Research on thermalism in Portugal and the international scientific knowledge

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Natural Mineral Water
Science
Thermalism

“... pode aferir-se do grau da civilização dum povo pelo cuidado e interesse que à administração mereçam as suas nascentes minero-medicinais e os estabelecimentos de que se utilizam”
(Decreto lei de 30 de Setembro de 1892)

“... we may estimate the civilizational level of a people through the care and the interest shown by the administration towards the miner-medicinal springs and the buildings that are in use”
(Decree law of September 30, 1892)
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Abstract:
The Portuguese thermalism has been one of the scientific areas that at the end of the XIXth century and the beginning of the next one have produced knowledge for a permanent update and influence, getting international exchanges.

However, this production has been scarcely integrated in the foreigner scientific congeners. The erratic feature of the researches produced in the areas of the Portuguese medical hydrology must have been one of the factors to contribute to the few disclosure inside the European scientific circles. But the participation of the Portuguese technical teams in field trips to the foreigner watering places and in international congresses of medical hydrology was much more operative. And, inside the academic sphere, Oporto University has been the one that has divulged the most this matter and has the thesis of his medical specialists published.

First of all, the XXth century was characterized by the scientific research flowering, featured by the creation of the Lisbon Institute of Hydrology. With the vocation for hydrological medical teaching, it was designed for doctors and for the Thermal Waters Analysis, supporting the scientific and hygienic needs of a growing thermal activity on the first century decades and getting new legal ground too. Science and sociability mutually took profit from the golden age and brought up a new spirit to the Portuguese thermalism. In the middle of the century followed a certain crisis on that demand, but scientific studies progressed and doors were open to a new development already coming at the end of the century (PINTO H G; MANGORRINHA J, 2009).

Nowadays, water researches and medical hydrological teaching mingle a conceptual comprehensiveness supplanting itself and setting the way to reach the knowledge of particular phenomena which individualize mineral waters. The investment on the study and on the research of mineral waters has been and still is a reference on the consolidation of attractive and sustainable thermal projects. This is the way for the sciences to keep their main role betting on our country to proceed with the research such as it is made on countries more developed than ours, in terms of thermalism, checking the step with the history of the future (PINTO H G, 2013).
Natural mineral water. Evolution of the concept

The scientific researches revealed, during the XVIIIth century, the effort on the sanitary control of the locations; having an influence on the thermal facilities conditions, gave an impulse to the water resources exploitation and to its legislation, namely in European countries such as France, whose legislation existed however since 1589.

Aquilegio Medicinal, 1726
Francisco da Fonseca Henriques (1665-1731)
Médico do rei D. João V
Royal permits
Construction of fountains, works in the gafarias and baths, exemptions to the goers of the waters, etc.

Medical Observations - mandatory written registration

Thermal Analyzes
1753. Água das Caldas, Bath, Jacob Castro Sarmento
1778. Águas das Caldas, University of Coimbra
First analysis carried out in Portugal by José Martins da Cunha Pessoa

Programs for the construction - bathhouse/hospital, convalescent houses, walks
Architectural and engineering projects for new bath houses
The studies of the mineral waters in Portugal

Chemical Laboratory of the University of Coimbra (UC)

Francisco Tavares (1750-1812)
Advertencias sobre os abusos, e legitimo uso das aguas mineraes das Caldas da Rainha, para servir de Regulamento aos enfermos que dellas tem precisao real, 1791

Jacob Castro Simento (1691-1762)
Matéria médica, 1735

Jose' Martins da Cunha
First analysis of the water, Estoril and Caldas da Rainha (1775 and 1781)

Jose' Martim da Cunha Pessoa (1745-1822), João Nunes Gago (1743-1819)
First analysis of the water, Estoril and Caldas da Rainha (1775 and 1781)
The first royal determination on 2 September 1822 points to the need of making a list of the springs, their origin and characteristics, fostering their study and analysis elaboration.

Liberalism brought the approach to Domingos Antunes Portugal’s ideas and to the latin principle that the mines and the right to explore them belong to the surface owner, and the same concepts have been respected later, in 1836, by the Minister of the Kingdom, Passos Manuel (Manuel da Silva Passos).

In 1836, on 14 September, a decree issued putting the Academy of Sciences in charge of the mineral water analysis on the Braga district.

In 1839, on 16 August, another decree put the Lusitanian Pharmaceutical Company in charge of the country mineral water analysis, through a special commission set up by the Law of 31 June and the decree from the Ministry of the Kingdom on 3 October.
1849-56. Banhos de Luso
António Augusto da Costa Simões
António Augusto Costa Simões conducts the qualitative analysis of the waters of the Luso Baths (1851).

"By measuring the amount of water discharged, its temperature and density, as to its chemical characteristics, using tincture and litmus paper, it has demonstrated its acid character, in addition to detecting carbonic acid, hydrogen sulphide, carbonates, sulphides, chlorides and traces of magnesia, alumina and soda inferred the presence of carbonates and carbonic acid from the effervescence produced during the addition of hydrochloric acid.

The sulphides and chlorides were detected by gravimetric methods: with the addition of lead acetate the formation of dark crystals on the walls of the reservoir, presumably lead sulphide, the addition of silver nitrate rendered the solution "milky" due to the formation of silver chloride, subsequently causing a dark precipitate which was suspected to be silver sulphide; copper (II) was found to form copper sulphide"

(Simões, AA of C., Instituto 1852, 1, 5, 16, 29, 43, 52, 60, 72, 80)

Based on the mineral content of the water, its physiological effects were described, emphasizing its qualities of thermal water; the hygienic effects and the relationship between the mineralizing principles and their curative effects were studied.
In 1867, Andrade Corvo nominated a “commission in charge of the mineral waters of the Kingdom”, composed by the doctors Thomaz de Carvalho and Agostinho Vicente Lourenço and by the mine engineer João Baptista Schiappa de Azevedo.

In the same year, on 20 May, the project law would regulate the use of waters and their exploitation. To this project, followed Duque de Ávila’s and Bolama’s one, in 1870. It is in this time, also, that the S. Miguel island waters are analysed by the French chemist Fouqué.

The analysis work was made by Doctor Agostinho Vicente Lourenço, who analysed the waters at the Polytechnic School laboratory, for the general recognition of springs “most celebrated, with the purpose of declaring their properties and that those researches became the sufficient ground for law”.

**That work was edited under the title Preparatory Papers about the Mineral Waters of the Kingdom, 1867.**

The catalogue edited in 1867, under the title *Preliminary studies about the main Mineral Waters of the Kingdom*, to be presented at the Paris Universal Exhibition, would have the French translation *Renseignement sur les eaux minerales portugaises*, a pioneer work on the comparison between the Portuguese medicinal waters and the foreigner medicinal waters.
New studies of the mineral waters in Portugal

Trabalhos preparatorios ácerca das aguas minerais do Reino e providencias do Governo sobre proposta da Comissão respectiva, 1867

A collection of mineral water samples integrated the work “Renseignements sur les eaux minérales portugaises”. The work won the gold medal in the International Exhibition of Paris (1867)

Doctoral dissertation in sciences presented to the University of Brussels and entitled Hydrologie Générale ou dissertation sur la Nature, qualités et les usages des eaux naturelles et artificielles, minérales et potables,

António Alves Ferreira, pharmacist of School of Pharmacy of Great Britain and the School of Medicine and Pharmacy of Rio de Janeiro
Previous to Decree-law 1892

- General Diplomas on Mineral Waters (since 1805).
- Resolution (September 1822) all Mineral Watersheds and Springs.
- Letter of Law of 1850 (allows the City Council of Mealhada to obtain a loan for the construction of a beach resort in Luso).
- Decrees and Law Letters authorizing the Caldas da Rainha Thermal Hospital, Santa Casa da Misericórdia de Lisboa, Aljustrel Municipal Council, among others, to invest in the thermal waters and the construction of bathhouses.
- Quesitos, 1860 (first survey, under the responsibility of the Ministry of Public Works and sent to all local authorities for the purpose of an inventory of the Kingdom's Mineral Waters).
- Draft Mineral Water Law (from 1860 to 1888 four bills are presented in Parliament).
Regulation of Portuguese mineral waters

1892. Mine-medicinal waters
1894. Medicinal waters
1928. Medicinal waters or Mine-medicinal waters
1990. Natural mineral waters

1892. All commercial exploitation of the mineral-medicinal water springs in Portugal was finally regulated. The owners were required to submit an application and were subject to inspection by the Junta Consultiva da Saúde Pública.
1917. Project for Thermal Park and Equipment. Termas de Melgaço
1901. Termas de São Vicente
1908. Termas do Vidago  Arq. José Ferreira da Costa · Palace Hotel

1916. Spring pavilions and thermal bath  A. Rodrigues da Silva Júnior
Establishing the use of the mine-medicinal waters springs and the facilities exploitation

After this legislation (1892), the State's intervention on this activity is almost total.

Baths became legal entities of private right and administrative regime, and mine-waters exploitation should be considered a public service.

By order of 13 December, the same year, the Division of Technical Services of Mines and Industry followed the royal ordination that the work of analytical chemistry in charge of the Ministry of Public Works should be developed.

For such, a laboratory was organized to make the analysis related to chemical and metallurgical services and to the water research and exploitation.
Charles Lepierre (1867-1945), came to Portugal in 1888, beginning to direct the practical works of chemistry of the Polytechnic School of Lisbon.

Professor at the Industrial Brotero School in Coimbra, and later joined the Microbiology Office of the Faculty of Medicine of the University of Coimbra for 20 years.

Participated in the 2nd International Congress of Analytical Chemistry, held in Paris in 1896, and published an extensive report on the magazine “O Instituto”.

In Lisbon he will lead the Laboratory of Analyzes of IST. Over the following decades, Lepierre performed dozens of analyzes of Portuguese mineral waters, pioneering the application of new methods of analysis.

He has also carried out works in the field of electrical conductivity and radioactivity of the waters.
Water analysis laboratories (19th-20th centuries)
Vidago, Curia, Luso, Gerês, S. Vicente
Research

- **1919** - Instituto de Hydrologia de Lisboa (IHL). Pioneer institution in the investigation in Natural Mineral Waters and Muds, Teaching and Scientific Divulgation. It was uniquely organized in a shared work logic between the Ministries of Public Works and Commerce, Labor, Public Education, Interior and private health and rehabilitation institutions.

- Decree-law nº 5787-F, May 10) and regulated in **1920** (Decree-lawnº 6366, January 21).

- The mission was structured in two main axes: research into the mineral waters of the national hydrological stations and training in hydrology, with the creation of a course in Hydrology and Climatology, exclusively for physicians.

- **1930**. Foundation of the Institute of Climatology and Hydrology, with its headquarters in Porto, near the respective University (Decree-law n.º 18378, May 23). The art. 3. of the decree creates a course of Climatology and Hydrology (under the terms of Decree-Law No. 5787-F, dated May 10, 1919) with the Faculty of Medicine of the same University.

- **1930**. Foundation of the Climatology and Hydrology course and respective Institute at the University of Coimbra (Decree-Law 18568, 31 July 1930). The art. 1: foundation of the Institute of Climatology and Hydrology, with headquarters in Coimbra and next to the respective University. The art. 3: creation with the Faculty of Medicine of the same University of a course of Climatology and Hydrology.

- Decree no. 20552, of November 27, **1931**, approves the Regulation of the Institute of Climatology and Hydrology of Porto (voted by the Council of the Institute in a session of January 24, 1931).

- Decree-Law no. 25700, July 31, **1935**, approves the Regulation of the Institute of Climatology and Hydrology of Coimbra.
Aula de química do prof. Charles Lepierre na Escola Brotero de Coimbra - coll. IST
The Research Laboratory (Lisboa)

Researchers and Teaching Medical Hydrology (Lisbon) promoted the sharing of multidisciplinary and institutional experiences, being constituted by a unique set of professors and scientists of national and international references:

Alfredo Augusto Freire d’Andrade · Charles Lepierre · Sílvio Rebelo Alves · Francisco Formigal Luzes · Ricardo Jorge · Francisco de Oliveira Luzes.

In 1919, the decree that creates the Institute of Hydrology determines:

A) To create methodical and practical teaching for doctors who wish to specialize in hydrological and climacteric clinics.

B) Centralize and methodize all studies and works on hydrology and climatology.

C) Coordinate the analysis of all Portuguese mineral waters.

D) To establish an information center for all entities interested in the exploration and application of mineral waters.

E) To make known, through all the forms it deems appropriate, the research done and the practical results obtained (Dec. 5787-F, 1919).

The Research Laboratory 1919-1937

- **1919** (June 30): the IST school council authorizes prof. Charles Lepierre to use the IST laboratories to carry out the IHL projects.

- The Laboratory establishes "the criterion to which the analysis of mineral-medicinal waters should obey so that there is absolute uniformity in the method of analysis" (Decree 15.401, of April 20, 1928).

- This was the chemical study, including the study of water radioactivity, spontaneous gases and bacteriological analysis.

- In this way, it is the responsibility of the IHL school council to determine the assessment procedures and standards that should be followed by all university and private or public laboratories (specific to water analysis).

- Between **1933-1937**, and under the direction of prof. Charles Lepierre (1867-1945), the laboratory promotes the analysis and study of the national thermal waters, including pioneering studies of Radioactivity and Microbiology, Organic Chemistry and Bacteriological Analysis.
Equipment and instruments, Laboratory of Analysis, IST - photo HGP, 2017
António Herculano de Carvalho


Worked in the area of Analytical Chemistry, being responsible for the analysis of wolfram ores during World War II, as well as other minerals from Africa.

He was the vice president of the Junta de Energia Nuclear (Nuclear Energy Board), to set up the inventory of uranium reserves and the possibility of using nuclear energy as a source of electricity, not power plants, but nuclear power plants.

He continued the study of the portuguese mineral waters, implementing new methodologies and publishing numerous scientific articles. He was the director of the Institute of Hydrology of Lisbon IHL) in 1960.

His direct collaborators include Dr. Amaro de Almeida (IH) and analyst expert João Duarte de Almeida (CEEN), who published under his guidance the Hydrological Inventory of the provinces Portugal (Algarve, Beira Alta, Trás-os-Montes and Alto Douro) and Minho - in posthumous publication.

It follows the publication of the *Bibliografia Hidrológica do Império Português* (Hydrological Bibliography of the Portuguese Empire, 1949).

Chemistry gained primacy over Medicine: the constitution of water began to be known, but the constituents of mineral waters and their application to the human body should be investigated further.
NATURAL MINERAL WATER

Legislation

Resource management

Appreciation of Resources
• Analytical programs
• Monitoring of abstractions
• Periodic inspection of funds
• Follow-up of the holding by the Technical Director

Preservation of resources
• Protection Perimeters

THE BETTER KNOWLEDGE OF RESOURCES AND EXPLOITATION PROCESSES HAS FOR EFFECTIVE MANAGEMENT OF THEIR ACHIEVEMENTS, THROUGH ADEQUATE CONTROL.
Arquitectura e Design
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“Mudança de ares, exercício ameno, banhos, copinho, peregrinação, entretenimento, Vita nuova! ...”

“Change of airs, mild exercise, baths, cup [water], pilgrimage, entertainment, Vita nuova! ...”

Júlio César Machado, 1875