

Appraising waters — The assimilation of chemists into the trade of mineral waters in eighteenth-century France

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Abstract

Mineral waters were a delicate and unstable product whose value as a remedy increased in early modern France. If it was once the prized luxury of the nobility travelling to the spa, the eighteenth century slowly watched it turned into a commodity. The waters became widely available in bottles and were sold in bureaus of distribution. Despite the logistical challenges of selecting and carrying the waters to their new urban public, many different springs made their way into most of France's cities. This took place under the watch and regulation of a uniquely dedicated institution, the *Société de Médecine*. This *Société* eventually settled its authority over the management of mineral waters, thanks to the backing of state power, the influence of the Academy and the newly recognized authority of chemists as analysts of waters. The purpose of this paper is to bring to light this overlooked institution and its essential role in the administration of mineral waters. Though it never eradicated fraud or succeeded in creating a full scientific and economic monopoly, it greatly broadened the budding trade of bottled water in France and gave a powerful incentive for chemists to better their mastering of the particularly challenging analysis of water.

Keywords

History of Science; History of Chemistry; 18th Century; Analysis; Mineral Waters

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Untangling

In 1773, the royal institution in charge of the administration of remedies and mineral waters in France received a letter from an apothecary named Tardy, who explained rather angrily that he was a victim of the utmost injustice. Tardy was the tenant of the bureau trading mineral waters in the small medieval town of Le Puy en Velay, in central France. This volcanic region was abundant in naturally mineral springs, but once bottled, Tardy was the only one with a right to sell the waters in town, in accordance with the current law put in place by the newly founded *Société de Médecine*. Tardy however, complained in his letter that some imposters had taken the habit of selling some waters at the gates of the city to passerby, creating disloyal competition and lowering the sales of the bureau, his livelihood.

His letter was read by Vicq d'Azyr, a well-established doctor, adjunct anatomist at the Academy of Sciences, and in charge of the correspondence at the *Société*.² Showing sympathy towards the situation at hand, he wrote a note on the back of the letter, explaining that given the poverty of the province surrounding the bureau of Le Puy en Velay, the commerce of waters must be "quite mediocre", thus meaning that any harm to that already slim profit must be indeed difficult to withstand.³

Tardy was however not quite as helpless as he might have seemed. A few years later in 1777, the institution received letters which it filed under the eloquent name "untangling of the situation between Tardy, distributor, and Arnaud, inspector".⁴ This inspector was a man charged by the *Société* to inspect the bureaus and check that the waters were sold in accordance to current legislation.⁵ In his letter, he did not seem to feel as empowered as his title might suggest. He explained that Tardy had on his own accord inflated the price of the water from the spring of Vals in order to make up the difference brought about by the sale of fraudulent waters. Despite much summoning from the inspector, Tardy refused to revert to the price per bottle decided by the *Société*. In the latter part of his letter, the inspector sounded quite desperate, as he begged for someone to intervene, and hoped that Tardy might come to his senses if directly ordered by the *Société*.

In a third letter sent internally at the *Société*, the situation became clearer. It was apparent that Tardy mostly made profit selling the waters from the Vals spring. He accused the inspector of devising against him with the help of a conspiring physician, by advertising the waters of a different spring, not sold in his bureau, thus harming his profit. The second half of the letter gave indications on how to best proceed in order to "untangle" this delicate situation. The author was unyielding on the topic of changing the price, and a note was added on the back of the letter specifying that Tardy had to be ordered immediately to return the bottles to their regular price. The attitude of the *Société* was however not unambiguously in favor of Arnaud. Despite his role as an agent of the *Société*, the author of

² Bibliothèque de l'Académie de Médecine, SRM 111B, dossier 22, 1773.

³ Ibid., "comme le Velay est un pays très pauvre et très peu habité, le commerce des eaux minérales ne peut qu'y être très médiocre".

⁴ Bibliothèque de l'Académie de Médecine, SRM 113, dossier 2, "Démêles entre Tardy distributeur et Arnaud, inspecteur", 1777.

⁵ Yves Oger, *Les bureaux de distribution des eaux minérales aux XVIIe et XVIIIe siècles* (Paris: Bibliothèque de l'Académie de médecine, 1999), 164.

the letter seemed to believe that the inspector might indeed have had a grudge against Tardy and did in fact attempt to conspire against him, maybe hoping that he would lose his permit.

“the inspector negates all other accusations; but that is only through vague talk that does not justify him and it is likely that Debuy and him have tried to give fame to the waters of Salers to the prejudice of those of Valz only to harm the director [Tardy] and his bureau”.⁶

Whatever the case may be, the next year, Tardy did receive the renewal of the permit he asked for and carried on his commerce.

This story is in many ways anecdotal, but it sheds a light on an important part of the history of remedies that is seldom written about. Mineral waters are mostly famous in early modern history as high class entertainment for the nobility in the great spas of Europe.⁷ A few of these places, such as Bath or Bagnères have received visits from distinguished guests and their reputation went beyond regional borders.⁸ It would however be a very limited understanding to think that the waters were only consumed by such crowds on a cure or a holiday. As shown by Tardy and his troubles, the waters of lesser known provinces became of interest to the public in France, and people began to purchase them in bottles, away from the spring, in conveniently dedicated bureaus. Those letters also show a glimpse of the complex social relations at play when attempting to set up a central medical institution in charge of trading legislation. While on paper, the hierarchy of responsibilities in this trade might seem straightforward, the alleged conspiracies of the inspectors show the complex sociabilities of trust that occur in this network.

The eighteenth century was the stage of much change in practices surrounding the consumption of mineral waters, as the public interested in its remedial abilities expanded and they became a commodity available at a (supposedly) fixed price. Even cities as small and isolated as Le Puy en Velay could sustain such a commerce, despite its struggles.⁹ This expanded consumption of mineral waters complicated the logistics necessary to make this volatile remedy travel from its source to its points of distribution across France, all the while retaining its material integrity, potency and exact chemical composition. Let us look at this history in more detail.

⁶ Bibliothèque de l'Académie de Médecine, SRM 111B, dossier 22, “l'inspecteur nie toutes les autres accusations ; mais ce n'est que par des paroles vagues qui ne le justifient point et il est vraisemblable que Debuy et lui ont cherché à donner de la célébrité au eaux de Saler au préjudice de celles de Valz que pour nuire au directeur et a son bureau.”

⁷ Annick Cossic & Patrick Galliou, *Spas in Britain and in France in the Eighteenth and Nineteenth Centuries* (Newcastle: Cambridge Scholar Press, 2006), 521.

⁸ On the influence of Bath, see: Annick Cossic, *Bath au XVIIIe siècle : les fastes d'une cité palladienne* (Rennes, Presses universitaires de Rennes, 2000), 200. On the reputation of the French spas through the republic of letters, see: Jean Balcou, “Deux philosophes aux eaux. De Voltaire à Diderot,” in *Spas in Britain and in France in the Eighteenth and Nineteenth Centuries*, ed. Annick Cossic & Patrick Galliou (Cambridge Scholar Press, Newcastle, 2006): 227-238.

⁹ Abel Poitrineau, “La vie rurale en Basse Auvergne au XVIIIe siècle (1726-1789),” in *Annales de démographie historique* (Paris, Éd. Sirey, 1967), 281-286.

Renewed interest in an old remedy

A wide range of French publics in the eighteenth century took interest in questions surrounding their health.¹⁰ Through a variety of medical oriented media, the public space of the enlightenment made some space for the discussion and interest in remedies and novel medical practices.¹¹ Mineral waters quickly became a part of that enthusiasm. To be clear, the idea of drinking or bathing in mineral waters in order to cure a variety of illnesses was not new. On the contrary, its use has been somewhat consistent in the antiquity and through the Middle Ages.¹² The novelty of the early modern mineral water is first one of definition, and second one of popularity. While medieval waters were visited for their warmth, occasionally celebrated in the literature as being capable of healing, there was no systematic description of what constituted a mineral water per se. Throughout the seventeenth century, the term “eau minérale” or sometimes the adjacent word “eau thermale” slowly came to have a more specific meaning.¹³ The definition was narrowed to only include naturally occurring springs containing a number of often unknown principles which conferred physiological effects. In the eighteenth century, it became widely understood that some waters were mineral, that is to say potent in a medical sense, and others were simply noteworthy for their warmth.

This distinction became of interest to state authorities, given the growing popularity of the waters and their sensitive nature as a health product. As early as 1605, the king's head physician in charge of the intendency of the mineral waters gave away permits to grant transporters the right to carry the waters.¹⁴ In 1670, the minister of finances Colbert was charged by the king to have all the mineral waters of France distilled in order to “be acquainted with their different qualities and know what they are proper for”.¹⁵ The interest in attempting to see that value past the most well-known springs was already present then.

¹⁰ Roy Porter, “Lay medical knowledge in the eighteenth century: the evidence of the gentleman’s magazine,” *Medical History* 29 (1985): 138-168; Michel Foucault, *The Birth of the Clinic, An archeology of medical perception* (London & New York: Routledge Classics, 2003), 266.

¹¹ William Coleman, “The People’s Health. Medical Themes in Eighteenth-century French Popular Literature,” *Bulletin of the History of Medicine* 51 (1977): 55-74.

¹² Marie-Reine Jazé-Charvolin, “Les stations thermales : de l’abandon à la renaissance. Une brève histoire du thermalisme en France depuis l’Antiquité,” *In Situ* 24 (2014) :1-14.

¹³ As a reference, the dictionary of Furetière gives a definition in the late seventeenth century that remains consistent for the century to come. The definition distinguishes mineral waters from thermal waters and gives a well exemplified description of the kind of minerals expected to be in the main types of mineral waters: Antoine Furetière, *Dictionnaire universel, contenant généralement tous les mots françois tant vieux que modernes, et les termes de toutes les sciences et des arts* (La Haye: ed. A. et R. Leers, 1690).

¹⁴ Alexandre Lunel, *La Maison médicale du roi, XVIe-XVIIIe siècles. Le pouvoir royal et les professions de santé* (Seysssel : Champ Vallon, 2008).

¹⁵ Pierre Clément, *Lettres, instructions et mémoires de Colbert, 5, Fortifications, sciences, lettres, beaux-arts, bâtiments, publ. d’après les ordres de l’Empereur*, tome V (Paris : Impr. Impériale, 1868), 291, Jean Baptiste Colbert to Riquet, 11 January 1670, “Le Roy ayant dessein de faire distiller toutes les eaux minérales qui se trouvent dans les provinces de son royaume, pour connoistre leurs différentes qualités et savoir à quoy elles sont propres, je seray bien ayse que vous preniez soin de faire tirer six bouteilles de celles de Balaruc en Languedoc et de Baréges, pour les envoyer par la voye que vous jugerez la plus commode et la plus prompte, estant nécessaire qu’elles soyent distillées bientost après qu’elles seront sorties de leur source.”

One event in particular became a catalyst for the enthusiasm around French mineral waters. In 1723, the new waters of Passy were discovered.¹⁶ Situated very close to Paris, the old waters of Passy were already well established and used by the royal family,¹⁷ so the discovery of a new source very near was well publicised and the question of moving waters to increase access became more prevalent. In only a few decades, the town grew to accommodate the influx of visitors, fueled by advertisement and controversy surrounding the true nature of the waters. The attention brought many physicians to take interest in Passy, and they published a number of papers on the analysis of the new springs. This correlated with an increased interest in trying to find new springs throughout the whole kingdom, and analyzing them in the hopes of getting public attention and profit.

The ever-increasing trend of transporting mineral waters was however not universally accepted. Some spring owners and physicians thought that buying a bottled remedy would never replace a lengthy cure directly at the spring. The head physician in the spa town of Vichy in central France wrote in 1755 an entire pamphlet on the many advantages of taking the water directly at the source instead of from exported bottles.¹⁸ Evidently quite biased in his opinions because of his need to keep people coming to the sources he was in charge of, his views on the matter are still worth unpacking. His grievances with transported waters revolved around two main ideas: first the system of transport was imperfect and unreliable, and second the water on its own was not sufficient to heal in itself. Concerning the former, he listed a number of fraudulent systems that he was aware of. For example, he denounced some of the illegal vendors who sold real Vichy water but taken from a place that was contaminated by other lesser waters. He also expressed his distrust for servants whom he accused of selling the waters for the wrong price in order to make a personal profit.¹⁹ Alongside active fraud, the pamphlet brought up the instability of mineral waters, explaining that they quickly changed properties once they made contact with air, especially given the high concentration of minerals present. Exposure to air and different temperatures had the inevitable consequence of altering the product, and no bottles could prevent these changes.

But his main issue lied with those who believed that Vichy water was a universal remedy that could cure all diseases when consumed.²⁰ There were different mineral springs in Vichy, and they subtly varied in composition, and consequently had different physiological effects. Tailoring the right spring for the right disease was part of the process of being cured by the waters. This delicate trial and error based process could not be undertaken with bottled water, as only the most illustrious spring of Vichy was exported. He

¹⁶ Moulin de Marguery, *Traité des eaux minerales nouvellement découvertes au Village de Passy: près Paris; dans lequel sont expliquées leur nature minérale, la difference des sources, leurs vertus, & leurs effets sur le corps humain*, (Paris : F. Barois, 1723).

¹⁷ Bibliothèque de l'Académie de Médecine, SRM 91A, dossier 5, "Passy-lès-Paris", 1779-1785.

¹⁸ M. Emmanuel Tardy, *Dissertation sur le transport des eaux de Vichy , avec la manière de se conduire avec succès dans leur usage*, à Moulins (Paris: Jean Faure, 1755).

¹⁹ On the prevalence of the theme and accusations of fraud in the early modern time period: Gérard Béaur, Hubert Bonin & Claire Lemercier, ed., *Fraude, contrefaçon et contrebande de l'antiquité à nos jours, Partie 3, Les praticiens de la fraude et de la contrefaçon*. Publications d'histoire économique et sociale internationale, Issue 21 (Genève: Librairie Droz, 2006).

²⁰ Themes of universal remedies long remained topical in early modern France: Alex Berman, "The Persistence of THERIAC in France," *Pharmacy in History* 12, no. 1 (1970): 5-12.

then explained that the water was not the only factor in the cure, but rather the entire range of goods and services that could only be obtained from a trip to Vichy, from the stunning landscape to the diverse amenities which were supposed to soothe the mind, allowing the waters to take better effect against disease.

In general, his opinion was that if the transporters could bring the water on their carriages to Paris, they were only bringing what had already become quite a sterile product. They could not bring with them the years of vernacular and scientific knowledge gathered by the locals, that the physicians of far away cities did not imagine.

The argument against transporting the waters because of their fragile nature remained prevalent.²¹ Many experimenters versed in the chemistry of mineral waters, believed that fizzy waters were particularly susceptible to alteration during transport. For instance, Huet de la Martinière concluded his analysis by recommending that the waters never be transported for this reason:

“Following an Experiment I would conclude that the mineral Waters of St Santin contain a very small quantity of elastic fluid, and that this air is bound weakly. Thereby can they not be conserved, nor can they survive transport, & they lose infinitely much from not being drank at the source itself.”²²

Despite the gap in time between the pamphlet on the Vichy waters and the 1778 analysis of the Saint Santin waters, Huet de la Martinière still did not believe that the bottling technology had become good enough to carry the delicate fizzy waters and keep their properties intact. This opinion was a manifestation of the wider belief in a holistic consumption of waters, celebrating simply taking them where they sprang with as little intervention as possible.²³ But this sentiment was not universally shared. There was in fact a demand from city residents who could not afford to travel to the springs, either by financial constraints or simply because they were too sick to take on the sometimes lengthy trips involved. In response to that demand, the owners of some smaller springs were, unlike the well-established physician of Vichy, very eager to have their waters sent away to be sold in bureaus where they hoped to find a clientele.

Overcoming adversity: the creation of the *Société de Médecine*

²¹ This criticism can also be found in the English case, in which there was criticism of the overuse of mineral waters with little to no knowledge on the best way to drink them: David Harley, “A sword in a madman’s hand: professional opposition to popular consumption in the waters literature of southern England and the Midlands, 1570-1870,” *Medical History* supplement, n°10 (1990): 48-55.

²² Bibliothèque de l’Académie de Médecine, SRM 92B, dossier 47, Analyse par Huet de la Martinière, “D’après une Expérience je conclurai que les Eaux minérales de St Santin contiennent une très petite quantité de fluide élastique, et que cet air y tient très peu. Aussi ne peuvent-elles ni se conserver, ni supporter le transport, & perdent-elles infiniment à n’être pas bûes à la source même.”, 1778.

²³ This is also linked to a longer standing distrust of overly complex remedies: Cécile Floury-Buchalin, “Les querelles autour des remèdes chimiques et exotiques dans la littérature du XVIIe siècle: enjeux philosophiques et professionnels,” in *Materia medica, Savoirs et usages des médicaments aux époques médiévales et modernes*, ed. Philip Rieder & François Zanetti (Genève: Librairie Droz, 2018): 131-146.

One of the unique aspects of the French trade of mineral waters was its centralized supervision. At the beginning of the eighteenth century, the patent letters of Pierre Chirac, head physician of King Louis the XV, put him in charge of managing this trade. He was thus allowed to nominate clerks in various cities to ensure the waters were being sold fairly. But as reports of illegal trading activity continued, Chirac devised the plans for a more sophisticated structure that would be in charge of this important task. Those plans would lead to an institution that could take care of all matters related to the trade of remedies in the kingdom and would hopefully foster a more open and transparent medical culture. During his lifetime, he faced strong opposition from the Faculty of Medicine, which remained entirely opposed to the opening of a rival institution, and the death of Chirac in 1732 meant that the project didn't succeed in his lifetime.²⁴ Jean-Marie François de Lassone, *pensionnaire vétérinaire* at the Academy, inherited the responsibility of intendancy over mineral waters in the virtue of his position as head physician. A mere forty years after Chirac's death, he revived his original idea, in the hopes that a dedicated institution would make the best of this national asset, as well as end fraud once and for all. His project was brought to life with the creation of the *Commission* for the intendancy over mineral waters in 1772, by order of Louis the XV. In 1776, in the midst of the spreading of a disease threatening livestock, a second commission was formed by Vicq d'Azyr with the purpose of studying and limiting epidemics. The two commissions' merging in 1778 became the *Société Royale de Médecine*. Gary Kates describes the creation of this *Société* as "an attempt to give some corporative structure to the straggling bands of physicians throughout France; but it also made a great play of its mission as recorder and diagnostician of epidemics and as information network on disease and the environment."²⁵ In this way, the *Société* played in the important eighteenth-century ideal of a centralised and monopolistic administration leading to a more beneficial management of public health.²⁶

Very much to the dislike of the Faculty of Medicine, The *Société* was given control over all mineral waters in France, and was financed in part by the profits it could make from the ensuing commerce of waters. This *Société* was based in Paris, though its aim was to reach far beyond the circle of Parisian doctors and apothecaries (especially since a lot of them remained loyal to the Faculty of Medicine, refusing to give any credit to the newly formed *Société*).²⁷ The real network of the *Société* was spread all around France, linked by a very active correspondence, with the aim of connecting physicians and chemists dispersed all over the kingdom to the active center of scientific life that was Paris. Vicq d'Azyr realising the importance of this network diligently took charge of the correspondence. This allowed the *Société* to quickly gather medical data on the various mineral springs in France and occasionally abroad. The Faculty of Medicine also realized the potential benefits of such a wide network of people, and attempted to establish a rival system of correspondence but

²⁴ Alexandre Lunel, ed., *Pierre Chirac, premier médecin du roi et le projet inachevé d'une surintendance médicale sur l'art de guérir* (Paris: Cour de France.fr, 2010).

²⁵ Gary Kates, ed., *The French Revolution: Recent Debates and New Controversies* (London & New York: Routledge, 1998).

²⁶ Michel Foucault, "La politique de la santé au XVIIIe siècle," *Les Machines à guérir, Aux origines de l'hôpital moderne*, dossiers et documents (Paris: Institut de l'environnement, 1976): 11-21; Deborah Lupton, ed., *The History of Public Health and the Modern State*, The Wellcome Institute Series in the History of Medicine (Amsterdam: Rodopi, 1994).

²⁷ Jean-Pierre Peter, "Une enquête de la Société royale de médecine : malades et maladies à la fin du XVIIIe siècle," *Annales. Économies, Sociétés, Civilisations*, 22e année, n 4, (1967): 711-751.

upon finding out, Lassone formally shut it down. In protest, the Faculty went on strike and resumed work only when ordered by the *Garde des Sceaux*. The *Société* managed to overcome the negative pressure of the Faculty on its second attempt thanks to two new favorable circumstances: having excellent relations with the Academy of Sciences, and obtaining the support of Necker, minister of finances, who unambiguously took the side of the *Société*.²⁸ This backing by on one side the highly recognized scientific authority of the Academy and on the other, by the power of the king, ultimately overtook the historically strong influence of the Faculty.

This centralization of knowledge through the managing of the correspondence and control over the trade of water thus remained quite unique, and it allowed the *Société* to gather unrivalled knowledge on the waters of France, their composition, geographical characteristics and medical use. This meant that during its short lifetime, it shows a very accurate picture of the evolutions of the cultural, scientific and economic understanding of mineral waters in the late eighteenth century.

Principle of public service

If the creation of the *Société* has been somewhat of a convoluted process, upon its establishment, the principles guiding its role as a state institution were made clear very early on. The most present precept made visible in the efforts of the *Société* was the philanthropic ideal linked to the mineral waters as a resource for public health.²⁹ In effect, this translated in an attempt to price the waters as affordably as could be expected. This initiative was present since the earliest version of the institution, as Pierre Chirac expressed this ideal himself: "It is also with this intent that the Commission Royale has diminished by a quarter or thereabouts from their old price all the mineral Waters, which by more or less remoteness, or the difficulty in transporting them, have been able to bear the price cut."³⁰ Deciding on the right price was the responsibility of the highest-ranking member in the hierarchy of the institution. Although it was stated in the legislation that the price should depend on the "nature of the waters, the difficulty in obtaining them, and administering them"³¹, it actually ended up being decided almost solely according to the distance of travel, regardless of the fame and composition of the water. This shows that if perhaps the *Société* originally intended to charge more for the most famous springs, their efforts to make them more accessible led them to cut costs in corners, and fame was a more reducible expenditure than transport. Once the price had been set, it was imperative that it remained stable, in order to avoid individual profit

²⁸ Bibliothèque de l'Académie de Médecine, SRM 114B, dossier 1, Necker to the Société, "you will always find me very eager to participate to the keeping up of an establishment whose utility is confirmed by successes which are in the interest of mankind and make it worthy of the protection of the Government", 1778.

²⁹ Paul Weindling, ed., *Healthcare in Private and Public from the Early Modern Period to 2000* (London & New York: Routledge, 2014), chapter 2, "Public and private healthcare for the poor 1650s to 1960s", 15-35; Lynn Thorndike, "Sanitation, Baths, and Street-Cleaning in the Middle Ages and Renaissance," *Speculum* 3, no. 2 (1928): 192-203.

³⁰ Joseph Raulin, *Exposition succincte des principes et des propriétés des eaux minérales, qu'on distribue au bureau général de Paris* (Paris: Claude Herissant, 1775), "C'est encore dans ces vues que la Commission Royale a diminué d'un quart ou environ de leur ancien prix toutes les Eaux minérales, qui par le plus ou le moins de leur éloignement, ou de la difficulté de leur transport ont pu supporter le rabais."

³¹ Bibliothèque de l'Académie de Médecine, SRM 114A, dossier 11, "Mémoire relatif à la création d'une Académie de médecine," Art 16, "Le prix des eaux dépend de la nature des eaux, de la difficulté à les obtenir et les administrer etc", 1724.

and fluctuation according to seasons.³² This charitable ideal was also present directly in the regulations of the *Société* concerning the care at the spring, for those who travelled to spa towns for cures. The intendants received orders to provide free care to those whose poverty had been attested by the priest of their hometown. The personnel of the bathing establishments were also prohibited from treating the rich customers better than the poor in the hopes of earning a generous reward. If they did receive one and the customer refused to take it back, the tip would be split or given to the poor.³³

This fixed price policy and the charitable mission of the spas were presented within the more general frame of the fight against charlatans and greedy sellers who hindered the accessibility of the remedy to the general public. Much of the discourse surrounding the waters invoked the high stakes of the *Société's* work. Mineral waters had reputations to uphold, and they were sensitive due to their status as remedies. The *Société* defended its purpose by promising to deliver the excellent remedy brought about by mineral waters to more people than ever before, but always while upholding the quality and safety of the product.

New structures for a safer trade

For as long as the mineral waters have been transported, complaints concerning fraud, unfair prices and extortions have been reported. During the many years of administration solely by the King's head physician, no authority had the power to hinder the development of a large alternative market of waters.³⁴ This fraudulent trade was vast reaching and inventive in its proceedings. Many have reported sales of genuine mineral waters sold outside of the official and documented transport system, others have complained of being sold fake versions, either from a lesser spring, or outright fabricated out of rainwater.³⁵ In order to answer these grievances, the *Société* had to install a number of structures that could meet the growing demands of the trade while keeping enough of a tight grip to discourage fraud.

The effort of organization of the *Société* revolved around a few key structures. One of the most visible was the development of the bureau system. Often held by a local apothecary, these small shops specialized in the sale of bottled mineral waters. They preferentially sold local waters but most of them also had the more famous springs in their inventory as well regardless of distance.³⁶ They also provided a variety of different containers, allowing the buyers to get the quantity needed for longer or shorter cures, according to the prescription of a physician. Tardy mentioned in introduction, held one of

³² Bibliothèque de l'Académie de Médecine, SRM 114A, dossier 11, "Mémoire relatif à la création d'une Académie de médecine," Art 18, 1724.

³³ Bibliothèque de l'Académie de Médecine, SRM 114A, dossier 11, "Mémoire relatif à la création d'une Académie de médecine," articles 2, 13 and 26, 1724.

³⁴ Marie Laure Simonetta, *La société royale de médecine 1776 - 1793*, mémoire de maîtrise sous la direction de Jean Claude Perrot à Paris 1 Sorbonne, 1992.

³⁵ These reports are mostly to be found in letters addressed to the *Société*, for example: Bibliothèque de l'Académie de Médecine, SRM 112, dossier 14, "Eaux minérales : rapport sur les fraudes et abus qui se commettent auprès des fontaines minérales à Bussang, Thionville et Besançon, à Bordeaux, etc," 1777.

³⁶ Olivier Caudron, "Le bureau de distribution des eaux minérales de La Rochelle (1773-1790)," *Ecrits d'Ouest* 19 (2011): 233-240.

the smallest bureaus in France, and paid the *Société* 50 *livres* a year for the right to operate in his city. Medium sized towns could expect to pay around 200 a year, and bigger cities such as Lyon paid 1000 every year for their privilege. The very first bureau of this kind far predates this legislation and was founded in Paris in 1682. However, the *Société* dramatically expanded on this already functioning structure leading to a total of 42 active bureaus between 1682 and 1790.³⁷ A resident of a city could be granted a certificate from the *Société* to become a bureau tenant, if they believed that a commerce of mineral water was to be profitable. This granted them the right to be the only person allowed to sell waters in their city, with legal access to the existing network of transporters. Upon receiving such a request, the *Société* would mandate an inquiry in the city in order to find out whether or not the implementation of a bureau could be realistic, and would also investigate the reliability and morals of the solicitor. The profession of the tenants ranged from apothecaries to confectioners, but they had to be backed by locals, preferably trustworthy figures such as priests or other physicians. Given the tendency to favor people with some education in medicine or chemistry, a majority of applicants were men. Nevertheless, a number of women held bureaus after their husband's passing and occasionally, women who were already selling waters before the instalment of this ruling were tacitly allowed to continue their trade.³⁸

Transport logistics were another essential aspect of these new structures.³⁹ Originally, waters were transported in reusable wooden barrels, but these containers were later dismissed as they were accused of altering the taste and properties of the waters. Glass bottles were used instead to solve this issue, in several different sizes "for the commodity of the public".⁴⁰ The bottle had to be filled at the spring, under the watch of an intendant. Said intendant had to make sure that the water did not get in contact with air after the bottle was closed with a cork, in order to preserve its qualities. He would then stamp his seal on the bottle, and deliver to the transporter a bill, which had to include an estimate of the time it should take to carry the waters to the bureau. From 1777, it was also required for fizzy waters to be transported in smaller bottles filled before sunrise, with a twice-sealed cork. Concerning the other types of waters, the general recommendation was to transport them preferably in the morning, so as to avoid the heat of the afternoon, and winter transport had to be avoided altogether. Mineral waters could only be carried from April until the first occurrence of cold weather, otherwise frost might have altered their properties or burst the fragile bottles. Once safely arrived at the bureau, they were stored by the tenant who had to keep count of the exact amount received, and this could be checked by inspectors later on.

In practice, these files seemed to be rarely fully up to date and sometimes completely neglected.⁴¹ The inspectors were also permitted to assess the quality of the waters and to destroy part of the stock if it turned out to be subpar. The laws and regulations concerning the trade of waters were very thorough and quite precise. The mineral water became a

³⁷ Yves Oger, 2.

³⁸ Bibliothèque de l'Académie de Médecine, SRM 113, dossier 19, "Lettre de soutien à la Demoiselle Antoinette Lacroix habitante de Montauban", 1778.

³⁹ Guy Arbellot, "La grande mutation des routes de France au XVIIIe siècle," *Annales, Économie, Société, Civilisation* 28, no. 3 (1973): 765-791.

⁴⁰ Bibliothèque de l'Académie de Médecine, SRM 95, dossier 1, "Réponses à la circulaire de Carrère," 1783.

⁴¹ Caudron, 9.

product, with a price and a place in the market of remedies sold in towns. The structures put in place were an attempt to cover both the legislative and practical aspects of the trade. Although the *Société* did not directly hire the numerous personnel involved in both the transport and the spa towns, they all carried official documents as proof of their association with the institution. This also meant that the *Société* was dealing with a huge network of physicians, intendants, transporters, apothecaries and the many others involved in this complex trade in some way or another, with only limited resources to enforce their authority.

The chemical standard exacted by the *Société*

The final guiding principle of the *Société* was a scientific ideal. It was seen as a place in which the theoretical knowledge of the Academy could be applied to the art of medicine. Much of the efforts of the *Société* were turned towards the gathering of medical data in an encyclopaedic manner.⁴² As the mapping of different natural resources was refined, more springs were being discovered. Given the number of potential new sources, the *Société* needed to reliably assert which waters had therapeutic effects and deserved to be spread to a wider public, and which were mediocre or too weak to be qualified as remedies.

During the eighteenth century, one method was slowly imposed as the answer to unlocking the secrets of the potency of mineral waters: quantitative chemical analysis. Although some chemical tests and the practice of evaporating water to observe residue had been known since the early Renaissance, the introduction of Boyle's systematic collection of color changing indicators truly changed the legitimacy of water analysis.⁴³ With this came the possibility of evaluating the quality and effects of a water by measurements, rather than by the experience of cures. This was a deep change for the practitioners who were used to prescribing waters empirically. The complexity of sentiments surrounding this shift in method is well summed up by these few lines from the physician Herrenschwann when sending his analysis of a Swiss water to the *Société*:

“In the olden times, experience alone made the reputation of the mineral waters in Switzerland and decided on the way to use them, multiplied successes accredited them from person to person for similar cases ; [...] In more modern times reasoning changed this trivial march; the desire to extend known virtues gave excitement to practice experiments; of which ill successes rebounded so much on the remedy alone, that some excellent baths, and most healthy waters, fell into discredit, and stayed in oblivion until the time that some analysis well or poorly performed withdrew them out of it.”⁴⁴

⁴² Françoise Tilkin, ed., *L'encyclopédisme au XVIIIe siècle: actes du colloque organisé par le Groupe d'étude du XVIIIe siècle de l'Université de Liège* (Genève: Librairie Droz, 2008), 373.

⁴³ Christopher Hamlin, *A Science of Impurity, water analysis in nineteenth century Britain* (Berkeley: University of California Press, 1990), 306.

⁴⁴ Bibliothèque de l'Académie de Médecine, SRM 93B, dossier 34, Analyse de Morell, “Dans les temps reculés, l'expérience seule fit en Suisse la réputation des eaux minérales et fixa la marche d'en user, des succès multipliés les accréditèrent de proche en proche pour des cas pareils ; on bat les eaux, on prit les bains tout uniment à la mode du Pays, et communément avec succès. Dans des tems plus modernes le raisonnement fit changer la marche triviale ; le désir de donner de l'extension aux vertus connues excita a faire des expériences ; dont les

According to Herrenschwann, the early attempts at analysis were guided by reason and by a will to judge water based on scientific grounds rather than tradition. Unfortunately this new science was too quick to be trusted and caused damage to the reputation of some waters. As analysis improved though, it could redeem its earlier mistakes by re-examining and asserting the qualities of these previously misclassified waters with a new-found scientific authority. As of 1782, when Herrenschwann sent in his analysis, his trust in the method seemed acquired, as even he called on other analysts to come and exercise their expertise in order to further confirm the rightfulness of his own findings.

The *Société's* first high profile test of their method came when they were instructed to resolve the case of Passy:

“The contestations that already arose in different times on the natural existence of the new Waters of Passy and on their healthiness, have been renewed recently; the minister has consequently charged the Société Royale de Medecine, to lead a careful examination on this object, and to report back.”⁴⁵

In this long-standing controversial case the *Société* had to directly investigate the waters, sending experts to evaluate and resolve the controversy, using the now well-accepted chemical analysis method. The experts included Cornette and Fourcroy, who were both chemists and attested once and for all through their reports that the waters were in fact remedial in nature and were deserving of their already gained popularity.

But for the most part, the waters were too numerous and too far-spread throughout the kingdom for the Parisian *Société* to be able to send people for each controversy. In this case, the usual procedure was to make use of the work sent in by the institute's network of correspondents. The *Société* had a lot of analysis on hand coming from various sources either informatively for their records or as a request to enter a certain water into the national trade. Upon receiving such requests, the *Société* made sure the report was internally validated rather than sending someone out into the field. Customarily the reports would be transmitted to two experts in chemistry, for a reviewal process. The chemists in question often had a link to the Academy of Sciences, as well as an active practice of chemistry. They read the report of analysis and gave their opinion of the method and the quality of the measurements. Once the analysis has been deemed done in good method, the reviewers turned to the results themselves. From there, they judged whether or not the concentration and nature of the minerals present in the water hinted at a good and potent remedy. Despite descriptive reports they often favored higher concentrations as being indicative of better waters. Once those chemists deemed it good enough, they wrote on the back of the report or on a separate letter that they approved of the analysis and the waters could go on to be

mauvais succès rejaillirent tellement sur le remède seul, que d'excellents bains, et des eaux des plus salubres, tombèrent dans le discrédit, et restèrent dans l'oubli jusqu'au tems que des analyses mal ou bien faites les en ayant tiré.”, 1788.

⁴⁵ Bibliothèque de l'Académie de Médecine, SRM 91A, dossier 5, "Les contestations qui s'etoient déjà élevées en differens tems sur l'existence naturelle des nouvelles Eaux de Passy et sur leur salubrité, s'étant encore renouvelés depuis peu; le ministre a en conséquence chargé la société Royale de Medecine, de porter un examen attentif sur cet objet, et delui en rendre compte." 1784.

bottled and sold in bureaus.⁴⁶ This process took place many times, and was mandatory, to the point where failing to meet its standards could even forbid some waters already being sold from further commerce. The expertise of chemists concerning the composition of mineral water had become necessary for quality control, hence why they were an integral part of the appraisal process. Their final word was the deciding factor on whether or not the sale of the water was to be authorized.⁴⁷

The strenuous process of analysis

But as much as chemists expressed their wish to be reliable on this operation, mineral waters resisted analysis. For many reasons and much to the knowledge of early modern chemists,⁴⁸ they were a very unstable product. The most obvious element of instability was the gas: when waters contained any, prolonged exposure to ambient conditions would cause the air to leave the water. But instability was also to be found elsewhere. Many waters left a deposit of minerals when decanted for a long time. Another issue was that of temperature, as many springs were notable for their heat. When cooling down, some of the minerals could no longer be sustained in solution, and the concentrations changed. This made the process of analysis complicated as the water analyzed differed regarding when the analysis was performed. The second problem was the overall low concentration of minerals. Even the strongest waters contained trace amounts, particularly the metals which were always dissolved in extremely low quantities. These two reasons made the analysis demanding. Many changes that chemists attempted to spot during the analysis could be very subtle and sometimes misleading. Some tests demanded observing a change in color or a precipitate, but when the product tested was present in low enough a concentration, the color change could be extremely subtle or the precipitate very faint, and therefore hard to differentiate from a simple change in lighting or dust contaminating the experiment.

Chemists were up against the very nature of mineral waters, and had to put great effort into refining their process of analysis. However their motivation remained strong, for not only were they relied on solely for such analysis but if they were to succeed it could be a breakthrough for the credibility of their discipline which was, after all, not fully established at that time and still regularly challenged. Chemistry needed to ensure its usefulness, and mineral waters proved to be the perfect backdrop for this.⁴⁹ Besides, the development of transport provided chemists with readily accessible samples to work on, and the public interest in the waters provided them occasionally with funds in order to carry out analysis.⁵⁰

⁴⁶ Some examples of this reviewal process: Bibliothèque de l'Académie de Médecine, SRM 92B, dossier 47, "Analyse des eaux minérales par Huet de La Martinière, médecin et correspondant de la SRM, revue par Coquereau et Bucquet"; SRM 91S, dossier 2, "Analyse des eaux minérales d'Orlienas par M. Lanoix".

⁴⁷ This happened for example to Pelvilain who was prevented to sell his waters of Trye le Château: Bibliothèque de l'Académie de Médecine, SRM 93A, dossier 11, pièce 4, 1779.

⁴⁸ The remarkable book by Christopher Hamlin on nineteenth century water analysis argues that the instability of water became known to chemist only by the end of the eighteenth century, and it was previously assumed that they were a stable product, but the archival evidence seems to indicate that this has been the sentiment for the entire eighteenth century. Hamlin, 306.

⁴⁹ Mi Gyung Kim, *Affinity, that Elusive Dream: A Genealogy of the Chemical Revolution* (Boston: MIT Press, 2003).

⁵⁰ This happened most notably in the case of Venel who was charged by the state to analyse all the waters of France, in a mission that ended up taking over 20 years and was never completed. See: Christine Lecornu

Because chemistry was up to the end of the eighteenth century unable to come up with a perfect system of water analysis,⁵¹ this left some space for incertitude and incomprehensible results. In the analysis of the waters of Saint Santin, the author seemed somewhat baffled by the low mineralization he measured: “Why one to two grains at most of this mineral naturally dissolved in the water taken every day by the sick, destroys efficiently and in quite little time some conditions that rebel against all our martial preparations highly concentrated?”⁵² He then gave a vague guess on the higher efficiency of natural iron which might retain more healing qualities than the artificially made equivalent, but the author admits that this is no more than an “admissible hypothesis” at best. This sort of conjecture can be found in many texts from the same period. Chemists were globally ready to admit that their science did not suffice to fully understand mineral waters. This was especially meaningful when compared with the instances in which the *Société* refused the right to sell a water based on the measured low concentration of minerals. The institution gave its trust to chemistry, despite chemists not fully trusting themselves.

An attempt at rigour: the method of analysis

This expressively humble attitude of chemists towards their capacity to give reliable analysis in text did not dull their strive to improve it. By the end of the century, they unequivocally viewed it as better than the allegedly vague and unscientific criteria that ruled prior. According to Hamlin, the first truly systematic and detailed method for analysis was brought about by the Swedish chemist Torbern Bergman.⁵³ When read side by side with other analysis reports of his contemporaries, Bergman’s method did not differ much from the best techniques of his time, but the fact that he provided a version clearly written, with great detail and made to be applicable to any water was deeply appreciated by the community of analysts. Especially after its translations, several chemists explicitly stated that they followed “the Method of the famous M. Bergmann professor of chemistry in Upsal”.⁵⁴ The section on analysis of Bergman’s *Physical and Chemical Essays* started with a short history of water analysis.⁵⁵ The only credit he gave to ancient methods of evaluation was on the most general level. As a rare concession to ancient science, he mentioned Pliny’s classification of water, specifying that it was an early and certainly rough attempt. Besides this, his views on the advantages brought about by modern chemistry were pretty clear, stating that it would be “tiresome and useless to relate the opinions of the ancients”.⁵⁶ His account of recent chemistry of water was in contrast a well-informed and detailed description of the many physicians, chemists and other natural philosophers involved in the search for a good method of analysis. This suggests the complexity of the matter, and the necessity of a large and international collaboration. Following the many findings and avoiding the pitfalls brought to light by this impressive collective of thought, Bergman gave his version of the essential steps that ought to be involved in the ideal chemical analysis.

Lehman, *Gabriel François Venel (1723-1775) : sa place dans la chimie française du XVIIIe siècle*, sous la direction de Bernadette Bensaude-Vincent, soutenue en 2006.

⁵¹ Hamlin, 10.

⁵² Bibliothèque de l’Académie de Médecine, SRM 92B, dossier 47.

⁵³ Hamlin, 10.

⁵⁴ Bibliothèque de l’Académie de Médecine, SRM 92B, dossier 47.

⁵⁵ Tobern Bergman, *Physical and Chemical Essays*, (London: ed J. Murray, 1784).

⁵⁶ Ibid.

The first step was in fact akin to the oldest form of water evaluation, as it required only the use of the senses, and consisted of describing the color, smell, taste and feel of the water.⁵⁷ These tests preferably had to be performed directly at the source. They were complemented by physical measurements of temperature, weight and atmospheric pressure. The second step concerned the use of indicators. Those substances were the object of much speculation and disagreement between chemists, but Bergman gave his list of the indicators he recommended, and those he advised to stay away from. Good indicators had the particularity to react in an observable way when put in contact with a specific other substance that was hence detected. A common one was the addition of an acid which produced an effervescence only in the presence of an alkali, or powered galls which turned purple in the presence of iron. For each indicator, Bergman gave precisions on the best kind to use, and the reaction to look out for:

“A saturated tincture, extracted by spirit of wine from powered galls: the watery tincture may also be employed, but it soon grows mouldy. -By this tincture iron is discovered, being slowly precipitated: -if the quantity of metal be small, the precipitate is purple; if large, black.”⁵⁸

Indicators allowed chemists to have a qualitative picture of the different minerals present in the water. Bergman in his *Essays* listed twenty-one of the most commonly used, but many more existed and were in use depending on availability. If the waters contained air, the next step was to carefully extract it and determine its nature. Bergman first noted that this particular analysis has “occasioned considerable difficulty”⁵⁹ to chemists and that a reliable method was only just elaborated.

Following the qualitative testing by the means of indicators came the heart of the procedure: the quantitative analysis of the water by evaporation. Bergman suggested a gentle evaporation, so as to not alter the residue, of between 2 and 20 litres of water depending on the mineralization. What was leftover after this evaporation was a mixture of all the different fixed parts of the minerals, namely the salts, earths and metals. The most difficult operation was then to separate these components from each other, and correctly identify them as the crystals all resembled one another. Once they were all successfully extracted and separated, they could be weighed and a concentration of each component present in the water could be calculated. The last step according to Bergman was used as a check of the reliability of the entire endeavor. He suggested that at the end of the procedure, the chemist made a synthetic version of the mineral water, following the concentrations just obtained from the analysis. If the natural and the synthetic waters matched, the analysis could be considered successful.

Many of these steps were, by design, redundant. Bergman specifically intended for his method to be thorough and full of safe checks. It was not uncommon to be faced with contradicting results. For example an indicator could give an unclear reaction, or an

⁵⁷ India Mandelkern, “Taste-Based Medicine,” in *Gastronomica* 15, n°1(2015): 8-21; Steven Shapin, *Changing Tastes: How Things Tasted in the Early Modern Period and How They Taste Now*, The Hans Rausing Lectures (Uppsala: Uppsala Universitet, 2011).

⁵⁸ Bergman, 19.

⁵⁹ Ibid.

unknown crystalline residue could remain impossible to unequivocally identify. Bergman's method encouraged cross interpretation and precise quantification, leading it to be seen as the culmination of the science of water analysis. This is why despite the complexity of the endeavor, this chemical analysis was well accepted by the scientific community of the late enlightenment as the reliable and singular way to appraise waters.

Conclusion

In 1733, Louis XV issued the following statement about any fraudulent mineral water traders:

“Let us defend any person of any quality and condition that they might be, to undertake in the future for any pretext that might be, to have transported, sell and distribute any mineral and medicinal waters under the penalty, according to this letter, of a 1500 livres fine, of confiscation and all related, damages and interests, even a greater fine if there are any.”⁶⁰

This incredibly high fine seems disproportionate to the offense, and signals a difficulty in stopping the alternative market from thriving. From 1733 to the creation of the *Société* many letters of a similar nature were issued none seeming to decisively put a stop to the problem. The *Société* tried upon its founding also tried to fix this problem through its tight-knit administration and network of inspectors. Despite this effort, unstoppable fraud still remained and eventually lead to much fatigue in the *Société* and criticism from people working around the springs. One of the great advantages of the frauds was the difficulty of court recourse. Despite many threats of heavy fees punishing illegal trades, actual sentences were very rarely carried out, due to the miscommunication between the *Société* and local parliaments.⁶¹ They rarely intervened in such matters, and some of them did not even recognize any judicial value in the permits handed out by the *Société*. This incapacity to act lead the *Société* to somewhat loosen its grip on the trade. The renewal of permits became less thorough, and some demands were left unanswered, as the institution stopped holding itself to its own standards.⁶²

Despite the many pitfalls encountered by eighteenth-century chemists while attempting to bring their expertise of analysis to the subject of mineral waters, they undeniably participated in the rise of their consumption and in the possibilities of trading them as a commodity. At the end of the century, and especially after the introduction of the Bergman method, the results of analysis became the deciding factor on which waters were mineral and which were not. The link to chemistry was in fact so well established that a mineral water was defined as such, only as long as the science used to measure its validity remained up to date. The introduction and popularization of air chemistry by Priestley for

⁶⁰ Georges Maillard, *L'Industrie des eaux minérales naturelles et artificielles, monographie juridique* (Paris: impr. de Chamerot et Renouard, 1891). “Faisons défense a toutes personnes de quelque qualité et condition qu’elles soient, d’entreprendre à l’avenir sous quelque prétexte que ce puisse être, de faire transporter, vendre et distribuer aucunes eaux minérales et médicinales à peine, conformément aux dites lettres, de 1500 livres d’amende, de confiscation et tous dépens, dommages et interets, même de plus grande peine s’il échoit.”

⁶¹ Stéphane Durand et al., *Des Etats dans l’Etat. Les Etats de Languedoc de la Fronde à la Révolution* (Genève: Librairie Droz, 2014). Stéphane Durand, “Les assemblées représentatives (XVIe-XXe siècles),” *Liame* 23 (2011): 1-4.

⁶² Oger, 2.

example, forced many waters to have to be remeasured against this scientific advancement. Reviewers at the *Société* were very explicit about this need for modernity:

“Mr. Huet has done the analysis of these waters by fire as well as by the means of reagents, and one can say that he has neglected nothing to make it complete, however among the experiments he reports several are faulty, and one can see that the author is not well acquainted with the new discoveries in chemistry.”⁶³

It was clear that any chemist wishing to perform reliable analysis had to keep up to date with the most recent developments of chemistry, and this was no small feat as many of the big changes in the discipline at the end of the eighteenth century had implications concerning the study of mineral waters.

This surge of interest in water motivated and permitted by chemical analysis is the reason why situations like the one between Tardy and his dreaded allegedly conspiracist inspector could ever take place. On one hand, the centralized power of the *Société* was the reason why less densely populated areas had the possibility to sustain the trade of what was still a fairly niche health product. But the trouble it encountered shows that the top down, simple centralized version of power was simply not adapted to the intricacies of regional variations and the wide scale of the trade. In that light, the efforts of the *Société* can be viewed as a failure to install a long-lasting control, and its dissolution alongside all other royal institutions in 1793 meant that its legislation was also erased.⁶⁴ But the trade of mineral waters survived, and most interestingly, the chemical standard that it worked so hard to install also remained. The idea that waters should be classified not by effects but rather by what minerals they contain and in which quantities is still used to this day. Chemists continued their work on water analysis beyond the rule of the *Société*, thanks in large parts to the notoriety they gained as analysts during its existence.

⁶³ Bibliothèque de l'Académie de Médecine, SRM 92B, dossier 47, “M. Huet a fait l'analyse de ces eaux tant par le feu que par le moyen des réactifs, et on peut dire qu'il n'a rien négligé pour qu'elles soit complète, cependant parmi les expériences qu'il rapporte plusieurs sont defectueuses, et l'ont vois que l'auteur n'est pas bien au courant des nouvelles decouvertes en chymie.”, 1778.

⁶⁴ Gaston Boissier, “La Suppression des Académies en 1793,” *Revue des Deux Mondes*, 5e période, tome 40 (1907): 721-751.