# THE HOUSE AND THE STREET: OBJECTS TO BE MEDICALIZED

## A CASA E A RUA: OBJETOS A MEDICALIZAR

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Maria Clélia Lustosa Costa - Federal University of Ceará – Fortaleza – Ceará – Brazil
clelialustosa@gmail.com

*The street is the hygienic unit of the city.*
FONSSAGRIVES, apud ROCHARD, 1888.

*The house can have a direct or indirect influence on health.*
J. P. FONTENELLE, 1930.

### Abstract

Once collective facilities in urban space had been isolated and medicalized, physicians became involved in inspecting and regulating housing, as they concluded that the house, especially the dwellings of the poor, were one of the focuses for the spread of diseases and epidemics. The attention paid to circulation spaces and housing and the determination of detailed rules for their construction should be analyzed not only as part of a power structure that authorized the medical discourse, but also as an action aimed to prevent the occurrence of urban disease and guarantee better conditions for the population's health. This study examines the recommendations of European and Brazilian medical theses and treatises to guaranty the healthfulness of collective and private spaces, showing how these were put into practice in Fortaleza, leaving marks on the urban landscape, architecture, forms and layout.
Keywords: hygiene, urban discipline, housing.

### Resumo

Depois de isolados no espaço urbano e medicalizados os equipamentos coletivos, os médicos se ocuparam em fiscalizar e regulamentar as habitações, pois concluíram que a casa, principalmente a casa do pobre, era um dos focos de disseminação de doenças, de epidemias. O olhar voltado para os espaços de circulação e para habitação e a determinação de regras minuciosas em sua construção deviam ser analisados não somente como parte de uma estrutura de poder que autorizava o discurso médico, mas como uma ação voltada também para prevenir a ocorrência de moléstias urbanas e garantir melhores condições de saúde à população. Essa comunicação trata das recomendações de teses e de tratados médicos europeus e brasileiros para garantir a salubridade dos espaços coletivos e privados, e de como estas foram colocadas em prática em Fortaleza, deixando marcas na paisagem, na arquitetura, nas formas e no traçado urbano.
Palavras-chave: higiene, disciplina urbana, habitação.

### Resumen

Una vez aislados en el espacio urbano y medicalizados los equipamientos colectivos, los médicos se ocuparon en inspeccionar y reglamentar las viviendas, pues concluyeron que la casa, principalmente la casa del pobre, era uno de los focos de diseminación de enfermedades y de epidemias. La mirada hacia los espacios de circulación, hacia las viviendas y la determinación de reglas minuciosas en su construcción, debía ser analizada no solamente como parte de una estructura de poder que autorizaba el discurso médico, sino como una acción

centrada también en la prevención y la aparición de enfermedades urbanas y garantizar mejores condiciones de salud a la población. Esta comunicación se ocupa de las recomendaciones encontradas en tesis y tratados médicos europeos y brasileros, para garantizar la salubridad de los espacios colectivos y privados, y de como estas fueron colocadas en práctica en Fortaleza, dejando marcas en el paisaje, en la arquitectura, en las formas y en el trazado urbano
Palabras-clave: higiene, disciplina urbanística, vivenda.

## The control of the air: intervention in collective and private space

Circulation and movement are mental categories that have been imposed on western thinking in various dimensions of life. Little by little an *episteme* of movement has been structured as a synonym of life and healthfulness. Inactivity and stagnation have become synonymous with death. This reflection is transposed to the city, making circulation the principle condition of public hygiene and stagnation the essential risk. Nothing that was mobile and that does not form a mass can be corrupted, because movement is the opposite of insalubrity. To perfect the work of ventilation there was a new template for the structures of urban space.

The natural and built environments were perceived as producers of miasmas. Various theories were developed that located the causes of disease in the environment and sought to understand its impact on the health of the population. Surveys were carried out (medical topographies) that showed that the urban environment was the most unhealthy and therefore should be the object of interventions. Once insalubrious facilities were located they were disciplined and removed from the urban area. The actions of the public authorities initially occurred in collective environments, regulating the location and construction of squares, streets, hospitals, slaughterhouses, prisons, cemeteries, and industries, etc.

Once the collective facilities had been isolated in the urban space and medicalized, doctors became involved in the inspection and regulation of housing, as they concluded that the house, especially the houses of the poor, was one of the focuses for the dissemination of diseases and epidemics. The hygienists easily identified the relationship that existed between adequate health conditions and the concentration of the population. The attention paid to the spaces of circulation and housing and the determination of detailed rules for their construction should be analyzed not only as part of a power structure that authorized the medical discourse, but also as an action intended to prevent the occurrence of urban diseases and guarantee improvements to the population's health.

This communication deals with the recommendations of European and Brazilian medical theses and treatises to guarantee the healthfulness of collective and private spaces, and how these were put into practice in Fortaleza, leaving marks on the urban landscape, architecture, forms and layout.

## Displacement of the actions of public space to the private space of housing

After the cholera-morbus epidemic of 1832, in Europe, medical discussions revolved around public housing and its airless atmosphere. A medical commission that evaluated the epidemic in Paris concluded that cholera was not contagious and was associated with precarious living conditions, mainly characterized by overpopulation and poverty. Therefore, there was a relation between the disease and the diminutive size of the dwellings, as the devastations were more deadly in the densely occupied poor neighborhoods.

Lécuyer (1986) considered that this conclusion pointed to a "social explanation" of the disease. Consequently, the forms of intervention altered and housing emerged as the new object to be disciplined. Once control over public spaces had been assured, medical norms went on to occupy the organization of the private sphere. However, this discursive transference required a renewal of strategies, due to the shift of actions from the public to the private space.

The myth of collective asphyxia promoted a new reading of the city, of space, of buildings and openings. It was believed that only the renewal of the air purified the space in question, thus it was necessary to build dwellings with large doors and windows, high ceilings and spacious rooms, in accordance with the number of residents. The importance of air quality to wellbeing had already been emphasized by Lavosier in 1789. He was one of the first to define spacial norms according to respiratory needs (Corbin, 1982).

In London, the autonomous English habitation triumphed, disassociated from the farm, the boutique and the office, as well as one family per house. At first, the living space was separate from the work space. Subsequently, domestic spaces were specialized, each with its own function, with the objective of preserving the health and morals of the residents: a room for the couple, a room for the boys, another for the girls, a living room, a dining room, a kitchen, pantries and bathrooms. Non-family members were expelled from the familial space.

In France, the rejection of *tout à l'égout,* the slowness of the water supply and the delays in the "machinery of comfort", meant that model achievements were almost exclusively concerned with ventilation and the new domestic spatiality (Corbin, 1982).

The findings of medical hygienists that there was a relationship between living conditions, the poverty of the population and the spread of diseases were the themes of reflections in the Hygiene Treaties and the theses defended in Medical Schools in Europe and Brazil.

## Medical treaties and interventions are space

The influence of places and the climate on man's physical and moral wellbeing was an idea that did not restrict itself to the sphere of medicine. The treaties on public hygiene, the popular manuals on health, the medical topographies, and the almanacs with proverbs were all marked by the neo-Hippocratic belief in air quality (Léonard, 1986). The circulation and renewal of air was the goal. To unclutter men and proceed with a new template for the equipment of urban space appeared as the means to perfect the work of ventilation, to contain the flux of social emanations (Corbin, 1986).

To combat the lack of hygiene and the spontaneous layout of unplanned thoroughfares that followed the population's instinct, hygienist treatises had methodical rules to guide municipal engineers: orientation, dimensions, paving, accessories, illumination and conservation and cleaning. By 1877, the *Traité Elementaire d'Hygiene Privée et Publique,* written by Dr. Becquerel, professor of the Paris School of Medicine, was already in its sixth edition and indicated the conditions necessary to maintain urban healthfulness: wide, straight, well-ventilated, paved streets with spacious, airy sidewalks and gutters for runoff; the removal of garbage, sewage and other filth; the exclusion of insalubrious and dangerous establishments; and the greatest dissemination of houses with the least possible number of floors.

Similarly, Jules Rochard (1888) emphasized that care of public thoroughfares made habitations healthier and more comfortable. They should not be too long, unless they were occasionally interrupted by plazas, squares (true reservoirs of air) and transversal streets, which acted as easy means of ventilation and circulation. The width of a thoroughfare was

very important for the penetration of air and light, avoiding exaggeration to prevent cities from becoming unlivable. The dimension of the large thoroughfares needed to be regulated in accordance with the circulation and the height of the buildings along their route. To facilitate the flow of water there should be a slight slope, but not too much, to avoid putting strain on the residents' muscles. The taller the buildings, the wider the thoroughfares needed to be. However, it was important to take into account the region and the climate. As to byways, Rochard believed that the tendency was for them to disappear as cites grew and were perfected.

The application of these recommendations was reflected in the European urban landscape. Jules Arnould (1897) stated that in the second half of the nineteenth century, French administrators had invested against "viscous walls, dark corridors, and filthy earth floors", everything was criticized, and they combated "these tall and massive buildings interspersed by narrow and tortuous streets through which air and light could not penetrate". There was an energetic re-management of cities and sub soils, based on hygiene.

> In their place stretched wide sunny streets, leafy avenues lined by taller, more spread out houses, the organization of which at least respected the right of residents to use the natural environments around them, even if they were still insufficient. This can be seen in Paris, London, Berlin and provincial cities... (Arnould, 1897, p. 23-24).

These indications spread throughout Brazil. Several authors, including Fontenelle and Sá Pereira debated the importance of the direction of streets, above all regarding sunlight and natural ventilation.

At the 1st Brazilian Conference on Hygiene (Rio, 1923), A. de Sá Pereira warned about "the need to plan streets that channel the air, oriented in the direction of prevailing winds, leaving the entry of air as unobstructed as possible". In determining the width of the streets, which was important from the point of view of the traffic, the proportions between the height of the buildings and the width of the streets should be taken into account, as well as the space that separated one house from another to ensure "the minimum sunlight to allow the elimination of damp in the walls". To complete the ventilating function he recommended that when constructing squares, there should be "a central corridor, the coalescence of all rear areas and back yards, and the buildings at the head of the squares should be lower than the others" (Apud Fontenelle, 1930).

Fontenelle argues that the first step in planning would be the projection of the system of streets and avenues. The direction and width of the streets would be fundamental for both internal communication in the city and public health. He proposed that where possible, streets should be traced in the direction of the four cardinal points, with meridional streets (NS) and equatorial ones (EW); some streets could stay in intermediary directions, such as diagonal streets.

Tree planting would be another element to embellish the streets and improve hygiene in tropical countries with excessive heat and sunshine like Brazil, offering the pedestrian a shady and more pleasant path. Trees would be planted in streets "forming two lateral rows and, sometimes, an additional but less necessary central row" taking care not to block the sunlight on the lower part of the frontage (Fontenelle, 1930, p. 286).

## Medical treatises and housing

In addition to the streets, the treatises dedicated chapters to norms regarding the construction of housing. In chapter IX of *Des habitations privées,* Becquerel makes a list of the important conditions for the healthfulness of a dwelling: a raised location on a wide well exposed street, in a neighborhood with promenades and trees and a convenient exposure, according to the region's climate. Among the main ways of ensuring the healthfulness of the dwellings, he considers airing, the type of heating and the care with cleaning. He defines the rules on how different rooms should be built and makes recommendations about the types of materials, foundations, walls, ceilings, plasterwork, and paintwork, etc. as well as for the annexes and the content of the interiors (rooms, bed curtains, kitchens and latrines). In the case of apartment buildings, he affirms that "the upper floors are healthier for living in due to the sunlight, ventilation and humidity" (Becquerel, 1877).

The conditions of the bedroom were fundamental to the health of the individual, as if they were too narrow this would hinder the access of "direct sunlight and breathable air", favoring the "development of epidemic diseases". The cubic capacity of the rooms should be planned considering the number of inhabitants and the amount of atmospheric air required, which varied between 6 to 20 $m^3$ per inhabitant (Becquerel, 1877).

He recommended the opening of large doors placed opposite the windows. This position "determined by opening two windows or one

window and a door placed face-to-face", favored the air currents, which were indispensible in certain circumstances (Becquerel, 1877, p. 392). In Europe's temperate climate, the windows should face east, as facing north was too cold in winter and too hot in summer.

Paris became an example of urban reform for European cities in the nineteenth century, as the measures adopted by the administrators in widening the thoroughfares and opening streets through insalubrious city blocks had the effect of improving the city's air. For Rochard (1888), the Parisian model should be followed with care by other cities in the world, that is, "adapted to the demands of the climate and the teachings of experience". In northern cities, heat and light were the objective and humidity was to be combated. Streets should be wide and straight and the houses low, allowing the sun's rays to reach the base. In meridional regions, on the contrary, it was necessary, above all, to avoid the sun and protect oneself against the wind and dust.

The *Diccionário de medicina popular e das sciencias accessórias para uso das famílias*[1], already in its sixth edition by 1890, followed the same orientations of European treatises. To prevent the formation of miasmas in the cities, Chemoviz recommended widening the streets and opening up the poorly aired city blocks, forbidding the construction of houses with many stories; multiplying the number of doors and windows in hospitals, barracks, prisons, etc.; removing vegetation or hills that concentrated the miasmas in valleys or prevented the wind from dispersing them. Another way to combat the miasmas was to "violently [clear] the air with the combustion of gunpowder", mainly in locations where the air did not circulate, such as ship's holds and covered decks. The diffusion of the miasmas could also be obtained by establishing differences in temperature "through heat, between the tainted atmosphere and the external air". One of the simplest systems was the use of chimneys. "If the fire is lit in the fireplace, when the doors are opened the air in a room is promptly renewed. Stoves will have the same effects, but less efficaciously" (Chernoviz, 1890, p. 425).

The *Compêndio de Hygiene*[2] (1930) reinforced the thesis of the circulation of the air as a means of disease prevention. For J.P Fontanelle, one of the simplest ways of ventilating the inside of buildings was to

[1] *Popular Medicine and Complementary Sciences Dictionary for Family Use*

[2] *Hygiene Compendium*

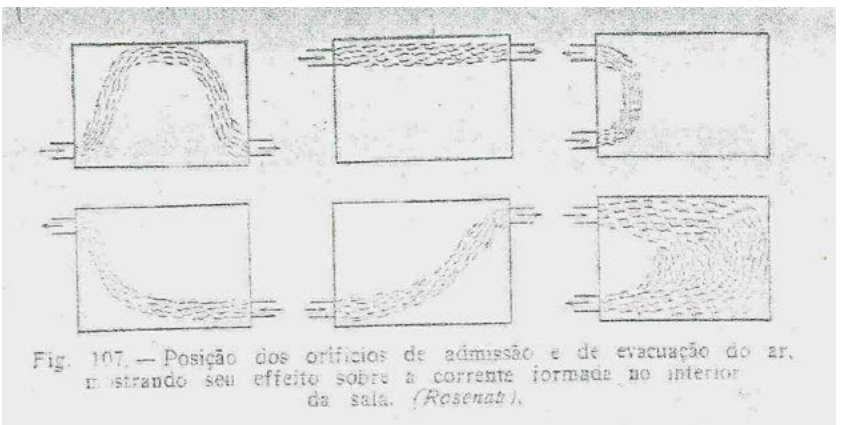
open the doors and windows. Even when they were closed, there was an exchange between the exterior and interior air through the cracks. Fresh air entered through the low parts and the heated air went out through the upper parts. Air currents were established due to the difference in temperature between the external and internal atmospheres. The phenomenon of ventilation is less in hot climates where there are not big differences between the interior and exterior temperatures.

Fontenelle criticizes the building regulations that require a ceiling height of up to 4 m, aiming to increase the cubic capacity of rooms, as this had no advantages for ventilation other than increasing costs and producing "unaesthetic" buildings. The movement of the air was necessary for ventilation to take place.

> Natural ventilation demands that the upper parts of rooms should have small orifices near the ceiling, for the evacuation of hot air, thus completing the circulation of the air, which enters through the open windows. To guarantee good ventilation, rooms should have two windows, one for the entry and the other for the exit of the air; it is best if they are on opposite walls (1930, p. 311).

In the drawing below, Fontenelle indicates the position of the apertures for the entry and exit of air, showing their effect on the current formed in the interior of the living room.

Figure 1 – The position of the openings for the entry and exit of air, showing their effect on the current formed in the interior of the living room.



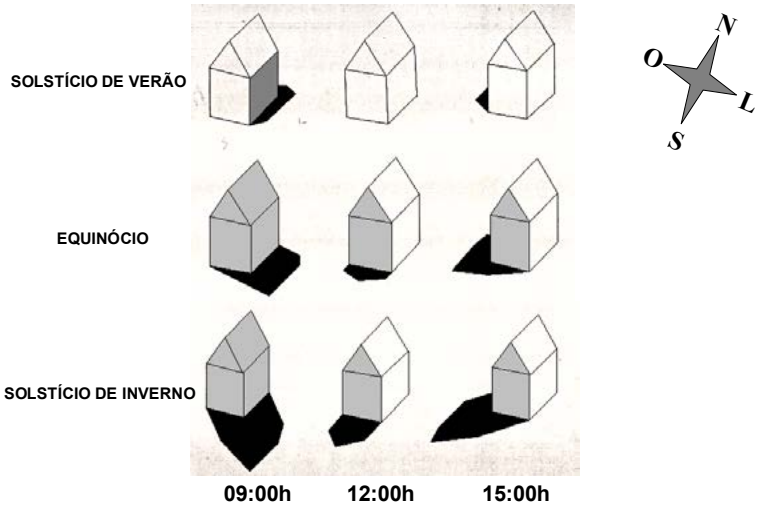

Source: Fontenelle (1930)

According to Fontanelle (930, p. 311) the best type of window for hot climates had movable parts, with a simple and easy-to-use mechanism so it could stay ajar, facilitating the ventilation. In Fortaleza these were known as windows with shutters (Figure 1).

"The house can have a direct or indirect influence on health" affirmed J. P. Fontenelle. In addition to good ventilation and adequate lighting, the doctor recommended the observation of soil and air humidity, protecting against atmospheric cold and heat, the correct supply and distribution of water, the adequate collection and disposal of wastewater, protecting against the invasion of parasites (rats, flies, mosquitoes, etc.), occupation by an adequate number of people, single family occupancy and the non-existence of "factories" in the living space, as these elements were essential to favor the family's health. He no longer spoke of miasmas, because at this point, the disease vectors to be addressed were parasites, bacteria and microbes (1930, p. 294).

The adequate orientation of buildings allowed them to receive good ventilation and the direct action of the sun's rays. This contributed to their illumination and sanitation. However, it was necessary to regulate the intensity and daily duration of the sunlight on the different facades of the building. In Brazil's climate, bedrooms should have windows facing the sunrise so they receive the morning sun and avoid the heat of the afternoon. Below there is an example of the incidence of the sun's rays on a building located in Rio de Janeiro, in the southern hemisphere, elaborated by Fontenelle (1930) that allows the best location for each room to be determined, according to its function.

Figure 2 – Building seen from the south, it is located in the southern hemisphere, on the latitude of Rio de Janeiro




**Edifício, visto pelo sul, situa-se no hemisfério austral, na latitude do Rio de Janeiro. (J.P. Fontenelle - Compêndio de Higiene 1930)**

Source: Fontenelle, 1930

Solstício de verão = Summer Solstice
Equinócio = Equinox
Solstício de inverno = Winter Solstice

Many architects argued that the old Brazilian colonial house, obviously adapted to modern scientific conquests, would best serve regions with hot climates. It was a type derived from Roman and Moorish houses. It had a central courtyard surrounded by several rooms, which supplied light, heat and air.

## Medical Thesis: the health of housing

On the 26th November 1860, Gabriel Alcides Raposo Câmera, born in Rio Grande do Norte, graduated as a doctor at the Bahia School of Medicine, defending the thesis: "The conditions necessary for housing in cities to be healthy".

Dr. Câmera, based on the prevailing hygienist medical theories in Europe, considered the dwelling place as a space to be guarded and regulated, so as to guarantee the health of cities. Despite the creation of Health Councils and Hygiene Commissions throughout the country, demonstrating the prestige attained by modern medicine, Dr. Câmera criticized housing standards. The houses were "low, humid, and graceless", because in Brazil public and private construction was "free of law, rules and direction". The shack and the thatched hut symbolized the "barbarity and absence of civilization". He argued that houses should be located close to bushes or trees, as this was a condition of hygiene. He idealized new cities with the aspect of the countryside, or "lush and delicate gardens", with a back-to-nature discourse.

> Man, destroyed by the abuses of civilization and attacked by cruel infirmities, often seeks the pure air of the fields and forests, and beneath the branches of these trees the dangerously sick have found relief for their maladies and the cure for their infirmities (Câmara, 1860, p. 2).

The intended model for housing and the city was from "cultured and advanced countries" where "the construction of houses or dwellings [was not left to] the discretion of just anyone". The main reference is Paris, "the capital of civilization", which was being submitted to a large reform by the mayor Haussmann and as a result "its buildings were gaining not only from beautification, but also and chiefly on the side of hygiene" (Câmara, 1860, p. 3).

Dr. Gabriel Câmara presented some points to be observed in building, regarding the most adequate exposure of the dwellings, the soil, the foundations, air circulation, sunlight and ceilings. He recommended the avoidance of soils that "contain organic waste, such as places where corpses and animals are buried, which are harmful to human health". He advocated good foundations and considered that habitations on the "ground level now have in cement and asphalt the most convenient conditions for their hygiene". He believed in the qualities of asphalt as it "drives away illnesses and does not shelter epidemics and pestilent diseases", by repelling worms, suffocating humidity and "desiccating" the air (Câmara, 1860, p. 4).

However, the hygienists disagreed about the building's exposure.

> The most noteworthy advised that their doors and windows should not face west, as there are always easterly winds full of humidity, and the practice in our country has demonstrated, by well founded experience, that the healthiest houses are those whose doors and windows open to the west (Câmara, 1860, p. 4).

Theories on aeration and exposure to the sun were taken into account in this thesis, as can be seen from the preoccupation with the orientation of the buildings and the dimensions of the doors and windows.

> If the circulation and renewal of the air is a hygienic precept, I accept it as good. If the penetration of the sun's rays is also a hygienic recommendation for our houses, it is clear that the windows and doors should be spacious and large, and consequently the buildings are elevated so as to become more attractive and happy (Câmara, 1860, p. 4).

Dr. Gabriel Câmera considered houses with three or more floors antihygienic and could not find any justification for building them in Brazil, as "in our extensive and gigantic land it is a crime, it is an infraction of the laws of hygiene, that such construction should be permitted and tolerated".

He argued that tile covered roofs were more appropriate due to their capacity to "refresh the burning of the sun, rather than slate and galvanized iron", construction materials suited to the European climate. He believed that for Brazil's inhabitants it would be more pleasant and healthier to use palm thatch, "if it were not for the danger and unsightliness".

Like the European hygienists, he recommended that the dimensions of the dwellings harmonize with the "civilization and beauty of the cities" and be proportional to the number of inhabitants.

In 1890 he did not stop to analyze the problem of sewage and waste "because in our land they are objects that still will not, and do not, attest to our civilization: rather their lack attests to some barbarity and ignorance".

These ideas expounded in the Treatises on Hygiene, that support the theses in Medical Schools, influenced the way cities and houses in Brazil were built.

### The situation of housing in Fortaleza in the nineteenth century

Until the separation of the province of Ceará from Pernambuco in 1799, and the granting of permission for direct trade with Portugal, the

capital was smaller than expected, with a few small single-story houses. With the progress of trade, in 1802 the Governor Bernardo Manuel Ferreira da Silva recognized the village's growth with the construction of more houses, reaching a total of sixteen. To control the delineation of the village, the street planner Manuel Ferreira da Silva was hired in 1800. Subsequently, construction was guided by an urban layout of parallel streets, designed by the Portuguese engineer Silva Paulet, who arrived in Ceará at the invitation of the governor Manuel Inácio de Sampaio.

Claval emphasizes that in addition to the plan and decoration designed by professionals who implemented urbanistic doctrines, "there is a way of life in cities that varies from one civilization to another and that results in a set of forms in the urban landscape. These often belong to the field of popular creations". In Brazil, as in Europe, "the urban landscape has the double mark of popular culture and the knowledge of the elite". (Claval, 1981, p. 283)

In Fortaleza, the difficulty in importing building materials favored their substitution with local products. Especially in popular housing, the building materials and techniques used by the indigenous or mixed-race population were adopted. As stated by Claval: "*Elle reflète également la texture sociale élémentaire de l'espace urbains*[3]". (1981, p. 242).

In his *Abbreviated Geographical Description of the Captaincy of Ceará*[4], of 1816, the author affirms that when he arrived in Fortaleza there was not even one house with more than one story and the single-storied ones were very inferior, with loose sand floors. Bricks, lime and wood were expensive and everything conspired to make building "costly". Koster, who was in Fortaleza at the end of 1810, observed that private houses were single-storied and the streets were unpaved.

There were two types of housing in the capital: brick houses with red ceramic tiles and houses with a palm thatch with walls of mud or braided straw. The houses were set in rows, side-by-side, narrow and flattened. Most were built of *taipa* (wood tied with liana and covered in mud), "possessing a shallow gable roof, sloping to the rear and to the front, with eaves and channels or eaves and cornices". The walls were smooth; they rarely had parapets or pediments and were without decorative

[3] "It also reflects the basic social fabric of urban space."

[4] Silva Paulet's authorship of this document is contested. For Barão de Studart this Memory is from the first half of 1816 and was written by the special magistrate Rodrigues de Carvalho. (RIC, 4th trimester of 1898, year XII, 1898, p. 31).

arabesques, moldings, colonnades or tiles, "without anything that could indicate the smallest amount of architectural taste" (Girão, 1979, p. 78).

In 1859, when the Scientific Commission was set up, Fortaleza had around 800 brick houses, although there were sixty storied houses, these were still rare. Most of the houses were small, low and dark; the roofs were rafter constructions with eaves and no gutters. Houses were huddled together for reasons of cost. Of the storied houses, the largest private building in Fortaleza belonged to Commander Machado, it was two-storied and hosted the members of the Commission. In the surrounding area, known as the "sands", lived two-thirds of Fortaleza's population, in more than 1,600 palm huts, "miserable hovels" spread out or in line, forming rows. The water supply was from wells in the back yards and three squares. The waste (*as sujidades*) was buried or exposed to the sanitary action of the sun, apart from a small amount that was carried to the sea, in *quimoas*[5], on slaves' heads (Braga, 1962).

In his diary, Freire Alemão observed that the houses were often surrounded by the typical local vegetation (Bitter Melon) that grew over the huts and fences, "covering the walls and roofs so that they appear to be made of this plant, which is nonetheless elegant". He added that "living in such shacks" was only possible due to the region's climate, which has a long dry season:

> The houses of the people, or those of mixed-race. They are huts made with forked posts and rough light wood. The walls and doors are of hill palm or Carnauba leaves. They usually have two rooms: one for sleeping and the other a living room and kitchen; the latter is often open on one or more sides, like the ones in Rio… Some have *taipa* walls, covered in mud; others are covered by tiles with palm leaf walls. Some are whitewashed, with wooden doors and painted; in others the cracks in the walls are filled with whatever comes to hand. Those by the slaughterhouse use horns, that is, their interiors; by the sugar mills they help themselves to the bagasse, etc. … Sometimes their roofs and walls are decorated with art, and elegance; the doors have sketched patterns (Freire Alemão, 1964, p. 219).

Around the Capital some houses have plastered or even whitewashed brick walls, covered with Carnauba palm leaves. The doors of the "shacks

[5] In Ceará, *quimoas* were special wooden barrels, in which the houses accumulates the feces and were then transported to the beach by slaves called *quimoeiros*. (Campos, 1988).

are roughly formed of palm leaves and the better ones use straw mats… The floor is bare earth and is often very damp, the furniture is made of rough timber, and the beds are hammocks" (Freire Alemão 1964, p. 202).

The palm leaf houses made the village "unsightly", which led to the Town Councils of the 4th of September 1822 to determine their removal, so brick houses could be built in their place. "It is agreed that on Travessa Street, which faces Trincheiras Square, lined with palm leaf houses, anyone one who wishes to build houses with tiles may do so, obtaining a license from the Senate to this end, and paying the owners of the palm leaf houses the evaluated price" (Nobre, 1981, p. 47). The loose sand on the dunes hampered construction and the materials were expensive and rare: the beams and lime came from Aracati or were imported from Lisbon. The solution to supply the market was the manufacture of white bricks, made of clay mixed with diatomite extracted from ponds on the outskirts of the city[6]. These white bricks were regarded with curiosity by visitors, and became a mark of buildings in Fortaleza from the beginning of the nineteenth century (Castro, 1982).

The single-story and multi-story houses of the wealthier population resembled those in Rio of the same standard, "with the differences required by each country's circumstances", that is, the region's climate. Freire Alemão emphasized the absence of architectural rules and the mania for colors that he considered bad taste, but praised the cleanliness and the quality of the building materials. The limestone was from rock, the bricks better than those in Rio and the roof tiles smaller and made better. The roofs were always clean and red without any shards to be seen. Single-storied houses in the city used lattice-work.

> In the city the houses are made of brick, usually using a mortar of sandy soil, similar to our plaster. The only addition is some sand, but in the public buildings, when they want safer work, a little limestone is added. They only use stone in the foundations – it is rare – and the city's sidewalks are made with ferruginous sandstone from Mucuripe... the doorways are of the same brick; however, the plastering is very good because they use limestone which is abundant and is a branch of the industry. Then it is all whitewashed and very white. Nowadays they are making rounded corners like

[6] According to Castro these bricks were light, quite porous, flattened and offered many advantages, such as their low weight per unit, the speed with which they adhered to lime and sand, as well as being anti-thermal. (Castro, 1982).

> in Rio - parapets, painted gutters, etc. (Freire Alemão, 1964, p. 219; Pacatuba, 20.v.1859).

Regarding the floors, Freire Alemão affirms that they were tiled with brickwork of a superior quality to those in Rio de Janeiro, laid in various patterns, mainly zigzagged. Some houses had wide paving and others used hexagonal French paving tiles. Some tiles, like the hexagonal ones, came from England. The sidewalks along the streets were of carved English stone or brickwork "artistically arranged and held in place with a border of upright bricks". (1964, p. 198).

Freire Alemão observed that the timber in the roof was carnauba palm. In the better buildings "planks [were used] for rafters, and clapboard or plain-saw for the slats". However, he emphasizes that "the wood used the most in the construction of houses is planking cedar, for everything, even the flooring and over the ground; the rafters are of Pepper Tree and the doorframes are white wood". Mr. Costa, from the Formoso River, explained to the botanist that they were using few buttresses. In the past houses and factories were buttressed, with the best using a hardwood called *coração-de-negro (Melanoxylon brauna)* and the woodwork mainly used pink ipê" (Freire Alemão 1964, p. 198).

The doors were made of narrow planks and the lintels were the same thickness until their extremities. Both in the city and the interior there was a particular type of shutter: "in simple doors, the lock rail is sawn in half to a convenient width, the cut part acts as a window, with hinges and a lock" (Freire Alemão 1964, p. 201).

To air and refresh the house the custom was to leave some rooms without a ceiling with communication between the upper spans. The walls went up to the height of the roof beams (*frechais*). The fanlights were of wooden fretwork intended to refresh the houses. In the modern houses glass window panes were used (Freire Alemão 1964).

In the houses of the wealthy, the furniture was similar to the houses in Rio de Janeiro. In the living room there were always one or two rocking chairs. What really drew attention was the presence of hammocks[7]. In some houses there was a bed or wall bed for guests. In the houses of the poor, hammocks also replaced chairs and sofas. "With a hammock, a

[7] Freire Alemão describes the "diverse ways of hanging a hammock in Ceará" and teaches that one should not lie in a hammock "lengthways, but diagonally", as it is more comfortable, as the body is "straight not curved". Some had large luxurious decorations, lace, embroidery or ruffles that hung from the side called verandas.

sheet or blanket, the bed is made". The hammock had some advantages in a climate like Ceará's as by swinging, people cooled down and did not feel the heat. Another advantage was that with hammocks sleeping alcoves were unnecessary. "Any room, even the dining room could be transformed into a bedroom, which goes back to its ordinary use in the morning". (Freire Alemão 1964, p. 218)

Throughout the houses of the wealthy and the poor (rooms, alcoves, corridors, verandah and kitchen) there are *armadores*, a type of iron hook to hang up the hammocks. (Freire Alemão 1964).

In Ceará "hammocks are for sleeping in, to read, to chat, etc." said Freire Alemão. He describes the habit of resting in hammocks after lunch. In the rich house of a plantation owner, "after lunch the rooms were hung with nine very clean and pretty hammocks; in which we all, hosts and guests, reclined to talk. This was between a hearty lunch and very good supper. Blessed life!" (Freire Alemão 1964, p. 201).

By the mid nineteenth century, there were already many houses with more than one floor. Some had a mezzanine floor, upper floors and open attics. The Pachecão, the first two-storied building in Fortaleza, was built in 1824 and the second, with more than two floors, in 1825. These buildings contributed to overcoming the preconception that it was impossible to build tall houses in Fortaleza, as the soft ground would not cope with the weight. Commander Machado's house was built in 1825, by the Coronel of the Engineers, Conrado Jacob Niemeyer, president of the Military Commission that executed the participants in the Confederation of the Equator (1824). As the city's builders refused to work on the construction, afraid of the building sinking into the sandy ground, Niemeyer forced the prisoners in the jail to do the work.

The houses on the ranches and farms of the large land owners were the biggest. They were characterized by large verandas wrapped round the whole or part of the house. Freire Alemão described some houses where he stayed in Fortaleza and other regions of Ceará. In April 1859, the scientific commission was the guest of Mr. Antero in Pacatuba, in a large house, over sixty years old; one of the first made in the area. It was a brick house with an open veranda, *aroeira* wood supports and red-painted windows and doors. The "beams on the veranda are seated on notches – there is no ceiling". On the way to the mountains of Aratanha, Freire Alemão (1964, p. 207) observed many small farms, which "had an air of

cleanliness, whitewashed brick houses with tiled roofs and verandas with pillars, sugar mills, with iron millworks, growing sugar, cassava, maize, etc". In Fortaleza he visited the farm of Sr. Machado:

> (…) the house is located on to one side, close to the Cocó River on a raised place; it is an old, huge house with thick walls and seven windows at intervals of five to six hand spans. There is not much headroom but the house is surrounded by a brick walkway (typical of Ceará), which is quite wide and three or four hand spans from the ground. The front has 3 windows; where the visitor's entrance is; one enters inside over a brick area. The tiles are large and square, and rough; it is notable that the doors and windows are placed from inside, at the side and the front in mid-wall, which as I have said are quite thick. None of the house has a ceiling, the roof is carnauba; and the interior walls, except those dividing the entrance room, only reach the beams, as is common in Ceará. Inside and at the back there are long walls and room for the kitchen, the sugar mill, flour mill, and other spaces of large farms, followed by corrals, large orchard, etc. (Freire Alemao, 2.6.1859, p. 226).

Usually these farm houses were paved and had no ceiling. "The common paving is long bricks, similar to building bricks, but smaller and better made; they are well laid in various patterns" (1964, p. 219).

In the nineteenth century Fortaleza the presence of poverty mixed with apparent wealth was very evident. The descriptions of the housing given by strangers allow a picture of a city of the poor and their shacks around what would be the city of the rich, placed in the center. However, given the general economic conditions of the city, it is possible to consider that there was not such a marked distinction between the two cities. The palm huts were described because they were objects of attention, given that this was a city that was the capital of province. The norms defined by the local authorities regarding the care with the city's aesthetics forbade the construction of new palm leaf houses in areas thought of as central.

### Street paving and runoff of rainwater

The houses were inserted in cities, thus, in addition to the preoccupation with private space it was fundamental to offer healthy conditions in the space on the street. The thoroughfares and sidewalks were constantly pointed to as being responsible for diseases.

In the mid nineteenth century, one of the great concerns of the province's presidents was the construction of paving in the capital's streets. Among the various arguments used to justify this urban improvement a report in 1860 highlights "the inhabitants' comfort, increased trade, greater ease of transport and public health, by removing the main cause of the ophthalmias that reign here" (Report, 1860, p. 9).

Constructing paved streets was considered a priority "in a city built on dunes of moving sand, the cause of so many annoyances, and even illnesses to those who transit through its streets, whether in the rainy season or under the scorching summer sun" (Report, 1858, p. 14).

The protestant American pastor Daniel Kidder[8], who was in Ceará between 1837 and 1838, described how much moving around Fortaleza bothered him:

> The whole city is built on sand. If we walk, the sand irritates our feet! If the sun is hot it burns us and, if the wind blows, our eyes get full of sand. The roadways and sidewalk are sand, with the exception of points paved with slabs or bricks. Whether one is on foot, on horseback or in a vehicle, the sand always bothers us! It is not rare for ten oxen to only pull one cart (apud Girão, 1979, p. 104).

Fortaleza's streets began to be paved during the administration of the Provincial President João Silveira de Sousa (1855-1859), who ordered "specialized road workers (*calceteiros*) from the island of the Azores to be hired, in order to improve their quality". As well as these, he ordered others to he hired from Germany. In a report from 1858 (p. 14), the president recognized that these improvements, despite being quite costly, "were considered a need of the first order".

The paving of the streets in rough stone was done using ferruginous stoneware (beach grit) that was very abundant on the point of Mucuripe (Bezerra De Menezes, 1992, p. 188).

To give continuity to his predecessors' projects, President Antonio Marcelino Nunes Gonçalves ordered a further six *calceteiros* to be hired, who arrived from Portugal in 1860. He believed that "within a short time, if not all the streets, at least those with the most traffic will be paved" (Report, 1860, p. 19).

[8] The Methodist missionary, considered one of the pioneers of Brazilian Protestantism, arrived in Rio de Janeiro in 1836, staying until 1842. He travelled the north of Brazil from 1837 to 1838. In the USA, his book "Sketches of Residence and Travels in Brazil" was published by Sorin & Ball, in Philadelphia, in 1845.

The results of this more intense activity led President Manuel Antonio Duarte d'Azevedo to state in his report that "almost the whole city enjoys the effects of this notable improvement", which began in 1987. A total of 11.820 ¾ *braças*[9] of paving had been laid. The president suggested that a municipal order be passed "to require owners to make the base of the buildings level with the street when carrying out important repairs, which would rapidly give that street the necessary elegance..." (Report, 1861, p. 17).

In addition to the paving, it was necessary to drain away the water, avoiding the formation of unhealthy pools of water. When Amélia Street was paved, an underground pipe was suggested, which would mean a large expense (Report, 1861).

Influenced by the European models, the Commission decided that to avoid the expense of underground pipes the "street paving [should have] the necessary slope by leveling the high places, providing the sidewalks with small parapets in the higher points, as is done in some cities in Europe" (Report 1861, p. 17). The president contracted "the construction of a sewage pipe, the digging of banks and gravelling" (Report, 1º. 10.1862, p. 37).

These works were carried out by the administration that auctioned "the supply of stone, to be paid at the rate of square *braças* of paving". With the arrival of the Portuguese road builders, the presidency, under the administration of José Bento da Cunha Figueiredo Júnior, and the treasury began to hire labor through contract work, but the supply of stone was still contracted out in thousands. Subsequently the supply of stone and labor were both contracted by public auction (Report, 1º. 10.1862).

The city expanded and new areas needed to be paved to facilitate the movement of people and merchandise. On the other side of the city, on the right bank of the Pajéu stream, where the Colégio dos Educandos Artífices was built, a "bigger population" agglomerated, leading the president to demonstrate the need for paving the extension of the Assembly Street, "to facilitate the access to the sand dune known as Oiteiro". The implementation of this project required the construction of a bridge over the Pajéu, and some expropriations on that street, "whose importance would not be small." Another area that needed urgent paving was the avenue to the public abattoir (Report, 6.7.1865).

[9] Old Portuguese unit of measurement. 1 *braça* = 2.20 meters.

The construction of ramps was the means found by the administration to improve the city's communication with the beach. In 1865, there was only the Market's ramp. The extension of Amélia, Formosa and Palma streets using ramps would establish a "convenient communication of the beach with the city's different central points, and was a notable embellishment for the capital". The ramp on Amélia Street, close to the Public Jail and São Casemiro Cemetery, "a flat area situated about 13 meters above sea level" would take advantage of the soil resulting from the leveling of the area behind the public jail (Report, 3.7.1868, p. 16).

The paving of the streets towards the cemetery and the abattoir were considered urgent in terms of public health. The former was due to the burials and the latter to facilitate the transport of fresh meat in accordance with hygiene requirements (Report, 1º. 9.1869).

Public and private spaces were normalized. The new Western mentality changed the people's relationship with their space and they began to regulate the city spaces, as some places began to be accused of favoring the spread of diseases.

## References

REPORTS of the Presidents of the Province of the State of Ceará Menezes Pimentel Public Library – Fortaleza Ceará

REPORT presented by the Provincial Legislative Assembly of Ceará on the opening day of the regular session of 1858. By his Excellency Dr. Joao Silveira de Sousa, president of the same Province. Ceará, Typographia Cearense, 1858.

REPORT presented by the Provincial Legislative Assembly of Ceará on the opening day of the regular session of 1861. By his Excellency Dr. Manoel Antonio Duarte de Azevedo, president of the same Province. Ceará, Typographia Brasileira de Paiva & Companhia, 1861.

REPORT presented by the Provincial Legislative Assembly of Ceará by His Excellency Dr. José Bento da Cunha Figueiredo Junior on the occasion of the installation of the Assembly on the 1st October 1862

REPORT presented to the Provincial Legislative Assembly of Ceará by the president of the Province His Excellency Dr. Francisco Ignacio Marcondes Homem de Mello at the second session of the 21st legislature on 07.06.1865. Typ. Brazileira de J. Evangelista, Paiva & Ca., 1865.

REPORT presented to His Excellency the 2nd vice-president of the Province of Ceará Dr. Gonçalo Baptista Vieira by the 1st vice-president on the occasion of his handing over the administration of the aforementioned Province on 07.03.1868 Fortaleza, Typographia Brasileira, 1868.

Maria Clélia Lustosa Costa is graduated in Geography from the Federal University of Ceará, Master in Geography from the University of São Paulo and Ph.D. from the Université Sorbonne Nouvelle - Paris III. Currently is Associate professor in the Department of Geography of the Federal University of Ceará.

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