



História, Ciências, Saúde-Manguinhos

ISSN: 0104-5970

ISSN: 1678-4758

Casa de Oswaldo Cruz, Fundação Oswaldo Cruz

Porras, María Isabel; Báguena, María José
The role of the World Health Organization country programs
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História, Ciências, Saúde-Manguinhos, vol. 27, no. 1, Sup., 2020, pp. 187-210
Casa de Oswaldo Cruz, Fundação Oswaldo Cruz

DOI: <https://doi.org/10.1590/S0104-59702020000300010>

Available in: <https://www.redalyc.org/articulo.oa?id=386164741010>

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The role of the World Health Organization country programs in the development of virology in Spain, 1951-1975

El papel desempeñado por los programas país de la Organización Mundial de la Salud en el desarrollo de la virología en España, 1951-1975

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Received on 8 June 2019.

Approved on 25 Nov. 2019.

<http://dx.doi.org/10.1590/S0104-59702020000300010>

PORRAS, María Isabel; BÁGUENA, María José. The role of the World Health Organization country programs in the development of virology in Spain, 1951-1975. *História, Ciências, Saúde – Manguinhos*, Rio de Janeiro, v.27, supl., set. 2020, p.187-210.

Abstract

Within the framework of recent historiography about the role of the World Health Organization (WHO) in modernizing public health and the multifaceted concept of global health, this study addresses the impact of the WHO's "country programs" in Spain from the time it was admitted to this organization in 1951 to 1975. This research adopts a transnational historical perspective and emphasizes attention to the circulation of health knowledge, practices, and people, and focuses on the Spain-0001 and Spain-0025 programs, their role in the development of virology in Spain, and the transformation of public health. Sources include historical archives (WHO, the Spanish National Health School), various WHO publications, the contemporary medical press, and a selection of the Spanish general press.

Keywords: public health; virology; World Health Organization (WHO); Spain; twentieth century.

Resumen

En el marco de la reciente historiografía sobre el papel de la OMS (Organización Mundial de la Salud) en la modernización de la salud pública y el concepto multifacético de salud global, se estudia el papel de los llamados "programas país" de la OMS en España desde su admisión en 1951 hasta 1975. Adoptando perspectiva histórica transnacional y enfatizando el estudio de la circulación de personas, conocimientos y prácticas científico-sanitarias, nuestro análisis se centra en los programas España-0001 y España-0025, en evaluar su papel en el desarrollo de la virología en España y en la transformación de la salud pública. Nuestras fuentes vienen de archivos históricos (OMS, Escuela Nacional de Sanidad), publicaciones de la OMS, revistas médicas contemporáneas, y una selección de prensa general española.

Palabras clave: salud pública; virología; Organización Mundial de la Salud (OMS); España; siglo XX.

Since the beginning of the twentieth century, while international health has evolved into global health (Packard, 2016; Birn, Pillay, Holtz, 2017) and the transnational historical perspective has become prominent (Barona, 2019, p.1-16), international agencies have received more attention from researchers on public health (Farley, 2004; Cueto, 2004; Birn, 2006; Solomon, Murard, Zylberman, 2008; Borowy, 2009; Cueto, Brown, Fee, 2011), who helped redefine their role within the international dimension of health and its transformation during the twentieth century (Iriye, 2002; Brown, Cueto, Fee, 2006; Brown, Cueto, 2011; Birn, 2014a, 2014b; Borowy, 2014; Barona, 2015; Cueto, Brown, Fee, 2019), as well as their contribution to the development of public health at a national and local level (Stapleton, 2000; Löwy, Zylberman, 2000; Rodríguez Ocaña, 2000, 2002, 2014b; Birn, 2006; Porras, Báguena, Ballester, 2010; Ballester, Porras, Báguena, 2015a; González Hernández et al., 2018).

This highlights the value of adopting a transnational historical perspective to analyze health policies, sanitary transformation, or the modernization of public health in a particular country, reaching beyond the dominant principle of nation and territoriality and connecting with international, supranational, or global history (Barona, 2018, p.3-4). This more complete understanding calls for identification of the role played by the various central participants who intervene to produce the final results, including the World Health Organization (WHO).

The history of this international agency and the role it has played has been studied by its own members (OMS, 1958; WHO, 1968; Hussein, 1998a, 1998b; Litsios, 2009, 2012), as well as historians of medicine and public health (Brown, Cueto, Fee, 2006; Brown, Cueto, 2011; Cueto, Brown, Fee, 2019), sociologists and political scientists (Haas, 1992; Barnett, Finnemore, 1999; Jasanoff, 2004) and an interdisciplinary group (Sturdy, Freeman, Smith-Merry, 2013). These different approaches have considered the WHO not only as a technical organization that defines guidelines, standards, and policies related to health and science, but also as a key element for producing and disseminating health knowledge in line with the concept of “epistemic communities” (Haas, 1992). Based on this concept, and studying this agency’s efforts to reform mental health policy across Europe, Sturdy, Freeman, and Smith-Merry (2013, p.1) showed its role in creating opportunities to share knowledge and best practice and create autonomous epistemic communities.

Considering these contributions and the lack of studies on the role played by the WHO in developing public health in specific European nations, our main aim here is to investigate the role played by the WHO’s “country programs” in Spain¹ in virology from the country’s admission to the WHO in 1951 until 1975. It is important to point out that the “country programs” were a means of providing technical assistance in response to a specific request from a particular nation (Cueto, Brown, Fee, 2019, p.55-57). The framework of “technical assistance” was established while the Canadian Brock Chisholm directed the WHO, and was meant to combat the tense political and ideological atmosphere between “two opposing views about public health, that of capitalism and that of communism” (Cueto, Brown, Fee, 2019, p.57), as well as “the displeasure of the United States in response to them” (Cueto, Brown, Fee, 2019, p.63). According to Marcos Cueto, Theodor M. Brown and Elizabeth Fee (2019, p.64), the “technical assistance” allowed the economic and social

realities that led to underdevelopment to be ignored, because it was based on the idea that transferring knowledge of science and technology was the key to development.² Here, we adopt a transnational historical perspective and emphasize the study of the circulation of health knowledge, practices, programs, and people.

We identified 21 programs of this type devoted to different topics which include strengthening maternal and child health, fighting venereal diseases, rehabilitating disabled infants, health administration, education, and training, developing hospital networks, nursery training, medical education, and environmental pollution (Ballester, 2016, p.32-33).³ Our analysis focuses particularly on the Spain-0001 (E1) and Spain-0025 (E25) programs, since they addressed control of communicable diseases with the laboratory as a key element. The former addressed control of endemo-epidemic zoonoses (brucellosis and rabies, among others) and was developed between 1952 and 1956, when the general director for Health was José Alberto Palanca (1888-1973); the latter involved viral disease control, was begun in 1959 and followed by E1901 (1971-1973) and VIR001 (from 1974 onwards) (WHO, 1960-1975), when Jesus García Orcoyen became the general director for Health (1903-1974) and introduced important changes from his predecessor.

Our main sources were found in the WHO historical archives (Geneva) and the Historical Archive of the National Health School (Madrid), and also included various WHO publications, the Reports of the General Directorate of Health, the contemporary medical press, and a selection of Spanish daily newspapers.

In order to better assess the role played by the aforementioned programs, we begin with a brief look at the origin of virological research in Spain prior to 1951, describe the country's incorporation into the WHO and the establishment of particular agreements, and follow with an analysis of changes observed in the training of scientists and health professionals in new viral techniques, improvements in scientific laboratories for viral research, and the development vaccines and design of epidemiological studies and programs to control viral diseases.

Virological research in Spain before its admission to the WHO in 1951

Before 1951, three locations were important to the development of virology in Spain, and corresponded to the most important cities in the country at that time: Madrid, Barcelona and Valencia.

The Alfonso XIII National Institute of Hygiene became the main scientific virological institution in Madrid before the Civil War, and also played a leading role during the early decades of Franco regime as some Spanish scientists who had trained here became key figures in the National Health School (Madrid). It was established in 1899 to address Spanish concerns about the epidemic of plague in Oporto (Portugal) and provide much-needed modernization in Spanish science and health. The country at that time was still very disturbed by the catastrophic Spanish-American war in 1898 the consequent loss of its colonies, and there was an important debate on the need to regenerate Spain (Porrás Gallo, 1998, 2019). As in other European countries, the Institute would help build Spain as a nation and expand public health while providing a source of state revenue (Barona,

2019, p.18, 53, 87). In fact, according to Barona (2019, p.51-52), “these national health institutions were instruments of the state for implementing new health policies inspired by experimental medicine and social research” and “they emerged as necessary instruments for state administrations” in order to solve the most important health problems and improve the health of the nation. These institutions should be considered as the liberal State’s political response amid the context of the birth of the international sanitary movement, when bacteriology showed its potential for controlling infectious diseases, but they were also the result of actions by international agencies (Office Internationale d’Hygiène Publique, Rockefeller Foundation, League of Nations) together with the State administrations (Barona, 2019, p.23, 53). Apart from teaching bacteriology, producing serum and vaccines, and conducting epidemiological studies on the main infectious diseases, the Alfonso XIII National Institute of Hygiene was also meant to be a driving force for Spanish bacteriological research (Grases, 1901, p.12). The goal was to emulate the Pasteur or Koch Institutes or even to reproduce the German laboratory network model and showcase national science and medicine while also acting as an important source of state revenue (Grases, 1901, p.12; Barona, 2019, p.53). The choice of Santiago Ramón Cajal (1852-1934) as director of the new institute was therefore crucial to its future survival and scientific success, as well as its international credibility and competitiveness⁴ (Porras Gallo, 1998, 2019).

Until the main building was constructed in 1914 and the new regulations approved in 1916 (Reglamento, 6 Oct. 1916), the core tasks of the Alfonso XIII Institute of Hygiene were very difficult to carry out. Although there was still a huge lack of funding and full-time staff, these improvements allowed for increased activities at the institute and initiated a brilliant phase which led Ramón y Cajal to consider it on a par with the best foreign centers in 1923 (Ramón y Cajal, 1984, p.211-212). This new phase was headed by Cajal’s disciple Jorge Francisco Tello from 1920 onwards. It involved improving research activities, and was especially important to the development and institutionalization of Spanish virology. The activities and research at the institute during this new period can be seen in the *Archivos del Instituto Nacional de Higiene de Alfonso XIII* (1922-1926), which succeeded the *Boletín del Instituto Nacional de Higiene de Alfonso XIII* (1909-1919), its previous scientific journal.

The research on the rabies virus conducted by Dalmau García Izcara in 1905 was the starting point of an important line of research into the “filterable virus,” which became essential to the initial development of virology and production of innovative viral vaccines by great scientists such as Eduardo Gallardo Martínez (1879-1964) or his disciple Julián Sanz Ibáñez (1904-1963), and in turn helped institutionalize virology in Spain after the Civil War (Rodríguez Ocaña, 2014a; Báguena, Porras, Caballero, 2014; Báguena, 2015; Porras Gallo, 2019).

Eduardo Gallardo was connected to the Pasteur Institute (Paris) and the Rockefeller Institute for Medical Research (New York) (Rodríguez Ocaña, 2014b, p.468). The scientific support from the Pasteur group enabled him to develop a neurovaccine against smallpox in 1923, following the Levaditi procedure (Gallardo, 1924). The Rockefeller Foundation not only gave Eduardo Gallardo the opportunity to conduct a fellowship at the Rockefeller Institute and establish relationships with leading North American virologists, but also

funding for his research laboratory in Madrid. With the collaboration of his assistant Julián Sáenz Ibáñez, he was able to set up the Rivers method to culture the vaccine virus *in vitro* and implement the Woodruff and Goodpasture method to culture this same virus in the chorioallantoic membrane of a chicken embryo (Gallardo, Sanz Ibáñez, 1937).⁵

Julián Sanz Ibáñez, who was one of Cajal's last disciples, had previous experience in tissue culture thanks to his time at the Kaiser Wilhelm Institut (Berlin) and the Neurologisches Institut (Vienna) during 1932, with a grant from the Junta para Ampliación de Estudios e Investigaciones Científicas (JAE). It is important to note that the institution was created in 1907 under the direction of Santiago Ramón y Cajal (1852-1934) to promote the development of Spanish science and scientific education through grants to its scientists to improve their training at the principal international scientific centers, and it maintained its activities until 1939 (Sánchez Ron, 1988; Puig-Samper, 2007). This qualified training permitted Julián Sáenz Ibáñez to establish the superiority of virus culture in chicken embryos (Báguena, 2015, p.96), which would be critical for the development of Spanish virology after the Civil War.

Eduardo Gallardo also played an important role in introducing virology in Valencia through Vicente Sanchis-Bayarri Lahoz (1899-1994), who went to the Alfonso XIII Institute of Hygiene in 1922 to improve his training in virology. In 1926, he was able to further develop his expertise in this area at the Pasteur Institute (Paris), thanks to a grant from the JAE. Sanchis-Bayarri Lahoz focused his research at Pasteur on the smallpox virus. When he returned, he was charged with verifying the activity of the smallpox vaccine at the Provincial Institute of Hygiene, an institution that played an important role in researching, preparing, and applying vaccines. In 1932, Sanchis-Bayarri Lahoz became a professor of microbiology at the Faculty of Medicine, which allowed him to set up a large bacteriological and virological research laboratory at this institution that became essential for the development of virology after the Spanish Civil War (Báguena, 2009).

The Alfonso XIII Institute of Hygiene was also important for setting up production and application of the rabies vaccine at the Municipal Bacteriological Laboratory of Valencia.⁶ In 1916, the inauguration of the Provincial Institute of Hygiene improved the capacity to research, produce, and apply vaccines in Valencia. Once again, the activities there were a consequence of the circulation of knowledge and practices acquired at the Alfonso XIII Institute of Hygiene and the Pasteur Institute by notable Valencian scientists, such as Juan Peset Aleixandre. The influenza pandemic of 1918-1919 showed the ability of the Provincial Institute of Hygiene, in collaboration with the Municipal Bacteriological Laboratory and the Army Health Laboratory, to develop a new vaccine against pneumococcus to combat the health crisis (Peset Aleixandre, 1922-1923, p.468-470).

Although Barcelona was also a key place in the development of virology, so far we have found less information to assess the role it played prior to the 1950s. Jaime Ferrán (1851-1929), a scientist well known for his cholera vaccine, was the first director of the Municipal Microbiological Laboratory (Barcelona), which was established in 1886. He also asked the city council to create an institute similar to the Pasteur Institute in Paris to produce and apply the smallpox and other vaccines. The local government agreed and the Municipal Institute of Hygiene was set up in 1891 (Roca, 1991). Jaime Ferrán researched

rabies and, following the Pasteur method, produced a new vaccine against the disease that only needed to be administered for five days, but caused paralysis in some cases. These negative side effects, together with others from his typhus vaccine, the death of a person who received his diphtheria vaccine, and strong reactions caused by his plague vaccine, led to his dismissal in 1905.

Nevertheless, Jaime Ferrán continued producing and applying vaccines in his private laboratory (Báguena, 1995), and Ramón Turró replaced him as director of the Municipal Institute of Hygiene. It is important to note the smallpox vaccination program established in this Institute in 1917, which consisted of notifying parents of newborns of their obligation to vaccinate them against smallpox. This program kept Barcelona free of smallpox even during the Spanish Civil War (Villalbí, 1991), and included some key elements that would later be incorporated in the equally successful Barcelona Extended Vaccination Plan of 1973. Agustí Pumarola Busquets (1920-1987), who expanded his bacteriological and virological training at the Pasteur Institute (Paris) and the Karolinska Institutet (Stockholm) during 1950 and later at the Statens Serum Institut (Copenhagen), would be a key figure in the development of virology and its application in Barcelona during the second half of the twentieth century.

The Spanish Civil War disrupted the scientific activity we have described, as did the post-war exile and repression of a significant number of our best scientists by the Franco regime. This was the case for the majority of researchers and teachers at the National Health School (Barona, Bernabeu, 2008, p.194), an institution established in Madrid in 1924 with support from the Rockefeller Foundation to train doctors in public health and achieve the much-needed modernization of the Spanish health system (Barona, 2015; Rodríguez Ocaña, 2014b). This institution would play a key role in the development of virology within the new framework established after Spain was incorporated into the WHO. Its leader, however, was not Eduardo Gallardo, although he remained in Spain. He had enormous experience and he taught viral disease at the National Health School (Escuela Nacional de Sanidad, ENS) in 1944,⁷ but he did not enjoy the confidence of the new regime,⁸ which instead promoted Florencio Pérez Gallardo (1917-2006) to head of the Virology Service at the ENS and gave scientific priority to institutions located in Madrid, as befitted a centralist state. Pérez Gallardo had been studying medicine in Cádiz when the Civil War broke out, and his professor of pathology, Miguel Carmena, sent him to the infectious diseases ward of a hospital on the front lines. He presented his doctoral thesis on rabies in 1940 and became a teacher of histology at the medical school in Cádiz, but when Gerardo Clavero (who taught hygiene at the same institution) moved to Madrid in 1941 to head the ENS he invited Pérez Gallardo to go with him.⁹ In Madrid, Florencio Pérez Gallardo started to work on exanthematic typhus and was able to attenuate a strain of rickettsia he dubbed “E strain” and used to develop a vaccine (Rodríguez Ocaña, 2017b).

The incorporation of Spain to the WHO and its first practical benefits

Five years after the Second World War, with the beginning of the Korean War and the new international context of the Cold War established, a new period began for the Franco regime.¹⁰ After international isolation during the first period of the dictatorship,¹¹

Spain joined several international agencies: the FAO at the end of 1950, the WHO in 1951, UNESCO in 1952, UNICEF in 1954, the UN in 1955, the International Monetary Fund in 1958, and the Organization for Economic Cooperation and Development (OECD) in 1961.

Although Spain's incorporation into the WHO was the first step in the long period leading towards the rehabilitation of the Franco regime and the end of the so-called "Spanish question"¹² (Moradiellos, 2003; Quintana Navarro, 1996; Cervantes, Pereira, 1990; Tusell, 1993; Portero, 1989, 2003; Del aislamiento..., 2006; Sánchez González, 2015), the international epidemiological and health benefits of belonging to this international agency along with the other nations were pointed out in the UN when the WHO constitution was signed. But sanctions against Spain were not revoked until November 4, 1950, and five months later (on April 5, 1951) Spain formally asked to be incorporated into the WHO; it was admitted on May 16 of the same year, and ratified the WHO's constitution on May 28, 1951 (Ballester, 2016, p.25, 2019). The admission of Spain into the WHO, which coincided with the estrangement of the Soviet Bloc countries, must be seen as one of the strategic moves in the Cold War (Rodríguez Ocaña, Porras Gallo, 2017). In fact, a few months later in July 1951, official negotiations started with the United States (Oreja Aguirre, Sánchez Mantero, 2007) which ended in the signing of an alliance and agreement of mutual collaboration between the United States and Spain in 1953 that had political and economic impacts on the country and Franco himself as well as on scientific and technological cooperation (Ballester, 2016, p.27, 2019). Even so, we should emphasize that the United States, which did not agree with the sanctions against Spain and its international isolation,¹³ had re-established financial, political, and economic relationships with Franco regime from 1946, and two years later (on July 26, 1948) stated its decision to attempt to slowly incorporate Spain into Western economic and military agreements (Achilles, 1948). For Andrei Gromyko, the Soviet Union's delegate to the first Committee of the General Assembly on May 4, 1949, the purpose of these actions was to use Spain as a military base (Tash, 1951, p.92-96), which proved true. International recognition reinforced the Franco regime and avoided any immediate likelihood of a return to democracy under a republican regime in Spain.

America's reluctance to sanction Spain, which was also shared by Great Britain,¹⁴ might also explain the early designation of Florencio Pérez Gallardo's virus laboratory at the ENS (Madrid) as the first National Influenza Laboratory in Spain, a member of the WHO influenza network developed after the World Influenza Center was created in 1947 in London (Ramírez, Porras, 2014; Porras, Ramírez, 2017). In fact, this designation came in February 1951, two months before Spain formally requested to enter the WHO. It had the support of the Franco regime and especially the ENS Director, Gerardo Clavero del Campo (WHO Influenza Centres, 21 Feb. 1951). He was also one of the members of the Spanish delegation that negotiated the practical details of the official relationship established between the WHO and Spain, and Pérez Gallardo became an advisor to this delegation (Ballester, 2016, p.27, 2019). We emphasize these actions because they foretell the prominent role Pérez Gallardo played in the future through WHO collaborative programs with Spain.

Scientific and technical cooperation with the WHO was defined by the basic agreement signed in Madrid on January 24 and Geneva on January 30, 1952 (Basic agreement..., 1952). This was the first step after Spain requested WHO technical assistance that the international agency based on “an administrative and technical unit named ‘project’” (OMS, 1958, p.150). Each project required four key structural elements: an initial survey of the field country, an epidemiological study, a plan of implementation, and a final analysis of its impact. The six articles that comprised the basic agreement established the details of the collaboration in furnishing technical assistance, cooperation from the Spanish government with technical assistance, the administrative and financial obligations of the WHO and the government, and various other facilities and privileges. It is important to note the conditions of this technical assistance because of its relevance to the development of Spanish virology. According to the first article of the basic agreement, technical assistance was to consist (among other things) “of making available the services of experts to Spain ... in order to render advice and assistance to the competent authorities” (Basic agreement..., 1952, p.1). These expert visits were a key element in developing physiotherapy and medical rehabilitation (Ballester, Porras, Báguena, 2015a, 2015b), which was also true for virology and transformation of the field of public health. Thanks to the visits by these experts and their obligation to instruct “in their professional methods, techniques and practices, and in the principles on which these are based” (Basic agreement..., 1952, p.2), dissemination of knowledge and practices followed, as did improvement in Spanish virus research and the professional careers of Spanish virologists, particularly those whose selection was supported by the Franco regime. The conditions of this agreement between the Spanish government and WHO may also explain the priority selection of Pérez Gallardo and some members of his scientific group to receive these benefits over other members less favored by the regime, such as Eduardo Gallardo and Agustín Pumarola Busquets from Barcelona.

This basic agreement was the starting point for the development of the 21 country programs until 1975, as well as the grants to finance visits by WHO consultants, training of Spanish health professionals, and inter-country programs. The technical assistance provided by the WHO to Spain through all these programs was a key element in the Franco regime’s fostering of Spanish scientific and technological development to counteract the deterioration resulting from the Civil War and the Second World War, and it provided a better position for Spain on the international level (Rodríguez Ocaña, 2019). Furthermore, this technical assistance was also relevant internally, thanks to the importance taken on by medical technologies that “became one of the essential resources to link the regime with the ideals of modernization and progress” (Menéndez Navarro, 2007, p.392).

The next step in implementing these 21 country programs was to define their contents and phases of implementation through supplementary agreements. In the following pages, we focus primarily on the E1 and E25 programs. The former, which was developed between 1952 and 1956, addressed endemo-epidemic zoonosis control (Supplementary Agreement..., 1952), particularly for leptospirosis (Rodríguez Ocaña, 2017b), brucellosis (González Hernández et al., 2018), and rabies (Báguena, Mariño, 2016).¹⁵ The latter addressed control of viral diseases from 1959 and was followed by E1901 (1971-1973) and VIR001 (from 1974

onwards) (WHO, 1960-1975), becoming a key tool in the development of virology and transformation of the field of public health in Spain.

Although José Alberto Palanca, as the general director for Health, directed Spain's incorporation into the WHO and the establishment of the basic agreement, most programs were developed after he had been relieved of his post and replaced by the gynecologist Jesús García Orcoyen in 1957. Palanca "symbolized the control of the National Health by the military and Catholic branch, as against the Falangists who directed the work and welfare areas," and his replacement represented a new period marked by the rise of technocrats in the Franco regime (Rodríguez Ocaña, 2019).¹⁶

WHO grant programs to establish new virology in Spain and improve the national and international image of the Franco regime

Grant programs to train Spanish scientists and health professionals, which were independent and separate from other collaborative WHO programs until the 1970s (Ballester, 2016, p.29), were crucial for scientific reconstruction and modernization in Franco's Spain as well as for improving the image of the Franco regime at home and abroad. This kind of program was a key means of supporting the WHO's regulatory efforts, and allowed specialized training through different strategies: research visits to the most important scientific centers, and participation in specialized courses, symposia, congresses, and Expert Committee meetings. These regulatory actions were complementary to the WHO's technical assistance (Lee, Fang, 2013, p.9). Consequently, in the WHO Expert Reports related to the two individual projects analyzed here, we frequently find recommendations to provide grants with a specific objective as a means of addressing problems detected during the expert visits.

After the basic agreement was signed, Spain received various types of grants.¹⁷ One was for a stay at the State Serological Institute of Copenhagen, where Pérez Gallardo spent two months. This training opportunity was followed by another to spend six months visiting the most important scientific institutions in the study of virus diseases and rickettsiosis, in France, Italy, Sweden, Denmark, and Switzerland (Ballester, 2016, 2019). Previously, when he was a doctor for the national health service (Sanidad Nacional), Pérez Gallardo had had access to other training opportunities funded by the Spanish government between 1942 and 1947, and went to Berlin, Lisbon, Morocco, and New York, where he spent over a year (June 1946-September 1947) in the laboratories of the Rockefeller Foundation, funded by the Junta de Relaciones Culturales of the Spanish Foreign Ministry;¹⁸ this program was re-established by Spain after the Civil War and acquired greater prominence after the end of the Second World War in order to combat the international campaign against the Franco regime (Delgado Gómez-Escalonilla, 2007, p.272-274). Within this program, as the heir of the JAE, the Spanish National Research Council (Centro Superior de Investigaciones Científicas, CSIC), created on November 24, 1939, played a key role in award grants to scientists (Delgado Gómez-Escalonilla, 2007, p.269).¹⁹ It appears that this training of Pérez Gallardo, which was supported by the Spanish government, and perhaps the connections he established with members of the WHO during his stay at the Rockefeller Foundation, were

helpful for his participation in the second International Congress on Poliomyelitis in 1951 (September 3-7), just a few months after Spain's admission to the WHO. At the same time, his presence "could be interpreted as a clear maneuver to give political validity to Franco regime, represented by a competent professional" (Porras, Báguena, Ballester, 2010, p.136).

Spanish government support for Pérez Gallardo's training in the new field of virology also evidences efforts by the Franco regime to justify his promotion as the head of the ENS Virus Service over Eduardo Gallardo. In fact, at this time the daily newspapers reinforced Pérez Gallardo's image as a specialist in viral diseases and rickettsiosis (*Actuación*, 26 May 1949; *V Curso...*, 17 Apr. 1953; *Convocatorias*, 17 Dec. 1954). He finally was promoted on February 11, 1955; this reinforced the pre-eminent role granted to the ENS by the Franco regime as the central institution for health research was reinforced. This is especially visible in relation to new Spanish government requests to the WHO for a project focusing on viral diseases and rickettsiosis of interest to the public health laboratories, which would become the E25 program that began in 1959.

All these grants, particularly the WHO ones, also gave Pérez Gallardo the opportunity to meet major scientists and establish relationships that in the future would be useful to him and to his research group, and permitted the creation of an epistemic community in Madrid, first around the ENS and later, around the new National Center for Virology and Sanitary Ecology (*Centro Nacional de Virología y Ecología Sanitarias*, CNVES).

The WHO grants covered not only stays for Spanish health professionals as they trained in new virology techniques, but also other ways of acquiring specialized knowledge. Spain received two grants associated with the E1.3 program on rabies; one was to participate in a workshop on rabies held at the Pasteur Institute of Coonoor (India) in 1952, which was probably attended by Pérez Gallardo. The country received three other grants through the E17 program: two were for trips to France in 1956 to study virology and vaccine manufacture, and the third was for travel to the United States for polio studies in 1957, when poliomyelitis presented an enormous public health problem in Spain (Porras et al., 2013).

Apart from individual benefits for scientists, the development of Spanish health institutions, and improvements in public health, the WHO grants provided an opportunity for Franco regime to attain national and international recognition and for Spain to be integrated into the international scientific circle, thanks to the congresses, seminars and other activities. One such seminar focused on the "characteristics of the diseases caused by virus and rickettsiosis of interest to the public health laboratories," organized by the European Regional Office of the WHO and held at the ENS in Madrid in 1956, a year after Pérez Gallardo became the head of the Virus Service at this institution (*El Congreso...*, 19 Apr. 1956; *Clausura...*, 26 Apr. 1956). This seminar was crucial for several reasons. On one hand, it was mentioned at this event that one of the main problems for these laboratories was the production of antigens and serum, particularly in small labs with limited resources (which was the case in Spain). This provided justification for the WHO to augment its technical support to Spain with the E25 program, which helped improve viral research and methods for diagnosis, prevention, and control of the viral diseases that caused epidemic outbreaks in Spain, such as poliomyelitis (Porras et al., 2013). On the other hand, Franco regime gained international visibility, the opportunity to show off

the Spanish health organization (which was noted by the ENS director during the closing ceremony) (Clausura..., 26 Apr. 1956), and to receive WHO support through the words of Doctor Bonno, director of the agency's Department of Infectious Diseases. He expressed his gratitude to Pérez Gallardo "for his great effort in preparing laboratory work" that he described as being "of extraordinary efficacy" (Clausura..., 26 Apr. 1956). In addition, at a national level Franco regime – with the help of the press – showcased Spain's scientific progress, describing the contents of the seminar with scientific terminology not accessible to the general public,²⁰ as did Spanish scientists such as Pérez Gallardo, who shared his laboratory work with Mac Callum (London) and Lépine (Pasteur Institute of Paris) during the seminar (El Congreso..., 19 Apr. 1956). At the same time, WHO collaboration with Spain was presented (also through newspapers) as normal for developed countries, and reinforced the role of virologists and virus laboratories in public health (Clausura..., 26 Apr. 1956). This also provided the justification for the new E25 program to Spanish society; it began in 1959, when Jesús García Orcoyen had been the general director of Health since 1957 and was more favorable to these health activities than his predecessor. As we shall see, his reformist activity became more important after 1963 (Rodríguez Ocaña, Atenza Fernández, 2019), also coinciding with economic improvement in Spain.

But despite Bonno's praise, the situation at the ENS virus laboratory was not good, as witnessed by two WHO consultants (F. Dekking and Tore Wessalén) who visited Spain in late 1959 when the E25 program began. Dekking denounced that before the Civil War, there had been two virus laboratories in Barcelona and Madrid, but there were none at that moment. He recommended sending a consultant to train staff for six months, due to the lack of experience, which was even worse than the equipment situation (Dekking, 1959). Meanwhile, after Tore Wessalén helped Pérez Gallardo establish methods to diagnoses viral diseases in the laboratory for two weeks, he noted that appropriate equipment and experienced laboratory technicians were lacking, and that "no virus had yet been isolated" in Pérez Gallardo's laboratory. Wessalén (1959) recommended improving the equipment, training one technician at a specialized laboratory, and sending a consultant to Madrid for a considerable period of time to establish "a national virus laboratory for diagnosis and research ... with full-time staff," due to the importance acquired by this kind of institution.

As a result, through the E25 program and its continuations (E1901 and VIR001), Spain received various grants to train Spanish professionals in virological techniques at the main international virus laboratories as well as to support WHO expert visits. These were essential to improve the conditions at the ENS Virus Service, and later so that the new CNVES (inaugurated in 1968 in Majadahonda, Madrid) could become competitive in virology. The main destinations of Spanish recipients of WHO grants included the WHO Standardization Laboratory (Lausanne, Switzerland), the Public Health Reference Laboratory, Colindale (London), and the Department of Virology at Birmingham University. Most of the WHO experts who visited the centers also came from these scientific institutions.

During this period, for example, Rafael Nájera did experimental work on the measles virus at the ENS in 1964-1965, with the help of G. Enders-Ruckle, a WHO consultant (Nájera, 1964-1965); he also received a grant to study rubella diagnosis techniques at Birmingham

University in 1967-1968, which led him to establish the rubella laboratory at the recently inaugurated Majadahonda center for national use in 1969 (Báguena, Porras, 2018a, 2018b).

After the second visit by Radovanovic (1971), the WHO consultant, to the Majadahonda center in 1971 to discuss the implementation of an extension of the E25 program, E1901 ("Epidemiological Studies of Virus Diseases of Public Health Importance") with Spanish health authorities and experts, he recognized that progress had been made in comparison with 1968, but he also noted a lack of staff training and some technical problems. He recommended grants for doctors Mateos, Casal, and Bermúdez de Castro to go to the Lausanne Laboratory, the Public Health Reference Laboratory of Colindale, London, and the Department of Virology at Birmingham University, respectively (Radovanovic, 1971). He also recommended grants to support two expert visits to the Majadahonda center by T.H. Flewett of the East Birmingham Hospital (UK), from April to June 1971 in order to advise on diagnostic electron microscopy, and for D. S. Rowe of the WHO Standardization Laboratory in Lausanne, Switzerland for one month (September-October) in 1971 to provide orientation on immunological aspects of diagnosis.

One year later, the Spanish government asked the UNDP for new grants for J. Casal (Zagreb), Bermúdez de Castro (Birmingham), R. Nájera (Mill Hill and Birmingham), L. Valenciano (Glasgow), J. Mateos (Paris), F. López Bueno (Utrecht), P. Moreno (England), P. Pérez Breña (Coventry), and A. Lozano (Mill Hill).

The Madrid group received most of the WHO grants, which led to the creation of an epistemic community around Florencio Pérez Gallardo and his disciple Rafael Nájera, as well as the resumption of scientific interchanges with the Western world that, according to Rodríguez Ocaña (2019), had been one of the implicit objectives of Spain's incorporation into the WHO.

From Madrid to Barcelona: the consolidation of Spanish virology during the 1950s and 1960s

As we have mentioned, Franco regime prioritized Madrid for the development of virology, focusing this activity on Pérez Gallardo and his virus laboratory at the ENS. The WHO supported this political decision in 1951, when his laboratory became the first National Influenza Laboratory of Spain, a member of the WHO influenza network (WHO Influenza Centres, 21 Feb. 1951), even though this laboratory was not well equipped to carry out this work (Ramírez, Porras, 2014; Porras, Ramírez, 2017). At that time Spain did not yet belong to the WHO, and Pérez Gallardo was only Assistant of Services at the ENS.²¹

In spite of these conditions, this laboratory was involved in the E1.3 Program that started in 1952, and in 1954 it joined the Pasteur Institute and Lederle Laboratory in a study coordinated by the WHO to develop an international standard hyperimmune serum against rabies. Pérez Gallardo also became a member of the WHO Expert Committee on rabies in 1954 (Expert, 1954; Comité..., 1957), and together with Hilary Koprowski (another member of this committee) tested the rabies vaccine in Kashmir and Kenya, publishing the results in the 1957 *Bulletin of the World Health Organization*. Pérez Gallardo's laboratory continued this research thanks to WHO funding. In 1968, ten years after the E1.3 program

ended, it produced a rabies vaccine with no adverse neurological reactions and a greater antibody response than the vaccines from the Institut Pasteur, Koprowski, and Fuenzalida (Nájera, 2006), in the so-called Pilot Center (*Centro Piloto*) of the newly-built center in Majadahonda, as fruit of the E25 program.

Although we did not find explicit references to the influence of the presence of poliomyelitis in Spain, we believe that the Spanish government's request for the E25 program was related to this health problem, which was registering its highest morbidity rates (Porrás et al., 2013). In fact, the WHO consultant Dekking justified the need to improve the ENS virus laboratory by saying the polio vaccination campaign in Spain would have to start very soon, and this called for a well-equipped laboratory, initially to study the situation and then control its efficacy.²² He also considered it beneficial to establish another similar virology laboratory in Barcelona (Dekking, 1959). We shall see below the long journey to solidify Spanish virology and adopt Dekking's suggestions.

Besides polio, Spain had to face the flu pandemic of 1957-1958, the first since Pérez Gallardo's laboratory had been incorporated into the WHO flu network. The laboratory was consequently expected to be able to produce a vaccine and provide sufficient doses to immunize people (Pérez Gallardo, Ruiz Falcó, 1957). The laboratory produced an effective vaccine, but in small quantities, despite Pérez Gallardo's earlier triumphant statements to the Spanish press (*España...*, 23 June 1957; *Durante...*, 26 June 1957). As with rabies, sufficient production of the influenza vaccine was not possible until the next pandemic (1968-1969) in the "Pilot Center" (Ramírez, Porrás, 2014; Porrás, Ramírez, 2017).

Despite the Franco regime's reluctance to acknowledge the poliomyelitis problem, Pérez Gallardo and his research team set up the first serological survey as part of an investigation into the epidemiology of this disease, which was carried out from 1957 with funding from the General Board for Health and the Juan March Foundation (*La ayuda...*, 2 Apr. 1958), when García Orcóyen was the new general director for Health. The survey was implemented according to the recommendations of the WHO Committee of Experts on Poliomyelitis (1954) and those indicated by the international agency in 1958 (*Comité...*, 1954; OMS, 1958); this required major changes to Pérez Gallardo's laboratory, which were made possible through support from the WHO E25 program and the grant program. Key to this structure was a virology laboratory devoted to isolating polio and other enteroviruses and identifying polio antibodies which were needed for subsequent epidemiological surveillance. This was established in the National Virological Center at the ENS, but it still had certain limitations and a shortage of full-time specialist staff, which justified the start of construction on a new building in Majadahonda (Madrid), but this decision only came several years later. The findings of this serological survey emphasized the urgent need for mass immunizations against poliomyelitis (Ballester, Porrás, 2009), but this happened just over a year later (1963-1964) on children under age 7 using Sabin's oral vaccine (Pérez Gallardo, Valenciano Clavel, Gabriel y Galán, 1964) provided by foreign laboratories. Pérez Gallardo wanted to produce the vaccine in his own laboratory, as Pierre Lépine did at the Pasteur Institute; he stated that technical experience was needed to produce the polio vaccine (inactivated or attenuated) in order to avoid dependence on the few countries that produced the vaccine,

but commercial import conditions did not permit it (Pérez Gallardo, 1961, p.356-358). Spain never actually produced its own polio vaccine.

There were also problems with producing the smallpox vaccine, because of difficulty following the 1959 WHO standards. This negative situation was reported by WHO expert Colin Kaplan during his visit in 1964, as well as by Roger Sohier (Sohier, 1964; Báguena, 2015). Some of the main problems they noted included lack of equipment, maintenance, care of laboratory animals, and full-time professionals, as well as inadequate funding. These experts also passed on Pérez Gallardo's complaints in order to restate the need for a new modern building. In response to these demands, the Spanish authorities started construction on the CNVES in Majadahonda in 1967, which was also directed by Pérez Gallardo. Additionally, the Pilot Center was created exclusively to manufacture and distribute vaccines to WHO standards, and began production of rabies, smallpox, and influenza vaccines in 1968.

As for research, some improvements were seen during the 1960s but difficulties remained. In 1961, the smallpox virus was isolated for the first time in Spain by Pérez Gallardo and Rafael Nájera at the Virus Service.²³ That same year, the Virus Service participated in the first clinical trial for the measles vaccine from the Lederle laboratory in New York, but the lack of resources for measles research prevented serological analysis before and after administration of the vaccine, which was done by Lederle (Carbonell et al., 1962). But three years later, Rafael Nájera conducted experimental work on the measles virus in the virus laboratory, not only culturing it but establishing a new method, thanks to help from the WHO consultant G. Enders-Ruckle (Nájera, 1964-1965). This improvement permitted the measles virus to be isolated in 1966, and the first serological survey to assess the measles problem in Spain was conducted in 1968 in the new CNVES in Majadahonda (Madrid). The findings from this survey led to an important clinical trial of the measles vaccine (Gimeno de Sande et al., 1972). The results of this pilot vaccination campaign showed that 90% of vaccinated children had immunity, but 10% exhibited secondary effects (Peligrosa..., 20 Mar. 1969), and this new vaccine was withdrawn in 1970. Only in 1978 was the measles vaccination introduced into the national schedule.

In 1965, after the rubella pandemic which began in Europe in the spring of 1963 revealed the high number of congenital malformations caused by this disease (Plotkin, Reef, 2004), Spain participated in a study to assess the magnitude of this problem led by the Department of Genetics at Oxford University and sponsored by the WHO (González Coviella, 1965). In 1969, after Rafael Nájera's 1967-1968 research visit to study techniques for immunological diagnosis of rubella in Birmingham, where he developed a simple method to produce the rubella complement fixing antigen (Nájera, 1975),²⁴ a new serological survey was conducted out to assess the rubella problem and develop a suitable immunization strategy for Spain. A key element of this task was the new rubella laboratory that Nájera launched at the CNVES (Knight, Nájera, 1969), which worked as a health service at the national level (García Orcoyen, 1970) and permitted assessment of vaccines against rubella. A primary study of rubella vaccine had already been conducted in Madrid in 1969 by the same laboratory, followed by two more the following year in Navarre.²⁵ In 1972, two more clinical trials were carried out in Navarre.²⁶ All these studies yielded good results,

which were confirmed after the rubella laboratory determined the presence of pre- and post-vaccine antibodies: 100% seroconversion in the first three trials, 80% in the fourth, and 79% in the fifth. These findings led to the inclusion of the rubella vaccine in the 1973 Barcelona municipal vaccination calendar. In 1975, a pilot campaign vaccinated 21,000 11-year-old girls from Barcelona, Madrid, Guipúzcoa, and La Coruña, leading in 1976 to the first national rubella vaccination campaign for 13-year-old girls. Finally, in 1979, the rubella vaccine was introduced into the national vaccine calendar for 11-year-old girls.

In spite of this research and epidemiological activity during the sixties and seventies in Madrid (initially at the Virus Service and later at the CNVES), WHO expert visits still revealed deficiencies. In late 1967, Colin Kaplan (1967) reported that the lack of specialized staff was still a major problem, and this situation continued until 1970, when another expert, Peter Wildy (1970), reported improvements, especially staff increases and good condition at the Vaccine Unit since its inauguration. Following the party line of the Franco regime, newspapers reported the modernization of the Majadahonda Center in 1970 alongside Wildy's visit (Cabezas, 9 Dec. 1970, p.22-23, 27). WHO experts also helped correct some of the deficiencies they found. For example, R.G. Sommerville, a virologist at the University of Glasgow and WHO expert, visited the CNVES in 1968 through the E25 program to teach the laboratory team how to prepare high quality antiviral sera, as well as the immunofluorescence technique for rapid identification of viruses (Sommerville, 1968).

The activities related to virology carried out during the 1960s resulted from economic and social improvements that followed the establishment of the *Planes de Desarrollo* (Development Plan) by the Franco regime, and were linked to the reformist driving force of the General Director for Health García Orcoyen. Since 1963, the same year that the first mass polio immunizations began with García Orcoyen's support, he implemented significant health reforms. These included dividing the health administration into four management units (services, medicine, pharmacy, and veterinary), each headed by its own general subdirector; the reform of access to the medical staff of the national health service (*Sanidad Nacional*), restoring the medical colleges' ability to choose their leaders, assigning responsibility for the salaries of rural doctors (*médicos titulares*) to the state, restructuring local health services, and drafting a health action plan in 1965 to establish structural reform (Rodríguez Ocaña, Atenza Fernández, 2019). Although there was some connection between the needs of the Spanish health administration and the WHO recommendations during the sixties, the implementation of the necessary reforms was lax and slow, as seen in virology and the attempts to transform rural health care which were the subject of WHO program E30 (Rodríguez Ocaña, Atenza Fernández, 2019).

In our view, it is important to point out that some of the WHO experts who visited Spain, such as Roger Sohier of the Pasteur Institute in Lyon, thought that there was no positive reason to attempt so many research activities on different viral diseases, due to the shortage of resources seen at the Madrid Virus Center (Sohier, 1965). In his letter to the director of the European region, Sohier expressed his concern that the center had not been able to work adequately; according to information from Ruiz Falco, one of its scientists, staff numbers had decreased just as he was attempting to develop a vaccine against flu and had started research into the measles virus, and the center asked Sohier to provide sera.

He did so, but questioned continued WHO collaboration with the center. Even so, Sohier agreed to help to establish “one [virus] laboratory that worked properly in Spain” (Sohier, 1965) and knew that Luis Valenciano’s enterovirus department had obtained good results. Sohier also stated that Rodríguez-Torres, assistant to Agustí Pumarola Busquets, head of the laboratory at the Faculty of Medicine in Barcelona, had made a research visit to his laboratory and was working assiduously. For this reason, Sohier considered “establishing relationships with him” (Sohier, 1965). Some information seems to confirm this relationship materialized: for example, Agustí Pumarola Busquets’ virus laboratory became the second National Influenza Laboratory of Spain in 1968 thanks to a proposal by Roger Sohier (WHO Influenza Centres, 10 June 1968) and not at the initiative of the Spanish government, which was the case with the first National Influenza Laboratory. Furthermore, annual reports from Sohier’s laboratory to the WHO, which were consulted at the agency’s Historical Archive in Geneva, reveal that collaborations between the two laboratories expanded in the following years during the 1970s, not only with scientists training in Lyon but also to isolate and identify the virus. This could also explain the prominence of Catalan pediatricians and scientists, with Agustí Pumarola as acting a driving force in conducting studies on measles and rubella and the early introduction of vaccines against these diseases into the Barcelona vaccination schedules years before they reached the rest of Spain.

Final considerations

We have shown how the support provided by the WHO technical assistance program and subsequent benefits allowed Spanish medical doctors and the Spanish government to call attention to important viral public health problems. This funding also allowed the establishment of a modern virology center and specialist staff training in Madrid, and reinforced the leading role of scientists promoted by the Franco regime after the disruption caused by the Civil War and its aftermath. However, some deficiencies still persisted at the Madrid center after our period of study ended. At the same time, and despite the lack of interest by the Franco regime, another virology center was established in Barcelona thanks to support from the WHO consultant Roger Sohier, who visited Spain several times during the E25 program. The government, in turn, benefited from all of this, since it was able to gain national and international legitimacy through the slow process of modernization and its approach to health problems. Yet even though one of the reasons behind the creation of the Alfonso XIII National Institute of Hygiene and the new CNVES (Majadahonda) was to produce the country’s own vaccines against these viral diseases for economic and strategic reasons, this was only partially achieved due to insufficient political support.

This Spanish case shows that the WHO also operated through the production and circulation of knowledge, of people as well as of scientific and policy practices, through assistance from the WHO country programs. Alongside key foreign figures such as prominent scientists and WHO experts, important domestic players in various locations can also be defined (such as Florencio Pérez Gallardo, Rafael Nájera, and Agustí Pumarola) who made the standardization of scientific and policy practices possible in Spain at the same time that modern virology was developing during Franco’s administration. We can

also see how two different epistemic communities were created in Madrid and Barcelona, and how the epistemic community in Madrid acted with a certain degree of autonomy that caused concern to some WHO consultants because of deviation from the initial plans. This autonomous action may explain why results were fewer and slower than expected from the WHO's collaboration with Madrid, despite the fact that this virological research center was privileged by the regime over its counterpart in Barcelona. Nevertheless, the development of both epistemic communities shows how the international scientific isolation of the regime was overcome, and the prestige attained by these groups of virologists, which in some cases allowed them to begin working on new viruses before social demand for such work existed in Spain. Even so, it is important to emphasize that the extremely centralist approach of the WHO collaboration programs which we have examined, and the prominent role of laboratory work, limited their impact on scientific and professional activity, as Rodríguez Ocaña (2019) has also shown.

Considering Spain as a developing country during the study period, we have also seen the active role played by Pérez Gallardo as a member of the WHO Expert Committee on rabies and Rafael Nájera in enabling a new method for measles culture, as well as a simple method to produce the rubella complement fixing antigen, thanks to the E25 fellowships and help from WHO consultants.

Finally, we would like emphasize that while we agree with Dora Vargha (2018, p.17), who recently pointed out that “virologists and physicians drew on their transnational relations and personal network to be participants in international conferences and study trips and to gain knowledge of cutting-edge research and technology,” it is also important to acknowledge the role of the WHO and its country programs, as well the new opportunities it created “to share holistic, experience-based and context-sensitive knowledge of instances of best practice” and to create “epistemic communities” (Sturdy, Freeman, Smith-Merry, 2013, p.1).

ACKNOWLEDGMENTS

The authors wish to express their gratitude to the director and staff at the WHO historical Archive and Library (Geneva) for their invaluable help in conducting this research.

This research was funded by MINECO-FONDOS FEDER (ref. HAR2015-70688-C2-2P) and Consejería de Educación (JCCM)-FONDOS FEDER (ref. SBPLY/17/180501/000382). Three previous versions have been presented at the ESSHC (Belfast, 3-7 April 2018) [The impact of the World Health Organization (WHO) country program E-25 on the development of virology in Spain], the Symposium Salud, Enfermedad y Medicina en el Franquismo (Ciudad Real, Spain, 27-28 June 2018) [El papel de los programas país de la OMS en el desarrollo de la virología Española], and in the workshop entitled The Meaning(s) of Global Public Health: scholarly and policy implications (Hermance, Switzerland, 28-20 November 2018) [The role played by the World Health Organization country programs in the development of virology in Spain].

NOTES

¹ Which has recently been undertaken (Báguena et al., 2014; Ballester, 2016, 2017, 2019; Ballester, Porras, Báguena, 2015a; González Hernández et al., 2018; Rodríguez Ocaña, 2017a, 2017b).

² Funds for technical assistance health programmes for developing countries were provided by the Second World Assembly, and the huge influence of the United States on the WHO was clearly seen in this process (Cueto, Brown, Fee, 2019, p.64).

³ WHO assistance in controlling communicable diseases was the second area of this technical assistance (Cueto, Brown, Fee, 2019, p.55).

⁴ Ramón y Cajal was not only a renowned national and international scientist, but was also close to the Dean of the Faculty of Medicine of Madrid and the President of the Madrid Medical Association, Julián Calleja (Porras Gallo, 1998, 2019).

⁵ The important role played by Eduardo Gallardo has been studied by Rodríguez Ocaña (2014a), Báguena (2015) and Báguena et al. (2014).

⁶ This laboratory was established in 1894 and was the first official institution for the production and application of serum and vaccines. Its first director went to the Pasteur Institute (Paris) to learn Émile Roux's method for producing and applying the antidiphtheria serum (Báguena, 1988; Bernat, 1991).

⁷ *Expediente personal de Eduardo Gallardo Martínez*. Archivo Histórico del Instituto Nacional de Sanidad Carlos III.

⁸ Eduardo Gallardo was a victim of personal reprisal (Báguena, 2015).

⁹ *Expediente personal de Florencio Pérez Gallardo*. Archivo Histórico del Instituto Nacional de Sanidad Carlos III.

¹⁰ Some Francoist historians have established three main periods of the regime, namely initial (1939-1950), intermediate (1950-1959), and late Francoism (1959-1975), while others consider only two, with early (1939-1959) and late Francoism (1959-1975).

¹¹ Particularly after Spain was excluded from the UN in 1945, following the Conference of San Francisco (June 1945) and the meeting at Potsdam (July 1945).

¹² As studied by Dale Raymond Tash (1951), the "Spanish Question" was raised for the first time at the League of Nations when the Spanish Civil War began and the Republican government asked for protection and some sanctions against Franco.

¹³ Great Britain also shared the American position (USA, 1949).

¹⁴ One example of the American and British positions involved commercial and scientific agreements related to the circulation and production of penicillin in Spain (Santesmases, 2018).

¹⁵ The second supplementary agreement addressed venereal diseases (Castejón Bolea, Rodríguez Ocaña, 2017).

¹⁶ The Palanca administration was the hardest during the Franco regime, and he was able to deal with the postwar epidemic situation and organize public health in Spain by means of the General Law for Health of 1944, amid general scarcity due to the autarchy (Rodríguez Ocaña, 2019).

¹⁷ Between 1952 and 1955, Spain received 118 grants that accounted for slightly less than 6% of the total (Rodríguez Ocaña, 2019).

¹⁸ *Expediente personal de Florencio Pérez Gallardo*. Archivo Histórico del Instituto Nacional de Sanidad Carlos III.

¹⁹ During the Second World War, Germany received most of the grants for training in the different specialties of medicine and chemistry. This situation changed when this war ended, and the United States and Great Britain became the main destinations for science, and France and Italy for humanities training (Delgado Gómez-Escalonilla, 2007, p.269-274).

²⁰ There were frequent mentions of "chicken embryo and tissue cultures of virus and rickettsiosis" or "laboratory work devoted to complement deviation haemagglutination" (El Congreso..., 19 Apr. 1956).

²¹ *Expediente personal de Florencio Pérez Gallardo*. Archivo Histórico del Instituto Nacional de Sanidad Carlos III.

²² Dekking's stance was in line with that of the WHO; we must remember the importance that this international agency placed on communicable diseases from its origins, along with the extension of the medical technologies to all countries (Cueto, Brown, Fee, 2019, p.55).

²³ This was during the outbreak that occurred at the National Hospital of Infectious Diseases (Madrid), following two imported cases from India (Báguena, Mariño, 2016).

²⁴ This new method was developed while he completed a master's degree in virology at the Birmingham Medical School during the 1966-1967 academic year. This degree was the first of its kind in Europe and was directed by Peter Wildy, a virologist expert and expert consultant for the WHO (Nájera, 1975). We have not yet obtained access to direct sources.

²⁵ With a vaccine made with the Cendehill strain, developed in Belgium.

²⁶ This time, with an intranasal vaccine developed at the Wistar Institute of Philadelphia.

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