

# **Public Health and Hygiene: The Circulation of Knowledge and Technology in the Sanitation System of Mexico City**

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## **I. INTRODUCTION**

Sanitation practices in Mexico City cannot be dissociated from the history of urban land. The miasmatic theories on health of the eighteenth century and the public hygiene theories of the nineteenth century, raised controversies around the lakes on which the city was built since its foundation;<sup>1</sup> herein lies the origin of the drainage projects that were chronically initiated and terminated since the seventeenth century.<sup>2</sup> Marked by its geography, the city was accompanied by a discourse that identified humidity as the irrefutable cause of illness and decay. Drawing from the latest scientific knowledge, nineteenth century politicians and scholars deliberated on methods aimed at improving health issues. It was then that they engaged in a dialog with the modernization and sanitation practices in use at the time in Paris, even before the Haussmanian ones.<sup>3</sup>

The objective of the public hygiene-aligned government—which in 1900 completed the largest-scale civil engineering endeavor in the city's history: the *Gran Desagüe* (or "great drainage project")—supported or rejected alternative proposals that aimed to transfer the city's public health issues to engineers. It was then that several private parties submitted projects that imported and adapted methods implemented in Paris, revealing the way in which the interests of incipient businessmen intersected with local and federal government disputes. More importantly, the proposals point to a general consensus: the need to consolidate an urban hygiene system based on scientific advances and their technical application. After the meaning of public and social order came together, people seized the idea that politics transformed their everyday spaces -through security, prevention, comfort, individuality, and so on.<sup>4</sup> It was after this process, which took over a hundred years to crystallize, when in Mexico City was possible to associate the community with scientific knowledge, technology and profit.

## **II. THE CONSTRUCTION OF THE PUBLIC HYGIENE CONSENSUS**

The humidity on which Mexico City was built was considered, since the sixteenth century, a health-related problem. Hippocratic theories considered it noxious to the balance of the fluids and solids that comprised all organisms, the city included. Other factors that cast doubt on the Texcoco Lake or the irrigation canals that intersected the capital, were the floods that overcame it, as well as Spaniards' fear of being surrounded by an unfamiliar environment. Without delving too deeply into these matters, what is clear is that the city's history henceforth develops from both the theory of fluids, and the physical characteristics of the city itself. This also explains why, for centuries, chroniclers, viceroys, scholars, physicians, hygienists, engineers, etcetera, would remain engaged in a discussion about whether or not the lakes and currents should be rerouted and drained.<sup>5</sup>

This long-held discussion, which turned the water currents that intersected the city into something noxious, took on a series of nuances during the eighteenth century; in addition to the Hippocratic discourse, there was an obsession with identifying and managing the places where the population multiplied the filth and hence the damage. This period is known for the persistent public announcements and regulations that warned citizens to be mindful of their habits. Since then, viceroys and posterior rulers were well aware of the relationship between humidity, the drainage system, health and hygiene.<sup>6</sup>

The creation of this health system brings to mind a modern perspective, in which the network of water supply and drainage relies on a complex weave of pipes, sewers, ducts, water tanks, water deposits, etcetera. The public announcements and prohibitions issued to the population, were the foundation on which civic policy would be built. From the final third of the eighteenth century—when the miasma paradigm had been consolidated as a widespread notion among some elite sectors of society—until the final third of the nineteenth century, it is possible to trace the history of the homologation of behaviors that would be requisite on a national level.

As a result of the Hippocratic theories that both physicians and rulers revisited and adapted to the issue of public health, with progressive intentions, a large number of documents were produced. These documents show how health norms were disseminated with a basis on the classification, registration and description of the

locations that were considered unsanitary. The result is a medical topography of the city, a "descriptive inventory of the resources and characteristics of a given territory,"<sup>7</sup> that beset both issuers and receivers of the newfound knowledge: public officials, physicians, engineers, businessmen, and citizens in general. These records refer to the "canals were clogged with garbage and dung flushed into them for the street", as "the drainage ditch running down the middle of the street...clogged with the manure and urine from animals and human beings alike".<sup>8</sup>

From its progressive logic, public health policy created inventories of these attributes which, since the eighteenth century, had been encompassed by the term *urban health police*. These catalogs reveal an embryonic sanitation system in place in Mexico City—when compared to the supply and drainage systems built since 1830 in Paris, such as the Canal de l'Ourcq. In Mexico City, this process was interrupted by the wars of independence from Spain; the progress achieved during the final decades of the eighteenth century were relegated due to the political turmoil. No continuity was given to the varied efforts after 1810: the construction of sewers, garbage collection, sidewalk cleaning, the leveling of streets, the desiccation of canals, the record of unsanitary locations, etcetera, were almost entirely suspended.

By the first half of the nineteenth century, Mexico City was marked by the same canals that intersected it one hundred years earlier. While some had been blocked, their currents continued to be used for the cultural practices and trades that linked city-dwellers (suffice it to mention the unwritten agreements such as those that forbade craftsmen to use water "before the hour of prayer"). In the nineteenth century, those very same canals served as drainpipes for garbage and filth, thanks to the belief that the current would drag everything to the east of the city, toward the salt waters of the Texcoco Lake.

In the early years of the nineteenth century, the possibility of transforming those practices was limited. In general terms, the city government, those in power, the district judges, the commissioners and the citizens themselves, were immersed in defining which type of relationship would be established with Spain. This explains why public health police ordinances and announcements were repeated with almost no variation until the latter half of the nineteenth century<sup>9</sup>: the orders and prohibitions directed at neighbors were reproduced over and over again, and went from warnings against tossing garbage into the canals, to those against milking cows in public squares, or reminders to answer the call of garbage collectors or to refrain from bathing animals and curing leather in the canals.

Following that nearly motionless period, new attempts at reorganizing the cultural practices of the population surfaced. Another public health system, as well as a new vocabulary to refer to public health, emerged during the latter half of the nineteenth century. The arrival of French entrepreneurs offering inventions or technical adaptations, was a symptom of a new paradigm. In a climate that charged with ever increasing intensity against behaviors that were considered adverse to public health,<sup>10</sup> these entrepreneurs took on the task. The product of technical knowledge and knowhow, their initiatives aimed to industrialize the city's waste. They sought the support of the city government and public health councils, thus decentralizing the role that traditional contractors and those responsible for the health and "beautification" of the city, had played up until that point. All of these tasks, formerly ordered from the seat of vice royal governments, were etched into the vocabulary of the private sector and of profit.

### **III. GARBAGE: AN INVENTION FOR URBAN INFRASTRUCTURE**

Up until the final years of the nineteenth century, the word garbage had alluded to matter that was in a state of decay. The matter itself—to borrow from today's vocabulary—was biodegradable. If waste was "natural" and unprocessed, how then to understand the construction of the complex technical framework created mainly with the aim of expelling from the city, the garbage and filth that were composed primarily of excrement and decaying matter? What allowed for and gave meaning to the creation of such a collection system? Was it necessary to build such a huge framework in order to drive out waste which could have been eliminated in some other way? What was the link between scientific knowledge, technology and economic liberalism?

The greatest innovation of the eighteenth century was the capacity to outline and disseminate the urban model that promised public health benefits. This century created the conditions that altered the meaning of human excrement into "garbage or filth", transforming it into a hazard. Finding support in the surveillance and policing of health, the groundwork was laid for the shift from a city accustomed to the open-air decay of organic matter, into one that would take steps to avoid filth.<sup>11</sup> The lessons of those decades paved the way for the application of medical knowledge and the interference of engineers in the environment.<sup>12</sup> The city went from "fetid miasmas" that circulated like abstract entities distributing evil, to one that limited its surveillance to specific locations—canals, garbage disposals, carts, public squares, etcetera—and with its own referential vocabulary.

Likewise, the shift in meaning of the terms *waste* and *garbage* which took place from the former regime to the modern era, added market value: the link between garbage and business strengthened the interest of applied science in the transformation of waste. Garbage went from being considered something that was

simply thrown out onto the street during the first third of the eighteenth century, to something to be regarded for what it could generate in terms of labor force and potential market value.

Between 1750 and 1860, descriptions, public announcements and reports, charged against uncivilized customs and the poor state of the means required for improvement. During the latter half of the nineteenth century, systems aimed at transformation were implemented. This transition enabled a bridge between two different notions endorsed by physicians and engineers, ranging from the concept of waste understood as something unavoidable or a necessary evil, to that of refuse synthesized by scientific methods. These actors added, to the confinement of garbage, its exploitation. In cities such as London or Hamburg, where iron foundries had an important presence, the problem of waste was solved almost directly with its incineration.<sup>13</sup> In other countries such as France, however, where farmers made use of the excrement and paid the city for the right to use it, combustion was not a direct step.<sup>14</sup> In Mexico, as we shall see further on, some methods brought from Paris were rehearsed, but the idea that the best solution was to drain the lakes, remained prevalent.

Up until that point, efforts to keep Mexico City canals from becoming the receptacles of human waste, had not been successful. Additionally, garbage collecting routines had not suffered any significant change: the carts made out of wooden slabs and pulled by mules, or the boxes with lids used to store garbage or sewage cleaning items, were reproductions of old models. It was only after the application of scientific advances and the implementation of a new logic around human labor—which privileged the development of machinery over nature, a departure from the Christian value system—that the relationship with the sanitation system changed. The opposition between the "biblical idea of labor" and its meaning insofar as it related to "industry", "skill and ability,"<sup>15</sup> allows for an explanation of why garbage collection was attractive during this period, distancing it from the dishonor associated with work thought to be ignominious. These were tasks formerly carried out by unclothed prisoners who submerged themselves in the canals, oblivious to the sludge and refuse that covered their bodies.<sup>16</sup> The search to renovate sewage cleaning techniques created a modern sanitation system.

By the latter half of the nineteenth century, collection carts employed a technique and craftsmen were valued for their capacity to apply the scientific advances of the time. This change paved the way for a differentiation between "artisanal garbage and industrial garbage"<sup>17</sup>, while a point of view was developed in consonance with the time and according to which new machinery, certain chemical substances or processes designed to transform matter, followed an "industrial mentality." This facilitated the building of a framework that distanced individuals from their own excretions and odors; "filth" that should be distanced from the city and destroyed in a place far from the social body that it endangered.

#### **IV. THE GREAT DRAINAGE: BUILDING A CONSENSUS**

Although by the last third of the nineteenth century, the words *cleanliness*, *sanitation* and *contagion* were commonplace, the idea of putting an end to fetidity and ridding the city of filth, was part of an active discussion. Draining the lakes was seen as a solution to the problem, but time had passed and no research had been undertaken on past experiences with drainage. This began to happen in 1823, when Lucas Alamán, a promoter of industry and the banking system, began gathering information on the history of drainage. A few years later, the post of *Oidor Superintendente* (member judge of the Spanish Crown), typically occupied by the person in charge of drainage during the vice royal period, became the *Diputación Provincial* (Provincial Deputation). In 1830, this new post was given to José María Luis Mora, one of the greatest defenders of Mexican liberalism. Both officials undertook the task of gathering information on the history of drainage.

By 1857, some actions were being undertaken. The *Junta de Salud* (Health Council) held a call for bids with the aim of solving the issue of the lack of hygiene in urban areas, the contract for which was won by an engineer by the name of Francisco de Garay, who, eight years later, would be appointed Director General of Drainage for the Valley of Mexico by Maximilian of Habsburg, the country's second emperor. Other calls for bids followed, which would aid in the gathering of experiences and knowledge that had until then remained dispersed. The next call for bids was announced in September of 1861, and was won by Juan Nepomuceno Adorno, an engineer whose sewage-cleaning machines of his own invention had been partially financed by the city government. His project, which stood in frank opposition to the Head of State, was relegated. His initial idea to build a canal in Tequiquiac in order to divert the water that flooded the city, was stumped, and he was only able to build two dikes. Later, when he invented machines to drain the sewers, the Inspector General, and not the Director General of Public Works, attended the demonstration. The Inspector's report states that the machine "hauled a layer of sand over an extension of thirty meters," thus cleaning the sewage pipe located at "Puente Blanquillo."<sup>18</sup>

Both calls for bids, as well as the appointment of Francisco de Garay to the post of Director General of Drainage, show that by the latter half of the nineteenth century, engineers were playing a key role in the planning of the sanitation system. They had replaced physicians because their work extended far beyond illness and the social body. During this period, Mexican president Sebastián Lerdo de Tejada (1872-1876) underlined that the sanitation system would be achieved only if it was connected to the drainage of the city and the creation

of a sewage system. However, the network of sewers and the irregularity of the streets, among many other factors, made the task of dealing with the venomous gases that contaminated the environment, a lengthy and complicated one.

Throughout the course of the following decades, a broad range of projects surfaced which addressed the issue. From France arrived a collection of inventions and adaptations based on the latest theories on gases— atmospheric pressure, percentage of oxygen, humidity or combustion—<sup>19</sup>which stood in opposition to philosophies based on the idea that all matter was composed of the four basic elements. Specialists on the matter were invited, such as D. Jourdanet, Medical Doctor, a Knight of the Legion of Honor and author of *Influence de la pression de l'air sur la vie de l'homme. Climats d'altitude et climats de montagne* (The Influence of Air Pressure on the Life of Man. The climate in high altitudes and mountainous areas, 1875). In collaboration with "city engineer" Roberto Gayol, D. Jourdanet formed the so-called "scientists group." It was during the final third of the nineteenth century, that the public health project and that of drainage finally became one.<sup>20</sup>This was how a sole criteria made its way toward the homologation of the city; under the motto of public health, the Superior Council for Sanitation issued regulations establishing that the building and occupation of housing should follow the network of water mains and running water.<sup>21</sup>That's when having a drainage system and water supply inside each room became a norm, an obligation, in an exclusion, but also a desire.<sup>22</sup>It was then that possessing a water supply and drainage system within each home, became desirable. Thus was established the first great plan for the collection and elimination of human excretions (not to imply that it was strictly followed in the whole of Mexico City), and thus the basis for the modern "history of comfort."<sup>23</sup>

## **V. FRENCH PUBLIC HEALTH MODELS**

A wave of French ideas derived from the reforms carried out in Paris since the Second Republic, arrived in Mexico during the latter half of the nineteenth century. Several individuals offered the city government models for health improvement; their proposals were adaptations or inventions that aimed to repair the damage caused by the filthy environment. Whether ideas to improve the receptacles used to collect excretions from housing; those meant to perfect the cart collection system; or those that aimed to turn garbage into raw materials, the proposals were all adaptations of French models.

The projects were submitted by businessmen with commercial aims, who adapted or invented the techniques. Their products marked a difference from those that had been used for the cleaning of the city, up until that point manufactured by artisans, in accordance to the guidelines and privilege systems of the guilds. They participated in the commercialized urbanization that distributed products from the so-called "republic of inventors," introducing waste into a commercial circuit.<sup>24</sup>It was then that waste, a formerly ignored matter, became a product. Below, I will refer to three specific moments: the transformation of animal corpses into raw material; receptacles denominated common disinfectants, and disinfecting carts.

## **VI. THE TRANSFORMATION OF ANIMAL CORPSES INTO RAW MATERIAL**

Between 1863 and 1869, the "French subjects" Aubry Magloire and Antonio Lacombe submitted to the city government a project for "the exploitation of dead animals." Their idea was to "establish a new industry for the making of vegetable soil" with the corpses: they would utilize the "skin and bones, for which so many applications are found in Europe, with methods the theory of which we possess."<sup>25</sup>

Their objectives were quite clear. Magloire and Lacombe planned to "take advantage of the multitude of dead animals that are thrown out onto the streets and trash heaps of the country's capital on a daily basis, which is damaging to Public Health and detrimental to the beauty of the city" in order to develop an industry which was authorized and practiced in France.<sup>26</sup>With this in mind, they requested a license that would allow them the "right to collect all of the dead animals in the city," thus preventing altercations with garbage collectors, who would henceforth not only incur in a fine if found "removing the skins from animals," but had the obligation to notify the entrepreneurs of locations where they spotted corpses.<sup>27</sup>

The two-year concession they requested would grant them permission to establish a closed location to the south and in the outskirts of the city. They would also be authorized to accept animal corpses from private individuals, which would be paid by the piece. The price would be established according to "the state the animals are found in." It is easy to imagine what such an offer might have provoked among city-dwellers; it could very well have been understood as the continuation of the killing of dogs ordered by the Viceroy Revillagigedo during the final decades of the eighteenth century.<sup>28</sup> Magloire and Lacombe used animal skins to make "leather", they used the meat "to heat the earth", the bones for *rocote* wine, and "the legs for carpenters' glue." This shows how the transformation of organic matter which was previously disposed of so that nature might consume it, entered a circuit of production and commercialization.

Magliore and Lacombe's proposal went far beyond anything that had up until that point been described in documents related to the tanners' guilds. It was a business that would exist outside of the guilds, a fact which surprised the city government. Apparently, no rules or regulations had as yet been issued regarding

the recycling of animal corpses. The city government approved the project, given that this type of business not only generated "numerous" products, but dealt with a good portion of the city's waste. "The use of thousands of skins" of the dead animals that were disposed of on a yearly basis, the "enormous amount of fat" that could be utilized in "the making of soaps and other products," as well as the "broad range of objects that can be manufactured from the bones, whether for the industry or for the large amount of glue that can be extracted, will undoubtedly be worth the investment" which the businessmen were to make initially.<sup>29</sup> Thus, the city government considered these "public health establishments" beneficial, and described them as "a new industry that supplies resources for the subsistence of many people, as well as the utilization of nearly every part of the animals, which would otherwise disappear without being of use to anyone."

The construction of the property where the cadavers would be processed, represented one more step in the consolidation of public hygiene policies. The city government was able to carry it out thanks to what had cumulatively been accomplished since at least the final third of the eighteenth century. Undeniably, the previous decades enabled the acceptance of the project: reports to the district judges, fines, public announcements, sewage regulations and so many other practices familiar to eighteenth-century city-dwellers, had jointly created, at least for a sector of the population, expectations regarding the importance of public health and wellbeing. It is for this reason that the private initiative promoted by Magloire and Lacombre was opportune; in the interest of collective progress, the city government approved the conditions for the establishment of an "office" dedicated to the recycling of those corpses. The location chosen for such an endeavor, was an expanse to the southeast of the city, close to the poorest neighborhoods, near the edge of the Texcoco Lake. It was also in close proximity to where the city's waste ended up due to the natural inclination of the land and the direction of the currents of the canals. The permit issued by the city government was subject to conditions that required compliance: the establishment should be located at a distance from the city, it should be fenced in by a wall six yards high, and it should have only one entrance to the south. The pavement should be "enameled" and "crossed" by an "open pipe with running water" where "dissections, washing, etcetera" were to be carried out.

The city government, the sanitation police, the business community and city-dwellers alike, would "benefit" from the creation of these companies. Clearly, however, none of the petitions, permits or proposals, revealed the horror that could have been generated by the desire of city-dwellers to sell dead animals to these establishments. A look at the registers reveals that the vice royal proclamations of that particular moment in time reflect a low regard for dead animals. In other words, the prohibition regarding the disposal of dead animals diminished precisely because the corpses had entered a regular commercial circuit. This can also be deduced from the project submissions that followed, such as that by another Frenchman referred to as "Mr. Cassin", who insisted on a ten-year concession for the same purpose. As a result of these initiatives, a new network surfaced between authorities, entrepreneurs and technical knowhow, which followed the decline of the guilds in 1813 and the creation of the *Junta de Fomento de Artesanos* (or Council for the Promotion of Craftsmen) in 1843, based on the assumption that craftsmen possessed a "qualified art."<sup>30</sup>

## **VII. "COMMON DISINFECTANTS": A FRENCH MODEL, REJECTED**

Other proposals included that of Victor Barea, who attempted to channel his inventions inspired in techniques that were being used in France. It was during the reign of the Emperor Maximilian of Habsburg, that Barea submitted to the Council for Sanitation a proposal for "common disinfectants." However, the proposal immediately met with strong opposition. Members of the Council for Sanitation argued that his proposal was "very far from satisfying the true demands of hygiene according to the scientific knowledge of the civilized world."<sup>31</sup>

In actual fact, the primary reason for the rejection of the proposal was the conviction held by politicians, scientists, scholars and businessmen alike, that the only real solution to the problem of public sanitation, was to drain the lake and reroute the river currents. In light of this adverse scenario, Barea proposed a "system" that consisted of improving the deposits intended for waste collection in the homes of the country's capital. However, his proposal only succeeded in heightening the concerns of the Council for Sanitation. His proposal refreshed the question that had remained latent: "Do the unsanitary conditions of the country's capital come exclusively from the emanations produced by the excrement deposits?"<sup>32</sup>

What remained unsaid was the assumption that the origin of evil could be traced to the humidity that came from the lakes, which fostered the creation of toxic miasmas. The members of the Council argued against the description of the city as a "stagnant, humid and organic environment," given that the new paradigm saw the ideal conditions for a civilized city, in the "dynamic, dry and mineral."<sup>33</sup> The answer to that question suggests the importance that the drainage project—chronically unfinished—maintained up until the nineteenth century. Equally important was the intervention of physicians, engineers and businessmen, in public health policies. The words of the representative of the Superior Council for Sanitation upon addressing the city, were plain: for him, the problem of "noxious gases" was not in the deposits used to store excretions, but in the faulty inclination of

the "main canal" that facilitated the "stagnation" and decay of fatty matter, which then gave way to the "release of noxious gases."<sup>34</sup>

With this answer, the Council representative rejected Bareau's offer, which consisted of "common disinfectants" that would allow for "improvements that would make public hygiene effective." His "new system" was comprised of "little devices called toilet separators, that aim to separate liquid fecal matter from the solid, thus avoiding the fermentation that gives way to the emission of deleterious miasmas... solid matter remains in the separator, so that only liquid matter runs through city canals."

Bareau's model, which had been "in use in France... since 1853", was made of "iron" and impeded the flow of sewage gases by means of a pipe, while at the same time keeping "the filth" from stagnating in "muck heaps" that remained immobile thanks to the "deficient incline of the city." The French entrepreneur's idea was that the government of Emperor Maximilian would establish a policy whereby city-dwellers and "farm owners" would be obligated to implement a "separating disinfectant system" in every home within a maximum time frame of two years, thus replacing the former "muck heap system." In other words, Bareau's project implied that the population should assume the implementation of the system as its duty. His "common separator" could be placed "in the main apartment of a household without causing the slightest visual or olfactory repugnance, and without posing the slightest health risk."

The Council members firmly opposed the project, and sought to shoot it down. Were the system to be accepted and the "common disinfectants" made mandatory, they claimed, it would no longer be possible to adopt "any of the many methods that are on a daily basis invented to avoid the damage caused by putrid fermentations; because abrogating the law would have its complications, in that property owners would be greatly encumbered by having to spend once and then again at a later date." Besides, stated the Council, forcing farm owners to "buy [Bareau's] artifacts" was an "injustice" and would cancel any future possibility of these being substituted for "others which offered the same or a better result."

Accepting the project meant favoring a monopoly in which "the need would force the consumer to turn to him who has the object needed." He who had the object needed would be Bareau. The Council spared no expense in dismantling the project, going so far as to use the very same arguments the Frenchman had used. They denied Bareau's claim that the artifacts had long since been "in use in France," arguing that they were already known "by books in Mexico" and that they had not been "judged by the most intelligent people to be a work of perfection to the extent that they should become something to be enforced by law," and that "respectable names such as SS. Combes, Frebuchtet, Bondet, Michal and Duvois" had declared before the "Council for Public Hygiene and Sanitation of the Seine," that the disinfectant separator system was very far from being a solution.

They also rejected the notion that "Mr. Bareau's system" of separating solids from liquids was innovative, given that "the liquid part of feces would flow into the sewers, and the solid part would remain in the receptacles."<sup>35</sup> Further, they refuted Bareau's idea of adding magnesium sulfate instead of the well-known disinfectant "pyrolignite of soil" which had been "declared preferable in forming an inoffensive fertilizer within a few hours."<sup>36</sup> In addition to suggesting the use of excrement as fertilizer, this phrase prompted a comparison of its use and effectiveness in both Mexico and France: "assuming that in Mexico, as is the case in Paris, it is verified that eighty percent of feces is liquid and only twenty is solid." Taking into account, additionally, the humidity of both countries, the Council demonstrated its ineffectiveness. The Council determined it would be absurd to implement the system in "the muddy soil of this capital." It also stated that the lack of currents in the sewers would in any case cause organic matter to decay in the open air.

For the members of the Council there was no other way, but to haul waste towards the San Lázaro Canal located to the east of the city, rather than wasting money. The "sum" proposed for the so-called "disinfectant separator system," they stated, should be employed in the "direct drainage" system that would guarantee better results, rather than being spent to "make one individual wealthy" and on something meant to benefit "the contractor."

And thus concluded the common disinfectant project proposed by Bareau to the Imperial government of Maximilian. The past, as well as the negative historical weight of the lakes did not allow for the gradual construction of a cleaning system for the city: the drainage, always either latent, mistaken or interrupted, also seemed to bear on the decision reached by the Council. The imaginary agreed on by physicians and engineers, excluded any other idea, as they waited for the day when "the direct drainage of the valley would take place." Once these words were pronounced, in December 1865, Miguel Hidalgo y Terán signed the document in which the Superior Council for Sanitation discarded the common disinfectants project proposed by Bareau.

## **VIII. STEPS TOWARD THE APPLICATION OF NEW CLEANING TECHNIQUES**

It was not only the categorical importance given to drainage which impeded the integration of isolated proposals such as that of the common disinfectants in the burgeoning cleaning system, but also the inertia of the vice royal social order. A resistance to change and the preference given to "city contractors" as responsible

for the maintenance and cleaning of sewers, were also factors that contributed to the transformation of public health. A long chain of trades linked to maintenance and to the production of supplies, stemmed from those contracts: cart manufacturers, mule feeders, garbage deposit watchmen, sewage cleaners, and etcetera, were different facets of the same problem.

By the latter half of the nineteenth century, this fragmented diversity started to be classified according to technical and scientific criteria. With this new vocabulary, scholars, physicians, engineers and politicians either supported or rejected measures for the city's sanitation system. Results were expected from the authority that had been placed in the hands of science. By 1885, the city government issued a call for bids which summoned "intelligent people" to submit "a project for the building of disinfectant and odorless carts for night service." The aim was to improve the collection carts that up until then had consisted of "large pipes or barrels on two wheels" pulled by mules. The award was agreed upon in October 1885, by the *Sala de Comisión de Hacienda* (Tax Commission) headed by Manuel Domínguez. The winner would receive 200 pesos.<sup>37</sup>

The call for bids responded to the need to solve the issue of the "fetid gases" that were released throughout the city upon collection: "our night carts envelop the entire city in an atmosphere saturated with infectious miasmas." For this reason, the Junta de Salud (Health Council) asked itself how to "carry out the transaction on the streets, how to avoid or diminish the emission of gases during this operation, how to avoid its release as waste is hauled?"

The members of the *Junta de Salud* were convinced that the call for bids would produce a method to solve the "dissemination and expansion" of the "fetid gases" that "severely disturb passersby and neighbors," avoiding "the unbearable pestilence that they leave in their wake." The old "pipes" that were in use allowed for waste to be "in constant contact with the environment." It was expected that bidders would design carts "equipped with a kind of cesspool where waste may be collected so as to avoid the release of gases, as well as with some sort of substance in its interior, such as iron sulfate, that might serve as a disinfectant."

The bidders submitted projects for carts that were adapted according to the principles of gas and combustion theory. It was clear that the main objective of the call for bids was to improve the environment, taking into account the scientific advances of the time. Atmosphere, gases, oxygen, pressure, heat or combustion, were recurring terms in the treaties of the period, such as that drafted by D. Jourdanet,<sup>38</sup> who was commissioned by then president Porfirio Díaz to carry out a study on urban sanitation. Jourdanet presented his analysis titled *Influence de la pression de l'air sur la vie de l'homme* (The Influence of Air Pressure on the Life of Man) at the same moment that the Junta de Salud and the city government awaited the results of the call for bids. Six projects proposing models that made use of applied science answered the call, which posed the challenge: "Which is the most effective, simple, and economical means by which human fecal matter can be collected, transported, disinfected and utilized in Mexico City today, and which might even foresee a future invasion of cholera?"<sup>39</sup> Two of the projects were selected and four were discarded.

Those who resorted to "disinfectants, such as a solution of sulfuric acid, iron sulfate, carbolic acid and other substances" were eliminated because the Junta de Salud (Health Council) considered that their disinfectant properties did not act in the "short term" which took place "from the moment that excrement is collected from homes, to that when it is emptied into the carts that haul it to the San Lázaro Canal." Likewise, projects that proposed the use of "pneumatic systems" such as those applied in Paris or Barcelona, were also disqualified, given that they were based on the "removal of fecal substances" which, in addition to not disinfecting, produced foul odors and "corrupted the air." None of the projects that were discarded, concluded the Junta, "completely solves the problem," given that with the systems they proposed "it is not possible to instantly disinfect fecal matter, much less keep the foul odors from spreading when it is emptied or transported through the streets."

The projects made "improvements on the system in use" at the time, coinciding with the opinion held by the Commission, that "the award go to the authors of the simplest and easiest to implement projects which most closely reflect the wishes of Regidor Domínguez." The projects that were accepted adopted "the burning of the miasmas that hover over the matter deposited in the cart, as a means of disinfection: one of the projects was sent from Jalapa and the other submitted with the pseudonym *Arer-Rac-Rotciv*." Both were based on the principles of combustion. In one case, the aspiration of gases and the burning of miasmas were carried out with combustion from an oil lamp, which additionally served to cast light. In the case of the second project, combustion was carried out by "burning coal or firewood in a special grill."

The winning projects reveal—in addition to the fascination with machinery that was prevalent at the time—how scientific knowledge and its technical application were integrated into public policy. The finalists were: Víctor Carrera for the project titled *Denaturalizer of gaseous products*, and *Description of the Project for the cart for hauling fecal matter in Mexico City*, invented by Porfirio Alcalde. Both projects used heat to "denaturalize" the putrid gases that emanated from fecal matter. Their designs, equipped with "deposits" that could be heated "with firewood or coal," thus dissolving the "putrid airs", were welcome. "The mechanism

between heat and gas is one of the principles of the projects, supported by the fact that gases released by *excremental bodies* are not offensive once they are burnt and, as a result, do not infect the atmosphere."

The improvement of the collection system did not contradict the privileges granted to contractors. The hierarchical and corporate method of collection continued, without removing the privileges of those in charge. The acceptance on behalf of the city government and Junta de Salud, of the proposal to use carts with deposits that could be heated, stemmed from the social consensus which upheld the notion that corporeal excrement, lowliness, illness, decay and public harm, went hand in hand. While all parties agreed on the need to apply the scientific theories on gas exposed to temperature and air pressure, not so with dismantling the old order. The technique of "denaturalization" and dissolution "putrid airs" through heat, was accepted by those who controlled the order of the distribution of waste. This project, as in the case of animal corpse recycling, did not pose a challenge to tradition: it was not about creating a parallel or independent power, such as the project proposed by Barea. Rather, it was about a new technology that was easily adapted to the traditional order that was in place. Hence, it was established that the technological advances produced by "intelligent people" could successfully be applied to the city's waste management system, while at the same time merging profit and leaving the class privileges in place untouched. Since then, the creation, modernization and privatization of drainage and waste in Mexico City, was anchored to a single system.

### IX. FINAL THOUGHTS

By the latter half of the nineteenth century, Mexico City was engaged in direct dialog with Paris and had established a circuit that connected urbanization, health, science, technology and commerce. While the Haussmanian urban project built streets or planned "the mobilization of spectacle" in boulevards, ceremonies, department stores, etcétera, in the Mexican capital predominated "the reorganization of public space for the far more mundane purpose" that also entailed the haussmannization.<sup>40</sup> Canals were still the predominant form of drainage, but the experience gained from the last third of the century illustrated, joined the guidelines based on the authority of technological knowledge.

The historical construction of the cleaning system is one of the approaches to explain the appropriation of urban space. With it a territorial order was classified both as recorded forms of exclusion. The consensus on public health, which established circulation as one of the main criteria of urban space, was followed by a specialization that had to do with the accumulation of individual knowledge, innovation and the acclaim of technology. This context gave way not only to the hygienist perspective on urbanization, which offered products that every citizen would be required to possess, but that of a cognitive system of the modern and the sublime. An activity inherent to the human condition was alienated from the individual body and transformed into a risk: by taking on the responsibility for this latent danger, the nineteenth century succeeded in relocating the habits and spatial references of each inhabitant of Mexico City. Thus, what was built was much more influential than any parliament or political party. The State appropriated the power of technological and medical knowledge in order to build the routes that would henceforth be followed by the waste produced by each individual. This is how the sanitation and hygiene system that seemed convincing to city-dwellers, was built. With a basis on scientific knowledge, the paradigm succeeded in making those who dissented view themselves as missing out on a public health benefit which in less than one hundred years would be imposed as a universal value.

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