

GEORGE HENSLOW : TRUE DARWINIST

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George Henslow a contemporary of Charles Darwin has become a forgotten figure in the history of science. He advocated a close and critical review of Darwin's work in the area of inheritance of acquired characteristics. In his investigations of Darwin's hypothesis of pangenesis he discovered an equal predilection for the process of natural selection as well as the passing on of acquired characters.

Henslow, a noted botanist, conducted a series of experiments to test and verify the neo-Lamarckian-Darwinian theory. He eventually published his findings in several important studies. Although his data and experiments confirmed that environmental influence was as powerful as the blind laws of chance; Henslow was not heralded by the neo-Darwinians as one of the fathers of modern evolutionary theory. After the death of Darwin, the Darwinists demanded that all evolutionists adhere to a strict orthodox code of accepting that biological change was caused only by random selection. However, in the United States the neo-Lamarckian-Darwinists received a wider range of approval from academic circles. Henslow and his works seems to have vanished from the halls of history of science because of his persistence of championing neo-Lamarckian-Darwinism in the latter half of the nineteenth-century.

Neo-Darwinian thinking has made George Henslow (1835-1925) another of the forgotten victorian scholars. A prolific writer of botanical textbooks and papers on the theory of inheritance of acquired characteristics in the plant kingdom, Henslow was a contemporary of Charles Darwin.

Like many Cambridge graduates he gravitated into university life, first as an Examiner at Tripos, Cambridge; and later as a Lecturer in Botany at Saint Bartholomew's Medical School and Queen's College.

In contrast to many other evolutionary theorists of the late nineteenth century, Henslow held the heretical belief that textual examination of Darwin's work demonstrated that environmental influences were an equally strong factor as random selection in the process of evolution. Evidence supporting his interpretation of Darwinian thinking is found in a letter written by

Darwin October 13, 1876, to Moritz Wagner which reads ; "In my opinion the greatest error which I have committed, has been not allowing sufficient weight to the direct action of the environment, i.e. food, climate, etc., independently of natural selection."¹

This letter and access to Darwin's publications led Henslow to the conclusion that Darwin was in many respects a neo-Lamarckian.

Henslow believed that examination of Darwin's texts would show an increasing belief in the influence of environment in bringing about changes in the species. Reflecting the evolutionary thought of that time, Darwin wrote in *The Origin of Species* (1859), "The laws governing inheritance are for the most part unknown."²

By 1876, Darwin moved closer to the neo-Lamarckian paradigm in describing variations in the plant kingdom. Darwin recorded in *The Effects of Cross and Self Fertilisation in the Vegetable Kingdom* :

That every organism is acted on to a certain extent by a change in its environment, will not, I presume, be disputed. It is hardly necessary to advance evidence on this head ; we can perceive the difference between individual plants of the same species which have grown in somewhat more shady or sunny, dry or damp places. Plants which have been propagated for some generations under different climates or at different seasons of the year transmit different constitutions to their seedlings.... In short, every alteration in the function of a part is probably connected with some corresponding, though often quite imperceptible change in structure or composition.

Whatever affects an organism in any way, likewise tends to act on its sexual elements. We see this in the inheritance of newly acquired modifications, such as those from the increased use or disuse of a part, and even from mutilations if followed by disease³.

In Volume I of *The Variation of Animals and Plants Under Domestication*, Darwin continues to explore the parameters of environmental influences, "The effects of injuries or mutilations are occasionally inherited ; and we shall see...that the long continued use and dis-use of parts produces an inherited effect"⁴.

Additional evidence of neo-Lamarckian predisposition is found in Volume II where Darwin quotes research which shows that temperature variations in the temperate zone produces marked inheritable differences in the body size, tint, beak, and tail length of birds.⁵

In 1871, Darwin developed the hypothesis of pangenesis to explain the inheritance of acquired characteristics.

This hypothesis differentiates between transmission and development by saying, "every unit or cell of the body throws off gemmules or undeveloped atoms, which are transmitted to the offspring of both sexes, and are multiplied by self-division. They may remain undeveloped during the early years of life or during successive generations; and their development into units or cells, like those from which they were derived, depends on their affinity for, and union with other units or cells previously developed in the due order of growth."⁶

Henslow is careful to distinguish between the origin of changes in a species and the action of natural selection on the process which determines which of the species is to survive.

This led Henslow to state, "I wish also to point out that Darwin's theory of natural selection rests entirely upon a series of a priori assumptions or deductions, which have never been verified; nor, indeed, do they seem capable of verification."⁷ Furthermore, Henslow argues that natural selection will permit the fittest among a species to survive, but does not account for the origins of new varieties.

Henslow, in interpreting Darwin, certifies that :

Darwin supposed that the new conditions stimulated the latent variability (or innate capacity for varying) and that as they grew up to the adult stage, they varied "indefinitely," some variations being indifferent, others useless or even injurious; while a few only, perchance, varied in such a way as to be slightly beneficial. These alone, he said, would survive, and all the others die before reaching maturity.⁸

Henslow keenly observes that, "when all the offspring vary alike under the definite action of the environment there are no variations for Natural Selection to select from."⁹

Nine years prior to the above statements, Henslow established his position towards the basic tenets of Darwinism. He wrote, "for Darwinism may be compared to an inverted pyramid, the apex being the mistake Darwin made in supposing variations in any seedling of a plant (or variety) in nature being 'indefinite.' They are always definite. Though hundreds may perish, the survivors all vary in the same direction, viz., towards adaptation to the environment."¹⁰ Henslow developed a correlation between Lamarckian and Darwinian thought by making use of his interpretation of Lamarck as a unifying vehicle, "every change of environment brings forward a new want which must be met by the individual if it is to retain its ground and propagate : and these new wants urge the being to new actions and new habits."¹¹

Among a series of successful neo-Lamarckian-Darwinian experiments, Henslow claims that both principles are simultaneously in function. He illustrates these convictions by a crucial test performed by M. Costantin who "has shown that if a leaf of *Sagittaria* which has begun to form a sagittate blade near the surface be suddenly plunged into deep water, the form is instantly changed ; the blade now develops an elongated point, attempting, in fact, to return to the deep-water ribbon-form. It ultimately assumes an elongated-hastate shape."¹² By 1895, Henslow considered himself a true Darwinist by writing, "Darwin asserts that Natural Selection has no relation whatever to the primary cause of any modification of structure."¹³

In his major work *The Heredity of Acquired Characters In Plants* (1908) Henslow clarified his disapproval of those who he decries to be misinterpreters. Henslow justifies "that present-day Darwinians contradict Darwin in several ways ; whereas not a line or a word in the whole of this book itself is opposed to Darwin's own description of what he briefly called 'the Definite Action' of the environment ; by which, as he asserts 'new sub-varieties arise without the aid of selection.' I have therefore, called this process 'The True Darwinism.'"¹⁴

CONCLUSION

Immediately following Darwin's death in 1882, his heirs, Alfred Russel Wallace and Thomas Henry Huxley, established their definition of Darwinism as almost a religion. This dogmatic approach caused the differences between the neo-Darwinists and neo-Lamarckians to be based more on emotion than on evidence. It is only after the middle of the current century that Ernest Boesiger can say :

It is well known that Darwin was convinced that use and disuse have played a considerable part in the modification of organisms and that these changes are transmitted to the offspring. The opposition between evolutionary concepts of Darwin and Lamarck was less profound than that between neo-Lamarckians and neo-Darwinists. Both Darwin and Lamarck thought that use and disuse are quite important in evolution ; both believed in hereditary transmission of acquired characters ; both postulated a very similar theory of heredity ; both were convinced that all organisms are a product of evolution, including man that evolution continues and that the principle of actualism permits its explanation. Both rejected finalism and vitalism.¹⁵

Wallace, one of the "crown princes" of evolutionary thought re-defined true Darwinism after Darwin's demise. Wallace gave prime importance to the action of natural selection in the origin of new species with the

exception of man's mental development. This led George John Romanes, pupil follower of Darwin to philosophically annotate :

He (Darwin) stoutly resisted the doctrine that natural selection was to be regarded as the only cause of organic evolution. On the other hand, this opinion was—and still continues to be—persistently maintained by Mr. Wallace ; and it constitutes the source of all the differences between his views and those of Darwin. Moreover up to the time of Darwin's death, Mr. Wallace was absolutely alone in maintaining this opinion : the whole body of scientific thought throughout the world being against him ; for it was deemed improbable that, in the enormously complex and endlessly varied processes of organic evolution, only a single principle should be everywhere and exclusively concerned.¹⁶

Wallace further excised the remains of Lamarckism in Darwinian theory with his book *Darwinism* (1889).¹⁷

During Darwin's life he was closely associated with and supported by his colleague Thomas Henry Huxley. Huxley acted as critic, defender and interpreter of Darwin's theory, both during his life, and after his death. Huxley, a physician, philosopher, biologist and educator preserved the neo-Darwinist interpretation of natural selection.¹⁸

Meanwhile, across the Atlantic Ocean in the United States far from the home of the British neo-Darwinists time and distance permitted neo-Lamarckism to develop. This growth and development is illustrated in a study of the genesis of American neo-Lamarckism. Edward J. Pfeifer's detailed analysis reveals that "neo-Lamarckian evolutionists . . . flourished in the United States toward the end of the last century. . . . The neo-Lamarckians . . . were of major importance in American science. Their researches enlarged biology, paleontology, and geology, and they did make a respectable contribution to evolutionary theory."¹⁹ Cynthia Eagle Russett, of Yale University, agrees with the graphic enlightenment that Pfeifer delineates. In addition, she depicts the milieu in the United States to be "more accurate to say that American scientists accepted their own interpretation of Darwinism, which was not in fact pure Darwinism. They did not, that is to say, attribute evolutionary changes in organic structures solely to the influence of natural selection."²⁰

It is quite possible that if Henslow had not been overshadowed by a Huxley-Wallace coalition in England ; and had instead lived in the United States, the greater intellectual freedom would have provided him with widespread academic recognition in his own lifetime and a place in modern scientific history.

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