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THE EXPERIENCE OF RESEARCH, TEACHING AND SCIENTIFIC PROMOTION OF THE MUSEUM OF HUMAN ANATOMY «FILIPPO CIVININI» OF THE UNIVERSITY OF PISA

Abstract - Together with other museums, since 1982 the Museum of Human Anatomy belonged to the University Museum System, which has undertaken joint initiatives for greater visibility of cultural heritage education: exhibitions, publication of books, guides and newspapers. Other activities were carried out independently to finalize more specifically some projects of the museum. Particular attention was paid to the multidisciplinary study and the recovery of principal collections (pre-Columbian mummies; Egyptian mummy with a sarcophagus, mummy of Arrighi), with the collaboration of many experts: historians, archaeologists, chemists, radiologists, physicians. The restoration has allowed the recovery of some preparations (specimens in formalin and mummies) and an ancient collection of books. These activities have resulted in teaching and promotion, publications, exhibitions and seminars, often as part of initiatives of the Regione Toscana as Amico Museo. The digital acquisition of certain preparations has resulted in interesting findings: educational products (three-dimensional models of the bones obtained with computed tomography (CT); virtual landscapes of information); participation in databases (Egyptian mummies project of the University of Ontario); visibility through a new museum site, the use of latest technologies for interactive communication (QR code). All these actions complement the more traditional media, such as paper guides and brochures. The evolution of museum activities is monitored with the help of satisfaction questionnaires and data processing on turnout of visitors.

Key words - Teaching, Promotion, Restoration, Research.

Riassunto - Ricerca, didattica e promozione scientifica nel Museo di Anatomia Umana «Filippo Civinini» dell'Università di Pisa - Insieme ad altri musei, il Museo di Anatomia Umana fa parte dal 1982 del Sistema Museale d'Ateneo con cui ha intrapreso iniziative comuni per una maggiore visibilità del patrimonio culturale universitario: mostre; pubblicazione di libri, guide e giornali. Altre attività sono state svolte autonomamente per finalizzare in modo più specifico alcuni progetti del museo. Particolare attenzione è stata rivolta allo studio multidisciplinare e al recupero delle principali collezioni (mummie e corredi funerari precolombiani; mummia egizia con sarcofago; mummia di Arrighi), con la collaborazione di molti esperti: storici, archeologi, chimici, radiologi, medici. Il restauro ha permesso il recupero di alcune raccolte (preparati in formalina e mummie) e di un antico fondo librario. Queste attività si sono tradotte in didattica e divulgazione, sotto forma di pubblicazioni, mostre e seminari scientifici, spesso nell'ambito di iniziative della Regione Toscana, come Amico Museo. La digitalizzazione di alcuni preparati ha permesso di ottenere risultati interessanti: prodotti didattici (modelli tridimensionali delle ossa ottenuti con tomografia computerizzata (TC); paesaggi virtuali d'informazione); partecipazione a banche dati (progetto mummie egizie dell'Università dell'Ontario); visibilità attraverso un nuovo sito museale; uso delle più moderne tecnologie di comunicazione interattiva (QR code). Tutte

queste iniziative integrano i mezzi più tradizionali, come guide cartacee e depliant. L'evoluzione delle attività museali sono monitorate con l'ausilio di questionari di gradimento e con l'elaborazione dei dati sull'affluenza dei visitatori.

Parole chiave - Didattica, Divulgazione, Restauro, Ricerca.

THE MUSEUM AND ITS COLLECTIONS

The University of Pisa was officially established in 1343, although a number of scholars claims its origin dates back to the 11th century (Del Tacca, 2000). The papal bull *In supremae dignitatis*, granted by Pope Clement VI on September 3rd 1343, recognized the *Studium* of Pisa as a *Studio Generale Pisano* an institution of further education founded or confirmed by a universal authority. Pisa was one of the first European universities that could boast this papal attestation, which guaranteed the universal, legal value of its educational qualifications.

A big revolution in the anatomical studies occurred with Andreas Vesalius and his *De humani corporis fabrica*; in 1542 he came in Pisa to give some anatomical lectures. Cosimo I also built the first anatomical theatre in Via della Sapienza, at the ground floor of a house adjoining the Church of Santa Maria Vergine.

After Andreas Vesalius many others important doctors, such as Realdo Colombo (1545-1548), Gabriello Falloppia (1548-1551), Lorenzo Bellini (1668-1703), Paolo Mascagni (in 1800), Filippo Civinini (1835-1842) and Filippo Pacini (1844-1846), held regular courses of human anatomy in Pisa.

This long academic tradition gave strong bases to the creation of an Anatomical Museum in Pisa; at the end of the 18th century also political reasons brought to the creation of a Museum, as also cities smaller than Pisa already had medical collections. Hence, in 1829 Tommaso Biancini opened the *Gabinetto Anatomico* in the new buildings of the *Stabilimenti Anatomici*. His successor, Filippo Civinini, continued to increase the anatomical collections and, a few years before the first Conference of Italian Scientists – held in Pisa in 1839 –, Civinini inaugurated the museum and adopted an al-

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bum to record visitors' comments. In 1842 he commemorated the establishment of the museum with a marble inscription, dictated by Giuseppe Cantini, and published also a history of the Museum since its opening, with an index of the collected objects (Civinini, 1841). To date, the museum houses about 3,400 items and includes not only descriptive and topographic anatomy preparations, but also archaeological collections (Egyptian and pre-Columbian mummies).

The anatomical collections include numerous osteological preparations: whole skeletons, individual bones with many interesting varieties, fetal skulls for the study of embryology, bones of various colors for practical demonstrations. Some skulls, of historical and cultural interest, are the *phrenological maps* dating to the period in which anthropology and criminology were in vogue.

The section of *angiology* boasts a considerable number of preparations on the heart and blood vessels. The angiologic preparations are of various sizes, but those that affect the curiosity of the observer are the *anatomical statues*, placed in special showcases. They have the main purpose to show the structures of the cardiovascular system. The statues show many anatomical varieties, by number, size and topographical arrangement, some of which very rare.

The section of *splanchnology* is conspicuous: there are widely represented different sections of the digestive, respiratory, nervous and urogenital systems. Numerous preparations, showing entire organs or parts thereof, are kept in special pots with alcohol or formalin. Many anatomical models are made from various materials: wax, papier-mâché and plaster for the older, plastic for the latest. There are several plaster casts of brains or skulls. A wax model of the human body is a true masterpiece: the skull is opened to show the hemispheres of the brain; the chest cavity and the anterior abdominal wall are opened to show the major organs, arteries, veins and nerves. Among the embryological preparations, different models in colored wax illustrate the most significant phases of human and animal development. The most interesting papier-mâché anatomical model is represented by a general model of the human body with removable organs, made in France in 1861.

Pre-Columbian collections come from the excavations carried out between 1860 and 1870 by Carlo Regnoli and include 121 vases dating to the period between the twelfth and sixteenth centuries and attributable to different pre-Inca cultures: most of the vases belong to the *Chimu* and *Chanca*y cultures. Some of these vases consist of simple bowls and jars; other vases had experienced a ceremonial use, as part of funerary objects, with anthropomorphic (heads of priests), zoomorphic (monkeys, snakes, cats, parrots) or phytomorphic (pepino fruits, ears of corn) representations. In five cases

there are other finds including pre-Columbian skulls, funerary objects (utensils, bowls, textiles, other vegetable remains). Two mummies are well preserved and have a typical fetal attitude, eloquent symbolism of fertility and fecundity; one of the mummies has also an artificially deformed skull.

Among the various mummies owned by the museum, two are Egyptian. One of them is still contained in its original sarcophagus, painted in vivid colors.

In 2005 the museum was given a mummy of the first half of the nineteenth century from the Hospital of Livorno. This mummy was obtained by embalming the corpse of Gaetano Arrighi, born in Arezzo in 1789. Arrighi was forty years old when he died and his body was not required, then he was subjected to the embalming process performed by the method of Giuseppe Tranchina (Ciranni *et al.*, 2005).

Other important finds, of great historical and artistic value, are displayed in two large galleries: the Mascagni's Gallery and the Gallery of Busts.

Along the Mascagni's Gallery, a valuable series of anatomical plates by Paolo Mascagni, who taught anatomy at Pisa in 1800, are exposed (Fig. 1). Besides the eight plates that depict the life-size human figure, there are twenty other plates that represent the viscera of the body cavities. The work was edited between 1823 and 1831, printed by Nicola Capurro, and posthumously released on the initiative of Andrea Vaccà Berlinghieri, Giacomo Barzellotti and Giovanni Rosini, friends and colleagues of Mascagni.

In the Gallery of Busts there are six plaster busts of distinguished scientists, naturalists and anatomists, who lived between the sixteenth and nineteenth centuries: Andreas Vesalius, Realdo Colombo, Lorenzo Bellini, Filippo Pacini, Bartolomeo Eustachio and Gaspare Aselli.



Fig. 1 - The Mascagni's gallery: two anatomical plates depicting the surface of the human body: front and rear view and viscera details.

A rich historical library, with numerous scientific journals and ancient books and atlases of anatomy, completes the heritage of the museum.

This set of collections, which appears heterogeneous, is the mirror and the legacy of eighteenth-century *Wunderkammern*, where everything that could surprise and amaze scholars and collectors of that time was gathered and proudly exposed.

After occupying a single room on the upper floor of the *Stabilimenti Anatomici*, the museum was transferred to the new School of Medicine and Surgery – inaugurated in 1874 – where it is still housed (Fig. 2). Considering that the School of Medicine and Surgery is about 50 m from the famous leaning tower and just beside the botanical garden, the touristic possibilities of the museum should be more appropriately exploited. In this respect, we are attempting to promote the visibility and the accessibility of the collections according to the modern technologies and to enter the museum for touristic tours.



Fig. 2 - The room «Pietro Duranti» of the museum.

ACTIVITIES AND PROJECTS OF THE MUSEUM

Since 1982, the Museum of Human Anatomy is part of the *Sistema Museale d'Ateneo* which has undertaken joint initiatives for greater visibility of cultural heritage education. In this respect, in 1999, the important exhibition *I musei e le collezioni dell'Università di Pisa nel 1999* was organized and hosted in Pisa at the historical Palazzo Lanfranchi to show the best preparations of all the scientific museums of the university. Our museum participated with the Egyptian mummies, some Mascagni's plates and anatomical preparations (Natale, 1999). In line with this, an elegant and precious book was also published to fully illustrate the history and the collections of the university muse-

ums (Natale, 2002) and a pocket bilingual guide is also available (Museo di Anatomia Umana, 2000). Furthermore, since 2000, a six-monthly journal – *Musei dell'Università di Pisa* – reports events and news of each museum.

Other activities were carried out independently on the *Sistema Museale d'Ateneo* and relate more specifically to some projects of the museum. In particular, in a field of research and analysis on its own heritage, the Museum has treated over the years various scientific works. The Egyptian collection has been extensively studied (Silvano, 2000; 2007). In particular, it has been published a study on the chemical characterization of the balms of mummification of Egyptian mummies and pictorial materials of the sarcophagus (Colombini *et al.*, 2007); also, for preservation and research, one of the two Egyptian mummies was subjected to a newly computed tomography (CT) that detected the absence of effective internal organs and some signs of evisceration process (Caramella *et al.*, 2007) (Fig. 3). In 2011, the digital images of the mummy joined the *IMPACT Radiology Mummy Database* of the University of Western Ontario, Canada.

With the collaboration of different teams of archaeologists and scholars, the collection of pre-Columbian artifacts is currently under study, so as to obtain more information on cultural and anthropological aspects of Peruvian cultures (Carla, 1990; Trebbi Del Trevigiano, 2004; Natale *et al.*, 2006; Paparelli *et al.*, 2011).

In order to save and preserve the collections, the restoration activity is also present in the museum with the collaboration of expert teams. Accordingly, the plaster busts have been cleaned and repaired. The mummy of Arrighi, seriously damaged, has been completely restored. On this mummy X-ray and imaging analyses have been also carried out for palaeopathological studies (Ciranni *et al.*, 2005). It is also in progress a 3D laser scan for educational purposes.



Fig. 3 - The Egyptian mummy during CT scan.

Furthermore, the museum realized 3D models of various bones after CT for student learning.

As far as the promotion and the increase in public engagement are concerned, the museum has an ongoing series of activities, including the participation to exhibitions and seminars, not only in the context of local initiatives, such as *Amico Museo*, sponsored by Regione Toscana, but also joining the national *Settimana della Cultura*, or international conferences, such as the PCST (*Public Communication of Science and Technology*) 2012 (Scucces *et al.*, 2012).

Among the most recent activities of the Museum, it is worth mentioning the edition of the new bilingual guide (Natale & Lenzi, 2012), brochures, and other materials intended also to the diffusion of information. Furthermore, a new and up-to-dated history of the museum and its collections has been published in a prestigious book dealing with the history of medicine in Pisa (Natale & Paparelli, 2006). In particular, the new technologies entered the management of the museum to increase the use and communication of the collections. In this respect, the new institutional website (<http://www.med.unipi.it/museoanatomia/>) has been improved and completely restyled. An early work focused on the development of *Information Landscapes* (IL) or 3D IL where texts and images are organized in chronological order. On the occasion of the celebration of the unification of Italy, for example, a special landscape was set up for highlighting some of the moments of that period when the museum was given the numerous pre-Columbian archaeological finds (Fig. 4).

Another important activity included the preparation of additional data, based on the *QR code* system which, by means of a special code located inside the museum, will benefit from further information and multimedia content on the collections.

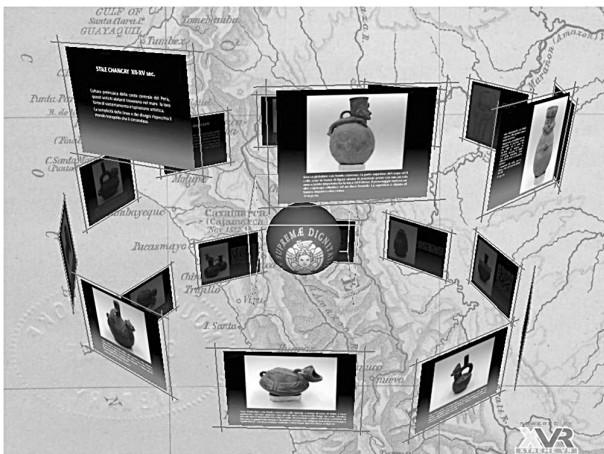


Fig. 4 - The Information Landscape: a detail of the pre-Columbian vases interactive catalogue.

The museum also lent some items to other exhibitions, such as some Mascagni's plates to *Sovrani nel giardino d'Europa, Pisa e i Lorena* held in 2008 at the Palazzo Reale of Pisa (Coppini & Tosi, 2008), or various anatomical preparations to the Museum of Veterinary Medicine of Pisa in *La 33^a Settimana delle Piagge*, in 2012. The museum also held exhibitions in the School of Medicine, where it is located. One of the most important is *Anatomia in mostra*, in 2010, where some precious and ancient anatomical books of the museum library were exposed after an accurate restoration. Information about book restoration – also exposed and discussed in special seminars – and some digitalized anatomical atlases were available on a special website (<http://www.bib.med.unipi.it/tesori/>) dedicated to the exhibition.

The museum not only is deeply connected to the university and scientific research, but it also cooperates and participates to private and local events. A concrete example of this activity was the exhibition held in 2010 in the Sala Brunelleschi of the Palagio di Parte Guelfa in Florence. Here, some skeletons of the museum were used by the original designer Maja Vukojicic as exceptional dummies for her clothes.

Finally, at the end of each visit, visitors are invited to sign the register book which allows evaluating influx and comments, and also to answer a short written questionnaire (bilingual) which allows having a useful feedback on specific museum criticisms.

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