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Progress in life's history: Linking Darwinism and palaeontology in Britain, 1860–1914

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ABSTRACT

This paper examines the tension between Darwinian evolution and palaeontological research in Britain in the 1860–1914 period, looking at how three key promoters of Darwinian thinking – Thomas Henry Huxley, Edwin Ray Lankester and Alfred Russell Wallace – integrated palaeontological ideas and narratives of life's history into their public presentations of evolutionary theory. It shows how engagement with palaeontological science was an important part of the promotion of evolutionary ideas in Britain, which often bolstered notions that evolution depended upon progress and development along a wider plan. While often critical of some of the non-Darwinian concepts of evolution professed by many contemporary palaeontologists, and frequently citing the 'imperfection' of the fossil record itself, Darwinian thinkers nevertheless engaged extensively with palaeontology to develop evolutionary narratives informed by notions of improvement and progress within the natural world.

1. Introduction

Palaeontology had a problematic position within Charles Darwin's initial promotion of the theory of evolution by natural selection. On the one hand, fossil evidence and understandings of an immeasurably long geological timescale were essential for illustrating that species had varied in the past, and that there was sufficient time in earth's history for the slow process of natural selection to lead to new forms. Darwin also personally engaged in palaeontological collection, and the South American fossils he retrieved during the Beagle Voyage were of significant interest to palaeontologists (Brinkman, 2010a; Podgorny, 2017). However, the state of palaeontological knowledge in the mid-nineteenth century also posed problems, which threatened to unsettle the theory if not carefully qualified. In *The Origin of Species*, Darwin highlighted both 'the imperfection of the fossil record' (Darwin, 1859, pp. 279–311) and the lack of records of any fossils below the Silurian (Darwin, 1859, pp. 463–5) as major problems for his theory that future research would need to rectify. Contemporary palaeontological collections were cited as being inadequate for this task, with Darwin lamenting: 'turn to our richest geological museums, and what a paltry display we behold!' (1859 p. 287).

For their own part, nineteenth-century palaeontologists have often been presented as having a difficult relationship with Darwinian evolution. The fragmentary nature of the palaeontological record ensured that demonstrating mechanisms like natural selection using fossils was difficult, and identifying the gender differences necessary for the even more contested issue of sexual selection was also problematic. While palaeontologists in the latter part of the nineteenth century moved increasingly to 'tree' modes when depicting life's history which were akin to Darwinian ideas of branching change (Pietsch, 2012), many still often conceptualized important strands of palaeontological development in terms of linear progress. There was also a tendency among many palaeontologists, such as Albert Gaudry in France or Edward Drinker Cope in the USA (Bowler, 1977), to make references to metaphysical forces or 'plans' in nature. This ensured that there was always a strong strand within palaeontology which went against the random and non-hierarchical view of nature which structured Darwin's theory.

As a result, palaeontology has often been taken as a key source of support for non-Darwinian forms of evolution, with Peter Bowler presenting it as one of the most striking manifestations of the 'Eclipse of Darwinism,' and a major source of support for alternate theories Neo-Lamarckianism, orthogenesis and saltationism (Bowler, 1983; 1996). It is certainly true that palaeontologists – and particularly those in France, Germany and the United States – were some of the leading promoters of these ways of thinking about evolutionary development, both before and after 1859. In Britain, the comparative anatomy of Richard Owen, which strongly resisted the implications of Darwinian thinking (and transmutationist ideas

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more generally), also drew a great deal from palaeontology (Desmond, 1984; Rupke, 2009; Camardi, 2001). While Owen's programme did not survive his death, later British palaeontologists, such as Harry Govier Seeley, Richard Lydekker (Bowler, 1996) and Robert Broom (Richmond, 2009) resisted strictly Darwinian ideas in favour of more metaphysical concepts well into the twentieth century.

Whether this frequent use of non-Darwinian ideas in palaeontology marks out the field as an area of theoretical innovation (albeit of ideas which were later rejected in the synthesis period) or as an odd cul-de-sac separated from the more 'mainstream' life-sciences is an open question that this special edition will hopefully go some way to resolving. However, it is important to note that palaeontology was an expanding and dynamic field in this period, and rejecting the role of non-Darwinian evolutionary theorists and models potentially risks imposing current views on evolution on nineteenth-century conceptions (Bowler, 2005, pp. 28–29). As shown in much recent work on the history of palaeontology (Brinkman, 2010a,b; Nieuwland, 2010; Rainger, 1991; Rieppel, 2012), the discipline was undergoing tremendous expansion in Europe, the USA and globally in this period, and gaining a great public profile. As a result, it could not be easily written off by more self-consciously 'Darwinian' thinkers – and indeed, was increasingly essential to engage with.

This paper will examine some of more direct confluences between Darwinian thinking and palaeontology by looking at how three key promoters of 'Darwinism' in public life in Britain – Thomas Henry Huxley, E. Ray Lankester and Alfred Russell Wallace – engaged with evidence and theories deriving from the expanding field of palaeontological research. It will primarily focus on their more popular writings, where they deployed evidence from life's history to explain evolutionary development to wider audiences. This was an increasingly important part of scientific activity in this period, essential to gaining both support and recognition, and also for asserting the significance of life's history for wider issues of evolution, nature, and progress. In doing so, this paper will engage with how palaeontological research was integrated into more explicitly Darwinian modes of thinking in this period, and how we can conceptualize the relations between 'Darwinian' and 'non-Darwinian' concepts.

Broadly, the article agrees with the line that what could be called 'Darwinism' in the 1870–1914 period often resonated strongly with contemporary notions of progress and development. This is an idea which has become widely presented in much recent literature (often taking a lead from Ruse, 2009), which is moving away from anachronistic back-readings of the post-1945 synthesis biology onto this earlier period. However, it develops these concepts by noting that in this reconciliation of progress and Darwinian thinking, the incorporation of ideas and models from the increasingly important field of palaeontology played a significant role. Palaeontological finds and theories could give scholars committed to promoting Darwinism a powerful set of images and resources, strongly committed to narratives of development and progress – both in nature and in modern science. Far from attempting to sideline palaeontological research as was often a feature in Darwin's own writings, invoking the importance of palaeontology was a key strategy for gaining appeal and honing models throughout this period.

2. Thomas Henry Huxley & the American addresses

Some of the earliest attempts to weld palaeontological research with an explicit commitment to Darwinian models of evolution were presented by Thomas Henry Huxley (1825–1895) – something possibly unsurprising given Huxley's status as an important Victorian public intellectual, and his role in the public presentation of Darwinian thought. In some ways, Huxley's extensive invocation of palaeontological finds and discoveries filled gaps in Darwin's own arguments, bringing the fossil record more clearly to bear on evolutionary processes. However, the use of palaeontology also caused ideas of progress and teleology in nature to come strongly to the fore.

Huxley engaged with palaeontological discoveries and debates throughout his career. This ranged from studying individual specimens, to writing popularizing accounts and specialist papers, and communicating with some of the leading figures involved in palaeontology. In Britain, his fierce debates with Richard Owen have been widely examined (Desmond, 1984; Rupke, 2009, pp. 182–208), and he was also involved in training and educating future generations of scientists who would go on to become important palaeontological researchers. Internationally, he engaged with palaeontologists in both continental Europe and the USA, and some of the leading American palaeontologists of the next generation, most notably William Berryman Scott, eventually Professor of Geology at Princeton, and Henry Fairfield Osborn, future President of the American Museum of Natural History in New York, spent part of their education in Britain specifically training under Huxley. As a participant in the networks of the life sciences in this period, Huxley was a key figure.

Huxley presented palaeontology as an extremely important contributor to understanding life, rather than something that raised problems in theoretical models. It was not just a source of evidence, but a source of theoretical innovation. Indeed, Huxley expressly mocked the use of palaeontology by many comparative anatomists by citing the (then) well-known maxim of the engineer James Brindley, that '"Rivers," … "were made to feed canals," likening this to how 'geology, some seem to think, was solely created to advance comparative anatomy.' (Huxley, 1862a, p. 273) Huxley felt that these conceptions were too narrow minded. Palaeontology certainly needed to be understood as providing evidence for evolutionary development and the narrative of life's history. However, it also provided a great deal of the theoretical base on which evolutionary ideas rested: 'allied with geology, paleontology has established two laws of inestimable importance: the first, that one and the same area of the earth's surface has been successively occupied by very different kinds of living beings; the second, that the order of succession established in one locality holds good, approximately, in all.' (Huxley, 1862a, p. 275). In understandings of both life's history and modern biogeography, palaeontology was crucial for presenting the raw evidence, but also giving important lessons on process in its own right.

Indeed, in Huxley's writings, he frequently asserted the importance of palaeontology and geology – often using the much longer public engagement with life's history through these subjects (as depicted in O'Connor, 2007) to lend support for the potentially more controversial aspects of Darwinian thinking. Indeed, in one of his earliest defences of Darwin's theory, he aimed to show how 'Mr. Darwin's work is the greatest contribution which has been made to biological science since the publication of the "*Règne Animal*" of Cuvier,' (T. H. Huxley, 1862b) and included a long discussion of how Darwin's theories were not only completely consistent with a range of palaeontological finds and discoveries, but were their best explanation. Gradual evolutionary modification and continuity in life's history explained why fossil animals mirrored modern forms in particular regions, such as the ground sloths and glyptodons in South America, the fossil marsupials in Australia, and the aurochs, mammoth and woolly rhinoceros in the Old World. (Huxley, 1862b, p. 144). Palaeontology showed that life changed throughout time, in a regular manner which created consistent life histories for particular regions.