

THE CONFRONTATION BETWEEN
REASON AND IMAGINATION:
THE EXAMPLE OF DARWIN

“When a man in the dark presses either corner of his eye with his finger, and turns his eye away from his finger, he will see a circle of colors like those in the feather of a peacock’s tail.”

Isaac Newton¹

The theme of Darwin’s struggle between reason and imagination is perhaps most clearly shown in his efforts in the *Origin* to conceive of how the eye of the body might have developed through natural selection. Thus he wrote:

To arrive, however, at a just conclusion regarding the formation of the eye, with all its marvellous yet not absolutely perfect characters, it is indispensable that the reason * should conquer the imagina-

¹ I. Newton, *Optics*, Bk III: pt. 1, Qu. 16.

* For reason, it is clear that Darwin intends the imagination corrected by observation.

tion; but I have felt the difficulty far too keenly to be surprised at others hesitating to extend the principle of natural selection to so startling a length.²

In other words, the imagination represents a stumbling-block for reason in arriving "at a just conclusion regarding the formation of the eye." This can only come about through reason prevailing over imagination. Darwin's struggle of reason and imagination, we shall see, derives from the realization that to find the laws of change in living nature it is necessary to make the imagination reasonable. To attempt merely to deny imagination is to invite defeat. Only by the 'taming' of imagination may one lighten, though not escape, the yoke of its instinctuality.

The difference for Darwin between being controlled by imagination and being able to control it appears most vividly in his puzzlement with regard to sexual selection, involving as it does the naturalist personally in his efforts to clarify the relations of body, imagination, perception, and reason. To his closest friends and supporters he confided this preoccupation. To Henslow, whom he had once called his "father in Natural History," Darwin wrote:

There is no greater mystery in the whole world as it seems to me, than the existence of the sexes...³

And to T. H. Huxley he had already written, before the publication of the *Origin*:

I am particularly glad that you are ruminating on the act of fertilization; it has long seemed to me as the most wonderful and curious of problems.⁴

In his writings on sexual selection, merely broached in the *Origin* but the very theme of *The Descent of Man and Selection in Relation to Sex* (1871), Darwin showed how the visible characters of male and female birds in particular might have

² C. Darwin, *Origin of the Species*, Ch. 6, "Organs of extreme complication and perfection."

³ Nora Barlow, (ed.) *Darwin and Henslow, The Growth of an Idea, Letters 1831-1860*, University of California, 1967. Letter of July 16, 1860, p. 209.

⁴ *Ibid.*, p. 210.

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been constituted by the aesthetic preference of generations of sexual mates. At the same time, however, that he is establishing the scientific case for his theory, Darwin is achieving the liberation of his reason from his own aesthetic enthrallment, as documented in the pages of his diary of the *Voyage*. This is particularly clear where he invokes feelings of the "sublime." His own 'sublimation' became by turns the model and illustration for the emergence of reasonable form from inchoate instinctual order, exemplifying at once his participation in the changing natural order, and that reason through which man rises above it as sheer metamorphosis. His notion of natural selection, his success in demonstrating its occurrence, thus became part of the verifying evidence. This can be seen by following him in his attempt to show how sexual preference works as a mode of natural selection.

For Darwin the tyranny of imagination unchecked by reference to empirical observation was implicitly illustrated by sexual selection. Its consequences—unconscious modifications of bodily form—represent the obverse of his own critically informed use of the imagination in articulating the process by which natural selection had occurred. Here theory conceived in wonder was submitted to the "facts of observation" which required in turn a transformation of the original vision.

The facts of observation were inspired by their relevance for testing the original theory even though, to the extent they were unanticipated, they in turn contributed to modification and reconstruction of the original vision. In this context, imagination became something like a primary working 'mirage,' a crude form of reason, as yet partial and undifferentiated.

Darwin's working out of his doctrine of natural selection, particularly in its mode of sexual choice, is as observed, inseparable from his grasp of the method he needed to accomplish this, and even more, inseparable from its consequences for his understanding of his own life. This last point can only be mentioned in the scope of this paper. Here I will merely attempt to show that in working out his case for natural selection, he also realized the method he had to follow to do this, and that this involved him deeply in a personal way.

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In the *Origin* the motif of the necessity to bring imagination under the control of reason occurs, as we saw, where Darwin seeks to understand how the eye might have emerged from natural selection. His train of thought is instructive for the different ways in which it employs the notion of imagination, first as an aid in scientific thought, secondly as a hindrance to such thinking, and thirdly, as the very medium of scientific conceptualization. Darwin starts by remarking on the inability of the imagination to provide an adequate scientific solution without recourse to empirical observation. He writes:

Reason tells me, that if numerous gradations from a simple and imperfect eye to one complex and perfect can be shown to exist, each grade being useful to its possessor, as is certainly the case; if further, the eye ever varies and the variation be inherited, as is likewise certainly the case; and if such variations should be useful to any animal under changing conditions of life, then the difficulty of believing that a perfect and complex eye could be formed by natural selection, though insuperable by our imagination, should not be considered as subversive of the theory.⁵

Darwin continues by referring to the specific kinds of observations that might be used to determine the occurrence of such gradations and variations. Following this he returns to imagination tacitly, but with greater specificity. Comparing primitive modes of animal response to light, he asks us to imagine a continuum reaching from an "aggregate of pigment-cells" in the wall of the body to the "organs of vision." This thought model also suggests continuity between responsiveness in the absence of a distinction between self and not-self, and response where such a distinction has been established. The possibility now of varying the 'distance' between impression and response, it may be seen, also enables a more cooperative relation between imagination and reason than the earlier emphasis on their opposition. A third reference to "imagination" now follows, this one consisting of the citation in our opening paragraph. It bears repetition:

⁵ Darwin, *loc. cit.*

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To arrive, however, at a just conclusion regarding the formation of the eye, with all its marvellous yet not absolutely perfect characters, it is indispensable that the reason should conquer the imagination; but I have felt the difficulty far too keenly to be surprised at others hesitating to extend the principle of natural selection to so startling a length.

To be sure, Darwin already seeks to restrain the imagination by reminding us of the “not absolutely perfect characters of the eye.” But he now attempts an even more intimate penetration of imagination by the spirit of reason through a model:

If we must compare the eye to an optical instrument, we ought in imagination to take a thick layer of transparent tissue, with spaces filled with fluid, and with a nerve sensitive to light beneath, and then suppose every part of this layer to be continually changing slowly in density, so as to separate into layers of different densities and thicknesses, placed at different distances from each other, and with the surfaces of each layer slowly changing in form. Further, we must suppose that there is a power, represented by natural selection or the survival of the fittest, always intently watching each slight alteration in the transparent layers; and carefully preserving each which, under varied circumstances, in any way or in any degree, tends to produce a distincter image.⁶

Here we can see Darwin, rapt but intent, fashioning a model in terms of language, as well as of vision, a model which combines continuity (represented by “transparency”) with discontinuity (represented by the “layers”), together accounting for that phylogenetic modification by which there occurs increasing distance between animal impression and response. As the intermediate levels are differentiated, the possible relations of impulse, perception, and control multiply in number.⁷

Darwin, characteristically enough, was not insensitive to the weakness of his argument in the preceding passage, lacking as it was in any reference to observable selective factors. When Asa Gray pointed this out to him after publication of the *Origin*,

⁶ *Ibid.*

⁷ This evolutionary logic also underlies Hughlings Jackson's conception of the central nervous system. Jackson, who was the first to establish neurology on a scientific basis, attributed his notions of “evolution and dissolution,” however, to Herbert Spencer.

in February, 1860, Darwin not only agreed but added a personal reaction:

About the weak points I agree. The eye to this day gives me a cold shudder, but when I think of the fine known gradations, my reason tells me I ought to conquer the cold shudder.⁸

How are we to understand this last remark of Darwin? First let us note a similar reaction, also reported to Asa Gray, April 3, 1860, to the sight of a feather in a peacock's tail, evidently to the ocellus, or 'eye,' in each feather of the peacock's tail, which he was to scrutinize so minutely in *The Descent of Man*:

... I remember well when the thought of the eye made me cold all over, but I have got over this stage of the complaint, and now small trifling particulars of structure often make me very uncomfortable. The sight of a feather in a peacock's tail, whenever I gaze at it, makes me sick...⁹

When Darwin wrote the above two letters in February and April of 1860, his work was under attack from many sides, to peak in June at the Oxford meeting of the British Association. He was beset with doubts, especially when faced with criticism from those whose support he most sought. In the same letter where he had spoken of his "cold shudder" Darwin added a postscript to bolster Gray against his doubts about natural selection.

I feel pretty sure, from my own experience, that if you are led by your studies to keep the subject of the origin of the species before your mind, you will go farther and farther in your belief. It took me long years...¹⁰

But the intimate tie between Darwin's struggle to convince informed friends and colleagues of the truth of natural selection and his "cold shudder" most clearly appears in an earlier letter to Lyell, Nov. 23, 1859. After expressing his gratitude to Lyell

⁸ *Life and Letters of Chas. Darwin*, ed. by Francis Darwin, II, p. 67, Basic Books, 1959.

⁹ *Ibid.*, p. 90.

¹⁰ *Ibid.*, p. 67.

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for finally coming over to his side, he tells us what it meant to him:

For myself, also, I rejoice profoundly; for thinking of so many cases of men pursuing an illusion for years, often and often a cold shudder has run through me, and I have asked myself whether I may not have devoted my life to a phantasy.¹¹

This confession testifies to the engrossing, though largely hidden, part played by imagination in the life work of Darwin, an imagination that could never be used directly to endow another with his own belief in natural selection. This imaginative belief formed such integral part of his life that the thought it might be unconvincing to others could only mean that he was deranged. Supporting such an interpretation is a passage from another letter to Asa Gray, this time in 1874, after Darwin had weathered the storms of adverse criticism, and the tide had turned in his favor:

Every one, I suppose, occasionally thinks that he has worked in vain, and when one of these fits overtakes me, I will think of your article, and If that does not dispel the evil spirit, I shall know that I am at the time a little bit insane, as we all are occasionally.¹²

The use of the imagination is double-edged. If it lies at the root of the scientist's power over nature, it is also the stuff of dreams and self-deception, followed by disillusion. The danger is that the scientist may not be able to bridge the difference between his vision and a demonstration convincing to others. In his absorption he may lose that sense of the whole in which nature and reason work together. For example, Michael Faraday, after a sensationally imaginative career as a scientist, having survived a breakdown, and now deep in the physics of magnetism and gravity, wrote in his diary in 1850, as Darwin was puzzling out the processes of natural selection:

"ALL THIS IS A DREAM."¹³

¹¹ *Life and Letters*, II, p. 25.

¹² *Life and Letters*, II, p. 367.

¹³ Joseph Agassi, *Faraday as a Natural Philosopher*, Univ. of Chicago, 1971,

It was just his remarkable imagination that has seemed to account in great part for Faraday's fundamental discoveries. When imagination outstrips the possibilities of empirical demonstration, it leads into the dream, with its possible mirages and disappointments. Loss of the world and delusion threaten.

Darwin's sense of an instinctuality at the heart of the dream is suggested by his marking of the following passage in his personal copy of Johannes Müller's *Physiology*:

The expression of Cuvier with reference to instinct is very correct. He says that animals in their acts of instinct are impelled by an innate idea—as it were, by a dream.¹⁴

Darwin's "cold shudder" and 'feeling sick' seem to have been his response to recognition of the potentially dangerous instinctual moment of his imagination in his search for the "law of change" of living things.

* * *

Darwin, still seeking a mechanism of evolutionary modification, turns from the refractory eye to an object of its gaze, in this instance an 'eye' of beauty. Already, in his discussion of the optic sphere, he had casually alluded to "its beautiful crystalline lens." Now he seeks to reduce the sway of imagination in his view of natural selection by deriving the power of beauty from sexual attraction. Perhaps he can then more soberly understand how the eye might have evolved. Darwin effects this derivation of the phenomenon of beauty through supposing that the sexual choices of generations of peahens might have produced the beauty of the male peacock. Already in his working notes of 1838 he had observed that:

we must suppose Pea-hen admires peacock's tail, as much as we do.¹⁵

In the *Origin* he had written:

¹⁴ M. T. Ghiselin, "Darwin and Evolutionary Psychology," *Science*, No. 179, 1973, p. 966.

¹⁵ H. E. Gruber, *Darwin on Man*, Dutton, 1974, p. 342.

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If man can in a short time give beauty and an elegant carriage to his bantams, according to his standard of beauty, I can see no good reason to doubt that female birds, by selecting, during thousands of generations, most melodious or beautiful males according to their standards of beauty, might produce a marked effect.¹⁶

Finally in 1871, Darwin gave, in *The Descent of Man and Selection in Relation to Sex*, a lengthy and detailed analysis of how such marked effects might have occurred. It is striking, as Julian Huxley has commented, that Darwin emphasized the selection of males by females, to the neglect of the reverse relation or even mutual selection, as did Huxley himself in his 1914 paper on *The Courtship Habits of the Great Crested Grebe*.¹⁷ However, if we consider the weakness of Darwin's attempt to understand the formation of the eye through natural selection, we may understand his shift to an alternate strategy, but now in relation to the ocellus or 'eye' in the plumes of a peacock's tail. This explanation, if applied to the bodily eye would suggest that its emergence resulted from the response of living cells to light, much as the eyes in the train of the peacock were conceived by Darwin as a kind of response to the amorous gazes of countless generations of peahens.

Let us now review the course of Darwin's thought on the eye. He began with an attempt to understand the development of the bodily eye on the basis of a fantasy model. Then, turning to understand the formation of the beautiful ocelli in the tail of the peacock, Darwin shifted from the eye as organ of vision to the eye as an aesthetic motif in the peacock's tail. In trying to understand the formation of the eye as an organ, he placed himself in the position of an imaginary observer; in trying to account for the formation of the 'eyes' of the peacock's tail he placed himself primarily in the position of the selecting peahen. In this way, Darwin alternately sought to do justice to both observer and participant positions in understanding the modification of bodily characters through natural selection. He was obliged to follow this course through his commitment to empirical observa-

¹⁶ C. Darwin, *Origin of the Species*, "Sexual Selection."

¹⁷ Julian Huxley, *The Courtship Habits of the Great Crested Grebe*, Jonathan Cape, 1968.

tion, together with a Newtonian standpoint, which constantly limited any tendency to a one-sided position. Throughout his zigzag course, he moved continuously toward a more and more scientifically meaningful account, out of a latent background of imaginative belief. The presupposition underlying such a method was that of the reciprocal implication of observer and world.

A biologist of our day has written about the naturalist's gaze in a way that conveys both the opportunity and possible pitfall of the imagination for Darwin. Konrad Lorenz says that no one would have the powers of concentration necessary for an analysis of animal behavior

unless his eyes were bound to the object of his observation in that spellbound gaze which is not motivated by any conscious effort to gain knowledge, but by that mysterious charm that the beauty of living creatures works on some of us.¹⁸

But the young Darwin of *The Beagle*, however, had already differentiated

a wonder which does not at first strike the eye of the body, but after reflection, the eye of reason.¹⁹

That wonder in the presence of nature from which Darwin begins already embodies imagination to begin with. A theory construed from this initial wonder then governs "the eye of the body" in empirical observation. Such observation holds in suspension the initial imaginative belief. It is to the final theory, as corrected by reflection, that the innermost "eye of reason" corresponds. The "eye of reason" is as much a self-construction as it is a disclosure, from the world, in the progress from wonder to scientific understanding. But this appears only in the course of the ongoing struggle between imagination and reason as we can see it instanced in Darwin's writings.

¹⁹ C. Darwin, *Voyage of the Beagle*, April 12, 1836.

¹⁸ Quoted by Philip C. Ritterbush, in *Organic Form*, ed. by G. S. Rousseau, Routledge and Kegan Paul, 1972, p. 58.