision of individuals, there are plenty examples demonstrating that management of university collections and their position within the university structure has a direct influence on the research, teaching and public service output. As for research and teaching, second generation university collections may benefit from close connections with departments, institutes or research centres of history of science and technology (although these are scarce in European universities) or post-graduate courses on these subjects. For first generation collections, these connections are crucial to the point of being an essential requirement. None of this is incompatible with the existence of 'umbrella' structures, preferably responding to rectors, to coordinate policies, strategies and public service. Neither is it incompatible with increasing autonomy – particularly for major, high-profile and professionally run university museums, such as the Musée des Arts et Métiers (CNAM), the Hunterian Museum (University of Glasgow), the Manchester Museum (University of Manchester), the Fitzwilliam Museum (University of Cambridge), and the Oxford University Museum.

University museums are 'strange beasts' indeed. They fluctuate between the world of museums and the world of academia – sometimes with one foot in each, at other times with both feet on one or the other. University museums do not feel completely at ease in the museum sector, but they do not feel completely at ease in the university either. As the previous chapter demonstrated, the literature is replete of inherent dilemmas resulting from this divide. University museum terminology is full of signs of this divide. Murphy (2003: 13) explained that university museums and collections are susceptible to "multiple schizophrenic dangers" resulting from a simultaneous displacement between "their own practices and more progressive museological standards generally" on the one hand and "the professional duty and the momentum of academic environment which may have little to do with collections". University museum curators speak of *égarement*, even disaffection. Anders Ödman, former Director of the History Museum of the University of Lund, Sweden, explained: "[...] the basic problem is that the museum comes under the Ministry of Education rather than the Ministry of Culture. We are playing in the wrong league"[177]. Many museums try to cope and combine the better of two worlds, but the divide is often too deep.

Universities are big. Museums and collections may be considered the 'jewels of the crown' in speeches delivered on solemn occasions, but they come low in the university's list of priorities – there are salaries of professors and researchers to pay, the running costs of buildings, the maintenance and improvement of laboratories and classrooms, building and expansion, investment and development, pharmaceuticals for the academic hospital, students grants. Museums and collections need to compete permanently with all of this. One curator put it this way: "[...] I have the impression of being a tennis player lost in the middle of a rugby team"[178]. More than the struggle, it is the constant awareness of the smallness – even frivolity, like 'jewels' are at times – that often makes university museums and collections so vulnerable and lost. That is why relevance for the university is crucial for collections. Relevance brings resources, but more importantly, relevance removes the feeling of being permanently at the mercy of a rector's or a dean's budgetary discretion, relevance brings recognition and visibility, relevance brings stability, autonomy and meaning.

[177] A. Ödman in *Bulletin of the European Museum Forum* (January 2001). Accessed 4 June 2001, in stars.coe.fr/museum/bulletin_e.htm.
[178] Anonymous museum curator, quoted in Weeks (2000: 10).

The divide between two worlds and the identity problem are in many ways recent. Until 50 years ago and despite the fact that resources were probably always scarce, university museums were full members of both the museum world and the university world. Their practices were in tune both with museological standards of the time and with the academic momentum. Many followed the triple mission – teaching, research and public display – but many others only did research or teaching and it was just as acceptable. By the mid-20th century, relevance for teaching and research appears to have gradually become questioned. Science evolved, research and teaching evolved, the university evolved. Research policies and funding changed and century old bonds began to break down. University museums and collections felt lost, without a voice. Many searched for an identity in the museum sector, only to discover that museums in general had changed considerably as well. The expectations of the public and society had also changed. This aggravated the sense of isolation. University collections are out of pace with their universities, with the museum sector at large and with contemporary society.

In the recent past, university museums have too often stood with both feet in the 'museum world', aligning their missions, their public, their identity, even their history, with non-university museums. Indeed, many university museums preferred to think of themselves as one more link in the long chain of museums of science, science centres and the like. There was the director of a high profile university art museum in Europe who, in the 1970s, was convinced that the projection of a credible public image was incompatible with being a university museum. In the words of a curator who shared the experience "at least publicly, he [the director] did not want to have anything to do with the university, to the point of removing all references to the university from letters, stationery, posters and business cards" (Anonymous, *pers. comm*. 2002). This is a legitimate, perhaps understandable, position, but one that not only denies an extraordinary historical legacy but also compromises the biggest strength of university museums. Most likely, these examples are less common today, as there is an increased awareness of the significance of university collections – still moderate but growing.

Tensions pulling in many different directions are not necessarily negative. It is crucial to leave the rhetoric of divides, divorces and impenetrable compartments behind and move forward. More than being divided between two worlds, university museums and collections are *at the intersection* of two worlds, which in elementary mathematics simply means that they integrate elements shared by both, resulting in a distinct and unique entity.

Belonging to two worlds may be a source of tensions, yet paradoxically it is precisely where the identity of university museums and collections lies. Museums are being created everyday and everywhere and it is pointless to imitate them. Being a museum in a university is all too easy and so is being a museum of a university or a museum for a university. The challenge is to discover what it means to be *a* university museum and *a* university collection today. This is *the* dilemma university museums and collections are facing. The rest – institutional visibility, recognition, professional standards, staff profiles and careers, audiences, resources – depends on how university museums and collections resolve this dilemma, strike an integrated balance between the two worlds and define their role in contemporary society. Most likely, the key lies in the artefacts, objects and specimens and the stories that these can tell – to researchers, to students and the general public of today and tomorrow.