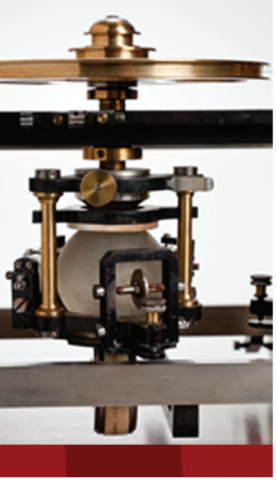

XXXI Symposium of the Scientific Instrument Commission

Rio de Janeiro, Brazil
08 - 12 October 2012

Book of Abstracts

Scientific Instrument Commission

MUSEU DE ASTRONOMIA E CIÊNCIAS AFINS

SIC 2012

XXXI Symposium of the Scientific Instrument Commission

International Conference

BOOK OF ABSTRACTS

Museum of Astronomy and Related Sciences

08-12 October 2012

MAST main building (Photo: Durval C. Reis)

Organization:
Museum of Astronomy and Related Sciences (MAST)
Scientific Instrument Commission (SIC)

With the Collaboration of:
Museu Nacional (UFRJ)
Museu Histórico Nacional (IBRAM/Minc)
Museu Imperial (IBRAM/Minc)
Observatório do Valongo (UFRJ)
Associação dos Arquivistas Brasileiros (AAB)
Sociedade Brasileira de História da Ciência (SBHC)
Observatório Nacional (ON)

Organising Committee:
Marcus Granato, CMU/MAST
Marta Lourenço, MCUL/CHC
Paolo Brenni, SIC/CNR/Fondazione Scienza e Tecnica, Florence
Sara Schechner, SIC/Harvard University
Christina Helena Barbosa, CHC/MAST
Marcio Ferreira Rangel, CMU/MAST
Ethel Handfas, FINEP

Scientific Committee:
David Pantalony, Canada Science and Technology Museum
Jim Bennet, Museum of the History of Science, Oxford/England
Magali Romero Sá, Casa de Oswaldo Cruz-FIOCRUZ, Rio de Janeiro/Brazil
Marcus Granato, CMU/MAST
Marta Lourenço, MCUL/CHC
Paolo Brenni, CNR/Fondazione Scienza e Tecnica, Florence
Richard Kremer, Dartmouth College
Sara Schechner, Harvard University
Silke Ackermann, British Museum, London/ England

Museums & Collections: Acknowledgements:
Museu Nacional (UFRJ)
Museu Histórico Nacional (IBRAM/Minc)
Observatório do Valongo (UFRJ)
Museu Imperial (IBRAM/Minc)

Sponsors:
CNPq - Conselho Nacional de Desenvolvimento Científico e Tecnológico
FAPERJ - Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro

Contents

Invited Speakers

Welcome Note
Use and circulation of scientific instruments

Silvia Figueirôa is geologist from the University of São Paulo (1981), and got her Master Degree (1987) and Ph.D. (1992) in Social History from the University of São Paulo, both in the specialty of the History of Science. She received the Habilitation in 2001 at the University of Campinas (UNICAMP), where she became full professor in 2006. Her postdoctoral studies were at the Centre Alexandre Koyré d'Histoire des Sciences et des Techniques (France, 2002). Since 1987 she teaches at the Institute of Geosciences, (State University of Campinas - UNICAMP), where she currently holds the position of Director (2009-2013). She has experience in history, with emphasis on the History of Science, as well as on the thematic of scientific archives, acting on the following topics: History of science and geosciences, with emphasis on Brazil; relationships between history of science and education; scientific documentation / technology. She is active in undergraduate and postgraduate levels supervising undergraduate, master, and Ph.D. students.

Conference 1
The 'Instrument of the Indies'. Lunar Eclipses and Longitude in the 16th c. Spanish Empire

María Portuondo graduated in electrical engineering from the University of Miami, Florida, and got her Ph.D. in History of Science and Technology from The Johns Hopkins University. She is currently Assistant Professor at Johns Hopkins University and recently received the John E. Fagg prize from the American Historical Association for the best book of History of Spain, Latin-America and Portugal. She has also published papers in national and international journals and obtained twenty-five patents in semiconductor packaging design, computer architecture and electronic connectors awarded in the United States.

Conference 2
Mr. Miller goes to Europe: gravity instruments and expertise in circulation 1920-1939"

Katharine Anderson graduated in History and English Literature from the McGill University (1986), got her M.A. degree in History from the University of Massachusetts/Amherst (1988), and PhD in History (1994) from the Northwestern University. She is currently Associate Professor in the Science and Technology Studies Program, Division of Humanities, Arts Faculty, York University. Publications include Predicting the Weather (Chicago, 2005), articles on observation practices in meteorology and oceanography in the nineteenth and early twentieth century, and most recently an annotated edition of the captains' narrative of the surveying voyages of HMS Adventure and Beagle 1826-36 (Pickering and Chatto, 2011). Her current book project is on oceanography in the 1920s and 1930s but an interest in the earth sciences, travelling and scientific instruments have combined in a project on Miller and the torsion balance. She is active in undergraduate and postgraduate teaching in science and technology studies.

Conference 3
Charting the Empire. Enlightened Visions and Reified Theorems in Eighteenth-century Spanish Scientific Expeditions

Juan Pimentel Igea graduated in Geography and History from the Universidad Complutense de Madrid (1987), and got his Ph.D in Geography and History from the same University (1994). His postdoctoral studies were at the Université Paris III (1994); at the Dept. of History and Philosophy of Science, from the University of Cambridge (1994-1996) and at Centro de Ciencias Humanas y Sociales (CSIC) from the Madrid Autonomus Region (2000-2001). He is currently Tenured Scientist at the CSIC since 2006 and coordinates research projects in the areas of History of Science; Science & Culture in the Early Modern Age; Scientific explorations & travel literature; Globalization & imperial dynamics of science. He has also published books and papers in national and international journals.

PROGRAMME

Monday, 08 October

08.30 - Buses to MAST

09.00 - Registration | Welcome coffee

10.00 - Opening Session - [National Observatory Auditorium]
Marco Antonio Raupp, Ministry of Science, Technology and Innovation
Maria Margaret Lopes, Director, Museum of Astronomy and Related Sciences/MCTI
Paolo Brenni, President, Scientific Instrument Commission
Marcus Granato, Chair SIC 2012, Museum of Astronomy and Related Sciences/MCTI

10.30 - Welcome Note - [National Observatory Auditorium]
Use and circulation of scientific instruments - Silvia Figueirôa (UNICAMP/Brazil)
Chair: Maria Margaret Lopes (MAST)

12.00 - Lunch

Session 1 (plenary) – Instruments at the Heart of Global and National Politics
Chair: Paolo Brenni, Fondazione Scienza e Tecnica, Italy
[National Observatory Auditorium]

13.20 - Magnificent Instruments for a Magnificent King: mathematical instruments in the library of João V, Lisbon | Luís Tirapicos, Centre for the History of Science, University of Lisbon

13.40 - Instruments in Transit - The Santo Ildefonso Treaty and the Brazilian Border Demarcations
Isabel Malaquias, University of Aveiro

14.00 - Between Education and Politics: the transfer of the 'Ajuda Royal Cabinet of Physics' from Lisbon to Rio (1810-1812)
Marta C. Lourenço, Museums of the University of Lisbon
Samuel Gessner, Centre for the History of Science, University of Lisbon
David Felismino, Museums of the University of Lisbon

14.20 - Province Engineers and the Use of Scientific Instruments during the Construction Process of Bridges and Roads in Minas Gerais (1835-1889)
Télio Cravo, University of São Paulo (Social History Postgraduate Program)

14.40 - The Use of the Laussedat's Phototheodolite in Brazil-Argentina Border in the Early Twentieth Century
Bruno Capilé, Museum of Astronomy and Related Sciences
Moema de Resende Vergara, Museum of Astronomy and Related Sciences

15.00 Discussion (30 min)

15.30 Coffee-Break

Session 2 (plenary) – Instruments Across the Atlantic: Astronomy instruments and astronomical observatories
Chair: Marta Lourenço, Museums of the University of Lisbon, Portugal
[National Observatory Auditorium]

16.00 - Telescopes in Colonial & Federal America, 1620-1820
Sara Schechner, Harvard University

16.20 - America's Earliest Astronomical Institution: Georg Marcgraf's Observatory in Dutch Brazil (1638-1643) A. The setting, building, instruments, usage and importance
Oscar Toshiaki Matsuura, Museum of Astronomy and Related Sciences

16.40 - America's Earliest Astronomical Institution: Georg Marcgraf's Observatory in Dutch Brazil (.1638-1643) B. Recife's astronomical instruments and their relation with Marcgraf's earlier training at Leiden Observatory
Huib J. Zuidervaart, Huygens Institute for the History of the Netherlands

17.00 - Heaving a Little Ballast: seaborne astronomy in the late-eighteenth century
Richard Dunn, Royal Museums Greenwich

17.20 - Discussion (30 min)

17.50 - Visit to MAST | Marcus Granato, MAST, MCTI

19.30 - Welcome Cocktail

20.30 - Buses to Catete

Tuesday, 09 October

08.30 - Buses to MAST

Session 3 (plenary) – Instruments Across the Atlantic: An overview of exchanges through time
Chair: Sara Schechner, Harvard University, USA
[National Observatory Auditorium]

09.30 - Between America and Europe: medical-surgical knowledge in transit (seventeenth and eighteenth century)
Roberto Poletto, UNISINOS (Postgraduate Program)

09.50 - The Use of Useless Instruments: The gnomonic inventions by V. Estancel (S.J.) in transit through the Portuguese empire (1650 - 1680)
Samuel Gessner, Centre for the History of Science, University of Lisbon

10.10 - Scientific Instruments in the Eighteenth Century Philosophical Travels
Alex Varela, Museum of Astronomy and Related Sciences

10.30 - Scientific Instruments Across the Atlantic Ocean: their identification and cultural symbologies in Rio de Janeiro according to Brazilian literature and journalistic reports (1850-1930)
Ricardo M. Figueiredo Filho, Federal University of Minas Gerais (History Postgraduate Program)

10.50 - On Creating International Markets for American Scientific Instruments in the Nineteenth Century
Richard L. Kremer, Dartmouth College

11.10 - Discussion (30 min)

11.40 - Group Photo (MAST main historical building)

12.00 - Lunch

13.30 - Buses to technical visit 1

14.00 - Visit to Museu Nacional
Claudia Rodrigues Carvalho and Luiz Fernando Duarte

15.30 - Buses to technical visit 2

16.00 - Visit to Museu Histórico Nacional – MHN
Vera B. Tostes and Beatriz Caldeira

18.00 - Buses – return to Catete

Wednesday, 10 October

08.30 - Buses to MAST

09.30 - Conference 1 [MAST Auditorium]
The 'Instrument of the Indies'. Lunar Eclipses and Longitude in the 16th c. Spanish Empire
María Portuondo, Johns Hopkins University, USA
Chair: Christina Barboza, Museum of Astronomy and Related Sciences, Brazil

10.30 - Discussion (30 min)

Session 4 - Instruments and Collections Studies I
Chair: Marcio Rangel, Museum of Astronomy and Related Sciences, Brazil
[MAST Auditorium]

11.00 - The So-Called “Chaucer Astrolabe”: the Italian tale of a medieval English instrument
Giorgio Strano, Museo Galileo

11.15 - The Role Played by Mathematical Instruments in Renaissance Music Treatises
Carla Bromberg, Simão Mathias Center of Studies in History of Science, Pontifical Catholic University of São Paulo

11.30 - Between Natural and Artificial: the nature of the distillation apparatuses in sixteenth century natural magic
Fumikazu Saito, Pontifical Catholic University of São Paulo

11.45 - Knowing and Doing Mathematics in the Seventeenth Century: a preliminary study on John Browne’s triangular quadrant
Ana Rebeca Miranda Castillo, Pontifical Catholic University of São Paulo
Fumikazu Saito, Pontifical Catholic University of São Paulo

12.00 - And Then There Were None: a review of John Dee’s scientific instruments and their subsequent disappearance
Louise Devoy, British Museum

12.15 - Discussion (30 min)

Session 5 - Teaching Cabinets: instruments and the history of education (Parallel Session)
Chair: Peter Heering, University of Flensburg, Germany
[Graduate Classroom (MAST building)]

11.00 - The Collection of Scientific Instruments of the Colégio Marista Arquidiocesano Museum in São Paulo | Katya Mitsuko Zuquim Braghini, School of Education, Federal University of Minas Gerais

11.15 - The Set of Physics Teaching Instruments at Pedro II High School, Rio de Janeiro, Brazil
Marcus Granato, Museum of Astronomy and Related Sciences
Liliane Bispo dos Santos, Museum of Astronomy and Related Sciences

11.30 - Materials for Sciences' Teaching in Brazil: the case of Culto à Ciência high school of Campinas/São Paulo State, Brazil - 1899/1902
Reginaldo Meloni, São Paulo Federal University

11.45 - Scientific instruments in the Teaching of Physics in Brazilian Secondary Schools from 1931 to 1961 | Maria Cristina de Senzi Zancul, São Paulo State University (UNESP)
Elton de Oliveira Barreto, São Paulo State University (Master course in School Education)

12.00 - The Electrostatic Machines in the UFRJ Polytechnic School Museum
Antonio Carlos Moreirão de Queiroz, Polytechnic School, Federal University of Rio de Janeiro

12.15 - Preserving the Scientific and Technical Heritage of Education: the 'ASEISTE'
Francis Gires, Association de Sauvegarde et d'Etude des Instruments Scientifiques et Techniques de l'Enseignement
Pierre Lauginie, Université Paris-Sud

12.30 - Discussion (30 min)

13.00 - Lunch

Session 6 – Instruments and Collections Studies II
Chair: Maria Lucia de Niemeyer M. Loureiro, MAST, Brazil [MAST Auditorium]

14.00 - Photographing Microscopic Preparations in the Nineteenth Century: techniques and instrumentation
Maria Estela Jardim, Centre for Philosophy of Science, University of Lisbon
Marília Peres, Centre for Molecular Sciences and Materials, University of Lisbon

14.15 - The Trajectory of the Telescope T. Cook & Sons in teaching and research in the Valongo Observatory
Maria Alice Ciocca de Oliveira, Valongo Observatory, Federal University of Rio de Janeiro
Rundsthen V. Nader, Valongo Observatory, Federal University of Rio de Janeiro

14.30 - The Gas Chromatograph - Trajectory of Chromatography in Brazil
Valeria Freitas, Museum of Astronomy and Related Sciences
Marcio Rangel, Museum of Astronomy and Related Sciences

14.45 - How Experiments Drag on – An Analysis of Pieter Zeeman's Apparatus for Measuring the Fizeau-Effect in Solids at the Museum Boerhaave, Leiden
Beto Pimentel, Federal University of Rio de Janeiro
Ad Maas, Museum Boerhaave

15.00 - Drummond Light, Limelight
Pierre Lauginie, Université Paris-Sud
Francis Gires, Association de Sauvegarde et d'Etude des Instruments Scientifiques et Techniques de l'Enseignement

15.15 - Surveying Results of Sets and Collections of Artifacts Related to Brazilian Federal Universities
Marcus Granato, Museum of Astronomy and Related Sciences
Elias da Silva Maia, Museum of Astronomy and Related Sciences
Fernanda Pires Santos, Museum of Astronomy and Related Sciences
Glória Gelmini de Castro, Federal University of the State of Rio de Janeiro (Museology undergraduate course)
Mariana S. Damasceno, Federal University of the State of Rio de Janeiro (Museology undergraduate course)

15.30 - Discussion (30 min)

Session 7 – Scientific Instruments and the Understanding of Scientific Ideas (Parallel Session)
Chair: Adriana Mortara, History Museum of Instituto Butantan, Brazil
[Graduate Classroom (MAST building)]

14.00 - Benjamin Martin: itinerant lecturer of Newtonian natural philosophy and scientific instrument maker in eighteenth-century England
Luiz Carlos Soares, Fluminense Federal University

14.15 - Balancing Light and Heat – Rumford's Experiments with the Thermoscope and the photometer
Peter Heering, University of Flensburg

14.30 - Scientific Objects and the Perception of Historical Time
Ricardo Aguiar Pacheco, Federal Rural University of Pernambuco

14.45 - Filming Nineteenth Century Physics Demonstrations with Historical Instruments
Paolo Brenni, Fondazione Scienza e Tecnica

15.00 - Stepping into the Past to Understand Time: explorations with astrolabes, clocks, and observation
Elizabeth Cavicchi, Edgerton Center, MIT

15.15 - The Good, The Bad and The Pretty: diffraction gratings in museums
Tacye Phillipson, National Museums Scotland

15.30 - Discussion (30 min)

16.00 - Coffee-Break

16.30 Conference 2
Mr. Miller goes to Europe: gravity instruments and expertise in circulation 1920-1939"
Katharine Anderson, York University, Canada
Chair: Richard Kremer, Dartmouth College, USA
[MAST Auditorium]

17.30 - Discussion (30min)

18.00 - Laboratorio Museotecnico Goppion and Museo Galileo presentations
The museum display case as an instrument of conservation and communication
Andrea Sartori (Goppion)
Presentation of the Book: "Displaying Scientific Instruments: From the Medici Wardrobe to the Museo Galileo" | Filippo Camerota, Museo Galileo

18.30 - Poster session
Complete list of posters at the end of the Programme

19.00 - Cocktail by L. M. Goppion

20.00 - Sky Observation through historical telescope

20.30 - Buses – return to Catete

Thursday, 11 October

08.30 - Buses to MAST

09.30 - Conference 3 [MAST Auditorium]
Charting the Empire. Enlightened Visions and Reified Theorems in Eighteenth-century Spanish Scientific Expeditions
Juan Pimentel Igea, Centro de Ciencias Humanas y Sociales, Consejo Superior de Investigaciones Científicas, Spain
Chair: Giorgio Strano, Museo Galileo, Italy

10.30 - Discussion (30min)

Session 8 - Around Museums and Scientific Heritage: instrument preservation and display I
Chair: Tacye Phillipson, National Museums Scotland
[MAST Auditorium]

11.00 - Museum Boerhaave: from junk to (almost) triple A
Hans Hooijmaijers, Boerhaave Museum

11.15 - Musealization of Science & Technology Objects
Maria Lúcia de Niemeyer M. Loureiro, Museum of Astronomy and Related Sciences
Liliane Bispo dos Santos, Museum of Astronomy and Related Sciences
Flávia B. Araújo da Silva, Federal University of the State of Rio de Janeiro (Museology undergraduate course)
Mariane Aparecida N. Vieira, Federal University of the State of Rio de Janeiro (Museology undergraduate course)

11.30 - Museum Collection of Health: the case of Oswaldo Cruz Foundation
Pedro Paulo Soares, Museum of Life, Oswaldo Cruz House
Inês Santos Nogueira, Museum of Life, Oswaldo Cruz House

11.45 - An Outlook of the Collection of Scientific Instruments of the Museu Dinâmico de Ciência e Tecnologia-UFJF (Brazil)
Patricia M. Mendes, Federal University of the State of Rio de Janeiro (Museology and Heritage Master Course)
Marcio Rangel, Museum of Astronomy and Related Sciences
Paulo Noronha, Museum of Astronomy and Related Sciences

12.00 - Scientific heritage in Brazil. Surveying Results of Sets and Collections of Artifacts Related to the Exact Sciences and Engineering
Marcus Granato, Museum of Astronomy and Related Sciences
Elias da Silva Maia, Museum of Astronomy and Related Sciences
Fernanda Pires Santos, Museum of Astronomy and Related Sciences

Glória Gelmini de Castro, Federal University of the State of Rio de Janeiro (Museology undergraduate course)
Mariana S. Damasceno, Federal University of the State of Rio de Janeiro (Museology undergraduate course)

12.15 - Instruments of Science and Technology: critical perspective of mutual relations
Renata Monteiro, Federal University of Rio de Janeiro ('Science and Health Education' Postgraduate Program)

12.30 - Discussion (30 min)

Session 9 - Scientific Instruments as Sources for the History of Research (Parallel Session)
Chair: Richard Dunn, Royal Museums Greenwich, UK
[Graduate Classroom (MAST building)]

11.00 - History of the Geo Measure Lab "Theodoro Sampaio" (LGTS) of the Polytechnic School of the Federal University of Bahia (UFBA): the formation and challenges of a university collection
Ana Regina T. F. Teles, Polytechnic School, Federal University of Bahia
Rimara M. Santos, Federal University of Bahia (Museology undergraduate course)

11.15 - Butantan Institute's First Electron Microscope
Adriana Mortara Almeida, History Museum of Butantan Intitute

11.30 - Materializing Physics in Mexico with Cosmic Rays Instruments
Adriana Minor Garcia, Universidad Nacional Autónoma de México (Postgraduate Program in History and Philosophy of Science)

11.45 - The Old Laboratory of the Instituto de Psicologia: from scientific legitimation to the foundation of an institution
Josiane Pawlowski, Psychology Institute, Federal University of Rio de Janeiro (UFRJ)
Guilherme M. B. Souza, UFRJ (Psychology undergraduate course)
Érika G. Ambrósio, UFRJ (Psychology undergraduate course)
Hugo Leonardo R. S. da Rosa, UFRJ (Psychology undergraduate course)
Rebeca Bartolote da Silva, UFRJ (Psychology undergraduate course)
Júlia Matos da Fonseca, UFRJ (Psychology undergraduate course)
Flávia Carolina S. Gomes, UFRJ (Psychology undergraduate course)
Arthur Arruda Leal Ferreira, Psychology Institute, UFRJ

12.00 - Solar Observations and Solar Instruments
Eugenio Reis, Museum of Astronomy and Related Sciences
Lise Marcelino Souza, Antares Observatory, Feira de Santana State University

12.15 - Research and Documentation of Museology and Seismology: history of seismographs and its performance in Brazil
Thomas F. S. Nizio, University of Brasilia (Museology undergraduate course)
George Sand Leão A. França, Seismological Observatory, University of Brasilia

12.30 - Discussion (30 min)

13.00 - Lunch

Session 10 - Around Museums and Scientific Heritage: instrument preservation and display II
Chair: Hans Hooijmaijers, Boerhaave Museum, Holland
[MAST Auditorium]

14.00 - Legislation for the Protection of Science and Technology Heritage: the case of Brazil
Pedro Louvain de Oliveira, Fluminense Federal University
Marcus Granato, Museum of Astronomy and Related Sciences

14.15 - The Historical Scientific Instruments of Petrography, Mineralogy and Chemistry from the Museu Nacional: a heritage to be preserved, researched and exhibited
Maria Elizabeth Zucolotto, National Museum, Federal University of Rio de Janeiro
Andrea F. Costa, National Museum, Federal University of Rio de Janeiro

14.30 - 3D Digitalization of Scientific Instruments – The Case of the Bamberg Meridian Circle
Ricardo Marroquim, Department of Systems Engineering and Computer Science, Federal University of Rio de Janeiro (UFRJ)
Felipe Moura de Carvalho, UFRJ (Systems Engineering and Computer Science Postgraduate Program)
Matteo Dellepiane, Visual Computing Laboratory, ISTI-CNR
Antonio A. F. Oliveira, Computer Graphics Laboratory, UFRJ

14.45 - The Collection of Instruments at Instituto Benjamim Constant and the Constitution of a Museum for the Institution
Debora A. Rodrigues, Federal University of the State of Rio de Janeiro (PhD Museology and Heritage course)
Marcus Granato, Museum of Astronomy and Related Sciences

15.00 - Time Measurement Through Historical Scientific Instruments and Exhibits
Flávia Requeijo, Museum of Astronomy and Related Sciences
Andrea F. Costa, National Museum, Federal University of Rio de Janeiro
Maria Esther A. Valente, Museum of Astronomy and Related Sciences
Flávio F. Mendes da Costa, Museum of Astronomy and Related Sciences
Leonardo Carvalho da Silva, Museum of Astronomy and Related Sciences
T. B. Silva, Museum of Astronomy and Related Sciences

15.15 - Documenting the Theodoro Sampaio Laboratory Land Survey Collection (Department of Transportation / Polytechnic School / Federal University of Bahia – UFBA, Brazil)
Suely Moraes Ceravolo, Federal University of Bahia (UFBA)
Diana Soares de Oliveira, UFBA (Museology undergraduate course)

15.30 - Discussion (30 min)

16.00 - Coffee-Break

16.30 - Presentation of Network 'Recent Heritage of Science in Universities' (Universeum Working Group) [MAST Auditorium]
Roland Wittje, University of Regensburg, Germany
Marta C. Lourenço, University of Lisbon, Portugal

17.00 - SIC's plenary business meeting - [MAST Auditorium]

17.30 - Closing Session - [MAST Auditorium]

18.00 - Buses – return to Catete

20.00 - Buses to Real Astoria Restaurant

20.30 - Conference Dinner

Friday, 12 October

09.00 - Buses to Visit 3

09.30 - Visit to Valongo Observatory
Maria Alice Ciocca de Oliveira and Rundsthen Nader

11.00 - Buses to Petrópolis

12.30 - Arrival in Petrópolis | Lunch

14.00 - Visit to Imperial Museum
Mauricio Vicente Ferreira Júnior

16.00 - Sarau

17.00 - Coffee break

18.00 - Return to Rio de Janeiro

19.30 - Arrival in Rio de Janeiro

POSTERS

Scientific Instruments in Personal Archives: acquisition policy and technical treatment
Maria Celina Soares de Mello e Silva, Museum of Astronomy and Related Sciences

The Challenge of Scientific Collections: the Cruls commission' case
Bianca Mandarino Costa, Federal University of the State of Rio de Janeiro (Master's course in Museology and Heritage)
Moema de Resende Vergara, Museum of Astronomy and Related Sciences

Using Old Instruments for Physics Teaching in Secondary Schools in the Past and Present: focus on Newtons's tube
Maria Cristina de Senzi Zancul, São Paulo State University
Maria José P. Monteiro de Almeida, Campinas State University

The Old Sextant as an Object of Higher Education Today
Antonio de Campos Sachs, Laboratory of Computer Networks and Architecture, University of São Paulo
Maria José P. Monteiro de Almeida, Campinas State University
Maria Cristina de Senzi Zancul, São Paulo State University

A Unique Nineteenth Century Brass Polarizing Microscope by Nachet at the Museu Nacional/UFRJ Collection
Jeroen Meeusen, Private scholar, Belgium
Maria Elizabeth Zucolotto, National Museum, Federal University of Rio de Janeiro

The Role of the Institute for Technological Research (IPT) in Brazilian Scientific and Technological Heritage
Cristiane Alves de Sousa, Technological Researches Institute of São Paulo State
Mariana Marchesi, Technological Researches Institute of São Paulo State
Sonia Strotino, São Paulo State University

The Steam Generators of Angra1 Nuclear Power Plant: from waste to registration
Monica Penco Figueiredo, Museum of Astronomy and Related Sciences

Scientific Instruments for the Construction of Territorial Knowledge: the petrographic microscopes of the Geographic and Geological Commission of São Paulo
Maria Luiza Emi Nagai, Geological Institute of the State of São Paulo
José Maria Azevedo Sobrinho, Geological Institute of the State of São Paulo

The Geological Museum Exhibition and Geographical and Geological Commission in the State of São Paulo
José Barcellos Ramos, Valdemar Lefèvre Geological Museum,
Fernando Alves Pires, Valdemar Lefèvre Geological Museum

Agricultural Sciences from Objects: the Memorial of Federal Rural University of Pernambuco (Brazil) in 100 Years of Teaching, Research and Outreach
Bruno Melo de Araújo, Federal Rural University of Pernambuco (History Master's course)
Ricardo de Aguiar Pacheco, Federal Rural University of Pernambuco
Emanuela Sousa Ribeiro, Department of Anthropology and Museum Studies, Federal University of Pernambuco

Identification of the Collection of Scientific Instruments of the Museum of Minerals and Rocks, Federal University of Pernambuco, Brazil
Maria da Conceição S. Wanderley, Federal University of Pernambuco (Museology undergraduate course)
Tiago R. da Silva, Federal University of Pernambuco (Geology undergraduate course)
Sandra de Brito Barreto, Geology Department, Federal University of Pernambuco
Emanuela S. Ribeiro, Department of Anthropology and Museum Studies, Federal University of Pernambuco

About the Material Culture of Bell's Early Experimental Tests: an analysis of techniques and instruments (1972-1982)
Wilson Fábio Oliveira Bispo, Bahia Federal Institute of Education, Science and Technology

Conservation of the Scientific Instruments of the Museum of Minerals and Rocks, Federal University of Pernambuco, Brazil
Maria da Conceição S. Wanderley, Federal University of Pernambuco (Museology undergraduate course)
João Pedro S. Bezerra, Federal University of Pernambuco - UFPE (Geology undergraduate course)
Sandra de Brito Barreto, Geology Department, UFPE
Emanuela S. Ribeiro, Department of Anthropology and Museum Studies, UFPE

First Glimpses on the Management of the Federal University of Pernambuco Science and Technology Heritage
Arlindo Francisco da Silva Filho, UFPE (Master's course in Public Management)
Emanuela Souza Ribeiro, Department of Anthropology and Museum Studies, UFPE
Sylvana Maria Brandão de Aguiar, Department of Anthropology and Museum Studies, UFPE

Material Culture of a Secondary School: instruments for science teaching
Wanderlice da Silva Assis, University of South Mato Grosso (PhD Education Postgraduate Program)
Eurize Caldas Pessanha, Federal University of South Mato Grosso

Introducing Teaching Laboratory Equipment from Europe in a Brazilian Secondary School at the End of the Nineteenth Century
Josilandia de Oliveira Beiral, Northern Rio de Janeiro State University (Master's course on History of Education)
Silvia Alicia Martínez, Social Policy Program, Northern Rio de Janeiro State University
Fernando José Luna de Oliveira, Northern Rio de Janeiro State University

The Museum of the History of Cartography and Topography, Federal University of Pernambuco, Brazil
Heloisa Montenegro Braboza, Federal University of Pernambuco (Museology undergraduate course)
Daniel Carneiro da Silva, Department of Cartographic Engineering, Federal University of Pernambuco
Arthur Emir Clifford Valença, Federal University of Pernambuco (BSc course in History)

Initiatives for the Preservation of the Heritage of S&T at the Museum of Science and Technology, University of Ouro Preto, Brazil
Gilson Antônio Nunes, Department of Museology, Museum of Science and Technology, Federal University of Ouro Preto (UFOP)
Mercedes Estela G. Rainho, UFOP (Museology undergraduate course)
Carlos Augusto R. Jotta, UFOP (Museology undergraduate course)
Felipe Eleutério Hoffman, UFOP (Museology undergraduate course)

The Astronomical Observatory at the Federal University of Rio Grande do Sul, Brazil: the collection of instruments and a case study in restoration
Cesar Papini Araújo, Federal University of Rio Grande do Sul (Museology undergraduate course)
Claudio M. Bevilacqua, Astronomical Observatory, Federal University of Rio Grande do Sul

The Breguet Telegraph Set and the Beginning of Telegraphy in Brazil
Mauro Costa da Silva, Pedro II High School

ABSTRACTS

Session 1 (plenary) – Instruments at the Heart of Global and National Politics

Chair: Paolo Brenni, Fondazione Scienza e Tecnica, Italy [National Observatory Auditorium]

- Magnificent Instruments for a Magnificent King: mathematical instruments in the library of João V, Lisbon
Luís Tirapicos, Centre for the History of Science, University of Lisbon

- Instruments in Transit - The Santo Ildefonso Treaty and the Brazilian Border Demarcations
Isabel Malaquias, University of Aveiro

- Between Education and Politics: the transfer of the 'Ajuda Royal Cabinet of Physics' from Lisbon to Rio (1810-1812)
Marta C. Lourenço, Museums of the University of Lisbon | Samuel Gessner, Centre for the History of Science, University of Lisbon | David Felismino, Museums of the University of Lisbon

- Province Engineers and the Use of Scientific Instruments during the Construction Process of Bridges and Roads in Minas Gerais (1835-1889)
Télio Cravo, University of São Paulo (Social History Undergraduate Program)

- The Use of the Laussedat's Phototheodolite in Brazil-Argentina Border in the Early Twentieth Century
Bruno Capilé, Museum of Astronomy and Related Sciences | Moema de Resende Vergara, Museum of Astronomy and Related Sciences

MAGNIFICENT INSTRUMENTS FOR A MAGNIFICENT KING: MATHEMATICAL INSTRUMENTS IN THE LIBRARY OF JOÃO V, LISBON

L. Tirapicos

Centro Interuniversitário de História das Ciências e da Tecnologia - Universidade de Lisboa, Faculdade de Ciências, Edif. C4, Piso 1, Gab. 28, Campo Grande, 1749-016 Lisboa, Portugal
ltirapicos@museus.ul.pt

Keywords: mathematical instrument, João V, cabinet, library, baroque

Abstract

The great Lisbon earthquake of 1 November 1755 destroyed the Royal Palace of Ribeira, where King João V of Portugal (ruled 1707-1750) had established since 1721 a rich and sumptuous library. The library occupied several rooms in the third floor of the palace and, like other royal libraries in Europe, also included an impressive set of mathematical instruments. In this paper, I will present recent research on these instruments, so far mostly overlooked by historians. I will present a preliminary list of the instruments compiled from primary sources and discuss them in the context of the time – usually seen as the climax of absolutism and baroque culture in Portugal. In particular, I will analyze a small group of instruments sent from Rome to the library by Francesco Bianchini (1662-1729), that, I will argue, materialize new discoveries in the havens, cosmological ideas of the king and the magnificence of the future owner. The exchange of favors and patronage of João V to Bianchini also indicates the important intermediary role of the Jesuit Giovanni Battista Carbone (1694-1750) – royal mathematician in Lisbon and user of astronomical instruments – in the creation of the library. Finally, I will address the relationship between instruments and books: the library was organized in such a way that mathematical instruments could be used in consultation with the relevant treatises, placed side by side.

Luís Tirapicos is a History of Science PhD student at the University of Lisbon and a member of the Centro Interuniversitário de História das Ciências e da Tecnologia. His main research interests are the history of astronomy in Portugal, Jesuit Science, the history of astronomical instruments and Iberian archaeoastronomy.

INSTRUMENTS IN TRANSIT - THE SANTO ILDEFONSO TREATY AND THE BRAZILIAN BORDER DEMARCATIONS

I. Malaquias

Departamento de Física, CIDTFF, Universidade de Aveiro, Aveiro, 3810-193, Portugal
imalaquias@ua.pt

Keywords: Brazilian border demarcation, astronomical & physics instruments, J.H. de Magellan, history of science

Abstract

Since the middle eighteenth century the Iberian Courts of Spain and Portugal were trying the readjustment of the Brazilian frontiers whose first division went back to the Tordesillas Treaty in 1454 when the two countries had divided their world empires. On October 1777 they signed the Santo Ildefonso Treaty and agreed on new operations for setting of borders that came to give Santa Catarina Island, in Brazil southern frontier, to Spain.

In the context of a period where instruments were developing fast in their conception but also in their production, materials and accuracy, it was evident that the need for updated instruments was in the rulers' and practitioners' minds. The Portuguese Court through its Foreign Office commissioned a Portuguese instrument expert in London – João Jacinto de Magalhães (better known as J. H. de Magellan, 1722-1790) to choose and supervise the acquisition of the astronomical and physics instruments needed for performing those scientific operations. The Spanish Court also agreed that Magellan should be the expert in charge for the Spanish equipment.

Eleven collections were produced and crossed the Atlantic for that project. In this presentation we will focus on the collections of instruments that were brought into being, and on the instrument makers, highlighting this specific enterprise, through which several instruments transited from the London workshops to Lisbon, Madrid and then to Brazil, as well as to a few vestiges of some still existing ones.

Isabel Malaquias got her PhD in Physics (History and Philosophy of Physics) with a thesis on "The work of John Hyacinth de Magellan in the 18th century scientific context". At present she is Associate Professor at University of Aveiro, Physics Department, and belongs to the Research Centre "Didactics and Technology in Education of Trainers" (CIDTFF). Her research interests focus on 18th and 19th century history of science, material culture of physics and chemistry, as well as science education.

BETWEEN EDUCATION AND POLITICS: THE TRANSFER OF THE 'AJUDA ROYAL CABINET OF PHYSICS' FROM LISBON TO RIO (1810-1812)

M. C. Lourenço[a], S. Gessner[b], D. Felismino[c]

[a]National Museum of Natural History and Science/CIUHCT, University of Lisbon
[b]CIUHCT, University of Lisbon
[c]National Museum of Natural History and Science, University of Lisbon/CHAM, New University of Lisbon
mclourenco@museus.ul.pt

Keywords: cabinets of physics, collections transfer, politics, socio-economic development

Abstract

In 1807, when Portugal was invaded by Napoleon's troops, Regent Prince John made a bold decision: he transferred the Portuguese Court and Royal Household to Rio de Janeiro. This was a massive political and logistic operation, supported by the British Crown and involving the transfer of the royal mint, the national archives and many items of national significance, including works of art, scientific instruments, military equipment, the contents of several palaces and c. 15,000 people. Upon the arrival of the Court, Rio de Janeiro became the capital of the Portuguese Empire. Several scientific, military, educational and cultural institutions were created which greatly contributed to the political, social and economic development of Brazil.

Amongst the items moved from Lisbon to Rio was the Cabinet of Physics of the Royal Palace of Ajuda. Initially organized in the 1770s for the education of the younger generation of Princes, the cabinet was transferred in three batches between 1810 and 1812, together with the Ajuda Library. In this paper, we will present recent research on the history of this cabinet, both in Portugal and in Brazil. We will also analyze its contents, role, and subsequent dispersal in light of a complex political and social context.

Marta C. Lourenço is B.Sc. in physics with Master degree (2000) in Museology at the New University of Lisbon and Ph.D. (2005) in History of Technology & Museology at the Conservatoire National des Arts et Métiers. She is currently a researcher at the Museums of the University of Lisbon. Her research interests include the history of university collections and cabinets of physics, the history of museums and scientific heritage.

Samuel Gessner, after a physics degree (Lausanne), embarked on history of science (post-graduate course and PhD at Paris 7). He is currently a post-doc at the CIUHCT-UL/UNL (Lisbon). His main focus is mathematical culture in early modern Europe, and the role of mathematical instruments, as conceived of by theoreticians and practitioners, using textual documents as well as material culture.

David Felismino is a PhD student in Modern History at the Faculdade de Ciências Sociais e Humanas of the Universidade Nova de Lisboa. He is a research member of the Centro de História de Além Mar and associated to the European network La Corte en Europa. His research interests include several themes of cultural history, especially Court culture and history of everyday life, consumption and networks of cultural exchange, mainly between the 16th and 19th centuries. He is a research member of the program On the Instruments'Trail: Exploring Royal Cabinets in Portugal (18th-19th) (Museums of the University of Lisbon).

PROVINCE ENGINEERS AND THE USE OF SCIENTIFIC INSTRUMENTS DURING THE CONSTRUCTION PROCESS OF BRIDGES AND ROADS IN MINAS GERAIS (1835-1889)

T. Cravo

Master's course in Social History, University of São Paulo, 1085 Lavras St. apt. 202, Belo Horizonte, zipe code: 30330-010, Brazil
teliocravo@usp.br

Keywords: Minas Gerais, Century XIX, Scientific Instruments and Province engineers.

Abstract

The objective of this research is to analyze the use of scientific instruments by the engineers of Minas Gerais province during the construction process of bridges and roads in the 19th century. It is considered that engineers around the territory developed specific practices that were influenced by the use of scientific instruments. The aim of this research is to demonstrate that the history of instruments cannot be reduced only to one measuring activity. The preliminary results achieved from the analysis of the process of bridges and roads, based on the records of the constructed database of bridges and roads of Minas Gerais allow the confirmation that instruments exerted an important communication role between the elements of science and the scientific culture of engineers. The analysis of the scientific instruments provided three specific results: i) the commercial relationship established between the trader José Maria dos Reis, owner of the "Armazém de Oficinas de Ópticas e Instrumentos Científicos" in the city of Rio de Janeiro, and the engineers of the provinces; ii) the values and the products bought in the commercial establishments; iii) the manner in which the engineers travelled and the social division of labor around the daily tasks of carrying, dismantling and keeping the scientific instruments.

Télio A. Cravo has a bachelor's degree in History and is a master's student in Social History at the University of São Paulo (USP). His main research interests are in the following subjects: History of Engineering, road infrastructure, Minas Gerais, science, scientific instruments and Empire of Brazil. The development of current research relies on the assistance of scientific scholarship granted by CNPq.

THE USE OF THE LAUSSEDAT'S PHOTOTHEODOLITE IN BRAZIL-ARGENTINA BORDER IN THE EARLY TWENTIETH CENTURY

B. Capilé[a], M.R. Vergara[a]

[a] Museum of Astronomy and Related Sciences (MAST/MCTI), Rua General Bruce, 586, Rio de Janeiro (RJ), 20.921-030, Brazil
brunocapile@mast.br

Keywords: Scientific Instruments, History of Science, Foreign Relations (Brazil and Argentina), Border Demarcation

Abstract

The present communication investigates the use of the Laussedat Phototheodolite in the Commission of Border Demarcation works between Brazil and Argentina (1900-1905). This instrument was developed by Aimé Laussedat in the mid-nineteenth century. The technique of photogrammetry assembled the traditional surveying method of measuring horizontal and vertical angles of the theodolite, and of photography. Although this technique had inaccuracies and was not accepted universally, the chief of the Brazilian commission Dionisio Cerqueira chose it with regard to the difficulties of access in some parts of the border. The phototheodolite was one of the group of scientific instruments that contributed to the establishment of the boundaries between these countries. At that time those instruments belonged to the Astronomical Observatory of Rio de Janeiro. The commission was responsible for the work of delimitation, demarcation and mapping, which were based on astronomical, geodetic and topographical observations. The utilization of several instruments present in those scientific practices resembled others that were employed in other Brazilian and foreign commissions of demarcation. That explains the circulation of knowledge concerning national demarcation process that occurred between Europe and South America. Nowadays, some of these instruments are incorporated into the collection of the Museum of Astronomy and Related Sciences (MAST), including this phototheodolite. The rescue of the history of this instrument is important as a witness of the scientific and technological heritage of the passage to the twentieth century. Furthermore, this study aims at elucidating the presence of the techniques used in the territorial formation of Brazil.

Bruno Capilé is biologist with master's degree in history of science from the Federal University of Rio de Janeiro (UFRJ). Currently he has a fellowship from CNPq working at the History of Science Department of the Museum of Astronomy and Related Sciences (MAST). His main research topics are: History of Science, History of Cartography, its objects and instruments, such as maps, surveying instruments, etc.

Moema de Rezende Vergara is researcher of the Museum of Astronomy and Related Sciences (MAST) and professor of the Post-graduate Program in Museology and Heritage (Federal University of Rio de Janeiro State and MAST). She has experience in the History of Science, working mainly on the following topics: history of science in Brazil, museums, nineteenth century, gender studies and public understanding of science.

Session 2 (plenary) – Instruments Across the Atlantic: Astronomy instruments and astronomical observatories

Chair: Marta Lourenço, University of Lisbon, Portugal [National Observatory Auditorium]

- Telescopes in Colonial & Federal America, 1620-1820
Sara Schechner, Harvard University

- America's Earliest Astronomical Institution: Georg Marcgraf's Observatory in Dutch Brazil (1638-1643) A. The setting, building, instruments, usage and importance
Oscar Toshiaki Matsuura, Museum of Astronomy and Related Sciences

- America's Earliest Astronomical Institution: Georg Marcgraf's Observatory in Dutch Brazil (1638-1643) B. Recife's astronomical instruments and their relation with Marcgraf's earlier training at Leiden Observatory
Huib J. Zuidervaart, Huygens Institute for the History of the Netherlands

- Heaving a Little Ballast: seaborne astronomy in the late-eighteenth century
Richard Dunn, Royal Museums Greenwich

- French Versus German Astronomical Instruments in a Few Nineteenth-Century South American National Observatories: a first assessment
Françoise Le Guet Tully, Observatoire de la Côte d'Azur | Santiago Paolantonio, Astronomical Observatory, National University of Cordoba | Jean Davoigneauc, Direction générale des Patrimoines, Ministère de la Culture | James Caplan, Laboratoire d'Astrophysique de Marseille, Université d'Aix-Marseille

TELESCOPES IN COLONIAL & FEDERAL AMERICA, 1620-1820

S. J. Schechner

Harvard Collection of Historical Scientific Instruments, Cambridge, MA, 02138, USA
schechn@fas.harvard.edu

Keywords: telescope, North America, trade, use

Abstract

Focusing on New England, this paper will examine the distribution and use of the telescope in America from colonial times until the early 19th century. We will find that most telescopes of the period were imported and prized possessions. I will discuss who owned these telescopes and how they acquired them; the uses to which telescopes were put; and how the instruments were kept operational.

Circa 1828, Amasa Holcomb of Massachusettswas the first to offer his own telescopes for sale commercially in the United States. He was followed by Henry Fitzin the 1840s and Alvan Clark in the 1850s. Possible reasons for the delay in production of telescopes in North America will be discussed.

Sara Schechner is the David P. Wheatland Curator of the Collection of Historical Scientific Instruments at Harvard University and Secretary of the Scientific Instrument Commission. Current research focuses on sundials and time finding instruments, telescopes and early American astronomy.

AMERICA'S EARLIEST ASTRONOMICAL INSTITUTION: GEORG MARCGRAF'S OBSERVATORY IN DUTCH BRAZIL (1638-1643). PART A: THE SETTING, BUILDING, INSTRUMENTS, USAGE AND IMPORTANCE

O. T. Matsuura

Museu de Astronomia e Ciências Afins, Rua Gal. Bruce 586, Bairro Imperial de São Cristóvão, Rio de Janeiro, RJ, CEP 20.921-030, Brazil
otmats@terra.com.br

Keywords: astronomy, scientific instruments, Dutch Colonial Brazil, Georg Marcgraf

Abstract

Thanks to the patronage of the governor of Dutch Brazil, Johan Maurits, count of Nassau, the German scholar Georg Marcgraf was able to found in 'Mauritsstad' (now the city of Recife), the first 'modern' astronomical observatory at the American continent where he carried out observations during his five years stay in Brazil. But even today, Marcgraf is best known as one of the main authors of the Historia Naturalis Brasiliae (1648), the influential first account of Brazil's zoology and botany. However Marcgraf´s main ambition was to produce Progymnastica Mathematica Americana as the austral counterpart to Tycho Brahe's Astronomiæ Instauratæ Progymnasmata (1598-1602). Marcgraf's sudden death early in 1644 stopped this ambition. Because Marcgraf´s astronomical observations were never published in a way comparable with his natural history observations and maps, his astronomical achievements were largely neglected and unknown. However, luckily, a copy of a manuscript of Margraf's observatory and observations in Brazil is still preserved in the Observatoire de Paris, as well as some notes and drawings in paper scraps kept at the Leiden Regionaal Archief and a watercolour of Zacharias Wagner at the State Art Museum of Leipzig. Based on these documents, we drew a detailed 3D reconstitution of the observatory, instruments and location in modern Recife and made an analysis of the observations (types, methods and errors). A confrontation of these results with the astronomical activities Marcgraf performed at Leiden Observatory before travelling to Brazil (to be discussed in the next presentation) will enhance our understanding of the way Marcgraf achieved his amazing results during his Brazilian sojourn.

Oscar Toshiaki Matsuura is B.A. in Philosophy, B.Sc. in Physics, M.Sc. in solar radio-astronomy and PhD. in cometary astrophysics (University of São Paulo, 1976). He is an Associate retired professor from the Department of Astronomy, Institute of Astronomy, Geophysics and Atmospheric Sciences, University of São Paulo. Currently he is collaborating with the Museum of Astronomy and Related Sciences and with the Post-graduate Program for the History of Sciences, Techniques and Epistemology (Federal University of Rio de Janeiro). His main research area is Brazilian history of astronomy.

AMERICA'S EARLIEST ASTRONOMICAL INSTITUTION: GEORG MARCGRAF'S TYCHONIC OBSERVATORY IN DUTCH COLONIAL BRAZIL (1638-1644). PART B: RECIFE´S ASTRONOMICAL INSTRUMENTS AND THEIR RELATION WITH MARCGRAF'S EARLIER TRAINING AT LEIDEN OBSERVATORY

H. J. Zuidervaart

Huygens Institute for the History of the Netherlands, (Royal Netherlands Academy of Arts and Sciences)
huib.zuidervaart@huygens.knaw.nl

Key-words: Astronomy, scientific instruments, Dutch Colonial Brazil, Leiden University

Abstract

Before his leave to Brazil, the German scholar Georg Marcgraf was trained in medicine, chemistry, botany, mathematics, cartography and practical astronomy at various European universities. This education influenced his work in Brazil in a profound way. A comparison between Marcgraf's astronomical working papers, from the instruction he received in 1637 at Leiden University, with his astronomical legacy, collected in the years 1638-1643 in Brazil, reveals that in Recife he almost copied the site, as well as the equipment, of Leiden Observatory.

In the preceding presentation by Oscar Matsuura, an outline is given of Marcgraf's astronomical achievements and his working methods in Brazil. In our talk, we first will present a survey of the usage and accuracy of the astronomical instruments which were used at 17th century Leiden Observatory. This institution was founded in 1634, only a few years before Marcgraf´s arrival in Holland. At that time, it was the only working astronomical observatory in Europe with an equipment, modelled after the dissolved Danish and Czech observatories of the late Tycho Brahe. Marcgraf's working papers, preserved in the Leiden archive since mid-17th century, enable us to reconstruct his usage of the instruments at Leiden Observatory. It appears that he not only operated the Tychonic measuring instruments with an accuracy comparable with the results of this famous Danish astronomer, but he also cleverly mastered the Dutch telescope in the observation of sunspots. In the end, we will confront these Leiden data with our knowledge of the instruments used at Marcgraf's Brazilian observatory. This comparison enhances greatly our understanding of the way Marcgraf achieved his amazing results during his Brazilian sojourn.

Huib J. Zuidervaart studied Physics, Astronomy and History of Science at the VU University in Amsterdam. He obtained a PhD. degree in the History of Science at Utrecht University. Currently he is working as an historian of science at the Huygens Institute for the History of the Netherlands in The Hague. His main field of research is the history of physics and astronomy in early modern Europe, with a focus on the history of scientific instruments and collections. Huib is also the editor-in-chief of the Belgian-Dutch journal for the history of science and universities Studium.

HEAVING A LITTLE BALLAST: SEABORNE ASTRONOMY IN THE LATE-EIGHTEENTH CENTURY

R. Dunn

National Maritime Museum, Greenwich, London, SE10 9NF, UK, RDunn@rmg.co.uk

Keywords: astronomy, expeditions, Board of Longitude

Abstract

The expeditionary activity of the late-eighteenth century involved moving observers and their instruments by sea in order to undertake series of investigations around the globe. In 1791, a recent graduate of Cambridge University named William Gooch was appointed by the British Board of Longitude as astronomer to George Vancouver's expedition to the Pacific (1791–95) and sailed on the Daedalus via Brazil and Hawaii to join the main party. Gooch never met up with Vancouver because he was murdered on Hawaii, but his frequent letters home offer a vivid account of what it was like to be an astronomer on a naval expedition. His account covers the process of his appointment, the practicalities of moving, storing and deploying instruments on the journey and the observing work undertaken both on board and at intermediate landfalls including Rio de Janeiro.

Richard Dunn is Senior Curator and Head of Science and Technology at Royal Museums Greenwich. Currently he is involved in a major research project on the history of the British Board of Longitude being run in collaboration with the Department of History and Philosophy of Science, University of Cambridge and funded by the Arts and Humanities Research Council.

FRENCH VERSUS GERMAN ASTRONOMICAL INSTRUMENTS IN A FEW NINETEENTH-CENTURYSOUTH AMERICAN NATIONAL OBSERVATORIES: A FIRST ASSESSMENT

F. Le Guet Tully[a], S. Paolantonio[b], J. Davoigneau[c], J. Caplan[d]

[a]Laboratoire LISE du Collège de France, Observatoire de la Côte d'Azur, BP4229, Nice, 06300 cedex 4, France
[b]Observatorio Astronómico, Universidad Nacional de Córdoba, Laprida 854, Córdoba, X5000BGR, Argentina
[c]Direction générale des Patrimoines, Ministère de la Culture, 182 rue Saint-Honoré, Paris, 75001, France
[d]Laboratoire d'Astrophysique de Marseille, Université d'Aix-Marseille, 38 rue Frédéric Joliot-Curie, Marseille, 13388 cedex 13, France | francoise.leguet@oca.eu

Keywords: Astronomical instruments, South American observatories, European instrument makers

Abstract

In 1852 the Chilean government took over the temporary observatory that the United States Navy had installed in Santiago three years earlier in an attempt to determine the solar parallax by observing Venus and Mars; the German astronomer Carl Moesta was appointed director. In 1871, the president of the young Argentine republic, Domingo F. Sarmiento, created a National Observatory in the university town of Córdoba at the request of the American astronomer Benjamin Gould, who was named director. The same year, Emperor Pedro II of Brazil named the French astronomer Emmanuel Liais to head the Observatory of Rio de Janeiro. At about the same time a large meridian circle, ordered in Paris by the Peruvian government in the late 1860s, arrived in Lima. About ten years later, in 1882, the Governor of the Province of Buenos Aires, Dardo Rocha, decided that his new provincial capital, the utopian city of La Plata, would have an observatory - whose direction was entrusted to the French naval officer François Beuf. We shall attempt to place the foundations of these establishments in their political and scientific contexts and give a description of their initial instrumentation. Then we shall try to assess the role of German science and the effects of the Franco-Prussian War of 1870 on the purchase of European instruments for these South American observatories.

Françoise Le Guet Tully is a historian of astronomy whose main fields of interest are the institutional history of French observatories and of observatories related to France, and that of in situ scientific instruments.

Santiago Paolantonio is an Engineer with a Master degree in Educational Administration and a Postgraduate degree in Astronomy Education and Communication. He works at the National University of Córdoba and is a member of the Research Group in Education, Outreach and History of astronomy of the Astronomical Observatory. His main research interests are on the history of astronomy, astrophysics, science disclosure and education.

James Caplan studied physics at the University of Chicago and earned a PhD in astronomy from Northwestern University. At the Laboratoire d'Astrophysique de Marseille (formerly the Observatoire de Marseille), where he is now astronome émérite, he developed Fabry-Perot interferometer instrumentation to observe the interstellar medium. He has been working to conserve, study and display the observatory's heritage.

Jean Davoigneau is attached at the Mission de l'Inventaire général du Patrimoine culturel of the Direction Générale des Patrimoines, French Ministry of Culture. He is referent for scientific and technical Heritage, works on questions of methodology, thesaurus and databases and participates to European and international projects. In 1995, in collaboration with Françoise Le Guet Tully, he launched the national inventory of astronomical heritage.

Session 3 (plenary) – Instruments Across the Atlantic: An overview of exchanges through time

Chair: Sara Schechner, Harvard University, USA
[National Observatory Auditorium]

- Between America and Europe: medical-surgical knowledge in transit (seventeenth and eighteenth century)
Roberto Poletto, UNISINOS (Postgraduate Program)

- The Use of Useless Instruments: The gnomonic inventions by V. Estancel (S.J.) in transit through the Portuguese empire (1650 - 1680)
Samuel Gessner, Centre for the History of Science, University of Lisbon

- Scientific Instruments in the Eighteenth Century Philosophical Travels
Alex Varela, Museum of Astronomy and Related Sciences

- Scientific Instruments Across the Atlantic Ocean: their identification and cultural symbologies in Rio de Janeiro according to Brazilian literature and journalistic reports (1850-1930)
Ricardo M. Figueiredo Filho, Federal University of Minas Gerais (History Postgraduate Program)

- On Creating International Markets for American Scientific Instruments in the Nineteenth Century
Richard L. Kremer, Dartmouth College

- The Acquisition of Didactic Collections for Scientific Education During the Nineteenth Century in the Colegio Nacional de Buenos Aires
Maria Gabriela Mayoni, Buenos Aires National College

BETWEEN AMERICA AND EUROPE: MEDICAL-SURGICAL KNOWLEDGE IN TRANSIT (SEVENTEEN AND EIGHTEENTH CENTURY)

R. Poletto

Unisinos, Av. Unisinos, 950 Bairro Cristo Rei, São Leopoldo, 93.022-000, Brasil
robertopoletto@hotmail.com

Keywords: cure arts, knowledge, circulation, scientific works

Abstract

In this communication, we propose to present some evidences of appropriation and circulation of medical-surgical knowledge's and practices in two books of Jesuit brother Pedro Montenegro, the Materia Medica Misionera (1710) and the Libro de Cirugía (1725). The application of therapeutical procedures recommended and adopted in Europe can be found in the Prologue of Libro de Cirugía, in which Montenegro makes it clear to the readers: "que todo su contenido lo he sacado de autores clasicos y doctos que son para la Medicina [...]". Regarding to the uses of certain surgical instruments, the Jesuit brother, as Dionísio Daza had already done (Practica y Teorica de Cirugia en romance, y en latin, 1626), and Felipe Borbon (Medicina y Cirugia Domestica, 1705), who had their books referred by him, presents their uses and differences: "Cuantas diferiencias hay de puntas de lancetas, y para que venas conviene mas cada una?" Beyond the mentions made to classic authors and the instruments widely used, we found, - especially in Matéria Medica Misionera - a broad flow of knowledge and information between the Iberian colonial areas and Europe. This circulation is evidenced in the information of balsamo de Copayba, what, by the Jesuit, "es hoy muy conocido, y úsado por toda la Europa, Africa, y America, y con grande estima, y subido precio en el Japon y China, segun estoy informado, á causa de sus admirables virtudes […]". With the presented data, we can conclude that systematized knowledge by scientific works produced in both continents reached relative circulation, and to the classic European knowledge were added a great range of native experience, evidencing the exchange that occurred in the cure arts of the period.

Roberto Poletto is a historian and started an undergraduate research working with Medical Treatises wrote in XVIII century. Currently he is a M.Sc. student at the Universidade do Vale do Rio dos Sinos (UNISINOS) where he has been working with healing and writing practices in a comparative perspective between Europe and America during the Ancient Regime.

THE USE OF USELESS INSTRUMENTS: THE GNOMONIC INVENTIONS BY V. ESTANCEL (S.J.) IN TRANSIT THROUGH THE PORTUGUESE EMPIRE (1650 - 1680)

S. Gessner

Centro Interuniversitário de História das Ciências e da Tecnologia - Pólo Universidade de Lisboa, Faculdade de Ciências,
Edif. C4, Piso 3, Gabinete 15 - Campo Grande, Lisbon, 1749-016, Portugal
samuel.gessner@gmail.com

Keywords: gnomonics, multiple dimensions of use, 17th century, Salvador da Bahia

Abstract

Valentim Estancel (or Stansel) (1621–1705) spent many years teaching at Jesuit institutions in the Portuguese empire. Having first studied and taught in Olomouc in Moravia and Prague, and after a sojourn in Rome (1655), the Jesuit later worked at the colleges of Elvas (1657–1658), Lisbon (1658–1660) and Salvador da Bahia (after 1663) and stayed in Pernambuco (1689). Estancel's interests were broad and included natural philosophy and astronomy. He corresponded with Athanasius Kircher and one of his observations of comets was cited by Isaac Newton in 1687. Among his vast production there are at least two small treatises on gnomonic instruments: Orbis Alfonsinus (ca. 1658) and Tiphys Lusitanus (after 1663). Internalist historians of science and technology could be perplexed by the practical "uselessness" of the instruments described. However, the cited works were dedicated to the Portuguese rulers D. Afonso VI (acclaimed king in 1556) and his brother D. Pedro II (governed from 1667) respectively. The instruments allowed their users to tackle problems that crystallized themes typical of a world-spanning empire, such as the Portuguese one, rooted in navigation: telling the local times for towns with different longitudes, determining one's latitude by observing the sun's extra-meridian altitudes, the earth's magnetism and local magnetic declination etc. In this paper a new reading of Estancel's instrument writings is proposed: a historiographical model concerning the multiple dimensions of use of instruments in 17th century Europe is put to test. By only considering several dimensions (operational, symbolic etc.) we can account for the peculiarity of the instruments that Estancel presented to the Portuguese monarchs.

Samuel Gessner, after a physics degree (Lausanne), embarked on history of science (post-graduate course and PhD at Paris 7). He is currently a post-doc at the CIUHCT-UL/UNL (Lisbon). His main focus is mathematical culture in early modern Europe, and the role of mathematical instruments, as conceived of by theoreticians and practitioners, using textual documents as well as material culture.

SCIENTIFIC INSTRUMENTS IN THE EIGHTEENTH CENTURY PHILOSOPHICAL TRAVELS

A. Varela

Museu de Astronomia e Ciências Afins, Rua General Bruce, 586, São Cristóvão, Rio de Janeiro, CEP.: 20921-030, Brasil
alexvarela@mast.br

Keywords: Scientific Instruments; Naturalists; Philosophical Travels; Natural History

Abstract

In the early 80s of the eighteenth century, the Portuguese Crown, together with the University of Coimbra and the Royal Academy of Sciences of Lisbon, organized the first philosophical travel to different parts of the Empire as Brazil, Angola, Mozambique, among others, with the order to obtain scientific information about these regions. The philosophical trips were paradigmatic achievements of the Age of Enlightenment. From characteristic eminently encyclopedist, these expeditions involve a multiplicity of interests. The naturalists - who studied at Coimbra, in the Course of Philosophy, especially the Chair of Natural History, taught by the italian naturalist Domenico Vandelli, had as tasks to describe the environment (climate, topography, cartography, etc.); to collect and catalogue specimens of flora, fauna and minerals; and also to comment on the ethnological character of indigenous peoples, among others. In this presentation we aimed to analyze the briefcase naturalist, indicating the scientific instruments used and what their respective roles at various stages of production of knowledge in the context of those trips.

Alex Varela is a historian, with Master (2001) and PhD. (2005) degrees in History of Science from the Institute of Geosciences, Campinas State University (Unicamp); post doctorate at the Department of History at the Rio de Janeiro State University (2011, UERJ). Currently he has a fellowship (CNPq) working at the History of Science Department (MAST). He develops researches in the fields of History of Science, History of Brazil, History of Geosciences and History of Medicine.

SCIENTIFIC INSTRUMENTS ACROSS THE ATLANTIC OCEAN: THEIR IDENTIFICATION AND CULTURAL SYMBOLOGIES IN RIO DE JANEIRO ACCORDING TO BRAZILIAN LITERATURE AND JOURNALISTIC REPORTS (1850-1930)

R. M. Figueiredo Filho

PhD student at Federal University of Minas Gerais (History Post-Graduation Program - History of Science and Culture)
Rio Grande do Sul Street, 1550/102, Belo Horizonte, Minas Gerais, 30170111, Brazil
ricardomfigueriedor@yahoo.com.br

Keywords: Scientific instruments exchanges, History of Sciences, ideological representations, Europe and Rio de Janeiro.

Abstract

This proposal focus on the exchange of scientific instruments between Europe and Rio de Janeiro and will have the methodological support of the history of science and the history of culture, besides the identification of scientific apparatus such as medical equipments and weather measuring instruments which were introduced to Brazil during the nineteenth century and early twentieth century. Those scientific instruments will be analyzed as symbols of civilization, modernity, progress and consequently hygiene. Furthermore, they will be contextualized in a Brazilian milieu in which the construction of national identities' ideas was very relevant. In this way, the travelling of scientific instruments between the Old and the New continent and its ideological representations will be investigated from Luiz Edmundo's journalistic reports, the novel The Alienist by Machado de Assis and the novel The Patriot by Lima Barreto.

Ricardo M. Figueiredo Filho is a historian with M.Sc. degree in Cultural History from the Porto University (Portugal). Currently he is a PhD student on History of Science and Culture at the Federal University of Minas Gerais. His main areas of interest are Environmental History and History of Science.

ON CREATING INTERNATIONAL MARKETS FOR AMERICAN SCIENTIFIC INSTRUMENTS IN THE NINETEENTH CENTURY

R. L. Kremer

Darrtmouth College, Hanover, New Hampshire 03755, USA
richard.kremer@dartmouth.edu

Keywords: Alvan Clark, Henry Rowland, Wiliam Gaertner, international markets

Abstract

Although most early scientific instruments used in the Americas were imported from European makers, by the nineteenth century a growing number of indigenous makers started producing apparatus for local markets from Québec City and Boston in the north to Mexico City and Rio de Janeiro in the south. And by the end of that century, some of these American-made instruments began finding their way back to Europe. The paper will analyze the efforts of American makers to create European markets for their instruments. By following case studies (Alvan Clark, Henry Rowland, William Gaertner and others), it will explore how the American makers used their own travel, other travelers' testimonials, advertising, trade catalogues, published articles in scientific journals and international expositions to persuade Europeans to purchase their products. By 1884 when the Pulkovo Observatory outside St. Petersburg installed the 30-inch objective lens made by Alvan Clark & Sons in Cambridgeport, Massachusetts into their new giant refractor, the circulation of American-made apparatus to Europe had become part of the global trade of scientific instruments.

Richard L. Kremer teaches history of science at Dartmouth College (USA) and curates that institution's collection of historic scientific instruments. His research centers on the history of astronomy, especially the instruments and tables of the early modern period. He also studies nineteenth-century astronomical observatories (Dartmouth's dates from 1853) and the development of electronic instrumentation in the early twentieth century.

THE ACQUISITION OF DIDACTIC COLLECTIONS FOR SCIENTIFIC EDUCATION DURING THE NINETEENTH CENTURY IN THE COLEGIO NACIONAL DE BUENOS AIRES

M.G. Mayoni

Colegio Nacional de Buenos Aires, Bolivar 263, Ciudad Autónoma de Buenos Aires, (1066), Argentina
mgmayoni@gmail.com

Keywords: didactic collections, secondary education, teaching sciences, material culture

Abstract

Didactic collections and the various documents associated with their acquisition that are preserved in the Colegio Nacional de Buenos Aires provide insight into the various aspects of material culture, ideas and proposals generated around the organization of science education in Argentina. This institution is one of the oldest secondary schools in the country and important personalities were part of its history. The national school was created as a public institution in 1863 and incorporated to the Universidad de Buenos Aires in 1911. Between 1870 and 1920 the school acquired for the scientific departments important collections made by different makers from all over Europe.

The acquisition of these collections at the end of 19th century is related to the implementation of a specific educational system in Argentina. During a period of national construction and economic growth, public education was nationally encouraged, and this drive resulted in a quick expansion of educational institutions with the intent of unification and normalization of the educational process.

Regarding teaching changes in science special attention was paid to European innovations in the second half of the 19th century. Universal expositions started to be organized in Europe and these became sources of ideas for the teaching field. French and German enterprises were our major providers. Economical possibilities in Argentina together with a determined idea on the government's part of supporting science resulted in subsidies for relevant acquisitions and generous investment in the field of science pedagogy, as reflected in the didactic collections of the Colegio Nacional de Buenos Aires.

Maria Gabriela Mayoni is conservator with degree in Studies in Conservation and Restoration of Cultural Heritage. Currently she makes part of the Conservation Group at the Colegio Nacional de Buenos Aires, Argentina, working in an Integral Program of Educational Heritage Preservation, including researches, conservation and cultural management. Last year she carried away internships about Heritage in Spain working at the Museo Nacional de Artes Decorativas and collaborated in the preservation program of the Veterinary Museum - Universidad Complutense de Madrid with IPCE (Instituto del Patrimonio Cultural de España) in the scientific collection of anatomical models.

Session 4 – Instruments and Collections Studies I

Chair: Marcio Rangel, Museum of Astronomy and Related Sciences, Brazil
[MAST Auditorium]

- The So-Called "Chaucer Astrolabe": the Italian tale of a medieval English instrument
Giorgio Strano, Museo Galileo

- The Role Played by Mathematical Instruments in Renaissance Music Treatises
Carla Bromberg, Simão Mathias Center of Studies in History of Science, Pontifical Catholic University of São Paulo

- Between Natural and Artificial: the nature of the distillation apparatuses in sixteenth century natural magic
Fumikazu Saito, Pontifical Catholic University of São Paulo

- Knowing and Doing Mathematics in the Seventeenth Century: a preliminary study on John Browne's triangular quadrant
Ana Rebeca Miranda Castillo, Pontifical Catholic University of São Paulo | Fumikazu Saito, Pontifical Catholic University of São Paulo

- And Then There Were None: a review of John Dee's scientific instruments and their subsequent disappearance
Louise Devoy, British Museum

- The Foundation of the Astronomical Observatory of Coimbra University and the Importance of its Primitive Instrumental Collection
Fernando B. Figueiredo, Astronomical Observatory, University of Coimbra

THE SO-CALLED "CHAUCER ASTROLABE": THE ITALIAN TALE OF A MEDIEVAL ENGLISH INSTRUMENT

Giorgio Strano

Museo Galileo: Istituto e Museo di Storia della Scienza, Piazza dei Giudici 1, Firenze, 50122, Italy
g.strano@museogalileo.it

Keywords: Astrolabes, Geoffrey Chaucer

Abstract

On June 4, 2012, a new piece entered Museo Galileo in Florence. Coming from the collection of Carlo Castiglioni via an auction held in Genoa, the so-called "Chaucer Astrolabe" was acquired by the private collector Tullio Tomba. In 2002, the importance of this piece was recognized by the Italian authorities. The Ministry for the Cultural Heritage placed a constraint to the possibility to freely export the instrument. Notwithstanding such a constraint, another collector, Luigi Koelliker, decided to buy the instrument in 2006 anyway. Unfortunately, two years later, Koelliker underwent a severe financial crisis due to the collapse of the Japanese car importation market. He decided to avoid failure by selling part of his collection. As a counterpart to the many instruments he exported, the Superintendence of Milan suggested Koelliker to donate at least one important item to a public museum. Koelliker generously decided to give the "Chaucer Astrolabe" to Museo Galileo.

In the absence of strict evidence, it is extremely difficult to connect an instrument to a specific person. In the case of the "Chaucer Astrolabe", there is no evidence that the father of the English literature, Geoffrey Chaucer (ca. 1343-1400), was the actual maker or owner of the instrument. The case of the "Chaucer Astrolabe" is even more complicated. On the one hand, several clues indicate that the astrolabe was made by a skilled craftsman who knew very well the manuscript copy of Chaucer's Treatise on the Astrolabe (ca. 1392) nowadays preserved at the Cambridge University Library. Moreover, the instrument was destined to somebody who lived in the London area. On the other hand, other clues denote a profound alteration of the original instrument. Such modifications and additions were probably made to increase the desirability of the damaged item once it was placed in the collectors' circuit.

Giorgio Strano, PhD, is curator of the collections at the Museo Galileo in Florence. Since 2006, he is a member of the "Gruppo Musei" of the National Institute of Astrophysics (INAF) in Rome for the preservation of instruments of historical interest in Italian observatories. He is general editor of the series Scientific Instruments and Collections of the Scientific Instrument Commission.

THE ROLE PLAYED BY MATHEMATICAL INSTRUMENTS IN RENAISSANCE MUSIC TREATISES

C. Bromberga

Pos-doc at CESIMA (Simão Mathias Center of Studies in History of Science , PUC/SP). Rua Caio Prado, 102 sala 48, São Paulo, 01303-00,0 Brazil
cbromberg@pucsp.br; carlabromberg@gmail.com

Keywords: History of Science, History of Music, History of Mathematics, Renaissance.

Abstract

It is assumed that an important part of the Scientific Revolution was the creation of an experimental method; therefore the creation of conventions for the proper use and classification of "scientific instruments" could be expected. However, prior to that period, instruments could be understood as a tool or as a method, in the sense that they could be models of nature, they could be extensions of the senses, they could be measuring devices or they could be means for creating conditions that would not occur naturally, just to mention a few possibilities. Music theorists of the sixteenth century - within this context - naturally described the use of mathematical instruments in their treatises. It is the purpose of this paper to show which instruments were constantly pointed out, how they were understood and therefore explaining their epistemological and ontological roles.

Carla Bromberg is BA in Music with a Master degree in Musicology from the Hebrew University of Jerusalem and a PhD. degree in History of Science from the Pontifical Catholic University of São Paulo (PUC/SP- Princeton University/USA). Her main research interests are on Music and Mathematics in the Renaissance, the relation between Science and Music and the role played by Music Theory in the History of Science. Since 2010, she is doing a post-doctoral research at the Centro Simão Mathias de Estudos em História da Ciência (PUC-SP).

BETWEEN NATURAL AND ARTIFICIAL: THE NATURE OF THE DISTILLATION APPARATUSES IN SIXTEENTH CENTURY NATURAL MAGIC

F. Saito

Pontificial Catholic University of São Paulo, Rua Caio Prado, 102, sala 46-49, São Paulo, 01303-000, Brasil
fsaito@pucsp.br

Keywords: History of Science, Natural Magic, Distillation, Apparatus

Abstract

In a recent study about the role of instruments in the construction of scientific knowledge between the sixteenth and seventeenth centuries, we took into consideration some historioraphic aspects which have guided current historical investigation of scientific instruments. That study whose purpose it was to discuss some epistemological implications of telescopic observations revealed to us that the understanding of the role of the pre-sixteenth century instruments requires from us more than reducing them to experimental environment or examining them in the light of their results. Once continuing the discussion raised by that study, this work aims to present some assumptions which have guided our investigation on instruments employed to analyze and to understand natural processes, notably, the distillation apparatuses. Distillation was an art which allowed natural philosophers to extract the healing virtues from different materials. This was a process which revealed not only the nature of those materials, but also other subtle aspects of this very nature. In this work we present the explanations given by Giambattista della Porta (1535-1615) for the use of different sorts of vessels and distillers. We based our investigation on Book Ten of his Magia naturalis libri XX (1589) and on his distillation treatise entitled De distillatione libri IX (1608). The reasons which he defined and determined the kind of vessels and distillers which should be used in specific processes point to some aspects which could help us to give meaning to their nature in the scientific enterprise, stimulating further ontological reflection on the nature of those instruments and apparatuses designed and built in sixteenth century natural magic.

Fumikazu Saito is currently a Professor at the Programs of Mathematics Education and History of Science, both at the Pontifical Catholic University of São Paulo (PUC-SP), He holds a PhD. degree in History of Science and is a research fellow at CESIMA (Simão Mathias Center of Graduate Studies in History of Science) where he works on the following topics: natural philosophy, natural magic, apparatus and scientific instruments, science and mathematics in the sixteenth and seventeenth centuries.

KNOWING AND DOING MATHEMATICS IN THE SEVENTEENTH CENTURY: A PRELIMINARY STUDY ON JOHN BROWNE'S TRIANGULAR QUADRANT

A. R. M. Castillo[a], **F. Saito**[b]

[a]*Pontificial Catholic University of São Paulo, Rua Xingutânea, 271, São Paulo, 03577-000, Brasil*
[b]*Pontificial Catholic University of São Paulo, Rua Caio Prado, 102, sala 46-49, São Paulo, 01303-000, Brasil*
anacastillo@ig.com.br

Keywords: History of Mathematics, Mathematical Instruments, Triangular Quadrant, Mathematics

Abstract

This work is part of a doctoral project in the Program of Mathematics Education of the Pontifical Catholic University of São Paulo that seeks to investigate the role of "mathematical instruments" in the construction of mathematical knowledge in the early modern era. Hence the aim of this work is to present a brief analysis of the mathematical knowledge implied in the construction and use of John Browne's "Triangular Quadrant" based on his work entitled The Triangular Quadrant or The Quadrant on a Sector Being a general instrument for Land or Sea Observation (1662). In his work, Browne remarked that this instrument, being a general instrument, could be used for land and sea observations. Furthermore he stated that it performs all the uses of the ordinary sea instruments available at that time more easily, profitably and conveniently. This probably is due not only to its ease in handling but also because it embodies mathematical concepts that allow someone to perform calculations with greater ease and accuracy than before. Indeed this very instrument described by Browne, like many others designed and built at that time, seems to have arisen in the tension between knowing and doing mathematics. In this sense, drawing from current historiographical trends, we propose to discuss the "Triangular Quadrant" as an artifact that embodies knowledge and points to a certain conception of science and mathematics, which could stimulate further reflection on sixteenth and seventeenth century mathematical instruments and their relationship with the field of mathematics and its objects.

Ana Rebeca Miranda Castillo is undergraduated in Mathematics and Bachelor in Mathematics from the Pontifical Catholic University of São Paulo (PUC-SP). She holds MA in Mathematics Education from the Mathematics Education Program/ PUCSP/Brazil and has expertise in Human Resources from University of São Paulo (Guarulhos). Currently she is a PhD. Student at the Program in Mathematics Education at the Pontifical Catholic University of São Paulo (PUCSP). She has experience in education with emphasis in Teaching and Learning.

Fumikazu Saito is currently Professor at the Programs of Mathematics Education and History of Science, both at the Pontifical Catholic University of São Paulo (PUC-SP). He holds a PhD. in History of Science and is a research fellow at CESIMA (Simão Mathias Center of Graduate Studies in History of Science) where he works on the following topics: natural philosophy, natural magic, apparatus and scientific instruments, science and mathematics in the sixteenth and seventeenth centuries.

AND THEN THERE WERE NONE: A REVIEW OF JOHN DEE'S SCIENTIFIC INSTRUMENTS AND THEIR SUBSEQUENT DISAPPEARANCE

L.E. Devoy

British Museum, Great Russell Street, London, WC1B 3DG, United Kingdom
ldevoy@britishmuseum.org

Keywords: John Dee, astronomy, navigation, material culture

Abstract

In 1589, the Elizabethan magus John Dee returned home to England after his travels in Bohemia to find that his precious manuscripts and scientific instruments had either been destroyed or stolen. Writing in his Compendious Rehearsal a few years later, Dee catalogues his losses and mentions instruments such as a ten-foot long radius astronomicus, a sea compass, laboratory apparatus, a lodestone and a pair of Mercator globes. Many of these items were significant instruments of the period as Dee had previously studied in Louvain in the 1540s and had gained a unique insight into the new cartographical and astronomical measurement techniques developed by Gemma Frisius and Gerard Mercator. When he returned after his studies, Dee was eagerly sought by English navigators for his expertise that could assist them in their quest to reach China via the North West Passage of the Americas. Consequently, a review of Dee's instrument collection can provide us with a useful insight into Dee's network of contacts and the early development of these particular astronomical and navigational instruments. In this paper I will review the known sources regarding Dee's scientific instruments and will outline my preliminary research on investigating the possible fate of this noteworthy collection.

Louise Devoy, after initial studies in Astrophysics, she transferred to the museums sector with a particular interest in the interpretation of history of science content for non-specialist audiences. She has worked in a number of UK national museums and is currently based at the British Museum where she is developing the science content for a new museum project in Abu Dhabi, UAE.

THE FOUNDATION OF THE ASTRONOMICAL OBSERVATORY OF COIMBRA UNIVERSITY (1799) AND THE IMPORTANCE OF ITS PRIMITIVE INSTRUMENTAL COLLECTION

F. B. Figueiredo

Centro de Geofísica da Universidade de Coimbra (IGUC), Observatório Astronómico da Universidade de Coimbra
Almas de Freire (Freguesia de Santa Clara), 3040 - 004 Coimbra, Portugal
bandeira@mat.uc.pt ; fernandobfigueiredo@gmail.com

Keywords: astronomical Observatory of University of Coimbra, astronomical instruments, Astronomical Ephemeris

Abstract

The establishment of scientific education at the University of Coimbra was one of the most important features of the Pombal's Reform of the University (1772). One of the best examples is the creation of the Faculty Mathematics and of the Astronomical Observatory of University of Coimbra (OAUC).
The foundation of the OAUC was fundamental in the institutionalization of astronomical science in Portugal, during a period when astronomy, supported by the great theoretical advances of the celestial mechanics and applied mathematics, could finally provide some important solutions to the most prominent scientific problems since Newton. Questions about navigation, geodesy, determination of comets' orbits and measures of time, were part of the program and practice of any astronomical observatory. Such questions were also central in the conception and planning of OAUC – the first university-based astronomical observatory, although with aspects of a National Observatory.
Jose Monteiro da Rocha (1734-1819) was the central personality in the conception, planning and construction of OAUC (1799), as well as in its instrument's provision (purchased and assembled throughout the 1780's) and posterior scientific activity.
The construction of the Observatory was originally planned for the site of the Castle of Coimbra. In 1775, when only the first floor of the Observatory was built, the construction stopped. However, to fulfill the teaching needs a small provisional the Observatory was built in the courtyard of the University. This provisional Observatory would eventually run for about 15 years! The definitive Astronomical Observatory was built between the years of 1790-99.
In this communication we present the study about the establishment of the OAUC and its primary astronomical collection (a transit instrument, a portable quadrant, a sector, several telescopes, etc.) and how that collection was responsible for the construction plan of the future OAUC and the establishment of the Astronomical Ephemeris of the OAUC (1803).

Fernando B. Figueiredo is licensed in Physics-Applied Mathematics from the Porto University with Master degree in History and Philosophy of Science from the Science and Technology Faculty of the New University of Lisbon and PhD. degree in Applied Mathematics from the University of Coimbra. His main areas of interest are on history of mathematics and astronomy (eighteenth century) – observatories, scientific instruments, astronomical ephemerides. Currently he is doing post-doctoral research at the Mathematics department and the Astronomical Observatory of the University of Coimbra and at the Centre François Viète (CFV), University of Nantes (France).

Session 5 - Teaching Cabinets: instruments and the history of education (Parallel Session)

Chair: Peter Heering, University of Flensburg, Germany [Graduate Classroom (MAST building)]

- The Collection of Scientific Instruments of the Colégio Marista Arquidiocesano Museum in São Paulo
Katya Mitsuko Zuquim Braghini, School of Education, Federal University of Minas Gerais

- The Set of Physics Teaching Instruments at Pedro II High School, Rio de Janeiro, Brazil
Marcus Granato, Museum of Astronomy and Related Sciences | Liliane Bispo dos Santos, Museum of Astronomy and Related Sciences

- Materials for Sciences' Teaching in Brazil: the case of Culto à Ciência high school of Campinas/São Paulo State, Brazil - 1899/1902
Reginaldo Meloni, São Paulo Federal University

- Scientific instruments in the Teaching of Physics in Brazilian Secondary Schools from 1931 to 1961
Maria Cristina de Senzi Zancul, São Paulo State University (UNESP) | Elton de Oliveira Barreto, São Paulo State University (Master course in School Education)

- The Electrostatic Machines in the UFRJ Polytechnic School Museum
Antonio Carlos Moreirão de Queiroz, Polytechnic School, Federal University of Rio de Janeiro

- Preserving the Scientific and Technical Heritage of Education: the 'ASEISTE'
Francis Gires, Association de Sauvegarde et d'Etude des Instruments Scientifiques et Techniques de l'Enseignement | Pierre Lauginie, Université Paris-Sud

THE COLLECTION OF SCIENTIFIC INSTRUMENTS OF THE COLÉGIO MARISTA ARQUIDIOCESANO MUSEUM, SÃO PAULO

K. M. Z. Braghini

Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, Brazil
Colégio Marista Arquidiocesano in São Paulo, São Paulo, Brazil
katya.braghini@yahoo.com.br

Keywords: scientific instruments, school museum, school heritage, teaching practice

Abstract

An object with many definitions and still understudied in Brazil, the School Museum was an institution invented in the nineteenth century for pedagogical purposes, an the era of constitution of great museums in Brazil and worldwide. In the field of Education, studies of the "School Museum" have focused primarily on its didactic use in the past and on the preservation of collections geared towards the culture of school supplies. This work will present, on two fronts of analysis, the collection of scientific instruments of the School Museum of the Colégio Marista Arquidiocesano in São Paulo, an institution geared towards primary and secondary education founded in 1858. First, the communication will focus on its constitution from an historical perspective (assembly, goals, use of the apparatus, etc.); then we will discuss its current role within the school center of studies (organization of the departments, pedagogical function, and current projects). Traces of the existence of scientific instruments for Physics, Chemistry, and Natural History have been found in the School prior to its transfer to the Marist Brothers in 1907. According to an inventory, which is still incomplete, there are 800 pieces acquired between the second half of the nineteenth century and the 1980s. Today the School Museum has several precision instruments, instruments for observation of experiments in Physics and Chemistry, anatomy models, prepared specimens of animals, human and animal skeletons, Mineralogy collections, archaeological specimens, among others,, most of them well-preserved. Instrument makers include foreign firms, such as Maison Deyrolle, Les Fils d'Emilie Deyrolle, Ducretet, Max Kohl, Carl Zeiss, the Welch Scientific Company, etc. as well as local firms such as Otto Bender, Franz Sturn Cia Ltda., Luis Fernando e Cia etc.. Future projects and the current use of the collection in pedagogical activities will be discussed in the presentation.

Katya Mitsuko Zuquim Braghini is a historian with Master and PhD degrees in Education from the Pontifical Catholic University of São Paulo. Currently she is a researcher for the Group of Studies and Research in History of Education, School of Education of the Federal University of Minas Gerais (UFMG), Brazil. She is conducting a post-doctoral research at UFMG aiming to understand the didactic use of scientific instruments in the Science rooms of the Secondary Schools during the transition between the XIX and XX centuries.

THE SET OF PHYSICS TEACHING INSTRUMENTS AT PEDRO II HIGH SCHOOL, RIO DE JANEIRO, BRAZIL

M. Granato[a], L. B. Santos[a]

[a]Museu de Astronomia e Ciências Afins, Rua Gal. Bruce 586, Rio de Janeiro, 20921-030, Brazil
lilianesantos@mast.br

Keywords: teaching collections, Colégio Pedro II, physics laboratory, physics instruments

Abstract

The origins of the Colégio Pedro II (CPII) date back to 1837 and are linked to the former São Joaquim Seminary, founded in 1739. It was Brazil's first official secondary school and was established in the renovated premises of the former Seminary on Rua Larga, now Avenida Marechal Floriano, in the centre of Rio de Janeiro. It was named in tribute to Emperor Pedro II, who at the time was just 12 years old. Created with the aim of being a model school for public secondary education in the imperial court city and in other provinces, Colégio Pedro II benefited from a prestigious teaching staff of renowned intellectuals. The school's physics laboratory started being equipped in the nineteenth century, with the earliest extant documents confirming the purchase of scientific instruments dating from 1843. The school's first major acquisition was in 1872, when 35 objects were purchased. A purchase agreement with a company called John Jügens for the acquisition of a large quantity of laboratory equipment dating from 1929 has also been found. Instruments were mostly from German origin, including from makers such as Max Kohl A.G., from Chemnitz, as well as E. Leybold's Nachfolger A.G, Phywe, Carl Zeiss, and Ernest Leitz. Instrument makers from France, Italy and the USA are also present, although in fewer numbers.

In the laboratory the objects were left unused by the teachers for decades. In 2009, as part of the MAST team's regular activities, they started being cleaned, recorded, photographed and arranged in the cupboards according to a preliminary classification. An inventory has been made, encompassing 971 objects. This set of objects is arguably the most significant and important of its kind in the country, demonstrating how physics was taught in practical lessons. In this communication, we will present the collection and historical data about the objects pertaining to it.

Marcus Granato is metallurgical engineer with Master (1999) and D.Sc. (2003) degrees in Materials Science from the Federal University of Rio de Janeiro. Currently he is Senior Technologist at the Museu de Astronomia e Ciências Afins where he has been the Head of the Museology Department since 2004. He is Professor of Conservation in the Post-Graduate Program on Museology and Heritage (Federal University of Rio de Janeiro State and MAST). His main research interests lie in conservation of scientific instruments, science and technology heritage and history of collections. He is the leader of a Brazilian research group in cultural heritage preservation.

Liliane Bispo dos Santos is a museologist with an undergraduate degree on Preservation of Scientific Heritage from the Museu de Astronomia e Ciências Afins (2012). Currently she has a fellowship working at the Museology Department (MAST). Her main research interests are on scientific heritage, documentation, history of Pedro II High School.

MATERIALS FOR SCIENCES' TEACHING IN BRAZIL: THE CASE OF CULTO À CIÊNCIA HIGH SCHOOL OF CAMPINAS/SAO PAULO STATE, BRAZIL - 1899/1902

R. A. Meloni

Universidade Federal de São Paulo [São Paulo Federal University]. Rua Duque de Caxias, 503/102, Campinas/São Paulo State, 13015-310, Brazil
meloni@unifesp.br

Keywords: Pedagogical instruments, Sciences education, Material culture

Abstract

Colégio Culto à Ciência [Culto à Ciência High School] was established in 1873 in Campinas/SP by an initiative of a group consisting of Positivists, Masons and Republicans. After 1896, the school organized a structure to offer a practical education for the natural sciences with the construction of specific spaces and the acquisition of pedagogical materials from European manufacturers.
The identification work of this archive consisted of comparing the material pictures and the names on the school inventories with the information from other sources. 196 materials have been identified of which 179 had been classified by names and typologies.
The typology used was based on catalogues of "Maison Deyrolle" because almost the totality of the collection was acquired from this French manufacturer. Because of this, instruments are divided as follows: Pesanteur – 8; Hydrostatique et Propriétés DES gaz – 17; Chaleur – 12; Electricité statique – 17; Magnétisme et Électricité dynamique – 47; Acoustique – 7; Optique – 14; Chimica -47; Not classified – 17; Total – 196.
From these materials, 77 were acquired before 1902. The others were acquired at the beginning of the 20th century, but folowing that year. Practically all instruments that have manufactures' identification are from the manufacturer "Les Fils d' Émile Deyrolle" relating to physics education, in addition. Besides, there are some materials for the education of Natural History and Chemistry education indicating a connection with German manufacturers.
At the moment, the materials are organized in a provisory collection catalogue that contains the pictures, the denominations, the references, the typologies, the manufacturers, the dates of acquisition and a summary on its purposes.

Reginaldo Alberto Meloni, having undregraduate diplomas in Chemistry and Pedagogy, Master in Social History and PhD. in History of Education in the area of History, Philosophy and Education, is a professor at the Federal University of São Paulo - UNIFESP/Diadema Campus - and develops researches on the following subjects: History of Chemistry Education in Brazil and material culture of sciences education at High School.

SCIENTIFIC INSTRUMENTS IN THE TEACHING OF PHYSICS IN BRAZILIAN SECONDARY SCHOOLS FROM 1931 TO 1961

M. C. S. Zancul[a], E. O. Barreto[b]

[a] UNESP, São Paulo State University, Rodovia Araraquara-Jaú, Km 1, Araraquara (SP), 14800-901, Brazil
[b] UNESP, São Paulo State University, Araraquara (SP), Brazil
aczancul@uol.com.br

Keywords: History of teaching Physics, old instruments for teaching. experimental teaching, secondary education

Abstract

In this presentation we intend to discuss the analytical potential of old instruments as sources for studying the history of teaching physics in Brazilian secondary education, from the perspective of a collection of scientific instruments belonging to the Physics laboratory at the Bento de Abreu State School in Araraquara (state of São Paulo), Brazil. Taking into account that the objects in the collection can be related to the goals of teaching Physics in the first half of the twentieth century in Brazil, based on the legislation of the time, we analyze the physics curriculum of secondary schools from 1931 until 1961. We also explore books used in physics teaching at this period. We argue that, despite the difficulties of using old instruments as sources of research, they play an invaluable role as objects of study and contributed to the understanding of relevant aspects concerning the experimental teaching in Brazilian schools.

Maria Cristina de Senzi Zancul has a Master's degree in Education from the Federal University of São Carlos – UFSCAR and a PhD degree in Education from the Júlio de Mesquita Filho Paulista State University - UNESP. She is Professor at the Department of Sciences of Education of the Postgraduation Program in School Education of the College of Sciences and Letters of Araraquara – São Paulo State University (UNESP). Her main research interests are in science education, physics teaching and environmental education.

Elton de Oliveira Barreto is undergraduated in Pedagogy and a Master student at the Postgraduation course in School Education of the College of Sciences and Letters of Araraquara – São Paulo State University (UNESP). His main research interests are about the use of old instruments in physics teaching and scientific instruments.

THE ELECTROSTATIC MACHINES IN THE UFRJ POLYTECHNIC SCHOOL MUSEUM

A. C. M. de Queiroz[a]

[a]*COPPE/EP-Universidade Federal do Rio de Janeiro, CP 68504, Rio de Janeiro, 21941-972, Brazil*
acmq@ufrj.br

Keywords: Electrostatic machine, Wimshurst machine, Bonetti machine

Abstract

The presentation will describe the electrostatic generators that exist in the Museum of the Polytechnic School of the Federal University of Rio de Janeiro; they were restored to working conditions and studied by the author. The first machine is a large Wimshurst machine built by Ducretet and Roger, Paris. The machine had its broken disks temporarily replaced by acrylic disks, while an adequate way to reproduce disks as the original glass disks is being studied; one missing Leyden jar and other few parts were rebuilt. The second is a small Wimshurst machine of unknown origin, which had the missing Leyden jars rebuilt and the original ebonite disks restored. The third machine is a large 8-disks Bonetti machine enclosed in a cabinet, built by Radiguet and Massiot, Paris. This machine was received as a donation more recently, and it was used for electrotherapy in the Medicine School in the beginning of the XX century. Essentially the machine required cleaning, replating of the metal parts, and painting. Restoration procedures will be discussed, with pictures and parameters of the machines shown. Available data about the origins of the machines, and a general view about the Museum will be presented.

Antonio Carlos Moreirão de Queiroz is Associate Professor at COPPE, Electrical Eng. Program, and at the Electronic and Computer Eng. Department of the Polytechnic School, Federal University of Rio de Janeiro (UFRJ). He obtained the B.Sc in electronic eng. (1979) from UFRJ, and the M.Sc. (1984) and D. Sc. (1990) degrees in electrical eng. from COPPE/UFRJ. His main interests related to early scientific instruments are especially in electrostatic machines.

PRESERVING THE SCIENTIFIC AND TECHNICAL HERITAGE OF EDUCATION: THE 'ASEISTE'

F. Gires[a] and P. Lauginie[b]

[a] ASEISTE, 3 rue des Chalets, 24000 Périgueux, France
[b] GHDSO, Université Paris-Sud, Faculté d'Orsay, 91405 Orsay cedex, France
pierre.lauginie@u-psud.fr

Key-words: education heritage, historical instruments, 19th century, scientific museums

Abstract

ASEISTE is a French association founded in 2004, aiming at the preservation of the scientific and technical instruments of Education (Association de Sauvegarde et d'Étude des Instruments Scientifiques et Techniques de l'Enseignement: Association for Preserving and Studying the Scientific and Technical Instruments of Education. http://www.aseiste.org), especially in secondary education schools. Objectives: retrieve and preserve instruments and collections; create comprehensive catalogues, both on-line and books; organize exhibitions around the collections; emphasize and support the pedagogical use of the collections. Several important projects have been completed:

• two books about the Physics collections of Lycée Bertran de Born (Périgueux) and Lycée Guez de Balzac (Angoulême): Physique impériale (2004) and L'empire de la Physique (2006). The 450 objects surveyed make up a reference for a nineteenth century model laboratory.

• 3750 objects of Physical sciences from more than 40 high schools (lycées and collèges) listed and described through comprehensive specification sheets available on the website1, together with short videos. The objects are classified according to place, name, manufacturer (including biographies) and discipline (subdivisions in use at the time were followed).

• a special department of the Musée Bernard d'Agesci in Niort displaying, among other instruments, a former personal collection of one of us (F. G.).

• several exhibitions: Physique impériale, an itinerant exhibition around the instruments of the book (2005); participation to the annual 'Book of History of Science Exhibition' (2006-2007) and the Sigaud de la Fond exhibition (Bourges, 2010).

Projects: in the short-term (Fall 2012), a 400 pages book on the Natural History collections of Lycée Bertran de Born and Lycée Guez de Balzac. In the mid-term: a 3-volumes encyclopaedia on the Physics collections of ca. 40 high schools (a paper analogue of the on-line catalogue).

Francis Gires, a former teacher in Physics in French high schools, is a founding member (2004) and current President of the ASEISTE, an association aiming at the study and preservation of the scientific and technical instruments of French secondary education schools. He has taken a decisive part in several exhibitions, in completing reference books on high schools collections and an extensive on-line catalogue of several thousands objects.

Pierre Lauginie, a former lecturer and researcher in Physics at the Faculté des Sciences d'Orsay, Paris-Sud University, has introduced an experimental approach to the History of science. He recently took part, as a scientific author, in a history of science film Les magiciens de la lumière (Wizards of Light) tracing the history of the speed of light measurements from Galileo to Léon Foucault. He is involved in scientific heritage projects in Orsay.

Session 6 – Instruments and Collections Studies II

Chair: Maria Lucia de Niemeyer M. Loureiro, MAST, Brazil [MAST Auditorium]

- Photographing Microscopic Preparations in the Nineteenth Century: techniques and instrumentation
Maria Estela Jardim, Centre for Philosophy of Science, University of Lisbon | Marília Peres, Centre for Molecular Sciences and Materials, University of Lisbon

- The Trajectory of the Telescope T. Cook & Sons in teaching and research in the Valongo Observatory
Maria Alice Ciocca de Oliveira, Valongo Observatory, Federal University of Rio de Janeiro | Rundsthen V. Nader, Valongo Observatory, Federal University of Rio de Janeiro

- The Gas Chromatograph - Trajectory of Chromatography in Brazil
Valeria Freitas, Museum of Astronomy and Related Sciences | Marcio Rangel, Museum of Astronomy and Related Sciences

- How Experiments Drag on – An Analysis of Pieter Zeeman's Apparatus for Measuring the Fizeau-Effect in Solids at the Museum Boerhaave, Leiden
Beto Pimentel, Federal University of Rio de Janeiro | Ad Maas, Museum Boerhaave

- Drummond Light, Limelight
Pierre Lauginie, Université Paris-Sud | Francis Gires, Association de Sauvegarde et d'Etude des Instruments Scientifiques et Techniques de l'Enseignement

- Surveying Results of Sets and Collections of Artifacts Related to Brazilian Federal Universities
Marcus Granato, Museum of Astronomy and Related Sciences | Elias da Silva Maia, Museum of Astronomy and Related Sciences | Fernanda Pires Santos, Museum of Astronomy and Related Sciences | Glória Gelmini de Castro, Federal University of the State of Rio de Janeiro (Museology undergraduate course) | Mariana S. Damasceno, Federal University of the State of Rio de Janeiro (Museology undergraduate course)

PHOTOGRAPHING MICROSCOPIC PREPARATIONS IN THE NINETEENTH CENTURY: TECHNIQUES AND INSTRUMENTATION

M. E. Jardim[a], I. M. Peres[b]

[a] Centre for Philosophy of Science of the University of Lisbon, Campo Grande, 1749-016 Lisboa, Portugal
[b] Centre for Molecular Sciences and Materials of the University of Lisbon, Campo Grande, 1749-016 Lisboa, Portugal
mejardim@fc.ul.pt

Keywords: photomicrography, 19th century, medicine, microscope

Abstract

Photomicrography, the photography of a microscopic preparation, is certainly one of the first applications of photography to science. In order to understand its history, the study of the evolution of the microscope and its adaptation to the photographic camera is important. The first photomicrography was obtained by Fox Talbot around 1839, using a solar microscope. During the years 1839-1840, Alfred Donné and Léon Foucault produced microdaguerreotypes using the electric arc as an artificial illuminant. Despite this pioneering work by Talbot, Donné and others, slow progress was made in photomicrography, primarily due to the belief that drawing was a more appropriate medium for the illustration of microscopic preparations. However, in the following decade, several instruments combining the microscope and the camera, arranged horizontally or in a vertical position, were invented. After the mid-1860s photomicrography development was mainly due to the use of immersion lenses and the Abbe condenser, and of the dry gelatine emulsion invented by Maddox, himself a keen microscopist. Following the work of Pasteur and Koch in microbiology and bacteriology, photomicrography became in the 1880s an important tool in medical research. By the end of the nineteenth century, with orthochromatic and panchromatic plates, crucial for histological coloured preparations, it was possible to produce and record quality images for research and teaching in several fields of science. In this paper we will provide an account of the evolution of the photomicrographic instruments and techniques during the nineteenth century with some scientific applications mainly in the field of medicine.

Maria Estela Jardim is Associate Professor (retired), Department of Chemistry, Faculty of Science, University of Lisbon. She is currently member of the Centre for the Philosophy of Science and associate member of the Molecular Sciences and Materials Research Centre, both from the University of Lisbon. Currently she is doing research on the History of Scientific Photography and Chemistry of Photography in the 19th century-early 20th century.

Marília Peres is a chemistry teacher. She acquired a M.Sc. degree in Chemistry for Teaching (field of history of science and scientific instruments). She collaborated in research on the collection of chemistry and physics at the Museum of Science of the University of Lisbon during 2005 and 2006. Currently she investigates on the History of Scientific Photography and Chemistry of photography in the 19th century-early 20th century (Ph.D. student).

THE TRAJECTORY OF THE TELESCOPE T. COOKE & SONS IN TEACHING AND RESEARCH IN THE VALONGO OBSERVATORY

M. A. C. Oliveira[a], R. V. Nader[a]

[a]Observatório do Valongo/UFRJ, Rio de Janeiro, Brasil
alice@astro.ufrj

Keywords: Scientific instruments, Valongo Observatory, Telescopes, Trajectories.

Abstract

The goal of this paper is to partly present the trajectory of the 30 cm diameter objective refracting telescope Thomas Cooke & Sons from the Valongo Observatory, Federal University of Rio de Janeiro (UFRJ). The refracting telescope, today part of the collection of scientific instruments of the Valongo Observatory, was purchased in 1910 by what was then called the Astronomical Observatory of the Polytechnic School.

Active participant in the development of astronomy in Brazil, especially in Rio de Janeiro, the telescope was widely used in practical teaching and in research conducted at the Observatory, particularly since the late 1950s, after the creation of the undergraduate degree in Astronomy at the University. It became one of the institution's main observation instruments.

The telescope's trajectory can be made visible through reports of didactic works and surveys conducted at the Observatory, as well as published scientific articles that refer to instruments used in astronomical observations, relevant educational activities or research. The telescope was used in sunspots observations, records of stars' occultation by the Moon and the transit of Mercury. It was also used in international observation programmes and astronomical research, for example in photographic records of the solar photosphere, solar and moon eclipses, the lunar surface and planetary surfaces, as well as in micrometric observations of double stars, comments on meridian astrometry and comets position log.

Maria Alice Ciocca de Oliveira is librarian with a Master degree in Museology and Heritage from the Federal University of the State of Rio de Janeiro and MAST (2011). She is currently librarian of the Valongo Observatory, at the Federal University of Rio de Janeiro. Her main research area is the study of the collection of scientific instruments of the Valongo Observatory.

Rundsthen Vasques de Nader is an astronomer with a Master degree in Astronomy from the National Observatory (Brazil). He is currently a PhD student in History of Science at the Federal University of Rio de Janeiro and an astronomer of the Valongo Observatory, at the same University. His main research interests are on history of astronomy, scientific instruments and observatories.

THE GAS CHROMATOGRAPH - TRAJECTORY OF CHROMATOGRAPHY IN BRAZIL

V. L de Freitas, M. F. Rangel

Museu de Astronomia e Ciências Afins, Rua Gal. Bruce 586, Rio de Janeiro, 20921-030, Brazil.
valeriafreitas@mast.br

Key-words: Museum, Collection, S&T Objects, Chromatography; Brazil.

Abstract

Taking as reference a musealized Science & Technology object (gas chromatograph), in the collection of the Museum of Astronomy and Related Sciences (MAST), in this paper we are going to analyze the propagation of Chromatography in Brazil. The gas chromatograph was manufactured by CG Scientific Instruments Ltd, a company created and directed by Ivo Gregori and Remolo Ciola between the years 1961 and 1994. In 2004, this gas chromatograph, with other 300 objects, was donated to the MAST by the Institute of Nuclear Engineering (IEN). During the '50s, in Latin America, Remolo Ciola stands out as one of the pioneers in developing of the technology for chemical analysis of organic compounds and the creation of a prototype gas chromatograph with low cost. This invention was developed about the same time in the United States and Europe. This technology received a big incentive from the military government and benefited from the National Informatics Policy, Law 7232, of 29 October 1984. Over the years, this protectionist practice turned out to be a big obstacle in creating the development of new technologies that adapt to the market needs. With the deepening of research on gas chromatograph, we can understand political tensions, economic and scientific activities that accompanied the construction of the Chromatography in Brazil. In this work we intend to demonstrate the importance of this area in Brazil and to discuss the development of a biography of a Italian chemist, naturalized Brazilian and the history development of oil industry in Brazil.

Valeria Leite de Freitas is a historian with an undergraduate degree in Preservation of Science and Technology Collections from MAST. Currently she is a master's student at the Graduate Program in Museology and Heritage (UNIRIO- MAST) and, since 2009, she has a fellowship (CNPq) developing researches at MAST. Her main research interests are on Museology, History of Science and Chromatography.

Marcio Rangel is a museologist with Master degree in Social Memory from the Federal University of the State of Rio de Janeiro (UNIRIO) and PhD. degree in History of Science from the Oswaldo Cruz Foundation (FIOCRUZ). He is researcher of the Museum of Astronomy and Related Sciences (MAST) and Professor of the School of Museology at UNIRIO. He also teaches at the Master's course in Museology and Heritage (UNIRIO and MAST). His main research interests are on museology, with emphasis on historical and scientific collections, history of science, memory and heritage.

HOW EXPERIMENTS DRAG ON – AN ANALYSIS OF PIETER ZEEMAN'S APPARATUS FOR MEASURING THE FIZEAU-EFFECT IN SOLIDS AT THE MUSEUM BOERHAAVE, LEIDEN

R. A. Pimentel Jr.[a], **A. Maas**[b]

[a]*Universidade Federal do Rio de Janeiro, rua J. J. Seabra s/nº, Rio de Janeiro, 22470-130, Brazil*
[b]*Museum Boerhaave, Lange Sint Agnietenstraat 10, Leiden, 2312 WC, The Netherlands*
beto@if.ufrj.br

Keywords: Pieter Zeeman, ether drag, interferometer, Boerhaave Museum

Abstract

During WWI, Dutch physicist Pieter Zeeman successfully reproduced an experiment previously performed by Fizeau in 1851, where the change in the speed of light in running water was measured. Zeeman's goal was to check for a correction factor which would complement Fizeau´s result. As of 1907, this factor was shown to be in accordance with Einstein's theory of special relativity. Thus in his experiment Zeeman gave significant evidence for the validity of Einstein's theory.
Afterwards, Zeeman became interested in testing for the same effect in solids. He purposed a fairly sophisticated mechanical setup in which transparent rods would move back and forth in a straight path. The apparatus used in this series of experiments is kept at Museum Boerhaave in Leiden, the Netherlands. In our presentation we analyse the equipment used by Zeeman in these last experiments in light of the remaining documentation and archival material. Thus we obtain a good impression of Zeeman's experimental ingenuity and perseverance. Yet, we also wonder what motivated Zeeman to conduct this series of experiments, as there were no reasons to believe that different results would be found other than from previous experimentation. The answer to this question provides a surprising insight into the consequences of the rise of Physics laboratories at Dutch universities in the early 1900s. We conclude that Zeeman's apparatus symbolizes a particular period in the history of experimental physics.

Beto Pimentel's alma mater is the Universidade Federal Fluminense (UFF), where he hold a bachelor's degree in physics and physics teaching and where he concluded his M.Sc. degree in optics and metrology. Since 1996 at Universidade Federal do Rio de Janeiro (UFRJ), Beto's main research interests cover science teaching, epistemology and history of science, the latter having been the subject of his Ph.D. degree (on the role of interferometry in XIXth century science) in 2012.

Ad Maas is curator at Museum Boerhaave, Leiden. He is a historian with Ph.D. degree (thesis about physics in Amsterdam between 1877 and 1940). He specialized in history of Dutch physics, Dutch scientific culture (1750-1950) and Willem Jacob's Gravesande. If you scroll the internet you will find that Ad Maas is also a photographer, has a driving school and is in short a very versatile person.

DRUMMOND LIGHT, LIMELIGHT

P. Lauginie[a] and F. Gires[b]

[a]GHDSO, Université Paris-Sud, Faculté d'Orsay, 91405 Orsay cedex, France
[b]ASEISTE, 3 rue des Chalets, 24000 Périgueux, France
pierre.lauginie@u-psud.fr

Keywords: light sources, XIXth century, optics, entertainment world

Abstract

The 'Drummond lamp' also called 'Drummond Light' or 'Limelight' was the most intense light source used for most of the nineteenth century, after the heliostat and before the adaptation of the electrical arc. It is a kind of blowtorch, fed, first with oxygen, and secondly, either with town gas, hydrogen, alcohol or ether. The flame is directed onto a piece of quicklime that, becoming white hot, emits extremely intense light, almost blinding. Thomas Drummond (1797-1840) adapted and improved a device invented by another Scott, Goldsworthy Gurney (1793-1875), a many-sided inventor, circa 1820. He applied it to the topography, especially the cartography of the hazy country of Ireland: 'light could be observed 68 miles away and would cast a strong shadow at a distance of thirteen miles'. The Drummond lamp was used for optical experiments, in particular by Fizeau in his measurement of the speed of light with a toothed wheel device, between Suresnes, near Paris, and Montmartre in 1849. Cornu would use it again at his duplication of Fizeau's experiment in 1876. A Drummond lamp of this epoch can be seen in the 'Fizeau scene' in the film Les magiciens de la lumière (Wizards of Light), a film produced by the Faculty of Sciences of Orsay.

The 'Drummond light' was widely used in the nineteenth century for stage lighting in theatres and music halls. The oxygen was produced in situ by a chemical process! In England, someone in the public eye was said to be 'in the limelight'. This is the origin of the title of the famous film of Charlie Chaplin: Limelight.

Pictures of Drummond lamps, engravings and a video will be shown. The 'quicklime effect' or candoluminescence was at the root of the new gas mantle arising around 1880. The physical origin of this effect will be discussed.

Pierre Lauginie, a former lecturer and researcher in Physics at the Faculté des Sciences d'Orsay, Paris-Sud University, has introduced an experimental approach to the History of science. He recently took part, as a scientific author, in a history of science film Les magiciens de la lumière (Wizards of Light) tracing the history of the speed of light measurements from Galileo to Léon Foucault. He is involved in scientific heritage projects in Orsay.

Francis Gires, a former teacher in Physics in French high schools, is a founding member (2004) and current President of the ASEISTE, an association aiming at the study and preservation of the scientific and technical instruments of French secondary education schools. He has taken a decisive part in several exhibitions, in completing reference books on high schools collections and an extensive on-line catalogue of several thousands objects.

SURVEYING RESULTS OF SETS AND COLLECTIONS OF ARTIFACTS RELATED TO BRAZILIAN FEDERAL UNIVERSITIES

M. Granato[a], E. S. Maia[a], F. P. Santos[a], G. G. Castro[a], M. S. Damasceno[a]

[a]Museu de Astronomia e Ciências Afins, Rua Gal. Bruce 586, Rio de Janeiro, 20921-030, Brazil
fernandasantos@mast.br

Key words: Scientific heritage, Scientific instruments, Collections, University heritage

Abstract

Most of Brazil's science and technology heritage remains to be identified. In 2010, the Museum of Astronomy (MAST) in Rio de Janeiro initiated a national survey aimed at both building a picture of the current state of this heritage and as a first step towards change. The survey is divided into different areas of knowledge and different time frames. Specifically, the survey covers groups of objects manufactured before the 1960s from the so-called 'exact sciences' and engineering, as well as geography, geology and oceanography.

A major portion of the institutions and sets of artifacts of interest to the project are in the ambit of federal universities. The present existence of historical objects at these establishments mainly occurs in either one of two situations: either personal initiatives by lecturers or technical staff, often due to emotional attachment to the artifacts because they were part of their professional life, and which they normally keep in their own offices and labs; or objects that have been abandoned, forgotten, typically located in cupboards, drawers and storerooms in universities, sometimes for many years. Often, in many of these institutions, a qualitative change of attitude can be observed as a result of MAST's work to preserve their cultural heritage. These changes become more evident and more frequent after MAST visits to see the collections. Staff at these institutions begins to see these objects in a new light when they rediscover them and perceive their value. This communication presents preliminary results concerning the federal universities that were visited until now. This work presents preliminary results concerning the federal universities that have been visited to date.

Marcus Granato is metallurgical engineer with Master (1999) and D.Sc. (2003) degrees in Materials Science from the Federal University of Rio de Janeiro. Currently he is Senior Technologist at the Museu de Astronomia e Ciências Afins where he has been the Head of the Museology Department since 2004. He is Professor of Conservation at the Post-Graduate Program on Museology and Heritage (Federal University of Rio de Janeiro State and MAST). His main research interests lie in conservation of scientific instruments, science and technology heritage and history of collections. He is the leader of a Brazilian research group in cultural heritage preservation.

Elias da Silva Maia is a historian with Master degree (2011) in History from the Fluminense Federal University. He is a PhD student at the History of Science Program in the Federal University of Rio de Janeiro. Currently he makes part of the team that develops the project Promotion of the Brazilian Scientific and Technological Heritage at MAST.

Fernanda Pires Santos is a historian and a Master student at the Museology and Heritage Program of the Federal University of Rio de Janeiro State (UNIRIO and MAST). Currently she makes part of the team that develops the project Promotion of the Brazilian Scientific and Technological Heritage at MAST.

Glória Gelmini de Castro is a museology student at the Federal University of Rio de Janeiro State (UNIRIO). She made part of the team that develops the project Promotion of the Brazilian Scientific and Technological Heritage at MAST.

Mariana S. Damasceno is a museology student at the Federal University of Rio de Janeiro State (UNIRIO). Currently she currently makes part of the team that develops the project Promotion of the Brazilian Scientific and Technological Heritage at MAST.

Session 7 – Scientific Instruments and the Understanding of Scientific Ideas (Parallel Session)

Chair: Adriana Mortara, History Museum of Instituto Butantan, Brazil [Graduate Classroom (MAST building)]

- Benjamin Martin: itinerant lecturer of Newtonian natural philosophy and scientific instrument maker in eighteenth-century England
Luiz Carlos Soares, Fluminense Federal University

- Balancing Light and Heat – Rumford's Experiments with the Thermoscope and the photometer
Peter Heering, University of Flensburg

- Scientific Objects and the Perception of Historical Time
Ricardo Aguiar Pacheco, Federal Rural University of Pernambuco

- Filming Nineteenth Century Physics Demonstrations with Historical Instruments
Paolo Brenni, Fondazione Scienza e Tecnica

- Stepping into the Past to Understand Time: explorations with astrolabes, clocks, and observation
Elizabeth Cavicchi, Edgerton Center, MIT

- The Good, The Bad and The Pretty: diffraction gratings in museums
Tacye Phillipson, National Museums Scotland

BENJAMIN MARTIN: ITINERANT LECTURER OF NEWTONIAN NATURAL PHILOSOPHY AND SCIENTIFIC INSTRUMENT-MAKER IN EIGHTEENTH-CENTURY ENGLAND

L. C. Soares

Universidade Federal Fluminense, Campus do Gragoatá - ICHF - Bloco O - 5º Andar, Niterói (RJ), 24.210-201, Brazil
luizcsoares@globo.com

Keywords: Benjamin Martin; Itinerant Lecturer; Scientific Instrument-Maker; Eighteenth- Century England.

Abstract

From the 1740s to the 1780s, Benjamin Martin (1704-1784) was recognised, by the English intellectual circles, as one of the most important Newtonian Natural Philosophers and an outstanding diffuser of Sir Isaac Newton's works. In the 1730s, Martin had headed a boarding school in the town of Chichester (South England) and he started his activities as a scientific instrument-maker. In the beginning of the 1740's, Martin closed his boarding school and entered the life of an independent and itinerant lecturer of Newtonian Natural and Experimental Philosophy, travelling around many towns of Southern, Central and Western England and obtaining great respectability with his new professional activity. Around 1756, 52 years old and fatigued by his itinerant activities, Martin opened a shop of scientific instruments in Fleet Street, London, where he manufactured and sold (until his death in 1782) many of his inventions and improvements. Amongst them were several types and sizes of telescopes and cylindrical microscopes, as well as eyeglasses to correct vision (known as spectacles in the middle of eighteenth century).

Thus, the focus of this paper is Benjamin Martin's professional trajectory as itinerant lecturer of Natural and Experimental Philosophy and scientific instrument-maker. We also indicate that this work is a partial result of a larger research on the actuation and importance of itinerant lecturers of Natural and Experimental Philosophy in the context of creation of an intellectual background for the English Industrial Revolution. Martin's case study is very expressive because – due to his many publications, inventions and improvements of scientific instruments – he can be considered as one of the exponents of the dissemination of an Applied Science ideal, which constituted one of the principal elements of the intellectual transformation of eighteenth-century English society.

Luiz Carlos Soares is historian with Master and PhD. degrees in History respectively from the Fluminense Federal University and from University College London (University of London). Currently he is full Professor of Modern and Contemporary History of the Department of History at the Fluminense Federal University. His present research interests are related to the History of Science and Technology in eighteenth-century England.

BALANCING LIGHT AND HEAT – RUMFORD'S EXPERIMENTS WITH THE THERMOSCOPE AND THE PHOTOMETER

P. Heerring

Institute of Physics and Chemistry and its Didactics, University of Flensburg, Auf dem Campus 1, 24943 Flensburg, Germany
peter.heering@uni-flensburg.de

Keywords: Replication method, Rumford, Thermoscope, Photometer

Abstract

Benjamin Thompson, Count Rumford published in the early nineteenth century experiments on radiant heat. In his researches he used a thermoscope which he claimed he had developed. Even though Rumford was at that time a well-established researcher, according to historians of science this research got him in trouble In 1804, when John Leslie published his monograph on radiant heat, it became evident that Rumford possibly knew about this work and the findings he had published previously were similar to Leslie's results.

Rumford's respective experiments were analyzed with the replication method. Moreover, we also analyzed Rumford's experiments with the photometer, an instrument that he introduced in the late eighteenth century to investigate light intensities – this was relevant to rate the efficacy (and thus the efficiency) of light sources. Practice with both instruments reveals that they have common working principle. However, Leslie's experiment has a completely different basis. Consequently, it appears evident that Rumford did not simply plagiarized Leslie's research. Even though his findings are comparable to the ones published by Leslie, it appears from the analysis of the practice with his instruments that his investigations were original, at least in the sense that he applied a measuring technique he already had mastered to a new problem.

In the presentation, Rumford's experiments will be analyzed and discussed. Moreover, the experiences with reconstructions of Rumford's set-ups will be discussed.

Peter Heering is professor of physics and physics didactics at the University Flensburg since 2009. His main research interests are historical scientific practices which he analyses with the replication method, and the implementation of history of science in science education. He is currently President-elect of the IHPST-Group (http://ihpst.net/) and Vice-President of the Inter-divisional Teaching Commission of the International Union of History and Philosophy of Science.

SCIENTIFIC OBJECTS AND THE PERCEPTION OF HISTORICAL TIME

R. A. Pacheco

Universidade Federal Rural de Pernambuco - UFRPE, Rua Dom Manuel de Medeiros, s/nº CEP 52171-010, Brasil
Pacheco_ricardo@yahoo.com.br

Keywords: historical time, exhibitions, Memorial of the UFRPE

Abstract

Museums create and continue to be thought of as "memory spaces". From the fifteenth century curio collectors to the public and private institutions of the twenty first century, the practice of encouraging contact with the object was inspired by the idea of stimulating the senses to promote ownership of certain recollection skills from the past. Using the category of 'regimes of historicity' and the concept of 'presentism', articulated by François Hartog, we shall focus on how museums broadcast the notion of historical time in exhibitions. We also ask what is the relationship between historic time offered by museums to their audiences? This paper examines the possibilities of perception of time history from parts of the permanent exhibition of the Memorial of the UFRPE. In particular, we focus on the perception of change and permanence in the way of doing science and to carry out higher education.

Ricardo de Aguiar Pacheco has a PhD degree in History from the Federal University of Rio Grande do Sul. Currently he is professor in the Department of Education at the Federal Rural University of Pernambuco (UFRPE), responsible for the Federal Rural University Memorial and Coordinator of Institutional Bursary for New Teachers Programme at UFRPE. His main research topics are on Cultural Heritage, Memory, History and Society.

FILMING NINETEENTH CENTURY PHYSICS DEMONSTRATIONS WITH HISTORICAL INSTRUMENTS

P. Brenni

CNR, Fondazione Scienza e Tecnica, Via Giusti 29, 50100 Firenze (Italy)
p.brenni@museogalileo.it

Keywords: videos, physics, instruments, historical experiment, demonstration, didactic

Abstract

The Fondazione Scienza e Tecnica in Florece preserves one of the largest collections 19th century physics instruments in Europe. After several years of restoration most of these instruments are perfectly functional. But they are too fragile and precious to be regularly used for lecture demonstrations. Therefore, we decided to film a series of classical experiments. Now more than 50 videos related to optics, pneumatics and electricity are available on YouTube: *http://www.youtube.com/user/florencefst/videos?sort=dd&view=0&page=1*

In my paper I will present how our videos are made as well as the problems related to the use of nineteenth century historical instruments. I will also discuss the possible uses of these videos both in history and didactic of physics.

Paolo Brenni studied experimental physics at the University of Zürich, where he graduated in 1981. He than specialised in the history of scientific instruments and of precision industry in the period from the beginning of 18th century to the mid-20th century. He is researcher for the Italian CNR (National Research Council) and works in Florence for the Fondazione Scienza e Tecnica and collaborates with the Museo Galileo. Actually he is president of the Scientific Instrument Commission of the IUHPS and of the Scientific Instrument Society. In 2009 he was elected first vice-president of the DHST of the IUHPS.

STEPPING INTO THE PAST TO UNDERSTAND TIME: EXPLORATIONS WITH ASTROLABES, CLOCKS, AND OBSERVATION

E.M. Cavicchi

Edgerton Center, MIT, 4-408, 77 Massachusetts Ave, Cambridge, MA, 02139, USA
ecavicch@mit.edu

Keywords: exploratory learning, clock mechanism, astrolabe, historical reconstruction

Abstract

An early twentieth century Parisian boy scampers deftly within the gears and swinging pendulum of an immense clock, keenly aware of its mechanism, whose running he daily maintains. Perhaps hindered by the ubiquitous availability of digitized time-readouts, such knowing agility with clocks, mechanism and time is not shared by typical viewers of Hugo, Martin Scorsese's 2011 movie based on the 2007 book by Brian Selznik. In my exploratory seminar, university student participants stepped further into that now-alien world through doing physical explorations with time-keeping instruments and practices of history and their own inventions. Dissecting a windup toy, or interacting with a replica of a 19th century pendulum clock, students developed a tactile and personal understanding of the nature of time and time-keeping. Interacting with an astrolabe, students conceived the idea of using it in reverse: not to tell time from the stars, but to find stars – which are unfamiliar to them – based upon the time of day. These students were participants in my MIT seminar on recreating past historical experiments motivated by the curiosity and questioning of present learners with future aspirations. I facilitate students in discovering their own curiosities about natural and historical materials and initiating investigations by employing the research pedagogy of critical exploration in the classroom. Developed by Eleanor Duckworth from origins in Jean Piaget, Bärbel Inhelder and the 1960s Elementary Science Study, critical exploration fosters an environment where learners' curiosity provokes explorative, collaborative developments in understanding the world and themselves. For example, confusion with the astrolabe brought one student to acknowledge that he lacked observational experience; others developed that experience using an instrument laser-cut by students. By opening clocks and probing their insides, these students entered Hugo's world. Inventing and constructing a mechanism of their own, they too pondered how to make time's passing more evident.

Elizabeth Cavicchi teaches at MIT's Edgerton Center through exploring natural phenomena and recreating historical experiments. Postdoctoral research at the Dibner Institute followed her Ed.D. from Harvard University; masters' degrees at Harvard, Boston University, and MIT; undergraduate studies at MIT. Her publications include Perspectives on Science (2006) and New Educator (2009). A visual artist, she responds to creativity in history and learning.

THE GOOD, THE BAD AND THE PRETTY: DIFFRACTION GRATINGS IN MUSEUMS

T. Phillipson

National Museums Scotland, Chambers Street, Edinburgh, EH11 1SW, Scotland
T.Phillipson@nms.ac.uk

Keywords: Diffraction gratings, ruling engines, international trade, object survival

Abstract

Ruling diffraction gratings is a very high precision technological challenge, and relatively few machines throughout the world have been made to produce high quality ruled gratings. This led to a trans-national trade in gratings according to the special characteristics of the gratings ruled on different engines. Diffraction gratings in the collections of National Museums Scotland and the University of St Andrews illustrate this, particularly the work done at Johns Hopkins University in the USA and on the Blythswood machine at Blythswood and later at the National Physical Laboratory in the UK. Notably, these collections illustrate the process of ruling gratings from the unruled blanks to experimentation and quality control. They highlight the importance of assessing how and why an artefact has come into a museum collection and whether it is an outstanding, average or poor representative of its type.

Tacye Phillipson is Senior Curator of Science at National Museums Scotland with responsibility primarily for twentieth century, and later, material. Her main topics of research are: Energy technology, politics and sociology of technology.

Session 8 - Around Museums and Scientific Heritage: instrument preservation and display I

Chair: Tacye Phillipson, National Museums Scotland [MAST Auditorium]

- Museum Boerhaave: from junk to (almost) triple A
Hans Hooijmaijers, Boerhaave Museum

- Musealization of Science & Technology Objects
Maria Lúcia de Niemeyer M. Loureiro, Museum of Astronomy and Related Sciences | Liliane Bispo dos Santos, Museum of Astronomy and Related Sciences | Flávia B. Araújo da Silva, Federal University of the State of Rio de Janeiro (Museology undergraduate course) | Mariane Aparecida N. Vieira, Federal University of the State of Rio de Janeiro (Museology undergraduate course)

- Museum Collection of Health: the case of Oswaldo Cruz Foundation
Pedro Paulo Soares, Museum of Life, Oswaldo Cruz House | Inês Santos Nogueira, Museum of Life, Oswaldo Cruz House

- An Outlook of the Collection of Scientific Instruments of the Museu Dinâmico de Ciência e Tecnologia-UFJF (Brazil)
Patricia M. Mendes, Federal University of the State of Rio de Janeiro (Museology and Heritage Master Course) | Marcio Rangel, Museum of Astronomy and Related Sciences _Paulo Noronha, Museum of Astronomy and Related Sciences

- Scientific heritage in Brazil. Surveying Results of Sets and Collections of Artifacts Related to the Exact Sciences and Engineering
Marcus Granato, Museum of Astronomy and Related Sciences | Elias da Silva Maia, Museum of Astronomy and Related Sciences | Fernanda Pires Santos, Museum of Astronomy and Related Sciences | Glória Gelmini de Castro, Federal University of the State of Rio de Janeiro (Museology undergraduate course) | Mariana S. Damasceno, Federal University of the State of Rio de Janeiro (Museology undergraduate course)

- Instruments of Science and Technology: critical perspective of mutual relations
Renata Monteiro, Federal University of Rio de Janeiro ('Science and Health Education' Postgraduate Program)

MUSEUM BOERHAAVE: FROM JUNK STATUS TO (ALMOST) TRIPLE A

H. Hooijmaijers

Museum Boerhaave, P.O. Box 11280, 2301 EG, Leiden, The Netherlands
hanshooijmaijers@museumboerhaave.nl

Keywords: Museum Boerhaave, money, campaign

Abstract

Museum Boerhaave was in great danger last year. Due to the crisis and a cultural unfriendly government, the museum was set a financial target. If it didn't succeed in reaching that goal, the result would have been closure. In my paper I deliver the story of a hectic half year in which Museum Boerhaave achieved to collect 1,000,000 euros. I will sketch the different levels of the campaign with which we tried to gain money and its successes and failures. I show the complete picture and hope to give everyone new ideas for their own use. Last but not least I invite everyone to come up with their own ideas for future use of all participants.

Hans Hooijmaijers is Head of Collections and Vice Director at Museum Boerhaave in Leiden, The Netherlands. He studied physics in Nijmegen and continued as a researcher at the Max Planck Institute für Stromungsforschung in Göttingen and later the University of Groningen. At Museum Boerhaave he started as curator of physics and astronomy focussing on the period 1600-1900. He curated several exhibitions on science in sports, the weather, light, food, Christiaan Huygens, clocks and telescopes. His latest writing projects were on a Dutch instrument maker of orreries, the nineteenth century Leiden Observatory and Dutch navigation.

MUSEALIZATION OF SCIENCE & TECHNOLOGY OBJECTS

M. L. N. M. Loureiro[a], L. B. Santos[a], F. B. A. Silva[b], M. A. N. X. Z. Vieira[b]

[a] Museu de Astronomia e Ciências Afins, Rua General Bruce, 586, Rio de Janeiro, 20921-030, Brasil
[b] Undergraduate Course in Museology, Federal University of the Rio de Janeiro State, Rio de Janeiro, Brazil
marialucia@mast.br

Keywords: Musealization, Scientific Instruments, Tide predicting machine, Chronometer

Abstract

The study addresses musealization of science & technology objects, reflecting on three objects from the collection of Museu de Astronomia e Ciências Afins (Museum of Astronomy and Related Sciences, Rio de Janeiro, Brazil): a tide predicting machine and a chronometer that belonged to the Brazilian Observatory and a Linear Particle Accelerator built at the Brazilian Center of Physical Researches - CBPF.

According to this study, musealization is an informational process aimed at a specific preservation strategy that has the museum as an exemplary case, and includes a set of selective processes of info-communicational character based on the valorization of different types of things.

The importance of science & technology objects is stressed by Gerard Turner, who emphasizes that observation and experiment are the basis of western scientific tradition. For Van Helden and Hankins, instruments determine what can be done and, therefore, what can be thought.

After being musealized, an object loses its original function and starts to play the role of document becoming an object of study and target of preservation and divulgation practices. In a broad sense, the idea of preservation goes beyond the actions aimed at maintaining the physical integrity of an object and includes the activities of registration and transfer of information to society at large, including future generations.

Musealization involves human values and, therefore, choices. What to musealize? What to leave as heritage for future generations? The search for an answer to these questions is a major challenge for museums, because they define, at the same time, what to preserve and what to relegate to extinction.

Maria Lucia de Niemeyer Matheus Loureiro has a bachelor's degree in Museology from Museu Histórico Nacional, Master and PhD degrees in Information Science from the Federal University of Rio de Janeiro (UFRJ). Currently she is researcher at Museu de Astronomia e Ciências Afins - MAST, and professor in the postgraduate course in Preservation of Science and Technology Collections (MAST). Her research interests are in the areas of musealization processes and science divulgation.

Liliane Bispo dos Santos is museologist (Federal University of Rio de Janeiro State, 2009), with an undergraduate degree in Preservation of Science and Technology Collections from the Museu de Astronomia e Ciências Afins (2012). Currently she has a fellowship (CNPq), working at the Museology Department (MAST). Her main research interests are: scientific heritage, documentation, history of Pedro II High School.

Flávia Braga Araújo da Silva is an undergraduate student in Museology at Federal University of Rio de Janeiro State (UNIRIO). Currently she has a scientific initiation scholarship (CNPq) at Museu de Astronomia e Ciências Afins.

Mariane Aparecida do Nascimento Vieira is an undergraduate student in Museology at Federal University of Rio de Janeiro State (UNIRIO). Currently she has a scientific initiation scholarship (CNPq) at Museu de Astronomia e Ciências Afins.

MUSEUM COLLECTION OF HEALTH: THE CASE OF OSWALDO CRUZ FOUNDATION

P. P. Soares[a], I. Nogueira[a]

[a]Casa de Oswaldo Cruz/Museu da Vida, Avenida Brasil 4365,Rio de Janeiro, 21045-900, Brasil
pedros@coc.fiocruz.br

Keywords: history, memory, science, health.

Abstract

The museum collections of the Oswaldo Cruz Foundation, under the guardianship of the Oswaldo Cruz House / Museum of Life, express the formation and transformations of fields and practices of biomedical sciences in Brazil, from the nineteenth century ad throughout the twentieth century. This presentation discusses the historical research about the artifacts of Science & Technology in health, focusing on the scientific relations between Brazil and other countries, in the formation of networks of manufacturers and merchants, and materials, purposes, procedures and uses of scientific instruments. Besides elucidating the methods, practices and techniques, these objects – preserved as cultural heritage of science and health – plays an important role for institutional memory and these are sources for studies about conjectures and social processes.

Pedro Paulo Soares is a historian with a Master degree in Social History from the Federal University of Rio de Janeiro. Since 2010, he coordinates the research project The museum collection of health in Oswaldo Cruz Foundation: objects, uses, history, at Museum of Life/Oswaldo Cruz Foundation. His main areas of interest are on the historic heritage of S&T in health, museum collections and their relationship to the institutional history and the fields of History of Science.

Inês Santos Nogueira is a historian with a Master degree in Social Sciences from the State University of Rio de Janeiro (PPCIS / UERJ). She make part of the team in charge of the historical research at the Museum of Life/Oswaldo Cruz Foundation since 2010, conducting research on the historic heritage of S&T in health, museological collections and their relationship to the institutional history and the fields of History of Science.

AN OUTLOOK OF THE COLLECTION OF SCIENTIFIC INSTRUMENTS AT MUSEU DINÂMICO DE CIÊNCIA E TECNOLOGIA-UFJF (BRAZIL)

P. M. Mendes[a], M. Rangel[b], P. Noronha[b]

[a] Master Course in Museology and Heritage (UNIRIO/MAST), Av. Pasteur 496, Rio de Janeiro, Brazil
[b] Museu de Astronomia e Ciências Afins, Rua General Bruce 586, São Cristóvão, Rio de Janeiro, Brazil, CEP. 20921-030.
patriciamunizm@hotmail.com

Keywords: Scientific Heritage, University Museum, Science and Technology Collections

Abstract

In the contemporary world, universities are strategic spaces for the custody and preservation of science & technology collections. In reviewing these cases we find that for different and not always clearly stated reasons, these institutions turn these collections into museological heritage. In this context, the Federal University of Juiz de Fora (UFJF) has made a significant contribution: the creation of Museu Dinâmico de Ciência e Tecnologia (MDCT). Focusing our analysis on the creation of this science and technology museum and the collections that are under its protection, in this presentation we will discuss the methods and procedures that culminated in the musealization of the MDCT collection. It is composed of a variety of objects, including scientific instruments, paper documents and photographs. The present work aims to analyze the MDCT collection of scientific instruments and contribute to the studies related to the formation and consolidation of S&T collections in Brazil. We hold that these collections are important sources of information for the field of museums, museology and heritage, because when we research these testimonies of the consolidation of science and technology in Brazil, we are also discussing the transformation of these cultural heritage collections into historical evidence of the expansion of Brazilian society in its territory.

Patricia Muniz Mendes is a historian with postgraduate degrees in Management of Cultural Heritage from the Instituto Metodista Granbery and in Preservation of the Collections of Science and Technology from the Museu de Astronomia e Ciências Afins. She is student at the Master's course in Museology and Heritage (UNIRIO/ MAST) and has experience in the areas of: Archeology, Anthropology, education, History and Museums.

Marcio Rangel is a museologist with Master degree in Social Memory from the Federal University of the State of Rio de Janeiro (UNIRIO) and PhD. degree in History of Science from the Oswaldo Cruz Foundation (FIOCRUZ). He is researcher of the Museum of Astronomy and Related Sciences (MAST) and Professor of the School of Museology at UNIRIO. He also teaches at the Masters course in Museology and Heritage (UNIRIO and MAST). His main research interests are on museology, with emphasis on historical and scientific collections, history of science, memory and heritage.

Paulo Noronha is undergraduated in Social Sciences from the Universidade Federal de Juiz de Fora with a Master degree in Production Engineering from COPPE (Universidade Federal do Rio de Janeiro - UFRJ). He is Senior Technologist at the Museu de Astronomia e Ciências Afins and collaborates with the Museu Dinâmico de C&T (UFJF). He has experience in the areas of Anthropology and Museums.

SCIENTIFIC HERITAGE IN BRAZIL. SURVEYING RESULTS OF SETS AND COLLECTIONS OF ARTIFACTS RELATED TO THE EXACT SCIENCES AND ENGINEERING

M. Granato[a], E. S. Maia[a], F. P. Santos[a], G. G. Castro[a], M. S. Damasceno[a]

[a]Museu de Astronomia e Ciências Afins, Rua Gal. Bruce 586, Rio de Janeiro, 20921-030, Brazil
eliasmaia@mast.br

Key words: Scientific heritage, Scientific instruments, Collections, University heritage

Abstract

Most of Brazil's science and technology heritage has yet to be tracked down. The knowledge amassed on the topic is still limited, and there is a real risk that Brazilian science and technology objects may already have been modernized or discarded, mostly to make way for more recent or up-to-date instruments or apparatus. A national survey was begun in 2010 to build up a picture of the current state of this heritage as a first step towards changing this picture. The survey is divided into different areas of knowledge and different time frames. As such, we are interested in sets of objects from the exact sciences, the different engineering specialties, as well as geography, geology and oceanography, which were manufactured in or before the 1960s. We assume that objects produced after this decade may still be in use and therefore fall outside the scope of the project.

This work presents an overview of Brazil's scientific heritage and the information provided is the outcome of this survey which is being undertaken under the coordination of Museu de Astronomia e Ciências Afins ("Museum of Astronomy and Related Sciences", or MAST), which is leading teams from five Brazilian universities.

A registration form was prepared which was adapted from a form used in surveys of collections of this kind in Portugal. Sets of objects have been identified at museums, universities, military establishments and some secondary schools. The best preserved collections are at the few museums devoted to the area, but the universities hold most of the artifacts. The overwhelming majority of the objects were made in the twentieth century, primarily the second half. The objective of this initiative is to raise the awareness of the Brazilian state so that a policy is created for preserving this heritage and financing mechanisms to assure it can be researched, conserved and ultimately fulfill its mission in society.

Marcus Granato is metallurgical engineer with Master (1999) and DSc. (2003) degrees in Materials Science from the Federal University of Rio de Janeiro. Currently he is Senior Technologist at the Museu de Astronomia e Ciências Afins where he has been the Head of the Museology Department since 2004. He is Professor of Conservation at the Post-Graduate Program on Museology and Heritage (Federal University of Rio de Janeiro State and MAST). His main research interests lie in conservation of scientific instruments, science and technology heritage and history of collections.

Elias da Silva Maia is a historian with Master degree (2011) in History from the Fluminense Federal University. He is a PhD student at the History of Science Postgraduate Program in the Federal University of Rio de Janeiro. Currently he makes part of the team that develops the project Promotion of the Brazilian Scientific and Technological Heritage at MAST.

Fernanda Pires Santos is a historian and a Master student at the Museology and Heritage Program of the Federal University of Rio de Janeiro State (UNIRIO and MAST). Currently she makes part of the team that develops the project Promotion of the Brazilian Scientific and Technological Heritage at MAST.

Glória Gelmini de Castro is a museology student at the Federal University of Rio de Janeiro State (UNIRIO). She made part of the team that develops the project Promotion of the Brazilian Scientific and Technological Heritage at MAST.

Mariana S. Damasceno is a museology student at the Federal University of Rio de Janeiro State (UNIRIO). Currently she makes part of the team that develops the project Promotion of the Brazilian Scientific and Technological Heritage at MAST.

INSTRUMENTS OF SCIENCE AND TECHNOLOGY: CRITICAL PERSPECTIVE OF MUTUAL RELATIONS

R. Monteiro

Universidade Federal do Estado do Rio de Janeiro (UNIRIO), Av. Pasteur 458 Urca, Rio de Janeiro, 22290-240, Brazil
renatas_monteiro@hotmail.com

Keywords: science center, science and technology museum, STS, collective subject speech

Abstract

The STS movement in science education arising in the 1960s and 1970s salvacionistic challenged view of science and its supposed neutrality. This movement pointed out the need for scientific and technological training of citizens as a means of social participation in policy decisions about science and technology and criticized the technocratic perspective that left such decisions simply in the hands of 'experts'. This research is aimed at the problem of STS relationships, examining the public perception of science centres and science technology museum using the collective subject discourse method. The field of research was developed in museum spaces with different characteristics, with the goal of analyzing the influence of exhibitions' presentations on the visitors perceptions of STS relations. Thus, the research was developed at the Museum of the Universe, Rio de Janeiro, and the Museum of Arts and Crafts, Belo Horizonte. The first museum approaches the model Science Centres of the third generation of museums, which prioritizes scientific concepts and phenomena, with a strong focus on manual interactivity. On the other hand, the second museum represents the first generation of museums, with its exhibition based on historical instruments that deal with the techniques, arts and crafts related to the universe of work in Brazil during the eighteenth to the twentieth centuries. The results showed that the later museum, with a prevalence of scientific instruments in the exhibition, had at higher frequency of core ideas related to critical perception of the STS relations, while the museum based on the science center model had a higher frequency of central ideas associated with naive visions of STS relations, such as those related to the idea of neutrality and technocratic perspectives.

Renata Monteiro is undergraduated in tourism, working with cultural heritage and specialized in Environmental Education. She got her MSc. Degree in Education from the Federal University of Rio de Janeiro State (2011) and is a DSc. student at the 'Science and Health Education' Program (Federal University of Rio de Janeiro - UFRJ). Currently she teaches at the Technical School Support Foundation of Rio de Janeiro (FAETEC).

Session 9 - Scientific Instruments as Sources for the History of Research (Parallel Session)

Chair: Richard Dunn, Royal Museums Greenwich, UK
[Graduate Classroom (MAST building)]

- History of the Geo Measure Lab "Theodoro Sampaio" (LGTS) of the Polytechnic School of the Federal University of Bahia (UFBA): the formation and challenges of a university collection
Ana Regina T. F. Teles, Polytechnic School, Federal University of Bahia | Rimara M. Santos, Federal University of Bahia (Museology undergraduate course)

- Butantan Institute's First Electron Microscope
Adriana Mortara Almeida, History Museum of Butantan Intitute

- Materializing Physics in Mexico with Cosmic Rays Instruments
Adriana Minor Garcia, Universidad Nacional Autónoma de México (Postgraduate Program in History and Philosophy of Science)

- The Old Laboratory of the Instituto de Psicologia: from scientific legitimation to the foundation of an institution
Josiane Pawlowski, Psychology Institute, Federal University of Rio de Janeiro (UFRJ) | Guilherme M. B. Souza, UFRJ (Psychology undergraduate course) | Érika G. Ambrósio, UFRJ (Psychology undergraduate course) | Hugo Leonardo R. S. da Rosa, UFRJ (Psychology undergraduate course) | Rebeca Bartolote da Silva, UFRJ (Psychology undergraduate course) | Júlia Matos da Fonseca, UFRJ (Psychology undergraduate course) | Flávia Carolina S. Gomes, UFRJ (Psychology undergraduate course) | Arthur Arruda Leal Ferreira, Psychology Institute, UFRJ

- Solar Observations and Solar Instruments
Eugenio Reis, Museum of Astronomy and Related Sciences | Lise Marcelino Souza, Antares Observatory, Feira de Santana State University

- Research and Documentation of Museology and Seismology: history of seismographs and its performance in Brazil
Thomas F. S. Nizio, University of Brasilia (Museology undergraduate course) | George Sand Leão A. França, Seismological Observatory, University of Brasilia

HISTORY OF THE GEO-MEASUREMENT LAB "THEODORO SAMPAIO" (LGTS) OF THE POLYTECHNIC SCHOOL OF THE FEDERAL UNIVERSITY OF BAHIA (UFBA): THE FORMATION AND CHALLENGES OF A UNIVERSITY COLLECTION

A. R. T. F. Teles[a], **R. M. Santos**[b]

[a] *Depto.de Transportes, Escola Politécnica, UFBA, Salvador-Bahia, Brasil*
[b] *graduate schoolarship, Museology Student, Faculdade de Filosofia e Ciências Humanas, UFBA, Salvador-Bahia, Brasil*
anaregi@ufba.br

Keywords: Collections of science and technology objects, Technological Evolution, Material Culture, Scientific Heritage

Abstract

In most universities, scientific instruments are acquired using specifications defined by the faculty, especially if they are for practical teaching activities. Over time, some instruments become obsolete as more modern ones are produced, gradually forming a parallel set of objects that have fallen into disuse. As no other uses than the ones for which they were acquired are perceived for these objects, the usefulness of keeping them is often questioned, as is the use of the valuable space they occupy. Only a few institutions have policies for the preservation and maintenance of these objects and the LGTS collection at the Federal University of Bahia is no exception. The first instruments were purchased in the late nineteenth century – when the Polytechnic School was founded – and others have been acquired through donations and agreements. Therefore, the collection has developed (and also been destroyed) over more than a century. This work presents the history of its formation, the challenges in keeping it, the current situation, and the perspectives regarding the involvement of the university's Department of Museology and Museu de Astronomia e Ciências Afins. It also shows the exemplary nature of this collection, marked by a large quantity and diversity of science and technology objects that bear witness to the technological evolution of surveying and observation equipment. Moreover, this work displays material culture through the presentation of two of the collection's objects: one that belonged to Theodoro Sampaio and another used by the Comissão da Carta Geral do Brasil, a commission deployed across Brazil to map out the country.

Ana Regina Torres Ferreira Teles is an architect and surveyor engineering with Master's degree in Geography. She is currently Professor at the Polytechnic School of the Federal University of Bahia (UFBA), teaching Topography, Cartography, Geodesy, Satellite Positioning System and GIS at undergraduate and graduate courses. Her main research interests are on Historical Cartography, Scientific Instruments of measuring and surveying, Linguistic Cartography.

Rimara Motta Santos is student in the undergraduate course on Museology at the Federal University of Bahia (UFBA). Her main research areas are on History of Museums and Collections, Documentation; scientific instruments.

BUTANTAN INSTITUTE'S FIRST ELECTRON MICROSCOPE

A.M. Almeida

Butantan Institute, Av. Vital Brasil 1500, São Paulo, SP, 05503-900, Brazil
amortara@butantan.gov.br

Keywords: Electron Microscope, Butantan Institute, Microbiology, History Museum

Abstract

The electron microscope on display at the Historical Museum of the Butantan Institute was acquired in 1952, by its director Aristides Vallejo Freire, with support from the Brazilian Research Council - CNPq. It was the first Siemens electron microscope to come to Brazil. The technical skills to use this equipment were obtained through training courses conducted in the United States with the Rockefeller Foundation support. Persio de Souza Santos attended courses in the University of Pittsburgh and helped guide the use of the microscope at the Butantan Institute. He then worked at the Polytechnic School of the University of São Paulo with microscopy ceramics. In addition to Persio, Helmut Ruska, a German physician, came to the Butantan Institute to assist in the training of those who would use the equipment. He was the brother of Ernst Ruska, who designed the first Siemens electron microscope, then at the Department of Micromorphology of the New York State Department of Health in Albany. He had already developed a number of studies with Siemens electron microscopes in Germany since the 1930s. He also developed research in partnership with Brazilian researchers on morphology of insect tissues, among other topics.

In the post second World War period, foreign makers of scientific instruments such as electron microscopes, acted aggressively in the dissemination, sale and training on the use of such types of equipment. This initiative facilitated the arrival of researchers and obtaining support from U.S. foundations to prepare Brazilian researchers, particularly in the field of Medicine and in some cases, Physics and Engineering.

Numerous articles were published by researchers of the Butantan Institute and by other research institutions that used the Siemens microscope (model 1000 A) for about 30 years. This instrument is now part of the historical collection of the Institute.

Adriana Mortara Almeida is a historian with Master (1995) and PhD. (2001) degrees in Communication and Arts from the University of São Paulo (USP). She made a post-doctorate in Museology at the University of Campinas, Brazil (2004). Since October 2010 she is Director of the History Museum of Instituto Butantan. She develops researches in the fields of Museum Education, Evaluation and History of Science.

MATERIALIZING PHYSICS IN MEXICO WITH COSMIC RAYS INSTRUMENTS

A. M. Garcia

Graduate Program in History and Phylosphy of Science, Universidad Nacional Autónoma de México; calle Minería 43 interior 11, colonia Escandón, delegación Miguel Hidalgo, Código Postal 11800, Distrito Federal, México.
admiga@gmail.com

Keywords: expedition, instruments, circulation, cosmic rays, physics, Mexico, and United States.

Abstract

A huge expedition through Canada, United States, Hawaii, New Zealand, Australia, Peru, and Mexico was organized by the US experimental physicist Arthur Compton in 1932. Its main goal was to take measurements of cosmic rays intensity at different geographical latitudes. Seven cosmic ray meters, portable instruments to take such measurements, were designed, calibrated, and standardized previously. People that lead each expedition were provided with one of those instruments, as well as trained to use it and to make the necessary handmade calculations and interpretations. People, instruments, and practices circulated with each expedition. Focusing on the Mexican expedition allows discussing not only how that circulation was managed, but also emphasizing how they were mobilized for local purposes. This paper is an attempt to analyze those topics.

What is more, instruments were crucial in Mexico for the involvement in the cosmic ray research introduced by Compton and supported by Mexican engineers in the thirties. Cosmic rays instruments were used and became significant in the Mexican context, including the mentioned cosmic ray meter and a cosmic ray counter designed and tested in Mexico in 1934 by another US experimental physicist Thomas Johnson. Also it was relevant a mathematical instrument for theoretical research of cosmic rays, the differential analyzer built by Vannevar Bush at the Massachusetts Institute of Technology. Mexican engineers that became the first physicists, made their thesis dissertation at MIT about cosmic rays theory using the Bush's analyzer. All those instruments were entangled in the attempt to create places of professionalization of physics in Mexico. In a certain sense, cosmic rays instruments gave materiality to the physics as a research profession in the local context. A reconstruction of that process is also included in this paper.

Adriana Minor García has a Bachelor's degree in Physics, Master degree in History and Philosophy of Science and she is a PhD student at the Graduate Program in History and Philosophy of Science, UNAM, Mexico City. Her PhD thesis is about the Mexican physicist Manuel Sandoval Vallarta, who was relevant to the establishment of inter-American scientific networks. Her main areas of interest are the social history of twentieth century physics, scientific instruments and international relations.

THE OLD LABORATORY OF THE INSTITUTO DE PSICOLOGIA: FROM SCIENTIFIC LEGITIMATION TO THE FOUNDATION OF THE INSTITUTION

G. M. B. Souza [a], E.G. Ambrósio [a], H. L. R. S. da Rosa [a], R. B. da Silva [a], J. M. da Fonseca [a], F. C. S. Gomes [a], A. A. L. Ferreira [b], J. Pawlowski [c]

[a]Gundergraduate Course of Psychology, Universidade Federal do Rio de Janeiro, Av. Pasteur, 250, Rio de Janeiro, 22290-250, Brazil
[b]Universidade Federal do Rio de Janeiro, Department of General and Experimental Psychology, Av. Pasteur, 250, Rio de Janeiro, 22290-250, Brazil
[c]Universidade Federal do Rio de Janeiro, Department of Psychometry, Av. Pasteur, 250, Rio de Janeiro, 22290-250, Brazil
josipski@gmail.com, Brazil

Keywords: Psychological instrument, history of psychology, psychological assessment

Abstract

In Brazil, the creation of psychology laboratories is prior to the establishment of psychological courses in the 1960s. These laboratories, based on models from research centers such as Leipzig, Cornell or Genebra, performed various functions: forensics, diagnosis, and even "scientific support" of the institution's activities. The creation of the Instituto de Psicologia (IP) of the Federal University of Rio de Janeiro - UFRJ also occurred in this historical context. Ever since the founding of the laboratory in 1924 at Colônia de Psicopatas do Engenho de Dentro, there has been an intense traffic of characters, lab equipment, headquarters, legal requirements, changes of institutions, functions and even their disappearance for short periods. Some components of this history are preserved in the old lab's equipment, even though after the 1960s it became less important, given its effectiveness as a teaching institute. Composed of pieces imported from Europe and the United States, some of this material was stored in the IP. In this work we aim to present a photographic record and a brief description of instruments that belonged to psychology laboratories. The study is part of a larger project that intends to organize both permanent and virtual exhibitions of these artifacts. A simultaneous task of cleaning, organization, library research and interviews was performed in order to achieve more information about the origins and use of the materials. Currently, the collection consists of fourteen instruments: audiometers, dynamometers, a polygraph, esthesiometer, and oscilloscope, among others. These apparatus refer to a period of transition in the history of psychometric tests, serving not only to academic purposes but also used for applied psychology in diverse contexts of intervention in the early twentieth century. They illustrate how instruments produce the "reality of psychological phenomena" and how they legitimize the "scientificity" and even the identity of an institution such as the IP (UFRJ).

Josiane Pawlowski is psychologist, with Master and Ph.D. degrees in Psychology from the Federal University of Rio Grande do Sul. Currently she is Adjunct professor in the Psychometric Department, Psychology Institute, at the Federal University of Rio de Janeiro. Her main research interests are on validation of psychological assessment instruments, history of measuring instruments in psychology, memory and other basic cognitive processes.

Guilherme Mello Bessa Souza is an undergraduate student of Psychology at the Federal University of Rio de Janeiro. His main areas of interests are on history of measuring instruments in psychology, memory and other basic cognitive processes.

Érika Gonçalves Ambrósio is an undergraduate student of Psychology at the Federal University of Rio de Janeiro. Her main areas of interests are on history of measuring instruments in psychology, memory and other basic cognitive processes.

Hugo Leonardo Rocha Silva da Rosa is an undergraduate student of Psychology at the Federal University of Rio de Janeiro. His main areas of interests are on history of measuring instruments in psychology, memory and other basic cognitive processes.

Rebeca Bartolote da Silva is an undergraduate student of Psychology at the Federal University of Rio de Janeiro. Her main areas of interests are on history of measuring instruments in psychology, memory and other basic cognitive processes.

Júlia Matos da Fonseca is an undergraduate student of Psychology at the Federal University of Rio de Janeiro. Her main areas of interests are on history of measuring instruments in psychology, memory and other basic cognitive processes.

Flávia Carolina dos Santos Gomes is an undergraduate student of Psychology at the Federal University of Rio de Janeiro Her main areas of interests are on history of measuring instruments in psychology.

Arthur Arruda Leal Ferreira is psychologist with Master degree in Psychology from the Federal University of Rio de Janeiro and Ph.D. degree in Clinical Psychology from the Pontifical Catholic University of Rio de Janeiro (PUC-RJ). Currently he is an Adjunct Professor in the Department of General and Experimental Psychology at the Federal University of Rio de Janeiro. His main area of interest is on history of psychology.

SOLAR OBSERVATIONS AND SOLAR INSTRUMENTS

E. Reis[a], L. M. Souza[b]

[a]Museu de Astronomia e Ciências Afins/MCTI, R. General Bruce, 586, Rio de Janeiro, 20.921-030, Brazil
[b]Observatório Astronômico Antares/Uefs, R. da Barra, 925, Feira de Santana, 44015-430, Brazil
eugenioneto@mast.br

Keywords: Solar instruments, Photoheliograph, Danjon Solar Astrolabe, Heliometer

Abstract

The aim of this paper is to present the history of instruments dedicated to study the Sun at the National Observatory, whether through photographs, the monitoring of sunspots, or astrometric measurements.

This history begins in 1887, when the Imperial Observatory gained its first solar instrument, a Steinhei photoheliograph, a precious donation from the astronomer Luiz da Rocha Miranda e Silva. Later, in 1911, the Observatory ordered another photoheliograph from the German optical instruments company Carl Zeiss, Jena. From 1998 to 2009, the Observatory made the longest series of solar diameter monitoring using a Danjon Astrolabe, installed on the campus since 1976, and adapted for solar observations using a CCD camera. This solar research continues today with a modern solar telescope, an Heliometer. This unique instrument was formally presented to the scientific community in 2009 at the end of the International Astronomic Union meeting, in Rio de Janeiro, and was placed into service in 2011.

We will present here the first part of this work, the contribution of the centenarians the Steinheil and Zeiss photoheliographs to solar research. The former operated in Castelo hill and a number of times made its mark in the history of the Observatory, such as in Sobral, 1919. At present it is on exhibition in the Observatorio Astronomico Antares, in Feira de Santana (state of Bahia). The latter is still in its original dome on the MAST campus and was used for decades to register photographically the Sun's disk and from 1968 to 1978 was used by the Solar Service to count and determine the heliographic coordinates of sunspot groups and to determine the K factor of the Wolf Number, a solar activity estimator. It is used from time to time to show the Sun and sunspots to students and visitors in special events related to popularization of astronomy and science education research.

Eugenio Reis holds a B.Sc. in Physics, a Master's degree in Astronomy, a PhD degree in Geophysics from Observatório Nacional and is specialized in dissemination of science and technology from Fiocruz. Currently he has a fellowship (CNPq) at the Museu de Astronomia e Ciências Afins, working with science popularization and non-formal astronomy education projects, and programs of observation of the sky and the Sun.

Lise Marcelino Souza is museologist and a Postgraduate student in Art and Cultural Heritage at Faculdade São Bento da Bahia. Currently she holds the position of Analyst in Museology at the Observatório Astronômico Antares/Museu Antares de Ciência e Tecnologia - Universidade Estadual de Feira de Santana (UEFS).

RESEARCH AND DOCUMENTATION OF MUSEOLOGY AND SEISMOLOGY: HISTORY OF SEISMOGRAPHS AND THEIR PERFORMANCE IN BRAZIL

T. F. S. Nizio; G. S. L. A. França

Observatório Sismológico da Universidade de Brasília, Campus Darcy Ribeiro, Asa Norte, Brasília - DF, 70910-900, Brasil
nizzio@gmail.com

Keywords: Seismology, Museology, Seismographs, Science Museum

Abstract

Science museums have encouraged the investigation of scientific phenomena through instruments that have once contributed to the logical construction of scientific movements but are still present in the daily lives of visitors. This is evident in relation to seismology, particularly in the case of the Permanent Display of Seismology, located at the University of Brasilia, which will be presented in this paper. The Display of Seismology is a museum aiming at communicating scientific knowledge and the history of seismology, which arrived in Brazil in the 1940s, to diverse social groups. The museum is located inside the Seismological Observatory, a research centre that has grown exponentially as a result of earthquake studies that are detected by instruments (seismographs and seismometers) spread across Brazil. José Alberto Vivas Veloso, former chief of the Observatory, has published a significant number of studies about earthquakes in Brazil and about the importance of Seismology and the Observatory in Brazilian territory. The goal of this article is to provide a brief analysis of the documentation in the light of earthquakes' research and the museum's audience communication.

Thomas Felix Sousa Nizio has a Bachelor's degree in History and is a student in the Museology undergraduate course at the University of Brasilia. His main areas of interest are on education in museums, scientific instruments, science museums and history of seismology. He is taking part in a University Extension project (Seismological Observatory's Permanent Display Project) since 2011.

George Sand Leão Araújo França has a Bachelor's degree in Physics, a Master degree in Geodynamics and Geophysics from the Federal University of Rio Grande do Norte and a Ph.D. degree in Geophysics from the University of São Paulo. Currently he is adjunct professor at the Seismological Observatory of the University of Brasilia. He has experience in Geosciences with an emphasis on Seismology, acting on the following topics: crust thickness, natural and induced seismicity, function of the receptor and Poisson ratio statistic

Session 10 - Around Museums and Scientific Heritage: instrument preservation and display II

Chair: Hans Hooijmaijers, Boerhaave Museum, Holland [MAST Auditorium]

- Legislation for the Protection of Science and Technology Heritage: the case of Brazil
Pedro Louvain de Oliveira, Fluminense Federal University | Marcus Granato, Museum of Astronomy and Related Sciences

- The Historical Scientific Instruments of Petrography, Mineralogy and Chemistry from the Museu Nacional: a heritage to be preserved, researched and exhibited
Maria Elizabeth Zucolotto, National Museum, Federal University of Rio de Janeiro | Andrea F. Costa, National Museum, Federal University of Rio de Janeiro

- 3D Digitalization of Scientific Instruments – The Case of the Bamberg Meridian Circle
Ricardo Marroquim, Department of Systems Engineering and Computer Science, Federal University of Rio de Janeiro (UFRJ) | Felipe Moura de Carvalho, UFRJ (Systems Engineering and Computer Science Postgraduate Program) | Matteo Dellepiane, Visual Computing Laboratory, ISTI-CNR | Antonio A. F. Oliveira, Computer Graphics Laboratory, UFRJ

- The Collection of Instruments at Instituto Benjamim Constant and the Constitution of a Museum for the Institution
Debora A. Rodrigues, Federal University of the State of Rio de Janeiro (PhD Museology and Heritage course) | Marcus Granato, Museum of Astronomy and Related Sciences

- Time Measurement Through Historical Scientific Instruments and Exhibits
Flávia Requeijo, Museum of Astronomy and Related Sciences | Andrea F. Costa, National Museum, Federal University of Rio de Janeiro | Maria Esther A. Valente, Museum of Astronomy and Related Sciences | Flávio F. Mendes da Costa, Museum of Astronomy and Related Sciences | Leonardo Carvalho da Silva, Museum of Astronomy and Related Sciences | T. B. Silva, Museum of Astronomy and Related Sciences

- Documenting the Theodoro Sampaio Laboratory Land Survey Collection (Department of Transportation / Polytechnic School / Federal University of Bahia – UFBA, Brazil)
Suely Moraes Ceravolo, Federal University of Bahia (UFBA) | Diana Soares de Oliveira, UFBA (Museology undergraduate course)

LEGISLATION FOR THE PROTECTION OF SCIENCE AND TECHNOLOGY HERITAGE; THE CASE OF BRAZIL

P. Louvain[a], M. Granato[a]

[a]Museu de Astronomia e Ciências afins, Rua General bruce 586, São Cristóvão, Rio de Janeiro, CEP.: 20921-030, Brazil, pedrolouvain@gmail.com

Keywords: scientific heritage, legislation, protection

Abstract

In Brazil, the heritage of science and technology is mostly unknown by the public. It is often cast aside in warehouses all around the country. Brazil's cultural heritage legislation is limited and does not take into account the singularities of this particular type of heritage. In order to improve its preservation, an effort is needed to bring the value of scientific instruments into line with cultural heritage legislation. After research into Brazil's federal and state constitutions for protection mechanisms, cultural heritage legislation from Argentina, Chile, Cuba, France, Italy, Mexico, Peru, Portugal, Spain and the United Kingdom was also analysed. The research presented in this communication was designed in order to identify which mechanisms for protecting science and technology heritage in the analysed countries could have a positive influence on Brazilian legislation. Among the countries studied, Brazil is the only that explicitly mentions science and technology heritage – both artefacts and buildings – in its constitution. The research also identified seven Brazilian states where no mention of this specific type of heritage is made. Moreover, it has found that São Paulo is the only state that protects the heritage of science and technology both in the culture and in the science and technology sections of its constitution. Brazilian legislation must be refined in order to eliminate such inconsistencies. In the absence of federal or state policies to protect this important type of heritage, the heritage of science and technology is left at the mercy of individual initiatives by a handful of institutions, which constitutes an alarming and arbitrary state of affairs.

Pedro Louvain de Oliveira is an undergraduate student of bachelor´s degree in History at Universidade Federal Fluminense (UFF). He has been researching with a CNPq scholarship at the Museu de Astronomia e Ciências Afins (MAST), supervised by Marcus Granato. His main area of interest is legislation for the protection of the cultural heritage related to science and technology.

Marcus Granato is metallurgical engineer with Master (1999) and D.Sc. (2003) degrees in Materials Science from the Federal University of Rio de Janeiro. Currently he is Senior Technologist at the Museu de Astronomia e Ciências Afins where he has been the Head of the Museology Department since 2004. He is Professor of Conservation in the Post-Graduate Program on Museology and Heritage (Federal University of Rio de Janeiro State and MAST). His main research interests lie in conservation of scientific instruments, science and technology heritage and history of collections. He is the leader of a Brazilian research group in cultural heritage preservation.

THE HISTORICAL SCIENTIFIC INSTRUMENTS OF PETROGRAPHY, MINERALOGY AND CHEMISTRY FROM THE MUSEU NACIONAL: A HERITAGE TO BE PRESERVED, RESEARCHED AND EXHIBITED

M.E. Zucolotto[a], A.F. Costa[a]

[a] Museu Nacional/Universidade Federal do Rio de Janeiro,Museu Nacional, Quinta da Boa Vista, Rio de Janeiro, Brazil
mezucolotto@globo.com

Keywords: microscopes, spectroscopes, chemistry, Museu Nacional

Abstract

The Department of Geology of Museu Nacional houses an important and little-known collection of scientific instruments and other objects of science and technology used in Petrography, Mineralogy and Chemistry. It consists of more than 2.000 items, among them microscopes, spectroscopes; refractometers, scales, Westfall and Jolly balance, theodolites, chronometers, micrometers and accessories. Most of these objects were built in Europe in the second half of the nineteenth and first half of the twentieth century. Among them, stands out a very special Nachet petrographic microscope: a XIX century Brazilian microscope mounted on Optics, manufactured by Jose Maria dos Reis of the complete Drum type, with all accessories and a set of slides with mica covers. The bulk of those objects are related to one of the most important Brazilian chemistry laboratories which from 1824 to 1931 was an autonomous section of Museu Nacional. It was created to identify and classify minerals, rocks, plants and other materials that were received by the museum from the entire kingdom. With the acquisition of many instruments from Paris in 1826, the laboratory contributed to the process of institutionalization of chemistry, as the development of mining and medical research in Brazil. The collection can be divided into scientific instruments, glassware and chemical reagents, most of these apparatus have been so far identified and restored. However, despite their historical and scientific importance, some materials are on display in the lobby of the department, while the most important as well as the incomplete ones are stored in the first author's office. There is still much to do, to catalog and preserve them in an official collection. We intend to publish a catalogue of these objects to stimulate their study and future exhibition to museum visitors.

Maria Elizabeth Zucolotto is an astronomer from Valongo Observatory (Federal University of Rio de Janeiro - UFRJ), with Master degree in Geology (1988) and DSc. degree in metallurgical engineering (1995), both at the UFRJ. Currently she is professor at the Postgraduate Course and meteorite curator of the National Museum (UFRJ).

Andréa Fernandes Costa has a Bachelor's degree in History and a Masters in Education. She has experience in planning, implementing and evaluating educational activities in science museums. She is currently an educator at the Educational Section of the Museu Nacional/Universidade Federal do Rio de Janeiro (MN/UFRJ). Her main research topics are: the exhibition and the educational use of scientific instruments in museums and the museum-school collaboration.

3D DIGITALIZATION OF SCIENTIFIC INSTRUMENTS: THE CASE OF THE BAMBERG MERIDIAN CIRCLE

R. Marroquim[a]; F. M. Carvalho[a]; M. Dellepiane[b] ; A. A. F. Oliveira[a]

[a]COPPE - Universidade Federal do Rio de Janeiro, Rio de Janeiro, 21941-972, Brazil
[b]ISTI - Consiglio Nazionale delle Ricerche, Pisa, 56124, Italy
marroquim@cos.ufrj.br

Key-words: 3d digitalization, 3d scanners, virtual replica

Abstract

3D digitalization techniques have nowadays gained its place in the context of cultural heritage. The creation of virtual replicas can be fruitful in many ways, such as the documentation of artifacts, tools for studying a restoration process, and public exhibition. However, the digitalization of historical scientific instruments adds new challenges to the field, since shapes and materials are different from those usually found in the cultural heritage field (e.g. statues and other historical artifacts). In addition, virtual replicas of scientific instruments should in some way reproduce their mechanisms in order to properly preserve its history.

In this paper, we present and discuss technical and practical details of the project to create a 3D-model of the Bamberg Meridian Circle from the Museum of Astronomy (MAST) collection. This project is being carried out in parallel with the instrument's restoration by the MAST staff and it is being funded by the FAPERJ agency. This enables a precise digital acquisition of all parts since the instrument is completely disassembled during restoration. The goal is to build a high resolution model of the instrument before and after the restoration, allowing its use by professionals as a study case and possibly as a didactic tool. Moreover, a lower resolution model will also be produced to create explanatory and interactive animations to illustrate the instrument's use to the general public.

The digitalization process is accomplished with open and free software from Brazilian and Italian institutions (respectively the Laboratório de Computação Gráfica - COPPE and the Visual Computing Lab-ISTI), hoping that it can be used by professionals in future developments of virtual replicas of historical instruments.

Ricardo Marroquim has MSc. (2005) and DSc. (2008) degrees in Systems Engineering and Computer Science from the Federal University of Rio de Janeiro. He was a postdoctorate fellow at the Visual Computing Lab – CNR (Pisa, Italy) in 2009. He is professor at the Department of Systems Engineering and Computer Science at the Federal University of Rio de Janeiro and a member of the Computer Graphics Lab (COPPE). His main research interests include photo-realistic rendering, 3D reconstruction and imaging applications to cultural heritage.

Felipe Moura de Carvalho is BSc. in Computer Science and has a Masters degree (2010) in the same area from the Systems Engineering and Computer Science Program, Federal University of Rio de Janeiro. He is a PhD. student at the same Program and his main research interests are interactive graphics, rendering, image processing, graphics hardware and game techniques.

Matteo Dellepiane received an advanced degree in Telecommunication Engineering (Laurea) from the University of Genova in 2002, and a PhD degree in Information Engineering from the University of Pisa (2009). He is currently a Researcher at Visual Computing Laboratory, ISTI-CNR, Italy. His research interests include 3D scanning, digital archeology, color acquisition and visualization on 3D models.

Antonio A. F. Oliveira got his B.Sc. and D.Sc. degrees in Electronics and Systems Engineering, respectively, both from the Federal University of Rio de Janeiro (UFRJ). He also holds a Masters degree in Mathematics. He has been working in the Computer Graphics Laboratory of UFRJ since 1989 and has taken part in many research projects in the areas of Computer Graphics and Image Processing.

THE COLLECTION OF INSTRUMENTS AT INSTITUTO BENJAMIM CONSTANT AND THE CONSTITUTION OF A MUSEUM FOR THE INSTITUTION

D. A. Rodrigues[a]; M. Granato[b]

[a]Universidade Federal do Rio de Janeiro, Centro de Memória da Escola de Serviço Social, Av. Pasteur, 250 fundos - Praia Vermelha, Rio de Janeiro, Brazil
[b]Museu de Astronomia e Ciências Afins, Rua Gal. Bruce 586, Rio de Janeiro, 20921-030, Brazil
deby.ar@uol.com.br

Keywords: Instituto Benjamim Constant, technology for blind people, instruments for people with physical disabilities

Abstract

The aim of this study is to address different issues related to the production of material heritage for blind people, based on the musealized objects at the Instituto Benjamin Constant Museum in Rio de Janeiro. The objects were made to meet the sensory needs of their users, constituting special technical and scientific objects, improved over the years, as a result of new studies and technologies. Most of the objects in question were used in education for blind people for their adaptation to the environment.

Founded on September 17th, 1854, the Imperial Institute for Blind Boys, today Instituto Benjamin Constant, was Brazil's first educational establishment for people with disabilities. Since the 1950s, the Instituto Benjamin Constant community has been trying to organize a museum aiming at reflecting major discussions about its history. Between the 1950s and 1970s, a collection was formed; in the 1970s new efforts were made to create a museum adapted to the sensory needs of its target audience. In 1990, new prospects emerged as a result of educational goals of the Instituto Benjamin Constant, specifically aimed at consolidating a museum that would discuss the issue of education for the blind. Since 1999, the museum is open to the public, receiving visits through requests by phone.

What role does this museum have for the construction of the identity and preservation of the memory of the blind people involved with Instituto Benjamin Constant? What relationships exist in the construction of their material heritage? How has technology been used by blind people? How is the heritage of this institution's community built up? What values does this community give to these assets as a means for referring to the past, giving pleasure to the senses and producing and imparting knowledge? These are a few of the questions discussed in the paper to be presented.

Debora de Almeida Rodrigues is museologist (UNIRIO, 2000) with Master degree in Social Memory and Document from the Federal University of Rio de Janeiro State -UNIRIO. She is a DSc. student at the Postgraduate Program in Museology and Heritage (Federal University of Rio de Janeiro State -UNIRIO / MAST). Currently she works at the Memory Center of the School of Social Work, Federal University of Rio de Janeiro (UFRJ). Her main research topics are: Technologies for people with visual disabilities; inclusive Museum; museography for people with special needs.

Marcus Granato is metallurgical engineer with Master (1999) and D.Sc. (2003) degrees in Materials Science from the Federal University of Rio de Janeiro. Currently he is Senior Technologist at the Museu de Astronomia e Ciências Afins where he has been the Head of the Museology Department since 2004. He is Professor of Conservation in the Post-Graduate Program on Museology and Heritage (Federal University of Rio de Janeiro State and MAST). His main research interests lie in conservation of scientific instruments, science and technology heritage and history of collections. He is the leader of a Brazilian research group in cultural heritage preservation.

TIME MEASUREMENT THROUGH HISTORICAL SCIENTIFIC INSTRUMENTS AND EXHIBITS

F. Requeijo[a], A.F. Costa[b], M.E.A. Valente[a], F.F.M.Costa[a], L.C.Silva[a], T.B. Silva[a]

[a] Museu de Astronomia e Ciências Afins, Rua General Bruce 586, São Cristóvão, Rio de Janeiro, 20.921-030, Brasil
[b] Museu Nacional (UFRJ), Quinta da Boa Vista s/n°, São Cristóvão, Rio de Janeiro, 20940-040, Brasil
flaviarequeijo@mast.br

Keywords: museum education, historical scientific instruments, time measurement

Abstract

We believe that science communication in museums can be improved by educational approaches which incorporate historical and philosophical dimensions of science, for they may help visitors understand the social and cultural construction of scientific thought. To achieve these goals we intend to use historical scientific instruments as leading actor of an exhibition. Previous research revealed that the public of the Museum of Astronomy and Related Sciences (MAST) appreciates the authenticity of its historical instruments. Also, the contact with such objects contributed to creating memorable moments, and possibly fostered their intrinsic motivation to learn about science. The study showed that these objects are relevant resources in promoting a critical interpretation of science. We seek to identify the influence of educational activities promoted at MAST to communicate about the effect of science and history of time on the public's concept of time. An exhibition about the theme will be organized focusing on the collection's instruments which belonged to the Imperial/National Observatory and were used in the determination and dissemination of time. Results obtained from interviews with the public in a first phase of this research indicate not only that the presentation of how scientific instruments work should improve, but also that issues related to time should be addressed in an interdisciplinary manner. Therefore the exhibition design plans to develop didactic models of preselected time measurement instruments of the collection, such as the pendulum clock, to explain their physics and functioning. There are obvious barriers in manipulating and interpreting these historical objects; however, this should not be an obstacle to their use in educational activities in museums. The educational possibilities of historical scientific instruments reinforce the need to develop appropriate ways to exhibit them to visitors. The integration of historical and interactive objects is a possible approach and should be further investigated in science museums.

Flávia Requeijo is Astronomer with a fellowship at the Museu de Astronomia e Ciências Afins (MAST). She has been developing educational activities in museums for nearly 10 years. Prior to joining MAST she has worked in the production of a long term exhibition at the Planetarium of Rio de Janeiro. Flávia has a Masters degree in Astronomy and is currently investigating the pedagogical aspects of historical scientific instruments in museums.

Andréa Fernandes Costa has a Bachelor's degree in History and a Masters in Education. She has experience in planning, implementing and evaluating educational activities in science museums. Currently she is an educator at the Educational Section of the Museu Nacional/Universidade Federal do Rio de Janeiro (MN/UFRJ). Her main research topics are: the exhibition and the educational use of scientific instruments in museums and the museum-school collaboration.

Maria Esther Valente is historian with a Master degree in Education and a PhD degree in Earth Sciences Teaching and History from the UNICAMP. Currently she works at the Museum of Astronomy and Related Sciences, and teaches at the diploma courses of Preservation of Science and Technology Collections (MAST) and Science, Technology and Health Dissemination (FIOCRUZ/MAST/others). She is professor at the Master course in Museology and Heritage (UNIRIO/MAST). Her main interests are in the area of Museum Education, especially S&T museums.

Flávio Costa is a designer. Currently he is working on an exhibition project about the science and history of Time Measurement, at the Museum of Astronomy and Related Sciences (MAST). Prior to joining MAST he has worked in the production of a long term exhibition at the Planetarium of Rio de Janeiro. He has experience in the area of Exhibitions Design, especially in science and technology museums.

Leonardo Carvalho da Silva has a bachelor's degree in Physics. Currently he has a fellowship from CNPq to develop projects at the Museum of Astronomy and Related Sciences (MAST).

Taysa Bassallo da Silva has a bachelor's degree in Physics. Currently she has a fellowship from CNPq to develop projects at the Museum of Astronomy and Related Sciences (MAST).

DOCUMENTING THE THEODORO SAMPAIO LABORATORY LAND SURVEY COLLECTION (DEPARTMENT OF TRANSPORTATION / POLYTECHNIC SCHOOL / FEDERAL UNIVERSITY OF BAHIA – UFBA, BRAZIL)

S. M. Ceravolo[a]; D. S. Oliveira[b]

[a] Department of Museology, School of Philosophy and Human Sciences, Federal University of Bahia. Salvador, Brazil. sumoce@ufba.br
[b] Scholarship recipient/UFBA, Museology Major, School of Philosophy and Human Sciences, Federal University of Bahia. Salvador, Brazil

Key words: documenting S&T objects, university collections, scientific and technological heritage, Polytechnic School of UFBA.

Abstract

A discussion is carried out regarding the approximation between the principles of documentation used in museums and the organization of collections made up of S&T objects based on ongoing project with the Theodoro Sampaio Laboratory Land Survey Collection (Department of Transportation / Polytechnic School / Federal University of Bahia / Brazil); a university collection made up of 400 pieces, fomenting interdisciplinary debate and reflection between Museology and Engineering. Interdisciplinary contact nourishes collaboration between a wide range of fields of knowledge: one associated with Applied Social Sciences (Museology), and the other Engineering, bringing them together to solve specific problems with regard to intellectual and physical control of this Collection with an eye to its preservation related to a particular disciplinary trajectory and to university education based on field study practices. In this presentation the collection is analyzed with regard to its importance as part of Brazil's scientific and technological heritage, aspects of its development, the applicability of its documentation methodology and the preliminary results obtained, with the aim of its musealization.

Suely Moraes Cerávolo is a historian with a Master degree in Information Science / Documentation and a PhD in Communication, both from the São Paulo University (USP). She made a post-doctoral research in Museology at the Museu Paulista (USP) and currently she is professor of the Museology Department, Faculty of Philosophy and Human Sciences, at the Federal University of Bahia (UFBA). Her main research interests are on History of Museums in Bahia and Museological documentation.

Daiana Soares de Oliveira is student in the Museology undergraduate course at the Federal University of Bahia. She has a scholarship from the Permanent Scholarship Program of UFBA. Her main research interests are on preventive conservation, restoration and museological documentation.

POSTERS

SCIENTIFIC INSTRUMENTS IN PERSONAL ARCHIVES: ACQUISITION POLICY AND TECHNICAL TREATMENT

M. C. S. M. Silva

Museu de Astronomia e Ciências Afins, Rua General Bruce 586, Rio de Janeiro, 20.921-030, RJ, Brasil
celina @mast.br

Keywords: personal archives, scientific instruments, acquisition policy, documentation of collections of instruments

Abstract

The personal archives of scientists present a variety of documents and media. There are no rules or legislation that lays out criteria for preservation under at home. But for these archives to be purchased by a museum or other cultural institution to integrate its patrimony [I am not sure what the author means here] we need consistent and substantiated criteria. The Museum of Astronomy and Related Sciences drew up and adopted a policy of acquisition for the archival holdings, museum collections and bibliographic documents providing criteria based on experience with the preservation of C&T collections [what are C&T collections?], on its their organizational structure and the provenance of documents and objects. The acquisition of personal archives containing scientific instruments and other arteifacts is pertinent and contemplated in the policy. The acquisition is evaluated by the team responsible for the Museum collection and follows the same criteria used for the Museum collection, such as origin, typology and state of conservation. The policy determines that the museology area team is responsible for the preservation and the technical treatment of the objects received, even taking as origin the personal archives and the description of objects take part of the personal archives' inventory [I am not sure what the author means with this sentence. Possibly: 'even taking into account the personal archives and the description of objects that form part of the personal archives' history'?]. Such a situation is possible by integrating the work of both teams and by institutional maturation [I am not sure what the author means here] on the aspects involving the preservation of collections.

Maria Celina Soares de Mello e Silva is Archivist at the Museum of Astronomy and Related Sciences in Rio de Janeiro (Brazil) and has a PhD degree in Social History from the University of São Paulo (USP, 2007). Currently she coordinates the Postgraduate Course in Preservation of Collections of Science and Technology (MAST). Her main research interests are on personal archives; documentary typology; Archives of science and technology; and preservation of scientific collections.

THE CHALLENGE OF SCIENTIFIC COLLECTIONs: THE CRULS COMMISSION CASE

B. M. Costa[a]; M. R. Vergara[b]

[a]Programa de Pós-Graduação em Museologia e Patrimônio (UNIRIO/MAST), Av. Pasteur, 458/410, Rio de Janeiro, Brazil
[b]Museu de Astronomia e Ciências Afins, Rua General Bruce 586, São Cristóvão, Rio de Janeiro, 20921-030, Brazil
bianca.mandarino@gmail.com

Key-words: Scientific Instruments, Biography, Museum, History of Science, Astronomy

Abstract

The present work, which is still at a preliminary stage, is concerned with a particular set of scientific instruments from the collection of the former National Observatory now preserved at Museu de Astronomia e Ciências Afins (MAST). The analysis to be undertaken aims to establish the biography of the scientific instruments according to the methodology proposed by Samuel Alberti and Jim Bennett. For these authors, albeit to different degrees, it is important to trace the trajectory of an instrument before it is incorporated into a museum collection. In other words, these instruments have to be looked at from their manufacture to their various uses throughout their 'lives'. This analysis covers the various stages of the instruments, from their conception to the moment when they become part of a museum collection. As a result, this study required an understanding of the contexts of usage and dynamic movements of these instruments in their home institution, in this case the National Observatory. Also analyzed were the demands of trade, disposal, donation and maintenance of the instruments within the institution. With regard to the dynamics of the National Observatory, a specific event had to be defined to operationalize this study. This paper thus focuses on two scientific expeditions by the Cruls Commission to the Central Plateau of Brazil in 1892 and 1894, whose mission was to conduct studies for the establishment of a new capital city. The capital of Brazil at this time was Rio de Janeiro, but in 1891 the federal government decided to move the capital inland for reasons of security and national integration. The commission was named after its leader, Luiz Cruls, then director of the Astronomical Observatory of Rio de Janeiro. In the historiography of science in Brazil, this commission has been widely studied for its scientific character. Its reports are important sources that help us to reconstitute aspects of scientific practice and the contexts of use of nineteenth century scientific instruments in Brazil.

Bianca Mandarino Costa is museologist and a Master student at the Museology and Heritage Program of the Federal University of the Rio de Janeiro State (UNIRIO and MAST).

Moema de Rezende Vergara is researcher of the Museum of Astronomy and Related Sciences (MAST) and professor of the Postgraduate Program in Museology and Heritage at the Federal University of the Rio de Janeiro State and MAST (UNIRIO/MAST). She has experience in the History of Science, working mainly on the following topics: history of science in Brazil, museums, nineteenth century, gender studies and public understanding of science.

USING OF OLD INSTRUMENTS FOR PHYSICS TEACHING IN SECONDARY SCHOOLS IN THE PAST AND PRESENT: FOCUS ON NEWTON'S TUBE

M. C. S. Zancul[a], M. J. P. M. Almeida[b]

[a]UNESP, São Paulo State University, Rodovia Araraquara-Jaú, Km 1, Araraquara (SP), 14800-901, Brazil
[b]Faculdade de Educação - Universidade Estadual de Campinas, Campinas, Brasil (CNPq researcher)
aczancul@uol.com.br

Keywords: Old instruments for teaching, Newton's tube, Physics teaching, secondary education

Abstract

Considering the fact that the historic knowledge can illuminate the present, in this presentation we intend to focus on an old instrument for Physics teaching –Newton's tube, which is still found today in some Brazilian schools. We will discuss what its use represented within a certain conception of teaching, in a particular historical moment. We also argue what this object, which appears in the context of a major scientific work - the Principia - and later was produced and included among the resources for teaching in elementary education, can teach today's young pupils. We believe that old instruments can still be used today, with significant changes in the nature of experimental activities carried out with them.

Maria Cristina de Senzi Zancul has a Master's degree in Education from the Federal University of São Carlos – UFSCAR and a PhD degree in Education from the Júlio de Mesquita Filho Paulista State University - UNESP. She is Professor at the Department of Sciences of Education and of the Postgraduate Program in School Education of the College of Sciences and Letters of Araraquara – São Paulo State University (UNESP). Her main research interests are in science education, physics teaching and environmental education.

Maria José P. M. de Almeida is Full Professor in Physics Teaching Methodology at the Campinas State University-UNICAMP, where she teaches and advises in the graduate programs in Education and Teaching Science and Mathematics and in the under-graduate physics teaching course.

THE OLD SEXTANT AS AN OBJECT OF HIGHER EDUCATION TODAY

A. C. Sachs[a], M. J. P. M. Almeida[b], M. C. S. Zancul[c]

[a]Laboratório de Arquitetura e Redes de Computadores, EPUSP, São Paulo, SP, Brasil (LARC colaborator)
[b]Faculdade de Educação - Universidade Estadual de Campinas, Campinas, SP, Brasil (CNPq researcher)
[c]Faculdade.de Ciências e Letras de Araraquara - UNESP, Araraquara, SP, Brasil.
antoniosachs@larc.usp.br

Keywords: sextant, geometry, history, sociology

Abstract

The construction of instruments that enable the human being to determine precise location and orientation began many centuries ago and continues today. Among those instruments, we mention here astrolabes, quadrants, cross-staff, octants and sextants. Today, the global positioning system (GPS) is the main location-finding instrument. From one to the other of the mentioned instruments, improvements and also operating principles changes have occurred. We know that these improvements and changes did not occur by chance. They have always been associated with socio-cultural-historical aspects of the societies in which they were produced and used and, in turn, their use influenced the actions that were possible in those societies. Among the ancient instruments, we believe that few have been so thoroughly studied as the sextant. Even so, we chose this instrument for our presentation. This choice is due to the access to an eighteenth century German model. Our goal is to address the possibilities of its use in higher education: for empirical use of - a concrete object, and for geometric explanation of its operation, requiring a certain level of abstraction. In addition to issues related to the stars and to angular measurements, we also want to address socio-historical usages that were performed, and that can still be done with this ancient instrument.

Antonio de Campos Sachs has a Bachelors and Masters degrees in Physics from the Campinas State University-UNICAMP and a PhD degree in electrical engineering from the São Paulo University - USP. He has experience in the areas of Semiconductor lasers manufacturing, WDM optical systems, optical networking and optical packet switching and is a collaborator researcher at the LARC-Laboratory of Computer Networks and Architecture (EPUSP-Escola Politécnica da Universidade de São Paulo).

Maria José P. M. de Almeida is Full Professor in Physics Teaching Methodology at the Campinas State University-UNICAMP, where she teaches and advises in the graduate programs in Education and Teaching Science and Mathematics and in the under-graduate physics teaching course.

Maria Cristina de Senzi Zancul has a Master's degree in Education from the Federal University of São Carlos – UFSCAR and a PhD degree in Education from the Júlio de Mesquita Filho Paulista State University - UNESP. She is Professor at the Department of Sciences of Education and of the Program of Post-graduation in School Education of the College of Sciences and Letters of Araraquara – São Paulo State University (UNESP). Her main research interests are in science education, physics teaching and environmental education.

AN UNIQUE NINETEENTH CENTURY BRASS POLARIZING MICROSCOPE BY NACHET AT THE MUSEU NACIONAL/UFRJ COLLECTION

J. Meeusen[a], M.E. Zucolotto[b]

[a] Private scholar, Leopold De Vriesstraat 16, B-2600 Antwerp, Belgium
[b] Museu Nacional / Universidade Federal do Rio de Janeiro, São Cristovão, Rio de Janeiro, RJ, Brazil
jeroen.meeusen@gmail.com

Keywords: Nachet, Museu Nacional, Polarizing microscope

Abstract

In the collection of the Geology Department of Museu Nacional resides a uniquely styled polarizing microscope signed "Nachet et fils - 17, rue St. Séverin Paris". This microscope has an unconventional design and differs from an 'ordinary' large Nachet stand in the following mannersways: 1) the body of the microscope was risen by introducing an 'elbow'; 2) provisions were made in the tube to introduce and move the analyzer; 3) a mysterious arm was attached to the nosepiece. This arm must have been connected to the - now missing - superstructure of the stage and formed a mechanical coupling [?] of the objective and the rotating stage. Such a feature causes the objective and the stage to rotate simultaneously, while the analyzer (in the tube) and the polarizer (below the stage) rest at place. As a result, there is no necessity for optical centration of the objective to the rotating axis as in 'ordinary' petrological microscopes of the time.

The case of the microscope still remains as do some objectives and eyepieces. The many holes in the mechanical stage suggest that a sophisticated superstructure holding the object went missing. The mirror fails [Do they mean that it doesn't work? Or is it missing?] too.

All the remaining mechanical parts of the microscope are reminiscent of the workmanship of Nachet and therefore original. The knurling of the wheels, form of substage and base allow us to date this microscope between 1886 and 1898. The fact that Orville Derby worked at Museu Nacional from 1877 to 1890 suggests that it was used by him.

Nachet introduced petrological microscopes in the late 1870s featuring a mechanical coupling of the objective and the rotating stage. However, the coupling was obtained in a completely different way as in the present microscope. It is therefore that we would argue that this microscope is unique and made by Nachet on specific request.

Jeroen Meeusen is undergraduated in civil engineer (MSc in Engineering) from Ghent University and is professionally active in the design of bridges and tunnels. In addition, he did studies in philosophy, history and logic of science at the same university. As a private scholar he has been researching the history of the early 19th century microscope, its users and makers.

Maria Elizabeth Zucolotto is undergraduated in astronomy by Valongo Observatory (Federal University of Rio de Janeiro - UFRJ), with Master degree in Geology (1988) and DSc. degree in metallurgical engineering (1995), both at the Federal University of Rio de Janeiro - UFRJ. She is currently a professor at the Postgraduate Course and meteorite curator of the National Museum (UFRJ).

THE ROLE OF THE INSTITUTE FOR TECHNOLOGICAL RESEARCH (ipt) IN BRAZILIAN SCIENTIFIC AND TECHNOLOGICAL HERITAGE

C.A.Sousa[a], M.T. Marchesi[a], S. Troitiño[b]

[a]IPT, Av. Prof. Almeida Prado, 532, São Paulo, 05508-901, Brasil
[b]FFC/UNESP, Av. Higyno Muzzi Filho, 737, Marília, 17.525-900, Brasil
Kiu@ipt.br

Keyword: IPT, collections, scientific heritage

Abstract

Since its creation, the Institute for Technological Research (IPT) has played a key role in the consolidation of Brazilian technological research, promoting the development of sectors such as construction, chemistry, metrology, metallurgy, aviation, timber, petrology and naval engineering, among others. In its centennial history, IPT has accumulated a rich collection comprising objects, documents and iconography related to its various activities. This collection is invaluable for scientific and technological heritage, as it enables the establishment of relationships between the work of the Institute, the process of technological development and the deep changes that took place in São Paulo and throughout the country since the nineteenth century. One of the issues that can be explored by historical research, for instance, is explaining how trading tools and transferring technology was done and the methodologies then used. In this sense, IPT hosts a multidisciplinary and rich collection, that constitutes a valuable source for research. In this presentation, it is going to be presented aspects of the history of the institution as well as the objects that materialize some of the processes developed there.

Cristiane Alves de Sousa is a historian with a degree in archival studies. She is assistant researcher at the Technological Researches Institute of São Paulo State (IPT) and has experience in Archives and Historical Heritage. Currently she is participating in the project of the Network of Technological Support for Restoration and Conservation of Historic and Cultural Heritage: Recovery of the Metallurgy Pavilions at IPT.

Mariana Marchesi has an undergraduate degree in Advertising and Propaganda and a master student at the Graduate Program on Communications Science of the University of São Paulo (ECA-USP). Currently she is a graphic designer at the Technological Researches Institute of São Paulo State (IPT) and has experience in the area of Communication, specially Advertising, Propaganda and Graphic Design.

Sonia Troitiño is a historian with PhD degree in Social History from the University of São Paulo (USP) and a degree in Cultural Heritage from the Fundación Duques de Sória (Spain). Currently she is professor at the Universidade Estadual Paulista Julio de Mesquita Filho in the course of Archival Science and member of the research group 'Genesis Document Archival and Culture & Gender'. Her main research interest is on Information Science with emphasis in Archival Science.

THE STEAM GENERATORS OF ANGRA1 NUCLEAR POWER PLANT: FROM WASTE TO REGISTRATION

M. P. Figueiredo

Museu de Astronomia e Ciências Afins – MAST, Rua General, 586 Rio de Janeiro, 20921-030, Brasil
monicapenco@mast.br

Keywords: Musealization, Generators belonging, Equipment for nuclear engineering.

Abstract

This paper aims to discuss the possibilities of musealization, preservation and exhibition of the old steam generators belonging to the Nuclear Power Plant Angra 1 on the site Central Nuclear Almirante Álvaro Alberto, in Angra dos Reis, RJ, Brazil. These steam generators, currently disabled, were responsible for the production of steam that moved the turbo-generator producing electricity for more than two decades. The steam generators were 'born' compromised due to the predisposition to wear the alloy used in the manufacture of their tubes. After signs of degradation, the generators were replaced and were stored in an isolated building near the power plant. The recognition of these equipments as heritage is based on the concept of musealization. Besides addressing musealization issues, in this paper we analyze the specificities of the preservation and exhibition of the two generators. Practices adopted in their decontamination will also be considered. The nonexistence of initiatives for the preservation of such heritage in the public sector determines the need to create a space dedicated to the preservation of this heritage providing a higher public understanding of the issue. The Museum of Astronomy and Related Sciences in Rio de Janeiro tries to fill this gap by incorporating in its collections historical nuclear engineering instruments from a research institute of the Ministry of Science, Technology and Innovation: the Institute of Nuclear Engineering.

Mônica Penco Figueiredo is museologist. She has a research scholarship from CNPq at Museu de Astronomia e Ciências Afins – MAST. Her main research interests are on Museology, Industrial heritage and Documentation.

SCIENTIFIC INSTRUMENTS FOR THE CONSTRUCTION OF TERRITORIAL KNOWLEDGE: THE PETROGRAPHIC MICROSCOPES OF THE GEOGRAPHIC AND GEOLOGICAL COMMISSION OF SÃO PAULO

M.L.E. Nagai[a], J.M. Azevedo Sobrinho[a]

[a]Instituto Geológico, Avenida Miguel Stéfano, 3900, São Paulo, 04301-903, Brazil
maria.luiza@igeologico.sp.gov.br

Keywords: material culture, technology, microscope, trade, expeditionary research

Abstract

Established between 1886 and 1931, the Geographic and Geological Commission of São Paulo (GGCSP) explored and subsidized studies for the development of the territory of São Paulo State. Both field surveys and research activities were possible due to the use of scientific instruments related to topography, geodesy, petrology, mineralogy, meteorology, astronomy and biology, among others. In this paper, we analyze petrographic microscopes acquired by the GGCSP in the nineteenth and twentieth centuries. They were intensely used in the geology lab of the Commission for the description and characterization of rock, mineral and fossil samples. The analysis is part of an ongoing research about the origins of these instruments, their components, makers, acquisition methods, suppliers, useful life and present state. The approach is based on material culture methods, coupled with the study of documentation from the GGCSP, commercial trade and the analysis of the political, economic and cultural contexts. Today, the collection of petrographic microscopes is kept at the Geological Institute of São Paulo, successor of the GGCSP, and it represents an important historical and cultural heritage of Brazilian science.

Maria Luiza Emi Nagai received her Bachelor's degree in History from the University of São Paulo (2008). Her academic activities are concentrated at the characterization of the Historical Collection of the Geological Institute of the State of São Paulo, acting on the topics of preservation and conservation of historical documents, digital file management and research on scientific expeditions of the nineteenth and twentieth centuries.

José Maria Azevedo Sobrinho received his Bachelor's degree in Geology (1986) and his master's degree in Geosciences (1995) from the University of Sao Paulo. He is researcher at the Geological Institute of the State of São Paulo and currently an advisor of the Laboratory for Microscopy and Director of the Department of Geology. He has experience in Geosciences, acting on the topics of petrology of igneous and metamorphic rocks.

THE WALDEMAR LEFÈVRE GEOLOGICAL MUSEUM AND THE EXHIBITION ABOUT THE GEOLOGICAL AND GEOGRAPHIC COMMISSION (SÃO PAULO STATE, BRAZIL)

J.B. Ramos[a] , F.A. Pires[b]

[a]Instituto Geológico, Avenida Miguel Stéfano, 3900, São Paulo, 04301-903, Brazil
[b]Museu Geológico, Instituto Geológico, Rua Ministro Godoi, 310, São Paulo, 05015-000, Brazil
josebarcellos@igeologico.sp.gov.br
ferpires@igeologico.sp.gov.br

Keywords: Geological Museum, Geographic and Geological Commission, Positivity, science, technology, education

Abstract

The Waldemar Lefèvre Geological Museum, which belongs to the Geological Institute of the São Paulo state department of the environment, displays some valuable historical collections, including one relating to the Geological and Geographic Commission (1886-1931). The commission was set up and operated in a historical period that was strongly influenced by positivism, which claimed that science and scientific breakthroughs would inevitably lead human beings towards progress and civilization and therefore allow humankind to exert complete control over nature. Contrasting with this perspective, the state of São Paulo was an enigmatic, unknown territory whose resources were yet to be identified and exploited and its area colonized in a bid to eliminate backwards habits and customs and bring it into the civilized world ruled by technical information and science. Focusing on solving the issue of the dissociation of the geological museum collection and proposing new educational approaches, this paper aims to research the scientific instruments which make up the Geological and Geographic Commission exhibition at the museum in order to verify the feasibility of its activities in the field of geosciences and also to analyze the technological and cultural viewpoints in the late nineteenth and early twentieth century. These studies will help the museum solve the problem of its collection's dissociation and come up with new exhibition strategies involving the scientific instruments of the Geological and Geographic Commission.

José Barcellos Ramos has a BSc. degree in History and is a technical expert in preservation and conservation of cultural heritage. Currently he is the head of the Department of Historical Archive at the Valdemar Lefèvre Geological Museum. His main research interests are on Museology, archives, conservation, preservation and education.

Fernando Alves Pires has a PhD degree in Geosciences. Currently he is the Director of the Valdemar Lefévre Geological Museum. His main research interests are onn Museology, Environmental Education, General Geology and Sedimentology.

AGRICULTURAL SCIENCES FROM OBJECTS: THE MEMORIAL OF FEDERAL RURAL UNIVERSITY OF PERNAMBUCO (BRAZIL) IN 100 YEARS OF TEACHING, RESEARCH AND OUTREACH

B. M. Araújo[a], R. A. Pacheco[b], E. S. Ribeiro[b]

[a]UFRPE/UFPE, da Baixa Street nº294, Jaboatão dos Guararapes,54.325-670, Brasil
[b]UFRPE, Dom Manuel de Medeiros Street, Recife,52.271-900,Brasil
[c]UFPE, José Anibal Fernandes Avenue, Recife, 50.740-560, Brasil
brunomelodearaujo@yahoo.com.br

Keywords: History of Science, Objects C&T, Material Culture, Modernity, Scientific Heritage

Abstract

The paper presents results of the unfolding of a Masters level research that discusses the establishment of agricultural higher education in the state of Pernambuco, Brazil. In this sense, it approaches to the History of Science and Museology, discussing the collection of the Memorial of the Federal Rural University of Pernambuco. From the organization of the permanent exhibition of the institution and anchored in the theoretical framework provided by the material culture studies, we present the construction of the scientific field of Agricultural Sciences in Pernambuco. The process of building the exhibition contains a set of information that consists mainly of objects from Sc & Tch (microscopes, episcopes, theodolites), in which we can construct an interpretation of the construction and legitimation of the set of individuals seeking their inclusion in the intellectual field of Pernambuco, as well as the modernization of its practices and techniques. The experience of this scientific field by setting its objects is of fundamental importance to expansion of knowledge of the objects studied, but also the field of symbolic relationships that they built.

Bruno Melo de Araújo is historian and a M.Sc. student in History at the Federal Rural University of Pernambuco - UFRPE. He is still an undergraduate student in Museology at the Federal University of Pernambuco - UFPE. His main research topics are: Heritage, Memory, Culture, Education and Society.

Ricardo de Aguiar Pacheco is a historian with Master and PhD. degrees in History from the Federal University of Rio Grande do Sul. Currently he is professor at the Department of Education (Federal Rural University of Pernambuco) and responsible for the Federal Rural University Memorial. His main research topics are: Cultural heritage, Memory, History and society.

Emanuela Sousa Ribeiro is a historian with Master and PhD. degrees in History from the Federal University of Pernambuco. Currently she is professor oft the Department of Anthropology and Museum Studies, at the same university. Her main research topics are: Management of Cultural Heritage, Museological Documentation, Cultural Heritage of Science and Technology.

IDENTIFICATION OF THE COLLECTION OF SCIENTIFIC INSTRUMENTS OF THE MUSEUM OF MINERALS AND ROCKS, FEDERAL UNIVERSITY OF PERNAMBUCO, BRAZIL

M. C. S. Wanderley[a], T. R. Silva[b], S. B. Barreto[c], E. S. Ribeiro[d]

[a] Undergraduate course in Museology - UFPE, Av. Acad. Hélio Ramos. S/N, Cidade Universitária, Recife - PE, CEP 50740-530, Brazil
[b] Undergraduate course in Geology - UFPE, Av. Acad. Hélio Ramos. S/N, Cidade Universitária, Recife - PE, CEP 50740-530, Brazil
[c] Geology Department and Museum of Minerals and Rocks, UFPE, Av. Beira Rio. 230/2602. Recife - PE, CEP 50750-400, Brazil
[d] Anthropology and Museology Department, Federal University of Pernambuco, r. Dhália, 315/501. Boa Viagem. Recife - PE, ZIP code: 51020-290, Brazil | emanuelasousaribeiro@yahoo.com.br

Keywords: Museum of Minerals and Rocks, scientific instruments, Science and technology collections

Abstract

The Museum of Minerals and Rocks at the Federal University of Pernambuco (UFPE) was inaugurated in 1968. The majority of its collections consist of minerals and rocks (c. 5,000 samples). The Museum also includes a collection of c. 100 scientific instruments from the first half of the twentieth century. These encompass goniometers, thermometers, refractometers, compensators, scales and microscopes of various models, produced primarily on metal and glass, wood, plastic and resin components. These science and technology objects result from research and teaching practices at the Mineralogy, Petrology and Paleontology of the former Institute of Geology (1957), offices of professors of Geology and Mining Engineering, the Laboratory of Mineralogy Optics of the Department of Geology, the former laboratory of X-ray diffraction analyzes and UFPE's Mineralogy Office. Although the majority has German origin, the collection is considerably heterogeneous in terms of instrument makers and manufacturers. Several European firms were identified, such as Ernst Leitz (Wertzlar, Germany), Carl Zeiss (Winkel, Germany), Hertel & Reuss (Kassel, Germany), Stoe & Cie, Fritz Rheinheimer (Heidelberg, Germany), Nonius (Delf, Netherlands) and to a less extent North American (Eimer & Amend, New York), Japanese (Rigaku Denki Co. Ltd.) and Brazilian manufacturers (Asca, RJ/SP/RS), among others. Only recently has this collection been studied and displayed to the public through research projects and temporary exhibitions at the Museum. It is an important collection in the fields of mineralogy and petrology, especially as material evidence of the training of geologists, mining engineers and natural historians in the twentieth century. It is expected, with this work, to help in the presentation of this collection to the museum community and to value this cultural heritage.

Maria da Conceição Santos Wanderley has a Bachelor's degree in Arts and is an undergraduate student in Museum Studies at the Federal University of Pernambuco. Her main research topics are: Scientific Museums, University Museums, Conservation in Cultural Heritage.

Tiago Rodrigues da Silva is an undergraduate student in Geology at Federal University of Pernambuco. His main research topics are: Gemology, Applied Mineralogy, Cultural Heritage of Science and Technology.

Sandra de Brito Barreto is geologist with Master degree in Geosciences (1991) and D.Sc. degree in Mineralogy from the Barcelona University (2000). Currently she is professor at the Department of Geology, Federal University of Pernambuco. Her main research topics are: Gemology, Applied Mineralogy, Mineralogical Characterization, Application of Analytical Techniques to Cultural Heritage.

Emanuela Sousa Ribeiro is a historian with Master and PhD. degrees in History from the Federal University of Pernambuco. Currently she is professor at the Department of Anthropology and Museum Studies, in the same university. Her main research topics are: Management of Cultural Heritage, Museological Documentation, Cultural Heritage of Science and Technology.

ABOUT THE MATERIAL CULTURE OF BELL'S EARLY EXPERIMENTAL TESTS: AN ANALYSIS OF TECHNICS AND INSTRUMENTS (1972-1982)

W. F. O. Bispo

Instituto Federal de Educação, Ciência e Tecnologia Baiano, Campus Santa Inês. Avenida Sampaio, nº03, Itapuã, CEP: 41630-030, Salvador, Bahia, Brasil.
wilsonfabio@gmail.com

Keywords: Instruments, Material Culture, Bell's Theorem, Experiments.

Abstract

In this work we analyze the material culture of early experiments with photons that tested Bell's inequalities. These were performed by Freedman and Clauser (1972); Clauser (1976), Fry & Thompson (1976); Aspect, Grangier & Roger (1981); Aspect, Grangier & Roger (1982) and Aspect, Grangier & Dalibard (1982). In the paper, we describe the instruments, how they were operated and their main roles in the experiments. We also include historical background on the main instruments and their origins, aiming at addressing the question: could these experiments have been developed before?

The analysis demonstrated that all instruments had already been developed in the 1930s, except lasers and quanticons (phototubes that can count single photons). On the other hand, analysis of the techniques showed that the experiments could not have been performed before the 1970s because the detection techniques were not sufficiently precise.

Wilson Fábio Oliveira Bispo has a bachelor's degree in Physics and a Master degree in History of Science from the Federal University of Bahia. Currently he is teaching at the Bahia Federal Institute of Education, Science and Technology. His main research interests are on History of Science and Science Education.

CONSERVATION OF THE SCIENTIFIC INSTRUMENTS OF THE MUSEUM OF MINERALS AND ROCKS- FEDERAL UNIVERSITY OF PERNAMBUCO, BRAZIL

M. C. S. Wanderley[a], J. P. S. Bezerra[b], E. S. Ribeiro[c], S. B. Barreto[d]

[a] Undergraduate course of Museology - UFPE, Av. Acad. Hélio Ramos. S/N, Cidade Universitária, Recife - PE, CEP 50740-530, Brazil
[b] Undergraduate course of Geology - UFPE, Av. Acad. Hélio Ramos. S/N, Cidade Universitária, Recife - PE, CEP 50740-530, Brazil
[c] Antropology and Museology Department - UFPE, r. Dhália, 315/501. Boa Viagem. Recife - PE, CEP: 51020-290, Brasil
[d] Geology Department - UFPE and Museum of Minerals and Rocks, Av. Beira Rio. 230/2602. Ilha do Retiro. Recife - PE, CEP 50750-400, Brasil, Brazil | emanuelasousaribeiro@yahoo.com.br

Keywords: Museum of Minerals and Rocks, scientific instruments, preventive conservation, remedial conservation

Abstract

As part of the project '"Promotion of the Brazilian Scientific and Technological Heritage'", studies on the preventive and curative conservation of its the collection of scientific instruments are being developed at the Museum of Minerals and Rocks, Federal University of Pernambuco (UFPE). In this paper we present ongoing results of these activities, namely the diagnosis of the conservation status and the curative conservation treatment applied to four artifacts of the Museum: a contact Goniometer of two cycles, a scale, a Gemological Microscope and an Abbe Refractometer. The goniometer and the scale were acquired by the UFPE Geology course in the early 1960s, and the refractometer and the microscope were acquired in the early 1970s, when gemology at the University was developing. Like other artifacts in the collection, they were important in the development of teaching and research practices in the Geology and Mining Engineering courses at UFPE. Presently, they are not on display and are stored in metal cabinets in a humid area; they have not had any attention for years. In the paper, materials – mostly alloy – and manufacturing techniques of the instruments will be identified, followed by a discussion of their uses in UFPE and finally, after the diagnosis of the preservation state, a description of the curative conservation intervention will be presented. Methodology will also be presented and discussed, including bibliography, field visits and interviews with the administration of the Museum of Rocks and Minerals and with former teachers who used the instruments. This work aims to present this collection to the museum community and to encourage the implementation of good conservation practices.

Maria da Conceição Santos Wanderley is graduated in Arts and an undergraduate student in Museum Studies at the Federal University of Pernambuco. Her main research topics are: Scientific Museums, University Museums, and Conservation of Cultural Heritage.

João Pedro Santana Bezerra is an undergraduate student in Geology at the Federal University of Pernambuco. His main research topics are: Gemology, Applied Mineralogy, Cultural Heritage of Science and Technology.

Sandra de Brito Barreto is geologist with M.Sc. degree in Geosciences (1991) and D.Sc. degree in Mineralogy from the Barcelona University (2000). Currently she is professor at the Department of Geology, Federal University of Pernambuco. Her main research topics are: Gemology, Applied Mineralogy, Mineralogical Characterization, and Application of Analytical Techniques to Cultural Heritage.

Emanuela Sousa Ribeiro is a historian with Master (2003) and PhD (2009) degrees in History from the Federal University of Pernambuco. Currently she is professor at the Department of Anthropology and Museum Studies, at the same university. Her main research topics are: Management of Cultural Heritage, Museological Documentation, Cultural Heritage of Science and Technology.

FIRST GLIMPSES ON THE MANAGEMENT OF THE FEDERAL UNIVERSITY OF PERNAMBUCO SCIENCY AND TECNOLOGY HERITAGE

A. F. Silva Filho[a], E. S. Ribeiro[b], S. M. B. Aguiar[c]

[a] Public Management Master's Course, Federal Univsersity of Pernambuco (UFPE), Rua Ernesto de Paula Santos,175/1001 Boa Viagem, Recife-PE 51021-330, Brazil
[b] Anthropology and Museology Department of UFPE, Rua Dhália, 315/501 Boa Viagem, Recife, PE, 51020-290, Brazil
[c] Anthropology and Museology Department of UFPE, Av. Acad. Hélio Ramos. S/N, Cidade Universitária, Recife - PE, CEP 50740-530, Brazil | arlindofsfilho@ig.com.br

Keywords: Scientific heritage, scientific collection, scientific collection management

Abstract

Created in August 1941, the Federal University of Pernambuco (UFPE) results from the merge of six schools: the Law College of Recife (1827), the Engineering College of Pernambuco (1902), the Pharmacy, Medicine and Odontology Colleges (founded after 1902) and the School of Fine Arts of Pernambuco (1932). During its existence, different academic units of UFPE, particularly the Geosciences and Technology Centre (GTC), has been accumulating historical teaching and research objects of different types and functions, such as microscopes, telescopes and miscellaneous laboratory glassware, scales, medical instruments dentistry and samples of geological materials, among others. Although today these instruments are organized in small collections or museums and they represent constitutionally protected heritage under the 'UFPE Science and Technology Heritage', they are not sufficiently recognised. In this paper, we present the first results of a study on the management of UFPE and its Science and Technology Heritage, aimed at evaluating the level of commitment and the perception that university administrators have about their responsibilities as managers regarding the protection and safekeeping of these collections. Challenges faced during the study will also be addressed, as well as the general storage and conservation conditions of the GTC collections.

Arlindo Francisco da Silva Filho has graduate degrees in Medicine and Tourism. Currently he is an undergraduate student in Museum Studies at the Federal University of Pernambuco and a Master's student in Public Management at the same university. His main research topics are: scientific museums, university museums, museum management, museums and tourism, cultural tourism and museums.

Emanuela Sousa Ribeiro is a historian with Master and PhD. degrees in History from the Federal University of Pernambuco. Currently she is professor at the Department of Anthropology and Museum Studies, in the same university. Her main research topics are: Management of Cultural Heritage, Museological Documentation, Cultural Heritage of Science and Technology.

Sylvana Maria Brandão de Aguiar is a historian with Master and PhD. degrees in History from the Federal University of Pernambuco. Currently she is professor at the Department of Anthropology and Museum Studies, Federal University of Pernambuco. Her main research topics are: Management of Cultural Heritage, Public Management, Religion History.

MATERIAL CULTURE OF A SECONDARY SCHOOL: INSTRUMENTS FOR SCIENCE TEACHING

W.S. Assis[a], E.C. Pessanha[a]

[a]Universidade Federal de Mato Grosso do Sul. Programa de Pós-graduação em Educação, Cidade Universitária, s/n - Caixa Postal 549, 79070-900 - Campo Grande - MS, Brazil
wand-assis@hotmail.com

Keywords: Scientific instruments, material culture, science teaching, secondary education

Abstract

This paper, in the fields of Museology, Material Culture, History of Education and Science Studies, intends to analyses a report from 1941 named "Relatório de Inspeção Prévia" found in the files of a school in Campo Grande, a city in the south of the state of Mato Grosso (Brazil). This document brings lists of Physics, Chemistry and Natural History Laboratory equipment and instruments, such as analytical and hydrostatic scales and instruments used to demonstrate the falling bodies experiment. Our hypothesis is that these instruments had been used to conduct experiments in the laboratories of this school. We believe that the objects carry information both intrinsic and extrinsic which has to be identified. Thus, this presentation aims to discuss how these instruments may help toward a better understanding of the school practices, policies and curriculum in order to write its history.

Wanderlice da Silva Assis is librarian and got her Master degree in Education from the Federal University of South Mato Grosso (UFMS). She is currently a PhD student in the Education Program at the University of South Mato Grosso, and a librarian at the same Institution. Currently she is professor at The Institute of Higher Education FUNLEC (IESF) in the undergraduate and the post-graduate courses in Library Science. Her main research interests are on school material culture, scientific instruments and science teaching.

Eurize Caldas Pessanha has a Bachelor's degree in Modern Languages Teaching and Pedagogy from the Faculty of Philosophy of Campos (Brazil) and got her Master Degree in Education from the Pontifical Catholic University in Rio de Janeiro (PUC-RJ), and her PhD in Education from the University of São Paulo (USP). Her post-doctoral studies were at the Department of Curriculum and Instruction at the University of Wisconsin - Madison and at Texas A&M University in College Station, Texas, United States. Currently she is Associated Professor at Federal University of South Mato Grosso (UFMS) in the undergraduate course in Pedagogy and in the Postgraduate Program in Education. Her main research interests are on school culture, history of school subjects, curriculum and the History of education.

INTRODUCING TEACHING LABORATORY EQUIPMENT FROM EUROPE IN A BRAZILIAN SECONDARY SCHOOL AT THE END OF THE NINETEENTH CENTURY

J.O. Beiral[a], S.A. Martinez[b], F.J. Luna[a]

[a]Centro de Ciência e Tecnologia bCentro de Ciências do Homem-Universidade Estadual do Norte Fluminense, Av. Alberto Lamego, 2000, Campos dos Goytacazes, 28020-600, Brazil | fernando@uenf.br

Keywords: teaching laboratory, secondary school, 19th century

Abstract

In one of the finest institutions of secondary education outside the provincial capitals of Brazil, a significant number of teaching laboratory equipment from the last decade of the nineteenth century still exists today. Located in Campos dos Goytacazes, a medium-size city c. 250 km north of Rio de Janeiro, the nation's capital at that time, the 'Humanities Lyceum' went through an important reform in 1890 in order to reinforce the teaching of chemistry, physics and natural history, in a shift from the previous emphasis on the humanistic disciplines. In tandem with other Brazilian secondary schools, the Lyceum in Campos followed the guidelines set by the Ginásio Nacional, a model institution located in the nation's capital, in an effort to build laboratories for the hands-on teaching of chemistry and physics, for which large rooms were equipped with appropriate countertops, plumbing and sinks, fume hoods and gas burners. Teachers with the necessary skills were, of course, needed, as well as preparadores, i.e. lab technicians – all were duly hired following a public selection. In this paper, we will present some of the apparatuses that were purchased at the time to equip the physics teaching laboratory, including a telegraph, a battery, a hydraulic press, a 'S Gravesande ring, a wire dilatometer, and a set of Magdeburg hemispheres. Since the period is prior to the industrialization of Brazil, which gained momentum only in the mid-twentieth century, most of the equipment was imported from Europe and the United States (such as Gebr. Wichmann microscopes from Germany or from the American Bausch & Lomb Optical Co.), although some were manufactured in Brazil, e.g. the microscope made by D. F. Vasconcellos Óptica, a firm located in São Paulo.

Josilandia de Oliveira Beiral has a Bachelor's degree in Physics from the Northern Rio de Janeiro State University and is a student at the Master's course on History of Education. Currently she teaches physics for high school students in Campos dos Goytacazes-RJ. Her main research interests are focused on teaching of laboratory classes of chemistry, physics and natural history at the end of the 19th century in Brazil.

Silvia Alicia Martínez has a bachelor's degree in sciences of education (Argentina) and a Master and PhD. degrees in Education from the Pontifical Catholic University of Rio de Janeiro (PUC-RJ). She made a post-doctorate in History of Education at the Lisbon University. Currently she is assistant professor at the Northern Rio de Janeiro State University and the Director of Graduate Study of the Social Policy Program. Her main research interests are focused on the history of education, educational heritage and careers in teaching.

Fernando José Luna de Oliveira is bachelor in Chemistry and has a Master and PhD. degrees in Chemistry, respectively, from the University of Ibaraki (Japan) and from the Campinas State University (UNICAMP). He made post-doctorates in Chemistry at the São Carlos Federal University and in History of Science at the Oswaldo Cruz Foundation (Rio de Janeiro, 2011). He is assistant professor at the Northern Rio de Janeiro State University since 1999. For the past seven years, he has been doing research on the history of chemistry in Brazil.

THE MUSEUM OF THE HISTORY OF CARTOGRAPHY AND TOPOGRAPHY, FEDERAL UNIVERSITY OF PERNAMBUCO, BRAZIL

H. M. Barbosa[a], D. C. Silva[b], A. E. C. Valença[c]

[a] Undergraduate Course in Museology, Federal University of Pernambuco - UFPE, Street Luciano Luis de Barros, quadra 23, bloco A7, apt 204, Jaboatão dos Guararapes, CEP: 54470-140, Brasil
[b] Department of Cartography Engineering, UFPE, Street Luiz Guimarães, 411 apt 601-C, CEP: 52061-160 Recife PE, Brasil
[c] Undergraduate Course in History, UFPE, Street Bom Pastor, 1485, Edificio Jaçanã, apt. 01, Bl C, Engenho do Meio, CEP: 50670-260, Recife, Brasil
hmontenegro91@gmail.com

Keywords: Museum of Cartography and Topography, cientific instruments, science and tecnology collections, documentation

Abstract

The Museum of the History of Cartography and Topography of the Federal University of Pernambuco (UFPE) has a collection of over one hundred objects, of which the majority was identified and collected by Antonio Barreto Coutinho Neto. Neto was a professor of Surveying and Calculation of Compensation and also Deputy Director of the Center for Technology and Earth Sciences, Founder and Coordinator of the Cartographic Engineering Course at UFPE. The collection, which will be presented in this paper, has its origins in the former School of Engineering (1895), later the Center for Technology and Geosciences where the Museum is located. The collection is diverse and its highlights are the theodolites, levels, barometers, as well as photogrammetry, drawing and calculating instruments, among others. It is being documented at a primary level, namely enumeration and basic identification. The existing literature collection at the Museum, consisting of books, manuals and works made by former students of Cartographic Engineering is a valuable source for our understanding of the collection.

Heloiza Montenegro is a Museology undergraduate student at the Federal University of Pernambuco. Currently she is a volunteer at the Museum of Topography and Cartographic Engineering of UFPE and has an interest in the areas of documentation of scientific objects and study of prison museums.

Daniel Carneiro da Silva has a bachelor's degree in Civil Engineering from theFederal University of Pernambuco, and a Master and PhD degrees in Geodesic Sciences from the Federal University of Parana. Currently he is associate professor of the Federal University of Pernambuco, at the Department of Cartographic Engineering. He has experience in project management roads and engineering education and research in Geosciences with an emphasis on Photogrammetry.

Arthur Clifford Emir Valencia is student of the BSc course in History at Universidade Federal de Pernambuco (UFPE), and currently unites his practices with the joint course of Museology.

INITIATIVES FOR THE PRESERVATION OF THE HERITAGE OF S&T AT THE MUSEUM OF SCIENCE AND TECHNOLOGY, FEDERAL UNIVERSITY OF OURO PRETO, BRAZIL

G.A. Nunes[a], M.E. Rainho[b], C.A. Jotta[b], F.E. Hoffman[b]

[a]Department of Museology, Museum of Science and Technology School of Mines, Federal University of Ouro Preto, Praça Tiradentes 20, Ouro Preto, 35400-000, Brasil
[b]Student of Museology, Federal University of Ouro Preto - UFOP, Praça Tiradentes 20, Ouro Preto, 35400-000, Brasil
gilson@ufop.br

Keywords: museology, heritage of science and technology, science and technology museums

Abstract

The School of Mines of the Federal University of Ouro Preto (UFOP) was founded in 1876. It was the first Brazilian institution of higher education in geology, mining and metallurgy. During its existence, a significant number of equipment and teaching models in several science and technology areas were imported from Europe and the United States to equip the laboratories and offices of the School.
As an institutional strategy to safeguard this heritage, the Mineralogy Museum was created with the basic mission to preserve and present the collection of minerals and fossils. This Museum became the Museum of Science and Technology, enlarging its mission to the preservation and display of the S&T equipment and models. Even before this new institutional setting, the Museum creates exhibitions, sponsored by companies, and collects, catalogs, preserves, in some cases restore the collections, but has a large number of pieces a consequence of lack of space for the collection storage. Since 1997, the Museum is open to visitors and has been proactive in preservation initiatives, with running projects funded by research agencies without interruption since 2004. In 2008, with the creation of the undergraduate course in Museology at UFOP, which the Museum was the instance of tenderers, the number of initiatives has considerably increased. Among these more recent projects are the Development of a Thesaurus of Scientific Instruments in Portuguese and the project for the Preserving the Heritage of Science and Technology of Brazil.

Gilson Antônio Nunes is civil engineer and a specialist in teaching of Astronomy. He has a Master degree in Materials Engineering (Federal University of Ouro Preto - UFOP) and is a D.Sc. student at the Materials Engineering Postgraduate Program (UFOP). Currently he is professor and Head of the Museology Department at UFOP and Coordinator of the Museum of Science and Technology, School of Mines, UFOP. His main research interests are on teaching of science, meteoric, historical scientific equipment.

Mercedes Estela Gomez Rainho is historian and undergraduate student of Museology at the Federal University of Ouro Preto. She has a fellowship at the Museum of Science and Technology, School of Mines, Federal University of Ouro Preto.

Carlos Augusto Ribeiro Jotta is an undergraduate student of Museology at the Federal University of Ouro Preto and has a fellowship at the Museum of Science and Technology, School of Mines, Federal University of Ouro Preto.

Felipe Eleutério Hoffman is an undergraduate student of Museology at the Federal University of Ouro Preto and has a fellowship at the Museum of Science and Technology, School of Mines, Federal University of Ouro Preto.

THE ASTRONOMICAL OBSERVATORY AT THE FEDERAL UNIVERSITY OF RIO GRANDE DO SUL, BRAZIL: THE COLLECTION OF INSTRUMENTS AND A CASE STUDY IN RESTORATION

C. P. Araújo[a], C. M. Bevilacqua[a]

[a]Universidade Federal do Rio Grande do Sul,Av. Bento Gonçalves, 9500, Porto Alegre,91501-570, Brazil
erex@if.ufrgs.br

Keywords: scientific instruments, preservation, restoration, Observatório Central

Abstract

This paper presents the collection of scientific instruments from the Astronomical Observatory of the Federal University of Rio Grande do Sul, Brazil. It consists of approximately 50 instruments that have been acquired since 1907 and have been used for several purposes, such as the Right Time Service, determination of latitudes, longitudes and geomagnetism, among others. The collection is described in its entirety. Main objects are illustrated and a brief description, functions and preservation status are also provided. As a case-study in scientific instruments' conservation, the restoration of the electric pendulum clock Riefler Nº. 303 will be presented, coupled with an analysis of methodology, results and future perspectives.

Cesar Augusto Papini de Araújo has a Bachelor of Laws degree from the Pontifical Catholic University of Rio Grande do Sul (PUCRS) and a Master of Arts degree in Contemporary History from the same University. Currently he is a senior undergraduate student in Museology at the Federal University of Rio Grande do Sul. His main interests are on restoration of watches and scientific instruments.

Claudio Miguel Bevilacqua has a BSc. degree in Physics from the Federal University of Rio Grande do Sul and a Graduate "Lato Sensu" degree in Physics with emphasis on Analysis and Characterization of Materials from the same institution. He holds the position of physicist at the Astronomical Observatory at UFRGS where he works in the dissemination of astronomical sciences and the preservation and restoration of the instrumental collection of this institution.

THE BREGUET TELEGRAPH SET AND THE BEGINNG OF TELEGRAPHY IN BRAZIL

M. C. da Silva

Colégio Pedro II, Campo de São Cristóvão 177, Rio de Janeiro, 20921-440, Brazil
maurocostasilva@ig.com.br

Keywords: Telegraphy, Breguet, Telecommunication,

Abstract

In the middle of nineteenth century, the imperial government of Brazil had interested to introduce the telegraphy in the country. The minister of Justice Eusébio de Queiroz was engaged to forbid the slave traffic, and got in touch with Guilherme Schüch de Capanema, a physics professor of Escola Central, a college of engineering in Rio de Janeiro. Capanema, who had studied engineering in Viena, had acquire a telegraphy set from one of the most famous French clockmakers, Breguet, who had developed an interesting telegraph system very easy to operate. This equipment was fundamental to prove the efficiency of this kind of telecommunication in the first test in Brazil at Capanema laboratory. In this occasion, Colonel Polidoro da Fonseca Quintanilha Jordão and Capanema had exchanged messages from one room to another. After the success of this experiment, the emperor D. Pedro II, whose interest in science and technology was well known, entrust the minister Eusébio de Queiroz to introduce the telegraphy in Brazil.

This work will show the Breguet telegraph set, the conception of telegraph transmission of this apparatus, the importance of this equipment in the introduction of telegraphy in Brazil, the utilization of this instrument in the world, especially in France, and afterwards the replacement by the Morse telegraph set.

Mauro Costa da Silva has bachelor's degrees in electrical engineering and physics. He also has a Master and PhD degrees in History and Philosophy of Science. He has been working in the history of telecommunication in Brazil, especially in the period between the Second Reign and the First World War, and the connection between the Brazilian telegraph network and the worldwide telegraph network.

Realização

Apoio

Colaboradores