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Spanish naturalists and natural history societies in the process of colonisation in Morocco (1859–1912)

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ABSTRACT: In this paper, we have analysed the reasons that motivated Spanish naturalists to pursue the study of nature in Morocco during the second half of the nineteenth century. We have paid special attention to the social, political and economic influence of the Africanist groups in the development of these studies. In doing so, our intention is to demonstrate how the scientific study of the natural environment constituted yet another argument for the colonisation of the territory. Our analysis spans a period from the Spanish-Moroccan War of the mid-nineteenth century to the declaration of the Spanish Protectorate over the northern part of Moroccan territory.

KEY WORDS: expeditions – North Africa – nineteenth century.

RESUMEN: En este trabajo analizamos los motivos que llevaron a los naturalistas españoles de la segunda mitad del siglo diecinueve a interesarse por el estudio de la naturaleza marroquí; prestamos especial atención a la influencia, social, política y económica que los grupos africanistas tuvieron en el desarrollo de estos estudios. Pretendemos mostrar con ello cómo el estudio científico del medio natural se convierte, en definitiva, en un argumento más en la colonización del territorio. Nuestro análisis abarca, en lo temporal, desde la guerra hispano / marroquí de mediados del siglo hasta la declaración del Protectorado español sobre la parte norte del territorio de Marruecos.

PALABRAS CLAVE: Expediciones – Norte de África – Siglo XIX.

CONSEQUENCES OF THE SPANISH-MOROCCAN WAR (1859–1860)

The war in Africa between Spanish troops and those of the Sultan of Morocco from October 1859 until April 1860 served as a pretext to print popular texts about a region that, despite its proximity, was practically unknown to Spaniards of the time. These texts, a reflection of a market for this type of product, were of mediocre quality with the exception of *Descripción y mapas de Marruecos ...* (Gómez de Arce and Coello, 1859) and were, without doubt, the best means available to learn about the territory of the developing conflict.

In addition, many Spanish soldiers came into contact with the territory during the Spanish-Moroccan War and more than a few published their impressions of the war theatre: Gutiérrez Maturana (1876), González Ruesgas (1860), or Monedero (1877). Nevertheless, it was the journalists sent by Spanish newspapers who, in greater detail, reported on the landscape, customs and geography of the Morocco. An important part of these chronicles appeared as periodicals, where references to the inhabitants and morphology became elements as attractive to the readers as the accounts of the war itself.

The Spanish troops' stay in northern Africa also had certain repercussions on the study of the natural environment. Weyler Laviña¹, Chief Medical Officer in the first of the three Spanish Army Corps to enter combat, had enough time and energy to collect plants and

make interesting geographical notes. His observations (Weyler Laviña, 1860a, 1860b) must have served as guidelines for those who, years later, wanted to botanise the North African territory. Immediately after the conflict, Landa Álvarez (1860)², also a military physician, published his memoirs providing a good guide to the climate of the area as well as to the measures taken to fight cholera, a disease that afflicted the Spanish troops in combat. Shortly afterwards, Ferreiro Peralta (1860)³ produced a proper description of the new Spanish territory in Morocco.

The treaty signed in Tetouan on 26 April 1860 put an end to the war in north-west Africa and, in addition to other political and economic considerations, led to the expansion of the borders of Ceuta (Gómez-Jordana Souza, 1976). In the spring of 1860, the Spanish government established a commission including Laguna⁴ and Satorras⁵, both forestry engineers, whose aim was to evaluate the forest of Sierra Bullones. The result of their studies (Laguna and Satorras, 1877) was a survey of the forests, without any attempt to approach the question of forestry regulation, in which the authors included an inventory of the trees a few months after the arrival of the Spanish troops at the gorge of yebel Mussa.

MOROCCO: LAND OF ADVENTURE

Driven by a mutual interest and their desire for adventure, Gatell⁶ and Murga⁷ fitted the image of the romantic traveller perfectly (Marín, 1996). Both went to Spanish Morocco once the war was over, immediately after the signing of the Treaty of Tetouan, and their travels had nothing in common with the Africanist mentality characterizing later Spanish visits to Moroccan territory. Both the men travelled in disguise, adopting Arabic names and the dress and customs of the people they visited, prolonging their travels and maintaining contact with the indigenous population over a period of several years.

The resulting publications (Gatell, 1879; Murga, 1878) are of considerable sociological and ethnographic value and have little in common with the reports of the official commissions. Gatell's and Murga's books were more like adventure novels than scientific texts and are imbued with the extraordinary freshness of first-hand experience.

Although lacking scientific rigour, Gatell's and Murga's accounts provide glimpses of the natural environment in which they worked. Their legacy is their "recollections", their itineraries, on occasion only descriptions of cities and distances, which were later used by those wanting to travel to North Africa with more colonialist intentions.

Murga and Gatell were not naturalists strictly speaking, but the knowledge of the natural environment demonstrated in their accounts, and in particular some anthropological detail, constitutes one of the recurring themes. These two men together with Cristóbal Benítez⁸, an equally romantic explorer, served as the lobby for those who defended from the Spanish Parliament the need to colonise the African territories.

THE RISE OF THE AFRICANIST INTERESTS: COMPANIES

The official founding of the Sociedad Geográfica de Madrid took place in the Real Academia de la Historia on 2 February 1876. From the start, this society promoted the idea of studying the geography of Moroccan territory, an area of special interest to the Spanish. This was particularly so since Auguste Beaumier, French Consul in Mogador, had evaluated the

economic possibilities of the Tangier-Mogador area, and his compatriot C. J. Tissot had interested himself in the triangle delimited by Tangier, Rabat and Fez. The Spanish, physically closer to these areas, believed themselves to be much better placed to undertake their study (Coello, 1876).

In December 1883, the Sociedad Española de Africanistas y Colonistas was created. It was a break-away from the Sociedad Geográfica de Madrid and, unlike the latter, was engaged in trading and other associated activities improper to a strictly scientific group like the Sociedad Geográfica de Madrid. The latter would soon assume a preponderant role in Spanish decision-taking in Africa.

Members of the Sociedad Española de Africanistas y Colonistas succeeded in influencing the Spanish government. In 1885, on the initiative of Segismundo Moret⁹ and with the agreement of the government, the Congressional Budget Commission included an amount of 100,000 pesetas for the organisation of scientific explorations and trips (Torres, 1885) in a project submitted for approval by the Spanish Parliament.

FROM "COMMERCIAL REPORTS" TO THE PROLIFERATION OF TRADING COMPANIES

The colonial aims in the Moroccan Empire pursued by Africanist groups found their most forceful defenders among the Spanish consuls who could provide most precise reports about local resources and their exploitation. Moreover, it was they who had the most interest in strengthening trade between Moroccan and Spanish ports.

Around 1877, Álvarez Pérez, Spanish Consul in Mogador, published his consular reports and included geographical, edaphic, ethnographical, botanical and zoological data (Álvarez Pérez, 1877a). The most interesting botanical aspects, relating to the cultivation of argan (*Argania spinosa* (L.) Skeels: Sapotaceae), were published separately (Álvarez Pérez, 1877b).

The trade reports sent to the General Customs Office frequently constituted much more than a mere bureaucratic procedure and became documents of reference for the Spanish Africanists of the second half of the nineteenth century, still hungry for information regarding the natural resources of the Moroccan Empire. The pages of Africanist periodicals, such as *El Boletín de la Sociedad Geográfica de Madrid* or *La Revista de Geografía Comercial*, usually printed extracts from the bureaucratic documentation of Spanish delegates.

During the early 1880s, it was generally believed that the European powers would intervene in Morocco. The progressive colonisation of Algeria by France and the convenience of extending its commercial activities to the Atlantic ports drove French diplomacy into maintaining a constant power struggle with Germany and Spain, the countries that were most interested in the possible colonisation of North African territories. This situation, fomented by different colonisation companies which made a point of divulging information, led to the creation of more than a few trading companies interested in the exploitation of the new territories.

Some of these companies sent expeditions or requested reports from those who understood Moroccan territory, so as to evaluate the possible commercial impact. Among these companies was the Sociedad Geográfica y Comercial de Barcelona, founded in 1884. A few months after its creation, this company commissioned Saturnino Jiménez to study the commercial resources of the coasts of the Rif. The work of Jiménez was closely related to attempts to

establish a German-Spanish alliance to curb the commercial dominance of France in northwest Africa. His proposals were excluded from Spanish policy after their rejection by German trading agencies and even by Bismark himself.

In Madrid during November 1883, the *Compañía Mercantil Hispano-Africana* was set up, its objective being to build factories on the northwestern coast of Africa. Its work was closely tied to the *Sociedad Española de Africanistas y Colonistas*, although the initial capital and trading name were different and this latter society was concerned with other African territories such as Río de Oro, Sahara and Guinea.

When Práxedes Mateo Sagasta came to power in 1885 in the reign of Queen María Cristina, there were important changes in Spanish policy on foreign trade, particularly towards Morocco. Segismundo Moret, who was named Minister of Foreign Affairs, favoured these commercial interests with the creation of the Chambers of Commerce.

The Spanish *status quo* policy towards the territory of the Moroccan Empire was experiencing more and more difficulties on two fronts. On one side, there was the gradual interfering of European powers in the affairs of the Moroccan Empire. On the other were the actions taken by the colonisation companies, making reiterated petitions to the Spanish Parliament and to the government for a change in attitude on the Moroccan question in order to promote Spanish presence in affairs, particularly those of economic nature.

SPANISH NATURAL HISTORY SOCIETIES AND INSTITUTIONS AND THE PROCESS OF COLONISATION

The integration of the naturalists into this colonisation process was progressive. The institutional push came from the *Sociedad Española de Historia Natural* and, given its ties with Ignacio Bolívar¹⁰, from the *Museo Nacional de Ciencias Naturales*.

Bolívar had organized and directed a scientific expedition of university students to Moroccan territory in 1883; the route taken was from Tangier to Tetouan and Ceuta (Bolívar, 1938). Members of the group included Odón de Buen¹¹, Reyes Prósper¹², Vila Nadal¹³, Antón¹⁴, and Chicote¹⁵, all of whom were linked in one way or another to the scientific activity that would take place in future years in the study of North African natural history. Four years later, in March 1887, Bolívar and the botanist Lázaro Ibiza¹⁶ applied for a grant from the General Office of Public Education to study the flora and fauna of the Moroccan Empire, but this was rejected.

In September 1894, Calderón¹⁷ presented the *Sociedad Española de Historia Natural* with a detailed study of the natural environment of the Chafarinas Islands. To justify the area studied, he used the premise defended by Castor Amís at the *Congreso Español de Geografía Comercial y Mercantil* held in Madrid that same year. The text, more political than scientific, included data provided by Miguel Iborra (1873–1941), a military pharmacist stationed in Melilla, and other data from an unpublished report by Vicente Chiralt. In both cases, the data were insufficient to justify the scientific aims supposedly pursued by the author, but was more than enough for the ultimate aim: to prove the usefulness of a scientific expedition to these territories over which Spain might one day be sovereign (Calderón, 1894).

The idea put forward by Calderón was taken up by the *Sociedad Española de Historia Natural* ten years later, when the social and political situation made it viable.

The Chafarinas, characterized as *terra ignota* by Calderón, would remain so for only a short time. The troops deployed there concerned themselves with exploration of the islands

and of their natural diversity. Luis Bescansa Casares (1878– c. 1922), a military pharmacist stationed at the hospital there between 1900 and 1901, was able to botanize and obtained the data necessary for his doctoral thesis, the first of its kind on the natural environment of these islands, entitled *Herborizaciones fanerogámicas en las Islas Chafarinas y sus inmediaciones del Campo Moro*, which he defended at the Universidad Central on 21 June, 1902. In the defence of his thesis, he advocated interest in the area in question, encouraging its study and emphasizing the special nature of the frontier of the territory explored (Bescansa, 1908).

THE COMMISSION FOR THE EXPLORATION OF NORTHWEST AFRICA

In March 1905, at the request of Martínez de la Escalera¹⁸, planning began for the annual expedition of the Real Sociedad Española de Historia Natural. This time the territory chosen was northern Africa. To this end, a commission was named, formed by Salvador Calderón, Ignacio Bolívar and Blas Lázaro. At the beginning of April, a rough draft was drawn up for a particular totally independent sector: a commission for the exploration of northwest Africa.

The Comisión para la Exploración del Noroeste de África was independent of the Society, especially as regards the raising and investment of funds. Forming the Commission were people of known political influence, unrelated to the Sociedad Española de Historia Natural, on whom the total responsibility of management rested. The choice of members of the Commission revealed the interest and influence of those who favoured the peaceful occupation of the area. It was presided over by a former Minister of Public Education, the liberal Manuel Allendesalazar. The Dukes of Alba, Luna and Medinaceli, and the Marquis de Santacruz occupied the vice-presidencies and an honorary place was reserved for Ramón y Cajal. The treasurer was the Marquis de Urquijo. Only the regular committee members seemed to be interested in and responsible for the scientific part of the project, and even among these it was possible to find individuals with political interests. One such person was Luis Bahía Urutia, who from his seat in the Parliament became interested in the agricultural situation of the North African territory. In 1906, José Muro y López-Salgado, Member of Parliament for Valladolid, joined the Commission. Thanks to his intervention, the Commission was included in the annual budget of the Ministry of State; J. Muro y López-Salgado became President of the Commission when, at the end of January 1907, Manuel Allendesalazar was named Minister of State in the cabinet of Antonio Maura.

The funds earmarked for this new commission were not slow in coming. First was a grant from King Alfonso XIII himself; those from political members of the commission, institutions interested in the colonising process, such as the Ministry of State, the Bank of Spain, the Casino de Madrid or the Asociación de Ganaderos and other private citizens linked to neo-colonialist groups (Nicolás M. Urgoiti, Carlos Barranco and S. Estefani, among others) came later. Ignacio Bolívar, in his three roles as treasurer of the Sociedad Española de Historia Natural, secretary of this commission and director of Museo Nacional de Ciencias Naturales, was responsible for drumming up financial help, establishing pertinent contacts with domestic and foreign scientists who would be collaborating in the classification of the materials collected, and procuring the publication of the results.

The creation of this commission was not accidental. It was a logical response to a social situation in which everything Moroccan was arousing exceptional interest in the European context. This was not just the case in Spain but also in France, where it should be remembered that in that same year the French Ministry of Public Education created a special fund for

the first time for the recently-founded “Scientific Mission to Morocco”. No one can deny a direct relationship between this interest to explore and the preparations for the share out of Moroccan territory. The echoes of the secret treaties between Spain and France, signed at the end of November 1904 and the beginning of September 1905, were already becoming public; a few months later, on 16 January, 1906, the Conference of Algeciras started.

The scientific study of the natural environment became one more argument for the colonisation of the territory.

The first expeditions organized by the Comisión para la Exploración del Noroeste de África took place during the summer of 1905; Fernández Navarro (1906)¹⁹ studied the geology of the Chafarinas Islands and that of some territories on the nearby coast. His results led him to confirm the volcanic origin of the Chafarinas and Alborán islands, the former as homogenous volcanoes and the latter as the remains of an explosive volcano, as well as the confirmation that the islets of Alhucemas and Peñón de Vélez de la Gomera were fragments of the neighbouring coast (Fernández Navarro, 1906b).

In 1906, Fernández Navarro elaborated a plan for the geological exploration of the African northwest (Fernández Navarro, 1906), which he presented to the Sociedad Española de Historia Natural. In this document, he insisted on the geological interest of the Rif coast, an area which he himself had studied the previous year. What was truly innovative about his plan however, and an exception to the general comments made at the time recommending economic support for research on North African nature, was his criticism of the idea that an in-depth research project would be impossible due to the scant financial resources available.

There was some improvisation in the approach to costs and organization of the study when Fernández Navarro alluded to the geological aspect as being of enormous economic interest due to its link to mining exploitation, which, together with the railroad, was one of the greatest incentives for neo-colonial capital. Far from defining possible methods of exploitation, which was without doubt the aim pursued by politicians and businessmen (Martínez Sanz, 1992) the efforts of the naturalists, still in their early stages, were limited to an inventory of the natural world.

In September 1906, Martínez de la Escalera, accompanied by a hunter and a taxidermist, focused on the study of the fauna of Mogador. His initial attempts at working in the area between Mogador and the Sus over a period of nine months were soon frustrated. Due to the irritation of the local tribes provoked by the resolutions of the Conference of Algeciras, the unstable situation in the area made it advisable to abandon the project and pursue his studies in the direction of Marrakech. After a short visit to Madrid, where he gave a conference at the Ateneo Científico y Literario, he left again for Morocco. During the summer of 1907, his goal was the Atlas Mountains, but, despite repeated attempts, this area would remain unstudied. A few months later, at the start of 1908, Spanish troops occupied La Restinga and Cabo de Agua. The army’s political influence was analysed in depth by Manuel Tuñón de Lara (1980). A new military action was brewing over Morocco.

Despite this situation, we must also mention the second expedition made by Fernández Navarro (1869–1930) to Tres Forcas and Cabo de Agua during the summer of 1908. At the same time, Arias Encobet²⁰, curator of the entomology section of the Museo Nacional de Ciencias Naturales and specialist in the study of dipterans, made a brief trip to Melilla. He came back not only with dipterans, but also with a variety of other insects: the neuropterans were studied by Navás²¹, after whom *Myrmeleon ariasii* Navás was named (Navás, 1913); the hymenopterans were studied by Dusmet²² (1915) and the coleopterans by Martínez de la Escalera (1909a). Even some reptiles were collected and studied by Zulueta²³ (1909).

THE FIRST OCEANOGRAPHIC RESEARCH: BETWEEN MOGADOR AND PUERTO PÍ

At the inauguration of the Oceanographic Museum of Monaco in 1910, Odón de Buen made reference to the scant information available on African ichthyology and the moral obligation of Spain to present concrete results on its research activities to the scientific community. Perhaps the situation would not have been so critical if there had been more coordination among the Spanish ichthyologists. On the initiative of the Museo Nacional de Ciencias Naturales, the Laboratory of Marine Biology was officially created on 22 August 1905, on the western coast of Morocco. Nevertheless, despite the appointment of José Rioja²⁴ as director of the centre in November of 1907, the laboratory, which should have been built in Mogador for the study of the flora and fauna of the territory, never materialised.

The reason for the lack of effectiveness in the creation of the Laboratory of Marine Biology in Mogador should be attributed to the completion of another Laboratory of Marine Biology in the Balearic Islands in 1906 at the request of Odón de Buen; this was inaugurated two years later at Puerto Pí. The first oceanographic studies of the Moroccan coast would be carried out from the marine laboratory in Puerto Pí, using a sailboat in poor condition named *Averroes*. To facilitate these studies, a provisional laboratory was created in Melilla, which was moved to its definitive location in Malaga in 1914.

Despite the initial failure of the Museo Nacional de Ciencias Naturales to use the projected biological station in Mogador, Lozano Rey²⁵ carried out numerous ichthyological research projects on the coast of Melilla. The first of these, in 1906, was in collaboration with Odón de Buen; the remainder, after 1908, were partially subsidized by the Museo Nacional de Ciencias Naturales.

THE NATURALISTS IN A MILITARISED SOCIETY

After the first attacks by the kabyles on the mining exploitations of the Rif in the summer of 1909, the militarised situation in Moroccan territory, contrary to what might be expected in imminent war conditions, proved favourable for the study of the natural environment. Military pharmacists provided important data on the flora, fauna and land of the Spanish Protectorate (González Bueno *et alii*, 1997; González Bueno and Gomis Blanco, 2002).

In 1912, Xiberta Raig (b. 1890), a military pharmacist stationed in Melilla, sent plants to Font i Quer²⁶ for classification. This was nothing new for the Catalan chemist and pharmacist who had already received other collections from Larache sent by Pérez Camarero (1844– post 1914), another military pharmacist who botanized that territory in the spring of 1913. In this group, we can also include Ángel Aterido (1886–1928) who botanized Tifasor between 1915 and 1916 during his military service. The process of specimen collection by the Medical Corps was to be fundamental for the elaboration of a flora of the western Mediterranean (1888–1964), undertaken by Font i Quer during those years.

Here we can observe a way of working prevalent in areas of difficult access. Researchers turned to the people stationed in the area, encouraging them to provide the necessary materials for the study of the natural environment, but the classification is then performed by professional scientists, very different from the amateur collector.

Despite this, naturalists prefer to see the materials *in situ*. Carlos Pau²⁷ disembarked in Melilla in the spring of 1910 with the intention of botanizing Zeluán and Nador (Pau, 1911).

This was not his first contact with Moroccan plants; years before, in 1897, he had published a brief article, vindicating the Spanish efforts in the classification of this flora at the beginning of the nineteenth century (Pau, 1897) and, shortly before initiating his Moroccan tour, he catalogued a handful of Moroccan plants collected by Benito Vicioso in Ceuta (Pau, 1908). What was botanized by Pau in this first self-financed African expedition, in the spring of 1910, had hardly any repercussion in his immediate botanical production, but the results would be present, one way or another, in the rest of his work. After the publication of his first article on plants of the Rif (Pau, 1911), he received a multitude of offers and requests from practically all the European botanists interested in North African flora.

During the summer of 1910, Fernández Navarro, disregarding the dangers of working in a territory in a state of war, travelled to the Kebdana mountains. He climbed yebel Tamsot, the highest peak, disguised as a native and accompanied by two Kebdanis, later joining the column of Colonel Aizpuru in the occupation of Yazanen. This gave him the opportunity to study the area around the mouth of the Kert. The data obtained during this trip, following an already established custom with this geologist, were published in the papers of the Sociedad Española de Historia Natural (Fernández Navarro, 1911, 1912).

The hostile situation in Moroccan territory may have slowed the expeditionary efforts of the Sociedad Española de Historia Natural but not their interest in divulging the inventory work carried out up until then. In March 1910, Emilio Ribera proposed presenting the completed studies at the National Exhibition to be held in Valencia. The material presented by the Sociedad Española de Historia Natural was duly awarded the gold medal.

In the same year, the Société d'Histoire Naturelle d'Afrique du Nord was created in Algiers. Its aim was to promote studies on North African nature.

A certain patriotic spirit could be appreciated in E. Ribera's proposal in defence of the precedence of the work done by Spanish naturalists.

The Sociedad Española de Historia Natural resumed its exploration programme for northern Africa in the spring of 1912, after the signing of the agreement establishing the Franco-Spanish Protectorate in the territory of Morocco. The political conditions of the territory, still to be pacified, would be quite different.

THE COLLECTIONS: WORK AT THE OFFICE

From 1860 until the end of the nineteenth century, the formation of collections in the Spanish territory of northern Africa was uncommon. At the turn of the century, and largely due to the insistence of the Sociedad Española de Historia Natural, the number of collections of African natural history objects increased considerably, particularly after the creation of the Comisión de Estudios del Noroeste de África in 1905.

The materials collected by the Spanish expeditions to North Africa were predominately those of zoological interest, especially entomological, perhaps due to the special tie that existed between the Sociedad Española de Historia Natural and the Museo Nacional de Ciencias Naturales. At this point it is necessary to highlight the work of the natural history collector Martínez de la Escalera and the management and coordination of Ignacio Bolívar, who promoted the study of the samples collected by prestigious European specialists. Most of these zoological collections are deposited in the Museo Nacional de Ciencias Naturales.

Botanical studies received a significant impulse after the creation of the Junta para Ampliación de Estudios in 1907. Until then, individual botanists had tried to undertake this

enterprise, either privately or with the support of the Real Sociedad Española de Historia Natural. In this respect, the work of Pau and Font i Quer should be noted. The herbarium of the Real Jardín Botánico in Madrid contains an important collection of plants of Moroccan origin that had been collected during these years, particularly the herbarium of Pau. The collections of Font i Quer are in the custody of the Institut Botànic in Barcelona.

Regarding geological studies, those carried out by Fernández Navarro, pioneer in the analysis of the Rif mountains and yebel mountain ranges, are worthy of note. His samples were deposited in Madrid, in the Museo Nacional de Ciencias Naturales.

The data available lead us to the conclusion that the Spanish naturalists studied both the zoological and botanical aspects of the North African territories with the same intensity. They paid less attention to the geological studies, although these attracted the attention of scholars in later years.

Collectors centred their efforts on different disciplines: in zoology, the arthropods (especially insects) and vertebrates (especially fish) were of interest; in botany, phanerogamic studies took priority over cryptogamic ones; in the field of geology, the studies centred on the superficial description of the territories and the search for mineral deposits.

NOTES

¹ Fernando Weyler Laviña (1808–1879), physician. After completing his studies in Paris, he joined the Cuerpo de Sanidad Militar, accompanying the Spanish Army on its campaigns in the Philippines and Morocco.

² Nicasio Landa Álvarez (b. 1831), army officer, physician, journalist, specialist in military ethics, member of the Real Academia de la Historia.

³ Martín Ferreiro Peralta (1830–1896), draughtsman, worked with Francisco Coello in producing the map of Spain, represented Spain at international geographic symposiums in Venice (1888) and Paris (1889).

⁴ Máximo Laguna Villanueva (1826–1902), forestry engineer, worked for the Ministerio de Hacienda, completed his studies in Tharand (Saxony), presided over the Comisión de la Flora Forestal Española. Member of the Real Academia de Ciencias, Exactas, Físicas y Naturales, presided over the Sociedad Española de Historia Natural.

⁵ Luis Satorras (d. 1902), forestry engineer, worked in the management of Catalanian forests.

⁶ Joaquín Gatell i Folch (1826–1879), from Catalonia, studied philosophy, languages (French, English and Arabic) and law.

⁷ José María Murga Mugartegui (1827–1876), army officer, resided in France and Great Britain; wrote chronicles of the Crimean War; from 1861 on dedicated all his effort to preparing his voyages to Morocco.

⁸ Cristóbal Benítez (*fl.* 1879–1882), interpreter for Spanish diplomats in Morocco.

⁹ Segismundo Moret (1838–1913), lawyer, Minister of the Interior, Speaker of Congress and Prime Minister (1905, 1906, 1909–1910).

¹⁰ Ignacio Bolívar Urrutia (1850–1944), Professor of Entomology at University of Madrid (1877–1920), director of the Museo Nacional de Ciencias Naturales (1901–1936) and the Real Jardín Botánico (1921–1930); President of the Junta para Ampliación de Estudios (1934–1936). Belonged to a great number of Academies and taught most of the Spanish naturalists of the time. In 1939, after the Spanish Civil War, he lived in exile in Mexico.

¹¹ Odón de Buen y del Cos (1863–1945), Professor of Natural History at the universities of Barcelona and, later, Madrid. Prominent scientific researcher, firm defender of Darwinism in Spain; directed the Instituto Español de Oceanografía (1914–1936) and was the driving force behind oceanographic studies in Spain. After the Spanish Civil War, he lived in exile in Mexico.

¹² Eduardo Reyes Prósper (1860–1921), mathematician and naturalist, specialist in the study of Spanish flora, Professor of Phytography and Botanic Geography at the University of Madrid, director of the Real Jardín Botánico (1919–1921).

¹³ Antonio Vila Nadal (1861–1941), doctor in natural sciences, university professor. Dedicated large part of his activities to spreading scientific knowledge.

¹⁴ Manuel Antón y Ferrándiz (1849–1929), doctor in natural sciences. Initiated his research in the study of malacology, later specialising in anthropological studies and becoming professor of the University of Madrid and head of the anthropology section of the Museo Nacional de Ciencias Naturales.

¹⁵ César Chicote del Riego (1861–1950), interested in entomology. Was head of the Municipal Chemical Laboratory of San Sebastián and, later, the Municipal Laboratory of Madrid, organising municipal disinfection and hygiene services.

¹⁶ Blas Lázaro Ibiza (1858–1921), naturalist, Professor of Descriptive Botany at the University of Madrid. His main preference was Spanish fungal flora.

¹⁷ Salvador Calderón Arana (1851–1911), naturalist, participated in the creation of the Institución Libre de Enseñanza; was Professor of Mineralogy and Botany at the University of Madrid; directed the section of mineralogy at the Museo Nacional de Ciencias Naturales.

¹⁸ Manuel Martínez de la Escalera y Pérez de Rozas (1865–1949), self-instructed. made important trips collecting natural samples, especially insects, in different European, Asian and African territories.

¹⁹ Lucas Fernández Navarro (1869–1930) naturalist, Professor of Crystallography at the University of Madrid. Was President of the Sociedad Española de Historia Natural, in whose journals he published most of his studies on crystallography and mineralogy.

²⁰ José Arias Encobet (1885–1921), was curator of entomology at the Museo Nacional de Ciencias Naturales, later becoming Professor of Animal Physiology and Organography at the University of Barcelona.

²¹ Longinos Navás Ferré (1858–1938), Jesuit priest, specialist in entomological studies, published more than 700 articles on this specialty.

²² José María Dusmet Alonso (1869–1960), naturalist, specialist in hymenopterans, honorary collaborator of the Museo Nacional de Ciencias Naturales for more than half a century.

²³ Antonio Zulueta Escolano (1885–1971), studied natural sciences at the universities of Paris and Madrid, dedicated his early efforts to the study of reptiles, later worked in genetics, introducing experimental genetics into Spain.

²⁴ José Rioja Martín (1866–1945), Professor of Invertebrate Zoology at the University of Madrid, was director of the Estación de Biología Marítima in Santander (1904), and in 1906 was named director of the Estación de Biología Marina in Mogador, which never reached fruition due to political problems.

²⁵ Luis Lozano Rey (1879–1958), Professor of Vertebrate Zoology at the University of Madrid, was curator of the osteozoology section at the Museo Nacional de Ciencias Naturales; dedicated large part of his efforts to the study of Mediterranean fish.

²⁶ Pius Font i Quer (1888–1964), army officer, was Professor of Botany at the University of Barcelona; presided over the Institució Catalana d'Història Natural and directed the Museu de Ciències Naturals (1921–1935) of Barcelona. Undoubtedly, he was one of the Spanish botanists of greatest international prestige.

²⁷ Carlos Pau Español (1847–1937), from his chemist's shop in Segorbe, maintained contact with foremost botanists from all over Europe; directed the botanical journal *Cavanillesia*, which was the first of its kind in Spain.

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