



FROM EPIGENESIS TO EPIGENETICS

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WAS ARISTOTLE THE 'FATHER' OF THE EPIGENESIS DOCTRINE?

BY INA GOY

Was Aristotle the 'father' and founder of the epigenesis doctrine? Historically, I will argue, this question must be answered with 'no'. Aristotle did not initiate and had no access to a debate that described itself in terms of 'epigenesis' and 'preformation', and thus cannot be considered the 'father' or founder of the epigenesis-preformation controversy in a literal sense. But many ancient accounts of reproduction and embryological development contain analogies to what early modern scientist called 'epigenesis' and 'preformation', and, in this analogous sense, Aristotle can be considered a precursor of the epigenesis-preformation controversy. But is Aristotle's position actually epigenetic (in this analogous sense), as most of the traditional interpreters hold, or preformationist, as some of the recent scholars believe? I will argue against the one-sidedness of both readings that Aristotle's account of reproduction and heredity contains mainly epigenetic, but also a few preformationist characteristics. Whereas, for instance, Aristotle's idea of a successive development of the embryo's parts is doubtlessly epigenetic, Aristotle's idea that the development of the embryo is an actualization and enlargement of potential parts, which are simultaneously present in the semen, can be considered a preformationist feature.

Goy I. (2018). Was Aristotle the 'father' of the epigenesis doctrine?. *History and philosophy of the life sciences*, 40(2), 28. <https://doi.org/10.1007/s40656-018-0193-2>

SIGNIFICANT CONTRIBUTIONS TO THE FIELD BY

Harvey Cavendish Kant Erasmus Darwin

Johann Friedrich Blumenbach Wilhelm His Benjamin

Goldberg Caspar Friedrich Wolff Clarke Denis

Diderot Jason Scott Robert Francis Glisson Anthony Collins Angela

Ferraro Karola Stotz Paul Griffiths Needham Charles Bonnet Gould

Roe Maienschein Antonine Nicoglou Weismann Hertwig Bowler Boris

Demarest Amanda Goldstein Jean-Baptiste Lamarck Møller-Sievers

Marcello Malpighi Whitman Thomas Hunt Morgan

Jean-Claude Dupont Wheeler Edmund Beecher Wilson

Conrad Hall Waddington etc.

QUESTIONS POSED

What comes first? Is everything organized from the beginning? Or organization and form arise over time?

Does form pre-exist? Or not? How does form emerge from non-form?

Is there any free will? Is everything predestined? Is epigenesis or preformation internally directed or depends on the environment? Does this apply only to organic beings or also to inorganic ones?

How does development happen? What are the essential causes and what initiates the developmental process?

What happens to me when I develop?

What is the final cause of whatever existing beings? How do we go from potentiality to actuality?

What is the driving force? What happens when two interact? Can I take the whole from the part?

Can the organism respond to changes and self-regulate? And how?

When does life begin? What is it that makes an organism more than just matter in motion?

How can we explain the very general, but not universal difference in structure between the embryo and the adult? or of parts in the same individual embryo, which ultimately become very unlike and serve for diverse purposes, being at this early period of growth alike? Or of embryos of different species within the same class, generally, but not universally, resembling each other? Or of the structure of the embryo not being closely related to its conditions of existence, except when the embryo becomes at any period of life active and has to provide for itself? Or of the embryo apparently having sometimes a higher organization than the mature animal, into which it is developed?

How can all diverse body parts become so diversely differentiated?

How, actually, did genes give rise to differentiated form?

LAMARCKIAN EVOLUTION

The complexifying force

Organisms tend to become more complex, moving "up" a ladder of progress (The force that perpetually tends to make order). Organisms move from simple to complex in a steady, predictable way based on the fundamental physical principles of alchemy. Simple organisms never disappear because they are constantly being created by spontaneous generation.

The adaptive force

Lamarck argued that this adaptive force was powered by the interaction of organisms with their environment, by the use and disuse of certain characteristics. It could also drive organisms into evolutionary blind alleys, where the organism became so finely adapted that no further change could occur.

First law: use and disuse

The more frequent and continuous use of any organ gradually strengthens, develops and enlarges that organ, and gives it a power proportional to the length of time it has been so used; while the permanent disuse of any organ imperceptibly becomes weak and deteriorates it, and progressively diminishes its functional capacity, until it finally disappears

Second law: inheritance of acquired characteristics

All the acquisitions or losses wrought by nature on individuals are preserved by reproduction to the new individuals which arise, provided that the acquired modifications are common to both sexes, or at least to the individuals which produce the young. (Soft inheritance, the inheritance of acquired characteristics, or simply "Lamarckism"

