The evolutionist debate in Spain during the nineteenth century: a re-examination

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Abstract

This article re-examines the research on evolutionism in Spain and updates knowledge on this topic in light of the work of Thomas Glick, the more philosophical work of Diego Núñez and contributions in recent years from the Latin American network of historians of biology and evolution, who have dealt with the more polemical aspects of the reception of evolution theory. It includes new arguments, such as identification of the drawings in *El Museo Universal*, whose Lamarckian or Darwinian nature has been a subject of ongoing debate. It also covers the crucial role of the acceptance of Haeckel's work in Spain in comparison to the weaker support for a strictly Darwinian perspective, the role of the Spanish histology school, and the impact of evolutionism on literature.

Keywords: evolutionism; Darwinism; Ernest Haeckel (1834-1919); Charles Darwin (1809-1882); Spain; nineteenth century.

The first references to and translations of Darwin in Spain

Research carried out in recent years by Alberto Gomis and Jaume Josa argues that the first references to Darwin in Spain, specifically to his geological work, are some indirect commentaries published in the 1840s and, most importantly, an early translation in 1857. This was Darwin's chapter on geology in *A manual of scientific enquiry*: *prepared for the use of Her Majesty's Navy and adapted for travellers in general*, a collective volume edited by Sir John Herschel, published in London in 1849 and translated into Spanish in Cádiz by the naval brigadier Juan Nepomuceno de Vizcarrondo, based on the second English edition of 1851 (Gomis, Josa, 2007). The first reference in Spain to Darwin's work on evolution may date to 1860, since in that year the *Revista de los Progresos de las Ciencias* [*Review of Progress in the Sciences*], the journal of the Real Academia de Ciencias Exactas, Físicas y Naturales [Royal Academy of Exact, Physical and Natural Sciences] in Madrid published a translation of a paper by Charles Lyell, "On the antiquity of appearance of man on earth," in which he cited the upcoming publication of Darwin's work on the origin of species (Pelayo, 2008). Three years later, some satirical caricatures entitled "Escalas de las transformaciones" ["Levels of transformation"] appeared in the journal *El Museo Universal* [*The Universal Museum*] (Escalas..., 28 jun. 1863, p.160, 14 jun. 1863, p.192, 31 mayo 1863, p.160, 17 mayo 1863, p.160). These ironically depicted man becoming an ox and then a pig, and other surprising transformations. Although they were believed to allude perhaps to Lamarck, they are in fact copies of some of the twenty engravings published by the caricaturist Charles Henry Bennett in the *Illustrated Times*, a London newspaper, between May 2 and October 10, 1863, under the title *The origin of species, dedicated by natural selection to Dr. Charles Darwin*.

It has been argued that Professor José Planellas of the Universidad de Santiago critiqued Darwinism in the 1860s. However, this is denied by Xosé Fraga, who argues that rather than strictly critiquing Darwinism, Planellas was in fact defending an antievolutionist position in general, perhaps alluding to Lamarck. This French transformist had been criticized shortly before by Sandalio de Pereda in his 1858 doctoral dissertation *Unidad específica de las razas humanas* [*The species unity of the human races*] (Puig-Samper, 1999), and some of Lamarck's ideas had been translated during the 1860s in the Barcelona journal *La Abeja* [*The Bee*] (Camós, 1997). Fraga only acknowledges early Darwinism in Rafael Cisternas y Fontseré (1818-1876), a professor of mineralogy and zoology at the Universidad de Valencia from 1861-1876, who, according to his disciple Eduardo Boscá, saw "the light" from his first reading of the *Origin of species*; Fraga also cites early Darwinism in Antonio Machado y Núñez, known as one of Darwin's main defenders in Spain in the 1860s in the city of Seville. In 1866, a professor of medicine there named Francisco Flores Arenas publicly condemned Darwinism; in that same year, in Barcelona, another professor of medicine, José de Letamendi, issued a critique of Darwin.

The Comisión Científica del Pacífico [Scientific Commission on the Pacific] played a special role. This Spanish expedition constituted one of Spaniards' earliest contacts with defenders and opponents of evolutionist theories, since on first arriving in Brazil they made contact with Fritz Müller, who had discovered the fundamental law of biogenetics later publicized by Ernest Haeckel. Later, in Buenos Aires, they met a well-known anti-evolutionist, doctor

Burmeister, and in Chile they collaborated enthusiastically with the German Darwinist Phillip, who was then director of the Museum of Natural History in Santiago (Puig-Samper, 1988). Given the biography used by naturalists from the Scientific Commission in their subsequent works, those years prior to the restoration of the Spanish monarchy in the last third of the nineteenth century were characterized by exemplary eclecticism in terms of scientific practice.

Later on, the responses to evolutionism in Spain were characterized by more ideological confrontation and it was applied less to biological research and scientific work in the field (Núñez Ruiz, 1975; Glick, 1982; Pelayo, 1999a). The revolution of 1868 was a catalyst for debate about evolutionism, since it brought freedom of the press and public discussion on topics like this, of great ideological, political, scientific and religious importance. This led, under the Restoration, to the 1876 translation of *The origin of man*, in Barcelona, and one year later to *The origin of species*, in Madrid, by Enrique Godínez (Gomis, Josa, 2009).

However, the first attempt to translate Darwin's book into Spanish was in 1872, and was based on the French translation by Clémence Royer. In addition to being late in comparison to the first translations published in other European countries, it was also incomplete, since publication was suspended when only the first two chapters and part of the third had appeared. The published sections appeared in the "Biblioteca social, histórica y filosófica" ["Social, historical and philosophical library"] under the title *Origen de las especies por selección natural ó resumen de las leyes de transformación de los seres organizados con dos prefacios de Mad. Clemencia Royer* [*The origin of species by natural selection, or a summary of the laws of transformation of organized beings, with two prefaces by Mme. Clémence Royer*].

A broad and systematic outline of evolutionist theory was published in the 1870s, in the first volume of a collection of papers entitled *La creación: historia natural escrita por una sociedad de naturalistas...* [*Creation: a natural history written by a society of naturalists…*] (Vilanova, 1872-1876), edited by the anti-Darwinian paleontologist Juan Vilanova. Although the lengthy section is not signed, it can be attributed to Francisco María Tubino, a journalist with an interest in prehistorical archeology. In the first part, Tubino deals with "The origin of species: antecedents of Darwin's theory," providing a long positivist commentary, followed by another, shorter section, "On the variation of animals and plants under the rule of man." In the second part he discusses "The origin of man according to Darwin," and ends with "Summary and conclusions" on the British naturalist's doctrine. In his footnotes to Tubino's book, Vilanova goes into more detail on issues relating to evolution theory with which he disagrees (Pelayo López, Gozalo Gutiérrez, 2012).

Antonio Machado y Núñez and the response to evolutionism

Antonio Machado y Núñez was the leading light of an institution that was central to the scientific field, the Anthropological Society of Seville, which was founded in 1871, under the revolution, and perished with the restoration of the monarchy. Machado, a great physician and naturalist and grandfather of the poets Antonio and Manual Machado, was a firm believer in Darwin's theories and introduced them into Spain (Machado y Núñez, 1989). In 1869, Machado y Núñez and Federico de Castro founded the *Revista Mensual de Filosofía, Literatura y Ciencias de Sevilla* [*Monthly Review of Philosophy, Literature and the Sciences in Seville*], the mouthpiece for Darwinism in Andalusia, as well as for evolutionism in general,

and, curiously, for Krausism, which was advancing towards positivism by then. In one of the first issues, Machado y Núñez (1871) published an article entitled "Apuntes sobre la teoría de Darwin" ["Notes on Darwin's theory"], in which he analyzed the concepts of natural selection, adaptation and competition for survival, and stressed the importance of the new theory. He published other articles in the same journal, such as "Teoría de Darwin: combate por la existencia" ["Darwin's theory: the struggle for existence," 1872], "Teoría de Darwin: la selección natural" ["Darwin's theory: natural selection," 1872], "Darwinismo: la edad de la Tierra" ["Darwinism: the age of the Earth," 1872] etc., as well as other pieces of a more general evolutionist nature such as a commentary in 1874 on Haeckel's *The history of creation* or commentaries on Herbert Spencer in an article titled "De la creación y de la evolución" ["On creation and evolution," 1874]. Machado y Núñez also published a book on Haeckel, *El monismo como nexo entre la religión y la ciencia* [*Monism as the nexus between religion and science*, Madrid, 1893]; he was one of the exponents of the German scholar's theories in Spain.

Among Machado y Núñez's collaborators were Góngora, Prieto, Chiralt, Tuñón, Caro etc., and especially his own son, Antonio Machado y Álvarez, who pioneered the study of folklore in Spain. Machado y Núñez also wrote an 1884 prologue to a Spanish translation of a work by Hugo Magnus, *Historia de la evolución del sentido de los colores* [*A history of the evolution of color sense*], in which he used natural selection as an evolutionary mechanism to explain color sense and claimed that Aristotle was the most important figure in Antiquity, just as Charles Darwin was to the modern era. We should also note Romualdo González Fragoso, managing editor of the Biblioteca Biológica [Biological Library], who in 1887 translated Haeckel's work *El reino de los protistas* [*The kingdom of protists*]; and also Lanessan's tract *La lucha por la existencia y la asociación para la lucha* [*The struggle for existence and association in that struggle*], with a prologue by Antonio Machado y Núñez.

One figure often mentioned is Rafael García Álvarez, professor of natural history at the Instituto de Segunda Enseñanza (Institute of Secondary Education) in Granada. In 1872, he defended Darwinism at the start of the academic year (García Álvarez, 1872). García Álvarez was one of the first naturalists who did not hold materialist views to defend and publicize Darwin's theory. His endorsement of Darwin's theses led the archbishop of Granada, Bienvenido Monzón (1873), to censure and condemn him. Subsequently, in his *Estudio sobre el transformismo* [*Study on transformism*, García Álvarez, 1883], he discussed the principal objections to Darwinist theory, insisting that he was only interested in those of a scientific nature, and would not cover those that belonged in the realm of theology.

Another member of this Andalusian group of evolutionists, even though he was born in Catalunya, was the sociologist Manuel Sales y Ferré, initially an orthodox Krausist who gradually evolved into a positivist in a process that led him to confront Federico de Castro at the Ateneo (Athaeneum) in Seville. In 1874, he had moved to Seville to become the chair of geography and history at the university. In that same year, he wrote a prologue for the Spanish translation of Quatrefages' book *Historia natural del hombre* [*The natural history of man*]. Five years later, he translated Hartmann's book *La verdad y el error en el darwinismo* [*Truth and error in Darwinism*], and shortly thereafter he published *Prehistoria y origen de la civilización* [*Prehistory and the origin of civilization*, 1880] and *El hombre primitivo y las tradiciones orientales: la ciencia*

y la religión [*Primitive man and oriental traditions: science and religion*, 1881]. In these works, he contrasted the idea of evolution with that of creation (Núñez Encabo, 1976; Jerez Mir, 1980).

The Sociedad Española de Antropología and the case of Chil Naranjo

In the Madrid area, the influence of Paul Broca on the anatomist Pedro González de Velasco led to the creation, in 1865, of the Sociedad Española de Antropología [Spanish Anthropological Society], the fourth in Europe. Spanish anthropology was characterized by the involvement of a great number of physicians, the influence of French positivist anthropology and the timid introduction of evolutionism, including Darwinism (Puig-Samper, 1982). It is interesting to note that one of the Anthropological Society's goals was the "classification of races and varieties among the human species and discussion of its origin," something which must have been of concern to the authorities, since the government minister Orovio, famous at the time, stated in the new scientific society's inaugural ceremony that they should study man's complexity, his moral and spiritual nature, raising their view to heaven, where they would find the inspiration and illumination to find the truth (Inauguración…, 1865). In fact, we know from Francisco Delgado Jugo, one of the leading members of the Anthropological Society, that in those early years of academic life, they were labeled as freethinkers and nonconformists who discussed topics of vital importance without "the iron girdle of dogma." This makes sense given that the society's members included men of great political and ideological importance such as Manuel Becerra, Nicolás Salmerón, Segismundo Moret etc., who were later prominent figures at the time of the September Revolution.

In 1874, once the political agitation had died down, the Spanish Anthropological Society was reinstated with a board of directors that included men like Joaquín Hysern, Rafael Ariza, Francisco María Tubino, Manuel Calderón, Pedro González de Velasco, Juan Vilanova, Manuel María José de Galdo etc., who held differing views about Darwinism, as seen in the society's journal, the *Revista de Antropología* [*Review of Anthropology*], or in the related publication *El Anfiteatro Anatómico Español* [*The Spanish Anatomical Amphitheater*], created by Velasco. We can see this group's attempt to respect contrary opinions on the polemic in Carlos María Ferrer's (1873) article "Refutación de algunas utopías" ["A refutation of certain utopias"], in which he argued in scientific terms against Darwin, whom he described as a "naturalist of much merit" who had come up with a theory to explain the origin of species that was, in Ferrer's view, contrary to physiological and anatomical laws, which he based, among others, on Richard Owen.

The Anthropological Society's anti-Darwinists included even its president, the physician Joaquín Hysern, a firm creationist who was obsessed with separating mankind from other living beings. The most enlightened was unquestionably Juan Vilanova y Piera, a professor of geology and paleontology. He was well-versed in Darwin's theory and continually sought to harmonize science and religion in a long series of articles stretching from one he published in 1866 in the *Revista de Sanidad Militar y General de Ciencias Médicas* [*Review of Army Medicine and General Medical Sciences*] to one that appeared in the *Revista de Antropología* in 1874, under the title "Origen, antigüedad y naturaleza del hombre" ["The origin, antiquity and nature of man"], and in later issues of the *Revista Europea* [*European Review*], in which he debated with Manuel de la Revilla, or in the course he taught at the Ateneo [Athaeneum]

in Madrid in 1882, in which he stuck to his positivist beliefs – which were similar to those of Quatrefages – about the antiquity of man versus the ultraorthodox Catholics, and firmly opposed Haeckel's theories.

One of the Anthropological Society's leading figures was its general secretary, Francisco Tubino, mentioned earlier. Tubino was behind Haeckel's appointment as honorary member of the new scientific society in 1874. In that same year, in the *Revista de Antropología*, he discussed the theories of Darwin and Haeckel, always from a positivist anthropological point of view (Tubino, 1874), along with other members of the society such as the physician Rafael Ariza (1874), whose article "Diferencias específicas de las razas humanas" ["Specific differences among human races"], took a positivist view that questioned some aspects of Haeckel's work, such as the shift from inorganic to organic matter.

Three years later, upon the publication of a portrait of Haeckel in the journal *La Academia* [*The Academy*], Tubino (1877) published a long, admiring commentary on Haeckel's works in an article in the *Revista Contemporánea* [*Contemporary Review*] under the title "La ciencia del hombre según las más recientes e importantes publicaciones" ["The science of man according to the most recent and important publications"].

Also related to the Spanish Anthropological Society was the anthropologist Gregorio Chil y Naranjo, from the Canary Islands. He was a member of the Société d'Anthropologie of Paris and founder of the society El Museo Canario (The Canary Islands Museum), inaugurated in 1880. Along with Juan Bethencourt – founder of the Gabinete Científico (Scientific Advisory Board) of Santa Cruz de Tenerife in 1877 – Chil brought Darwinism to the Canary Islands. His most important works were the *Estudios históricos, climatológicos y patológicos de las Islas Canarias* [*Historical, climatological and pathological studies of the Canary Isles*], published in Las Palmas in three volumes from 1876-1891, in which he attempted to provide an evolutionist explanation for the geological origin of the islands and their aboriginal inhabitants, which cost him public condemnation by the Catholic Church, which censured his works (Bosch Millares, 1971; Estévez González, 1987).

A leading member of the second generation of Spanish anthropologists or naturalist anthropologists was Manuel Antón Ferrándiz (22 abr. 1895). In 1895, he reviewed and commented on the discovery of *Pithecanthropus Erectus* (Java Man) in the journal *La Ilustración Española y Americana* [*The Enlightenment in Spain and America*] in Spain. Although Antón argued that there was not enough data to accept Dubois' proposal of a new genus and species, he acknowledged that it was a human race inferior to Neanderthals, more similar morphologically to simian-anthropoid features. In any case, he wrote, its geographic location was a new clue supporting Haeckel's hypothesis, which placed the origin of man on the ancient, vanished continent of Lemuria.

The evolution debate in the scientific and cultural press

For an example of the debate over evolution in the press in Spain in the nineteenth century, we can look at the position of the editor of the *Revista Contemporánea*, the Cuban-born philosopher José del Perojo, who had a degree from Heidelberg and played a leading role in publicizing evolutionism at the time by supporting publication of the first translation of Darwin's *Origin of species* in 1877 and later the translation of *The descent of man* (1885).

In the journal he edited, Perojo (1876) published an article entitled "Haeckel juzgado por Hartmann" ["Hartmann's assessment of Haeckel"], in which he discussed Haeckel's career and work from a philosophical standpoint in contrast to the recommendations of Eduard von Hartmann, the philosopher of the unconscious. The positivists' critique of Haeckel's work because of its "metaphysical" elements was incomprehensible to Perojo, who not only supported Haeckel's theoretical and speculative syntheses but argued that they were necessary to build modern science (Perojo, 1876). In the same journal, in the context of an explanation of Hartmann's philosophy, another writer praised evolutionism and maintained that very few studies had been as influential in the education world as Darwin and Wallace's works on natural selection. R.M. (perhaps Rafael Montoro?) stated in 1876 that Haeckel made a distinguished representative of Darwinism, thanks to his originality and independence, and his ability to provide a teleological explanation for the universe, something for which the positivists criticized him (R.M., 1876).

Pedro Estasén (1876), a collaborator of Perojo's on the *Revista Contemporánea*, who had already declared himself to be an evolutionist in 1876 in an article on evolution theory applied to history, described the premises of the new German materialist evolutionism in his article "La creación, según Haeckel" ["Creation, as seen by Haeckel," Estasén, 1878], which he wrote as a prologue to the Spanish-language edition of Haeckel's *History of creation*. Jules Soury (1877) took a stronger line in his article "La antropogenia de Haeckel" ["Haeckel's anthropogeny"] in the *Revista Contemporánea*. Soury went so far as to claim that the ancient belief or dogma of creation was an obsolete doctrine, alongside other philosophies such as those of Hegel, Schopenhauer and Hartmann, in light of the theories of Lamarck, Goethe, Darwin and Haeckel, who had developed a theory of evolution as an individual case of the cosmic hypothesis of conservation and transformation of physical forces.

Among the relevant journals that covered evolutionist philosophy at the time was the *Revista Europea* [*European Review*], founded by the Cuban-born intellectual Tristán de Jesús Medina, in 1874. Medina was a curious character, trained in Cuba, the USA and Germany, with an interesting literary career (Instituto…, 1984). The earliest evolutionist references appeared in the first volume in the *Boletín de las Asociaciones Científicas* [*Update on scientific associations*] section, in comments on a lecture by the dean of the Academy of Professors of Madrid University, Moreno Nieto, "La vida, su origen, sus causas, su conocimiento" ["Understanding the origin and causes of life"]. Moreno Nieto argued that metaphysics was necessary to explain the phenomenon of life and he critiqued Raspail, Haeckel and Spencer's theses on the subject, whilst attacking the Darwinists and expressing surprise that Darwinism had been so successful in Germany thanks to Haeckel's work as a professor at the University of Jena. In the third volume of the *Revista Europea,* Antonio María Fabié (1874) had an article entitled "Examen del materialismo moderno" ["An examination of modern materialism"], in which, after praising Father Ceferino González as the new exponent of Thomism and defending Hegelian idealist philosophy, he criticized some of the new philosophers such as Feuerbach and Strauss, as well as Darwin and Haeckel's theories – especially Haeckel's *History of creation* – as absolutely materialist. Fabié considered Haeckel's new theories to be a continuation of well-known works by figures such as Büchner – especially his *Force and matter* – and Darwin, whose doctrines the German scientists were drawing on. In 1875, the

journal published a piece by the paleontologist Juan Vilanova entitled "Ciencia prehistórica" ["Prehistoric science"] and an article by José del Perojo (1875) "La antropología y el naturalismo contemporáneos en Alemania" ["Contemporary anthropology and naturalism in Germany"], which discussed the latest trends in German anthropology and quoted Haeckel as the author of a supposed center of creation in Lemuria, in southern Asia, in the context of the polemic between monogenism and polygenism.

The seventh volume of the *Revista Europea* covered Eduardo Hartmann's (1876) article on Haeckel, which had appeared in the *Deutsche Rundschau*, as part of the journal's attempt to feature the opinions of foreign scholars on evolution theory. This is seen also in the same volume in the article "Teoría de la herencia" ["The theory of inheritance"] by Francis Galton (1876), which comments on and discusses Darwin's theory of pangenesis; and furthermore in an article by Carlos Martins (1876), "Las pruebas de la teoría de la evolución en historia natural" ["Proofs of evolution in natural history"], which had appeared in the *Revue des Deux Mondes*. The *Revista Europea*'s most interesting contribution to the spread of Haeckel's work in Spain was the publication of part of his work by Claudio Cuveiro González. Cuveiro had written for various journals in Pontevedra before becoming editor of the *Diario de Pontevedra* (Ossorio y Bernard, 1903), and he published a Spanish-language version of Haeckel's work titled *Historia de la creación de los seres orgánicos, según las leyes naturales* [*History of the creation of organic beings, according to natural laws*] (Haeckel, 1878-1879). This was the first work of Haeckel's to be translated into Spanish.

It is clear that this spirited defense of evolutionism occurred because anti-evolutionist critiques were sufficiently strong in Spain, as Diego Núñez Ruiz (1975, 1977), Thomas Glick and Francisco Pelayo showed some time ago. It is true that, from a scientific point of view, there were not many adversaries of the caliber of the paleontology professor Juan Vilanova (Pelayo, 1999a) or the forestry engineer Antonio García Maceira (Pinar, 1999). One of the first opponents of Darwinism in Spain was Emilio Huelin, who gave a fairly respectful analysis of Darwin's theory in 1871 in the *Revista Científica* section of the *Ilustración Española y Americana,* although he did not share Darwin's views. But he made some fairly harsh statements about Haeckel's doctrine (Huelin, 15 feb. 1871), calling him the most fanatical supporter of those who claimed that man descended from apes.

One of the most peculiar opponents of evolutionism was Benedicto Antequera, who became known for an article published in the *Revista de España,* in 1880, under the title "La antropología transformista y sus errores" ["Transformist anthropology and its errors"] (Antequera, mar.-abr. 1880). He was not the only one; others who shared his opposition included characters such as Alejandro Oliván, whose political work is very well-known, and whose book *De locuciones viciosas y de la filosofía flamante* [*On vicious speech and flamboyant philosophy*] (Oliván, 1876) has already been analyzed (Maldonado Polo, 2002).

Krausist positivism and evolutionism: the Spanish Natural History Society

Krausism, which had been growing closer to positivism and evolutionism, including Haeckelian evolutionism, was evident in the pages of the *Boletín de la Institución Libre de Enseñanza* (*BILE*), the journal of the Institución Libre de Enseñanza [Free Educational Institution], which was led by Francisco Giner de los Ríos and which largely welcomed the

new positivist Krausism. In some cases it harbored critical Darwinists like Enrique Serrano Fatigati or Salvador Calderón. One of the authors who, indirectly, did the most to advance Darwin and Haeckel's theories within the Free Educational Institution was Augusto González de Linares, a former professor of natural history at the University of Santiago, who had been expelled from the faculty in the 1875 purge of Krausist intellectuals known as the *cuestión universitaria* ["university issue"]. He was already known for his support for Darwinism at the university, which had unleashed heated debate about evolution in Galician society (Caro Baroja, jul. 1976). According to Xosé Fraga (2002), it was during this time that González de Linares, under the direct leadership of Francisco Giner, attempted to develop a plan for the study of natural history that accepted a certain amount of evolutionism within metaphysical monism, above all in his work *Ensayo de una introducción al estudio de la historia natural* [*An attempt at an introduction to the study of natural history*], published in 1873.

In 1877, the *Boletín de la Institución Libre de Enseñanza* – which announced the appointment of Darwin and Haeckel as honorary professors of the Institution – resumed publication of González de Linares' (1877) lectures with "La morfología de Haeckel: antecedentes y crítica" ["Haeckel's morphology: antecedents and critiques"]. According to the records, in April 1877, González de Linares discussed the general importance of Haeckel to philosophy and natural history, stressing the antecedents to the German academic's work on morphology, especially in authors such as Goethe, Oken and Carus, who had defined morphological principles; Lamarck and Darwin on organic evolution; and others such as Burmeister or Jaeger, who had extended the principle of symmetry relationships, which had already been established for crystals, to organisms (González de Linares, 1877). In his May lectures, Linares explained the idea of the unification of the natural world up to the philosophical monism of Haeckel, for whom matter, form and force were essentially equal in organisms and inorganic bodies, a statement that González de Linares considered entirely well-founded and one of the most notable parts of Haeckel's theory.

In 1878, the *Revista de España* published an article by Augusto González (nov.-dic. 1878) de Linares entitled "La vida de los astros" ["The life of the stars"], which was apparently one of the lectures he gave at the Free Educational Institution (González de Linares, nov.-dic. 1878; Sala Catalá, 1987; Baratas, 1997). The article began by praising Virchow, whose critique of some of Haeckel's premises González de Linares agreed with, arguing that his central theory was fairly hypothetical.

Scanning through subsequent years of the *Boletín de la Institución Libre de Enseñanza*, we also find an interesting article by J. Madrid Moreno (1882), devoted to explaining Haeckel's *Kingdom of protists*. The author praises Haeckel for systematizing these beings that did not fit easily into the animal and vegetable kingdoms (1882). Without going into much detail, we should also mention two other figures affiliated with the Free Educational Institution: Blas Lázaro Ibiza, an assistant professor at the Free Educational Institution from 1880-1885 who was solidly in favor of Darwinian evolution and distanced from the Haeckelian version (González Bueno, 1984), and Salvador Calderón, another faculty member expelled from the university who became a professor at the Free Educational Institution, who came over as a Darwinian in some of his writings, although in later articles he drew closer to the neo-Lamarckism of Edgard Drinker Cope (Pelayo, 1999b).

These two naturalists were also very involved with the Sociedad Española de Historia Natural [Spanish Natural History Society], founded in 1871 by a group of naturalists of differing ideological views. This diversity is clearly reflected in their stance on Darwinian evolution. Notable among the conservatives were Juan Vilanova, Miguel Colmeiro, Federico Botella, José Solano, Gerónimo Macho, Estanislao Vayreda and José Landerer; while among the progressives most loyal to Darwinism were Salvador Calderón (mentioned earlier), José Macpherson, Francisco Quiroga, Víctor López Seoane, Eduardo Boscá and especially Ignacio Bolívar and his disciples or collaborators at the Museum of Natural Sciences such as Manuel Cazurro, Enrique Rioja, José Royo, Ángel Cabrera, Vicente Sos, Margarita Comas or Antonio de Zulueta. As Fraga has pointed out, Darwinism had little impact on naturalists' scientific practice, although it did influence their taxonomic activities and helped to change the Cuvier model of nature and to draw more attention to variability.

Evolutionism among Spanish physicians: the histological school

The role of Doctor Peregrín Casanova Ciurana (Glick, 1982; Pelayo, 1999a) in spreading Haeckel's work among the Spanish medical profession is well-known. He corresponded directly with Haeckel – as seen in the letters edited by Glick – and was one of the leading proponents of Haeckel's theses in his book *La biología general* [*General biology*] (Casanova Ciurana, 1877), as well as in a prologue to Oswaldo Codina's Spanish translation of the *Ensayos de psicología celular* [*Essays on cellular psychology*] (Casanova Ciurana, 1882).

One of the best-argued critiques from the medical field appeared in a paper given by Eduardo García Sola (1883), a professor of general pathology on the Faculty of Medicine at the University of Granada: his *Examen crítico de las teorías histogénicas dominantes* [*A critical examination of the leading histogenic theories*], which won the contest run by the Royal Academy of Medicine in 1882. García Sola's goal was to explain and critique Haeckel's plastidular theory, from a point of view solidly grounded in the latest science – with which he was demonstrably well acquainted – and without advancing any *a priori* condemnations of Haeckel and his work.

As regards the possible "practical" application of evolutionist hypotheses, there has been discussion about whether they might have been used by the Spanish histological school, led by Santiago Ramón y Cajal. It should be pointed out that Luis Simarro was undoubtedly the person who introduced evolutionist hypotheses into Spanish histology, especially after his spell in Paris studying under Mathias Duval. Simarro's own histological collections clearly show an evolutionist approach in his histological research. His use of series in different phases of embryological evolution and his comparative study of phylogenetically related animals were an attempt to demonstrate experimentally something that was later reflected in the work of other members of the histological school, such as Achúcarro, Del Río-Hortega, Tello, Sánchez, Castro, Lafora etc.

As for Ramón y Cajal's own view, the Aragonese scholar recounted how in his youth, in the risky articles he published in the journal *La Clínica* in Zaragoza around 1883 – articles he signed under the pen-name "Dr. Bacteria" – besides demonstrating his knowledge of cellular theory, he was influenced by the ideas of Haeckel, Huxley and Claude Bernard, and was also a proponent of spontaneous generation, despite Pasteur's experiments, since he felt these were

only conclusive in terms of the origin of current living beings. Ten years later, after settling in Madrid, Cajal recalled joining the discussion group at the Café Suizo, which included figures like Blas Cabrera, Odón de Buen or Alejandro San Martín, a group to which he felt he owed much of his intellectual training, since in the course of those philosophical discussions they "spoke with veneration and enthusiasm of evolutionism and its high priests, Darwin and Haeckel" (Ramón y Cajal, 1917, p.243).

Also in regard to his supplemental training in Madrid at the end of the nineteenth century, Cajal reminisces about Salmerón's lectures, which covered the works of Comte Littré, Huxley, Darwin, Haeckel, Spencer and Claude Bernard, in a philosophical trajectory from Krausism to positivism. Cajal also attended lectures on the philosophy of law given by Francisco Giner de los Ríos, founder of the Free Educational Institution. In his lectures, Cajal discussed biological problems, based on the theses of Weissmann, Darwin and Spencer. The practical application of evolution theory is obvious also in Cajal's histological work, where he applied the new evolution theory in framing his work on nerve cells, which he presented to the International Congress of Medicine in Rome, in 1894, in a paper entitled "Consideraciones generales sobre la morfología de la célula nerviosa" ("General considerations on the morphology of nerve cells"). Among the conclusions of this paper, which showed a purpose-based view of evolution as perfecting the nervous system up to the level of mankind, there were some clearly Haeckelian principles, such as the statement that "the 'ontogeny' of nerve tissue reproduces, in abbreviated form, with some simplifications and leaps, its 'phylogeny,' both in relation to neuroglia and to nerve cells" (Ramón y Cajal, 1917, p.313).

Curiously, in 1898, when the regenerationist journal *Vida Nueva* [*New Life*] called for a research institute for Santiago Ramón y Cajal, they put a citation from Haeckel on the importance of studying biology on a par with the neuro-histological work of the Aragonese scholar. Despite this, we cannot conclude that Cajal entirely agreed, from a theoretical standpoint, with all of Haeckel's evolutionist theses, since in the pages of that same journal, in the same year, he seemed closer to being a positivist in favor of the hypothesis of evolution.

> Who knows if, over the centuries, when mankind is optimally adapted to the environment in which he grows and has perfected his optical and acoustical registers, and the brain permits combinations of ideas that are more complex, whether science will be able to decipher the most general laws of matter, within which, as a particular example of them, the extraordinary phenomenon of life and thought will perhaps be enshrined? (Ramón y Cajal, 13 nov. 1898).

Cajal was equally cautious in the prologue he wrote later to his friend and colleague Enrique Lluria's 1905 book *Evolución super-orgánica* [*Super-organic evolution*] (Puig-Samper, 2002), in which he mixed Spencerism and Haeckelism, convinced that there was a general mechanics of the universe, and believing in the unity of matter and energy; he accepted the law of gradual perfection in evolution and the heritability of acquired characteristics, but not the idea of applying the idea of the "struggle for existence" to man, a view which coincided with some anarchist theorists and which Cajal had already set out in 1898 in the journal *Vida Nueva* (Lluria, 13 nov. 1898).

The position of anarchism and radical republicanism

We cannot provide a comprehensive analysis here of the impact of evolutionism on the anarchist movement and radical republicanism. Álvaro Girón (1996) has done essential research on Spanish anarchists' use of it, and points out at the beginning of his book *Evolucionismo y anarquismo en España* [*Evolutionism and anarchism in Spain*] that for them, the concept of "evolution" was an idea "inscribed in an overall cosmic process, inspired fundamentally by speculations on the indestructibility of energy, whose direct source was Spencer and Haeckel. These ideas also had quite an impact on the thought of Kropotkin" (Girón, 1996, p.10). It is also clear that, as Girón states, Darwin was a sacred symbol of evolutionism, but the philosophical explanations and political applications of Spencer and Haeckel were more attractive to the anarchists. To make matters more complicated, they used Haeckelian materialism in a rather confused way, in which matter and spirit formed part of a single substance, which led to Haeckel's monism, the most obvious influence of which is found in Fernando Tárrida del Mármol in the *Revista Blanca* [*White Review*].

Besides, as Girón stresses, many anarchist intellectuals, such as Francisco Ferrer i Guardia, Anselmo Lorenzo or José López Montenegro, rejected basic tenets of evolutionism like the "struggle for existence," which seemed to contradict their utopian vision of nature, whom they saw as a mother who provided for all needs, even to the point of excess, as Anselmo Lorenzo (1905) argued in his work *El banquete de la vida* [*The banquet of life*]. Some of them, like Federico Urales (Joan Montseny), went so far as to suggest an idea of never-ending evolution that led all beings towards perfection, which did not indicate a divine origin nor rule out the idea of man's resemblance to other animals, as Lorenzo and Tárrida claimed repeatedly, based on Haeckel's theory of recapitulation.

Girón also describes the impact of evolutionism on Ferrer's group and on the Modern School, where Haeckel had more of an effect, as seen in Tárrida – perhaps the most faithful follower of Darwin and Haeckel – as well as in Anselmo Lorenzo, who was a translator and editor for the review published by the School, who denied the Haeckelian struggle for existence, or in Ferrer i Guardia himself, who had collaborated personally with Haeckel on the League for the Rational Education of Children.

We do know that many members of the radical republican movement espoused positivist Krausism, which we outlined earlier. Perhaps the only really significant member of that group who needs to be introduced is Odón de Buen. Part of his scientific work was included on the Catholic church's Index of prohibited books, and he was removed from his faculty position in natural history at the University of Barcelona for some time. Odón de Buen took part in the first International Congress of Free Thinkers in Paris in 1889, along with personalities such as Herbert Spencer, Berthelot, Salmerón, Clemence Roger – Darwin's French translator – and Cipriani. He also brought Spaniards to the Congress of Free Thinkers in Rome, chartering a boat, the Mallorca, to make the trip from Barcelona to Civitta Vechia with over two hundred people on board. In Rome he met Haeckel in person, and used his work *Art in nature* for his architecture lectures in Madrid when he moved there in 1911 to take up the chair of Natural History that had been left vacant by the death of Salvador Calderón. Odón de Buen (2003) also confessed in *Mis memorias* [*My memories*] that he had belonged to a monist league along

with Haeckel and that had been able to get to know the man a little, and to visit him at his Museum of Phylogeny in Jena. He also recalled a card from Haeckel that bore a portrait of him with an anthropomorphic skull in hand, and the following phrase in Spanish: "To Buen's family, from his friend, primate and virtual fossil" (p.126).

Evolutionism in Spanish literature

Darwinian ideas can be seen in Spanish journalism and literature in the last third of the nineteenth century, generally in rather simplified versions. The genres they appear in the most are poetry, the short story, the novel and drama. Although the brutal naturalism of Emile Zola and his followers was a new development that encouraged the presence of Darwinism in literature of the period, references to evolutionism were not limited to the realist movement, for reasons we hope to set out here.

In poetry one can point to certain instances, like the well-known poem of Gaspar Núñez de Arce (1891) dedicated to Darwin in 1872. Although Núñez de Arce acknowledged the British naturalist's stature and importance thanks to his enormous contribution to the natural sciences, he was not in favor of Darwin's theory for religious reasons, and also out of a philosophical fear that science might replace religion and remove the moral constraints on mankind, which would lead to catastrophe. This same stance can be seen in the poem "Médico popular" ["Doctor of the poor"] by Juan Ramón Jiménez, and also in critiques of Darwin's followers such as Ludwig Büchner, about whom Vicente Coronado (21 mayo 1899) wrote a satirical poem mocking the hereditary transmission of acquired characteristics. Luis Vidart (ene.-feb. 1881) does something similar in one of his own poems, referring to the supposed descent of man from the apes and reflecting, as we have shown in another study on these authors, his philosophical concern about the destiny of mankind, preferring to see human beings as being perfected by the hand of God rather than the misery or mediocrity granted by mere matter (García González, 2009).

The short story, whether stand-alone or occasionally included within a novel, or one that incorporated poems, allowed authors to explore some of Darwin's assumptions, as seen, for example, in a story written by María Belmonte (1894) and published in the Spanish press. The narrative deals with the long-standing conflict between materialists and spiritualists, stressing Darwinism as an essential element; the author, who, like many intellectuals, was a philosophical dualist – especially after Haeckel's work with its unitary monism of science and religion – opts for a third way being opened up by positivism at the time. In Belmonte's story, a character named Juan, who represents scientists, believes in the origin of pre-existing forms. He cites Haeckel and Darwin in relation to the origin of the races, with which he is in favor. This is followed by the mocking and contemptuous response of Gualberto, the spiritualist character. This debate turns out to be a dream experienced by a person who is a combination of the two: Juan Gualberto. The story ends with the author advocating for philosophical dualism. In other short stories, the idea that man could originate from the apes is ridiculed, as seen in various works by Fernández Bremón, such as "Gestas o el idioma de los monos" ["Heroic deeds or the speech of monkeys"] y "El último mono" ["The last monkey"].

Novels and plays also contained simplified treatments of the theories and ideas of the great figures of evolutionism such as Darwin, Haeckel, Büchner, Huxley, Wallace, and others who

were not strictly evolutionist but who passed as such – like Spencer – but we must remember that there were various types of evolutionists: those who believed in partial evolution for man and animals, those who held religious ideas and those who did not etc. Their scientific premises are used in novels in a variety of ways. Most of the time their names are merely mentioned to support some anatomical, physiological or psychological feature or to mock some aspect of evolution, such as man's descent from the apes.

In general, anatomical and physiological features are associated with the instincts, whereas moral and intellectual faculties highlight either the characters' intelligence and virtues, or their criminality and brutality (as seen in some novels by Emilia Pardo Bazán), in order to defend or attack religion, side with either the liberals or the conservatives, or even the socialists and anarchists, and advocate either to maintain the status quo or, on the contrary, to call for social, political and economic reforms, stressing above all education's role in overcoming human beings' instincts.

Evolutionism was also used at times – depending on the character and the author – either to defend or denounce the supposedly scientific arguments wielded to uphold racial discrimination and slavery in the nineteenth century, as seen for example in some of the novels of Castelar and Calcagno (García González, 2002, 2009). But allusions to Darwin's basic assumptions about the struggle for existence and natural selection were undoubtedly the ones most apparent in Spanish novels, notably those of Eduardo López Bago, Remigio Vega Armentero and others (Fernández, 2014). In some cases, they mentioned supposed experiments aimed at creating the hypothetical anthropopithecus; these references became more detailed in the early decades of the twentieth century, and the subject was treated as a colossal joke in a novel by Ricardo Baroja.

Literary translations published in Spain, above all of French works for the theater or for the general reader, were also an important vehicle for spreading evolutionist ideas. These were mostly described in simplified terms, as in *The struggle for existence* by Alphonse Daudet, translated into Spanish by Hermenegildo Giner de los Ríos (García González, 2013).

Final considerations

Examining works that contained responses to Darwin's theories in Spain allows us to see the complexity of the evolutionist debate in the second half of the nineteenth century. At a time of much ideological confrontation, the reception of Darwinist ideas depended on interactions between political, religious and philosophical factors. Indeed, when evolutionist theories crossed the threshold of science and called into question the biblical narrative of creation, theologians, philosophers, politicians, scientists and writers all became involved in the controversy around evolution. Thus, the repercussions of evolutionism in Spain were felt not only in scientific circles but spread to many different cultural media and spaces of knowledge.

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