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CHAPTER I

*Seeing things: Charles Darwin and Victorian
visual culture*

Charles Darwin and Victorian Visual Culture examines the illustrations in Darwin's books from his *Monograph* on barnacles in the early 1850s to his volume on earthworms in 1881, and their relationships to Victorian visual culture and aesthetics. I begin with the barnacle book, his last major work before *The Origin of Species*, because even though it does not mention natural selection, Darwin had already developed his theory and privately found confirmation of his evolutionary views in his surprising barnacle discoveries. In my focus on the publications that followed the *Origin*, I treat not just those that extended the *Origin's* theoretical project (*The Descent of Man* and *The Expression of the Emotions*), but also the under-studied books on plants and earthworms that both reflect Darwin's experimental interests and overtly sought to expand and buttress the *Origin's* arguments. Although the *Origin* itself contains just a single illustration, all these other works are copiously illustrated in a range of media, from wood engraving to lithography to photography, by some of the best-known artists and engravers of the period. Despite both considerable recent scholarly interest in the visual, and a body of scholarship on Darwin so extensive as to be deemed an "industry," literary and cultural critics of Darwin on the one hand, sociologists of science, historians of science, and art historians on the other, have paid limited attention to the visual component of his work. This is all the more surprising when we consider that Darwin faced a very basic visual problem: how could natural selection, a concept almost by definition impossible to illustrate directly, be illustrated, especially when the existing visual conventions of the natural sciences were associated in varying degrees with conceptions of species fixity?

In focusing on how illustrations are constructed and their meanings determined, sociologists and historians have tended to rely on the notion that the meaning of images is determined largely by the accompanying text. Literary and cultural studies scholars, on the other hand, while aware that the ambiguities and instabilities of language make control over

meaning and audience more problematic, have tended to give short shrift to the original scientific context that so interests historians and sociologists. Instead, these scholars have focused on the way scientific images “travel” in a culture, doing different ideological work in different ideological contexts. In this study I attempt to synthesize these two approaches by looking at the interface between them. I approach Darwin’s works as what W. J. T. Mitchell calls “imagetexts.” In *Picture Theory*, Mitchell argues that “all media are mixed media,” and thus that an illustrated text is better conceived not as a juxtaposition of two media but as a composite, synthetic work combining image and text. Imagetexts, however, are not seamless. When gaps or ruptures emerge between textual and visual representation, the imagetext becomes an “image/text.” At such moments representation itself becomes an issue, and the migration of the image into the broader culture is facilitated.¹ These concepts are useful for analyzing the work of Darwin and his opponents. The obstacles to illustrating natural selection made Darwin especially dependent on the symbiosis of visual and textual languages, and they led him to work largely within existing visual conventions rather than inventing new ones more amenable to his theory and his purposes. I thus examine the ways Darwin avoids, manipulates, and modifies these existing conventions in particular works, and I focus on the interplay between his images and texts. As a counterpoint, I also provide similar analyses of the imagetexts of several of Darwin’s opponents and of the ways both sides attempted to expose and exploit the instability of their opponents’ visual and textual languages. I analyze not just the construction of imagetexts but also their destabilization and breakdown, and the ideological stakes involved both before and after their migration into the broader culture.

My project here thus also connects the illustrations of Darwin and his opponents to Victorian visual culture, to issues of religion and morals, class and nation, gender and sexuality, race and empire. But the most prominent focus, the one that will weave its way throughout this study, is the impact of Darwin on Victorian aesthetic debates, particularly the central role his evolutionary accounts of beauty and color had for the development of a materialist aesthetics that differed fundamentally from the enormously influential views of John Ruskin, the great Victorian critic of art and society. While Ruskin’s hostility to Darwinism is well known and has become much more thoroughly understood over the last two decades, I hope to provide here an important and overlooked or at least underappreciated reason for that hostility. I argue that Darwin’s work provided a direct and fundamental challenge to Ruskinian aesthetics, and that Ruskin

understood this and sought to counter it. Darwin naturalized the human aesthetic sense in *The Descent of Man*, making our notion of beauty an evolutionary inheritance from animals. In several of his botanical books, Darwin similarly naturalized the existence of color in flowers, arguing that color was an evolutionary adaptation for attracting insects to ensure cross-pollination. Beauty for Darwin was neither a Divine gift to brighten our days nor a sign of moral and spiritual health, as it was for natural theologians and Ruskin, but a utilitarian trait generated by and for evolutionary survival. Coupled with other contemporary work on the physiology of the senses (particularly sight and hearing) and physiological approaches to psychology, these elements of Darwin's theories were central to a new "physiological" (or "evolutionary," or sometimes "empiricist" – the terms varied) aesthetics popularized aggressively in the 1870s and 80s, particularly by Grant Allen, that often positioned itself against Ruskin. Ruskin fought back, and he did so with increasing virulence as the threat posed by physiological aesthetics to his own positions became clearer and more forceful. My point, it should be stressed, is not that Ruskin's *real* objection to Darwinism was aesthetic, but that for Darwin and his followers as well as for Ruskin, the aesthetic, the scientific, and the ideological were inextricably connected. And needless to say, much more was at stake for the Darwinists and the Ruskinians than the philosophical understanding of beauty. At stake was Victorian artistic and visual culture, and Victorian culture generally – the nature of its politics, its social relations, its wealth, its beliefs, its families, its environments.

In the remainder of this introduction, I will develop more fully the arguments and contexts I have just sketched: the importance and functions of Darwin's illustrations; their relation to Victorian visual culture and aesthetics, especially the conflict between physiological and Ruskinian aesthetics; and the lessons that Darwin's imagetexts have for our understanding of scientific illustration and the interplay of word and image in science.

DARWIN'S ILLUSTRATIONS

Opening the final chapter of *The Origin of Species*, Darwin described his book as "one long argument." It was sufficiently long, he felt, that before concluding with ruminations upon his argument's implications for natural history, for the origin and future of organic life, and even for religion, a recapitulation of its major points was required. Forced to publish prematurely when Alfred Russel Wallace sought his assistance with a paper outlining remarkably similar views, Darwin regretted from the outset that this "Abstract," as he called the *Origin*, lacked the references and detailed

evidence contained in his “big book” on natural selection, still incomplete after some twenty years. “I can here give only the general conclusions at which I have arrived,” he lamented in the Introduction to the *Origin*, “with a few facts in illustration.”

But the *Origin* offers limited “illustration” in another and more obvious sense: it contains just a single visual illustration. While Darwin often speaks vividly to the mind’s eye, most memorably in the closing paragraph’s evocation of a “tangled bank,” he has little to offer the reader’s physical eye. This may well seem unsurprising, and it certainly is not much noticed. The *Origin* is, after all, as Darwin said, an argument. Insistently textual, it does its work with words, not pictures. A great deal of modern scholarship, by literary critics, historians of science, and rhetoricians, has demonstrated the subtleties and complexities of that textual work. From the influence of *Paradise Lost*, to the definition of “progress,” to the function of the elaborate analogy between natural and artificial selection, the *Origin* is arguably science’s most closely-parsed text.²

Although historians of science have recently begun to devote sustained and serious study to the role of visual material in science, almost no attention has been paid to the visual component of Darwin’s work. Martin Rudwick, in his innovative article on the “visual language” of nineteenth-century geology, comments that Darwin “seems to have been exceptionally ‘non-visual’ as far as the *communication* of his observations and theories was concerned.”³ Rudwick’s claim is clearly right in the case of the *Origin*, and it is accurate as an assessment of Darwin’s own “artistic competence” in relation to the drawing ability not only of the nineteenth-century geologists with whom he most closely identified himself at least until the mid-1840s, but also of most of the zoologists and botanists among his contemporaries. Geology, zoology, and botany required some competence in draftsmanship, both for observational sketches and more finished drawings, but Darwin’s private writings are hardly rich in such visual material, and those that exist are rather crude. In developing illustrations for his books, he had to rely heavily on others and frequently borrowed images that had already been published elsewhere. Compared to the illustrations in other works of natural history, whether aimed at popular, elite, or professional audiences, Darwin’s can appear eclectic, derivative, even at times simplistic.

Yet the lack of illustrations in the *Origin* is more striking when we look at the rest of Darwin’s work. Unlike his notebooks and letters, his books are rich in illustrations. The five-part *Zoology* of the *Beagle* voyage contains 166 plates, including fifty colored lithographs of birds by John and

Elizabeth Gould and forty-nine uncolored lithographs of fish and reptiles by Benjamin Waterhouse Hawkins. The illustrations for the three parts of the *Geology* of the voyage are not nearly as lavish, but forty-four in-text wood engravings are supplemented in one part by three endpapers and in another by five endpapers (four of them drawn by G. B. Sowerby, Jr.) and a foldout map of the southern part of the continent at the beginning. His Monograph on barnacles (1851, 1854) contains forty plates of living species by G. B. Sowerby and seven of fossil species taken from G. B. and James de Carle Sowerby's *Mineral Conchology*. Most of his botanical books of the 1860s and 70s are dominated by wood-engraved in-text figures rather than separate plates: *Orchids* (1862; 2nd edition 1877) has thirty-three, *Climbing Plants* (1865; 2nd edition 1875) has thirteen, *Insectivorous Plants* (1875) has thirty, *Different Forms of Flowers* (1877) has fifteen, and *The Power of Movement in Plants* (1880) has 196. *Different Forms of Flowers* and *Cross and Self Fertilisation* (1876; 2nd edition 1878), on the other hand, are illustrated primarily with tables (thirty-eight and 106, respectively). Wood-engraved text figures also predominate in the non-botanical, post-*Origin* publications: *The Variation of Animals and Plants Under Domestication* (1868; 2nd edition 1875) has forty-three, *The Descent of Man, and Selection in Relation to Sex* (1871; 2nd edition 1874) has seventy-six, and *The Formation of Vegetable Mould Through the Action of Worms* (1881) has fifteen. *The Expression of the Emotions in Man and Animals* (1872) contains twenty-one wood engravings and seven heliotype plates of photographs.⁴

The visual fortunes of Darwin's first book, his *Journal of Researches* of the *Beagle* voyage, are also revealing. It initially appeared in 1839 as one of the four volumes of Captain Robert Fitzroy's *Narrative of the Surveying Voyages of HMS Adventure and Beagle Between the Years 1826 and 1836*. Although it was issued separately just a few months later, Darwin had less initial control over his "first literary child" than he did with his subsequent books. Two large fold-out maps accompanied it, but the text itself was sparsely illustrated with only a few figures. In 1845, when Darwin negotiated a revised, stand-alone edition with John Murray, he was able to secure some additional text figures, but to Darwin's disappointment, the maps were omitted.⁵ In 1860, however, when Murray reprinted the *Journal*, presumably capitalizing on demand created by the furor over the *Origin*, Darwin successfully urged him to restore the maps.⁶ Much later, after Darwin's death, Murray brought out an illustrated edition that not only included the maps but added twelve plates and drastically increased the number of figures to ninety-three. Both author and publisher appreciated the value of illustrations and understood their readers would expect a work full of them.

The nature and quality of the visual materials in Darwin's books varied. He used tables, maps, schematic and abstract diagrams, naturalistic illustrations of plants and animals, and photographs of humans. These were reproduced using a variety of techniques in different media: wood engraving, copper engraving, lithography, photoengraving, heliotype. Some illustrations were copied from other sources; some were commissioned; others were produced by his sons. Well-connected both scientifically and socially, Darwin was able to secure enough external financial support to ensure that even his early publications were well illustrated. A Government grant of £1000 funded the publication of both the *Zoology* and *Geology* of the *Beagle* voyage. The Ray and Palaeontographical Societies, which financed publications from their members' annual subscription fees, brought out the parts of his barnacle *Monograph* devoted to living and fossil species, respectively. Later in his career, Darwin had the money and leverage to guarantee that even with commercial publication his books were illustrated as he desired, and his correspondence is littered with letters dealing in whole or part with visual matters. He sought out some of the best artists and illustrators: Joseph Wolf, W. H. Fitch, G. B. Sowerby, Briton Riviere, T. W. Wood. In several cases, as in his recruiting of John Gould to produce the lithographs for the *Zoology* of the *Beagle* voyage and his use of numerous photographs for *The Expression of the Emotions*, he proved himself to be innovative or at least sensitive to visual trends. As Phillip Prodger confirms in his extensive work on the illustrations for the *Expression*, Darwin oversaw his visual materials with great attention and care.⁷

The illustrations in Darwin's books played important roles in his arguments, and he could deploy them with great skill. The single illustration in the *Origin* is a case in point (fig. 1.1). It is a diagram, introduced in the chapter on natural selection. Offered as an aid in understanding the effects of natural selection on the descendants of a common ancestor, and in particular the principle of divergence, the diagram was, Darwin told Murray, "indispensable."⁸ Like many of the *Origin's* textual illustrations, it begins as an idealized, hypothetical case – a thought-experiment. A to L represent the species of a large genus inhabiting a particular geographical region. Each horizontal line represents a thousand or more generations. The dotted lines emanating from A and I – the two most common, widely-diffused, and widely-varying species – represent slightly varying offspring. When a dotted line reaches one of the horizontal lines, a small numbered letter indicates that sufficient variation has occurred to form a well-marked variety. (On the principle that the most divergent variations are preserved and accumulated by natural selection, the outer dotted lines are the ones

Darwin's illustrations

7

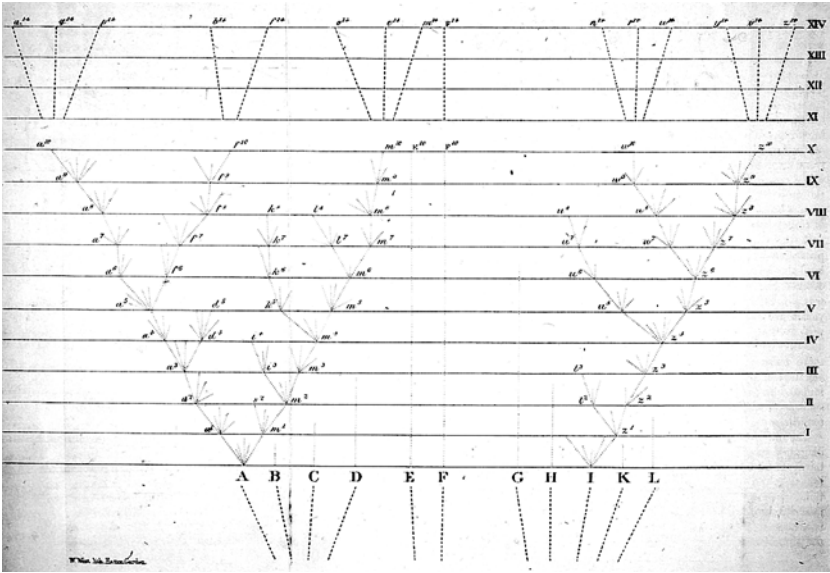


Figure 1.1 Diagram from Charles Darwin, *On the Origin of Species* (London: Murray, 1859), between pages 116 and 117.

that lead to varieties.) This process continues with the varieties up to horizontal line X, after which Darwin presents a simplified and condensed version of it. By the ten-thousandth generation, species A has evolved into three different species (a₁₀, f₁₀, m₁₀); by the fourteen-thousandth generation, it has evolved into eight species (a₁₄ to m₁₄). The original species A, as well as intermediate varieties and species, have become extinct. So, too, have species B, C, and D, which survived for a time but were eventually displaced by the descendants of A. Only one of the original species, F, the most distinct from A and I, survives to the fourteen-thousandth generation. From eleven species, then, fifteen emerge, their relationships to each other and their ancestors different and generally more distinct than in previous generations. So distinct, says Darwin, that we are to imagine the ultimate descendants of A and I to constitute two separate genera, or at least sub-genera.

The diagram, then, is a remarkably economic representation of the effects of natural selection, even incorporating several specific Darwinian principles related to divergence of character and extinction. It is also flexible. Allow each horizontal line to represent a million generations, Darwin says, and the diagram can depict the formation of two families or orders. Or,

visualize the horizontal lines as a section of the strata of the earth's crust and the diagram becomes a representation of the fossil record. Darwin uses the diagram in precisely this way much later in the *Origin*, near the end of his two chapters on geology. He demonstrates visually that the imperfection of the fossil record, far from being a problem for his theory, is actually predicted by it. He shows why the oldest fossils generally differ most from existing ones, while some are virtually identical, and how it is that distinct species from consecutive geological formations can be so closely related.

The diagram does not occur in a vacuum; it utilizes and modifies visual conventions of geology and natural history, conventions themselves shaped in part by artistic and literary precursors. As a rendering of natural selection's effects on a group of species, the diagram is a visual corollary of Darwin's evolutionary version of the "Tree of Life." "The affinities of all the beings of the same class have sometimes been represented by a great tree," Darwin writes, and "I believe this simile largely speaks the truth." But he gives this common taxonomic icon, with its Biblical echoes, a more truly organic gloss:

The green and budding twigs may represent existing species; and those produced during each former year may represent the long succession of extinct species. At each period of growth all the growing twigs have tried to branch out on all sides, and to overtop and kill the surrounding twigs and branches, in the same manner as species and groups of species have tried to overmaster other species in the great battle for life. The limbs divided into great branches, and these into lesser and lesser branches, were themselves once, when the tree was small, budding twigs; and this connexion of the former and present buds by ramifying branches may well represent the classification of all extinct and living species in groups subordinate to groups. Of the many twigs which flourished when the tree was a mere bush, only two or three, now grown into great branches, yet survive and bear other branches; so with the species which lived during long-past geological periods, very few of which have left living and modified descendants.⁹

Species are not specially created, suddenly introduced, and then withdrawn according to divine plan, but evolve from other species, and survive and modify or become extinct, in a natural and contingent manner. As Gillian Beer remarks, for Darwin, tree imagery generally is "a condensation of real events, rather than a metaphor."¹⁰

Similarly, when read downward on the page and backward in time, the diagram evokes the visual conventions of geological sections.¹¹ While roughly similar in various ways to both traverse and columnar sections, the diagram is even more idealized. Traverse sections, which imagined the strata beneath a section of landscape sliced vertically as they would appear

in a quarry or a cliff, attempted to capture the basic contours of the beds and the surface topography, complete with faults and folds and angles of orientation. Columnar sections, on the other hand, depicted strata as they were thought to have been originally laid down, eliminating disturbances to present an essentially horizontal view of the order and relative thickness of the layers. These sections had become highly schematized by the time Darwin took up geology in the early 1830s, but his diagram, with its flat “top” and equidistant horizontal lines, gestures even less at an actual landscape and its strata. For Darwin of course depicts not a particular locale, but a generalized section that can stand, at least in theory, for any spot on earth. In essence he makes the diagram palimpsestic by inviting his readers to superimpose his “tree of life” onto a geological section, thereby creating an evolutionary view of paleontology.

Not all of the illustrations in Darwin's books are as rich and as important as this diagram. But many are. And virtually every one serves more than a merely “illustrative” purpose. Each is there because Darwin wanted it to be. Most, in fact, are the result of a whole series of choices – about what was to be depicted; how it was to be obtained; who was to draw it; in what medium it was to be reproduced and by whom; whether it was to be colored; where it was to be located in the text and whether it was to be grouped with other figures; how it was to be sized, oriented, cropped, and captioned. Like his prose, Darwin's illustrations were assembled in an often laborious, painstaking manner. He clearly saw them as significant components in the communication of his observations and theories. I will thus be providing in this book many readings of Darwin's illustrations, elucidating their contributions to his arguments, and explaining how he utilizes, manipulates, and sometimes departs from existing conventions in scientific illustration to achieve his desired ends.

Understanding the function of Darwin's illustrations is important, because Darwin faced a major illustrative difficulty: how was natural selection to be depicted *visually*? How could something that acts at such a leisurely pace on such tiny variations be captured directly? Gillian Beer, George Levine, and James Krasner have all demonstrated the representational obstacles faced by Darwin in the *Origin* in rendering his theory textually, and Krasner has shown how the new physiological understanding of vision and the eye as limited and imperfect, embraced by Darwin and incorporated into his argument, made the literal act of seeing as well as the textual depiction of the seen deeply problematic. That visual depiction of the unseen posed a comparable problem for him is thus not surprising and may have contributed to the paucity of illustrations in the *Origin*. Geologists,

paleontologists, and comparative anatomists had already conjured up what Martin Rudwick calls “scenes from deep time,” illustrations of life in primeval seas and prehistoric landscapes, but natural selection was not a phenomenon, an event, or a thing, but a *process*. Darwin was asking his readers to visualize how one scene modified into another via a mechanism that, unlike geological forces, could not be directly observed in the present.

Moreover, many of the conventions of scientific illustration and the assumptions underlying them, including the concept of species itself, were not congenial, and even downright hostile, to Darwin’s evolutionary views. According to Ann Shelby Blum, by 1850 professional zoological publications, concerned primarily with taxonomy and usually under cost constraints, tended to depict “several species resting on a single plane, or floating in a space of indeterminate depth” (fig. 1.2). The stylistic hallmark of these plates was what Blum calls “graphic fluency”: an emphasis on detail and symmetry with an implied light source beyond the upper-left-hand corner that gave the plate “classical overtones.” While such composite plates facilitated the comparative methods then dominating zoology, the goal of comparison was to clarify rather than to blur the boundaries between species, or between species and varieties.¹² The absence from the plates of any environmental background or context also clearly posed a problem for Darwin. Yet as we have already seen in the case of the *Origin’s* diagram, and as we will see in the case of the barnacle *Monograph* (the work of Darwin’s that most closely follows the visual conventions of professional, taxonomic natural history), Darwin was both fully aware of the underlying assumptions and traditional uses of these conventions, and adept at manipulating them for his own purposes.

The zoological illustrations in more popular works of natural history at least offered Darwin images of the animal in nature. Such images did not have a particularly long history. Through most of the eighteenth century, animals were usually depicted without a background; when one appeared, it had more to do with providing perspectival orientation than displaying habitat. This became the common mode of representation in works based on the Linnaean system, with its morphological focus. Illustrations indebted to those of Linnaeus’s contemporary, the great French naturalist Georges-Louis Leclerc, Comte de Buffon, who stressed the taxonomic importance of an animal’s habits, life cycle, and habitat as well, finally made some gesture towards providing an appropriate landscape background.¹³ This Buffonian mode was more common in popular works in the early nineteenth century, but it of course emphasized stability and symbiosis rather than competition between animal and environment, and