

9. History, Education and Science Dissemination

9.01 The art of scientific illustration in Butantan

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Introduction: Since the beginning of Butantan Institute, people such as August Esteves, Carlos Hoehne and Teresa Sarli, had produced engravings used to illustrate scientific articles, didactic materials and complete works, which are examples of scientific publications at that moment. The scientific illustration followed the disciplines' changes, serving still today the researchers as a visual and didactic resource. Therefore, in 2009 in the *National Week of Sciences and Technology: Sciences in Brazil*, the Historical Museum organized, for the purpose of exhibiting the graphics collection of Butantan, the exposition the Art of Scientific Illustration. **Objectives:** The exposition intended to show the work of the illustrators of Butantan in its historical and social context, featuring the art of the representation and of the scientific communication. It adopted different insertions throughout time, going beyond the esthetic and technical aspects, and showing the peculiarities of each tracer. **Methods:** We chose two types of illustration that had been historically significant: zoological and botanical. After raising the authors and the production of the same ones, we related the tradition of inserting them in the practical one of the graphical register on the national scene since the XVIII century, identifying styles, intentions and traditions that had characterized the illustration as a resource for the register and the dissemination of the research of public character. For this, we created an exposition with strong visual appeal, stimulating the visitors to participate in the research that had resulted in engravings of plants, animals and human beings, by means of panels that had presented the subject in different languages. **Results and Discussion:** The exposition remained in the Museum during the period of October 2009 until January 2010, receiving 18,471 visitors where 3,527 were set appointments. The white public participating in the educational action was defined as being the childhood public with ages between 6 and 12 years. The educational action was carried out for 1405 and divided into three moments: 1) presentation of the subject and chronology, 2) inclusion of the public in the workshop, "also a Scientific Tracer" and 3) use of a line of the time where each pupil inserted its illustration, recognizing it in the already identified secular traditions. **Argument:** The exposition was a chance to show the importance of the tracer as identification and spreading of national the environmental and social elements, beyond characterizing the Butantan of this tradition inside. However, the great motivation of the exposition was to divulge part of this significant quantity and so little known.

Supported by: Fundação Butantan

9.02 Architectural heritage inventory

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Introduction: With the opening of discussions in the History Museum about the architectural heritage of Butantan Institute, a study of the construction's history was conducted through examination of the Annual Reports. During the research, we noted a scarcity of data about the constructions. At the same time, we observed in the Institute's iconography an important wellspring to research of some architectural aspects and the occupation's and space's uses. Therefore, the team prepared two instruments for research: an inventory of buildings and a database for iconographic documents, which together, may complement and extend the discussion about patrimonial preservation. **Objectives:** The aim was to extend our knowledge of the buildings that belong to Butantan; to get information about the architectural sections, construction techniques, buildings' history and buildings' changes, to encourage the discussion and policy making for preservation and educational activities using the data obtained. This work was carried out in partnership with the Engineering' Department and the Institute Documentation Center. To determine if the iconography will be used as a research source, an identification form was created to catalog and integrate the collection's database. **Methods:** In order to identify development notes, for the buildings as well as the iconographic material, literature support relative to aspects of cataloging, evaluation and preservation were raised and discussed. For the filing and analysis of records, an extensive bibliography that approaches relevant questions was planned. Parallel to readings and preparation of identifying notes, actual topographies of buildings were prepared to be part of the database. **Results and Discussion:** As to the research work and discussion about to the fields that must be present for the knowledge of the iconography collection and buildings, were elaborated two identifies notes and cataloging. The database has been discussed in partnership with the Butantan Foundation computer sector. For the partial results, we realized some photographic essays of the state of the buildings. The essays will be attached to the buildings inventory. The purpose of preparing this inventory was to enhance in the community the importance of identity and the institutional heritage preservation, which consist of the buildings, old documents and museum collections, and also scientific and intellectual. Through the heritage's observation and documentation, it is possible to think in political and control strategies, security and preservation of property, avoiding loss, dispersions and destruction.

9.03 Implementation of an innovative service: exchange of serum for snakes by the Instituto Butantan (1901-1919)

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Introduction: The service of exchange of snakes for antidote serum was created, introduced and implemented by Vital Brazil, the first director of the Instituto Butantan. In order to continue with the research on snake poisoning and the production of antidote serum, medical doctors required a large number of snakes to extract poison, the raw material for the production of serum. The system of exchange was implemented to face the difficulty of buying or obtaining live snakes in good condition. **Objectives:** This study aimed at the analysis of the implementation of the exchange system at the Instituto Butantan. The service was rendered by the Institute from its foundation until the mid-1990s. It was significantly important for enlarging the snake collection, the development of the study of snake poisoning, the production increase of antidote against snake bites, as well as for the information to the population, which contributed with diminishing mortality due to snake bites. **Methods:** This work was grounded on a systematic research of official documents from the Institute, archived by the Laboratory of History of Science (Laboratório de História da Ciência) as annual reports, statements and mail, as well as the bibliography on the history of health during the first years of the Brazilian Republic. **Results and Discussion:** To debate the implementation of the exchange service, means to discuss the institutionalization of the Instituto Butantan itself, due to the fact that the exchange of serum for snakes is vital for its production: to analyze the difficulties of legitimization and spreading a treatment unknown up to then, which was based on bacteriology –a science just starting at the time; to ponder on an issue of the institutional history– i.e., the institutional mission (production, research, health education); to reconsider the health policies during the first decades of the twentieth century. As a director of the Institute, Vital Brazil organized a service and implemented a project of health education for the population, thus allowing the snake poisoning to become a matter of public health.

9.04 Studies undertaken by the Microbiology Museum concerning the viability of a science laboratory at the Instituto Butantan base in the Amazon

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Introduction: During its first eight years of existence, the Microbiology Museum has established itself as an important center for developing educational activities and disseminating scientific information, with the aim of stimulating the curiosity of the general public about science - especially Microbiology. The administration of the Instituto Butantan took advantage of these experiences and invited Museum team to develop strategies for establishing a science laboratory for public school students in Belterra, a municipality of Santarém, Pará. **Objective:** The aim of this study was to analyze the practicality of establishing a science laboratory for grammar and high school students at the Instituto Butantan base in the Amazon, taking advantage of the abilities and skills of its professionals in the areas of science, the physical possibilities of the locale, and the interest of the municipal administration. **Methods:** The present study was based on interviews with a total of 15 professionals - 5 health workers, 1 laboratory technician, 1 general education coordinator, 1 school director, and 7 science and biology teachers in public schools in the municipality of Belterra. The physical conditions of some public schools' infrastructure were also analyzed. It was found that only 12 teachers in Belterra had studied natural sciences and, of these, 2 had graduated in Biology. Science classes in many schools are given by teachers from other areas. Only one of the 64 public schools has a science laboratory (with a microscope that is not being used). Only one of the teachers interviewed had some notion of the principles of microscopy. **Results and Discussion:** An analysis of the information gathered in Belterra indicates that it would be possible to set up a science laboratory there if certain factors were taken into account. The existing laboratory at one of the schools was only recently built and is of adequate size and physical structure to install a duly equipped science laboratory for the Amazonian Base of the Instituto Butantan and can attend to the needs of students from other schools. The Municipal Department of Education already regularly provides transportation for students to and from other schools. There is an obvious need to prepare the local teachers to use the laboratory and their disposition to do so became evident. However, financing for setting up the laboratory and purchasing materials for class activities are important limiting factors that must be considered. This preliminary survey points to the need for continuing discussions and cooperation between Belterra and the Instituto Butantan, which can result in a work plan contemplating the requirements for establishing and running the proposed science laboratory.

Supported by: Projeto Butantan Amazonia, Secretaria da Saúde de São Paulo

9.05 Education and training activities developed by the “Divisão de Desenvolvimento Científico do Instituto Butantan”

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Introduction: The Instituto Butantan executes several activities focusing on the Sciences, among them the development of scientific projects, new drug discovery, innovation and staff formation can be pointed out as important tasks. The education and students' formation are also important issues included in the attributions of the “Divisão de Desenvolvimento Científico (DDC).” To reach the students' training, four different programs have been established in the Instituto Butantan: PIBIC, PAP, Post-Graduation and NEUAP. **Objectives:** The aim of this communication is to describe the four programs developed by DDC focusing the students' formation and explain how each program contributes to the scientific activities of the Instituto Butantan. **Methods:** Among the programs developed, “**PIBIC** - Programa Institucional de Bolsas de Iniciação Científica” focuses on the graduation students. Its main objective is to awake the scientific vocation and to stimulate potential talents among university graduates. Another program developed here is the “**PAP** - Programa de Aprimoramento Profissional.” which aims to complement the training of recent graduates, by training them under direct supervision of specialized professionals in the diverse areas that integrate the program. A really important program created in the Instituto Butantan is the **Post-Graduation Program**, whose main approach is a multidiscipline formation, focusing on poisons and toxins (effects on biological systems, structural aspects, etc), envenomation, therapeutics and bioprospecting. Finally, the youngest program of the DDC is the **NEUAP** “Núcleo de Extensão Universitária e Aperfeiçoamento Profissional” which enrolls several scientific researches of our community who offer courses in different areas to graduate students and graduated people. **Results and Discussion:** All of these programs were created to improve the theoretical and practical knowledge of the different students who are interested in the Scientific Projects of Instituto Butantan, by promoting their involvement with the researchers who have a high scientific level and also by offering them a fellowship support supplied by different agencies.

9.06 Evaluation of the journal *Cadernos de História da Ciência* of Butantan Institute as a vehicle for divulging the history of science and health

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Introduction: Created in 2005, the journal *Cadernos de História da Ciência* publishes original papers, interviews, reviews and analyses of sources in the area of the History of Science and Health. Since 2009, as a result of the indexing process, the editorial board found it necessary to define more clearly the public to which it is aimed, as well as to improve its identification with other research groups in the area, making it a recognized communication vehicle. **Objectives:** The aim here was to discuss, by means of a survey of the CNPq Research Groups (area of History of Science and Health) and *Scielo* evaluation for indexation, the scope of the *Cadernos de História da Ciência*, as well as to pose a critical analyses of its constitution as an information vehicle of the area, taking into account the institutional relationship of the authors and the discussed themes. **Methods:** The Journal indexation process, started by the *Scielo* evaluation, has offered us the first insight with respect to the influence the Journal upon the professionals of the area, identifying some points that deserve to be reevaluated about the institutional origin of the authors, members and associated researchers. Second, we surveyed the CNPq research groups, mapping their origin, institutions and internal leaderships, relating the themes discussed by those groups and the papers published by the *Cadernos de História da Ciência*. **Results and Discussion:** The revision of the items reported by *Scielo/Bireme* suggests that by its definition as an information vehicle of the area of History of Science and Health the Journal should have more representation from other parts of the country, as up to this moment, more than 80% of papers published come from the Southeast region, mainly from São Paulo and Rio de Janeiro. On the other hand, of 36 research groups, 26 are from the Southeast region (1 from Minas Gerais, 11 from Rio de Janeiro and 14 from São Paulo) and only 10 are from other regions: 1 from Northeast, 5 from North and 4 from the South. Thus, in our opinion, up to this moment, even though we are restricted to the region that produces most of the knowledge in the area, we do not exchange themes outside the interests of the research in health institutes, having little interchange with the universities such as the groups from UFRJ, USP and UNICAMP.

9.07 Hospital care and health policies in the State of São Paulo (1800-1950)

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Introduction: Hospitals play an essential role among the health policies of the state. This has, however, been a rather recent matter of consideration. In the nineteenth century, the hospital was almost unknown for most of the population. Illnesses received home care and hospitalization was recommended only in some cases among the low-income population. In the mid-nineteenth century, changes occurred as to the importance of the hospitals and their role in curing. The discussion, however, lay on the responsibility of the organization of hospital care: if it had to be in the hands of philanthropy, the state, the employers, the ill people themselves through organizations of civil societies or different working groups. At the end of the 1930s, there was an increasing investment by the state in the building and maintenance of hospitals. **Objectives:** This work is part of a broader project on the relationship between public and private health policies in the State of São Paulo, focusing on hospital care. **Methods:** The analysis is grounded on a systematic research of the state legislation for health and on the messages and reports of the presidents of the province and the governors of the State of São Paulo during the mentioned period –a period which witnessed important changes in the political, social, economical, demographic and scientific scenarios in the State of São Paulo and Brazil. **Results and Discussion:** What were the roles played by the state as for hospital care in São Paulo from the beginning of the nineteenth century and the decade of 1950? What were the proposals, projects and measures implemented by the government of São Paulo regarding hospital care? These are some of the issues which guide this work, which aims at the analysis of the official policies and at the comprehension of the changes during the 150 years covered in this study.

9.08 Learning in science museums: young visitors at the Microbiology Museum - Phase II

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Introduction: Very few events in Brazilian museums are specifically planned for children even though these young visitors represent a significant percentage of the population that passes through the Microbiology Museum of the Instituto Butantan every year. As such, studies about this youthful public will be important for planning educational programs and an exposition for the Museum specifically directed to them. This research project is being developed in two phases: the first phase has already been completed, and was designed to examine the degrees of knowledge that children already have about microorganisms; the second phase has been initiated and its preliminary results have been analyzed. **Objectives:** The objectives of the second phase was to evaluate what types of equipment have the greatest potential for stimulating children to learn more about microorganisms, which are most adequate for the expositions and what are the best materials and techniques for teaching about magnifying images. **Methods:** This research was carried out through interviews with young children (4-6 years) who were visiting the Microbiology Museum and from the *Centro de Convivência Infantil* (CCI) do Instituto Butantan. These young people were invited to manipulate several materials such as hand-held or fixed magnifying lenses, a toy called "Eye Clops" (which magnifies objects and transfers their image to a TV screen), boards with drawings and pictures of microorganisms, as well as three-dimensional models of microorganisms (made from resins or fabrics). The children's responses were recorded or filmed with video cameras and subsequently transcribed, notes were taken, and the drawings made by the children were collected for evaluation. **Results and Discussion:** The use of hand-held lenses was found to be more interesting as they can be readily manipulated and their magnifying effect is immediately appreciated. The "Eye Clops" apparatus did not contribute greatly to conveying the idea of amplifying images. All kinds of images was judged possible to use in games and animated films planned for future expositions as well as 3D models that were also found to be attention-holding. The data presented here brings various important elements to the planning and development of museum exhibits to teach young children more about microorganisms. As such, we believe that this work can contribute to strengthening research into learning experiences in museums and also enrich educational practices and aid in disseminating scientific knowledge in these cultural settings.

Supported by: FAPESP

9.09 100 years of the book "A defesa contra o Ofidismo" and the building of Public Health in Brazil

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Introduction: In 2011, "A defesa contra o Ofidismo" celebrates 100 years of its first edition. The researchers of Laboratório de História da Ciência of Instituto Butantan had worked with this important text, in the way of emphasizing the importance of the scientist Vital Brazil for building the Brazilian Public Health. **Objectives:** The work aimed at bringing out the importance of the book through the viewpoint of the scientist, his insertion at the Instituto Butantan and in the health service organization in São Paulo. **Methods:** In this historical analysis, different sources were used, biographic aspects of the author and his inclusion in the scientific scenario in his time. In addition, the analyses focused on the social, economic and political conditions of the creation of public health institutions and their performance in these periods. **Results and Discussion:** Vital Brazil began his works when infectious diseases and their combat were the great concern of the public health policies, and great health campaigns were developed in a vertical way. In this period Vital Brazil had implemented a movement of health education to the population to fight against mortality of snake bite. This mobilization had proved to be nationwide, reinforcing a trend of precursor form of public policy implemented, especially since the 1920s.

9.10 New educational and scientific dissemination activities by the Microbiology Museum in 2009/2010

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Introduction: The mission of the Microbiology Museum is to serve especially young people stimulating their scientific curiosity and lend support to science education in schools. The museum also seeks to promote a greater understanding of science by the general public. As all fields of science are advancing at a very rapid pace, the museum continually seeks to update its presentations and develop new activities that complement existing exhibits. **Objectives:** The aim of this work was to reformulate the activity modules currently used in the high school science laboratory, to develop a module directed towards grammar school students, to offer night students of Biology the opportunity to visit the science museum, and to better inform the public about A H1N1 flu. **Methods:** The five original modules directed toward high school students were reformulated into just three modules and in one workshop only with the concept of DNA, which is administered independent of the other modules. A workshop was created specifically directed toward *Ensino Fundamental II* students. A night visit sponsored by the staff of the museum received 30 Biology students from the University of São Paulo (USP) enrolled in a course dealing with Methodologies of Teaching Biological Sciences. The students attended a special monitoring with emphasis on educational activities offered by the Museum. The exposition concerning the A H1N1 flu included panels with printed material, booklets made for different age groups, an interactive game, and an educational video about the importance of the vaccine and its production process developed by the Instituto Butantan in an interview with Prof. Isaias Raw. **Results and Discussion:** There was a significant increase in the number of modules offered in the first semester of 2010 as compared with the same period in 2009 (80 versus 55), which indicates that the reduction in the number of modules motivated the students from both public and private schools to participate in these activities as they could complete all of the modules with fewer visits to the Museum. The evening visits to the museum gave the USP students the opportunity to experience for themselves non-formal educational strategies that can help young people become more aware of the role of science in the modern world. Approximately 68,000 people (including 20,400 students) visited the temporary exposition "*The H1N1 virus in the gun-sights of Brazilian science*" over a period of 7 months - reaffirming the interest of the general population in scientific exhibits. These encouraging statistics reinforce the mission of the Microbiology Museum, which is to bring scientific information and education to the general public and stimulate critical reflections on the role of informed citizenship in modern society.

Supported by: Fundação Butantan

9.11 Belterra's Center of Memory: a space for the rescue of local memory

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Introduction: By the end of 2009, the group *Research on Patrimony and Memory of Belterra*, responsible for creating and organizing the historical heritage and the activities of patrimonial education in the municipality of Belterra, recognized that it was a duty to make heritage accessible and inserting it in the Education Secretariat. Doing that, the municipality becomes the main agent responsible for the creation of a policy for the local heritage. The Instituto Butantan became a partner and collaborated, by the project Butantan at Amazonia and INCTTOX, to define these policies. **Objectives:** The aim of this work was to support the creation of the Belterra's Center of Memory in order to develop research related to guarding and conserving documents containing the history of Belterra and to provide a space for the public to have access to its own heritage, performing its main duty of promoting the community's participation in the process of official recognition as a historical city, and the inclusion in the federal Plan for Acceleration of Development–Iphan PAC Cidades Históricas. **Methods:** A multidisciplinary group made a survey of the heritage collected by the institutions of Belterra and Santarém, the public and the cultural places of the municipality. Besides being used as sources of the research performed by Butantan, all the material had to be submitted to a conservation and cataloguing process to be made publicly accessible. It is also responsibility of the municipality and the Butantan to qualify multiple agents through courses and trainings on Patrimonial Education, involving documents' management and workshops to rescue the memory and to value the inhabitants' histories of life, seen as a cultural heritage of Belterra. The Butantan and the Education Secretariat developed these workshops, including these issues in education programs of the public schools. **Results and Discussion:** In May 2010 the Belterra's Center for Memory was inaugurated, settled in a historical building, originally used as the physicians' house and more recently as the Health Secretariat. The restoration of the building was performed by the organization AmaBrasil, maintaining the same structure as the original, from the 1940's. Since the beginning the City Hall, it has been responsible for the administration of the Center, with the technical support of the Education Secretariat. Nowadays, the Center is consolidated in the scholastic calendar and on daily lives of inhabitants. Our initiative to open a discussion about history, heritage and culture led us to congregate people, ideas and documents. The challenge for the future is to maintain initiative, gaining new partners and financial support.

Supported by: Projeto Butantan na Amazônia/Secretaria da Saúde de São Paulo, Prefeitura Municipal de Belterra

9.12 Evaluation of the activities of the Historical Museum in 5 years of management
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Introduction: The Historical Museum of the Butantan Institute has undergone some reformularizations, generating the necessity of one practical of systematic and clear evaluation, becoming more compromised with the use of instruments or processes that evaluate the degree of reaching its action. **Objectives:** This work aimed at correcting the absence of this practice, a strategic planning was elaborated to present the results and the evaluation of the innovation proposals during the five years of this management. For this, general elements had been considered that evaluated the involvement of the internal team and the exploitation of the visiting public, serving as an element of analysis for the future managements. **Methods:** We used analyses cross related to the involvement of educators of the Museum and the public, by means of the following elements: elaboration, execution and scientific production subsequent to the application of the activity (internal evaluation) and number of visitors and impressions registered in the notebook of visitation and for the email of the Museum (external evaluation). **Results and Discussion:** During 5 years, the Museum developed activities where the public participated in different ways, between expositions of short duration, workshops and special guided tour. The coefficient of participation in the elaboration and application of the activity did not always follow the same degree of interest in the scientific production of the group, resulting in cases in which the initial research took advantage of dissemination and the later production, mainly in the workshops and special guided tour. The opposite occurred in the expositions of short duration that had also motivated employees and educators in the article elaboration, abstracts, presentations and internal records of the actions promoted. When crossing these elements with the participation of the public, we corroborated the perception that the expositions, for the dynamics, involvement and knowledge acquired from the work team, more had been used to the advantage of its pedagogical aspects and of leisure. We determined, however, that the involvement of the public does not only depend on the treated subject, but on the dissemination (contact by telephone, folders, posters, email list, etc). It is therefore one practise little used, but basic for the Museum: to consider the spreading as integrant of the elaboration of the initial proposal, and not only as the completion of the actions. It is clear that there is a need to articulate the internal projects of research with the promoted actions, in ways to stimulate scientific production. In this direction, the team dedicated the different forms of registering that join internal and external impressions to the action, as a blog of the Historical Museum, which shows the stages of the activities and the results obtained by means of the notations of the proper participating pupils.