Introduction

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In the late 1830s, when Charles Darwin was formulating his theories of evolution, including the reason behind the existence of the emotions (formerly, the passions) and their manner of expression, eighteenth-century aesthetic theory provided a serious resource. Notebooks from 1838 to 1844 are filled with references to Joshua Reynolds, Edmund Burke, Archibald Alison, and David Hume, among others. Then, as in recent decades, neither scientists, nor philosophers, nor art theorists were thought to have a privileged position in explicating emotive responses to forms and colors in the natural world or in the domain of the arts. Darwin's ideas were shaped by many observers on the human (or animal) response to the natural world, especially, but not exclusively, those engaged in neurology, including a number of aesthetic theorists. Today, an active site of aesthetic theory is emerging from current work in neuroscience, and Darwinian ideas have proven to be central, as we shall see.

While a round through the neurosciences might make sense in terms of a physiological basis for aesthetic theory that we might expect to be connected to Darwin, what of the "in between" period, when other kinds of theories supplanted or were more readily considered than a biological basis for an aesthetic appreciation of nature and art? Indeed, when Darwin was publishing his principle texts, other positions were far better known and more influential than a physiological basis for aesthetics, such as the moralizing of Ruskin on the spiritual underpinning of beauty in nature and, by extension, in the best of art, and the Aesthetic "art for art's sake" Movement—neither moral nor based in biological concerns. Yet a number of theorists of the arts either used Darwinian language, referred to the scientist in crucial aspects of their work, or enthusiastically recalled his writings as central to their own developing ideas. These include philosophers of art as divergent as Hippolyte Taine, Alois Riegl, Gottfried Semper, Heinrich Wölfflin, Aby Warburg, George Santayana, and E.H. Gombrich.

In some cases, cultural histories were implicated in the idea of selective external pressures that "weed out" the unviable, leaving only the environmentally suitable, according to Darwinian natural selection. Devoted Darwinian follower Grant Allen had taken up this approach in *Evolution in Italian Art* (1908). In it, he claimed a limited number of possible subjects available to Italian artists during the Renaissance and a "descent with modification," which he examines "with the eye of an evolutionist." Thus, varieties emerge that reflect different environmental conditions imposed upon them; for example, the "Paduan type," which "befits the denizen of a university city." This "scientific" approach to the history of art itself has a considerable legacy, as we shall see. Moreover, we find Darwin emerging at unlikely aesthetic junctures, such as in the early twentieth century, when artists mined his ideas on camouflage to affect the aesthetic act of the "hidden" object in plain view wherein the end goal is protection from one's enemy, ultimately contributing to the promotion of camouflage during World War I. In another context that involves survival and its antithesis, are corporeal aesthetics of health and the body in eugenics campaigns in which Darwin's ideas on selection were often appropriated and underscored as authoritative.

As a student at Cambridge in the late 1820s, Darwin had read Joshua Reynolds' *Discourses on Art* and Edmund Burke's *A Philosophical Enquiry into the Origin of our Ideas of the Sublime and Beautiful* and had visited the paintings collections at the National Gallery in London and at the Fitzwilliam in Cambridge.[1] As would be the case with a gentleman scholar of Darwin's generation, he was familiar with the by then standard aesthetic categories of the sublime, the beautiful, and the picturesque. Like the artists who accompanied voyages of exploration, he often framed his pictorial references in this familiar context during the course of his five-year voyage around the world.[2] In his *Beagle* diary of the early-to-mid 1830s, and later in the published *Journal of Researches*, novel scenes were often described according to such conventions. On approaching Santa Cruz:

> The gaudy coloured houses of white yellow & red; the oriental-looking Churches & the low dark batteries, with the bright Spanish flag waving over them were all most picturesque.—The small trading vessels with their raking masts & the magnificent back ground of Volcanic rock would together have made a most beautiful picture.[3]

When he refers to several soldiers playing cards by a campfire at night on the Argentine pampas as a "Salvator Rosa scene," he is demonstrating awareness of the British association of the sublime with the example of the seventeenth-century painter.[4] In concluding comments on his voyage, real scenes and artificial representation converge: "Group masses of naked rock, even in the wildest forms; for a time they may afford a sublime spectacle… paint them with bright and varied colours, they will become fantastick; clothe them with vegetation, they must form, at least a decent, if not a most beautiful

picture."[5] In his discussion of color, Darwin was evocative and often precise. He relied upon Patrick Syme's hand-tinted *Werner's Nomenclature of Colours*, but sometimes mentioning the art of painting itself was enough.[6] In December of 1831, when approaching the Bay of Biscay, he wrote:

> [I] was much struck by the appearance of the sea… It is not only the darkness of the blue, but the brilliancy of its tint when contrasting with the white curling tip that gives such a novel beauty to the scene.—I have seen paintings that give a faithful idea of it.[7]

After the publication of his experiences and some of his scientific observations aboard the *Beagle*, Darwin turned once again to Reynolds and Burke, and to many other sources as well, as he worked privately on the theories that would come to have such a tremendous impact on science and culture over the next two centuries. Aesthetic theorists now were helpful to him not in "picturing" nature, but in grappling with the physiology behind responses to the natural world. Darwin was drawn to the "sensationalist" school of philosophy of the mind in British eighteenth-century thought that originated with Locke, who connected subjective human response to objective phenomena in the environment. Followers of this school made the vibratory patterns of the nervous system central in understanding the relationship of man to his surroundings. These vibrations, following the impact of the external object on the nervous system, were described as sensations. For Locke, sensations are followed by reflection, which shape the self. Locke believed that the effect of sensations on the *tabula rasa* of the newborn contributed to associations or memories and were crucial to development.

Darwin thought Edmund Burke worthy of consideration. Burke drew on the materialism of Locke, but had less of an interest in associationism. Burke made pleasure and pain the two central arenas of aesthetic impact in his program—the former attached to society (and beauty) and the latter to self-preservation (and the sublime). Though not a scientist himself, he posited that beauty is produced through smoothness and gradual variations in external objects, producing a relaxing effect on the nerves, whereas responses connected to terror and pain (the sublime) cause extreme tension in the nerves. The speculative advantage for Darwin was the universal application of such possibilities, an emphasis on innate responses (rather than those which are learned), and a program dividing the individual under threat, which could be applied to the struggle for life within and without species, countered by a theory of the need for and pleasure found in society.

The Scottish branch of associationism was compelling as well. These thinkers focused on the nervous system and stressed past memories or associations. For Hume, whose *A Treatise of Human Nature* had been published in 1739–1740 and *Of the Standard of Taste* appeared in the same year that Burke initially published *A Philosophical Enquiry* (1757), the source of aesthetics rested within the mind. However, Hume believed that the physical structure

of the mind made some objects more readily beautiful and others likely to inspire fear. Archibald Alison, in his *Essays on the Nature and Principles of Taste* (1790) went further in abandoning the idea of aesthetic possibilities residing within the object itself. Aesthetic appreciation was ultimately found in the free play of the imagination rather than a direct impression from object to mind. We have individual associations or memories that cause responses. Following Locke, we find a face beautiful, for example, not because of set laws of beauty, but because of past associations. Darwin's grandfather, the evolutionist Erasmus Darwin, who was attentively read by Charles Darwin in the years he formed his central ideas, followed such associationist thinking:

> Our perception of beauty consists in our recognition by the sense of vision of those objects, first, which have inspired our love by the pleasure they have afforded to many of our senses; as to our sense of warmth, of touch, of smell, of taste, of hunger and thirst; and secondly which bear any analogy of form to such objects.[8]

Writing in the early nineteenth century, the Scotsman Dugald Stewart also found aesthetic associations to be located in the mind rather than in the object, but this occurs through a complex series of associations. Darwin outlined Stewart's theories of the sublime and of taste. In his autobiography Darwin noted that while on the *Beagle* voyage, he had thought sublime sensations were attached to a higher power (god), but had since realized this was not the case (see Chapter 1 of this volume). Stewart's explanation for such confusion, as noted by Darwin, was that we understand the meaning of the sublime to be, at its most literal, height, and we associate ascension with power (or the sensation of "inward glorying") and therefore think of god as living in the heavens. Later, when we experience wonder or terror as in observing a vast ocean, for example, we are reminded of the rather similar sensations we experience with height and this brings god to mind; thus, through a complex interaction of associations we associate god with the sublime. Darwin offered a somewhat Burkean corrective: "It appears to me, that we may often trace the source of the 'inward glorying' to the greatness of an object itself or the ideas excited & associated with it…"[9] However, the Scottish program encouraged him to consider variability and relativity in standards of beauty. Therefore, humans followed cultural standards of beauty in mate choice and even highly personal ideas based on past associations.

But what of Joshua Reynolds and Darwin's readings in the late thirties? Reynolds is hardly a theorist who would be considered as grounded in biology; on the contrary, his program held up classical standards of the ideal. Yet Reynolds did acknowledge relativism and opinion in relationship to beauty, to which Darwin responded, "Is our idea of beauty, that which we have been most generally accustomed to…[d]eduction from this would be that a mountaineer…borne out of country yet would love mountains, & a negro, similarly treated would think negress beautiful…" Darwin further

commented that although Reynolds could account for the instinct to feel beauty, he could not account for the feeling itself.[10] Later, in preparing *The Expression of the Emotions in Man and Animals* (1872), he found Reynolds' observations of the human figure worth reviewing and mentions him, perhaps because this book was designed to appeal to artists as well as scientists.[11]

Darwin's own most developed aesthetic program was in the area of sexual selection wherein he believed that females of all species save humans choose the most "beautiful" male, whether this is based on color or formation of secondary sexual characteristics (e.g. antlers) or size or a combination thereof, and human males choose females also based on ideas of beauty. Sexual selection was introduced in *On the Origin of Species* (1859), but largely developed in later years and was a major consideration in *The Descent of Man, and Selection in Relation to Sex* (1871). The impact of the Darwinian program on the aesthetics of allure among humans has been the subject of a number of books in literary theory and more recently has come into focus in the arts.[12] Biologist Geoffrey Miller has suggested that it is sexual choice with all its aesthetic implications that has been the driving force of human evolution (as opposed to the primacy of that other Darwinian mechanism "natural selection" or "survival of the fittest.").[13] This includes abilities in the arts, sports, and leadership that are forms of display and become interwoven with mating rituals (including in the present day).

Darwin's extensive speculations on the biological basis of mate attraction (where beauty effects procreation and survival of the species) or the symbiotic relationship between birds or insects and plants and flowers (where beauty as perceived by humans is but a byproduct of natural processes, such as the ability of those seeking nectar to spot bright colors) drew considerable attention, much of it negative. The eminent art theorist, John Ruskin, who thought of himself as a skilled scientist, was a self-appointed detractor, promoting the idea that beauty in nature was for the aesthetic pleasure of god and man. Jonathan Smith has written about the specifics and timing of Ruskin's publications on plants, for example, designed to thwart Darwin.[14] When the formerly devoted follower of Ruskin, Dante Gabriel Rossetti, seemingly diverged to produce sensual "material" paintings of women compressed in tight spaces beginning in 1859—a date that coincided with the publication of Darwin's *On the Origin of Species*—there were those who suspected some kind of theoretical alignment between the scientist's physiological arguments on evolution and the emerging amoral school of Aestheticism, most notably that branch derisively dubbed the "fleshly school," which included Rossetti, by poet Robert Buchanan.[15]

Though Rossetti never claimed a biological or Darwinian basis to his approach, the theorist who did attempt to popularize the scientist's aesthetic ideas was Grant Allen. In a direct rebuttal to Ruskin and his followers (perhaps Buchanan among them) he opened his text *Physiological Aesthetics* (1877) as follows:

> 'Why we receive pleasure from some forms and not from others,' says professor Ruskin, 'is no more to be asked or answered than why we like sugar and dislike wormwood.' The questions thus summarily dismissed by our great living authority on Aesthetics are exactly the ones that this little book asks and, I hope, answers.[16]

Allen turned to Darwin's interest in pleasure and pain and also credited natural selection with prompting our aesthetic tastes. His aesthetic categories were not the beautiful and the sublime, but rather the beautiful and the ugly (the latter causing disturbing sensations to the nervous system and of less concern than the beautiful). Allen had been influenced by Alexander Bain who based aesthetics largely on pleasure. He found in Bain as well as in Herbert Spencer (*Principles of Psychology*, 1855) the conviction that all mental processes were based on physical sensations rather than spontaneous thought. Like Spencer, he believed in increasing evolutionary complexity within individuals (in a hierarchical sense) and the history of society. Those with "indiscriminate nervous organization, an untrained attention, a low emotional nature, and imperfect intelligence" could not take pleasure in either art or the beauties of nature, the latter being of the greatest importance. By the 1870s, Allen's ideas appeared far more modern than those of Ruskin in certain quarters, and his volume had some impact at that most venerable of institutions, the Royal Academy. Two years later, he published *The Colour-Sense; Its Origin and Development. An Essay in Comparative Psychology.* In this volume, Allen discussed the development of color detection in all creatures. Human ancestors developed an attachment to bright colors through the search for food, and this attachment was shared by all fruit-eating animals and living beings who made use of flowers. Indeed, insects and birds were engaged in a symbiotic relationship with flora, aesthetic beauty resulting from their interdependence. Bright colors were also important in mate selection and in recent times could be found in the arts. Fifteen years later, Allen went further still, ascribing all pleasure and beauty to the sex instinct.[17] From his perspective all "loveliness" in nature was based on Darwinian sexual selection. Even all of humanity's higher emotions, including paternal and maternal love, could be traced to the sex instinct. George Santayana, one of the first to publish on aesthetic theory in the US, assigned Grant Allen's *Physiological Aesthetics* in the first class taught on the subject at Harvard (1892–1893). In his own text based on his course lectures, *The Sense of Beauty* (1896), these words were included in his opening paragraph:

> Of late we have even learned that the forms of many animals are due to the survival by sexual selection of the colors and forms most attractive to the eye. There must therefore be in our nature a very radical and wide-spread tendency to observe beauty and to value it.[18]

Darwin's cousin, Francis Galton, appropriated ideas on natural selection to uphold his eugenic theories, disseminated into culture both in Britain

and abroad in light of healthful, fit, beautiful bodies. These perfect and appropriately erotic bodies were then enmeshed in aesthetic theories of sexual selection. While the ominous implications of the wide spread of eugenics has led to a lengthy history of absence of scholarly work on the decades-long pervasiveness of these corporeal and reproductive ideals in visual culture, recently this lacuna has been addressed in the scholarly literature.[19] Barbara Creed has examined the lighter side of the by then wide popular acceptance of evolutionary ideas regarding the body by demonstrating the Darwinian roots of both degenerative and monstrous corporeal types (given the transformative properties of evolution with its dark degenerative potential) and healthful, reproductive, beautiful bodies in early Hollywood films. Creed writes about the Darwinian "mating game" as celebrated in such cinematic productions of the 1930s as Busby Berkeley musicals with their tap-dancing bevies of beauties sporting "fruit" costumes, aerial portrayal of choreographed "flowers blooming," and male wooers penetrating their combined center as if through a pistil, singing such refrains as "I'm young and healthy":

> More than any other art form, the cinema, with its power to transform an image into a spectacle, has responded to Darwin's sexualisation of beauty…The power of the visual image and special-effects technologies… have combined with the cult of stardom to present beauty as erotic, alluring and captivating, leading to a sexualisation of beauty.[20]

The aesthetic implications of the ability of an organism to "disappear" by imitating its surroundings or another living entity is an organic aesthetic "strategy" that fascinated Darwin and his followers. Camouflage refers to the ability of a creature to appear as part of its environment while mimicry is an adaptation to look (or sound) like another species. Oxford biologist Edward Poulton devoted himself to promoting Darwin's natural selection as the overriding mechanism behind mimicry and camouflage at the end of the nineteenth century. His follower, the painter Abbott Thayer, not only used Darwinian ideas on camouflage as the basis for his nature paintings, but through personal observation promoted both artistically and scientifically the importance of the countershading of an animal's coat to survival (as in an animal's white belly), wherein forms appear less solid and round, thereafter called *Thayer's Law*, along with disruptive coloration (as in a zebra's stripes). In 1909, he and his son Gerald Thayer authored the book *Concealing-Coloration in the Animal Kingdom: An Exposition of the Laws of Disguise through Color and Pattern, Being a Summary of Abbott Thayer's Disclosures* (New York: Macmillan). During World War I, Thayer and his followers successfully proposed ideas to camouflage ships, instituted through the American Camouflage Corp.

Despite the deeply ingrained influence of Lamarkian evolution in France, Darwinian ideas began to reach a fairly large audience of artists as early as the 1860s through the theorist Hippolyte Taine and his lectures at the École

des Beaux-Arts. Already convinced that the spirit and form of a people reflect the environment and the time period in which they find themselves—an idea captured in his well known dictum "race–milieu–moment"—he had likened this relationship to that between a plant and its species and surroundings. In 1865, in a lecture to his students on the historical moment and artistic forms, published in his famous *Philosophie de l'art,* he gave this advice:

> Physical temperature acts by elimination and suppression—in other words, by *natural selection*. Such is the great law by which we now explain the origin and structure of diverse and existing organisms—a law as applicable to moral and physical conditions, to history as well as to plant and animal. In short, there is a *moral* temperature, consisting of the general state of mind and manners…a moral temperature makes a selection among different species of talent, allowing only this species or that to develop, to the exclusion of others. It is through some such mechanism that you see in artistic schools at certain times the sentiment of the ideal.[21]

That culture might respond to similar pressures found in the biological world would become an integral idea in histories of art and style in Germany. Semper, Riegl, and Wölfflin were all concerned with understanding formal changes over time. Semper identified *Urformen* (prototypical forms) and the subsequent development of form through environmental conditions and circumstances, e.g. a formula akin to "descent with modification," no doubt inspired by his reading of Darwin's *Origin of Species*, despite an antipathy to determinism and what it might suggest concerning free will.[22] The architectural theorist Georg Heuser explicitly conjoined ideas from Semper and Darwin to promote a technological history of architecture with natural selection as the motivating force.[23]

Similarly, Conrad Fiedler also applied Darwinian language to architectural history in *Observation on the Nature and History of Architecture* (1878). Riegl also followed a "descent with modification" schema in which formerly conceived periods of decay are accompanied by the budding of new life and new forms appropriate to the time. He used the term *Kunstwollen* to suggest the new "adaptations" of inherited form. Sensory experience was important to Riegl as well, and he was interested in the work of physiologist Sigmund Exner, part of a circle working in Austria in the late nineteenth century attempting to understand the impact of evolution on aesthetics. Exner emphasized the evolution of the nervous system and a parallel processing in the brain of memory traces and sensory stimuli in cultural adaptation. Sensory stimuli causing pleasure would then be associated with beauty and this would often have a cultural basis.[24] Like Riegl, Wölfflin also used the analogy of the "bud" of a new style with an inherent basis in old forms in his *Principles of Art History* (1915). Later in the twentieth century, E.H. Gombrich found cultural applications of Darwin's selection worthy of consideration.[25]

Darwin's *Expression of the Emotions* influenced the awareness of the emotional power of art and primitive sources in expression in Germany, where

it had a significant impact. As we have seen in Darwin's study of eighteenth-century aesthetic philosophy, he was interested in the physiological basis of all emotions. Human physiology was recognized by Robert Vischer as the basis for aesthetic response, exemplified by his concept of "empathy" formulated in 1873, one year after the publication of *Expression*. As in the eighteenth century, "nerve vibrations" were responsible. Through a visual and general corporeal experience, nerve vibrations force an object or experience into focus and then it enters the conscious mind, resulting in a symbolic picture. Touch mattered as well as sight and the overall experience is an empathetic one.[26] For Vischer, our drive to "preserve ourselves" is part of our emotional response which also includes the drive towards well being.[27] In the emotional feedback loop from object to subject to anthropomorphic envisioning of the object, the response is first immediate and sensory, then responsive and kinesthetic.[28] Wölfflin addressed Vischer's ideas by positing that our psychological tendency to project our own bodies onto the objects we view "animates" them, producing kinesthesia.[29]

Aby Warburg enthused later in life about his original reading of *The Expression of the Emotions* in 1888 and how this text thereafter was central to his ideas. The expressive emotional force of the individual illustrations (photographs and wood engravings) captured his imagination. He saw in their extreme gestures and aroused states an encounter between the individual and the chaotic world in which the struggle for existence is found in heightened responses. In outlining the importance of Darwin's book for Warburg, E.H. Gombrich noted that Warburg was steeped in the popular notion that a given historical period could have a means of corporeal expression or mental experience, a spirit of the age.[30] Warburg believed that evolution was teleological with an increasingly advanced state of mental activity and therefore through time there was an inevitable suppression of frenzied gestures; thus one could trace a "historical psychology of human expression." However, emotive corporeal forms with their "Dionysian" qualities—pathos formula—lie latent in cultural memory.

Unlike Warburg's fascination for regressive, "irrational" responses in human nature to the environment, around the same time in Germany, Darwinian follower Ernst Haeckel promoted an understanding of the human capacity to accept a lyrical form of beauty through an appreciation of the symmetrical forms (in all their intricacy) underlying natural entities, and this had a significant impact on design. Recently, Stephen Eisenman has argued that Darwin's botanical ideas had an influence on design aesthetics in England such as in the work of Christopher Dresser.[31]

In recent years, Darwin and evolutionary aspects of aesthetic theory have come into focus again, though the theorists are largely from the fields of anthropology and psychology. Titles of publications along these lines include *Evolutionary Aesthetics* (Eckart Voland and Karl Grammer, eds, Berlin:

Springer Verlag, 2003), *Evolutionary and Neurocognitive Approaches to Aesthetics, Creativity and the Arts* (Colin Martindale, Paul Locher and Vladimir Petrov, eds, Amityville: Baywood Publishing, 2007), and Denis Dutton's *The Art Instinct: Beauty, Pleasure, and Human Evolution* (New York: Bloomsbury Press, 2009). Evolutionary psychology accepts Darwin's natural selection and extends it to the psyche, positing that our mental capacities are themselves adaptations laid down through natural and sexual selection. Through generations of ancestral experiences we are not born a *tabula rasa*, aesthetically speaking, but have innate tastes. As psychologist Randy Thornhill puts it in the first chapter of *Evolutionary Aesthetics*,

> Beauty is a promise of function in the environments in which humans evolved, i.e., of high likelihood of survival and reproductive success in the environments of human evolutionary history. Ugliness (which evolutionary psychologists seem to prefer as a counter-thesis rather than the sublime) is the promise of low survival and reproductive failure.[32]

An example of how evolutionary psychologists have applied this is the recent popular notion that humans respond aesthetically in a most positive fashion to "savannahs" (in nature and by extension in landscape art) because our ancestors had found this kind of habitat hospitable (and we like branching trees because it reminds us of climbing and escape from danger). It should be noted that not all evolutionary psychologists agree on all points; we may prefer other kinds of habitats (and landscapes in art) because of personal familiarity.

Thornhill notes how psychologists are not all in agreement in terms of corporeal aesthetics either. Alfred Wallace (who shared the discovery of natural selection) diverged from Darwin in explicating a theory that "extravagant features" were to signal phenotypic quality as opposed to mere beauty. While all evolutionary psychologists accept sexual selection, according to Thornhill the consensus at present comes down on the side of Wallace.[33] Another category of interest has to do with neural responses to shapes, colors, and lines. For example, Richard Coss has credited natural selection with "pre-attentive" visual pattern recognition such as diamond patterns as "snake skins." Natural selection, according to Coss, also allows us to detect and quickly finish in our minds partial images. Responding to ideas concerning features and survival is neurologist Joseph LeDoux, who has pointed out that an emotional "quick and dirty" response to gross features such as an S-curve form (which passes directly through the thalamus) allows us to leap out of harm's way, before slightly later processing in the visual cortex and the amygdala (which mediates the emotional response) results in a more fine-tuned assessment of whether we have or have not seen a snake.[34]

Increasingly since the 1950s, neurologists have explored aesthetic implications of neural structures from an evolutionary perspective. For example,

Semir Zeki, along with other brain scientists, has examined aesthetics in light of the transformation in different areas of the brain in evolutionary history and the interaction between attentional and emotional areas in viewing something pleasurable.[35] Anthropologists tend to look at aesthetic production as adaptive and or symbolic. For example, Steven Mithen has suggested hand axes are "aesthetic," given their importance in social and sexual contexts. Anthropologist Ellen Dissanayake has argued that aesthetics—heightened expressions—served to separate off special objects and performances. Deemed more attractive and pleasurable, these sites served to bring about social bonding.[36]

Philosopher and aesthetic theorist Wolfgang Welsch has argued that the importance of animal aesthetics and its understanding to human aesthetics has been largely ignored, despite its significance to Darwin. He notes that Darwin suggested the aesthetic possibilities of odors, songs, "antics," and especially "ornaments of many kinds [such as] the most brilliant tints, combs and wattles, beautiful plumes, elongated feathers, top-knots, and so forth" and quotes the scientist on aesthetic similarities between humans and animals (for example, Darwin had written "the same colors and the same sounds are admired by us and by many of the lower animals," "birds […] have nearly the same taste for the beautiful that we do," and "'the high standard of taste' [in animals] generally coincides without our own standard)."[37] While noting Darwin's comments on pre-aesthetic beauty (e.g. simple animals like corals "are ornamented with the most brilliant tints, or are shaded and striped in an elegant manner [as] the direct result of either of chemical nature or the minute structure of their tissues") and proto-aesthetic beauty (e.g. colors and forms of flowers and fruits as bearing a relational structure to insects and birds necessary for pollination), basing his argument on Darwin, Welsch sees true aesthetics (with human implications) as originating in the non-human world with female choice through their "sense of beauty" and involvement in courtship rituals. Welsch counters the tendency of aesthetic theorists in psychology to emphasize utility and survival in the environment, since, as Darwin points out, aesthetic considerations in sexual selection often undermine survival (as in the peacock's tail, which attracts the attention of predators). Arguing that animals experience aesthetics (as gradations of pleasure) motivated by the sex drive, Welsch addresses the idea that humans are not necessarily so rudimentary in aesthetic response (though he cites Freud on sexual sublimation as a general pervasive condition). His answer to the animal / human aesthetic dilemma lies in the neurological system. Here, too, he invokes Darwin and quotes him on aesthetics: "There must be some fundamental cause in the nervous system."[38] Aesthetics is found in the complex neural relationships that have to do with the emotions and intellect. Though some aspects of aesthetics are cultural or of "high taste," Darwin invokes evolutionary history:

> Everyone who admits the principle of evolution [should] reflect that in each member of the vertebrate series the nerve-cells of the brain are the direct offshoots of those possessed by the common progenitor of the whole group. It thus becomes intelligible that the brain and mental faculties should be capable under similar conditions of nearly the same course of development, and consequently of performing nearly the same functions.[39]

We have already seen that Darwin was aware of theories of the nervous system in aesthetics that date back to the eighteenth century, and Erasmus Darwin had stressed continuities between animals and humans and believed that thought or emotion was based on the movement of "neural fibers."

A cognitive–evolutionary perspective with a Darwinian epistemology has developed in recent decades within literary and film criticism as applied to culture studies, and this can address histories of culture and aesthetic issues. Lisa Zunshine traces this evolutionary orientation in culture studies to Raymond Williams' influential publication *The Long Revolution* of 1961.[40] According to Zunshine, art is "a form of communication predicated on the living organism's need to adapt to its constantly changing environment or to find a way to modify that environment…given that our species' environment is first and foremost *other minds*."[41]

This volume is written by art and literary historians and artists who address Darwin's intersections with aesthetic theories and cultural histories from the eighteenth century to the present day. This writer examines Darwin's interest in Burke's interpretation of the sublime for its physiological dimensions and emphasis on self-preservation at a time when the scientist's theories of survival and natural selection crystallized. Burke was of interest in cultural and scientific circles around Darwin's evolutionist grandfather Erasmus Darwin, whose treatise *Zoonomia*, inflected with certain Burkean ideas, was a point of departure for Charles Darwin.

Laurence Shafe examines competing theories of beauty in light of Darwin's biologically-based aesthetic program of sexual selection, including those of Ruskin, Darwin's follower and aesthetic theorist Grant Allen, and the artists of the Aesthetic Movement. In so doing, Shafe uses the symbol of the peacock's tail which was repeatedly invoked by Ruskin, Darwin, and the aesthetes. Marsha Morton examines the art historical program of Alois Riegl, whose thoughts were rooted both in Darwinian ideas of competition in nature and those of Ernst Haeckel (Darwin's German follower), who emphasized order, community, pantheism, and unity. While Riegl's general historical program as "descent with modification," exemplified by his concept of the driving force of *Kunstwollen* as inheritance and adaptation has been previously noted (see above), this chapter argues that his central concepts of haptics and optics are based on shifting strategies for society's relationship with nature. In the ancient world, haptics or "near view" (isolated self-sufficient objects denoting power) existed at a time when the "right of the strongest" prevailed amidst a

chaotic environment with implications of "survival of the fittest," whereas in the modern age, individuals are cognizant of nature's violence and their own unprivileged status and the optical or "distant view" (interconnectedness of forms in space) prevails as a utopian ideal of interdependence in nature along the lines of Haeckel's "world spirit."

Cultural selection as theorized by Grant Allen or Riegl, among others, as an applied Darwinian historical model of analysis fell out of favor in the twentieth century with the exception of Gombrich and, to some extent, in the "prime object" narrative proposed in George Kubler's *The Shape of Time*, 1962 (see Chapter 4). The "evolution of art," on the other hand, to convey a general notion of progress with the implied (non-Darwinian) teleology of improvement, itself rooted in the Victorian period, was widespread in the first part of the twentieth century. Thus, early twentieth-century abstraction, for example, was generally thought of as part of the inevitable evolution of art from Symbolism or late Impressionism. Recently, as scholarship has returned to the pros and cons of a Darwinian framework to understand transitions in cultural forms, art historians have shown renewed interest in the idea of selection. In 2007, Robert Bork called for a re-evaluation of the application of the Darwinian model of descent to the field of art history.[42] And in 2008, the panel "Is Evolutionism Still Dead?" at the College Art Association conference opened up the issue of Darwinian applications once again. Larry Silver returns to Darwin and proposes that the Darwinian model does have something to offer. In his essay "Culture and the Shape of Time" (Chapter 4), he examines the case of Antwerp in the sixteenth century. He argues that pictorial genres such as landscapes and scenes of everyday life which emerged for the first time in the context of easel painting, can be followed in their shifts of form and meaning though time in the context of market and geographical conditions—in this case involving cultural isolationism.

Sigrid Weigel investigates the epistemological problems associated with applying evolutionary units to culture, suggesting that we need to consider the methods by which meaning is generated within different frameworks of reference. She also notes the tension between the concept of evolution and that of system when evolution is applied to society and culture. She examines fields in which evolution is commonly applied today (beyond the biological), such as communication, the "evolution of culture" by early homo sapiens, the use of tools and their impact on culture, and of greatest interest today, systems theory. She considers current biological interest in a fusion of natural systems with the idea of self-regulation, and she also returns to the development of evolutionary thinking, finding a cultural legacy in the work of Lamarck that then influences Darwin.

Sabine Flach turns to the interesting case of Aby Warburg, who never wavered from claiming the importance of Darwin to his aesthetic and cultural

program. Through Warburg's personal insights, Flach suggests that Darwin's *Expression of the Emotions* with its dramatic imagery can be understood as a form of cultural history or rather of nature (science) and culture in tension. She argues that there is an oscillation between the two in Darwin's images, just as there is between the fact of science and the fiction of the sometimes flamboyant or posed corporeal gesture (and their suggestion of events to the viewer), and the combination of heredity (in expression), habits of gestures, and the current environment in which living figures are located. Jan Söffner examines reasons why classic discussions of semiotics and mimicry are ill-founded by referring to Darwinian mimicry. In so doing, he turns to Surrealist imagery and theory and the "riddles" found there in representation and resemblance and unsettled boundaries between one object or another. He argues that true mimicry itself is phenomenological, environmental, and sensorial, not merely visual, and that this is the case in the Surrealist examples (painting, texts, film) that he explores.

Artist and scientist Ellen K. Levy examines divergent scientific views on natural selection today and how these have influenced the aesthetic choices made by some artists. For example, two major trends in evolutionary thinking currently include on the one hand, the more classic view of many evolutionary psychologists, who posit that the environment works on heritable variations, which is also held by artists using a genetic algorithm model (GA) that mimics the process of natural selection, and on the other hand, the perspective of developmental biologists, who argue for the overriding importance of natural constraints on the developing organism that channel evolution and limit adaptation. This, in turn, is echoed in the work of artists who choose a cellular automaton model (CA) that involves generating complex patterns from simple rules. Models of the brain also reflect different views: evolutionary psychology suggests that cognitive plasticity in humans derives from the interplay of diverse instincts in competition. Another faction stresses the roles of information processing and feedback as shaping cognitive development. These views are also found in some current art production. While focusing on artists, Levy reflects upon the "aesthetic" choices of scientists in presenting their ideas.

Notes

1. The Reynolds is noted in Frederick Burkhardt, Sydney Smith, David Kohn, and William Montgomery, eds, *The Correspondence of Charles Darwin*, 1 (Cambridge: Cambridge University Press, 1985), 71, 95, 397, 428. On the Burke, see Chapter 1 of this volume, endnote 4.
2. On ways in which artists recorded unfamiliar sites according to their training in landscape painting, see the writings of Bernard Smith, especially *European Vision and the South Pacific: 1768–1850* (New Haven, CT: Yale University Press, 1959; reprinted in 1985).
3. R.D. Keynes, ed., *Charles Darwin's* Beagle *Diary* (Cambridge: Cambridge University Press, 2001), 20.

4. On the legacy of Rosa as initiating the sublime in landscape painting, see Charlotte Klonk, *Science and the Perception of Nature: British Landscape Art in the Late Eighteenth and Early Nineteenth Centuries* (New Haven, CT: Yale University Press, 1996), 9–10.

5. Keynes, *Charles Darwin's* Beagle *Diary*, 443.

6. The full title is *Werner's Nomenclature of Colours, with Additions, Arranged So as to Render it Highly Useful to the Arts and Sciences, Particularly Zoology, Botany, Chemistry, Mineralogy and Morbid Anatomy. Annexed to Which are Examples Selected from Well-known Objects in the Animal, Vegetable, and Mineral Kingdoms*. Darwin's personal copy, now in the Darwin Library at Cambridge University, is the second edition of 1821.

7. Keynes, *Charles Darwin's* Beagle *Diary*, 18.

8. *Zoonomia*, 3rd edn (London: J. Johnson, 1802), 1, 145.

9. P.H. Barrett, P.J. Gautrey, S. Herbert, D. Kohn, and S. Smith, transcribers and eds, *Charles Darwin's Notebooks, 1836–1844 : Geology, Transmutation of Species, Metaphysical Enquiries* (Ithaca, NY: Cornell University Press, 1987), 605.

10. See *Notebooks*, 527, 570.

11. Jonathan Smith has noted that Darwin had suggested to his publisher that the book be sent to art journals for review. See *Charles Darwin and Victorian Visual Culture* (Cambridge: Cambridge University Press, 2006), 184. When writing about similarities between crying and laughing, Darwin quotes Reynolds: "It is curious to observe, and it is certainly true, that the extremes of contrary passions are, with very little variation, expressed by the same action." *The Expression of the Emotions in Man and Animals*, ed. Paul Eckman (Oxford: Oxford University Press, 1998), 207.

12. In literature, see Gillian Beer, *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction* (London: Routledge & Kegan Paul, 1983); Richard Kaye, *The Flirt's Tragedy: Desire without End in Victorian and Edwardian Fiction* (Charlottesville, VA: University of Virginia Press, 2002); and George Levine, *Darwin Loves You: Natural Selection and the Re-enchantment of the World* (Princeton, NJ: Princeton University Press, 2006). In art, see Jane Munro, "'More Like a Work of Art than Nature': Darwin, Beauty and Sexual Selection," in *Endless Forms: Charles Darwin, Natural Science, and the Visual Arts*, eds Diana Donald and Jane Munro, exh. cat. (Cambridge: Fitzwilliam Museum, New Haven, CT: Yale Center for British Art), 253–91 and Barbara Larson, "Darwin's Sexual Selection and the Jealous Male in Fin-de-Siècle Art," in *The Art of Evolution: Darwin, Darwinisms, and Visual Culture*, eds Barbara Larson and Fae Brauer (Hanover, NH: University Press of New England, 2009), 173–93.

13. Geoffrey Miller, *The Mating Mind: How Sexual Choice Shaped the Evolution of Human Nature* (London: Heinemann, 2000).

14. See his essay, "Evolutionary Aesthetics and Victorian Visual Culture," in *Endless Forms*, 237–52.

15. See Gowan Dawson, *Darwin, Literature and Victorian Respectability* (Cambridge: Cambridge University Press, 2007), 14–21.

16. Grant Allen, *Physiological Aesthetics* (London: Henry S. King, 1877), vii.

17. Grant Allen, "The New Hedonism," *Fortnightly Review* (March 1894), 377–92. Joy Harvey has noted that by the 1870s in France, some anthropologists identified sexual selection as the basis of beauty among all living things. See Joy Harvey, "Evolutionism Transformed: Positivists and Materialists in the Société d'Anthropologie de Paris from Second Empire to Third Republic," in *The Wider Domain of Evolutionary Thought*, eds D.R. Oldroyd and K. Langham (Dordrecht: D. Reidel, 1983), 289–310.

18. George Santayana, *The Sense of Beauty: Being the Outlines of Aesthetic Theory* (New York: Scribner's Sons, 1896), 1.

19. Fae Brauer and Anthea Callen's volume, *Art, Sex, and Eugenics: Corpus Delecti* (Burlington, VT: Ashgate, 2008) is the first text to address this visual culture and the Darwinian roots of Galton's program. Although Darwin himself was not a eugenist, Galtonian language did enter his later work. See Fae Brauer, "Framing Darwin: A Portrait of Eugenics," in *The Art of Evolution: Darwin, Darwinisms, and Visual Culture*, 144–5.

20. Barbara Creed, *Darwin's Screens: Evolutionary Aesthetics, Time and Sexual Display in the Cinema* (Melbourne: Melbourne University Press, 2009), 111.

21. Hippolyte Taine, *The Philosophy of Art* (trans. John Durand from *Philosophie de l'art*, Paris 1865) in *Lectures on Art*, 1st ser. (New York, 1875), 93–4. Slightly earlier, in his *History of English Literature*

(1863–1864), he directly referred to *Origin*. For a discussion on Taine and evolutionism, see Thomas Munro, *Evolution in the Arts, and Other Theories of Culture History* (Cleveland, OH: The Cleveland Museum of Arts, n.d.), 105–17.

22. P. Steadman, *The Evolution of Designs: Biological Analogy in Architecture and the Applied Arts* (Cambridge: Cambridge University Press, 1979), 73, and W. Kleinbauer, *Modern Perspectives in Western Art History, an Anthology of 20th-Century Writings on the Visual Arts* (Toronto: University Press of Toronto, 1989), 20.

23. See H. Mallgrave, *Gottfried Semper: Architect of the Nineteenth Century* (New Haven, CT: Yale University Press, 1996), 364.

24. On Exner, see Olaf Breidbach, "The Beauties and the Beautiful—Some Considerations from the Perspective of Neuronal Aesthetics," in *Evolutionary Aesthetics*, eds E. Voland and K. Grammer (New York: Springer, 2003), 39–68.

25. See, for example, E.H. Gombrich, "Evolution in the Arts: The Altar Painting, its Ancestry and Progeny," in *Evolution and its Influence*, ed. Allen Grafen (Oxford: Clarendon Press, 1989), 107–25; E.H. Gombrich, *In Search of Cultural History* (Oxford: Clarendon Press, 1969); and John Onians, "Gombrich and Biology," in *E.H. Gombrich in Memoriam*, ed. Paula Lizzarga (Pamplona: Ediciones Universidad de Navarra, 2003), 95–119.

26. See Robert Vischer, "On the Optical Sense of Form: A Contribution to Aesthetics" (1878), in *Empathy, Form, and Space, Problems in German Aesthetics, 1873–1893*, eds H. Mallgrave and E. Ikonomou (Santa Monica, CA: Getty Center Publications, 1994), 89–123.

27. Ibid., 103.

28. Ibid., 92.

29. See H. Wölfflin, "Prolegomena to a Psychology of Architecture" (1886), in *Empathy, Form, and Space Problems in German Aesthetics 1873–1893*, eds H. Mallgrave and E. Ikonomou, 149–90.

30. E.H. Gombrich, "Aby Warburg: His Aims and Methods: An Anniversary Lecture," *Journal of the Warburg and Courtauld Institutes* 62 (1999), 272.

31. Stephen Eisenman, ed., *Design in the Age of Darwin: From William Morris to Frank Lloyd Wright*, exh. cat. (Evanston, IL: Northwestern University, 2008).

32. Thornhill in *Evolutionary Aesthetics*, 9–10.

33. Ibid., 11.

34. Joseph LeDoux, *The Emotional Brain: The Mysterious Underpinnings of Emotional Life* (London: Phoenix, 1999), 166.

35. See Marcos Nadal, Miquel Capó, Enric Munar, Gisèle Marty, and Camilo José Cela-Conde, "Constraining Hypotheses on the Evolution of Art and Aesthetic Appreciation," in *Neuroaesthetics*, eds Martin Skov and Oshin Vartanian (Amityville, NY: Baywood Publishers, 2007), 103–30, and Semir Zeki, "Neural Correlates of Beauty," *Journal of Neurophysiology* 91, 1 (2004), 699–705.

36. Ellen Dissanayake, *Homo Aestheticus* (Seattle, WA: University of Washington Press, 1995).

37. Quoted in Wolfgang Welsch, "Animal Aesthetics," in *Contemporay Aesthetics* 2 (2004), 13.

38. Darwin quoted from *Origin* in ibid.

39. Darwin quoted from *Descent* in ibid.

40. Lisa Zunshine, ed., *Introduction to Cognitive Cultural Studies* (Baltimore, MD: Johns Hopkins Press, 2010), 5.

41. Lisa Zunshine in ibid., 10.

42. Robert Bork, "Art, Science, and Evolution," in *Making Art History: A Changing Discipline and its Institutions*, ed. Elizabeth Mansfield (New York: Routledge, 2007), 187–202.