



Journey from Enchantment to Disenchantment? A Study on Darwin's Descriptions of Nature from the *Journal to the Origin*

¿Viaje desde el encantamiento hasta el desencantamiento?
Un estudio sobre las descripciones de la naturaleza de Darwin
desde el *Journal* hasta el *Origin*

BÁRBARA JIMÉNEZ-PAZOS*

Abstract: Taking into account the disputed question about enchantment or disenchantment of the world caused by modern science, this paper comparatively examines the semantics of the lexicon of Charles Darwin's *Journal of Researches* and *The Origin of Species* using computational text-mining strategies. The aim is to show that there is a direct semantic path, starting with the *Journal* and culminating in the *Origin*, which confirms a tendency towards a disenchanted type of language used by Darwin in his descriptions of nature. This is demonstrated by the lexical and semantic analysis of both texts.

Keywords: Darwin, Nature, Disenchantment, Lexical Analysis, *Journal of Researches*, *Origin of Species*.

Resumen: Teniendo en cuenta la cuestión en disputa sobre el encantamiento o el desencantamiento del mundo causado por la ciencia moderna, este artículo examina comparativamente la semántica del léxico en *Journal of Researches* y *The Origin of Species* de Charles Darwin utilizando estrategias computacionales de minería de textos. El objetivo es mostrar que existe un camino semántico directo, comenzando en *Journal* y culminando en *Origin*, que confirma una tendencia hacia un tipo de lenguaje desencantado empleado por Darwin en sus descripciones de la naturaleza. Esto queda demostrado por el análisis léxico y semántico de ambos textos.

Palabras clave: Darwin, Naturaleza, Desencantamiento, Análisis Léxico, *Journal of Researches*, *Origin of Species*.

Recibido: 18/02/2019. Aceptado: 16/09/2019.

* Postdoctoral fellow, at the time of writing the article, at the University of the Basque Country (San Sebastián, Spain), IAS-Research. Centre for Life, Mind and Society research group. Logic and Philosophy of Science Department (barbara.jimenez@ehu.es). The author holds a postdoctoral fellowship granted by the Basque Government. Programa Posdoctoral de Perfeccionamiento de Personal Investigador Doctor del Gobierno Vasco. Grant code: POS_2019_2_0012. The Basque Government offers financial support to the author. *Ayudas Actividades de Grupos de Investigación 2019-2021*. Project code: IT1228-19. Lines of Research: Darwinism and Worldview, Perception and Description of Natural Landscape, History of Ideas, History of Science. Recent Publications: Jiménez Pazos, Bárbara (2018), "The Deteleologization of Nature: Darwin's Language in *On the Origin of Species*", *Metaphysica* 19 (2): pp. 185-200; Jiménez Pazos, Bárbara (2017), "Percepción, Descripción y Explicación en la Obra de Alexander von Humboldt", *Ideas y Valores* 66 (165): 57-83.

1. Hypothetical remarks on Darwinian lexicon and disenchantment¹

The conceptual framework of this article is the relationship between scientific knowledge and culture. Its aim is to comparatively examine the semantics of the lexicon of two of Charles Darwin's major works, *Journal of Researches* (1839) (hereinafter JR) and *On the Origin of Species* (1859) (hereinafter OS), as a significant case study of this relationship, especially in what concerns how culture perceives and represents nature. To this end, the disputed question about disenchantment of the world (Weber 2004) caused by modern science will be taken into account as theoretical background.

The hypothesis I explore is that the explanatory knowledge of nature that Darwin progressively acquired moulded his worldview in favour of a disenchanted, or “demagified”, view of the world, and hence, of nature, in a non-pejorative, or non-Weberian sense of the term: it is apparent that, over time, Darwin's perception of the natural world shifted beyond the socio-culturally prevailing worldview towards a disenchanted worldview, that is, a worldview based on scientific-explanatory onto-epistemological presuppositions; nevertheless, this should not imply a weakened aesthetic perception of the natural landscape, one of the main implications commonly attributed to disenchantment. This hypothesis should be confirmed by looking at relevant lexical clues, especially adjectives, in Darwin's JR, one of his first works, and OS, a work of maturity; these should, thus, clarify with a greater precision than is available in historiography (Levine, 2011; Richards, 2002, 2011), the issue of whether scientific activity eliminated Darwin's aesthetic sensitivity.

The analysis of the respective lexicons should help clarify whether or not the acquisition of descriptive and explanatory knowledge about the functioning of nature are factors capable of changing the worldview of the observer of nature, that is, Darwin, in such a way that it leads him to adopt a disenchanted worldview. The presumable lexical variations between JR, a work which best represents the pre-evolutionary, or enchanted, view of nature, and OS, and icon of disenchantment in the history of science, will be analysed critically with the purpose of finding a direct semantic path, starting with JR and culminating in OS, which confirms a tendency towards a disenchanted type of language used by Darwin in his descriptions of nature. The lexical differences should be illustrative of the consequences that the development of evolutionary theory has had on the perception of nature and, consequently, on the issue of disenchantment.

To test this hypothesis, a computational analysis has been undertaken using the *WordSmith Tools* (Scott, 2017) software package, in order to analyse the variations of the lexicon used by Darwin in JR and OS². For reasons that will be discussed below, special attention has been paid to adjectives.

1 A more detailed version of the content of this article can be found in my Ph.D. dissertation: Jiménez Pazos, Bárbara (2016), *Imagen del Mundo, Percepción y Descripción de la Naturaleza. Un Estudio Comparado en torno a las Presuposiciones Onto-epistemológicas en la Poesía Romántica Inglesa y la Prosa Científica de Charles Darwin / Worldview, Perception and Description of Nature. A Comparative Study on the Onto-epistemological Presuppositions in English Romantic Poetry and the Scientific Prose of Charles Darwin*.

2 I published an article on the topic of Darwin and disenchantment in this very journal: Jiménez Pazos, Bárbara (2017), “Charles Darwin y el Desencantamiento Weberiano”. Thanks to the computational tools I have been using lately, here I present a different approach to the topic of Darwinian disenchantment based on more exhaustive results.

Thus, the second chapter of the article summarizes the state of the art around the concepts of “enchantment”, “disenchantment” and “re-enchantment” in order to specify the place that Darwin’s ideas occupy in this discussion. The third chapter presents the semantic differences obtained from the comparative computational analysis of the lexicon in JR and OS. An assessment has been made as to whether Darwinian adjectivation confirms the hypothesis that Darwin’s aesthetic perception grows as his explanatory knowledge about the natural landscape increases. In the fourth and final chapter, conceptual and philosophical analyses of the results obtained from the computational analysis are addressed and the conclusions concerning the adopted hypothesis are presented.

2. Negativist and optimistic disenchanters: where do Darwinian texts belong?

Max Weber’s *Entzauberung der Welt*³ (disenchantment of the world) is one of the most representative commonplaces of contemporary historiography about the cultural impact of modern scientific knowledge. In his 1919 text *Wissenschaft als Beruf* Weber argues that a world rationalized and intellectualized by technology and calculation that facilitates a non-magical, demystified understanding of the conditions under which we live, would lead to the disenchantment of the world:

The growing process of intellectualization and rationalization does *not* imply a growing understanding of the conditions under which we live. It means something quite different. It is the knowledge or the conviction that if *only we wished* to understand them we *could* do so at any time. It means that in principle, then, we are not ruled by mysterious, unpredictable forces, but that, on the contrary, we can, in principle, *control everything by means of calculation*. This in turn means the disenchantment of the world. Unlike the savage for whom such forces existed, we need no longer have recourse to magic in order to control the spirits or pray to them. Instead, technology and calculation achieve our ends. This is the primary meaning of the process of intellectualization (Weber, 2004, 12-13)

How then do Darwinian texts respond to Weberian disenchantment? JR contains characteristics of an enchanted or semi-enchanted text, because, despite the fact that descriptions of nature of a naturalistic type abound, a type of narrative with subjectivized ontological descriptors that does not rule out considering nature as numinous reality also stands out. By contrast, OS is a characteristically disenchanted and disenchanting text, because it forced, when it was first published in 1859, to shake strongly the conception of nature in force at the time in favour of a disenchanted (“demagified”), or secularized, conception ruled by the evolutionary principles described in it; internalizing evolutionary ideas brought with it a deep feeling of loss of the religious meaning of life. This

3 Although the coining of the term “disenchantment” is generally attributed to Max Weber and his sociological analysis of the influence of modern scientific knowledge on culture, the poet Friedrich von Schiller had previously alluded to the “dis-godding of nature” (*die Entgötterung der Natur*) in his 1788, 25-stanza-poem “The Gods of Greece” (*Die Götter Griechenlandes*) where he refers to the passing of an age in which divinity inhabits the world to a godless world, and thus, a godless nature.

consequence has, in fact, inspired the emergence of the compensatory counter-concept of “re-enchantment”. The abundant debate over the past decades on this issue shows that the notions of “enchantment”, “disenchantment” and “re-enchantment” are not exactly univocal, much less the interpretation of the Darwinian position in this regard. In what follows, I offer a structured reconstruction of the state of the art. This reconstruction will show that the dominant position in the interpretation of the Weberian concept of disenchantment is based on a negative conception of the concept.

2.1. Negativist Disenchanters

Weber’s diagnosis has led to the widespread presupposition that modern science, on the one hand, is neither oriented nor able to give meaning to the world and, on the other hand, does not empower a humanized perception of nature. Modern science would consequently produce an irreversible dehumanization of culture (Adorno and Horkheimer, 2016 [1944]; Berman, 1981; Gibson, 2009).

These assumptions have been commonly acknowledged by the majority of critical literature that addresses the topic of disenchantment⁴. Expressly, except perhaps for the more historical, neutral studies on enchantment, disenchantment and secularism (Greisman, 1976; Swatos, 1983; Lassman and Velody, 1989; Curry, 1999; Koshul, 2005; Martin, 2005; Taylor, 2007; Walsham, 2008), the majority of approaches to this topic, moved by an apparently intense feeling of negativity, try to convince of the social need for various types of “re-enchantment”. Artistic and literary (Graham, 2007; Landy and Saler, 2009; Paige, 2009), ecological (Berman, 1981; Partridge, 2004; Gibson, 2009), mystical or spiritual (Kontos, 1994; Ruickbie, 1999; Gane, 2002; Partridge, 2004; Gibson, 2009), religious (Berger, 1999; Griffin, 2001; McGrath, 2002; Graham, 2007; Gibson, 2009) and secular or scientific (Partridge, 2004; Levine, 2008; Landy, 2009; Landy and Saler, 2009) forms of re-enchantment are proposed as a way out of the fateful, disenchanting present and future of society.

The concept of Weberian disenchantment certainly reveals a humanistic discomfort when integrating the descriptive-explanatory knowledge of the world and its interpretation into an image of the world that also satisfies existential human needs or impulses, including aesthetic ones.

Although the critical literature around these concepts does not generally explicitly relate disenchantment with Darwin’s work, it is unquestionable that one of the most paradigmatic scientific-naturalistic theories embodying the Weberian thesis of scientific disenchantment is Darwin’s theory of evolution. Its disenchanting effect became evident in the socio-cultural reception of the theory from the publication of Darwin’s OS in 1859, as attested by the debate held by Thomas H. Huxley with the adverse cultural environment, and as is still evidenced by the current philosophical reception of this theory as a “dangerous idea” (Dennett, 1996).

4 The available literature on the topic of disenchantment is very vast. In what follows I present a selection of the works I find most informative and outstanding.

2.2. Optimistic Disenchanters

G. Levine (2008) has best made explicit the relationship between Weberian disenchantment and Darwin's work. Levine discards the disenchanted vision as attribute applicable by default to the acceptance of the Darwinian theory. He argues that the optimal way to internalize Darwin's theory is to assume it as re-enchanting, that is, as a theory that offers a new but more detailed and realistic view of the complex functioning of nature. This more complete vision of nature would generate in the observer, as a consequence, deeper feelings of admiration than before knowing its mechanisms.

In addition to considerably optimistic positions like Levine's regarding Darwinian science, there are, also, more opponents of the idea of assimilating the supposedly negative effects of science on aesthetic sensibility (Pearson, 1892; Dawkins, 1998; Beer, 1983; Fisher, 1998; Carlson, 2000; Parsons, 2008; Campion, 2011; Dennett, 2017). These views generally agree on the enchanting power of science advocating that natural landscapes and phenomena can become even more aesthetically enriched once these have been explained rationally.

This is precisely the position I adopt regarding the state of the art. Although I disagree with the conception of Darwinian science as re-enchanting, I will defend Levine's optimism regarding the aesthetic enrichment of nature that Darwinian evolutionary theory offers to anyone who internalizes it. I will also assume the positive vision that the remainder of the previously-mentioned authors maintain regarding the growth in aesthetic sensibility that allows scientific knowledge of nature. As it is said, I will try to make this perspective visible in Darwin's work through a computational analysis of nature's descriptions, especially focused on Darwinian adjectivation, beginning in JR and ending in OS.

3. Philosophical and computational comparative analysis of the *Journal* and *The Origin*: semantic differences

I have pursued two main purposes in the undertaking of the computational comparative corpus-analysis of Darwin's JR and OS. These have been, on the one hand, to contribute to clarify the relationship between scientific knowledge and cultural perceptions and representations of nature. To this end, on the other hand, a semantic analysis of Darwin's lexicon across JR and OS has been carried out to know whether there are semantic units that allow exploring the question of whether Darwin's conception of nature shifted from being enchanted, or partially enchanted, to disenchanted.

The concrete aspects of these two general objectives have thus been to prove, firstly, that there has been a development in Darwin's perception of nature; secondly, that the knowledge of the evolutionary principles prompted Darwin to create a demystified, disenchanted worldview, yet, intellectually and aesthetically more valuable and intriguing, and; finally, that disenchantment grew progressively in time, and that this fact is reflected in changes of the lexicon Darwin uses to describe nature in JR and OS.

In what follows, sub-chapters 3.1., 3.2., 3.3. and 3.4. will describe, on the one hand, the computational methodology that has been carried out in order to fulfil the objectives just mentioned (sub-chapter 3.1.) and, on the other hand, the general (sub-chapter 3.2.) and

specific (sub-chapters 3.3. and 3.4.) results that have been obtained out of a philosophical and semantic comparative analysis of the lexicon in JR and OS.

3.1. Methodological Background: Against the *Voluntas Auctoris*

One of the consequences frequently attributed to disenchantment is the loss of aesthetic sensibility to natural beauty. In fact, Darwin himself had occasionally commented on the influence of his scientific activity in his aesthetic sensibility (Barlow, 2005), terms that seem to confirm the thesis of disenchantment. But regardless of Darwin's assessment of his own aesthetic sensibility against natural beauty, whether or not he conveys a disenchanted explanation of nature should be visible by examining the semantics of the lexical differences of the vocabulary used to describe nature in JR, a major work of his youth with narrative traits revealing a latent enchanted, or semi-enchanted, view of nature, and in OS, a major work of his later years which has contributed to the disenchantment of the world.

Evoking the narratives of nature written by Romantic naturalists like Alexander von Humboldt, the descriptions of nature in JR convey to the reader a strong thirst for specific knowledge of the physiognomy of natural landscapes, but also constantly reflect the emotional impression awakened in Darwin in function of the variability of the features of the landscape. Perception and landscape analysis converge masterfully throughout the pages of this work. But the passage of time, together with his growing acquisition of knowledge, makes Darwin's conception of landscape shift towards a less emotional, Romantic, that is, an enchanted kind of narrative. In fact, a new dimension is noticeable in the way Darwin perceives and describes nature in OS, caused by an increasing knowledge of it. And this fact is clearly perceptible when comparing Darwin's descriptions of nature in JR and in OS, placing special emphasis on the elements on which Darwin focuses his aesthetic interest.

Although there are no notable studies on Darwin's use of language in JR, there are, certainly, concordances of OS (Barrett *et al.*, 1981) and other major works by Darwin (Barrett *et al.*, 1986, 1987; Weinshank *et al.*, 1990), as well as *variorum*⁵ texts of the six editions of OS (Peckham, 1959). However, there has never completed a comprehensive semantic analysis of Darwinian lexicon across JR and OS which can confirm or reject the thesis of disenchantment. There are only a few succinct studies available, minimal in some cases, focusing on certain aspects of Darwin's vocabulary and its variations. Some of these works do not focus on the question of disenchantment (Liepman, 1981; Sulloway, 1985; Loye, 2000; Shillingsburg, 2006; Sainte-Marie *et al.*, 2011; Hidalgo-Downing, 2014; Menninghaus, 2016). Other critical approaches to the Darwinian lexicon either try to find lexical signs confirming the influence of teleological thinking in Darwin's work (Sloan, 2005; Richards, 2011), or directly advocate that Darwin is a secularly enchanted author (Levine, 2008).

As is common in the critical history of ideas, a conceptual analysis of the available semantic material is an essential element of the methodology. More specifically, this research has

5 The *Online Variorum of Darwin's Origin of Species*, created by B. Bordalejo (2012), is available at the <http://darwin-online.org.uk> (van Wyhe, 2002) website. Furthermore, there are also inspiring graphic projects that help visualizing the lexical changes applied throughout the six editions of OS like the *(En)tangled Word Bank*, devised by Stefanie Posavec and Greg McInerney, and Ben Fry's *On the Origin of Species. The Preservation of Favoured Traces* project.

required a computational corpus-analysis of relevant lexical material, that is, the final texts of JR (1860) and OS (1876), for these are the most complete and revised editions of JR and OS. The vocabulary contained in these editions has been processed using one main software package for computational linguists: *WordSmith Tools* (Scott, 2017). Firstly, taking as source editions the textual versions of JR and OS available at <http://darwin-online.org.uk> (van Wyhe, 2002), “clean” txt files have been created, that is, free from metadata and special characters that the software package does not properly process. Secondly, these files have been processed with the *WordList* tool in *WordSmith Tools* in order to obtain word frequency lists. In this type of word list, the words occurring in the texts are ordered by their frequency of occurrence, from the most commonly occurring words, down to those words which appear less frequently. The key words that are relevant to this study have been processed with the *Concordance* tool in order to locate them in the textual context. Finally, a Consistency List has been created by merging the Frequency Word List of JR with the Frequency Word List of OS. This type of word list permits a comparison of the frequency of a certain word in both JR and OS.

3.2. *General Remarks on Darwinian Lexicon*

Focusing attention on finding the lexical changes showing a progressively disenchanting, yet aesthetically empowered, view of nature, the comparative analysis of the Darwinian lexicon in JR and OS allows us to obtain relevant information. The semantic differences between the two works provide valuable data to characterize the Darwinian view of nature and its impact on contemporary scientific worldviews. In addition, these differences have been useful to determine the evolution of Darwin's thought, that is, to detect the mutability of his view of nature, from partial enchantment to disenchantment, across the course of time, from JR to OS.

To this end, the type of language that makes JR and OS characteristic, as well as the lexical and semantic variability between both works have been found by an in-depth study of the Frequency Lists corresponding to each work, on the one hand, and, on the other hand, by looking at the Consistency List obtained with *Wordsmith Tools*.

Darwin's lexicon in JR and OS certainly shows clear semantic variations that can be observed by just matching both works under a seemingly simple criterion such as the abundance or scarcity of some terminology. Specifically, a comparative analysis of adjectival frequencies in JR and OS has enabled the obtaining of relevant information in this regard: The meaning of a noun may change with respect to the issue of disenchantment depending on the adjectivation. An expression like “sublime landscape” does not have the same meaning as “arid landscape”; the first refers to the viewer's impression of the landscape while the second to the physical constitution of the landscape itself. Thus, it makes no sense to analyse nouns without adjectival determinations or equivalent periphrasis. From this point of view, the study of adjectives is useful and reliable.

To this respect, the great profusion and repetition of certain nouns in JR, which correspond to common, visible elements of the natural landscape, and their corresponding adjectives has to be highlighted. Conversely, certain terminological scarcity can be detected in OS. By way of example, a greater absence of adjectives, frequent in JR, accompanying nouns that are supposed to be frequent in descriptions of nature of 2007 kind, like *wind*,

sun, sky—and its analogous term, *heaven*—can be noticed in OS. The richness in JR of a select adjectivated vocabulary, covering the elements that are most immediate to Darwin, is not manifested symmetrically in OS. This double fact is already an indication that is favourable to the hypothesis that assumes a tendency toward disenchantment from JR to OS. We will see that these differences are not only stylistic, but, more importantly, reflect a modification of criterion or of cognitive interest in the perception and subsequent description of nature.

The pre-eminence of phenomenal or procedural explanations are more pronounced in OS than in JR, as the latter stands out as a descriptive-aesthetic work and the former, conversely, includes content of an explanatory character, without prejudice to the notable presence of natural landscapes described in a significantly explanatory-causal manner.

In this way, in conjunction with the analysis of the lexicon that Darwin uses to describe the most immediate and visible elements of nature in OS, attention has also been paid to the way he adjectivates key abstract nouns, like *law, structure, force, fact*, etc., along with other nouns with a scientific-technical character, such as *organ* and *species*, with the last word referring to either the abstract concept of species or to a specific species.

The results obtained from the tracking of abstract nouns referring to forces, structures, etc., in both works is precisely what allows confirmation of the hypothesis that there is a disenchanting ideological evolution that starts in JR and culminates in OS. The lexical content around abstract concepts like the ones just highlighted is much more abundant in OS than in JR. While JR is noted for its scenic descriptions, OS is remarkable for the richness of a vocabulary that is more focused on providing countless explanations on the functioning of nature than in the enumeration and adjectivation of the elements belonging to the natural landscape. It is understandable that a work like JR, destined to give a naturalistic account of the observed phenomena, landscapes, animal and plant species, etc., has a noticeably more aesthetic-descriptive lexicon than a work like OS, of a scientific-explanatory nature, and dedicated to the development of the scientific theory that provides the solution to the issue of the evolution of the species. However, the asymmetry of lexical content observed in the comparative analysis between the two works is not resolved, from an epistemological point of view, by such a trivial argument as is the one that assumes that the specific purposes to be achieved in each work are the main cause of the presence of inequalities in the abundance or scarcity of a particular type of vocabulary.

Indeed, the differing character of the lexicon in JR and OS allows confirmation of the progression of knowledge about nature in Darwin himself, on the one hand, and an analogue changing of the issue on the study of the natural environment which is the focus of his attention. The exuberant deployment of a type of adjectivation focused on the natural scenery, present throughout the pages of JR, shows a keen interest in revealing even the smallest detail of the splendour of a landscape that he observes and studies for the first time. This attitude of intense concern for nature favours the obtaining of the type of knowledge required for the formulation of theories about nature through close observation of the natural environment. But, as should be shown in sub-chapters 3.3. and 3.4., the lexicon deployed along OS shows an epistemological breakthrough, a turning around of a thematic core that would necessarily change over time, and indeed, varies satisfactorily in OS. And that is what the semantic material of OS confirms.

3.3. Adjectivation in the Journal and in the Origin

The adjectives used to describe nature in JR stand out for their double aesthetic-naturalistic character. Thus, attention must be given to the linguistic expressions that, because of their frequency in the work, sometimes, and for their ability to offer special aesthetic dynamism to the reading of Darwin's descriptions of nature, constitute an accurate representation of the type of language that appears throughout JR.

Regarding the adjectivation of an aesthetic-sentimental character applied to the nouns which describe common, visible elements of the natural landscape, the following adjectives stand out in the Frequency List of JR: *beautiful* (62)⁶, *charming* (4), *delicious* (6), *delightful* (15), *extraordinary* (41), *fine* (109), *glorious* (5), *grand* (46), *immense* (38), *interesting* (64), *lofty* (51), *luxuriant* (23), *magnificent* (16), *memorable* (4), *noble* (24), *overwhelming* (8), *perfect* (53), *picturesque* (21), *pleasing* (15), *pretty* (27), *solemn* (5), *splendid* (11), *sublime* (7), *wild* (128), *wonderful* (35).

The adjective *wild*, accidentally, allows the creation of bonds between the aesthetic descriptions of nature in JR and a type of description that is more scientific-explanatory. The subjectivity that moves beyond an account of nature that presents it as beautiful, picturesque, glorious, etc., is intertwined with a narrative, objective description. The wild natural landscape, novel and exotic to Darwin, is characterized by constituting the greatest cognitive temptation that drives him to study the components of the landscape's wholeness in detail.

The aesthetic description of the landscape in JR, then, remains closely linked to the description of Darwin's emotional state. As if it were a spontaneous descriptive attitude, the analysis of the parts of the scene of nature that is being observed is accompanied by an account of his aesthetic-emotive perception.

Given the detailed study of nature by Darwin and his subsequent description of what he observes in JR, a significant list of adjectives can also be extracted. These adjectives are of a scientific-technical nature, of a naturalistic character, or adjectives whose application is remarkably restricted to natural sciences: *allied* (35), *aquatic* (14), *barren* (17), *basaltic* (15), *cryptogamic* (7), *damp* (36), *dry* (103), *endemic* (2), *flat* (40), *irregular* (31), *level* (117), *marine* (29), *microscopical* (2), *narrow* (61), *neighbouring* (35), *organic* (29), *rapacious* (5), *rocky* (28), *stunted* (13), *surrounding* (52), *tame* (32), *tropical* (23), among others.

However, the analysis dedicated to abstract nouns in JR shows a partial case of the aesthetic-sentimental form of adjectivation. Partial because there are also occasional expressions like *marvellous fact*, *overwhelming force/power*, *wonderful fact(s)* and *wonderful structures*—although these are strictly occasional. In fact, these are the only expressions of a sentimental character detectable when tracing the abstract lexicon in JR. The remainder of the adjectivation is characterised by belonging to a descriptive-explanatory type, with expressions like *analogous fact(s)*, *elevatory forces*, *geological structure*, etc., highlighted by being some of the most frequent. Although a lack of frequency is notable of both aesthetic and scientific-technical adjectives, the most remarkable is the scarce presence of adjectivation in general, of both types, dedicated to theoretical concepts of nature.

6 The numeric values between brackets refer to the frequency of appearance.

On the contrary, focusing particularly on the lexicon used to describe the most common and visible elements of the natural landscape, the Frequency List of OS reveals, on the one hand, an overwhelming abundance of adjectives of a scientific nature. On the other hand, a striking scarcity of adjectives of an aesthetic-sentimental type has to be noted, taking into account the large number of pages forming the entirety of OS.

A list of some of the most significant scientific adjectives, and those with the greatest presence in the work, should be detailed, as they affect a higher number of nouns in OS: *allied* (150), *alpine* (20), *analogous* (54), *ancient* (92), *aquatic* (22), *arctic* (34), *complex* (80), *developed* (150), *different* (355), *distinct* (347), *domestic* (142), *domesticated* (38), *dominant* (43), *doubtful* (38), *endemic* (20), *external* (40), *extinct* (122), *favourable* (73), *female* (37), *geographical* (50), *geological* (104), *gradual* (33), *homologous* (32), *hybrid* (46), *imperfect* (34), *important* (170), *improved* (71), *inherited* (92), *intermediate* (170), *living* (113), *male* (57), *marine* (37), *modified* (211), *native* (21), *natural* (528), *naturalised* (32), *numerous* (85), *occasional* (46), *ordinary* (66), *organic* (169), *particular* (32), *peculiar* (64), *physical* (54), *remarkable* (63), *reproductive* (38), *rudimentary* (87), *specific* (52), *strange* (33), *temperate* (40), *terrestrial* (46), *transitional* (37), *tropical* (15), *wild* (53), among others. The adjective *wild*, curiously, ceases to have as relevant a presence as it had in JR. The number of cases of the adjective *wild* in OS (53) is reduced by more than a half when compared with its presence in JR (128).

There are no aesthetic-sentimental adjectives in the lexicon of OS, which affect concrete, mostly visible elements of nature, whose presence should be noted. But this fact is not confirmed though in the study of the adjectivation of, mainly, abstract aspects of nature. Besides the expected abundant appearance of scientific adjectives like the ones just listed above, the presence of adjectives of a Romantic character that accompany nouns referencing functions, processes, or, in the case of the noun *organ*, vital parts of the physiological composition of the species, is significant. The most relevant expressions include the following: *admirable powers*, *beautiful adaptation(s)/co-adaptations*, *exquisite adaptations/structure*, *exquisitely adapted organs*, *fine/finest gradation(s)/species*, *great fact(s)/force/law(s)/power*, *mysterious laws*, *perfect adaptation/gradation(s)/organ(s)/power/structure*, *truly wonderful fact/power*, *wonderful fact/structure*, *wonderfully perfect structure*, *wondrous organs*.

Furthermore, the nouns that have been adjectivated in the expressions just mentioned demonstrate that Darwin's most aesthetically expressive lexical descriptors in OS are reserved to describe the excellence of nature's mechanisms or concrete elements, like organs, involved in natural processes. Darwin's aesthetic interest is, thus, closely related to his knowledge of the functioning of nature's hidden relations, forces, structures, powers, etc.

As can be seen, OS also includes a number of aesthetic-sentimental adjectives such as *exquisite* (2), *marvellous* (6), *wonderful* (41) or *wondrous* (2), but adjectives with a descriptive-explicative inclination are clearly predominant. The aesthetic-sentimental adjectives used by Darwin in OS, besides, generally, appearing less frequently than in JR—the adjective *wonderful* is an exception, as it appears more frequently in OS (41 cases) than in JR (35 cases)—are characterized by a lower aesthetic-emotional intensity. The adjectives just mentioned do not have the same level of expressive intensity as adjectives like *charming*, *delicious*, *delightful*, *glorious*, *luxuriant*, *magnificent*, *solemn*, etc., mostly present in JR.

3.4. Darwin's Aesthetic Maturity: Journey from Beauty to the Beauty of Excellence

As the analysis of the Darwinian lexicon in JR and OS has shown above, Darwin's descriptions of nature stand out for using what W.F. Cannon calls "intense modifiers" (Cannon, 1968, 156), that is, expressions that affect nouns of both a material and abstract character, adjectivated by adding adverbs that contribute a special emphasis and strength to the descriptions of nature drawn by Darwin. Some examples have been previously mentioned, like *wonderfully perfect* and *truly wonderful*, but the list of examples to highlight these types of expressions is very extensive. They constitute a perfect example of the convergence of the scientific and aesthetic-sentimental ways of adjectivation. JR and OS share the type of intense modifiers that contribute to the dynamism of the narration of the scenarios, phenomena and mechanisms of nature, and distance it from the type of arid expressions typically found in conventional texts in the field of natural sciences. Nevertheless, despite sharing the use of intense modifiers, the applicability of these varies in both works.

Hence, the expressions below from JR should be noted: from an analysis of descriptions of the visible or perceptible elements of nature, *occasionally pretty scenery*, *beautifully cultivated valley*, *beautifully luxuriant vegetation*, *brilliantly coloured birds*, *delightfully aromatic leaves*, *eminently sociable plants*, *exceedingly cold wind*, *exceedingly monotonous scenery*, *extraordinarily common plants*, *extremely magnificent view*, *particularly favourable climate*, *singularly clear view*, *tolerably luxuriant vegetation*, among other expressions. From an analysis of the descriptions of abstract aspects of nature related with structures, facts, functions, etc., *closely-allied species*, *exquisitely delicate structures*, *generally affirmed fact*, *highly interesting facts*, *highly remarkable fact*, *previously known species*, *strongly marked gradations*, among others. This selection of intense modifiers drawn from an analysis of Darwinian descriptions of material and abstract nature in JR shows a clear preponderance of, and a trend towards, an aesthetic description of the landscape, the general state of the climate or the particular impression that tropical vegetation stirs in Darwin. In other words, these modifiers, of an expressive intensity around the most common and specific elements of the natural landscape, delve into the description of the kind of aesthetic perception obtained in the observation of nature, and in more specific cases, indicates the intensity of the climatic perception, for example. In short, the intensifiers in JR enhance the expression of a, usually aesthetic, perception of a specific natural context. Although less frequent, the intensifiers of the descriptions of the abstract in nature have a dual nature: on the one hand, objectively qualify the properties of interspecific relationships or the particular characteristics of certain natural structures; on the other hand, they indicate a certain subjectivity projected onto a particular estate of the events that occur in the natural world and make it *interesting* or *remarkable*.

As for the analysis of the descriptions of the visible elements of natural landscapes in OS, significance must be given to those expressions—similar to those previously mentioned of an objective nature in JR—that emphasise Darwin's explanations: *abruptly changed forms*, *anciently domesticated animals/plants*, *clearly distinct animals*, *closely related forms*, *closely(-)allied forms*, *differently coloured flowers*, *directly intermediate forms*, *elaborately constructed forms*, *extremely abundant plants*, *fully developed tree*, *greatly modified forms*, *highly attractive plant*, *highly developed being*, *specifically distinct forms*, *strictly adapted animals*, *unequally related forms*, *widely and perfectly diversified animals/plants*. In the

descriptions of abstract, technical, procedural, etc., elements of nature in OS, the expressions worth noting include: *abnormally developed organs, aboriginally distinct species, certainly distinct species, closely related species, closely(-)allied species, distinctly allied species, elaborately constructed organ, excessively complex relations, exquisitely adapted organs, fully acknowledged fact, fully developed structures, generally extinct species, highly important facts, highly perfected structure, incessantly ready power, infinitely complex relations, insensibly fine gradations, lowly organized structures, nicely balanced forces, particularly distinct species, perfectly defined species, really surprising fact*. The number of omitted expressions, for reasons of an economy of space, is very high; expressions of this type appear with a notably higher frequency than in JR.

However, if in JR it is possible to detect examples of an explicit aesthetic character, in OS there is hardly any variety. In contrast, a more objective, descriptive-explanatory language flourishes in OS, nuanced with details of the state, the shape, development and complexities, to name a few, surrounding species, natural forms, structures, forces, organs, etc. The adjectivation of an aesthetic-sentimental nature does not seem conducive to settle in a work like OS, replete with explanations about the evolution of species, which gain the necessary emphasis, power and explanatory accuracy through the objectivity of Darwinian language. Nevertheless, this fact does not mean that Darwin ceases to perceive nature aesthetically in OS. But just the contrary. The intense modifiers in OS, although clearly reflect a purely naturalistic perception of nature, also reveal Darwin's interest in a kind of beauty that differs from nature's breathtaking beauties described in JR. Darwin's aesthetic attention in OS focuses on the perfection of organisms, the complexity of relations, the adaptability of organs, the definition of species, that is, nature's excellence in the development of life on Earth.

4. Conclusions

The pendulous descriptive movement between visible and abstract nature, evident in the Darwinian lexicon, reveals a linear structure, a journey from JR to OS, in the way of perceiving the natural landscape. Curiosity, interest, an ability to feel surprise, beauty, wonder, in short, the essence of Darwin's passions, vary depending on a major acquisition of empirically contrastable scientific knowledge.

4.1. Conceptual and Philosophical Implications of the Analysed Darwinian Lexicon

Descriptions of natural landscapes of many kinds stand out in JR. These natural scenes generate both a great scientific interest in Darwin, as well as a deep sense of awe and happiness. The enumeration of the elements that evoke the greatest curiosity in him is a constant descriptive fact in this work. The vocabulary used suggests the beauty of a landscape that is experienced for the first time. JR is a work that witnesses the approaching of Darwin's scientific maturity, that is, his passage from analytical holism to a detailed and individualized analysis, and the balance of both in an aesthetic-scientific synthesis of Romantic, enchanted, origin, but with a purely Darwinian direction.

However, as the analysis of Darwinian lexicon in OS has shown, it is essential to Darwin to be able to *recognize* every element in nature in order to admire the landscape as a whole.

Without *recognition* of the landscape, that is, a maturation process that scientifically filters every element of what constitutes the whole, an unscientific sentimental-aesthetic perception would be inevitably insufficient. The almost inexistent mere aesthetic descriptions of nature in OS are a side-effect of this fact.

Nevertheless, from the fact that a clear decrease in lexical content dedicated to the description of aesthetic feelings towards nature can be observed in OS, the decline of his interest in landscape aesthetics should not be inferred. Just the opposite, Darwin's lexicon shows an intense interrelation, according to G. Levine (2011, 54-55), between the pleasure obtained from the contemplation of the landscape, and the intellectual pleasure of theorizing or drawing hypotheses, a solid unity between sensation, feeling and thought. The scientific assimilation of the individual parts of the landscape is, in fact, Darwin's fundamental basis for a feeling of pleasure.

Darwin's maturation as a naturalist causes a perceptual diversion, not the loss of the ability to aesthetically perceive nature. In OS, Darwin focuses on a new objective that is admirable for its complexity. The expansion of knowledge about the intricate relationship of the forces of nature makes them amazing, beautiful, and surprising, while respecting the aesthetic interest that Darwin retains for the beauty of landscapes. The aesthetic-sentimental, yet disenchanted, appreciation of nature found in Darwin's OS is characterised as being more mature, increasingly intense, and closer to the natural landscape. In short, it is a disinterested relationship of passion, a more human bond with nature.

4.2. On Science and Disenchantment in the Darwinian Descriptions of Nature

A lexical and semantic analysis of Darwin's JR and OS has shown that his scientific knowledge about the domain of the world he studies, eliminates or implicitly modifies basic assumptions about nature concerning the relationship human beings have with it. A view of nature then appears in JR and OS where there is not an interfering subjectivity in the process of interpreting what is observed. However, the thesis that I have tried to defend does not centre on the possibility of objective scientific knowledge in Darwin's work, but on the type of worldview that Darwin's vocabulary distils in JR and OS. The results of the computational analysis of the Darwinian lexicon show that the prevalence of adjectives that exclude non-objective properties favours the disenchanted conception of nature.

A scientific view of the world thus takes shape that explores the structure and laws of nature so that it describes and explains a natural reality detached of any mysterious premise, ultimately, a reality that can be called "demagified" or disenchanted.

There is, nonetheless, a relevant difference between JR and OS which confirms the journey from (partial) enchantment to disenchantment. Darwin's scientific-explanatory knowledge of nature in OS becomes manifest in descriptions of natural landscapes with a use of less subjectivised descriptors than in JR. The evolution of Darwin's thought, from JR to OS, that this difference shows leads us to claim that scientific naturalism such as Darwinian evolutionism causes a strong conceptual review of basic assumptions regarding nature and the relationship it has with human beings. This new implicit view of nature, manifested in the texts that have been analysed, leads to a different way of perceiving nature, including its aesthetic perception, and a different way of describing it.

The landscape descriptions present in Darwin's texts are, thus, a reflection of a disenchanting view of the world in a non-pejorative sense. This disenchanting conception leads to a perception of nature that does not lessen Darwin's aesthetic sensitivity to the landscape, as has been seen in the lexical and semantic analysis of the texts. Instead, it makes it more powerful. Scientific knowledge allows the observation of nature from new perspectives; a specialized analysis, focused both on the individual elements that make up the natural landscape as well as on the whole in itself, enables the perception of certain aspects of nature that would not emerge through a mere aesthetic-contemplative observation devoid of such knowledge. To the extent that it is accepted that science is a specifically symbolically human activity, integrating its contents in the perception and description of the beauty of natural landscapes should make that aspect of the experience of the world more symbolically human.

In short, according to the results of the semantic analysis of JR and OS, the negativist position would be unauthorized, both from the general point of view of the interpretations of Weberian disenchantment and, *a fortiori*, regarding the Darwinian conception of nature. At the same time, the optimistic position would be reinforced, according to which a greater explanatory —disenchanting— knowledge of the nature that Darwin admires, allows finer tuning of his aesthetic judgments.

Although OS is a work with greater disenchanting content than JR, that is, with a greater scientific-explanatory load, the adjectivation in OS demonstrates that Darwin's aesthetic and intellectual fascination with nature does not diminish, but rather strengthens.

References

- Adorno, T., Horkheimer, M. (2016) [1944], *Dialectic of Enlightenment*, translated by John Cumming, London and New York: Verso.
- Barlow, N., ed. (2005), *The Autobiography of Charles Darwin, 1809-1882*, New York: W.W. Norton & Company.
- Barrett, P. H., Weinshank, D. J. and Gottleber, T. T., eds. (1981), *A Concordance to Darwin's "Origin of Species"*, Ithaca and London: Cornell University Press.
- Barrett, P. H., Weinshank, D. J., Ruhlen, P. and Ozminski, S. J., eds. (1987), *A Concordance to Darwin's "Descent of Man, and Selection in Relation to Sex"*, Ithaca and London: Cornell University Press.
- Barrett, P. H., Weinshank, D. J., Ruhlen, P., Ozminski, S. J. and Berhage, B. N., eds. (1986), *A Concordance to Darwin's "The Expression of the Emotions in Man and Animals"*, Ithaca and London: Cornell University Press.
- Beer, G. (1983), *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot, and Nineteenth-Century Fiction*, Cambridge: Cambridge University Press.
- Berger, P. L., ed. (1999), *The Desecularisation of the World: The Resurgence of Religion in World Politics*, Washington D.C.: Ethics and Public Policy Center.
- Berman, M. (1981), *The Reenchantment of the World*, London and Ithaca: Cornell University Press.
- Bordalejo, B. (2012), Online Variorum of Darwin's Origin of Species, in *The Complete Work of Charles Darwin Online*, edited by John van Wyhe (2002) <http://darwin-online.org.uk/> (accessed 21 June 2020).

- Campion, N. (2011), "Disenchantment and the Awe of the Heavens", in *The Inspiration of Astronomical Phenomena VI*, edited by Enrico Maria Corsini, ASP Conference Series 441: 415-422.
- Cannon, W. F. (1968), "Darwin's Vision in *On the Origin of Species*", in *The Art of Victorian Prose*, edited by George Levine and William Madden, New York: Oxford University Press.
- Carlson, A. (2000), *Aesthetics and the Environment: The Appreciation of Nature, Art and Architecture*, London and New York: Routledge.
- Curry, P. (1999), "Magic vs. Enchantment", *Journal of Contemporary Religion* 14 (3): 401-412.
- Darwin, C. (1839), *Journal of Researches into the Geology and Natural History of the Various Countries Visited by H.M.S. Beagle, under the Command of Capt. Fitz Roy, R.N.*, London: Henry Colburn.
- Darwin, C. (1860), *Journal of Researches into the Natural History and Geology of the Countries Visited by H.M.S. Beagle round the World, under the Command of Capt. Fitz Roy, R.N.*, London: John Murray.
- Darwin, C. (1859), *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, London: John Murray.
- Darwin, C. (1876), *The Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, London: John Murray.
- Dawkins, R. (1998), *Unweaving the Rainbow: Science, Delusion and the Appetite for Wonder*, Boston: Houghton Mifflin Company.
- Dennett, D. C. (1996), *Darwin's Dangerous Idea: Evolution and the Meanings of Life*, London: Penguin Books.
- Dennett, D. C. (2017), *From Bacteria to Bach and Back: The Evolution of Minds*, New York: W. W. Norton & Co, Inc.
- Fisher, P. (1998), *Wonder, the Rainbow, and the Aesthetics of Rare Experiences*, Cambridge (Mass.): Harvard University Press.
- Gane, N. (2002), *Max Weber and Postmodern Theory: Rationalization Versus Re-enchantment*, New York: Palgrave.
- Gellner, E. (1987), *Culture, Identity, and Politics*. Cambridge: Cambridge University Press.
- Gibson, J. W. (2009), *A Reenchanted World: The Quest for a New Kinship with Nature*, New York: Metropolitan Books. Henry Holt and Company.
- Graham, G. (2007), *The Re-enchantment of the World: Art versus Religion*, Oxford: Oxford University Press.
- Greisman, H. C. (1976), "'Disenchantment of the World': Romanticism, Aesthetics and Sociological Theory", *British Journal of Sociology*, 27 (4): 495-507.
- Griffin, D. R. (2001), *Reenchantment without Supernaturalism: A Process Philosophy of Religion*, Ithaca and London: Cornell University Press.
- Hidalgo-Downing, L. (2014), "The Role of Negative-Modal Synergies in Charles Darwin's *The Origin of Species*", in *Evaluation in Context*, edited by Geoff Thompson and Laura Alba-Juez, 259-280, Amsterdam: John Benjamins Publishing Company.
- Jiménez Pazos, B. (2016), *Imagen del Mundo, Percepción y Descripción de la Naturaleza. Un Estudio Comparado en torno a las Presuposiciones Onto-epistemológicas en la Poesía Romántica Inglesa y la Prosa Científica de Charles Darwin / Worldview, Per-*

- ception and Description of Nature. A Comparative Study on the Onto-epistemological Presuppositions in English Romantic Poetry and the Scientific Prose of Charles Darwin.* Tesis Doctoral. Departamento de Filosofía, Universidad del País Vasco.
- Jiménez Pazos, B. (2017), "Charles Darwin y el Desencantamiento Weberiano", *Daimon. Revista Internacional de Filosofía*, 71: 95-106.
- Kontos, A. (1994), "The World Disenchanted, and the Return of Gods and Demons", in *The Barbarism of Reason: Max Weber and the Twilight of Enlightenment*, edited by Asher Herowitz and Terry Maley, 223-247, Toronto: University of Toronto Press.
- Koshul, B. B. (2005), *The Postmodern Significance of Max Weber's Legacy*, New York: Palgrave MacMillan.
- Landy, J. (2009), "Modern Magic: Jean-Eugène Robert-Houdin and Stéphane Mallarmé". In *The Re-Enchantment of the World: Secular Magic in a Rational Age*, edited by Joshua Landy and Michael Saler, 102-129, Stanford, California: Stanford University Press.
- Landy, J., Saler, M. (2009), "Introduction: The Varieties of Modern Enchantment", in *The Re-Enchantment of the World: Secular Magic in a Rational Age*, edited by Joshua Landy and Michael Saler, 1-14, Stanford, California: Stanford University Press.
- Lassman, P., Velody, P. (1989), "Max Weber on Science, Disenchantment and the Search for Meaning," In *Max Weber's 'Science as a Vocation,'* edited by Peter Lassman and Peter Velody, 159-204, London: Unwin Hyman.
- Levine, G. (2008), *Darwin Loves You. Natural Selection and the Re-enchantment of the World*, Princeton (New Jersey): Princeton University Press.
- Levine, G. (2011), *Darwin the Writer*, Oxford: Oxford University Press, 2011.
- Liepmann, H. P. (1981), "The Six Editions of the 'Origin of Species': A Comparative Study", *Acta Biotheoretica*, 30: 199-214.
- Loye, D. (2000), *Darwin's Lost Theory of Love: A Healing Vision for the New Century*, New York: toExcel.
- Martin, D. (2005), *On Secularization: Towards a Revised General Theory*, Aldershot/Burlington, VT: Ashgate.
- McDowell, J. (1996), *Mind and World*. Cambridge (Mass.) and London: Harvard University Press.
- McGrath, A. (2002), *The Re-Enchantment of Nature. Science, Religion and the Human sense of Wonder*, London: Hodder & Stoughton.
- Menninghaus, W. (2016), "Caprices of Fashion in Culture and Biology: Charles Darwin's Aesthetics of 'Ornament'", in *Philosophical Perspectives on Fashion*, edited by Giovanni Matteucci and Stefano Marino, 137-150, London and New York: Bloomsbury Academic.
- Paige, N. (2009), "Permanent Re-Enchantments: On Some Literary Uses of the Supernatural from Early Empiricism to Modern Aesthetics", in *The Re-Enchantment of the World: Secular Magic in a Rational Age*, edited by Joshua Landy and Michael Saler, 159-180, Stanford, California: Stanford University Press.
- Parsons, G. (2008), *Aesthetics and Nature*, London and New York: Continuum.
- Partridge, C. (2004), *The Re-Enchantment of the West: Alternative Spiritualities, Sacralization, Popular Culture and Occulture*. Volume I. London and New York: T & T Clark International.
- Pearson, K. (1892), *The Grammar of Science*, M. A. London: Walter Schott.

- Peckham, M. (1959), *The Origin of Species: A Variorum Text*, Philadelphia: University of Pennsylvania Press.
- Richards, R. J. (2002), *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe*, Chicago: The University of Chicago Press.
- Richards, R. J. (2011), "Darwinian Enchantment". In *The Joy of Secularism: 11 Essays for how We Live Now*, edited by George Levine, 185-204, Princeton (New Jersey): Princeton University Press.
- Ruickbie, L. P. (1999), *The Re-Enchanters: Theorising Re-Enchantment and Testing for its Presence in Modern Witchcraft*, King's College, University of London. Department of Theology.
- Sainte-Marie, M. B., Meunier, J., Payette, N. and Chartier, J. (2011), "The Concept of Evolution in the *Origin of Species*: A Computer-assisted Analysis", *Literary and Linguistic Computing* 26 (3): 329-334.
- Schroeder, R. (1995), "Disenchantment and its Discontents: Weberian Perspectives on Science and Technology", *Sociological Review* 43 (2): 227-250.
- Scott, M. (2017), *WordSmith Tools*, Version 7. Stroud: Lexical Analysis Software.
- Shillingsburg, P. L. (2006), "The First Five English Editions of Charles Darwin's *On the Origin of Species*", *Variants* 5: 221-248.
- Sloan, P. R. (2005), "It Might Be Called Reverence". In *Darwinism and Philosophy*, edited by Vittorio Hösle and Christian Illies, 143-165, Notre Dame: University of Notre Dame Press.
- Sulloway, F. J. (1985), "Darwin's Early Intellectual Development: An Overview of the *Beagle* Voyage (1831-1836)", in *The Darwinian Heritage*, edited by David Kohn, 121-154, Princeton (New Jersey): Princeton University Press.
- Swatos, W. H. (1983), "Enchantment and Disenchantment in Modernity: The Significance of 'Religion' as a Sociological Category", *Sociological Analysis* 44 (4): 321-338.
- Tanaka, D. J. (2009), "Gnosofilia: Bloch, Benjamin, and the Authority of Counter-Tradition". In *The Re-Enchantment of the World: Secular Magic in a Rational Age*, edited by Joshua Landy and Michael Saler, 181-201, Stanford, California: Stanford University Press.
- Taylor, C. (2007), *A Secular Age*, Cambridge (Mass.) and London: The Belknap Press of Harvard University Press.
- Van Wyhe, J., ed. (2002), *The Complete Works of Charles Darwin Online* (<http://darwin-online.org.uk>).
- Walsham, A. (2008), "The Reformation and 'The Disenchantment of the World' Reassessed", *The Historical Journal* 51 (2): 497-528.
- Weber, M. (2004), "Science as a Vocation", in *The Vocation Lectures*, edited by David Owen and Tracy B. Strong, translated by Rodney Livingstone, 1-31, Indianapolis and Cambridge: Hackett Publishing Company.
- Weinshank, D. J., Ozminski, S. J., Ruhlen, P., Barrett, W. M., Herbert, S., eds. (1990), *A Concordance to Charles Darwin's Notebooks 1836-1844*, Ithaca and London: Cornell University Press.