Studies in History and Philosophy of Biological and Biomedical Sciences 53 (2015) 107–110

Contents lists available at ScienceDirect

Studies in History and Philosophy of Biological and Biomedical Sciences

journal homepage: www.elsevier.com/locate/shpsc

Essay review

The many chances of Charles Darwin

Charles H. Pence

Louisiana State University, 102 Coates Hall, Baton Rouge, LA 70803, USA

Darwin's Dice: The Idea of Chance in the Thought of Charles Darwin, Curtis Johnson. Oxford Univ. Press, Oxford & New York (2015). xxxii + 253 pp., Price US$29.95 hardback, ISBN: 978-0-19-936141-0

1. Introduction

Charles Darwin was, clearly, a man comfortable with epistemic ambiguity. Indeed, one of the most refreshing things about reading the works of Darwin—particularly his reflections in his many and detailed notebooks—is how he is willing to frankly acknowledge his ignorance. Nowhere, arguably, is this evidenced more than in Darwin's discussions of variation. While Darwin was deeply concerned with explaining the way in which variations occurred in animals, as has been expertly argued by both Hodge and Sloan (Hodge, 1985; Sloan, 1986), his empirical success was limited, and evolutionary theory would await the unification of Mendelian genetics with Darwin's work in the early 20th century (and the characterization of DNA beyond it) before the problem would fully be resolved.

This left Darwin in something of an unenviable position. He knew that explaining the causes of the variations that produced the history of life would be vital to, in particular, his critics' acceptance of his theory, yet he had precious little that he could concretely say about them. In no small part, then, the period dubbed the "eclipse of Darwinism" by Bowler (1992) can be interpreted as being driven by the inability of the Darwinian theory of the day to offer a coherent account of variation.

Despite this minimal historical sketch being nearly common knowledge at this point, it can still offer us a vast array of interesting historical questions to be analyzed. One, in particular, will be the focus here. How did Darwin deal, rhetorically, with the fact that he could not offer an ironclad, empirically supported theory of variation?

It is clear that the answer to this question has something to do with Darwin's use of chance. After all, we now refer to one of the central principles underlying his insight about heritable variation as "random variation," and much of this usage traces directly back to Darwin's own frequent references to chance in the discussion of variation. Famously, of course (and right at the beginning of a chapter of the *Origin of species*, no less), Darwin explicitly asserted that such references point out only our lack of understanding of the relevant causes at work:

> I have hitherto sometimes spoken as if the variations – so common and multiform in organic beings under domestication, and in a lesser degree in those in a state of nature – had been due to chance. This, of course, is a wholly incorrect expression, but it serves to acknowledge plainly our ignorance of the cause of each particular variation. (Darwin, 1859, p. 131)

But the simplicity of this disavowal (and the implication, thereby, that there exists only one notion of "chance" in Darwin—chance as ignorance of true causes) masks the depth and sophistication of Darwin's thought on the matter. As has been argued by numerous commentators (Beatty, 2006; Depew & Weber, 1995; Hodge, 1987; Hull, 1973; Pence, 2015), chance is one of the most subtle and interesting topics in Darwin's thought, and studying it can shed light on the way in which Darwin understood areas of biology as disparate as the causal structure of natural selection and the morphology of orchids.

One fact must be acknowledged immediately—when Darwin uses the word "chance," he refers to a bewilderingly large variety of concepts. For example, in my own work on Darwin's use of chance, I note that Darwin moves back and forth among chance as the absence of design, chance as something like the law of large numbers (about which more later), and (most often) chance as subjective ignorance of the true deterministic laws, leading as a consequence to unpredictability (Pence, 2015, pp. 50–51). Beatty (2006, p. 630) emphasizes in addition to these the sense in

E-mail address: charles@charlespence.net.

http://dx.doi.org/10.1016/j.shpsc.2015.07.008
1369-8486/

which, by extension, divergences themselves can be said to be "chancy" (i.e., unpredictable) for Darwin. Several other authors (Lennox, 2010; Noguera-Solano, 2013) have also more fully elucidated the role of chance as opposed to design (or, to borrow Noguera-Solano's apt term, "predesign") in variation. All our analyses of Darwin's use of chance, then, must figure out how to come to terms with this thoroughgoing polysemy.

Into this tangled fold enters Curtis Johnson's new book, *Darwin's dice: The idea of chance in the thought of Charles Darwin*. While I think there is much to recommend the detailed analysis that is found in Johnson's book, I have genuine reservations about its central theses. Happily, however—and for precisely the reasons that I noted above—exploring my misgivings illuminates many of the most exciting and interesting areas of Darwin's thought. In spite of our disagreements, I believe that Johnson has carefully and clearly pointed out a wealth of information, much of it important to clarifying our understanding of Darwin.

2. A wide-searching spotlight

I should begin by noting the impressive breadth of Johnson's work, which is undoubtedly its most outstanding feature. Johnson works through Darwin's discussion of chance as it applies to a large array of topics—the chance transport of organisms to new locations, chance as related to the causes of variations, chance's role in the anthropomorphized, agential version of natural selection (and the changes in this position over time), the focal "architect" metaphor found in the *Descent of man*, Darwin's evolving relationship to the "Lamarckian" influences of use and disuse, and finally his thoughts on the relationship between chance and human free will and morality. A synthetic account of all these strands had yet to be attempted, making much in Johnson's book rewarding even for those who have already read fairly extensively in Darwin studies.

To single out a few of these themes, I find particularly intriguing Johnson's treatment of "chance transport"—the facilitation of the distribution of species by carriage across water to islands. Johnson emphasizes and details the role of the coevolution of adaptations for chance transport as a place where adaptation and chance play a peculiar and interesting role for Darwin. As far as I know, the question of chance transport has yet to receive any extensive discussion in the literature, and this section is both welcome and novel.

Further, Johnson both closely tracks and evaluates hypotheses concerning the development of Darwin's thought over time. He is a keen reader of the changes that occurred from Darwin's journey aboard the H.M.S. Beagle, through his various private transmutation notebooks, the various editions of the *Origin of species*, and his later works including the *Descent of man* and *Variations of plants and animals under domestication*. Some of the material Johnson covers, such as Darwin's "Old and Useless Notes," are not often discussed in connection with Darwin's views on chance, and these broader connections are incredibly instructive.

In this sense, then, I wish to express wholehearted agreement with one of Johnson's central theses: that the exploration of Darwin's various uses of "chance" ought to be one of the central foci in attempting to understand Darwin's thought. Doing so can bring together parts of Darwin's oeuvre not normally united in Darwin studies. For example, close attention to the use of chance serves as a fruitful way for Johnson to explore whether or not Darwin did, as has occasionally been alleged, become "more Lamarckian" over the course of his writings, offering greater pride of place to use and disuse. Examining how chance is invoked in Darwin's discussions of giraffes added to the sixth edition of the *Origin* (in response, Johnson persuasively argues, to St. George Jackson Mivart's extremely negative review of the *Origin*) lets us see that, in fact, Darwin's attitude toward the role and prevalence of the inheritance of characteristics via use and disuse remains roughly constant throughout Darwin's works. Johnson has therefore set for himself an incredibly difficult task, one never to have been attempted in this form. The work is worthy of admiration for this reason alone.

3. Chance and chances in Darwin

We meet with problems, however, when we turn to Johnson's central, and most controversial, thesis. Johnson argues that Darwin's works, properly understood, will show that, while he believed as early as 1837 that "chance" was "a basic factor in evolution," he consciously worked "to cast the role of chance in ways that, while preserving its central meaning, would either obscure its role in the theory or at least make it seem innocuous to otherwise friendly natural philosophers" (p. xiii).[1] According to Johnson, borrowing the coinage of Dennett (1995), Darwin saw chance as a "dangerous idea," one that he would have to actively suppress within his writings in order to be accepted by the professional, theistic, British scientific establishment.

To begin to evaluate this claim, I want to focus on a particularly troublesome phrase in the quote above. Johnson argues that Darwin wanted to *preserve the central meaning* of chance in his works, despite surface-level alterations to the phrasing of his arguments. For the reasons already mentioned, however, I find it doubtful that, for Darwin, chance has a central meaning to be preserved in the first place.

In one sense, Johnson acknowledges this fact. Across his book, he details instances in which Darwin uses chance in a myriad different ways. Chance refers to something like "probability of survival" in the struggle for existence, as well as the "fortuity" that new variations will match environmental conditions and outcompete their rivals (p. xxi; this distinction is then collapsed on p. 11). We also have chance as unknowability (pp. xxiv, 111) both in practice (pp. 16, 105) and in principle (pp. xxiii, 17, 104, 113, 124, 191),[2] as phenomena which it is impossible to explain or understand (pp. 17, 124), as isotropy or randomness with respect to future adaptive needs (pp. xxiii, 13, 103, 112, 116), as absence of creative or designing power (pp. 37, 77), as causes of which we are currently ignorant (pp. 13, 76, 125) or laws of which we are currently ignorant (pp. 39, 137), as events which cannot be predicted (pp. 16, 111), or even as a cause in its own right (pp. 72, 171, 209).[3] Unfortunately, these differing notions of chance are not clearly distinguished throughout the work, making the interpretation of some of Johnson's central claims exceptionally difficult.[4]

[1] Page numbers without reference refer to Johnson.

[2] Notably, Johnson doesn't believe the distinction between predictability in practice and predictability in principle to be relevant to his project here, because "as I see it, both classes are 'chance' variations for Darwin" (p. 68, note 10). This is odd, as he will go on to discuss this distinction, though only briefly, at pp. 175–181, and it is clear that it has bearing on his later discussions of the relationship between chance and predictability or understanding. Unfortunately, a discussion of the impact of the indefinite/definite variation distinction on Johnson's arguments would require another essay of nearly this length.

[3] This last notion, to the extent that it appears in Johnson's work (e.g., that Darwin's uses of the terms accident and happenstance "suggest 'chance' as the 'cause' of variation" (p. 172)) must be accidental, as Johnson elsewhere (e.g., p. 137) acknowledges that Darwin clearly believed that every event in the universe had a deterministic, law-like cause (deriving from his commitment to Herschel's philosophy of science; see Hodge, 1992, 1989, 1983). As Manier accurately put the matter, Darwin "attributed no causal force to chance itself" (Manier, 1978, p. 121).

[4] In the span of one paragraph, for example, Johnson writes that chance "meant 'no assignable reason'" (perhaps unpredictability or unknowability in principle), that it also meant "cause unknown" (unknowability in practice, at least, if not in principle), as well as that the causes "ultimately may be resolved into deterministic laws" (ignorance of laws), and finally that those laws "are often beyond human comprehension" (unknowability in principle) and "cannot plausibly be assumed to be directed by divine intelligence" (lack of design; all p. 191).