Edinburgh and the birth of British evolutionism: a peek behind a veil of anonymity

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A Peek Behind a Veil of Anonymity

Abstract

Erasmus Darwin's evolutionary verses were isolated and ephemeral philosophical speculations. The real and academic birth of British evolutionism took place a couple of decades later in Edinburgh. It is probably no coincidence that the first fruits of this evolutionary theorizing were published during the approximately 2 years (1825-1827) that Erasmus' illustrious grandson Charles studied there: his evolutionary thinking was almost certainly more inspired by the first wave of British evolutionary theorizing than he later acknowledged or maybe even remembered. Unfortunately, we still don't know with certainty the identity of the authors of some of the key manifestations of this theorizing. Our identification, with the help of modern author verification software, of the authors of two of these anonymous evolutionary articles, published in 1826 and 1827, confirms that Darwin's geology professor Robert Jameson played a pivotal role in it.

Keywords Charles Darwin, Robert Jameson, evolutionism, Edinburgh, computational stylometry

In the second chapter, "The Birth of Evolutionism," of his acclaimed *Monad to Man* (2009a), Michael Ruse refers to Jean-Baptiste Pierre Antoine de Monet, Chevalier de Lamarck (1744-1829) as the naturalist who has "the fullest claim in France to being the first genuine, thorough, organic evolutionist" (p. 45). In Great-Britain, the physician Erasmus Darwin (1731-1802) stands out unambiguously as the first "real, systematic evolutionist" (p. 56).

However, the latter was a provincial figure and an evolutionary soloist, whereas Lamarck was but the most prominent member of an academic school or wave of Continental evolutionists (Corsi 2005). The epicenter of the British equivalent of this early nineteenth-century Continental European wave of transformists and evolutionists was located, not in Erasmus' rustic Lichfield, nor in the industrial Derby where he lived between 1782 and 1802, but in the vibrant Edinburgh where his grandson Charles (1809-1882) studied medicine between 1825 and 1827.

The so-called Athens of the North is sometimes called Britain's most European city. It was, two centuries ago, at a time that medical schools were still important for the training of men of science in many disciplines, also still the main center of excellence in medical education in the English-speaking world and a magnet for medical students from all over Europe. It should therefore not surprise us that it was in Edinburgh that a wider, Continental European tradition of evolutionary and transformist thinking first blossomed on the British Isles. We will first give a brief overview of the extant literature on this early but relatively short-lived—it faded in the more restrictive intellectual climate of the 1830's and 1840's—academic efflorescence of evolutionary theorizing in Great-Britain, before going on to present our own contribution to this literature: the identification, through computational stylometry, of the authors of two anonymous articles (published in 1826 and 1827), the first of which constitutes the first evolutionary article, published in Great-Britain. In this sense, it is indeed "a landmark in the history of evolutionary biology" (Eldredge 2015, p. 52). Lastly, we also discuss the historiographical relevance of this identification.

A survey of the extant literature

The Edinburgensian birth of British evolutionary theorizing was first tentatively illuminated through the prism of the (suspected) impact it had on the later development of British evolutionism. Desmond (1989), for example, located the roots of the politically charged pre-Darwinian evolutionary ideas that raged throughout early to mid-nineteenth-century London and its medical schools in Edinburgh. Other scholars have examined the Edinburgh background of the evolutionary work *Vestiges of the Natural History of Creation* (1844) (Hodge 1972, Yeo 1984, Secord 1989, Jenkins 2015a, Ch. 6), published anonymously by the prominent Edinburgh journalist and publisher Robert Chambers (1802-1871). It created a veritable sensation (Secord 2000) by introducing evolutionism to a broader British public and thus also prepared the way for *On the Origin* (1859), as admitted by Darwin himself (it even outsold his magnum opus until the twentieth century).[1]

This brings us to the intriguing question as to whether Edinburgh's most famous student was, despite his own assertions to the contrary, influenced by the Edinburgensian evolutionists. Darwin's modern biographers have described his stay in Edinburgh in great detail (Desmond and Moore 1992, Browne 1995). It is clear that his behavior changed markedly during his second year (1826-1827), the (academic) year in which our first anonymous article was published: he became more of a student of natural history than a student of medicine. During the summer recess of 1826, he had already become certain "about needing to give up medicine" (Browne 1995, p. 63), even though he had to take only two more courses to fulfill the preliminary requirements for a medical degree. His brother Erasmus had left Edinburgh in

[1] Several other predecessors of Darwin also had an Edinburgh background: William Wells (1757-1817), James Cowles Pritchard (1786-1848) and, most importantly, Patrick Matthew (1790-1874) studied medicine at Edinburgh University. Matthew published *On Naval Timber and Arboriculture*, the book in which he anticipated Darwin's theory of evolution through natural selection, in 1831 in Edinburgh.

March or April 1826 (Sloan 1985, Browne 1995), which led him, now left to his own devices, to become "well acquainted with several young men fond of natural science" (Barlow 1958, p. 48). Last but not least, during the summer of 1826, he had also become convinced "that his father would leave him comfortably off" (Desmond and Moore 1992, p. 31).

On 28 November 1826, he was elected a member of the Plinian Natural History Society, an organization which had be founded in 1823 by a group of undergraduates. It was meant to provide young men with a venue in which to discuss natural history and other topics that were broached during courses at the university. Inevitably, some of the subjects discussed at those youthful gatherings bordered on the indictable. On 5 December, Darwin even joined the Society's governing council. He also became, for a few months, research assistant of its stalwart, the Lamarckian anatomist and zoologist Robert E. Grant (1793-1874) (Fig 1). Grant introduced him to the elite Wernerian Natural History Society. It had been founded, on 12 January 1808, by Robert Jameson (1774-1854) (Fig 2), its life president. Jameson was a former pupil of Abraham G. Werner (1750-1817) (Fig 3), the so-called father of German geology and arguably the foremost geologist of the eighteenth century.

A list of 21 writings that Darwin had "read thro [sic] since [his] return to Edinburgh" is also revealing.[2] It included only seven works which were relevant reading material for a medical student. Many books, essays and papers on this list were instead about travel and natural history (nine in total). One of the works listed was his grandfather's *Zoonomia* (1794-1796), a medical treatise that also con-tained evolutionary considerations and that he admired greatly at the time. His dismissive remarks about the man notwithstanding (Darwin 1854, Barlow 1958), Darwin also became a very attentive and assiduous participant in Jameson's natural history lectures (one of which was entitled "On the Origins of the Animal Species"),

[2] See: https://www.darwinproject.ac.uk/people/about-darwin/what-darwin-read/darwin-s-student-booklist.

practicals and field trips (Secord 1991). One of the benefits of attending his lectures was that Jameson's students were given free ac-cess to the natural history museum of Edinburgh University, built up and run by Jameson sin-ce 1793 and "the finest institution of its kind in Britain" (Browne 1995, p. 69).

It is, with the benefit of hindsight, quite clear that Darwin's career as a naturalist started in earnest during that second year at Edinburgh University. But was he also influenced by the Edinburgh evolutionists? Can we, again with the benefit of hindsight, say that his conversion to evolutionism also started in Edinburgh? There is certainly no clear paper trail, linking his Edinburgh days, his research on board HMS *Beagle* and his evolutionary theorizing. How-ever, he does refer, in his aforementioned student booklist, to "Several numbers in the New Edinb: Philos Journal," the journal in which our two anonymous articles were published.[3] Some scholars (e.g., Hodge 2014) have suggested that Darwin's experiences at Edinburgh indeed played a greater role in the development of his evolutionary ideas than he later acknowledged. Browne (1995, p. 85) points out that Darwin read copies of Grant's 1826 papers on marine zoology "almost as if collecting all possible points of view about transmutation and secular science in general." His collaboration with Grant on the latter's transmutation-inspired research of marine invertebrates in any case influenced his own invertebrate research on HMS *Beagle* and this research may, in turn, have provided an important foundation for his evolutionary theorizing in 1837 (Sloan 1985).

Several paleontologists with an interest in the history of Darwinism or historians with a specific interest in the history of geology and paleontology (Brinkman) have argued that Darwin's study of fossils also played an important role in his conversion to evolutionism

[3] The second volume appeared in April 1827 and contained, like the first volume, two issues, which probably means that the booklist was written during or after that month (otherwise, Darwin couldn't have read "several numbers" in that journal).

(Eldredge 2009a,b, 2015, Brinkman 2010, Dominici and Eldredge 2010, Allmon 2016). Fossils certainly played a key role in our two anonymous articles, as we will explain in the next section. Eldredge (2009a, 2015) has, more specifically, argued that Darwin's early, paleontological research on HMS *Beagle* was inspired by these articles and by the Edinburgh evolutionists (see also Dominici and Eldredge 2010).

In his recent study of these evolutionary thinkers, the Edinburgh historian Bill Jenkins (2015a,b, 2016) explicitly avoids viewing them as in any sense precursors of Darwin. He rather places them in their own historical and geographical context. He is undoubtedly correct when he puts our unfamiliarity with this school down to the fact that none of the early evolutionists wrote a major work on evolution. This, however, is not the only explanation. The mainstream interpretation of the history of (British) evolutionary thought is, to begin with, thoroughly Darwin-centric. As Corsi (2005, p. 67) puts it: "By concentrating on Darwin and the Origin, scholars (especially British and American scholars) give a misleading impression of what happened in the 19th century." Another reason for our unfamiliarity with the Edinburgh evolutionary thinkers is that this movement or school is currently not associated with any central figure. A third and related reason is that our understanding of the Edinburgh academic birth of British evolutionism and of the way it influenced the later course of evolutionary thinking in Great-Britain—possibly including Darwin himself —is still incomplete.

There is not even certainty about the identity of the anonymous authors of the two most intriguing articles that marked this birth. They formed part of a series of five "openly transformist articles" (Jenkins 2015a, p. 89) which, between 1826 and 1829 (the year of Lamarck's death), were published in the aforementioned *Edinburgh New Philosophical Journal*. This journal was edited by Jameson and formed "the most prolific source of transformist articles" (p. 13) during the Edinburgh wave of evolutionary theorizing. Two of these five transformist

articles were written by Grant, although "he did not publicly reveal the full extent of his [evolutionary] views until he delivered the Swiney lectures in London in the 1850s" (Browne 1995, p. 83). A third article, published in 1829, was an English-language summary of a paper by Étienne Geoffroy Saint-Hilaire (1772-1844) that had appeared in the *Mémoires du Muséum d'histoire naturelle* the year before. Only the identity of the authors of our two anonymous and explicitly evolutionary articles remains unknown or uncertain.

Two anonymous articles

Grant had been influenced by Erasmus Darwin's *Zoonomia*. However, the evolutionary speculations in that work were generally not thought of as belonging to the domain of science (Ruse 2009b). Even the more elaborate evolutionary doctrine of Lamarck was, in the eyes of many nineteenth-century scholars, too philosophical to be taken seriously (e.g., Knox 1855). The progressive geohistory of the aforementioned Werner was in any case a more important or more reliable source of inspiration for the first wave of evolutionary theorizing among British academics (Jenkins 2015a,b). Werner, who, in 1775, became the first scholar to teach geology as a separate branch of science, interpreted the history of Earth in terms of a series of depositions in a gradually receding universal ocean (Neptunism). According to this theory, all rocks had been precipitated from that ocean and now were arranged in formations around the Earth like the layers of an onion, with the younger rocks and their respective fossils deposited on top of the older ones.

The first of our two anonymous articles, "Observations on the nature and importance of geology" (Anonymous 1826), dealt, as the title indicates, with the science of geology. It appeared in the first volume of the *Edinburgh New Philosophical Journal* (April-October 1826) and gave the reader a thumbnail sketch of the economic and scientific significance of this still

young science. Geology was, according the author, more than any other physical science, connected with other sciences and informed us of the origin, destruction and distribution of organic beings. The increasing complexity of the fauna and flora that had populated the globe, as tentatively revealed by the progressive nature of the fossil record, suggested that Lamarck was right: one species could give rise to another. As the anonymous author put it (Anonymous 1826, p. 297):

> The doctrine of petrifactions, even in its present imperfect condition, furnishes us with accounts that seem in favour of Mr Lamarck's hypothesis. We, in fact, meet with the more perfect classes of animals, only in the more recent beds of rocks, and the most perfect, those closely allied to our own species, only in the most recent; beneath them occur granivorous, before carnivorous, animals; and human remains, are found only in alluvial soil, in calcareous tuff, and in limestone conglomerates.

However, the author did not follow Lamarck's view that there was an innate tendency toward increasing complexity. He warned the reader that "this meritorious philosopher" had "resigned himself to the influence of imagination, and attempted explanations, which, from the present state of our knowledge, we are incapable of giving" (Anonymous 1826, p. 297). The example of domesticated animals and cultivated plants that had been modified by change of situation, climate, nourishment or other circumstances, inspired him (i.e., the anonymous author) to speculate instead that many fossil species had also gradually been transformed into others under the influence of a changed climate or nourishment.

The second anonymous publication, "Of the changes which life has experienced on the globe" (Anonymous 1827), appeared in the third volume of the *Edinburgh New Philosophical Journal* (April-October 1827). It has attracted much less attention than the 1826 article, even

though it is exclusively dedicated to the idea of evolution. Like its predecessor, it refers to the importance of petrifactions or fossils as evidence of the successive changes that species have undergone. It attributes the differences which vegetables and animals exhibit, according to the various climates or locations in which they grow, to the gradual influence of a small number of natural causes. The main causes include gradual changes of natural phenomena and forces, such as modifications of the climate, the steady lowering of the sea level and the equally gradual diminution of volcanic activity. More irregular and violent upheavals are proposed as a second, but minor, cause of evolutionary modifications.

The authors

The 1826 article was initially attributed to Grant, even though he was not even a geologist (Eiseley 1958). In 1991, James Secord argued that its aims, content and style were identical to some of Robert Jameson's publications of the mid-1820s, although his stylistic comparison was based on only a few key words and phrases. As a result of this publication (Secord 1991), many modern historians consider Jameson to be the most likely author of "Observations on the nature and importance of geology" (1826). However, even Secord himself (Hopwood et al. 2010) has admitted that his attribution was not definitive or conclusive. Consequently, many modern scholars still ascribe the 1826 article to Grant (see, e.g, Galera 2016). Browne (1995, p. 81) refers to Grant as the most likely author, although she adds that "the point is still hotly debated." In a footnote, she speaks of some unidentified "third party" (Browne 1995, p. 554, n. 37). Corsi (2011), one of the foremost specialists in the pre-Darwinian history of evolutionary biology, has recently suggested that the author may have been the Austrian geological pioneer, friend and disciple of Jameson, Ami Boué (1794-1881) (Fig 4). Boué

became interested in geology through Jameson's influence while studying medicine in Edinburgh.

Jenkins (2015a) points out that most of the content-based arguments in favor of Jameson would indeed hold equally well for Boué. He has also identified Boué as a likely candidate for the authorship of the 1827 article. This publication was originally also ascribed to Grant (Desmond 1985). Eldredge (2015) attributes it to Jameson. Jenkins (2016) argues that it is very unlikely that it was written by Jameson though, as it refers to a Plutonist view of the geological history of the planet. This theory, which attributed much of the history of the planet to volcanic activities, was very much at odds with Jameson's still zealous Neptunism but less so with Boué's more hybrid interpretation of geological history.

It seems clear that the mystery of the authorship of these anonymous articles will never be conclusively resolved through a content-based analysis. Luckily, modern computational stylometry offers us an alternative way to identify authors of anonymous texts, one which has already yielded many remarkable results in the study of anonymous literary or, more broadly, non-scientific texts (e.g., Mosteller and Wallace 1963, Craig 2009, Kestemont et al. 2016, Stover et al. 2016) (Box 1).

Box 1. Stylometry

Stylometry refers to the quantitative study of writing style. It is a popular application of computational text analysis (Eder et al. 2016). One area in which the use of stylometry has produced interesting results is the field of authorship studies (Koppel et al. 2009, Stamatatos 2009, Juola 2006). Here, computational methods are applied to establish the authorship of anonymous texts, solely on the basis of their writing style, i.e. text-internal evidence. The assumption is that there exists a set of statistically quantifiable characteristics that are specific to an individual author's language use (Halteren et al.

2005). These characteristics are extracted from texts into so-called document vectors, offering a quantitative representation of the writing style in documents which can later be modelled using algorithms from statistics and machine learning (Sebastiani 2002). Controlled experiments show that stylometric methods are often able to correctly identify the author of anonymous documents, although the minimum requirements for such experiments should not be underestimated (e.g., document length) (Luyckx and Daelemans 2011).

Stylometry makes a distinction between authorship attribution and authorship verification. The setup of authorship attribution can be likened to a police line-up: the algorithm is asked to select the single most likely authorial candidate from a (typically fairly restricted) series of candidate authors. A major drawback of attribution studies, however, is that one cannot guarantee that the actual author of an anonymous text is included in the set of candidate authors. A typical attribution classifier has no 'none of the above' option and will, by necessity, always attribute an anonymous document to one of the candidate authors, even if the actual author is missing from the set of candidates. In authorship verification (Koppel and Winter 2014), on the other hand, algorithms are used which do not assume that the correct candidate author is necessarily available to a system, which is a much more difficult setup. Here, the problem is defined as a series of independent, pairwise comparisons: given an anonymous document, and a training oeuvre for a single candidate author, the task is to estimate the probability that this author wrote the anonymous texts, while not taking into account the other competing candidates.

One of the reasons why authorship identification through computational stylometry has not yet been applied in the field of the history of science is that it is a more time-consuming endeavor than a content-based analysis (for which scientific texts of course are perfectly suited).

Hundreds of relevant and suitable historical texts must be collected, digitized via optical character recognition software, and turned into machine-readable versions of the original publications, i.e., UTF8 encoded plain text files. Moreover, those documents must be of a sufficient length. From the writings, collected for this article, only documents were eventually considered which consisted of at least 1,000 tokens (after tokenization). Documents longer than 3,349 tokens (i.e., the length of the longest text under scrutiny here, "Observations on the nature and importance of geology") were divided into consecutive, non-overlapping samples of 3,349 tokens.

A credible analysis of articles with an open set of candidate authors, as is here the case, has also only recently become feasible, thanks to methodological advances (cf. Box 1). For our own analysis, we applied a state of the art authorship verification algorithm, called the 'imposters approach' (Box 2).

Box 2. The imposters approach

The imposters approach (Stamatatos et al. 2014) has been well-researched in a series of empirical studies and has consistently ranked very high among the competitors of the annual PAN competition (Stover et al. 2016, Kestemont et al. 2016). The imposter verification algorithm has also been successfully applied to a number of case studies in literary history which are quite similar in nature to the anonymous articles which form the focus of the present paper. Two sets of authors are distinguished in this approach: a background collection, which functions as the imposters pool, and a foreground collection, which contains a considerable number of publications by the most likely candidate authors for an anonymous text. Below, we describe how the imposters pool serves as a stylistic point of reference: if an anonymous text x has been written by candidate author A, the

stylistic similarity between x and A should be relatively bigger in comparison to random subsets of imposters who, so to say, attempt to claim the authorship of x.

The verification setup (detailed in S1 Appendix) requires that for an anonymous text, represented by vector x, we independently assess the authorship of each target author A from the collection of foreground authors. For each target author A, we first select all document vectors from the foreground corpus, belonging to author A. Next, we start the following bootstrapped procedure. During each of k iterations (e.g., k=500), we randomly sample (i) 30 distractor documents from the pool of imposter authors in the background corpus, which we call *I*, and (ii) half of the available characteristics from the vocabulary used (up to 50,000 word unigrams and 50,000 character tetragrams). We calculate the minimal distance which exists between the anonymous text *x* and (i) any vector from A's oeuvre and (ii) any imposter document. (In this comparison, we never pair segments which were extracted from the same text to neutralize the effect of thematic similarities between such segments.) In each iteration, we record whether x was closer to any item in A than to any item in I. The probability that author A wrote document x, is then expressed as the ratio of iterations in which $min(dist(x, A)) < min(dist(x, I))$.

An attractive quality of the imposters approach is that the system is not particularly sensitive to its exact hyperparametrization (e.g., the number of imposters samples drawn), as long as sensible settings, such as the ones below, are selected. This alleviates the need for a complicated calibration procedure. For the calculation of the distance between document vectors, we made use of Ruzicka's 'minmax' measure (Stamatatos et al. 2014), which can be expressed as a normalized distance measure, using the following formulation: $minmax(a, b) = 1 - \frac{\sum_{i=1}^{n} \min(a_i, b_i)}{\sum_{i=1}^{n} \min(a_i, b_i)}$.

Crucially, this approach depends on the availability of a large pool of distractor documents which are close enough in style and content to the foreground texts by candidate authors to serve as useful comparands (cf. Box 2). In our own study, these background texts consist of more than two hundred publications or extracts from publications by dozens of nineteenth century natural history authors. Our foreground collection contains one hundred texts by six candidate authors: aside from the three candidates that were already mentioned (Grant, Jameson and Boué), we have also included the zoologist and geologist John Fleming (1785-1857) and the geologists Charles Lyell (1797-1875) and Thomas Weaver (1773-1855).

The reason why we inserted Weaver as a candidate author is that he was a prominent Wernerian geologist. John Fleming seems an unlikely candidate as he became a fierce critic of the notion of evolution in the 1840s. However, during the 1820s and 1830s, he had been surprisingly sympathetic to Lamarck's works and supportive of Edinburgh transformists like Grant and Knox (Jenkins 2015a). Lyell is, at first sight, an even more unlikely candidate author. Not only because he wasn't an Edinburgh scholar but also because he became, in the 1830's, one of the main critics of Lamarckism or any other kind of progressive transformism or geology. As a young man and aspiring geologist, however, Lyell thought very differently about the history of Earth. In a review of the *Transactions of the Geological Society of London*, for example, published in the *Quarterly Review* of 1826 (Lyell 1826), he argued for a progressive, ascending scale in the geological succession of life forms.

We applied the verification algorithm, as outlined in Box 2, to the texts of these six foreground authors (the authorship of which is undisputed), and, subsequently, to the two anonymous texts. As the table in S2 Appendix shows, the algorithm has, with only a few exceptions, attributed all the texts in the foreground collection with a high to very high average probability (see confusion matrix, Fig 5) to their correct and known author. The relatively low average probability of the attribution of the texts by Lyell (to Lyell) can

perhaps be explained by the fact that his wife Mary had to help him in writing his articles, due to his ever-deteriorating eyesight (Somerville 2001, p. 351).

Subsequently, in the actual test phase, the algorithm was used to compute the probability of the authorship of the six candidate authors for each of the two anonymous articles (see S2 Appendix). The probability that Lyell was the author of the first text (1826) is zero. The probability that he was the author of the second text (1827) is almost equally low: 0.007. What might, at first sight, be more surprising to specialized historians like Corsi and Jenkins, is that Boué is only the fourth most likely author of the first text (0.044). However, it should be remembered that the software analyzes writing style, not content, and, as a foreigner, Boué apparently had a very distinct style of writing. The fifth most likely author of the 1826 text was Weaver (0.015), Fleming came in third (0.494), Grant second (0.775) and, not surprisingly, Jameson first (0.869). Boué was, on the other hand, clearly and unequivocally identified as the author of the second text (0.93), as Jenkins suspected. Grant was again the second most likely author (0.79), followed by Jameson (0.637), Fleming (0.567), Weaver (0.009) and Lyell (0.007).

The significance of this identification

There are two reasons why our stylometric analysis can be said to provide strong evidence for the authorship of these two articles. First, it confirms the aforementioned content-based identifications and, particularly, the content-based identification of Jameson as author of the 1826 article. Second, it has revealed a clear stylistic difference between the two most credible candidate authors, Jameson and Boué. It thus also tentatively confirms what was already suspected by several scholars: that Darwin's (and Boué's) geology professor Robert Jameson was the central figure of the wave of evolutionary thinking in Edinburgh. Our study might

therefore help to enhance the reputation of this somewhat enigmatic figure that Darwin dismissively called "that old brown, dry stick Jameson" (Darwin 1854; Burkhardt and Smith 1989, p. 195).[4] In 1991, Secord referred to him as probably the most poorly understood scholar in British natural history and geology during the first half of the nineteenth century and concluded that his reputation urgently needed to be revised and reassessed. Ten years later, Hartley (2001, p. 23) echoed these words: "Despite these many achievements, Jameson still remains the most poorly understood geologist and natural historian in early nineteenth century Britain." This is still the case today.

Last but not least, our confirmation that Jameson can indeed be considered the academic father of British evolutionism also highlights the enigma of Darwin's stay in Edinburgh: it seems just as unlikely that he was not inspired by the Edinburgh evolutionists as it is that he chose to keep silent about the inspiration it provided for his later evolutionary theorizing or that he had completely forgotten this source of inspiration.

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[4] In a letter from May 29, 1854 to his friend Joseph D. Hooker, Darwin deplored that Edward Forbes (1815-1854), Jameson's successor as Regius professor of Natural History at Edinburgh University, had lavishly praised Jameson in his introductory lecture: "I wish (…) he would not praise so much that old brown, dry stick Jameson" (Darwin 1854; Burkhardt and Smith 1989, p. 195).

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Fig 1 Robert E. Grant (1793-1874) was a British anatomist, zoologist and well-known Lamarckian. He was the first proposed candidate for the authorship of the two anonymous articles which have been subjected to stylometric analysis in this article. Source: Wellcome Collection.

Fig 2 Robert Jameson (1774-1854). A British naturalist, mineralogist and geologist. In 1804, he succeeded John Walker (1731-1803) as Regius professor of Natural History at Edinburgh University. To most scholars, he is the most likely author of "Observations on the nature and importance of geology" (1826). Some also believe him to be the author of our second article, "Of the changes which life has experienced on the globe" (1827). Source: Wikimedia Commons.

Fig 3 Abraham G. Werner (1750-1817), known as the father of German geology. He demonstrated the chronological succession of rocks in the Earth's crust and developed a theory about the history and cause of this stratification, known as Neptunism. He had a huge influence on his pupil Robert Jameson.

Fig 4 Ami Boué (1794-1881), an Austrian geologist, born in a Huguenot family in Hamburg. After receiving his first education in that city and in Geneva and Paris, he studied medicine in Edinburgh where he came under the influence of Robert Jameson. After obtaining his medical degree in 1817, he proceeded to study geology and eventually settled in Vienna. Corsi (2011) has suggested that he is the likely author of the article "Observations on the nature and importance of geology" (1826). Jenkins (2015a) has identified him as a possible author of "Of the changes which life has experienced on the globe" (1827). Source: Lysippos/Wikimedia Commons.

Fig 5 Confusion matrix. This matrix shows the average probability with which the trained author verification algorithm has attributed articles whose authorship is known to six candidate authors of the two anonymous articles. The relatively low average probability of the attribution of the texts, written by Charles Lyell (1797-1875), may be caused by the fact that he was assisted by his wife Mary in writing his articles, due to his very poor and, ultimately, failing eyesight.