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Commentary

Observations on Darwin and geography

Noel Castree (2009) and Felix Driver (2010) have presented somewhat contrasting takes on both the attitude of geographers towards the Darwin anniversaries of 2009 (as indicative of the prominence of Darwinian ideas in the discipline), and the broader issue of whether the assessment of the significance of the Darwinian heritage reflects the willingness of geographers to engage in the discussion of 'big ideas'. I offer some observations on these points, and also some comments on the relevance and, as I believe, to some extent, neglect of Darwin's contribution to my own specialist subfield of geography. But first I think we should clarify what we might have been celebrating in 2009.

'Charles Darwin' and 'evolution' are tied so closely together that a conscious act of mind is required every now and again to clarify the relationship between them. The word 'evolution' first appeared in *On the Origin of Species* only in the sixth edition of 1872 (not in the fifth of 1869 as stated by David Stoddart (1966, page 683; 1986, page 159), and had in fact first been used by Darwin in print in the first edition of *The Descent of Man* in the previous year. The verbal form 'evolved' had been the last word of the main text of the *Origin* since the first edition but Darwin had omitted the term evolution, probably in order to avoid ambiguity arising from its range of meanings in previous and contemporary usage. But as has frequently been pointed out before, it is important to differentiate between the impact of Darwin's *Origin* in convincingly making the case that organic evolution had occurred, and the reaction to the particular mechanism proposed by Darwin—natural selection—by which organic evolution could come about (Bowler, 1988). It is incontestable that Darwin was enormously successful in propagating the concept of organic evolution (an idea that was, of course, not original to him), but equally clear that his suggested mechanism of natural selection—the stunning, novel, materialist insight that he contributed—received a highly sceptical reception amongst most of his contemporaries, a response that is reflected in Darwin's rowing back on natural selection in successive editions of the *Origin*. It was not until Mendelian genetics had been welded to Darwin's mechanism as the 'modern synthesis' in the middle of the 20th century that natural selection assumed its ascendancy.

As for the impact on geography, Stoddart (1966) summarizes the situation succinctly: "Darwins' theory made a clear distinction between the way in which evolution was effected, and the course of evolution itself: geography seized on the latter and ignored the former" (page 696). So unlike a number of disciplines, most obviously biology, which were able to celebrate Darwin's 'blind watchmaker' insight, geography, had it been so inclined, would largely be marking Darwin's role in promoting the importance of history, contingency, and progressive change embodied in 'evolution'. But 'evolution' is a big, overarching idea and, as Castree (2009) argues, geographers, by and large, have not been keen on, or promoters of, big ideas in recent times. Big ideas that claim to provide significant insights across broad fields of study are prone to attract controversy, as is evident in the conjunction of evolution with fields such as psychology, human behaviour, and literary studies (Badcock, 2000; Carroll, 2004; Wilson, 1975). There is, perhaps, a certain irony in the situation that at a time when big issues of 'geographical' content and relevance—climate change, sustainable development, globalization, water shortages, food security, rising energy costs, and poverty—have assumed

substantial significance in public awareness, the media and in politics, it has been those not trained in the discipline of geography who have been most prominent in providing overviews of them. Taking the example of the economist Jeffrey Sachs's *The End of Poverty* (2005), we find in his "differential diagnosis" for poverty reduction a list of eight categories of factors (page 84). The category with the most individual factors is labelled (somewhat oddly) 'physical geography' and includes transport conditions, population density, agronomic conditions, and disease ecology; but many of the other groups of factors, such as 'geopolitics' and 'cultural barriers', are inherently 'geographical' or have a significant 'geographical' dimension. The geographical approach is further emphasized by eleven full-colour maps plotting distributions of variables documenting, or related to, poverty, and the index has numerous references to 'geographic factors'. In a section headed "Waking up to geography" (pages 104 – 105) Sachs recounts a conversation with a World Bank consultant and records how the consultant's "point about Bolivia's geographical distress was truly (and incredibly) something new for me" and that he had not previously reflected on how particular geographical variables were perhaps "the overriding factors in Bolivia's chronic poverty:—In all of my training, the ideas of physical geography and the spatial distribution of economic activity had not even been mentioned" (page 105).

But to move, in concluding, to my own specialist research field of geomorphology, I think there are some respects in which the contribution by Darwin has been underestimated, and consequently inadequately celebrated. Darwin's early career in terms of time expended, and publications produced, was primarily 'geological'—the significant majority of his scientific notes on the 'Beagle' voyage were geological rather than biological. And if we look at this work we find that much of what Darwin wrote, and the way he thought, is geomorphological. The research programme that emerged during the 'Beagle' voyage, and that he made plans to develop on his return, was to fashion a theory of the earth that related surface forms to internal processes and that could provide a causal understanding of the Lyellian 'steady-state' conception of crustal uplift and subsidence. Darwin's coral reef theory was created in this context—he saw coral reefs as geophysical probes that could document ocean floor subsidence—and in the *Origin* we find that he favours topographic change through denudation over sedimentary evidence in demonstrating the 'lapse of time' that was so vital in support of his assertion of speciation through slow evolution (Darwin, 1859, page 284). In fact, both Darwin's scale of approach, and his emphasis on the insights (literally) that topography and topographic change can provide resonate with the present active research agenda in the earth sciences relating uplift, erosion, and topography (Summerfield, 2000). Darwin's landscape vision that was first evident on the 'Beagle' voyage when he imagined vanished volcanic peaks in viewing Moorea from the heights of Tahiti (Herbert, 2005, page 171), and that was still in evident in his image of the denudation of the Weald in the *Origin* (pages 285 – 286), seems to me precisely the kind of mental reconstruction of past landscapes that is the foundation of William Morris Davis's geomorphological methodology. There have been different interpretations as to what, precisely, most influenced Davis in constructing his cycle of erosion (Kennedy, 2004; 2006; Livingstone, 1992), and Davis's own comments are not necessarily reliable in this regard, given the inherent incompatibility between cyclic and evolutionary conceptions of change. There were, of course, precedents for thinking of landscapes in terms of their evolution, including the thoughts of a previous Regius Chair at my own institution, Sir Archibald Geikie (1879), though it seems improbable that Darwin's landscape vision did not have an impact.

But in addition to the prominence of geomorphological thinking in Darwin's 'geological' work and its role in documenting the 'lapse of time', there is, arguably, a more fundamental reason to celebrate the significance of Darwin's geomorphology.

Darwin advanced and empirically tested hypotheses in many fields ranging from geology to plant morphology, organic evolution, and psychology (Ayala, 2009), but, as Michael Ghiselin (1984) has emphasized, it was Darwin's geological (and in my interpretation predominantly geomorphological) researches that provided the proving ground for developing his strategy of hypothesis development followed by testing through an assessment of the compatibility of the predictions of a hypothesis with respect to a range of phenomena—a process of corroboration that William Whewell characterized as the "consilience of inductions" (Ruse, 2009). We can perhaps say that Darwin's inherently geomorphological theory of coral reef formation was the methodological progenitor of his world-changing theory of evolution by natural selection.

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