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Good Theory Gone Bad – Preformationism

by Tiffany Wang

(Honors Chemistry 1551)

Preformationism, or preformism, was a popular theory that tried to explain how organism developed from the the moment it could be perceived as an individual organism from its parent (“Epigenesis and Preformationism”). The theory stated that “the generation of offspring occurs as a result of an unfolding and growth of preformed parts” (Lawrence). In other words, these preformed parts were already present in the organism as a kind of blueprint or model for the organism, and the organism develops its parts based on those preformed parts.

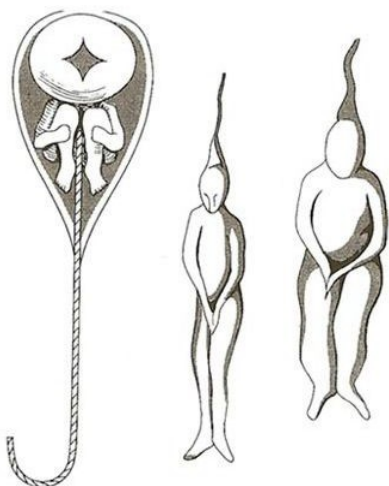


Fig 1. Left-most image originally drawn in 1695 by Nicholas Hartsoeker, a preformationist. This is a popular image used to reflect the ideas of preformationism (Philpot Education).

This theory had “philosophical roots” in Descartes’ works (Lawrence), that nature is a machine. He said that nature had mechanistic-like properties and actions, with a small difference of humans being a machine but with a soul, unlike other organisms (Descartes).

Descartes’ philosophy introduced the idea that nature had a pre-determined process of growth and behavior, which preformationism is based on. As Figure 1 demonstrates, a preformed human in a sperm develops into the human, reflecting the image and parts of the being in the sperm that had served as a model or blueprint.

The two differing models of preformationism are the ovism model and the spermism model. The difference between the two models is described in an article, stating that “ovists... argued that a miniature human was housed within each female egg,” and “spermists... argued that each sperm contained little people, or homunculi” (Ludwin).

The ovism model was first thought up before the spermism model. Eggs were known to be present in the process of many animals’ initial developmental process. This idea was then thought to be applied to all animals, and it was concluded that “animals that gave birth to live young might also have an egg stage in their early development” (Lawrence). Organisms were then concluded to have originated from the egg, which was used to support the ovism model. In addition, the ovism model was supported by the idea that, because “the spherical nature of an egg [was] a universal symbol of generation (like the Earth, the Sun, and the chicken egg)” (Ludwin).

The spermism model was formed when microscopes were further advanced. Sperms were observed by Nicholas Hartsoeker under a microscope, and “Oppenheimer and Lefevre’s 1984 edition of Introduction to Embryonic Development states that ‘In 1664 Niklaas Hartsoeker drew a figure of a miniature human (homunculus) inside a sperm, presumably representing what he saw under the

microscope” (Pinto-Correia). Hartsoeker concluded that there was a small being, a homunculus, in sperms, because under a microscope, he “observe[d] sperm cells moving in semen. These animalcules, as they were called then, seemed a perfect delivery system for little offspring, and... their existence in itself indicated that the homunculus was contained in the sperm” (Lawrence). In other words, the movement of the sperm convinced Hartsoeker that there was a miniature person operating the sperm from the inside of it.

At the time, the preformationist models competed and conflicted with the epigenesis approach. While preformationism states that the form of the organism has already been determined, and that development is leading to the form that has already been predetermined, the epigenesis approach is “the view that the organism is not fully formed at the beginning of embryonic development; rather, its form arises gradually, changing shape and acquiring its adult parts over time.” Epigenesis’ difference from preformationism is that organisms’ forms are not predetermined. These two approaches were popular at their time, and reflected similarities with the psychology nurture vs nature debate.

The preformationist model was ultimately disproven by cell theory, the division of cells involved in development and growth. In the book “Whose View of Life?”, Jane Maienschein described von Baer’s observation of cell division and conclusion about preformationism (specifically about the homunculus), stating that “How... could a tiny, preformed being exist in the unfertilized egg, be divided up by such furrowing, and retain its form?” (35). Furthermore, August Weismann concluded that, “within the context of cell theory and given that the entire body begins in one fertilized cell, all the diverse body parts can become so diversely differentiated” (“Epigenesis and Preformationism”).

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