



# The challenge of instinctive behaviour and Darwin's theory of evolution

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**In the *Origin of Species* (1859), Darwin argued that his revolutionary theory of evolution by natural selection represented a significant breakthrough in the understanding of instinctive behaviour. However, many aspects in the development of his thinking on behavioural phenomena indicate that the explanation of this particular organic feature was by no means an easy one, but that it posed an authentic challenge – something that Darwin himself always recognized. This paper explores Darwin's treatment of instincts within his theory of natural selection. Particular attention is given to elucidate how he tackled the difficulties of explaining instincts as evolving mental features. He had to explain and demonstrate its inheritance, variation, and gradual accumulation within populations. The historical and philosophical aspects of his theory are highlighted, as well as his study of the case in which the explanation of instincts represented a 'special difficulty'; that is, the sterile castes of social insects.**

## Summary

Darwin's treatment of instincts within his theory of evolution by natural selection is exposed and discussed. The first section reconstructs the historical background of the studies of instincts in natural theology and naturalism in order to put Darwin's theory in context. The second section exposes Darwin's notion of instinct. The third section exposes Darwin's demonstration of the evolution of instincts by natural selection. The fourth section argues that Darwin hold an emergentist view of instincts. The last section exposes Darwin's solution of his 'one special difficulty': the evolution of instincts and body of sterile insects.

## Introduction

A possible view of Darwin's approach to behaviour is that it was a simple inclusion of an organic feature under the scope of his theory of evolution.<sup>1</sup> However, a deeper analysis reveals that it was more complex than that, especially

with instinctive behaviour. Darwin himself pointed this out. In the *Origin of Species* (1859), he listed what he considered to be the four main difficulties of his theory. The third was the explanation of instincts: 'can instincts be acquired and modified through natural selection? What shall we say to so marvellous an instinct as that which leads the bee to make cells, which have practically anticipated the discoveries of profound mathematicians?'.<sup>2</sup> He did not overcome the challenge of explaining the evolution of instincts straightaway once he conceived his theory of natural selection in 1838. Rather, he developed and refined solutions cautiously over several years.<sup>3</sup> His mature views appeared mainly in the chapter VII ('Instinct') of the *Origin*. Here he advanced that, despite being mental, instincts can be adequately explained as if they were corporeal structures of the organism since they meet the necessary conditions to evolve by means of natural selection. Moreover, based on this perspective, he was able to solve the historical difficulties of a particular type of instincts dubbed 'wonderful instincts,' including those of the sterile castes of social insects.

This paper explores Darwin's treatment of instincts within his theory of evolution by natural selection. Particular attention is given to the difficulties of explaining instincts as evolving mental features. Darwin had to show that instincts varied, these variations were heritable, and beneficial variations could accumulate gradually in populations. In the following two sections I briefly consider the historical background and Darwin's context regarding the studies and opinions on instinctive behaviour. I argue that this context, in addition to his scientific goal of explaining the evolution of the vast diversity of species, determined his notion and definition of *instinct*. In the next section, I expose the evidence and arguments put forward mainly in his *Origin* in order to sustain that instincts evolve by natural selection. One interesting issue which is sometimes neglected in the studies of Darwin's theories of behaviour is the underlying

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<sup>1</sup> Swisher, C. (1967). Charles Darwin on the Origin of Behavior. *Bulletin of History of Medicine*, 41: 24–43.

<sup>2</sup> Darwin, C. R. (1859). *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. London: John Murray. p.172.

<sup>3</sup> Burkhardt R.W. (1985). Darwin on Animal Behavior and Evolution. In: Kohn, D., ed. *The Darwinian Heritage*. New Jersey: Princeton University Press. pp. 327–365; Richards, R. J. (1987). *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior*. Chicago: The University of Chicago Press. pp. 83–110.



**Figure 1.** Portraits of William Paley (left) and Charles Darwin (right) at the Dining Hall, Christ's College, University of Cambridge, Cambridge, U.K. Photo courtesy of Dr. Richard Bellon.

philosophical commitment to the body/mind problem. This matter, in relation to instincts, will be addressed in the next section followed by an exposition of his brilliant solution to the 'one special difficulty.'

### Historical background and context

The notion that living beings can display certain behaviour without consciousness and without individual experience has been present throughout the history of Western thought.<sup>4</sup> In many cases, this kind of behaviour has been contrasted with man's reasoning capacity. It has been thought that since humans think, learn and act deliberately, then we behave rationally rather than instinctively. Hence, the roots of the study of instincts can be traced back at least to the ancient Greeks who conceived a dualism of man's rationality on the one hand and animals' natural and blind impulses on the other.<sup>5</sup> Interestingly, this proposed classification had an important impact in the religious worldviews of medieval Europe like Christian philosophy which adopted it as a basic notion. For theologians such as Thomas Aquinas, instincts show the manifestation of the divine providence since God has 'planted' in animals beneficial instructions.<sup>6</sup> Also, the description of animals as instinctive instead of rational creatures justified the image of man as the only of God's creature with a soul and an afterlife in Heaven or Hell.

In the eighteenth and nineteenth centuries, natural theologians continued reflecting about instinctive behaviour and the divine providence in light of the vast increase of knowledge on natural history. The world was being enthusiastically explored by Europeans and it was not

rare for naturalists to join naval expeditions to investigate nature in remote lands. They typically published their findings and stocked museums with their collections of specimens. The Anglican clergyman William Paley (Figure 1) reflected on this outpouring of new information in his classic work *Natural Theology*, published in 1802 and avidly read by the young Darwin. Paley, like Thomas Aquinas, thought that diverse and complex instincts provided compelling evidence that nature is divinely designed.<sup>7</sup> In the same vein, other natural theologians pointed to various instincts whose complexity in their view provided irrefutable proof of God's interventions in nature. William Kirby and Henry Lord Brougham, in works that Darwin read closely, used the honey bees' hive-building instinct, the bird's nesting instinct, and the instincts of the sterile insects as pillars in their arguments for natural theology.<sup>8</sup>

Although the discussion on instincts was restricted to the theological domain for a considerable time, an important and revolutionary change happened. A new philosophical and scientific program emerged in the Enlightenment of the eighteenth century which rejected religious dogmatism and sought explanations of physical phenomena in natural rather than supernatural causes. René Descartes, whose ideas were founders of this movement, proposed an influential view on animal behaviour which largely fostered the pre-nineteenth debates on instinct. He and his disciples argued that animals function and behave like organic automata governed by the laws of mechanics.<sup>9</sup>

<sup>7</sup> Paley, W. (1802). *Natural Theology; or, Evidences of the Existence and Attributes of the Deity, Collected from the Appearances of Nature*. London: Taylor and Wilks. pp. 324–345.

<sup>8</sup> Richards, R. J. (1981). Instinct and Intelligence in British Natural Theology: Some Contributions to Darwin's Theory of the Evolution of Behavior. *Journal of the History of Biology*, 14(2): 193–230. pp. 209–226.

<sup>9</sup> Rosenfield, L. C. (1941). From Beast-Machine to Man-Machine: Animal Soul in French Letters from Descartes to La Mettrie. New York: Oxford University Press; Wilm, 1925, op. cit. note 4. pp. 78–84.

<sup>4</sup> For a thorough historical reconstruction see Wilm, E. C. (1925). *The Theories of Instinct: A Study in the History of Psychology*. New Haven, CT: Yale University Press.

<sup>5</sup> Beach, F. A. (1955). The Descent of Instinct. *Psychological Review*, 62(6): 401–410; Wilm (1925). op. cit. note 4.

<sup>6</sup> See, for instance, Thomas Aquinas (1265–1274). *Summa Theologica*. Part I-II (Prima Secundae). Q.40, Art.3, Ad. 1.

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