

Darwin and Ontology¹

Elizabeth Grosz

I speak to you today neither as somebody working in or on literature nor as somebody working in the sciences; instead I come from that neglected place in between, that is neither literary nor scientific, though at its best it aspires to both while accomplishing neither, the place of philosophy, or rather, of a kind of philosophy that is ostracized by the discipline of philosophy and has thus taken shelter in the hospitable institutional locations that literature, and to a lesser extent, science, sometimes offer. I want to speak about something that I believe is relevant to both literature and science while it nonetheless remains the provenance of philosophy: about questions of ontology and their powerful but neglected contributions to how we think life and matter, the preoccupations, in the most abstract sense, of literature and science respectively.

Ontology seems to be the forgotten or repressed element of contemporary philosophical thought and in what literature and science borrow from philosophy. The devastating critique of metaphysics that both revitalized the natural sciences, helped generate the social sciences, and effectively transformed both philosophy and literature during the early years of the twentieth century has perhaps succeeded only too well not only in adjudicating the appropriate and inappropriate questions to which knowledge must direct itself, but in dismissing many questions that, it seems, we cannot do without, that we cannot but ask. Some of the most basic questions of ontology—what is matter? what is life? how do they link together? what are their relations of intrication?—need to be readdressed, perhaps not in the same terms in which they were originally considered, but in more contemporary terms, which account for the social, historical and political context in which metaphysics is invariably if unconsciously embedded. In the desire to abandon metaphysical presuppositions and to replace the apparently unanswerable questions of ontology with the more modest propositions of epistemology, to move from the unknown to the knowable, shifting the ground from what exists to what we can know, the inevitable ontological investments of discourses, the presuppositions they must make about the modes, types and forms of existence they analyze, have remained unexamined, though the production of ontologies continues unabated.

For the purposes of this paper, I will concentrate on only an element in the work of Charles Darwin, the first of the great theorists of temporal becoming. Darwin developed the theory of natural selection not only into a scientific research paradigm of unparalleled fruitfulness and success for nearly a century and a half, but also generated a philosophical discourse, which elaborates conceptions of matter, life and time, whose ontological resonances have still not been properly understood, even today.

While there has been a great deal of attention devoted to Darwinism, to scientific developments and elaborations within biology and its cognate disciplines since the writings of Darwin himself, and while Darwinism has had a powerful effect on literature, on cultural and artistic representations, on economic and political discourses particularly in the late nineteenth and early twentieth centuries, rather surprisingly, it has not had the same impact in philosophy, which has tended to address it only marginally, if at all. Only in recent years has analytic philosophy embraced Darwinian biological models as paradigms of mind;² and it is even rarer to find philosophers from the Continental tradition invested in exploring the philosophical implications of Darwin's work.

It will be my claim that, although there are acknowledged and well-recognized gaps and points of unclarity in Darwin's understanding—most notably, his self-avowed ignorance of the mechanisms of inheritance, published in earliest form by Gregor Mendel in 1863, only a few years after the publication of the first edition of Darwin's *The Origin of Species* (1859)—his account of the development of species, including the descent of man, provides a powerful and fundamentally plausible and suitably complex understanding both of the genesis of (primitive) life from the complexity of matter, and of the growing elaboration, adaptation and specialization of organisms to their life conditions. Whether knowingly or not, Darwin develops an ontology, an account of a real, that is fundamentally different from that of his predecessors and contemporaries. It is an open and generative force of self-organization and growing complexity, a real that grows, that is dynamic, that has features of its own which, rather than simply exhibit ongoing stability, are as readily understood in terms of the active forces of change. Darwin managed to make this dynamism, this imperative to change, the center of his understanding of life itself. He makes it clear, and indeed a founding presupposition, that time, along with life itself, always moves forward, becomes more rather than less complex, producing divergences rather than convergences over time. He make temporality an irreducible element of both matter (matter as geological record) and of life (descent).

The question of origins, and originality, is paradoxically not only the buried center of Darwin's concept of the evolution of species, it is also one of the critical historical questions directed to Darwin's own discourse. It is a truism that Darwin's *The Origin of Species* precisely refuses to deal with the question of the origin of species! It is also well recognized that Charles Darwin is not really the 'originator' of the theory of natural selection, of modification with descent, or the struggle for existence, though his name is now singularly associated with bringing a mass of scientific information together to produce an ever more credible and carefully detailed account through presenting a vast repertoire of empirical observations to confirm his carefully articulated claims.

The question of the origin of species is intimately bound up with the question of the identity, or unity, of the object of biological and historical investigation. This is

among the most complex and under-discussed elements of Darwinism. What is the minimal unit, the scientific object, of investigation? The individual, the group, the species, or genera? The ways in which species develop and undergo modification over the passage of time is closely linked with what the criteria of differentiation between one group and another closely allied with it are. What differentiates one species from another? How do we tell where one species ends and another begins? How small or large must the differences be for us to designate the emergence of new species from already existing ones? In attempting to devise workable, though not essentialist, answers to these questions, Darwin inadvertently introduces a fundamental, irreducible indeterminacy into the largely Newtonian framework he aspired to transpose into the field of natural history: the impossibility of either exact prediction or even precise calculation, the seeking of tendencies rather than individual causes, of principles rather than universal laws. Darwin introduced a new understanding of what science must be to be adequate to the real of life itself, to the real of time and change—something Newtonian physics not only ignored but was unable to explain—and it was this that differentiated his understanding of natural selection from those of his contemporaries and predecessors: such a science could not take the ready-made or pre-given unity of individuals or classes for granted but had to understand how any provisional unity and cohesion derives from the oscillations and vacillations of difference. His understanding of science is necessarily committed to a concept of history, and thus of events, which are always unique and unrepeatable, which defy precise causal explanation, and which can only provide explanation at a certain level of generality—not Laplace's demon, which can calculate all the causal links constituting any event, but broad tendencies, which explain no individual in particular, but which calculate species in terms of gradual individual transformation.

Instead of a theory of genetic origin, or a theory of descent from original primordial ancestors, paradoxically and without much analysis by other commentators, Darwin seems to produce a quite peculiar, and thoroughly postmodern, account of 'origin': Origin is neither a divinely ordained beginning *ex nihilo*, a magical creation or gift, nor is it the result of an infinite, unbroken material and historical chain of organisms linked through descent, the two residual theological models, creationism and infinite or eternal existence. Origin is a consequence of human or rather, scientific, taxonomy, a function of language. Origin is a nominal issue. What constitutes an origin depends on what we call a species, where we (arbitrarily or with particular purposes in mind) decide to draw the line between one group and another that resembles it, pre-exists it, or abides in close proximity with it. What we call a species depends on certain affinities and resemblances, as well as on differences and incompatibilities. A species is an arbitrarily chosen set of similarities that render other differences either marginal or insignificant. Species are a measure, an incalculable, non-numerical measure, of significant difference. The individuals constituting each species vary immensely from each other; and

when these variations exhibit some systematicity and resemblance, we may be justified in describing the individuals thus associated as a variety; and similarly, it is only if the variety has marked and significant differences from other varieties that it has the potential to develop into separate species, genera and phyla. The origin of species can be understood as the measure of degrees of difference between individuals and groups, a kind of biological pure difference. "Evolution" itself, from the Latin *e-volvere*, means "to roll out," to "unfold," and while it is a term Darwin himself avoids, preferring the phrase "natural selection," it is actually perfect to capture this difference which is never based on a given unity but on a broad community-in-difference and common history which could be understood as biological 'memory,' as the present traces and supercessions of the past.

There is no given mode of definition or genealogical method that could, without arbitrariness, provide clear-cut units to undertake the retrospective and reconstructive search for origins that any historical method implies. One could impose definitions a priori on species and varieties, as did the neoclassical Aristotelians like Buffon and Cuvier, but then one would have to explain the generation of vast anomalies, and in doing so, one would lose sight of what justifiably enables individuals to be grouped into categories or types: "No criterion can possibly be given by which variable forms, local forms, subspecies, and representative species can be recognised,"³ which he later elaborates as follows:

Certainly no clear line of demarcation has as yet been drawn between species and sub-species, that is, the forms which in the opinion of some naturalists come very near to, but do not quite arrive at, the rank of species; or, again, between sub-species and well-marked varieties, or between lesser varieties and individual differences. These differences blend into each other by an insensible series; and a series impresses the mind with the idea of an actual passage.⁴

In other words, the differences between individuals do not thereby generate differences in kind or category. Individual differences form continua, whose divisions remain relatively arbitrary, contingent on the pragmatic purposes of the division. Differences which "blend into each other by an insensible series" are differences of degree rather than of kind. Yet it is the continual production of degrees of difference that, over long enough periods of time, will generate kinds of difference. The differences between individuals, if they are significant, if they make a difference that is pronounced enough, produce varieties, which, if their differences are significant, generate the capacity to be categorized together as species. Darwin makes it clear that it is not simply differences, or even difference mingled with modes of repetition/ reproduction, that constitute the basic categories of life and of species, but rather, modalities, types or degrees of difference: it is "the passage from one stage of difference to another"⁵ which is central to the operations of natural selection, the movement of differentiation which, as gradual and possibly imperceptible as it is,

marks off varying degrees of differentiation from one generation to the next. Variations are crucial for the breadth, density and longevity of species, but these variations are the very mechanism by which differences in kind are born. However, what constitutes a variation, and what remains simply an individual modification within a species is not just qualitative, for the quantitative plays a significant role in the movement from variety to species: a variety is considered a variety only insofar as its numbers have not yet surpassed those in the species of which it is a variation:

If a variety were to flourish so as to exceed in numbers the parent species, it would then rank as the species, and the species as the variety; or it might come to supplant and exterminate the parent species; or both might co-exist, and both rank as independent species...

From these remarks, it will be seen that I look at the term species as one arbitrarily given, for the sake of convenience, to a set of individuals closely resembling each other, and that it does not essentially differ from the term variety, which is given to less distinct and more fluctuating forms. The term variety, again, in comparison with mere individual differences, is also applied arbitrarily, for convenience' sake.⁶

In other words, his objects of analysis are distinctive or significant differences, differences whose divergence can only be understood differentially, that is, retrospectively and comparatively—historically—rather than in terms of any fixed or unchanging characteristics, any content, essence, function or morphological feature. There is no origin of species because there is no unity from which descent is derived, only types, variations of differences and types of reproduction and descent, which must be assumed from the start. This structure of variation or differentiation, as modern biochemists hypothesize, may in fact characterize the status of those prebiotic elements whose status “on the edge of chaos”⁷ prepares for their transformation into primitive proteins, that is, for the emergence of primitive life.

The ongoing production of individual differences is the internal motor, the “vitalist impetus” as Bergson quite profoundly understood, a tendency we may see as the orientation to self-organization, which directs or orients individuals, in ways unrecognized by Darwin and still relatively obscure today, to varying from their parents and from each other, not through the blending of parental characteristics, as Darwin had supposed, but through the complex processes of meiotic division and recombination that characterize embryological development. These perceptual or motor individual differences are the raw materials of natural selection. These slight and usually minor individual variations have unknown causes. However, Darwin's ignorance of the principles of heritability did not compromise his understanding of evolutionary processes, and this is in part because he did not seek out the causes of individual variation but only their effects (it is also significant that

although some contemporary gene-centred research is attempting causal explanations of individual variation, the astronomical number of genetic elements, the complexity of their rules of combination, and the impossibility of any one-to-one mapping of genes to phenotypical characteristics makes this a nearly impossible project. It is for this reason, among others, that genetic research is at best statistical or probabilistic rather than deterministic. It analyzes tendencies and orientations rather than causal linkages, which means that it generalizes about populations rather than individuals). It is this that enabled evolutionary theory to remain agnostic relative to, and to remain independent of, the particular theories of genetics to be later developed:

We are profoundly ignorant of the cause of each variation. We are far too ignorant to speculate on the relative importance of the several known factors; and I have made these remarks only to show that... we ought not to lay too much stress on our ignorance of the precise causes of the slight analogous differences between species... The laws governing inheritance are for the most part unknown. No one can say why the same peculiarity in different individuals of the same species, or in different species, is sometimes inherited and sometimes not so...⁸

Genetics is unable to explain a direct causal connection between a genetic element—a single gene, a single chromosome—and a singular phenotypic characteristic, “the cause of each variation.” Darwin’s acceptance of both the impossibility and the dispensability of any causal explanation was central to his reformulation of biology: from now on, what causes a change is of less interest than the antecedents, the ancestors, of that change. Randomness is introduced into the dimension of heritability. Even if it is clear that all inherited material comes from one’s parents, it remains unpredictable which genetic characters will be selected and combined, which will function as dominant or recessive relative to each other, in short, what particular detailed kinds of individual will be formed, until the individual is there. Then retroactive analysis can begin. This remains as true today as in Darwin’s time. There is a fundamental randomness about the particular, detailed chromosomal structure of the individual, but even more significantly, there is a fundamental randomness of individual variation relative to natural selection. They function independently of each other, variations being generated independent of adaptedness, generated, so it seems, for their own reasons.

Darwin wants to link the most significant differences that constitute species, sub-species and varieties, and the associated problem of the “origin” of species, to the differences between individuals. Indeed his individualism is fundamentally linked to his anti-essentialism.⁹ Species cannot be readily defined for they are not constituted of essential features, abilities or forms: species are nothing but the aggregation of interbreeding individuals who share a common descent. Many biologists before Darwin recognized that species varied, but such variation was

regarded only in limited terms: species, like celestial bodies, underwent cycles of growth and reproduction, and this type of systematic and predictable variation, as well as those systematic differences that constitute the sexual bifurcation of many species, could well be accommodated in a typology rather than a genealogy of species; but when Darwin construed species as a post hoc aggregation of individuals, what required explanation was no longer the possibility of individual variation but the converse, the long-term, relative stability of the characteristics attributable to species. The question is converted from: how can individuals vary so widely? to: how can species maintain their identity and cohesion over time? In effect, he dynamized and historicized species through linking them to the continuous variation produced through individuals, developing an anti-essentialism of species only by propounding an essentialism of individuals (an essentialism that itself is being displaced, perhaps even deconstructed, through the understanding of individuals as the products of the differentiations of genetic and environmental factors that are each themselves differential rather than essential in their functioning).

Most individual differences under most sets of circumstances remain largely irrelevant to natural selection: it is only under crisis conditions, when selective pressures are at their strongest, that they acquire the status of instruments of privilege and survival. Natural selection functions to select negatively for those characteristics which may prove harmful to the individual and its progeny, and to provide a context in which benign or benevolent characteristics are positively preferred over those individuals in which they are absent or less developed. These individual differences become relevant to the categories and forms of selection only when species are approaching a Malthusian state of maximum growth, when even slight or marginal advantages offer the individual some hope of survival over others.

Darwin's model of evolution, of the biological unfolding of life, involves the complex interplay between the principles of individual variation, heritability, and natural selection provide, on the one hand, an explanation of a series of processes and interactions that are fundamentally mindless and automatic (as Dennett has recognized), but, on the other, are also entirely unpredictable and inexplicable in causal terms or in any terms which atomize or isolate units, steps, or stages. Darwin conceptualize a machinery of natural forces—no longer gravity or mechanics, no longer precisely predictable—that, when they operate as a complex, as an assemblage, produce both massive variation, and the beauty and elegance of life adapted in its most intimate contours and features to its environment. Natural selection does not simply limit life, cull it, remove its unsuccessful variations: it provokes life, incites the living to transform themselves, to become something other than what they once were, to differentiate themselves by what they will become. Natural selection is not simply a passive background or context within which individual variation unfolds, a mere landscape that highlights and positions the living being; it is a dynamic force which sets goals, provides resources, and incentives for the ever-inventive functioning of species. Natural selection entails

that the material world, and the other organisms by which a living being is surrounded, function as positive provocation to the self-overcoming that is the most basic characteristic of life, this self-overcoming attesting to the irreducible investment of life in the movement of time, its enmeshment and organization according to the forward direction of time.

To sum up then, some of the key implications of Darwin's model of inheritance, variation and descent, by way of a conclusion:

1. Darwin's work, if it is relevant as all, is not only a theory of biological but also of cultural, social and political development. What Darwin's work makes clear is that what has occurred to an individual in the operations of a milieu or environment (it matters little here if it is natural or cultural) is the force or impetus that propels that individual to processes of self-transformation. The struggle for existence is precisely that which induces the production of ever more viable and successful strategies, strategies whose success can only be measured by the degree to which they induce transformation in the criteria by which natural selection functions. Evolution and growth, in nature as in culture, are precisely about overcoming what has happened to the individual through the history, memory, and innovation open to that individual, and group. This is true of the survival of species as much as it is of the survival of political strategies and positions, historical events and memories, linguistic structures or economic processes. Darwin makes it clear that self-overcoming is incessantly, if slowly, at work in the life of species. The logic by which this self-overcoming occurs is the same for natural as for social force. This self-overcoming, however, cannot survive as a wild trajectory unconnected to the past. Any viable evolutionary strategy always implies a continuity with the past, even if not its conservation: evolutionary movement functions through a continuous differentiation, that is to say, with what coheres with the past through gradations;

2. Darwin accounts for the social, not directly, not through biology, for the biological structure of man in no way pre-empts the forms of social organization within which he will live, but through the logic of natural selection. Culture cannot be viewed as the completion of nature, its culmination or end, but must be seen as the ramifying product and effect of a nature that is ever-prodigious in its techniques of production and selection, and whose scope is capable of infinite and unexpected expansion in directions that cannot be predicted in advance. Language, culture, intelligence, reason, imagination, memory—terms commonly claimed as defining characteristics of the human and the cultural—are all equally effects of the same rigorous criteria of natural selection: unless they provide some kind of advantage to survival, some kind of strategic value to those with access to them, there is no reason why they should be uniquely human attributes, or unquestionably valuable attributes. Darwin affirms a fundamental continuity between the natural and the social, and the complicity, not just of the natural with the requirements of the social, but also of the social with the selective procedures

governing the order and organization of the natural. According to Darwinian precepts, culture is not different in kind from nature but an indeterminable elaboration of the virtualities of the natural;

3. Darwin had provided a model of time and development that refuses any pre-given aim, goal or destination for natural selection. This already serves to differentiate Darwin from virtually all of his followers. He refuses anything like the telos or directionality of the dialectic, or a commitment to progressivism in which we must always regard what presently exists as superior to or more developed than its predecessors. Evolution is both fundamentally open but also regulated within quite strict parameters. We cannot assume that the goal of natural selection is the survival of the individual or the species, nor can we assume that the goal of evolution is the proliferation of progeny (as is common in contemporary sociobiology). Darwin makes it clear that many species support and indeed require non-reproductive members; it is thus not clear that any pre-given aim or goal can function as the purpose or function of evolution. There are historical constraints on what becomes a possible path of biological/ cultural effectivity: it is only that which has happened, those beings in existence, now or once, that provide the germs or virtualities whose divergence produces the present and future. That which has happened, the paths of existence actualized, pre-empt the virtualities that other existences may have brought with them, they set different paths and trajectories than those that might have been;

4. This logic of self-overcoming, the motor of Darwinian evolution, must be recognized not only as a distribution of (geographical and geology) spacing, but above all as a form of temporization, in which the pull of the future exerts a primary force. Beings are impelled forward to a future that is unknowable, and relatively uncontained by the past. It is only retrospection that can determine what direction the paths of development, of evolution or transformation, have taken and it is only an indefinitely deferred future that can indicate whether the past or the present provide a negative or positive legacy for those to come. This means that history and its cognate practices (geology, archaeology, anthropology, psychoanalysis, medical diagnostics etc. etc.) are required for understanding the current, always partial and residual situation as an emergence from a train of temporal events already given, which set the terms for but in no way control or direct a future fanning out or proliferation which follows directions latent or virtual but not necessarily actualized in the present. History, the partial and ambiguous record of the past, is not adequate to indicate particular trends, directions and variations that may occur in the future.

5. One of the more significant questions facing contemporary political discourses is precisely what generates change, how change is facilitated, what ingredients, processes and forces are at work in generating the conditions for change, and how change functions in relation to the past and the present. Darwin presents here, in quite developed if not entirely explicit form, the germs for an account of

the place of futurity, the direction forward as the opening up, diversification or bifurcation of the latencies of the present, which provide a kind of ballast for the induction of a future different but not detached from the past and present, a future that functions through the propulsion of the past but without the direct mediation or control of the present. The future emerges from the interplay of a repetition of cultural/ biological factors, and the emergence of new conditions of survival: it must be connected, genealogically related to what currently exists, but is capable of any possible variation or development of current existence. The new is the generation of a productive or viable monstrosity;

6. Darwin's work, with the centrality it attributes to random variation, to chance transformations and thus to the unpredictable, has provided and will continue to provide something of a bridge between the emphasis on determinism that is so powerful in classical science and the place of indetermination that has been so central to the contemporary form of the humanities. Evolution is neither free and unconstrained, nor determined and predictable in advance. It is neither commensurate with the temporality of physics and the mathematical sciences, nor is it unlimited in potential and completely free in direction. Rather, it implies a notion of overdetermination, indetermination and a systemic openness that precludes precise determination; and

7. Darwin had provided a model of history that resorts neither to the telos or a priorism of the dialectic, nor to a simple empiricism which sees history only as the accumulation of variously connected or unconnected events. History, both social and evolutionary, small-term and long-term history, is both fundamentally open but also regulated within quite strict parameters. There are historical constraints on what becomes a possible path of biological/ cultural effectivity: it is only that which has happened, those beings in existence, now or once, that provide the germs whose divergence produces the present and future. That which has happened, the paths of existence actualized, pre-empt the virtualities that other existences may have brought with them, setting different paths and trajectories than those that might have been. History is a broader phase space than that which can be occupied by living beings. And the history or genealogy of living beings transforms and magnifies this phase space, the space of virtualities or latencies, as they transform themselves. While history remains open-ended, the past provides a propulsion in directions, unpredictable in advance, which, in retrospect have emerged from the unactualized possibilities that it yields.

Notes

1 An earlier version of this paper was presented at the Society for Literature and Science in Buffalo, October 11-14, 2001.

2 See Daniel Dennett, *Darwin's Dangerous Idea: Evolution and the Meaning of Life* (New York: Touchstone Books, 1996), and Kim Sterelny, *Dawkins vs. Gould: The Survival of the Fittest* (New York: Totem Books, 2001).

3 Charles Darwin, *The Origin of Species* (Oxford: Oxford University Press, 1996), 72.

4 *ibid.*, 77.

5 *ibid.*, 78.

6 *ibid.*, 78-79.

7 See Ilya Prigogine and Isabelle Stengers, *Order Out of Chaos: Man's New Dialogue with Nature* (London: Harper Collins, 1984), and Stuart Kaufman, *The Origins of Order: Self-Organization and Selection in Evolution* (New York: Oxford University Press, 1993).

8 *ibid.*, 31-32.

9 Ernst Mayr will argue that perhaps one of the reasons that evolutionary theory was articulated in Britain rather than in the more biologically sophisticated Germany was precisely the British distrust of essentialism:

“It has long been a puzzle for the historian of biology why the key to the solution of the problem of evolution was found in England rather than on the European continent. No other country in the world had such a shining galaxy of famous biologists in the middle of the last century as the Germany of Rudolphi, Ehrenberg, Karl E. von Baer, Schleiden, Leuckart, Siebold, Koelliker, Johannes

Müller, Virchow, and Leydig, and yet his solution to the problem of evolution was found by two English amateurs, Darwin and Wallace, neither of whom had had thorough zoological training. How can one explain this? My answer is that philosophical thinking on the continent was dominated at that time by essentialism.” See Ernst Mayr, *Evolution and the Diversity of Life. Selected Essays* (Cambridge, MA: The Belknap Press of Harvard University Press, 1997), 11.