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Title: Fighting disease and epidemics: Ricardo Jorge and the internationalization of Portuguese science.

Biography:

Ricardo Jorge was one of the principal doctors responsible for the sanitary transition in Portugal. He was was born in Oporto, 9 May 1858 and he died in Lisbon, 29 July 1939[1]. When he was 16 years old, Ricardo Jorge enrolled in Oporto’s School of Medicine and Surgery, where he was a brilliant medical student, who won several science awards. In 1879 he graduated with an essay on nerves,[2] and in 1880 he won the competition for the job of substitute lecturer in the surgical section of his school, with a dissertation on the *Brain’s motor locations*, thus beginning a vast teaching career, as well as a medical practice. He taught Anatomy, Histology and Experimental Physiology and in 1895 he received the title and tenure of Professor of Hygiene and Forensic Medicine at Oporto’s School of Medicine and Surgery. He researched on the qualities of spas, electricity and gymnastics for diagnose and treatment of nervous diseases,[3] which he applied in his practice by creating and directing Oporto’s Hydrotherapy and Electrotherapy Institute. He also founded Oporto’s Laboratory of Microscopy and Physiology.

Together with Bernardino A. Gomes (Lisbon, 22 September 1806 – Lisbon, 8 April 1877)[4], José T. Sousa Martins (Alhandra, March 7 1843 – Alhandra, August 18

[1] Almeida, Maria Antónia Pires de, 2011, ‘Ricardo Jorge’, *Biographies of Portuguese Scientists and Engineers* [*Biografias de Cientistas e Engenheiros Portugueses*], Lisbon: CIUHCT. Electronic resource: http://ciuhct.com/index.php/pt/biografias/345-jorge-ricardo-almeida.html (last access 12 Nov. 2012). Amaral, Isabel *et al.* (coords.), 2010, *Routes of Public Health in the XIX and XXth centuries – about Ricardo Jorge* [*Percursos da Saúde Pública nos séculos XIX e XX – a propósito de Ricardo Jorge*], Lisbon: CELOM.

[2] Jorge, Ricardo, 1879, *An essay on nerves: inaugural dissertation presented and argued before Oporto’s School of Medicine and Surgery* [*Um ensaio sobre o nervosismo: dissertação inaugural apresentada e defendida perante a Escola Medico-Cirurgica do Porto*], Porto: Typ. Occidental.

[3] Jorge, Ricardo, 1888, *De l'électrométrie et de l'électro-diagnostic: á propos de la paralysie faciale de Ch. Bell*, Porto: Typ. Occidental. Jorge, Ricardo, 1888, *The Gerez Spa: history, hydrology, medicine* [*O Gerez thermal: historia, hydrologia, medicina*], Porto: Typ. Occidental.

[4] Almeida, Maria Antónia Pires de, 2011, ‘Bernardino António Gomes’, *Biographies of Portuguese Scientists and Engineers* [*Biografias de Cientistas e Engenheiros Portugueses*],

1897)[5], L. Câmara Pestana (Funchal, Madeira, 28 October 1863 — Lisbon, 15 November 1899)[6], A. Almeida Garrett (Oporto, 22 September 1884 – Oporto, 19 November 1961)[7] and F. Silva Correia (Sabugal, 20 May 1893 – Lisbon, 19 December 1966)[8], he was part of a group of specialized doctors who put in place the most important measures in controlling endemic diseases and epidemics, which scourged the western world and, more specifically, the city of Oporto between the middle of the nineteenth and the beginning of the twentieth century. Their professional training and academic and scientific performances reveal the value of these protagonists in Portuguese science, who demonstrated their worth in periods of grave epidemic crisis. Their capacities were confirmed by the emergency of the sanitary situations with which they were confronted and by the authorities' confidence in them, by putting them in charge of the disease control and elimination process. It was in the most critic times that Portuguese scientists were confronted with the state of the art of international knowledge and proved that medical science in Portugal was levelled with the most scientifically advanced countries of the time, whose specialists kept a close dialogue with Portuguese doctors, both by travelling to Portugal to study epidemics and then publishing scientific works praising the Portuguese professionals and the measures taken, and in international sanitary conferences where the most important scientist were sent by their governments to represent them and discuss the necessary measures to jointly fight epidemics.

Lisbon: CIUHCT. Electronic resource: http://ciuhct.com/index.php/pt/biografias/336-gomes-bernardino-antonio.html (last access 12 Nov. 2012).

[5] Almeida, Maria Antónia Pires de, 2011, 'José Tomás de Sousa Martins', *Biographies of Portuguese Scientists and Engineers* [*Biografias de Cientistas e Engenheiros Portugueses*], Lisbon: CIUHCT. Electronic resource: http://ciuhct.com/index.php/pt/biografias/346-sousa-martins-jose-thomas-de.html (last access 12 Nov. 2012).

[6] Almeida, Maria Antónia Pires de, 2011, 'Luís da Câmara Pestana', *Biographies of Portuguese Scientists and Engineers* [*Biografias de Cientistas e Engenheiros Portugueses*], Lisbon: CIUHCT. Electronic resource: http://ciuhct.com/index.php/pt/biografias/330-camara-pestana-luis.html (last access 12 Nov. 2012).

[7] Almeida, Maria Antónia Pires de, 2011, 'António de Almeida Garrett', *Biographies of Portuguese Scientists and Engineers* [*Biografias de Cientistas e Engenheiros Portugueses*], Lisbon: CIUHCT. Electronic resource: http://ciuhct.com/index.php/pt/biografias/335-garret-antonio-de-almeida.html (last access 12 Nov. 2012).

[8] Almeida, Maria Antónia Pires de, 2011, 'Fernando da Silva Correia', *Biographies of Portuguese Scientists and Engineers* [*Biografias de Cientistas e Engenheiros Portugueses*], Lisbon: CIUHCT. Electronic resource: http://ciuhct.com/index.php/pt/biografias/357-correia-fernando-da-silva.html (last access 12 Nov. 2012). F. Silva Correia succeeded Ricardo Jorge as president of the Superior Institute of Hygiene and wrote extensively about him: Correia, Fernando da Silva, 1957, *The Superior Instiute of Hygiene Dr. Ricardo Jorge* [*O Instituto Superior de Higiene Dr. Ricardo Jorge*], Lisbon. Correia, Fernando da Silva, 1958, *Ricardo Jorge in the hierarchy of Portuguese physicians, municipal doctors and hygienists* [*Ricardo Jorge na hierarquia dos físicos-mores, médicos municipais e sanitaristas portugueses*], Lisbon. Correia, Fernando da Silva, 1960, *Ricardo Jorge's life, work, style, lessons and prestige* [*A vida, a obra, o estilo, as lições e o prestígio de Ricardo Jorge*], Lisbon: Inst. Superior de Higiene Dr. Ricardo Jorge.

The periods of declared epidemics are unique opportunities for the observation of societies and historical moments.[9] And indeed, it was during these crises that most hidden problems were revealed and solutions were put in place. In the dramatic words of Ricardo Jorge, the city of Oporto was a 'graveyard', where the 'islands' were a factor of disease proliferation, with special mention to tuberculosis,[10] and the epidemics had a special preference for the 'poor classes, poorly housed, poorly treated and baldy kept'.[11] These comments, made during the 1899 bubonic plague and the 1918 exathematic typhus epidemic, reveal the most important problems Oporto faced and show that this doctor and university professor had a social conscience and saw the need to improve social conditions for disease control. In those difficult days Portuguese doctors and scientists were perfectly aware of the necessity for field work and general practice in hospitals and clinics, as well as research and study, simultaneous with teaching. They all practiced these activities and published results in national and international scientific journals. They travelled abroad, did internships in foreign laboratories and went to international scientific and sanitary conferences, from which they returned with new experience, drugs and instruments. All these elements confirm the internationalisation of Portuguese science in the nineteenth and twentieth century.

However, there were considerable differences between the urban centres of Lisbon, Oporto and Coimbra, where the best hospital conditions and specialists gathered at the time, and the rural, generally more inland areas, where the medical and sanitary conditions were considerably insufficient in medical staff and resources.

Ricardo Jorge and Hygiene:

Throughout his career Ricardo Jorge participated in numerous international conferences and field trips abroad, such as the one in 1883, when he spent some time in Strasbourg's Pathologic Anatomy Laboratory and in Paris, where he met Jean-Martin Charcot (1825-1893), a prestigious neurologist, and attended his lessons.

After a controversial debate on the location of graveyards in Oporto, in 1884 Ricardo Jorge promoted four conferences which were published in a book titled *Social Hygiene applied to the Portuguese Nation*. Upon studying local sanitary conditions, he

[9] Rosenberg, Charles E., 1987, *The Cholera Years: The United States in 1832, 1849 and 1866*, Chicago and London: The University of Chicago Press.
[10] Jorge, Ricardo, 1899, *Demographics and Hygiene in Oporto: climate, population, mortality* [*Demographia e hygiene da cidade do Porto: clima-população-mortalidade*], Porto: Repartição de Saúde e Hygiene da Câmara.
[11] Jorge, Ricardo, report on exanthematic typhus to the Superior Council of Hygiene, *Diário de Notícias*, 21 February 1918, Lisbon's daily newspaper, 1864 to present.

concluded that state intervention was an absolutely necessity for the creation of a modern sanitation system not only in Oporto, but nationwide.[12] The seriousness and scientific level of his proposals turned him into one of the most prestigious hygienist doctors of his time, who largely influenced Portuguese public health policies.

As a result his work, Ricardo Jorge was invited by Oporto's Municipality to be a part of a committee in charge of studying the city's sanitation. His final report was published with the title *Oporto's Sanitation* in 1888.[13] In 1891 he was named municipal doctor and the following year he was invited to direct the city's Services of Health and Hygiene and its Municipal Bacteriological Laboratory.

In 1899 Ricardo Jorge published one of the fundamental books for the understanding the city's sanitation problems: *Demographics and Hygiene in Oporto: climate, population, mortality*.[14] In it, the city's history and its problems are fully described with a medical point of view, particularly concerning the critical neighborhoods, where there were 'islands' with filth and misery, which helped the dissemination of diseases and epidemics, particularly TB. In his description of the population's living conditions and hygiene, Ricardo Jorge concluded that Oporto had the worst possible sanitation. This book, along with the work of other doctors and noblemen, helped influence the Queen Dona Amélia to create, in 1899, the National Assistance to Tuberculosis Patients, which promoted the construction of sanatoria and other TB facilities all over the country.[15]

Oporto and the plague:

In June 1899 there were several cases of bubonic plague in Oporto, which were diagnosed in early July by the municipal doctor and director of the public disinfection facilities, Ricardo Jorge,[16] in a poor neighborhood near the docks. His response was according to the emergency of the situation: isolation of patients and affected areas, prevention and hygiene. There was a reduction of train travel and passenger inspection

[12] Jorge, Ricardo, 1885, *Social Hygiene applied to the Portuguese Nation: Oporto Conferences* [*Hygiene social applicada à Nação Portuguesa: conferências feitas no Porto*], Porto: Civilização.
[13] Jorge, Ricardo, 1888, *Oporto's sanitation: report to the Municipal Sanitation Committee* [*Saneamento do Porto: relatório apresentado à Commissão Municipal de Saneamento*], Porto: Typ. António José da Silva Teixeira.
[14] Jorge, Ricardo, 1899, *Demographics and hygiene, op. cit.*
[15] Almeida, António Ramalho, 1995, *Tuberculosis: a disease from the past, the present and the future* [*A tuberculose: doença do passado, do presente e do futuro*], Porto: Bial.
[16] Jorge, Ricardo, 1899, *The bubonic plage at Oporto, 1899. Its discovery. Early works* [*A peste bubónica no Porto, 1899. Seu descobrimento. Primeiros trabalhos*], Porto: Repartição de Saúde e Hygiene da Câmara.

and sanitary visits were made by health department doctors accompanied by the police. In August the first official bulletin was published, with information on the transmission of the disease: 'The disease is caused by a microbe that can be found in swollen ganglions. Transmission is made through the skin, the nose and the mouth. According to Yersin, fleas are the main vehicles of contagion. There is a vaccine and treatment with the Yersin serum…'[17]

Ricardo Jorge, the health official in charge, was up to date with Yersin's and Shibasaburō's findings: after researching the plague in China, these physicians had isolated its bacillus in 1894 and produced a serum which was the only known prophylaxis and treatment available at the time. This serum was more effective if applied within the first few days of the disease.

Immediately the world took notice and several foreign doctors went to Oporto to study the disease. Two of them, Drs. Calmette and Salimbeni,[18] came from the Pasteur Institute in Paris and brought with them several tubes of the Yersin Serum, which they applied to themselves, to the medical staff they worked with in special hospital for plague patients and to the patients themselves. Spanish doctors also went to Oporto to study the disease and wrote reports that describe the entire work done during the epidemic.[19] There were also doctors and medical delegates from the governments of Germany, the United Kingdom, Sweden, Norway, Italy, the United States, and Russia.

On 24 August, a sanitary cord was established around the city, enforced by the military. It lasted until 22 December, with the resistance of economic elites, who saw their business paralyse, because products could not circulate. Nevertheless, Ricardo Jorge was aware that the challenge was not in well educated groups of society, but the working classes, who lived in the filth and in poor housing conditions, where fleas and rats were abundant. And he knew that the most important action was to remove people from these nasty circumstances. Sanitary practices were imposed which included compulsory baths for any suspect of being sick (he ordered the construction of public baths) and even burning down the houses considered to be infected beyond salvation. In fact, these sanitary measures worked, and mortality was low: 326 cases, of which

[17] *O Comércio do Porto*, 17 August 1899.
[18] Calmette, A. and Salimbeni, A., 1899, 'La Peste Bubonique – Etude de l'Epidémie d'Oporto en 1899', *Annales de l'Institut Pasteur*, 865-936.
[19] Ferrán y Clua, J., Viñas y Cusí, F., Grau, R., 1907, *La Peste bubónica: memoria sobre la epidemia ocurrida en Porto en 1899*, Barcelona: Tip. Sucesor F. Sánchez. Montaldo y Peró, Federico, 1900, *La peste bubónica en Oporto (Portugal) 1899-1900: hecho epidemiográficos e investigaciones clínicas recogidos personalmente y anotados por el Doctor F. Montaldo... que asistió en la epidemia, durante tres meses, como Delegado Médico del Gobierno de España: memoria oficial*, Madrid: Establ. Tip. de Portanet.

111 deaths.[20] But public reaction condoned them: common people did not believe there was an epidemic at all and mobs reacted with extreme violence. Many doctors were assaulted with stones, especially Ricardo Jorge, who was responsible for their enforcement. Even though he was praised by the entire medical community, the city was against him. The mayor himself considered the isolation of the city as an interference of central government in local business and presented his resignation, because the sanitary cord was not removed.[21] Ricardo Jorge ended up resigning for the lack of support regarding his health policies[22] and moved to Lisbon, where he continued his career as one of the most important hygienists in Portugal, with worldwide recognition. In Oporto, the fight was won and the plague was considered extinct in January 1900. Regardless of the knowledge of the disease, and even though he had taken the Yersin serum, one the main doctors who was handling the crisis died from the plague: Câmara Pestana, the Director of the Bacteriological Institute.

Ricardo Jorge in Lisbon:

In Lisbon, Ricardo Jorge was immediately named General Inspector of the Sanitary Services of the Kingdom of Portugal, Professor of Hygiene at the School of Medicine and Surgery and member of the Superior Council of Health and Hygiene. And he started to work on the General Law of the Health and Public Beneficence Services, approved in 1901. On his account, Portugal had modern laws, bureaucracy and a control network for public health and hygiene; and specialists to follow the international scientific debate on the subject. His body of work as a professor, a researcher and a mentor of the new legislation originated a profound reform in public health in Portugal, with the creation of a division of health issues in government (1899) and of the Superior Institute of Hygiene (1899), named after him in 1929.

Contributions to the internationalization of science:

In 1914-1915 Ricardo Jorge was the president of the Society of Medical Sciences. He went on with his participation in international conferences, such as the Sanitary Committee of the Allied Countries, which took place in Paris, 1918, and also the following year, when he presented a report on the flu in March and another one on

[20] *Diário de Notícias*, 31 January 1900.
[21] *O Comércio do Porto*, 2 September 1899.
[22] *Diário de Notícias*, 30 September, 1899.

exanthematic typhus in October to the International Committee for Public Hygiene.[23] In 1929 he travelled to Brazil as a representative of the Office International d'Hygiène Publique to participate in the celebration of the centennial of the National Academy of Medicine, in Rio de Janeiro and to present a conference.[24] The city was in the middle of a yellow fever epidemic, which Ricardo Jorge helped to fight, along with his colleague Oswaldo Cruz, the director of Rio's Health Institute.

His huge body of published work followed his entire career path and varied research subjects, in differente languages, with material that continued to be published even after his death. With special incidence on hygiene and epidemics,[25] his publications include the following themes: general medicine, malaria,[26] leishmaniasis,[27] demography, spas, literature, general history and history of medicine,[28] biographies and travel books. With over sixty books, 15 of them in French, he also published in scientific journals, both Portuguese and foreign, revealing an interest in the internationalization of Portuguese scientific research. He published in several Portuguese medical journals, such as *Clinic, hygiene and hydrology*, *Contemporary Medicine*, and in international journals, such as *Bulletin Mensuel de l'Office International d'Hygiène Publique*, for example.

Most of the six doctors mentioned above had scientific training in Portuguese universities of their time and they created and presided over scientific institutes. They promoted sanitary policies that produced important results, some immediately, some

[23] Jorge, Ricardo, 1918, *Influenza: the new Iberian Peninsula incursion* [*A influenza: nova incursão peninsular*], Lisbon: Imprensa Nacional. Jorge, Ricardo, 1919, *La grippe: rapport préliminaire présenté à la commission sanitaire des pays alliés dans sa session de mars 1919*, Lisbonne: Imp. Nationale. Jorge, Ricardo, 1920, *Le typhus exanthématique à Porto, 1917-1919: communication faite au Comité international d'hygiéne publique dans sa session d'Octobre 1919,* Lisbonne: Imp. Nationale.

[24] Jorge, Ricardo, 1930, *Brazil! Brazil!: Conferece at the Brasilian Academy of Letters on Brazilianism in Portugal and talks in Rio and S. Paulo from 30 June to 25 July 1929* [*Brasil! Brasil!: Conferência na Academia Brasileira de Letras sobre o Brasilismo em Portugal e alocuções proferidas no Rio e em S. Paulo de 30-6 a 25-7 de 1929*], Lisbon: Fluminense.

[25] Jorge, Ricardo, 1926, *Les pestilences et la Convention Sanitaire Internationale,* Lisbonne: Institut Central d'Hygiéne. Jorge, Ricardo, 1927, *Alastrim et variole: vaccine, encéphalites postvaccinales*, Lisbonne: Institut Central d'Hygiène. Jorge, Ricardo, 1928, 'Les faunes régionales des rongeurs et des puces dans leurs rapports avec la peste: résultats de l'enquête du Comité Permanent de l'Office International d'Hygiène Publique: 1924-1927', in E. Roubaud, *Étude systématique descriptive des puces des rongeurs transmettant la peste*, Paris: Masson et Cie. Éditeurs.

[26] Jorge, Ricardo, 1903, 'Epidemiology. On the study of malaria and its combat in Portugal' ['Epidemiologia. Sobre o estudo e o combate do sezonismo em Portugal'], *Anais de Saúde Pública do Reino*, Coimbra: Edição da Imprensa da Universidade. Jorge, Ricardo, 1906, *La malaria au Portugal: Premiers résultats d'une enquête,* Lisbonne: Inspecção Geral dos Serv. Sanitários.

[27] Jorge, Ricardo, 1935, *La leishmaniose au Portugal*, Lisbon: Tip. Henrique Torres.

[28] Jorge, Ricardo, 1932, *Les anciennes épidémies de peste en Europe, comparés aux épidémies modernes,* Lisbon: Imprensa Nacional.

others only several years later. Due to their scientific value and career they were given the most important jobs of their time in the areas of health and sanitation. They had the following similar features: they were all university professors, with a symultaneous medical practice and research; they were members and directors of scientific societies and they had relevant public jobs in times of sanitary crisis; they diagnosed the main problems that afflicted public health and proposed adequate solutions, which were enforced, although most of the times their application was not as fast and effective as they desired. Ricardo Jorge's biography was selected for his work in fighting disease and epidemics, his longevity and importance for the establishment of the first modern laws regarding sanitation in Portugal.