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CONSERVATION OF ARCHITECTURAL COMPLEX OF MANGUINHOS, IN RIO DE JANEIRO, BRAZIL

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Abstract. *The aim of this paper is to report on the history and conservation interventions of the historic architectural complex of Manguinhos, in Rio de Janeiro, one of the most significant and symbolic architectural ensembles in Brazil. It is the headquarters of the Oswaldo Cruz Foundation – Fiocruz, under the supervision of the Brazilian Ministry of Health, the most prominent institution of science and technology on health in Latin America. It was protected by the National Historic and Artistic Heritage Institute (IPHAN) in 1980. The construction of the complex started in 1904 on the initiative of the renowned Brazilian scientist Oswaldo Cruz and was designed by the Portuguese architect Luiz Moraes Júnior. The main monument of the architectural complex, the Moorish Pavilion, received varied influences of styles and the décor is a reference to Alhambra. An architectural reading of the complex of Manguinhos will be made, examining the architectural language adopted on the historical buildings in particular the Moorish Pavilion; the material and building systems used in its construction; its meaning for the city and the heritage designation process, the surrounding environment in various periods, and the physical, functional and visual relationship with the city. Regarding the restoration works method, the following will be examined: causes of deterioration; diagnosis and state of conservation; interventions performed over the years; and the project and methodology and the latest intervention works. The conclusion, will analyze the interventions undertaken in the light of modern principles of cultural heritage preservation, the importance of the restoration works of the complex of Manguinhos, and its use as a public cultural and scientific space for the city.*

1. INTRODUCTION

The former Federal Serotherapeutic Institute was created in 1900, in the neighborhood named Manguinhos, in the city of Rio de Janeiro, Brazil. It was composed of a small number of traditional constructions, with brick walls and ceramic tiles roofs. In the same setting there was also an old garbage incinerator that belonged to the municipal administration, comprising the chimney, garbage incinerator and incinerator deposit [1]. By the end of 1902, the scientist and sanitarian physician Oswaldo Cruz became the director of the Federal Serotherapeutic Institute and on March 23, 1903 he was appointed by the President of Brazil, Rodrigues Alves, as head of the Directory-General of Public Health (DGPC), where he remained until November 1909.

His mission was to implement a modernizing model of public health, with the purpose of breaking through the insalubrious reality originated in the Imperial period of Brasil. The priority of the sanitarian reform project was to eradicate the three main pestilential diseases of the time:

smallpox, yellow fever and bubonic plague. In order to respond to the new demands and modernize the premises of the Federal Serotherapeutic Institute, Oswaldo Cruz started the construction of Manguinhos Architectural Complex. This conjuncture was decisive for Manguinhos − whose definition was inspired on the French Pasteur Institute − to become its tropical version and start the production of medicaments, scientific research, and activities related to public health [2].

2. A BRIEF HISTORIC AND ARCHITECTURAL ANALYSIS

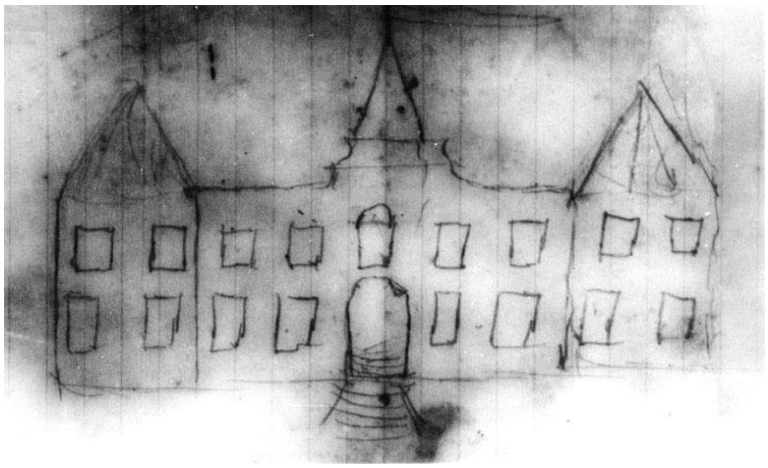

Figure 1. First sketch of the Moorish Pavilion made by Oswaldo Cruz himself (c. 1905). DAD-COC-Fiocruz archives. Photograph by J. Pinto.

The arrangement of Manguinhos Architectural Complex followed a layout that provided good ventilation and insolation of the buildings, and the highest area of the terrain was chosen for the main building to ensure a good visibility of the complex. The Moorish Pavilion, or Moorish Castle, with the front garden in the French style, stands out for its privileged setting, like the Greek temples and Portuguese colonial churches; the front of the building faces the view of the Guanabara bay. Due to its setting, shape and rich decorative details, the Moorish Pavilion is the largest building, standing out among the others in the complex, and therefore it represents the apex of the project. The buildings were arranged as to create a plaza, currently named Pasteur; on one side there is the Horse Stables; on the other side, the Quinine and the Moorish Pavilion; the Plague Pavilion closes the plaza on the back side. Behind this building, on a higher level, there is the Saltwater Aquarium. Separated from this arrangement, on the other hill of the campus, there are the Oswaldo Cruz Hospital, currently named Evandro Chagas Hospital; a vivarium for small animals, named Pigeonry; and the Vaccines Pavilion, built in the 1920s. These two last buildings are placed on the way between the two hills [3].The projects of the buildings that compose Manguinhos Architectural Complex were commissioned to the Portuguese architect and engineer Luiz Moraes Júnior [2].

The first building of Manguinhos Architectural Complex was the Plague Pavilion, built in 1904 in a style that resembles the English industrial and railway stations constructions. It was meant for the preparation of serums and anti-pestilence vaccines, horse inoculation tests, and research on plague. In that same year, the Horse Stables was built in the Tudor style, meant for the inoculation of virulent material and other operations performed on horses, with the purpose of obtaining serum, except for the anti-plague serum; and the Pigeonry was built as a vivarium for small animals. The Moorish Pavilion started to be built in 1905, when the two first buildings

were ready. In the following decade, the Saltwater Aquarium and the Quinine were built, this one meant for the production of official medicaments, and for research and laboratory of chemistry. The constructive system used in Manguinhos Architectural Complex consisted of a foundation made from a track filled with stones, cement and sand, over which were laid load-bearing walls of stones and bricks. The roofs were covered with tiles imported from Marseille, France, that were set on metal structures, in the case of the Horse Stables, and on wooden structures in the cases of the Plague Pavilion and the Quinine. For the Moorish Pavilion, the solution adopted was roof terraces paved with ceramics, also imported from Marseille. The terraces were built from metallic structural profiles, having the hollows filled with perforated bricks, and are surrounded by crenels and turrets – ornaments molded with cement and sand. On the two towers, that are crowning elements of the Moorish Pavilion, a metallic structure was used to sustain the 33 different types of ornaments made of cement and sand, and spherical shaped cupolas covered with copper. For the construction of the Moorish Pavilion large excavations were made on Manguinhos hill, into which large granite blocks were placed and set with cement and sand in the proportion 1:3 originating self-supporting walls of one-meter width. The materials used in the construction of Manguinhos Architectural Complex, such as soil, wood, sand, gravel and stone, were extracted from the estate's terrain. The other materials were imported: mosaics, tiles, bricks, and floor ceramics from Marseille, France; from Germany, lamps, steel, windows and doors, and wall tiles England; marble, from Carrara, Italy; and the tile ceramics (Bordallo Pinheiro), from Portugal [3].The construction works were directed by the Italian master builder Basílio Silvestre Aor, who commanded Portuguese, Italian and Spanish craftsmen specialized in joinery, masonry, painting and stucco. Oswaldo Cruz participated actively in the conception of the projects and followed the construction works development.

The Moorish Pavilion, main edifice of the complex, had its first sketch made by Oswaldo Cruz himself. It was a set of floor plans and elevations that served as a base for Luiz Moraes' projects. On the first project, dated 1905, the Moorish Pavilion had only three floors above the ground floor. On the project dated 1907, also with three floors, the architect added two side-towers to the building, probably influenced by the Montsouris Observatory in Paris. It was only in 1908, when the construction works were already ongoing, that Luiz Moraes elaborated the final project with five floors. All the projects presented a neo-Moorish style.

The buildings designed by Luiz Moraes present an eclectic architectural language, in which the composition is conceived according to the classical principles of frontality, axiality, and symmetry, but there is an ornamental treatment in which two or more styles and decoration tendencies are mixed together. The Plague Pavilion was inspired on the English railway stations, most likely due to the architect's background in railway engineering. The English architectural language used on the main complex - Horse Stables, Quinine, Plague, and Moorish Pavilions – is present together with the Portuguese and Arabic architectural languages. The English style appears both in the architecture of the Horse Stables Pavilion and in the iron elements of stairs, stalls, railings, bars, lamps etc.; also in the equipment, such as scales and elevators, and in the composition and finishing materials, such as granite and solid bricks.

Portuguese, Moorish and English languages are masterly combined in the Moorish Pavilion, Manguinho's headquarters. The English architecture influence in the Moorish Pavilion conception is found in the adoption of the "H" floor plan, with a large stairway in the richly decorated central entrance hall. These are some of the characteristics of the Elizabethan architecture predominant in England in the second half of the 16th century, during the reign of Elizabeth I (1558-1603). Another explanation for the floor plan used at the Moorish Pavilion relates to the Portuguese influence, namely in the adoption of the typical floor plan of 17th

century Portuguese mansions, whose major contribution to the evolution of residences in Portugal was the introduction of the "U" floor plan, with an open patio at the building's back-side. The distribution of spaces is symmetrical, drawing from a central axis, where there is a large hall with stairs, either in the interior or the exterior of the building, or an internal enclosed patio. In the case of the Moorish Pavilion, the distribution of the rooms is made from the central hall and internal stairs, richly decorated. The symmetry is especially present on the façades, where the decorative elements follow a rigorous composition. Another significant characteristic of the Portuguese tradition can be identified on the placement of the lavatories in a tower virtually isolated from the main body of the building.

The decoration follows yet another aesthetic orientation. The adopted language of Arabic origin follows the movement of medieval architecture revalorization that occurred in Europe in the first half of the 19th century as a reaction to the classicist predominance, in an attempt to retrieve the artistic memory of past eras of notable constructive splendor.

The idea of a 'Palace of Science' imagined by Oswaldo Cruz for the Institute's main building was achieved, in the interpretation of its architect, with the use of the language influenced by the architecture of Alhambra, in Spain, thus demonstrating the Iberian cultural heritage of its designer. The first sketch imagined by Oswaldo Cruz, though, revealed a medieval aesthetics, with two triangular-shape towers, therefore distant from the final design implemented by Luiz Moraes.The rich decoration of the main areas of the building, namely the principal stairway hall, the last floor hall, the library reading room, and the verandas, where rich finishing materials were used, besides the handcrafted panels in plaster and wood, contrasts with the extremely simple and functional laboratories, with plain walls with no decoration and covered with white tiles, with rounded corners at the junction of walls and floor [3].

The Pigeonry was built far away from the other buildings of the complex and perhaps for this reason it represents a significant contrast. Its composition and ground floor are also symmetrical; however, it is considered the freest project designed by Luiz Moraes Junior. Small pavilions in geometrical lines and a central tower form a light, harmonious and unpretentious ensemble; the few ornaments are decorative details in concrete, like roof ends and stairs banisters imitating tree trunks as in the gardens of French inspiration [4].

In September 1907, Brazil participated in the 14th International Congress of Hygiene and Demography, held in Berlin, and presented the architectural projects being implemented in Manguinhos. The Brazilian section was awarded the Gold Medal, which was handed to Oswaldo Cruz. In March 19, 1909, the institution was named Oswaldo Cruz Institute, currently Oswaldo Cruz Foundation – Fiocruz, https://portal.fiocruz.br/.

At the closure of the first decade of the 20th century, the first and second floors of the Moorish Pavilion were occupied by operating laboratories, while the construction works continued on the upper floors. The Horse Stables and Plague Pavilion were concluded and operating with activities to obtain serum from horses inoculation with virulent material. The Plague Pavilion, currently named the Clock Pavilion, was used exclusively to obtain antiplague serum. The Pigeonry was already occupied with small-size guinea-pigs. Other buildings concluded in that period were less sophisticated, such as the pergola that originated the Tea House and its annex.

The program of construction and modernization of the Institute's premises continued to be implemented in 1912, including the beginning of the Oswaldo Cruz Hospital, currently Evandro Chagas Hospital. This pavilion integrated a hospital complex originally designed with six unities, of which only one was built, being inaugurated in 1918. The purpose of selecting the other hill to build the Evandro Chagas Hospital was to isolate it from the Institute's laboratorial areas. The building has two floors and the spatial arrangement distributes centrally the basic

services areas and at the extremities the support areas, as kitchen, laundry etc. Interconnecting these areas there are two wards. Externally, the building has a sober, symmetrical solution, in which the ornamental elements are restricted to the verandas that surround the wards, providing internal environmental comfort [5].

The year of 1915 marked the beginning of the construction of the Saltwater Aquarium, which at that time had direct connection with the sea (Guanabara Bay) and was meant for the study of the aquatic microorganisms. Its architecture of art nouveau inspiration contrasted with the other buildings of the complex; it was one of the few attempts of Moraes to adopt a more contemporaneous architectural language [3].

In February 14, 1917, due to Oswaldo Cruz's health problems, the direction of Oswaldo Cruz Institute was assigned to Carlos Chagas, also a physician and scientist, who gave continuity to the construction of Manguinhos Architectural Complex [6].

From 1910 onwards, the inner walls of the third, fourth and fifth floors of the Moorish Pavilion were built, and the following years the terraces and towers too. In 1918 the museum and the library had been installed on the third floor; the ornamentation works of the hall and the library's noble room had been concluded, as well as the external ornaments made of cement and sand. In that same year, the laboratory equipment and electric, thermic, telephone and telegraphic installations had been implemented. Most of the equipment was supplied by the German firm Siemens & Halske.

Oswaldo Cruz died prematurely on February 11, 1917, before the conclusion of the entire architectural complex. The last projects designed by Luiz Moraes for the Institute − the Quinine and the Vaccine Pavilion − were concluded in the 1920s, under Carlos Chagas' administration.

The construction works of the Quinine started in 1919; its purpose was to house the Official Medicaments Service. It was designed to be entirely harmonized with its surrounding, and the volumetry, proportions, composition and façades treatment are similar to the Horse Stables; but is the only building with a polygonal floor plan, which creates an inner patio through which the circulation is made.

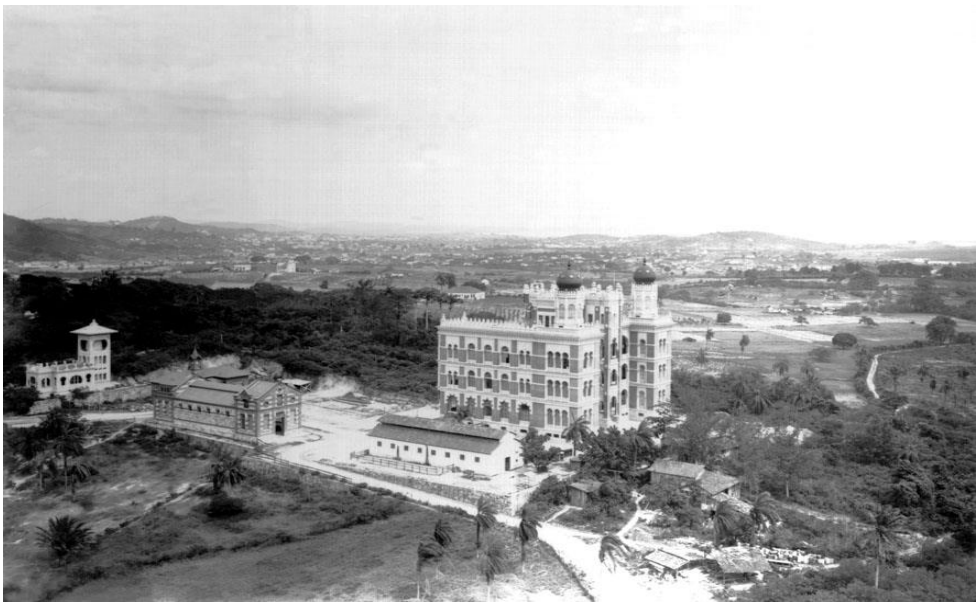

Figure 2. Manguinhos Historical Architectural Ensemble. From left to right: Saltwater Aquarium, Horse Stables Pavilion, old stables, and above the Moorish Pavilion (c. 1918). The Plague Pavilion is behind the Horse Stables Pavilion. DAD-COC-Fiocruz archives. Photograph by J. Pinto.

When concluded in 1922, the Quinine, with two floors, together with the Horse Stables and the Plague Pavilion, these with one floor each, formed a harmonious group of buildings around the Pasteur Plaza, with the Moorish Pavilion, with five floors, presenting the greatest monumentality. This ensemble has always been the highlight of Manguinhos campus due to the architectural styles, the materials used and the constructive systems adopted [3].

No other facilities were built in the complex that could equal these buildings in terms of the construction quality, which was the result of the craftsmanship, techniques, and materials used.

This can be verified in the design, also by Luiz Moraes, of the Vaccine Pavilion, built in 1922, which did not present the same monumentality as the previous ones. The building originally had a floor plan in a "U" shape, with an open patio; conventional constructive systems were adopted, with regular brick walls set with mortar made of lime, sand and cement, and roofs made of a wooden structure covered with French ceramic tiles. Less noble materials were used and the façades, covered with roughcast, are composed of a sequence of large wooden windows, marked by projecting elements.

The premises of Manguinhos Architectural Complex, especially the Moorish Pavilion, were built with the latest technological sophistication available in the country in the early 20th century [3].

3. TRANSFORMATION THROUGH TIME

From the 1930s onwards, major changes occurred within the limits of Manguinhos campus. In 1939−1940 there was the demolition of the old chimney of the garbage incineration furnaces of the Municipality of Rio de Janeiro; it had been the last construction contemporaneous to the Federal Serotherapeutic Institute. Several pavilions were built, notably the Pavilion of Courses and the Central Restaurant, with the application of the 'Five Points for a New Architecture' conceived by the Swiss-born French architect Le Corbusier: pilotis, roof-gardens, glass curtain walls on the façade, free floor plans. The construction materials and the structural constructive system characteristic of the modern movement featured reinforced concrete, ceramic tiles walls, glass curtain walls on the façade, roof-terraces with ceramic pavement, and roofs covered with amianthus tiles.

Designed by the Brazilian architect Jorge Ferreira, with decorative tiles panels by Paulo Osir Rossi, the project of the Central Restaurant was awarded the Special Mention of the jury of the 1st International Architecture Biennale held in São Paulo in 1951. Even more creative, the project of the Pavilion of Courses, by the same architect, had the collaboration of Roberto Burle Marx - author of the landscape architecture and the wall tiles panel, with aquatic microorganisms motif. Jorge Ferreira's architecture is among the most remarkable works produced in Brazil from the 1930s onwards, which gained international repercussion due to the creative reinterpretation of modern architecture principles. However, as will be exposed further in the text, not all the modern buildings constructed in Manguinhos campus have a good architectural quality nor were they all adequately implemented [3].

It was in the 1940s, marked by the consolidation of Manguinhos campus limits and the introduction of modern architecture at Fiocruz, that occurred the first mischaracterizations of the architectural ensemble conceived by Oswaldo Cruz and Luiz Moraes Junior. In 1936, more space for laboratories was evidently need in the Quinine; besides, the possibility of installing an elevator and constructing one more pavement was under study. In 1943, a project by Nabor Forster was approved by Luiz Moraes and two more pavements were constructed at the Quinine, therefore altering the harmonious relation that existed between the buildings around Pasteur

Plaza. As the project was supervised by Luiz Moraes himself, the final outcome was still well composed in its ensemble, though there was a loss in the relation between the previously existing scale and volume. A thorough observation of the currently existing façades and some internal construction details reveals the differences between the original floors and those that were added. This construction works also made changes on the staircase column and the placement of toilets. This would be one of the last participations of Luiz Moraes Junior at Fiocruz [3].

The construction of the old refectory and the Adolfo Lutz Pavilion (1949-1953) also altered the ambience of Manguinhos Historical Architectural Ensemble, due to the styles and construction materials used, and moreover due to the proximity with it. The construction of Carlos Chagas Pavilion (1944−1950), Bio-Manguinhos (1956−1965) and Leônidas Deane (from 1956 onwards), despite not being direct interventions in this historical ensemble, did in fact alter its relation with the surroundings. The Carlos Chagas Pavilion disputes the silhouette and partially blocks some of the main lines of sight of the architectural ensemble, namely the sight from the bordering Avenida Brasil (Brazil Avenue, a main highway in the city of Rio de Janeiro) direction south, and the sight from the road from Ilha do Fundão (Fundão Island) in Manguinhos direction. The Bio-Manguinhos building disputes the silhouette and partially blocks the line of site of the architectural ensemble of those who drive on Brazil Avenue direction north [4]. The Leônidas Deane Pavilion was designed with modern and ample installations to substitute the current Evandro Chagas Hospital, which since the 1930s had shown signs of being too small for the scientific researches in the experimental medicine. The new building was conceived with volumes in not much elaborate proportions, non-harmonious, and it was incorrectly placed. Its large dimensions are incompatible with its setting on the hilltop and there is an excessive proximity to Evandro Chagas Hospital, since its ground floor is too near from the old building.

The Seawater Aquarium lost its function with the construction of Brazil Avenue (1939-1946) when the connection with the sea through an earthenware pipe was interrupted; since then it turned into ruins and was demolished probably in 1958. In 1962, the Gomes de Farias Pavilion was constructed over the ruins of the aquarium, with no concern about its adequacy to the built environment. On the contrary, with its architectural characteristics and placement, it altered the ambience of Manguinhos Historical Architectural Ensemble. Another incorrect intervention carried out in the 1960s was the construction of an energy substation next to the Clock Pavilion.

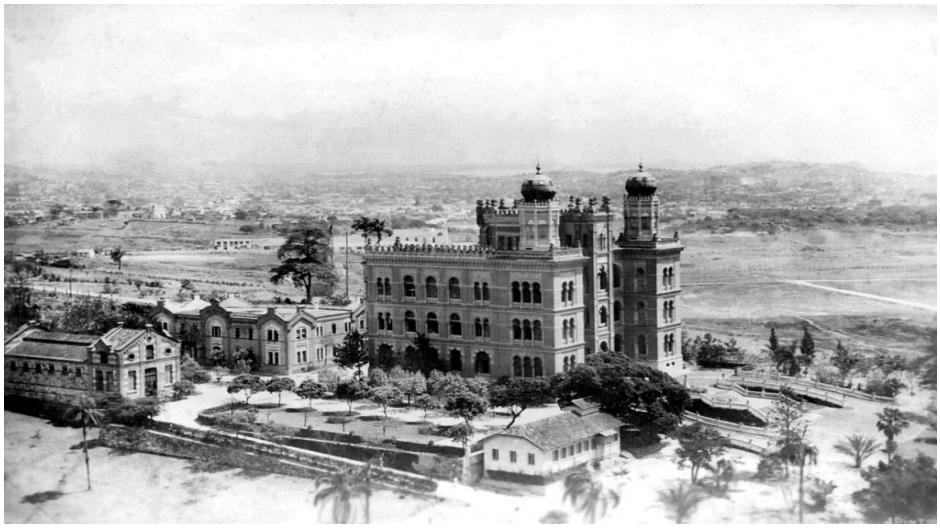

Figure 3. Manguinhos Historical Architectural Ensemble. From left to right: Saltwater Aquarium, Horse Stables Pavilion, Tea House annex, above Quinine and Moorish Pavilion (n.d.). DAD-COC-Fiocruz. Photograph by J. Pinto.

The institutional crisis during the military dictatorship (1964-1985) that in the 1960s culminated in the abrogation of ten scientists also affected Manguinhos campus' buildings, which became totally disregarded, some of them in ruins, remaining virtually only deteriorated service networks and obsolete equipment [7]. In December 1977, several pavilions were retrieved and re-inaugurated, among which the Quinine and the Vaccine Pavilion, this one adapted to become the Residential Village, currently known as the Yellow House. In this period, the Didactic Historical Museum was created; it was placed on the first floor of the Moorish Pavilion and was not conceived and implemented according to modern museology criteria.

PROTECTION MEASURES AND RESTAURATION AND CONSERVATION INTERVENTIONS

In January 1981 the Ministry of Culture homologated the process of heritage listing of Manguinhos Historical Architectural Ensemble through the Institute of Historical and Artistic National Heritage (IPHAN), at that time Secretary of Historical and Artistic National Heritage (SPHAN) [4]. This listed ensemble comprises the Moorish, Plague, Horse Stables Pavilions; the Pigeonry; and Evandro Chagas Hospital. In 1986, there was the demarcation of an extensive green and environment preservation area in the surroundings of this architectural ensemble.

In 1985, with the re-democratization occurring in the country, the institute started a process of revitalization and democratization through the creation of new scientific-technological unities and the introduction of a new management model, since then characterized as democratic and participative. The unity named Oswaldo Cruz House (COC) was created in 1985 with the purpose of retrieving and preserving the memory of biomedical and health science in Brazil, the development of historical research and museology activities, and the restauration and conservation of the historical architectural heritage of Fiocruz [3].

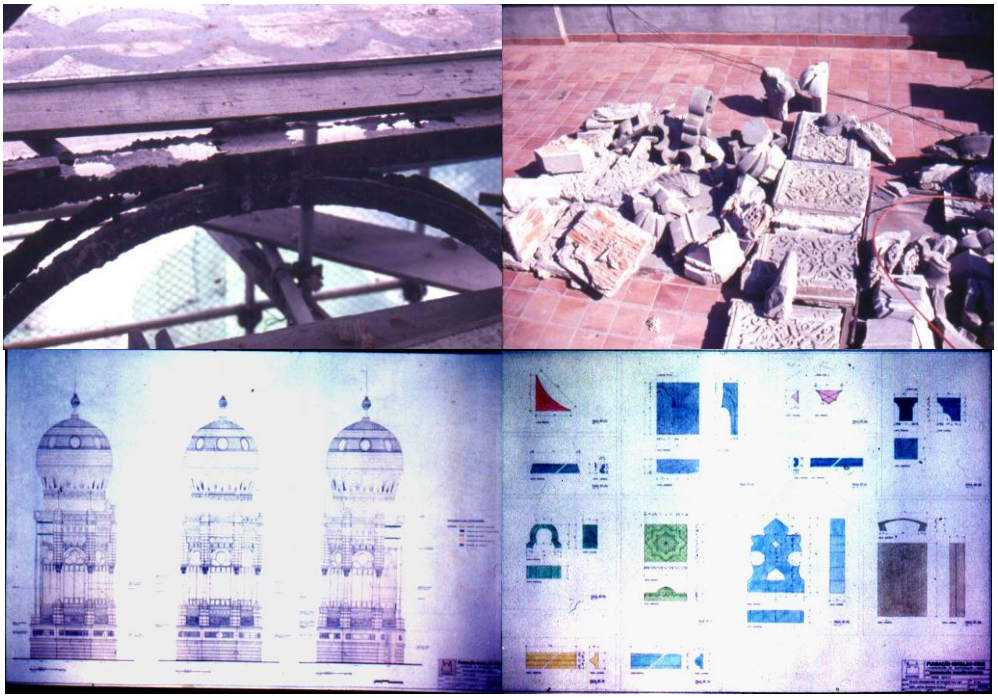

Figure 4. Interventions on the Manguinhos Historical Architectural Ensemble. From left to right: metallic structure, ornaments made of cement and sand, drawings of the façades, and ornaments of the towers of the Moorish Pavilion (1990s). DPH-COC-Fiocruz archives. Photograph by Benedito Tadeu de Oliveira

With the creation of Oswaldo Cruz House (COC) http://www.coc.fiocruz.br/index.php/pt/, the Clock Pavilion was renovated in order to become the seat of the unity; the Didactic Museum was transferred from the first floor of the Moorish Pavilion to the Horse Stables. In 1989, due to the increasing restoration works after the institution was listed as National Heritage, the Department of Historical Heritage (DPH) of COC was created and became responsible for the conservation, restoration and valorization of the historical architectural heritage of Fiocruz, in conformity with the modern principles of cultural goods safeguarding. The DPH also became responsible for researches on the relationship between heritage, architecture, urbanism, and health considering the historical and technological dimensions. Following a global planning, the stages of this work have been carried out according to financial resources availability and priorities established under criteria regarding safety and integrity of the materials [3].

The DPH is responsible for the implementation of preservation projects that are based on the outcomes of historical, stylistic, techniques and materials researches; mapping of damages, diagnoses and intervention methodology; supervision of conservation works, coordination of the systematics of preventive and corrective conservation, adaptation of spaces for new functions; development of a program of education and capacitation of skilled workers in the traditional arts and crafts in the area of cultural heritage conservation.

The different degradation degrees of Manguinhos Historical Architectural Ensemble occurred due to the following factors: wear and degradation of construction materials, lack of preventive maintenance, and wrong interventions suffered along the years. There was no major use incompatibility in these buildings; therefore, this was not an important factor for the degradation [8]. In general lines, the restoration interventions performed on the buildings of Manguinhos Historical Architectural Ensemble were as follows: impermeabilization and restoration of roof-terraces; treatment and reinforcement of metallic structures; restoration of ornaments made of cement and sand, restoration of wall tiles; wall painting restoration; restoration and gaps filling on original coverings; restoration of metallic and wooden windows and doors; substitution of hydro-sanitary, telephone, and electrical installations, and installation of central air-conditioning system, all in compliance with listed buildings[8].

The development of COC, with activities in the areas of research, archive and scientific museum, led DPH's architects to design new premises, always with the concern of keeping to an architectural language in harmony with the historical buildings.

In the last decade of the 20th century several new buildings were inaugurated at Fiocruz, such as Manguinhos Library, the Factory of Vaccines, the Reception Center, and the Museum of Life Pavilions. http://www.museudavida.fiocruz.br/

The Museum of Life was created by Oswaldo Cruz House in 1993 with the objective of bringing science nearer to the population and broadening science and health education to the public, by stimulating the understanding and participation in scientific and sanitarian issues. There is a peculiarity in the fact that the museum is inside Fiocruz campus, which is a scientific structure par excellence. This insertion enables the reflection on historical, territorial and cultural references of the institution's community of scientists and technicians, counting on the vast knowledge produced in its laboratories and scientific collections.

The inauguration of the Museum of Life was in May 1999, opening the celebrations of the Centenary of Fiocruz; since then it has been attracting hundreds of visitors monthly. The first circuit is made on the 'Train of Science', circulating through the following spaces: Reception Center, Science Park, Pyramid, Epidaurus, Butterflies Vivarium, Science on Scene Tent, Temporary Exhibitions Room, Horse Stables Pavilion, Clock Pavilion and Moorish Pavilion.

The construction of the new buildings within the listed perimeter raised the concern about

their adequacy to Manguinhos architectural universe; several constructive techniques were adopted, with the use of steel structural profiles, ceramic bricks on walls as finishing material, ceramic tiles on roof coverages, and the option of designing semi-underground constructions as not to interfere with the visibility of the listed buildings.

At the Reception Center of the Museum of Life there was an attempt to refer to Luiz de Moraes Junior's architecture, adopting a contemporary architectural language but using construction materials as granite and Portuguese stonework on pedestrian pavements, architectural elements as a clock tower, solutions as the wall panel mosaic by the Brazilian artist Glauco Rodrigues portraying historic moments of Fiocruz, besides constructive systems similar to those used on the early 20th century buildings [9]. The final outcome has a good insertion in the surrounding environment and dialogs with Manguinhos Historical Architectural Ensemble. The building is inspired on the railway stations architecture of the 19th century, there is a predominance of empty over full wall-surfaces, and the project's strength is on the steel structure with simple and functional design. The adoption of the architectural language of railway stations is due to the fact that visitors are transported to the other Museum of Life pavilions on a stylized train on wheels. Another intervention made with the same concern is the Annex of the Horse Stables, which is part of the Space of Biodiscovery. The Annex's façades have similarities with the Horse Stables Pavilion in the shape of the openings, treatment of surfaces and construction materials. The new construction was built below the level of the Horse Stables with the purpose of not interfering with its architectural sight, and vegetation was planted on the roof-terrace to integrate it with the environment.

In parallel with the construction works of the facilities needed to meet the new demands for space, Fiocruz continued to carry out the program of restoration and conservation of the Manguinhos Historical Architectural Ensemble, with the support of all the presidencies of the institution from 1987 onwards. Restoration works included the verandas of Evandro Chagas Hospital, façades of the Quinine, and the entirety of the Pigeonry, the Horse Stables and the Clock Pavilion [10]. In 1995, on the centenary of death of the French scientist Louis Pasteur, the monumental illumination of Manguinhos Historical Architectural Ensemble was inaugurated, as well as the restoration works of Pasteur Plaza.

Due to the dimensions and architectural characteristics, the Moorish Pavilion requires complex interventions, which were initiated in 1987 and continue to be carried out in the present; the works have considered the availability of free spaces and the degree of urgency of interventions [11]. The restoration of the Moorish Pavilion, which is occupied by of Presidency of Fiocruz, has always been carried out by parts, equivalent to the half floor area, which are released and occupied successively shortly after completion of the works. The most complex interventions were those of the restoration of crenels and turrets, and of the north and south bow windows, which required the removal of the ornaments for the treatment of the metallic structures. The restoration works of the Moorish Pavilion, which is occupied by the Presidency of Fiocruz, have been carried out in parts and will be the object of future specific publication. There are reports of all the interventions, illustrated with photographs, historical documentation, and are registered on U-matic with statements of technicians and crafts workers involved in the works. The full restoration project comprises architectural survey, mapping of damages, analysis of construction materials, study of deterioration causes, diagnosis, and intervention project [12].

In 1998 the actions of cultural heritage preservation of Fiocruz were extended to the modernist pavilions. In that year, the Central Refectory and the Pavilion of Courses, designed by architect Jorge Ferreira, were listed by the Institute of Cultural Heritage of the State of Rio de

Figure 5. Interventions on the Manguinhos Historical Architectural Ensemble.From left to right: Clock Pavilion, Quinine, Moorish Pavilion and Horse Stables Pavilion (1990s). DPH-COC-Fiocruz archives. Photograph by Benedito Tadeu de Oliveira.

Janeiro (INEPAC/RJ). The restoration of the wall tiles panel created by Burle Marx at the Pavilion of Courses was the first intervention, carried out from 2016 onwards.

Despite the accelerated process of constructions in Fiocruz in the 1990s, the area delimitated in 1986 was virtually preserved. The few interventions carried out respected the surrounding environment and the historical heritage.

4. CONCLUSIONS

The Oswaldo Cruz Foundation, linked to the Ministry of Health, is the largest biomedical research institution in Latin America and it is internationally recognized. It is a public and strategic health institution, with the following missions: to produce, disseminate and share knowledge and technology directed to the strengthening and consolidation of the Brazilian Unified Health System (SUS). The defense of the right to health and to ample citizenship is a central value of Fiocruz.

The campus of Oswaldo Cruz Foundation, comprising approximately 850,000 m^2, is a large green area which presently has circa 160 buildings, with significant architectural examples of various periods. But it is the Manguinhos Historical Architectural Ensemble, especially the Moorish Pavilion, the institution's highest symbol, which remains as the highlight in the Cultural Landscape of Fiocruz. Several factors have contributed to the preservation of the architectural ensemble, such as the solidity of the constructions ensured by the construction systems and materials used; the symbolism of the buildings that was consolidated during almost 120 years of existence of Fiocruz; and the care of the institution with its cultural heritage.

The creation of Oswaldo Cruz House, dedicated to the activities of research, education, documentation and diffusion of the history of public health and biomedical sciences in Brazil, was fundamental to the preservation of Fiocruz's memory. Other Brazilian institutions initiated and implemented some cultural preservation actions, but for different reasons they were not as

successful as Fiocruz, which is currently a reference in its purpose and original areas of activities, but also in the preservation of Brazilian cultural heritage.

The creation of the Department of Historical Heritage (DPH) within Oswaldo Cruz House (COC) has been of utmost importance for the preservation of Manguinhos Architectural Complex, which gathers historical, cultural, and scientific values to apply as a candidate as UNESCO World Cultural Heritage.

Figure 6. Aerial view of Fiocruz campus (c. 2000). CCS-Fiocruz archives.

REFERENCES

[1] Dias, E. O Instituto Oswaldo Cruz - resumo histórico (1899-1918). Rio de Janeiro: Manguinhos, (1918).

[2] Benchimol, J.L. (coord.). Manguinhos do sonho à vida: a ciência na Belle Époque. Rio de Janeiro: COC, Fundação Oswaldo Cruz, (1990).

[3] Oliveira B.T. (coord.), Costa, R. da G.R. e A. J. de S. Pessoa. Um lugar para a ciência: a formação do *campus* de Manguinhos. Rio de Janeiro: Editora Fiocruz, (2003).

[4] Alcântara, P. (coord.). Processo de tombamento do Conjunto Arquitetônico de Manguinhos. Rio de Janeiro: IPHAN, (1980).

[5] Aragão H. B. de. Notícia Histórica sobre a Fundação do Instituto Oswaldo Cruz, *in* Memórias do Instituto Oswaldo Cruz. Tomo 48, (1950), Rio de Janeiro: Serviço Gráfico do IBGE.

[6] Chagas C. F. Meu Pai. Rio de Janeiro: COC, Fundação Oswaldo Cruz, (1993).

[7] Lent H. O Massacre de Manguinhos. Rio de Janeiro: Avenir, (1968).

[8] Oliveira, B.T. e Costa, R. da G. Patrimônio – Manguinhos, Fiocruz. São Paulo, Revista Arquitetura e Urbanismo, 44 (1992), pp.52-53.

[9] Oliveira, B.T. e Costa, R. da G. R. Centro de Recepção do Museu da Vida, Manguinhos, Rio de Janeiro. São Paulo, Revista Projeto Design, 243 (2000), pp.61-63.

[10] Oliveira, B.T. Restauração em Manguinhos - Pavilhão do Relógio. São Paulo, Revista Projeto, 160 (1993), p.55.

[11] Oliveira, B.T. A restauração do Castelo de Manguinhos. São Paulo, Revista Projeto, 136 (1990), pp.122-124.

[12] Oliveira, B.T. O processo de recuperação do Castelo de Manguinhos. São Paulo, Revista Projeto, 120 (1989), pp.154-155.