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Dossier: SCHOOL SPACES AND ARCHITECTURES

TEACHING SPACES FOR CLINICAL MEDICINE AND EXPERIMENTATION: HOSPITALS AND LABORATORIES IN MEXICO CITY, 19TH CENTURY

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ABSTRACT[2]**:** In this essay I ask how clinical and experimental knowledge was spatially organized in Mexico at the end of the 19th century. The historiography takes laboratories as spaces distinct and exclusive from hospitals; it is considered that the clinic is not equivalent to experimentation. Throughout the 19th century, the Hospital de San Andrés was the place where students of the School of Medicine practiced and learned clinical and pathological anatomy. But it was also there that spaces were opened for experimentation and clinical analysis, in collaboration with the National Medical Institute. Here I focus on those hybrid spaces of experimentation and therapeutics, non-canonical laboratories, currently unstudied. I analyze how the territory of the pathological, located in the body, multiplies in these heteropic spaces, occupied by clinical practices governed by the urgencies of pain, but crossed by the productivist economy that imposes experimentation. Practices and rhythms that produce, in the same places, different knowledge about the pathologies of Mexicans; none of them proves to be more efficient than the other. But, if we observe them from where they settled, Mexico City, it is visible that this knowledge, clinical and experimental, entrenched in their institutions, served political interests of order, hygiene and containment. From the hospitals and laboratories, the School of Medicine educated to control a city that grew in disorder; besieged by epidemics; a society that sought to make research a tool for development, order and cure.

Keywords: Hospitals; laboratories; experimentation; clinic; medical knowledge.

ESPAÇOS DE ENSINO CLÍNICO E EXPERIMENTAL: HOSPITAIS E LABORATÓRIOS NA CIDADE DO MÉXICO, SÉCULO XIX

RESUMO: Neste trabalho, eu me pergunto como o conhecimento clínico e experimental foi espacialmente organizado no México no final do século XIX. A historiografia toma os laboratórios como espaços distintos e exclusivos dos hospitais; considera-se que a clínica não é equivalente à experimentação. Ao longo do século XIX, o Hospital San Andrés foi o lugar onde os estudantes da Escola de Medicina praticaram e aprenderam anatomia clínica e patológica. Foi ali mesmo que, em colaboração com o Instituto Médico Nacional, foram abertos espaços para experimentação e análise

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clínica. Neste caso, me concentro nesses espaços híbridos de experimentação e terapia, laboratórios não canônicos, atualmente não estudados. Analiso como o território do patológico, localizado no corpo, se multiplica nestes espaços heterópicos, ocupados por práticas clínicas regidas pelas emergências de dor, mas atravessadas pela economia produtivista imposta pela experimentação. Práticas e ritmos que produzem, nos mesmos lugares, diferentes conhecimentos sobre as patologias dos mexicanos; nenhum se revela mais eficiente do que o outro. Mas, se os observarmos de onde eles se estabeleceram, Cidade do México, é visível que este conhecimento, clínico e experimental, entrincheirado em suas instituições, serviu a interesses políticos de ordem, higiene e contenção. Dos hospitais e laboratórios, a Escola de Medicina educou para controlar uma cidade que crescia em desordem; cercada por epidemias; uma sociedade que procurava fazer da pesquisa uma ferramenta para o desenvolvimento, a ordem e a cura.

Palavras-chave: Hospitais; laboratórios; experimentação; clínica; conhecimento médico.

ESPACIOS DE ENSEÑANZA DE LA CLÍNICA Y LA EXPERIMENTACIÓN: HOSPITALES Y LABORATORIOS EN LA CIUDAD DE MÉXICO, SIGLO 19

RESÚMEN: En este ensayo me pregunto por cómo se organizó espacialmente el saber clínico y experimental, en México, a fines del siglo XIX. La historiografía toma a los laboratorios como espacios distintos y excluyentes de los hospitales; se considera que la clínica no equivale a la experimentación. A lo largo del siglo XIX, el Hospital de San Andrés fue el lugar donde los estudiantes de la Escuela de Medicina practicaron y aprendieron clínica y anatomía patológica. Pero fue ahí mismo donde, se abrieron espacios para experimentar y realizar análisis clínicos, en colaboración con el Instituto Médico Nacional. Aquí me enfoco en esos espacios híbridos de experimentación y terapéutica, laboratorios no canónicos, actualmente no estudiados. Analizo cómo el territorio de lo patológico, localizado en el cuerpo, se multiplica en esos espacios heterópicos, ocupados por prácticas clínicas regidas por las urgencias del dolor, pero atravesado por la economía productivista que impone la experimentación. Prácticas y ritmos que producen, en los mismos lugares, distintos conocimientos sobre las patologías de los mexicanos; ninguno se revela más eficiente que otro. Pero, si los observamos desde donde se aposentaron, la Ciudad de México, es visible que esos conocimientos, clínicos y experimentales, atrincherados en sus instituciones, servían a intereses políticos de orden, higiene y contención. Desde los hospitales y los laboratorios, la Escuela de Medicina educaba para controlar una ciudad que crecía en desorden; asediada por las epidemias; una sociedad que buscó hacer de la investigación una herramienta de desarrollo, orden y cura.

Palabras clave: Hospitales; laboratorios; experimentación; clínica; conocimiento médico.

INTRODUCTION

This essay analyzes the relationship between spaces and knowledge. I question the places that experimentation took in medical knowledge and in the teaching of modern medicine in the mid-nineteenth century. The historiography of contemporary medicine, since the 1960s, moves away from the idea that there is a simple correlation between the adoption of scientific (experimental) knowledge in medicine and an increased ability to generate effective medical care and efficiently cure patients (Warner, 1991: 454). In this essay I intend to discuss the thesis that laboratories are the spaces that, at the end of the 19th century, turned medicine into a science (Bernard, 1994). More precisely, the history of medicine has been made with the idea that clinicians, guided by the senses to diagnose and cure, had to learn to experiment, only in this way they would overcome the "art" and form closer to "science". Following these judgments, historians separate hospital or clinical spaces from laboratories, to the point of thinking of them as exclusive. Thus, they speak of spaces where clinical practices and knowledge would prevail and others where experimental practices, the laboratories, dominate. Inspired by the critical reviews of other

historians of medicine (Barbara & Corvol, 2012; Latour, 1992; Sinding, 1999) I have found that the forms of production and circulation of clinical and experimental knowledge reveal hybrid practices and spaces, where unexpectedly the boundaries between art and science are broken. In the same space, subjects and objects experience different times, hierarchies and distances. In Mexico, at the end of the 19th century, in the Hospital de San Andrés, a place destined to the clinic, unexpected spaces appeared to practice experiments, let's say non-canonical "laboratories" (Kohler, 2008; Rankin, 2019).

Some historians of education (Alcubierre and Sosenski, 2018; Chaoul, 2014; Ortega, 2015) have shown that analyses of space offer clues about how teaching and, by extension, research took place. The National School of Medicine (Escuela Nacional de Medicina - ENM, 1833) made hospitals an extension to teach clinical and pathological anatomy. The hospital, on the other hand, opened spaces for therapeutic experiences, before the students of the ENM learned to experiment, nor did they have a laboratory. These hybrid spaces speak of a complex relationship between medical teaching and research in Mexico.

The appearance of these unexpected spaces for experimentation and clinical practice responded to a multiplicity of factors. In the first place, it must be emphasized, medicine was not only taught in the School of Medicine, since then the hospitals and especially the Hospital de San Andrés was a space of practice and teaching for doctors. Upon entering the Hospital, the student enters an architecture that imposes short deadlines, established by the therapeutic rhythm, made of the closeness that implies the doctor-patient relationship and the urgency that implies the possibility of death. In these therapeutic time-spaces, a moral regime dominates, imposing on the bodies a moral order that implies hygiene, vigilance over movement, containment. In the face of this clinical regime, however, another space opened up, made up of an experimental regime.

In 1890, the Hospital entered into an agreement with the National Medical Institute (Institiuto Médico Nacional - IMN, founded in 1888). The aim was to test the effectiveness of the active substances obtained in the Institute's Experimental Physiology and Chemistry laboratories on the Hospital's patients. Thus, bacteriology analyses and clinical examinations among patients began to be performed.

A second issue to take into account is that this transposition of spaces implied more than a mere spatial juxtaposition. Laboratories and certain experimental practices were invented in the hospital. Undoubtedly, experimenting implies an economy of time and spaces different from clinical ones; the experimenter is involved in a regime of efficiency, seeking an economy between what is consumed (artifacts, substances and animals) and what is produced (drugs, vaccines). The laboratory implies abandoning the short term and the intimacy of the macroscopic gaze of the clinic. When experimenting, long times and a microscopic gaze are privileged, detached from the patient's clinical history, bodies without histories are treated. What does this hybrid space imply, where different practices and norms coexist?

These hybrid spaces, multiplicity of times and spaces show that teaching medicine cannot be seen on a single plane; the multiplicities of space and time speak of the multiple ways of re-creating and intervening pathologies, as well as teaching how to cure them. The laboratories inside the Hospital represent spaces where sick people and animals coexisted; death and the repeated eagerness to reproduce life and its phenomena; the experience of healing and the power of creating active principles from "Mexican" plants to generate medicines adapted to the nation.

Third, these hybridizations show that the relationships between spaces and knowledges are neither necessary nor predetermined; rather, they are contingent and political. In this case, the spatial connections and hybridizations (the architecture) between the School of Medicine, the hospitals and the laboratories seem to respond to a political organization of space. Specifically, to the relationship between the hospitals and Mexico City, the place where they settled (Massey, 1994, pp. 3-5). Seen from the outside, the clinical order and the experimental order appear as a replica of the spatial/temporal relations of that City that lived besieged by disorder, bad smells and miasmas. Certainly, the HSA admitted quarrelsome, poor, indigenous, unhygienic bodies. Upon entering the hospital, they were offered a medical history that contrasted with their lives, made up of social and political contradictions. The hospital offered its patients the order of the pathological; moreover, if their bodies entered the experimental regime, they entered a space even more distant from their pasts and histories, the doctor re-constructed their "natures" The laboratory in the hospital appeared as a political promise, where the past of the patients could be transformed into the promise of a more certain, healthy future. The hospital laboratory promised to find,

with Mexican plants and animals, medicines to cure national ills and to create a national pharmaceutical company.

THE CLINIC AT THE HOSPITAL DE SAN ANDRÉS, THE SEPARATION BETWEEN THE NORMAL AND THE PATHOLOGICAL

The origin of the Hospital de San Andrés (HSA) is novo-Hispanic. From its foundation in 1789 until 1904, it occupied a building located on Tacuba Street (downtown) in Mexico City. Originally destined to the Jesuit School, after 1857 and the Reform Laws, the Hospital -like the rest of the hospitals in the City- became part of the Public Charity, administered by the Ministry of the Interior. Since then, the finances, administration and government of the HSA were subject to a secular regime and a medicine based on the clinical method, taught at the ENM. The clinic was based on the principle that the pathological is not something external to the body, it is lodged in it. One looks for the lesion under the skin, repeated in other patients. Thus, pathologies are known by the differences and similarities between the normal and the pathological and one of the medical disciplines that investigates this is pathological anatomy. Clinical knowledge is not acquired from the voice of those who suffer from the disease, the physician distances himself from the particular case and, rather, seeks to identify diseases, that is, natural and ideal species that are ordered and classified by differences or analogies. The physician responds to a botanical thought, which integrates the history of its manifestations: when did the fever begin, when did the swelling appear?

Under this regime and method, in the civil hospital, he sought to offer care according to a classificatory order of these clinical species (nosology). To observe them requires a spatialization, let's say, flat. The patients are arranged in such a way as to make the signs of the disease visible, so that, as if it were a picture, they can recognize even its smallest details. This spatial and temporal arrangement of the disease was somehow reproduced in the medical records that physicians took of their patients. There the physician recorded the symptoms; he described the pathological signs and their diagnosis; the history thus allowed him to evaluate the efficacy of the prescribed treatments. This historical order did not end with the death of the patient. The disease circulated within other areas of the hospital: it passed to the necrological analysis and from there, to the Amphitheater, theater of dissections, resections and pathological anatomies, a space where the students of the School of Medicine were trained to look and dissect. In front of the cadaver, he finally penetrates into the original point of pathology. He identifies the diseased organ and submits it to necropsy in order to preserve it and show it to others, to students, to colleagues, to the curious. From pieces of anatomy, those pieces of dissected cadavers, students and teachers learn to see, at the macro level, the forms that diseases take inside the body.

In order to impose the order of pathological anatomy, around the 1960s, the Hospital San Andrés was reorganized. A spatial arrangement was sought to ensure that physicians could observe all the details, the slightest changes and accidents in each patient. The patients were distributed in wards, according to the type of diseases. With a maximum occupancy of 300 beds, the Hospital had 11 wards, separated by ailments and sex: there were seven for men and four for women: alcoholics, syphilitics; surgery, medicine and surgery wards for women. Bed by bed, this classificatory order (women/men; typhoid/typhoid/tissue) offered the doctor, day by day, material to decide what to do, how to intervene. The arrangement by wards also allowed doctors and students to control the patients at a glance, thus economizing their movements. In short, the architecture of the Hospital allowed to privilege a contained look that embraced, in its confinement, each patient. In the center there was a large courtyard; on the upper floor there was a chapel, the public office of the charity, the medicine cabinet and the police station (Martínez Barbosa, 2005, pp. 43,75).

Throughout the century, physicians sought to organize the Hospital according to the law of clinical spatialization, where the topography of the pathological coincides with the limits of the sick body (Foucault, 1996). In that topographical vision, medicine marks the limits or boundaries between the normal and the pathological; in other words, to separate the sick entity from the normal. By extension, physicians sought to isolate the spaces of contagion and disease from healthy spaces, in order to maintain order, even in the spaces of illness or death. However, throughout the 19th century, the HSA was

considered a dangerous place, where it was easy to become infected and meet death. It came to represent a fragile institution, attacked by the disorder of diseases and their "contagions".

Although multiple architectural adaptations were made, they were always constrained by the structure and the colonial façade of the building. There was talk of the lack of space in that colonial building to alleviate the problem of patient overcrowding and the dangers of contagion. However, within those limits, the management of the HSA favored a certain occupation of the hospital space: the professors and students of the School of Medicine were given space, they offered their professorships within the walls, in the Amphitheater they taught dissection and anatomical preparations and, in general, experimentation. The School of Medicine in the Hospital seemed to ensure, despite the disorder and the permanent danger of the death of patients, the control of pathological spaces with the practices of teachers and students.

Opening a space to the School in HSA, ensured a place and power to the medical profession. Faced with other healing practices, performed outside the Hospital, such as homeopathy, healers or unqualified midwives (Agostoni, 2005, p. 99), within the walls, the observance of the practice, as marked by the clinical precepts, became the guarantee to strengthen the profession. Thus, by the 1970s, the Hospital was the space that ensured the physician's place in society, like the degree obtained at the School of Medicine. In other words, there was no qualified physician without prior training in hospital spaces, a guarantee of professional success (Warner, 1987, pp. 239).

TEACHING AT THE HOSPITAL, LABORATORY AND RESEARCH FACILITIES

The Hospital de San Andrés was one of the most important centers of medical teaching and research throughout the 19th century. Since 1833, when the medical profession integrated the teaching of Surgery, the hospital gave space to the professors of the School of Medicine to teach their students how to operate and treat patients. It should be noted that the National School of Medicine was located a few meters away from the Hospital, in the old building of the Inquisition. In 1867, the school modified its study programs, emphasizing practice-oriented teaching, favoring subjects such as clinical (normal and pathological), operative practices and dissection. Little by little, the Hospitals ceded space and allowed professors and students to approach the bedside and mingle with the cadavers (Martínez Barbosa, 2005, pp. 108-110).

In the HSA amphitheater, a space was made for students to put their knowledge into practice. If the patient died, they dissected and prepared anatomo-pathological pieces, some of which were collected in the Museum of Pathological Anatomy of the ENM. These clinicians were confident that these remains made into museum pieces would become useful for teaching, to explain the causes of the diseases suffered in the country. It was hoped to create a properly Mexican medicine; since those remains made museum objects, through the clinical history, the students associated them to a specific patient, could know their sex and "race", key data for many clinical investigations of the time.

It was precisely because of the interest in pathological anatomy that Dr. Rafael Lavista, director of the HSA (1874-1900), opened a Museum of Pathological Anatomy from 1895 to 1900. Despite space shortages, he decided to open a place that required the acquisition of instruments to operate and create anatomical pieces, as well as to perform clinical-bacteriological and chemical analysis of toxins in urine, blood and sputum. Among the instruments acquired were Zeiss microscopes, microtomes, ocular micrometers, achromatic condensers, freezing apparatus, capillaries, operating cutlery, objectives and microphotographic apparatus. (Carbajal, 1906; Lavista, 1899). Next to the Museum, a laboratory for clinical analysis was improvised, reserved for patients, but little by little it was also filled with instruments, such as microscopes; in addition, animals were brought for experimentation, with microorganism culture stoves, dogs, pigeons and some of them inoculated with staphylococcus and bacteria. Little by little the Museum became a bacteriology laboratory, which in 1900 was transformed into the Anatomo-Pathological Institute. Rafael Lavista (1899), being the director of the Hospital, was convinced that by "intentionally provoking in animals, lesions similar to those observed in the human species", the physician could see the secrets of the diseases and allowed him to "apply in a rational way, the resources offered by truly scientific therapeutics." (p. 327). These new spaces, hammered open, cannot be considered as a mere continuation of the logic of the clinical spaces, dominant in the Hospital.

By giving place to experimental practices in spaces destined to the clinic, other forms were favored, which we will call "hybrid logics", heterotopias. Contiguous to the order of clinical practice, experimental spaces appear as places where, in addition to patients and doctors and their students, instruments and reagents, anatomies and animals circulate under an order that breaks with the hierarchies, times and positions of the hospital and the School and its teaching practices.

It is interesting to remember that almost at the same time that this space for experimentation was opened at the HSA, in December 1895, an agreement was signed with the National Medical Institute (IMN, 1889). The purpose of such an agreement was:

> "to collect clinical observations about the therapeutic action of plants and material products of the country"; "to establish a clinical cabinet for chemical analysis, microscopic studies, serotherapy, curative vaccines (in addition to) supplying plants of the country (...) so that in the Laboratory of the Public Beneficence pharmaceutical preparations could be made" available to the Hospital. (AHSSA-BP-EH, Serie Hospital San Andrés, legajo 8, expediente 2, f. 3) [3]

That hospital space, adapted to the professorships and students of the ENM, was modified to give a space for action to experimentalist physicians who intended to test the efficacy of the active substances obtained in that Institute with the patients of the Hospital. There are no detailed descriptions of how the new experimental materials were organized, but it is clear that this space for clinical practices with patients and physicians was "penetrated" by the intense circulation of medical objects and instruments, application of medicines and clinical analyses. It is not that they occupied empty or new spaces; rather, the experimental regime was installed on top of the clinical regime. Where experimentalist physicians were able to circulate, the topography of the pathological, whose seat is in the patient's body, took on other densities and visions. It is still the same patient, but seen in its macroscopic dimension: the same diseased organ is there, but now in fragments, cuts or microscopic details. A cut determines the causes of the whole, the organic disorder. Thus, urine, sputum, saliva and blood (the patient's own substances) become chemical testimonies of the ailment; they are analyzed to determine whether or not the drugs act in the healing process. In these acts, the sick body is multiplied, it is now produced experimentally; and its ailments are visible or existent by other instrumental means, such as microscopes (Mol, 2002).

The laboratory-space of the Hospital did not make its way through the medical professors of the ENM. As we saw above, the ENM entered the Hospital because of the interest in the practices of the chairs of surgery, therapeutics and internal and external clinic. At the ENM there was a space to teach physiology and chemistry, but it was not until 1890 that a space was opened on the roof of the School with instruments and a trainer to learn theoretically how to experiment, especially those reported by the French physiologist Claude Bernard. The experimental was a matter of theoretical or methodological discussion, not practical (Cházaro, 2018; Marcial 2004, Rodríguez de Romo, 1997). It was not until 1900, with Dr. Carmona y Valle as director, that a laboratory was properly set up; instruments were ordered for student use and a professor was hired to teach experimentation (Carrillo, 2001). The physicians and medical students who worked at HSA and IMN learned as they went along what to do with laboratories and experimentation. Put this way, what moved HSA clinicians, we may ask, to make (unexpected) room for experimental practices?

THE EXPERIMENTAL ORDER AND LABORATORIES

The historiography of medicine has made the National Medical Institute the inaugural point of medical experimentation in Mexico (Rodríguez de Romo, 1997). The National Medical Institute (1889-1915) is part of the scientific institutions promoted and developed by the Secretary of Development, Carlos Pacheco (Cuevas, 2006; Marcial, 2004; Vergara, 1896). As is known, the Secretary defended a policy committed to the "capitalization" of the country; it was hoped to create the conditions to produce merchandise that would both valorize and nationalize what the era identified with "Mexican nature" (Zuleta, 2000). As part of this program, the Minister promoted the creation of the Institute to investigate

the healing power traditionally attributed by the "people" to certain plants and animals. This official was convinced that supporting medical research would promote a pharmaceutical industry based on "Mexican" plants and animals. Research on agricultural and forest reserves was seen as part of a model to generate economic wealth.

In this spirit, the IMN was inaugurated with the idea of doing chemical and physiological experimentation. In 1890, it was organized into five work sections: Section 1, dedicated to natural history, focused on herborizing, collecting and conserving animal and plant species from which active principles would be extracted. The latter would be studied in Section 2 by means of chemical analysis to identify their possible therapeutic actions. The third section would analyze in animals (dogs, rabbits and rabbits) the possible toxicity and activity of these identified substances. With these tests, the Clinical Section would test, among patients, the therapeutic efficacy of the synthesized drugs. The fifth Section was to study the hygienic conditions of the country and encourage a possible pharmaceutical industry (Altamirano, 1897; Hinke and Cházaro, 2012). Without pretending to delve into the activities of the IMN, I am rather interested in noting some of the characteristics of the laboratories of the second (chemistry) and third sections (experimental physiology).

From 1889, when the Institute opened its doors, until 1904, when the ad hoc building was inaugurated, the laboratories did not have their own place. The IMN was installed in the house of the Minister of Development, located in Candelarita Square.) The house, which was adapted several times, was used for experimental work for more than 15 years. Although there are no testimonies of how they adapted that house for their work, that space, according to Altamirano, did not facilitate the Institute's tasks: at the IMN, the "laboratories [were installed] in private houses" causing constant delays, disorder and fragmentary results (Instituto Médico Nacional, 1894, pp. 214-217). This aspect of improvisation, lack of time control, which seems to have been experienced in these spaces for experimentation, however, did not respond to a lack of rigor or lack of economic resources. The Ministry of Development invested a lot of money to acquire instruments, reagents and utensils for experimentation. Rather, according to one of the IMN researchers, it took a long time to imagine the spaces to build laboratories and make them their own (Vergara, 1898).[5] Meanwhile, between the hospital and the experiments, hybrid spaces and products were created. When the IMN signed the scientific agreement with the HSA, the Institute entered the discipline and the clinical order, where times, spaces and procedures are not the same as in laboratories, where there are usually no patients. In this case, the experimentation was intended to test the active substances, obtained by experimentation, to prove their effects on patients, in vivo. Daily reports such as the following resulted from these experiments:

> "I administered capulin bark in decoction to two malaria patients. The first one, Margarito Martinez, whose accesses were daily, ingested for five consecutive days the decoction, made with four grams in the first one, and with five in each of the remaining ones. The accesses did not disappear during this period and the area of splenic massiveness increased little. The hematozoa also did not disappear from the blood (...) I performed twelve analyses of urine and one of pleural fluid, sent to the Institute by the doctors of the Hospital de San Andrés" (Terrés, et al, 1897, p. 16).

In the IMN laboratories, reports of their procedures with instruments and animals, in the experimental space, produced narratives similar to those used with patients. A typical report from the IMN experimental physiology laboratory reads:

"A small female dog was administered by subcutaneous injection 3 centigrams of emulsified essence (Epazote de Zorrillo), and as after half an hour no effect was noticed I applied another injection, but this time with 2 c. of pure essence. (...) I prepared some capsules with different doses of essence to be administered through the stomach" (IMN, 1897, p. 13).

These narratives express a hybrid spatiality, the limits of the laboratory do not end at the walls of the Institute. Inside, the active substances were extracted and their toxic action on the physiology of the experimental animals was determined. But these experiments only ended with the patients and in the times of hospital therapeutics. Moreover, because of the nature of pharmacological research, laboratory practices included experiences in the "field." Physicians frequently went out to herbalize plants,

worked outside the Institute, guided by indigenous people and peasants, who taught them their curative applications.

The practices and disciplines of the laboratories located between the Hospital and the Institute did not coincide with those of a "standard" laboratory; not in the sense of, for example, the laboratory of Claude Bernard, of the Collège de France, the inspiration of the Mexican physicians. In the Frenchman's laboratory, the objective was to produce more experiments in the shortest time, with a rational use of space and time. There, the patient was replaced by animals, subject to observation, destined to die (Kohler, 2008; Lalouette, 1990). Based on cases such as Bernard's, some European and North American case studies speak of laboratories as a factory for the production of knowledge and products. They speak of Factory design (Wise, 1999); in this case, laboratories reproduce an organization and work discipline that could be emulated to centers of capitalist production of goods. In the case studied here, the shared space between the hospital, the school and the laboratory produced hybrid spaces and disciplines, where practices were always limited by improvisation or the times and needs of the hospitals. We can advance that the purpose of generating an industry of medicines based on national medicinal plants and animals did not prosper.

This situation recalls the house-school or the house-workshop (Chaoul, 2002), whose practices necessarily combined were folded to the demands of the owners of the property or to their practices. One could speak of a condition characteristic of the pre-industrial production of knowledge, however, these explanations would lead us to dead ends, such as proposing that only in factory-type laboratories would scientific knowledge be produced (Sturdy & Cooter, 1988; Warner, 1991). Rather, in the face of these spatial arrangements, it is worth asking why these hybrid forms of medical research, care and education predominated in nineteenth-century Mexico. Especially, if one takes into account that, over time, the HSA, the IMN and the ENM were delimiting their spaces and ended up redefining their limits and their relationships with each other, but also with the City that housed them and the government that financed them.

INSIDE AND OUTSIDE: THE POLITICS OF RESEARCH SPACES IN MEXICO CITY.

The hybrid spaces of hospitals and medical research institutes occupied a place within Mexico City, that is, they imply complex social relations, they did not occur in a vacuum. In this sense, it is important to note the cultural and political meanings that these spaces weaved with the society of the late nineteenth century. The spatiotemporal experience of clinical and experimental interventions cannot be dissociated from the medical history of the city and its inhabitants (Carbonetti, 2011; Chaoul, 2002; Márquez, 2005; Rodríguez-Kuri, 1996).

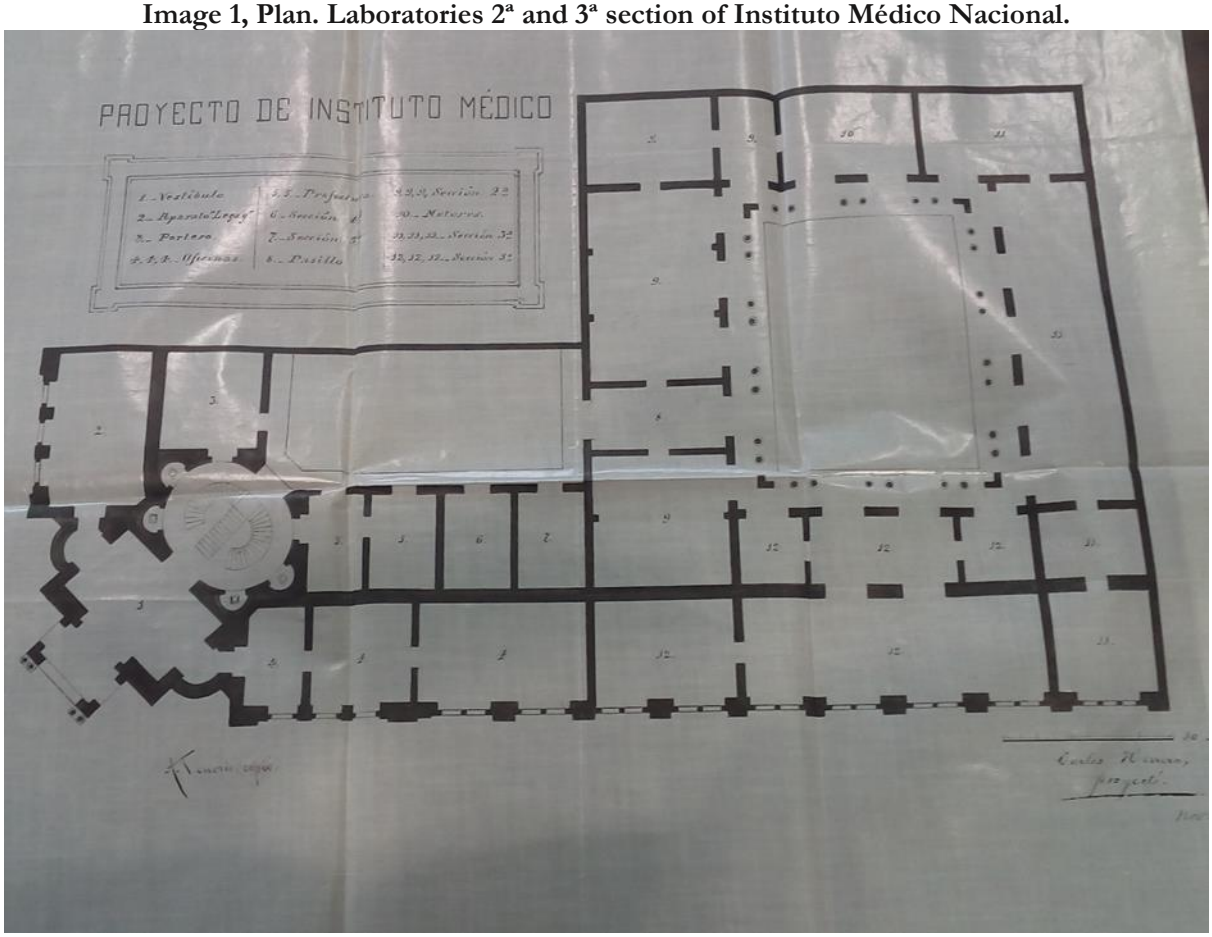
Since the arrival of Porfirio Díaz to power, the city was in constant growth. Employees of the bureaucracy, merchants (Jiménez, 1994; Rodríguez-Kuri, 1996; Semo, 1994), workers and indigenous peasants lived there. The population grew due to the migration of many indigenous peoples who, little by little, abandoned agriculture; their lands, surrounding the city, became the object of urban speculation. Judging by the doctors, as the city grew, the disorder increased: life in society turned, albañales into "filthy spills," "lakes of putrefaction," "origin of pestilential diseases." (Reyes, 1864, p. 148). This social disorder, was personalized in the patients of the hospitals. Most of them were certainly poor and, according to the doctors, these were people weakened by the constant epidemics and diseases they suffered.

These experiences and judgments, disseminated by the press, made the City look as in need of intervention and not in any sense, but in terms of the moral order derived from hygiene and medicine. Hence the alliance of the city governments, the state and physicians (Rodriguez-Kuri, 1996; Peard, 1999). Seen from that city, hospitals and research institutes appear as the promise of disease containment. In a way, the walls of the Hospital promised the order and morality of the clinic, presided over by the doctor-patient relationship, contained by the precepts of hygiene. These political modes of action and intervention spatially and temporally delimited the inside of medical institutions.

In 1904, the inside of the IMN was transformed: after many delays and with a great investment of capital, its building with laboratories was inaugurated, finally there was a place where to place the arsenal of instruments and to lodge the experimental animals. It was located on Balderas Street

(today the site of the Historical Archive of Water), at a distance from the San Andrés Hospital and the ENM. The Novo-Hispanic style façade of the building is striking; it contrasts with the design of the interior, an ad hoc space to house the experimental life. The chemistry apparatus and animals occupy a central place.

Image 1, Plan. Laboratories 2ª and 3ª section of Instituto Médico Nacional.



Source: AGN, IPyBA, IMN, Caja 126, Expediente 7.

The researchers do not have private spaces (offices); they circulate around the tables where the instruments are placed to extract evidence of the workings of nature from the animals. There are no patients there; and ENM students do not come, as in the Hospital, for training. The new building is designed to produce and reproduce active substances and drugs. However, the IMN closed its doors in 1915, without having created a pharmaceutical industry or favored a commercial production of medicines.

For its part, the Hospital San Andrés, until 1905, was located in the center of the city, in front of the current Palacio de Minería. The old colonial building that housed the HSA was closed for multiple reasons, the doctors said, due to lack of space. In the new building that took the name of General Hospital, the services of the HSA and other large public hospitals of the city, such as the Maternity, Morelos and Juarez, were brought together (Liceaga, 1900, p. 14).

Outside the walls of the Hospital and the laboratories, the spaces of the "healthy" appear as open and free places. At least, the HSA was often the target of criticism: it was considered a hotbed of infection; especially the neighbors claimed that "deleterious gases" were emitted from its windows. In the words of one of its critics, the HSA was: "a focus of infection, attacked by bedbugs, filth, producer of mephitic miasmas;" threat to the population: it expelled bad odors and on visiting days, around it, "people full of rags" gathered (quoted in Martínez, 2005: 61). Indeed, the hospitals attended to people without luster, poor people, since people with resources were attended to in their homes (Márquez Morfin, 1994). In a certain sense, for the inhabitants of the City, the inside of the hospitals represented

an order, but linked to pain, punishment and death. In spite of many testimonies of resistance from the population, the medical order was imposed in the public and political life of that country. At the beginning of the 20th century, hospital spaces were reorganized around the General Hospital of Mexico (1905). And even when the National Medical Institute, somewhat unexpectedly, closed its doors in 1915, the generation of experimentalists who tried to open a space for experimentation in the City transcended the Revolution (1910-1920) and took a place in the School of Medicine, already integrated in the National University. The project of converting native medicinal plants into an industrial product, through experimental work, proved to be unfeasible. However, the research institutes, even after the Revolution, had become a political promise for the ENM: to create experimental research in order to found national experimental therapeutics. In a way, we can affirm, everything that seems to us delimited or circumscribed to medical institutions organizes the lives of the inhabitants of Mexico City: the inside is part of the outside.

FINAL IDEAS

An analysis of the places and spaces where medical knowledge is produced reveals how knowledge involves a complex politics. Put differently, it tells us about knowledge as the result of relationships that organize certain inclusive or exclusive hierarchies: spaces of the normal versus unhygienic spaces; dirty or clean; to be inside or to stay outside. In the case of 19th century medicine, a major cut across medical practices and knowledge is the principle that pathologies are located in the body. The latter can be intervened macroscopically or microscopically: one, in the clinic, the other in the laboratory. In both cases, they are the same bodies, but produced, recreated in different spaces, sometimes hybrid or contiguous. Seen from space, medical practices provoke exclusions, tensions and problems: experimentation implies a spatio-temporality different from the clinic. Hospitals sought to organize themselves according to the principles of what Foucault called "clinical spatiality and morality" (Foucault, 1996, pp. 16-41). The experimental is designed according to a moral regime that sought to privilege economy and the search for production. In Mexico, these practices did not take place in different spaces; rather, it was the Hospital that invented experimentation and created hybrid spaces, such as the hospital-school-laboratory, today overshadowed by historians.

These spaces, hybrid or not, imply a political geography. The public space of the city is the very basis of the architecture of medical knowledge and, we can ask ourselves, how much of the inside of medical institutions corresponds to the outside, to the city that houses them? The way diseases and the sick are distributed or delimited presupposed a public policy that sought to intervene, contain and control the population of the city, and in consonance with this temporal and spatial search, medicine structured its knowledge, articulated its research and offered certain cures.

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