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Waters, Water and the Hydrosocial Politics of Bathing in Mexico City, 1850-1920

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ABSTRACT: Before the emergence of microbiology in the 1860s, the relationship between health and water was understood to hinge mostly on its manifold mineral qualities; medical treatments often involved bathing in particular waters to take advantage of their curative powers. With the help of microscopes, those waters came to be seen as home to dangerous microbes and a cause, as much as a cure, of disease. But while biology placed water management on a new footing, ideas from chemistry about the diverse positive medical effects of mineral waters continued to justify the use of those heterogeneous sources for bathing in pools and spas. In this article, I trace this slow, incomplete transition from chemical to biological understandings of waters and health in Mexico City in the late 19th and early 20th centuries. Contradictory hydrosocial processes took shape as scientists, businesspeople and politicians sought to deliver biologically pure, potable public water to individual bathrooms and to, at the same time, promote the healing properties of social bathing in chemically heterogeneous waters.

KEYWORDS: Bathing, water, infrastructure, medicine, history, Mexico

INTRODUCTION

A recent review article on the anthropology of water notes the now-commonplace recognition of the heterogeneity of the liquid, social and cultural forms that surround it (Ballestero, 2019). Historians of science have been joined by anthropologists in making a distinction between local ontological constructions of waters as unique and plural, and an equally constructed idea – one that has gained sway in the modern period – that water is a singular, elemental resource (Hamlin, 2000, 2008; Li, 2015; Linton, 2010; Schmidt, 2017; Wagner, 2013). In this article, I simultaneously employ and question the oppositional framing of 'waters' vs. 'water'. On the one hand, I trace a conceptual shift from multiple waters to singular water in Mexico, a shift that began with research on mineral springs by 18th-century chemists and was consolidated during the 19th century with the rapid expansion of hydraulic infrastructure in Mexico City. While the science of singular water was by that time well established, during the long rule of Porfirio Díaz (1876-1910) real estate developers and governments expanded their control over the resource at the expense of local communities; they built infrastructure that homogenised the heterogeneous waters it captured, before delivering it to users in new and old neighbourhoods of the city. This infrastructural development generated new, more expansive, and integrative 'hydrosocial territories' (Boelens et al., 2016), as residents of the Valley of Mexico came to be connected in new ways, physically and politically, to varied water sources, to the homogenised water that was produced, and to each other. Among those water sources were springs that had supplied the city since before the arrival of the Spanish, aquifers that were being newly accessed by artesian wells, and distant springs brought under command through the use of new engineering techniques and materials (Agostoni, 2003; Bannister and Widdifield, 2014; Tortolero, 2000) as well as through legally sanctioned forms of dispossession (Aboites Aguilar, 1998; Walsh, 2015).

Within this process of hydrosocial integration, however, quotidian practices of bathing reproduced concepts of multiple and unique waters. Little attention has been given to the intimate, culturally rich forms of hydrosociality, such as bathing, that accompanied this infrastructural and urban expansion. What is evident in the history of bathing in Mexico is that diverse engagements with, and ideas about, water are conserved throughout the long transition to singular, modern 'water'. At least as far back as ancient Greece, immersion baths and steam baths in heterogeneous waters with specific powers (often called 'virtues') were considered curative; the emergent modern science of medicine and chemistry retained these notions of diversity and agency even as it built an elemental model of water as a singular substance.

In Mexico, the evolving balance of water and waters was shaped by the divergence in the late 19th century between chemistry and biology, the two branches of science that concerned themselves with the promises and perils of water for public health. This scientific discussion was focused on bathing and had deep implications for hydrosociality. Stagnation and putrefaction were rejected early in the modern period (Guillerme, 1988), but only in the 19th century did water come to be increasingly understood as a vector for pathogens. As hydraulic infrastructure expanded in the late 19th and early 20th centuries, scientists and urban planners urged urban residents to stop their social bathing in springs, canals or bathhouses in favour of private showering in their homes. In this transition, bathing in household showers using public water was reframed as having the purpose of cleanliness and hygiene. Meanwhile, long-standing traditions of therapeutic, prophylactic and leisurely steaming, soaking and swimming in heterogeneous waters continued at spas and bathhouses, which were often supplied by artesian wells and mineral springs.

The shift in bathing culture in Mexico City was a fundamentally political process that incorporated scientific concepts of water quality and public health. The field of chemistry dominated the science of water in Mexico until about 1860, when advances in microscopy enabled a biological approach to understanding the contents of water. These new methods and forms of scientific knowledge about the heterogeneity of waters emerged alongside the earlier ones; that is, biology did not eradicate chemistry. Thus, even though together they hardened the concept of a singular water that coursed through new infrastructures, neither approach eradicated the plurality of waters; in fact, the scientific study of heterogeneous waters was expanded and strengthened in the efforts to homogenise them. Equally important, neither chemists nor biologists argued that different waters were ontologically distinct socionatural substances, but rather they considered waters to be versions of a single thing that took multiple forms because of the dissolved minerals and microorganisms found in it. As a result, although the hydrosocial transition to solitary bathing was a deeply conflictive cultural shift among different social groups in the Valley of Mexico, it was thought through in the course of a debate between branches of modern science. These concepts and conversations around chemistry and biology percolated throughout society in Mexico City, informing the bathing practices and social relations of all its residents.

THE VIRTUES OF WATERS

Long before the recent appreciation for 'vibrant matter' (Bennett, 2009) and non-human 'actants' (Latour, 2004), scholars strove to understand the powers of different waters to influence the health and well-being of people. Different waters were described as having different 'virtues', that is to say powers that were identified by their material effects on other bodies – human and non-human – and grouped according to those effects and their assumed underlying causes. For millennia in the Mediterranean and Europe, waters were considered to be varied and specific to particular geographical places (Miller, 1962). These qualities were seen to give them regenerative, therapeutic and medicinal powers, and it is hard to overestimate the importance that waters held for health in the ages before antibiotics and surgery. Waters were thought to both cure illnesses and prevent them. In the tradition derived from classical antiquity, there were many categories of waters, each defined by a characteristic: salty, iron, soda, hot,

warm, etc. Certain kinds of waters balanced the body's humours in particular ways; others were prescribed for skin problems, venereal diseases, kidney stones, even madness. Healers applied waters as medicine in an empirical and experimental way that was informed by the texts of classical antiquity and the Arab world and later by the emergent science of the Renaissance and Enlightenment (Girón Irueste, 2006; Ruiz Somavilla, 1992).

European mineral and hot springs were especially important sites for the growth of modern science and medicine; this was also true for colonial New Spain, what is today Central America, Mexico and the American Southwest. Scientists elaborated classification systems for these waters and the humans who used them – as they did for plants, animals and the rest of the natural world – and expeditions were mounted to document this diversity. Scientists travelled far from the capital, Mexico City, to search for mineral springs and to measure their temperature, smell, taste, colour, density and chemical composition (Aceves Pastrana, 1993; Beaumont, 1772; Carreón Nieto, 1999). They invariably found people bathing in, and drinking, these waters, and the scientists would then seek to identify the effects of those waters on the physiology of the locals. They often reflected on the possibility of developing these spring waters into spas like those that became increasingly fashionable across Europe after 1600 (Mackaman, 1998; Porter, 1990).

With the emergence of Enlightenment science in the 18th century, intellectuals began to approach waters and their medicinal qualities in a new way (Coley, 1979, 1982; Porter, 1990). Departing from the empirical, experimental Hippocratic and Galenic tradition, scholars working in the emerging scientific paradigm developed a theoretical and systemic approach to understanding the diversity of waters and their particular medical effects. Scholars distilled, processed and analysed the contents of mineral springs to identify their components, locate them in relation to other substances, and discern their effects on the human body (Hamlin, 1990; Linton, 2010). In this fashion, they built a model of the relations among elemental substances in the universe – the discipline of chemistry – which had great implications for medicine. Doctors in Mexico such as Juan Manuel Venegas (1778) brought new information about the substances in plants and waters to bear on existing schemes for understanding disease and well-being such as temperature, climate and humours, and elaborated treatments based on drinking, immersion and showering. These applications were believed to compensate for an excess of some condition in the body (heat, cold, humidity, dryness, viscosity) with an opposing quality (temperature, chemical, area of application) of the water or its application. However, even as medicine and chemistry developed a unified scientific paradigm for understanding waters, their heterogeneity and virtues remained unquestioned.

In 1772, the priest Fray Pablo de la Purísima Concepción Beaumont published a study of the springs of San Bartholomé, near the city of Querétaro. Beaumont's treatise displays the ongoing tension between his analysis of the universal benefits of bathing in water and the distinctiveness of different groups of bathers and waters. According to him, the local Indigenous people accumulated cold and humidity in their bodies from their work in the agricultural fields, and then spent much of their free time in the hot waters to compensate for that. Beaumont also maintained that they benefitted from soaking in the hot springs because their bodies were chemically harmonised with the composition of the water. The bones of Indians, he said, were "spongy, filled with lots of oily marrow, and sulphurous" (Beaumont, 1772: 95). This understanding of health as a coincidence among varied bodies and waters jostles alongside Beaumont's framing of the study as an effort to identify and promote the benefits of bathing in water to public health in general (ibid: 9).

A similar tension between the heterogeneous and homogeneous nature of water was at the centre of many Enlightenment-era efforts to understand the world from the emergent scientific perspective. Antoine Lavoisier, who identified a number of chemical elements and contributed to the elaboration of the periodic table, was particularly influential among intellectuals in Spain and in her New World colonies. Even before the publication of his major work in 1789, the idea gained traction that water was a pure substance composed of two parts hydrogen and one part oxygen, and that dissolved into it were other substances that provided all the waters of the world with their particular properties. Earlier descriptions

of diverse waters based on geography, temperature, astrology and supernatural forces were replaced with a Linnean array of categories based on the main impurities found in water, including iron, sulphur, carbonate (soda) and salt.

Lavoisier emblematises the shift from 'waters' to 'water' (Linton, 2010), but his formulation of hydrological singularity did not eradicate the recognition of plural waters such as hot springs; they continued to be understood and valued in terms of their particular and varied virtues. In 1790, scientists from Mexico's Royal Botanical Garden (*Real Jardín Botánico*) left Mexico City bound for the hot spring of Cuincho, near what is today Morelia, Michoacán. They sought novel plants, waters and minerals in order to develop their medicinal uses. To determine the mineral contents of the water of the Cuincho spring, the scientists stirred calcium oxide (CaO) into two litres of the water. This resulted in a precipitate of 23 grains of carbonic acid (H_2CO_3), indicating that there was carbon dioxide (CO_2) mixed into the water (H_2O) (Valladolid). The scientists extracted the neutral salts by boiling the water, and put them aside for analysis back in Mexico City by the director of the Royal Botanical Garden, Vicente Cervantes. By identifying and separating out the mineral content of Cuincho's water, the scientists also isolated the substance – H_2O, or general homogeneous water – that was common to all springs, rivers, lakes, seas and other waters. They produced "the earliest publication found yet concerning Lavoisierian chemistry in New Spain" (Aceves Pastrana, 1993: 90), but their understanding of medicine still did not stray far from the climatological and humoural orientation inherited from the Greeks, Romans and Arabs. Subsequent studies of spring waters, however, began to extend the modern chemistry that had been employed in testing the waters, to the analysis of ailments and cures. For example, such a study of the hot spring waters of Xochitepec took place in 1797 (Aceves Pastrana, 1993).

The assumption that waters had powerful 'virtues' that derived from their status as unique things survived the emergence of chemistry relatively intact and was in some ways strengthened. The idea that waters are agential, and that this agency can be described in terms of the effects that waters have on other bodies, framed the quest to find chemical substances that could be separated out from each unique water and utilised to treat a corresponding chemical problem in the human body. The science of waters practised in Mexico at the end of the 18th century thus marks the transition from the experimental, empirical methods of trial and error central to Galenic medicine, to the theoretical and systemic approach ushered in by Lavoisier. It was a fundamentally new way of understanding water as a universal element containing diverse mineral components, as perceived and measured using increasingly precise techniques. The developing episteme of enlightenment science, however, absorbed, rather than abolished, the cultural assumption that waters were multiple and heterogeneous substances whose virtues derived from particular environments and formed their correspondence to particular human bodies. Despite the paradigm shift marked by the emergence of modern science, heterogeneous waters flowed on.

CHEMISTRY, BIOLOGY AND THE HETEROGENEITY OF MODERN WATERS

Beginning around 1850, governments and private companies in the cities of the developed world used new engineering techniques and materials to build large-scale water systems. This time of increased economic growth and technological development that took off after 1880 in Mexico was referred to as the *Porfiriato*, named for President Porfirio Díaz who ruled the country as a dictator for almost 30 years (1880-1884, 1888-1910). Infrastructure delivering potable water brought many sources together into one flow and monitored that flow for biological pathogens, creating a new kind of water that was uniform, sanitary and public (Aboites Aguilar, 2012; Aréchiga Córdoba, 2004; Bannister and Widdifield, 2014; Linton, 2010). The Valley of Mexico, where Mexico City is located, was a vast shallow lake with a history of destructive floods, and the expansion of modern water in the late 19th century followed centuries of efforts to drain the landscape (Candiani, 2014; Vitz, 2018).

What is not often remembered, however, is that the production of this new water depended on a continuing appraisal of the heterogeneity and specificity of waters. When building infrastructure, engineers studied the location, origin, flow rate and other qualities of particular water sources; chemists and biologists, for their part, ensured compliance with uniform health standards by measuring the mineral and biological contents of these waters. Until about 1860, the scientists who did this work were mostly chemists; at that point, the discoveries of microbiota by Pasteur moved the emphasis to the field of biology. While Pasteur was not an applied water scientist or engineer, his influence was particularly strong in Mexico which, between 1864 and 1867 was ruled by Emperor Maximilian and Empress Carlota, who had been instated by Napoleon III to rule Mexico as part of the French Empire. Generations of Mexican scientists and public health officials were trained in France and in the French tradition. In 1887, the year the Pasteur Institute was founded, the founder of the Mexico's modern health system – Eduardo Liceaga – conducted research on rabies there (Carrillo, 2001; Escotto Velázquez, 1999). More powerful microscopes enabled scientists to see the tiny organisms that cause the diseases previously thought to derive from the waters themselves or from the gases that emanated from them (Latour, 1993). Public health then squared off against these bacteria in an effort to sterilise and sanitise water. On the path to modern water, what both chemists and biologists actually measured was heterogeneity.

The diversity of water sources was not simply an unavoidable precursor to purity; it was also a goal in itself. The same economic growth that propelled the expansion of infrastructure during the Porfiriato also promoted the development of spas and bottling plants at mineral springs. Spring waters and artesian well waters emerged from deep underground with little biological contamination, and so were an important source of safe bottled drinking water. At the same time, however, most Mexicans continued to hold deep-seated beliefs about the medicinal powers of mineral water. The idea that bathing in them and drinking them was therapeutic enjoyed a resurgence with the popular 'hydropathy' movement in the 1840s, and in the late 19th and early 20th centuries, there was a multiplication of bathhouses, spas and water cures (Anderson and Tabb, 2002; Green, 1986; Mackaman, 1998). Even after the identification of microbial disease vectors, medicine in Mexico kept its focus on the relationship between bodies and local environments and continued to view mineral waters as important agents of well-being. The rapid expansion of uniform public water was accompanied by a booming science and business of heterogeneous waters.

In 1854, Sebastian Pane drilled the first artesian well to tap the aquifers below Mexico City, marking the beginning of a process of modernisation and expansion of hydraulic infrastructure that continues today. Because of artesian wells, the city's water use almost doubled by 1858; by 1883 it almost tripled (Peñafiel, 1884: 50). Aquifer water, however, was an unknown substance and there was no information about where it came from, how much there was, its mineral content and quality, its relation to surface waters, or the effects of extracting it from the ground. This new water was not well received at first by the wealthy households served by the new artesian wells. City dwellers complained that water from some of the public wells, such as those on the Calle de los Cordobanes (today's Calle de los Donceles) and the Aduana (today Calle 5 de Febrero), was *azufrosa* (sulphurous) or *hedionda* (bad-smelling), the sulphurous smell reminding them of hot springs (Río de la Loza, 1911: 216-17). They reported that the water upset their stomachs and made their hair fall out.

Leopoldo Río de la Loza set about identifying the minerals that caused the smell in order to understand their effects on the body. Río de la Loza was a chemist and professor at the National School of Medicine and an expert on the medicine of waters. His family owned a number of pharmacies. He used the drilling residue from Pane's artesian wells to locate aquifers that lay under Mexico City at different depths and to study the qualities of their different waters (Noticia Geológica, 1858). Through this analysis, he found that the artesian waters were actually better for the health of the public than others from springs and other sources in the Valley of Mexico. Questioning the popular idea of miasmas, Río de la Loza argued

that the smell was harmless and that it was the calcium and magnesium in the water that caused minor digestive problems (Río de la Loza, 1911 [1863]: 225).[1]

Río de la Loza died in 1876, just two years before Pasteur published his landmark study entitled *Les Microbes Organisés* (Pasteur 1878). At the 1878 Hygiene Congress in Mexico City, this study sparked a hot debate between advocates of the established medical tradition that was rooted in chemistry and the new adherents to microbiology. When Río de la Loza died, the field of medicine was still solidly rooted in the chemistry of waters, but in the following decades scholars such as Eduardo Liceaga would move the focus to bacteriology. Liceaga was Río de la Loza's most notable student, an important political figure who created many of the modern institutions that characterised public health in 20th-century Mexico. In 1887 and 1888 he toured Europe, learning about sanitation, water infrastructure and public health. He studied at the Pasteur Institute in Paris, held the presidency of Mexico's National Health Council, helped write the 1891 Sanitary Code, oversaw the construction of the National General Hospital (1905), led the prophylactic effort to identify and quarantine yellow fever in Mexico's port cities, and founded Mexico's National Bacteriological Institute. But despite Liceaga's remarkable success in promoting microbiology, he and other medical professionals during the *porfiriato* continued to assume health and disease to be about the relationship of human bodies to the physical and chemical composition of their environment (Ross, 2009: 575).

In Antonio Peñafiel's *Memoria Sobre las Aguas Potables de la Capital de Mexico* (1884), we can see the way that chemistry and biology – minerals and microorganisms – combined in the scientific understanding of waters. While the chemical analysis still took centre stage, Peñafiel grappled with how the putrefaction of organic material was related to the growth of microscopic plants and animals (Peñafiel, 1884: 121). "Pasteur has not finished building his theory", he said, "but we can seize on the most prominent and visible results of these vital, chemical actions" (ibid: 122). Peñafiel's discussion of bacteria in water was limited to the presence of carbonic acid and ammonia resulting from fermentation, and thus the microbiology of contagion was still something of a black box in Peñafiel's climatological, chemical approach.

Along with chemistry's role in understanding the particularities of the many waters that flowed together to form public city water, the growth of spas and mineral springs bathhouses at the end of the 19th century also bolstered the importance of that discipline's appreciation of heterogeneous waters. Rather than viewing water as being either the medium through which microbiological threats to public health came into contact with people or the substance that could be used to wash those threats away, chemistry continued to insist that certain waters had, because of their particularities, a crucial therapeutic role. Spas protected the 'virtues' of the particular sources they used by not integrating them into one extensive infrastructural flow.

In 1884, the same year that Peñafiel codified the sanitary approach to public water, José Lobato announced the victory of science over "vulgar", "empirical" traditions of water therapy. Lobato wrote that "little by little the belief in the therapeutic effects of mineral waters has turned into a scientific doctrine, and that this has become known to all social classes in the civilized countries of Europe, America, Asia, etc" (Lobato, 1884: xii). Lobato's analysis and his classification of mineral waters was based on European models, but he adjusted them in order to grapple with the specificities of the Mexico's mineral waters. In doing so, Lobato built on the tradition of studying the chemical and mineral qualities of water that had been developed by Río de la Loza. He used chemical composition and geological origins to establish 7 families, 14 classes and 57 genders of mineral waters (ibid: 23). The therapeutic agency of a particular water, described in the 18th century as its 'virtue', was recast by Lobato at the end of the 19th century as a "medicinal, mineralogical principle that gives expression to a medical power" (ibid: xiii). "Scientific doctrine" did not rid waters of their multiplicity or their efficacy, even as biological understandings of water quality were integrated into the production of a singular public water.

[1] On the relation of health to smells and miasmas, see Corbin (1988).

Popular cultural ideas and bathing practices propelled the science of heterogeneous waters forward. Despite the emergence of modern homogeneous water and biological definitions of its quality, the popular idea that waters were multiple and powerful shaped Mexico's medical science and its public health system. In the 1870s, mineral springs in the Valley of Mexico were converted into bathhouse spas, part of a wider profusion of baths and bathing at the time. The hot springs bathhouse of Peñón de los Baños had fallen into disrepair since its last major reconstruction in the 1760s, but it was still used by many working class residents of nearby Mexico City (Aveleyra Arroyo de Anda, 2005; Ocampo, 1794).[2] In 1875, the Aragón bathhouse was built at a mineral spring on the road to Guadalupe, where the Virgin of Guadalupe was said to have appeared hundreds of years earlier. This bathhouse served the pilgrims who visited the chapel that had been built over the spring (Lobato, 1884: 188). Patients flocked to the new bathhouse to treat their anemia and other maladies with the iron-rich waters and, shortly afterwards, Eduardo Liceaga built a bathhouse nearby called La Estación. These bathhouses served humble Mexicans who shared a deep cultural assumption that waters were efficacious and heterogeneous.

For centuries, elite Mexicans had worried about the sexuality and sociality of public bathing by the lower classes. For Lobato, however, the worry was that their medical traditions were not scientific enough and their tastes not sufficiently sophisticated. "Take a look at the buildings in Aragón and Guadalupe…", Lobato implored, "and you will see that they are none other than common baths, fitting for a population that has little civilization, scientifically and socially speaking" (ibid: 212). He dismissed the popular healing tradition at El Pocito (the mineral spring at Guadalupe) as unscientific "empiricism" and argued that, "the Spaniards made indigenous converts believe that the spring is miraculous and supernatural" (ibid: 94). Bourgeois bathing practices and bathhouse visits controlled by medical experts required a great deal of money and leisure time, which most Mexicans did not have, but crowds still administered their own treatments at Peñón de los Baños, for example, because of the widely held belief that they were useful for rheumatism and infertility among women. With an eye to expanding the business of bathing and modernising medicine, Lobato did not argue for a science of pure, homogeneous water but rather for a science of heterogeneous waters that might reform popular culture.

Businesspeople and government officials in Mexico sought to channel the popular tradition of therapeutic bathing into a modern, progressive industry, calling for more studies of heterogeneous waters and their medical effects. By 1886, there were chemical analyses of 116 springs and in that year the National Academy of Medicine – "mortified" by the idea that Europeans would hold more interest in their hot springs then they did – approved a national-level study of Mexico's mineral waters with the purpose of generating scientific information to support medical applications and the development of spas (*Gaceta*, 35-40, 47-55, 70). Spa medicine took on a nationalist tone, focused on the climatological specificity of Mexican bodies and environments. In 1889, Carlos Pacheco created a National Medical Institute (NIM), stating that its work would be "in some cases only applicable to this country" (Sosa, 1889a); the implication was that Mexican waters were most suited to curing Mexican bodies. Over the next two decades, the NIM conducted an ongoing effort to study the country's waters and "form a hydrological repertoire with chemical and therapeutic uses" (*Anales* 1894, 82; Escotto Velázquez, 1999; Liceaga, 1949; Liceaga and Gayol, 1898: 842). Modern Mexico was in urgent need of its own spas.

Eduardo Liceaga led the effort to promote both the science and the business of bathing in Mexico. He was keenly interested in the role of water in public health, and he pushed therapeutic bathing with the same conviction with which he promoted microbiological approaches to sanitation and modern water supply systems. He collaborated with engineer Roberto Gayol to build Mexico City's sewer system and, at the same time, equipped the new General Hospital with a hydrotherapy building that offered a variety of medicinal, therapeutic and hygienic encounters with water.[3] Liceaga was also personally involved in

[2] AHCM, Ayuntamiento, Policía en General, Vol. 3630, Expediente 218 (April 3, 1827); José María Manero to Juez Policía.

[3] Archivo Histórico de la Secretaría de Salud; Fondo Beneficencia Pública; Hospitales; Hospital General; Caja 2; Expediente 22; 1903; "Pago de útiles".

the business of therapeutic bathing, building the La Estación bathhouse in Guadalupe and participating in a project to erect a sumptuous, modern spa at Peñón de los Baños (Liceaga, 1892; Lobato, 1884: 100-106; Bárcena, 1885). Liceaga presented a study of Peñón's waters to the Mexican National Academy of Medicine and had it translated into English to attract additional visitors and investors (*Gaceta Médica*, 1891: 231-232; Ross, 2009). The new bathhouse at Peñón, completed in 1892, was built to serve the Porfirian bourgeoisie, and poor people no longer had the informal access they had enjoyed for centuries (Walsh, 2018: 59-64); other spas built at the same time in Mexico were aimed at international travellers. After 1884, the railroad that passed through Aguascalientes brought visitors to its new bathhouses, and the Topo Chico bathhouse near Monterrey was erected in the 1890s, together with an elegant hotel (Walsh, 2015).

FROM BATHING TOGETHER TO SHOWERING ALONE

Mineral springs spas and resorts multiplied in Mexico between 1880 and 1930, consolidating a business of bathing that was built on deep-seated popular and scientific ideas about the virtues of heterogeneous waters, as well as on ancient traditions of social bathing that had roots in prehispanic Mesoamerica and in the classical Mediterranean world. At the same time, the expansion of hydraulic infrastructure brought homogeneous public water to more and more people in cities and towns across Mexico. Two kinds of bathing thus took shape, therapeutic and hygienic, and both were aimed at promoting health. "Hygiene and therapy fight for dominance in hydrology", announced Secundino Sosa, editor of *El Estudio*, the journal of the National Medical Institute (Sosa, 1889b). Hygienic bathing removed dirt, toxins and microbes from the skin; it was washing and cleaning. Therapeutic bathing promoted health by bringing bodies in contact with waters and their idiosyncratic mineral contents. Hygienic bathing, supported by its scientific footing in biology rather than chemistry, slowly gained precedence as the 20th century progressed.

Both of these understandings of healthfulness supported a shift from social soaking to individual showering. For thousands of years, peoples throughout the Americas bathed together in sweat lodges; they were known in the Indigenous language of Nahuatl as *temāzcalli*, the name being modified under European colonial rule to *temazcal*. In the region that is now Mexico, the temazcal was a small house made of stone and mud brick that was used for social, ritualised cleansing and healing. Usually there was an exterior oven attached to the structure with a shared wall, and water could be thrown on that wall to produce steam. Rituals of healing and fertility, agriculture and the underworld continued to orient sweat lodge bathing despite centuries of efforts by the Catholic Church and the colonial state to eliminate them and make bathing an individual practice with the sole purpose of cleanliness (Romero Contreras, 2001; Silva Prada, 2002). Until the second half of the 19th century, the social dimensions of bathing – certainly not unique to the Americas – continued to flourish in the immersion baths that replaced the temazcal in New Spain. From that point on, increases in the water supply and new ideas about hygiene made showering alone increasingly prevalent.

From the perspective of microbiology, the shower was a way to benefit from the cleansing effect of water while ensuring that the water did not move microbes from one body to another. Showers produced a constant, unidirectional movement of water and, like toilet flushing, alleviated worries about contagion and stagnation. In 1885, a traveller in Mexico commented that the "bathhouses with showers, already common in Mexico, are challenging the bathhouses with tubs and *placeres* [literally, "pleasure" baths] that are so common in this country, where all social classes frequently bathe". Showers in public bathhouses would erase the scene – described by a horrified Antonio García Cubas in 1904 – of a poor woman bathing her entire family in the same tub of dirty water (García Cubas, 1904: 372).

Showers also appealed to those who saw bathing as therapeutic. While in the 19th century Liceaga, Lobato, and many other doctors still believed that minerals were the agents in waters, therapeutic bathing increasingly deployed the tactile pressure of jets, fountains and, most importantly, showers.

Showers were a mainstay of hydrotherapy, which held that it was the physical action of water on the body, rather than the minerals or chemicals contained in the water, that was beneficial. This viewpoint gained strength from the knowledge that minerals suspended in water were actually not absorbed by the skin. In the 1840s, popular hydrotherapy (also called hydropathy) had been rejected by many doctors in Mexico as an empirical, unscientific practice; throughout the last half of the century, however, medical students continued to submit theses on "scientific hydrotherapy" for the professional examination at the National School of Medicine. Hydrotherapists applied jets of water to the body with an increasingly complex array of hoses and showers; by 1905, such showers were installed at the new General Hospital in Mexico City, and in 1910 the psychiatric hospital La Castañeda began to use them.

The extension of hydraulic infrastructure into the household generalised the practice of individualised showering with modern homogeneous water. After 1850, widespread everyday bathing became possible with the groundwater provided by artesian wells, and bathhouses grew in popularity and number. After 1910, this expansion of social bathing was eclipsed by private bathing as the water from the Xochimilco springs was drawn into the city's distribution infrastructure (Bannister and Widdifield 2014). New neighbourhoods west of the historic city centre were obliged by the 1891 Sanitary Code to include sewers and conduits for potable water, and water was to be delivered individually to all new houses (Liceaga, 1949: 84-88, 92-3). People no longer had to rely on collective fountains and wells that had served the city's inhabitants for centuries, and the bathhouse was slowly displaced by the bathroom. The shower was also a turning away from the bathhouse culture of the late 19th century, whereby swimming pools, libraries, restaurants and numerous private rooms facilitated all kinds of sexual and social encounters among middle-class and elite Mexican men (Macias González, 2012). After the Mexican Revolution, reformers in the Federal Health Department promoted the shower as a fast, efficient way to wash the body; the sensuality and the connotations of homoeroticism that were carried by shared immersion baths was thus eliminated.[4] In the 20th century, the policing of sociality and sexuality further ensured the dominance of individual showering.

The shower was considered by its modernising proponents as the most progressive mode of bathing and one that was "most commonly used in the civilized countries".[5] It applied homogenous, constantly flowing water to bodies, ensuring hygiene and cleanliness and providing therapeutic effects from physical pressure regardless of the homogeneity of the water. In the 1920s, Mexico City's Health Department passed regulations that required each apartment in a building to have an individual water meter and required showers to be installed in all private housing.[6] Public bathhouses were required to replace bathtubs with showers.[7] In the mid-20th century, when hydraulic infrastructure achieved universal access at the household level accompanied by further regulations, the sociality that had defined immersion bathing for centuries was for the most part ruptured.

CONCLUSIONS

Around 1850, the way people in Mexico City interacted with the waters around them began to change, part of a larger shift in hydrosocial territories and cultures. Expanding urban infrastructure combined multiple distinct waters into a single homogeneous water, subject increasingly to the public health standards defined by microbiologists. Regardless, people continued to recognise a diversity of tastes and qualities among the different water sources that supplied their city. Waters had always been recognised for their various qualities – *gorda* ('fat'), *delgada* ('thin'), *gruesa* ('thick'), *dulce* ('sweet'), *salada* ('salty'),

[4] Archivo Histórico de la Secretaría de Salud (AHSS); Fondo Salubridad Publica (FSP); Sección Servicio Jurídico (SSJ); Caja 3; Expediente 11; 1924; "Proyecto de Reglamento de Baños Públicos del DF". AHSS; FSP; SSJ; Caja 3: Exp. 16; Newspaper clipping: "El Baño más Higienico"; source and date unknown.

[5] AHSS; FSP; SSJ; Caja 3: Exp. 16; Newspaper clipping: "El Baño más Higienico"; source and date unknown.

[6] AHSS; FSP; SSJ; Caja 21: Exp. 9; Transcript of Meeting (9 April, 1930).

[7] AHSS; FSP; SSJ; Caja 3; Exp. 11; 1924; "Proyecto de Reglamento de Baños Públicos del DF".

hedionda ('bad-smelling'), *azufrosa* ('sulfurous'), etc. – and the science of chemistry continued to describe the multiplicity of waters in terms of their temperature, density and levels of oxygen, carbonic acid, calcium sulfate, bicarbonate of calcium, and other contents (Tabla Analítica, 1853: 53). Writing in 1855, historian and linguist Manuel Orozco y Berra, listing the various uses of different waters, wrote that, "[S]ome were destined to satisfy household needs, others for industrial ones, and not a few for restoring the health of man" (Orozco y Berra, 1855: 86). In a seeming paradox that reveals a false opposition, waters continued to be viewed as both plural and specific precisely *because* of the efforts made by scientists and planners to combine them into a singular substance.

When tiny organisms were discovered to be the cause of disease, medicine and public health in Mexico moved in a new direction. Microbiology and hygiene rebalanced both the purpose and the practice of bathing, as water used to clean bodies could just as easily bring them into contact with elements that were considered dangerous. Bathtubs and soaking were rejected by public health officials in favour of showers that ensured that 'dirtiness' was banished rapidly down the drain. The popular sociality of bathing, long suspected by elite Mexicans to be dangerous (Walsh, 2018), was stymied as large numbers of people took to showering alone in their homes. The temazcal, which had served Indigenous people over centuries of colonial rule, was finally eliminated from Mexico City's bathhouses, another aspect of the conflictive hydrosocial transition to modern water. The long shift to the shower and the rise of the singular concept of sanitised water, however, did not eradicate the engagement with diverse waters in the spas and bathhouses; people continued to visit these sites of leisure and recreation. As the 20th century progressed, the business of bathing was supported by an evolving discourse and practice of water therapy which survived in popular culture and on the margins of mainstream medicine. After 1920, the solitary household shower using public water grew to be the most important daily contact most city dwellers had with the liquid, but heterogeneous waters and water cultures lived on in the hot spring resorts and bottling plants that flourished throughout Mexico during the 20th century.

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