

Spermism ^[1]

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[Spermism](#) ^[5] was one of two models of preformationism, a theory of embryo generation prevalent in the late seventeenth through the end of the eighteenth century. Spermist preformationism was the belief that offspring develop from a tiny fully-formed embryo contained within the head of a [sperm](#) ^[6] cell. This model developed slightly later than the opposing ovist model because [sperm](#) ^[6] cells were not seen under the [microscope](#) ^[7] until about 1677. [Spermism](#) ^[5] was never as dominant as ovist preformationism, but it had ardent followers whose work and writings greatly influenced the development of [embryology](#) ^[8] in this time period.

[Spermism](#) ^[5] was and is now sometimes referred to as animalculism, a name taken from the term most naturalists at the time used to refer to microscopic organisms, or vermiculism, which comes from a specific term for [sperm](#) ^[6] cells referring to their worm-like appearance. The most notable spermist philosophers and scientists were [Nicolaas Hartsoeker](#) ^[9], Anton Leeuwenhoek, and [Wilhelm Gottfried Leibniz](#) ^[10].

The discovery of [sperm](#) ^[6] in animal [semen](#) ^[11] was the result of improvements in the [microscope](#) ^[7] in the middle part of the seventeenth century. Many of these improvements were the work of Anton Leeuwenhoek, a Dutch lens grinder and optics manufacturer. The Royal Society of London officially credited Leeuwenhoek and his student [Johan Ham](#) ^[12] with the discovery of [sperm](#) ^[6] cells (then called seminal [animalcules](#) ^[13]) in 1677. [Nicolaas Hartsoeker](#) ^[9], a young Dutch microscopist, disputed this claim, saying he had first seen them under the [microscope](#) ^[7] in 1674 but was not certain enough about what he had seen to make his results known at the time; Hartsoeker had assumed at first that the tiny wriggling cells were a type of parasite. Already familiar with the theory of preformationism, Hartsoeker, Leeuwenhoek, and others began to investigate the [sperm](#) ^[6] cells for signs that they could be the carrier of the preformed offspring instead of the [ovum](#) ^[14].

The scientists conducting this research based most of their positive conclusions on the appearance of [sperm](#) ^[6] under the [microscope](#) ^[7]. Hartsoeker is famous for a sketch of a homunculus in the head of a human [sperm](#) ^[6], which he published in 1694 in his *Essai de Dioptriques*, though Hartsoeker does not claim to have actually seen this preformed human under the [microscope](#) ^[7]. Other researchers, such as Dalenpatius (pseudonym of [Francois de Plantade](#) ^[15]) in 1679, and [Nicolas Andry](#) ^[16] in 1700, did state that they had seen not only small [humans](#) ^[17] in the [sperm](#) ^[6] cells, but had seen that the [sperm](#) ^[6] cells of each species they studied resembled the adults of the species. [Albrecht von Haller](#) ^[18], a well-respected contemporary microscopist and an adherent to the opposing ovist model, wrote that he had looked for this evidence in [semen](#) ^[11], but had not found it.

Besides the lack of clear evidence, one of the main problems with the spermist model was the implied wastefulness of human lives or human souls. If each human [sperm](#) ^[6] cell contained a potential person, critics pointed out, then millions of people were dying with each successful [conception](#) ^[19]. This was enough to make many preformationists reject spermism in favor of ovism, because ovism did not seem to carry with it that same degree of wastefulness. Leeuwenhoek and Hartsoeker tried to explain this resulting waste by pointing to the wastefulness of seeds in plants and of eggs in frogs. When this failed to satisfy the opponents of spermism, Hartsoeker formulated the idea that is now called [panspermism](#) ^[20]: [sperm](#) ^[6] that did not find purchase in a female's [womb](#) ^[21] evaporated into the air and became particles that floated until they could be recycled into active [sperm](#) ^[6]. This idea was also propounded by [Wilhelm Gottfried Leibniz](#) ^[10], the philosopher-mathematician and co-inventor of calculus, who tied it into his metaphysical theory of monadism. While this idea addressed the problem of wastefulness, it introduced even more difficulties for the spermists, who now had to deal with explaining the process by which these floating [sperm](#) ^[6] cells with their preformed embryos could find their way back to the male animals of their species. Accordingly, [panspermism](#) ^[20] did not gain much purchase. [James Cooke](#) ^[22] reintroduced the idea in 1762, and his writings were satirized by Sir [John Hill](#) ^[23] in a paper called *Lucine sine Concubita*, detailing a machine invented to capture floating [sperm](#) ^[6] cells.

The idea of [panspermism](#) ^[20] thus failed to resolve the problem of wastefulness. Spermists in the 18th century turned to very different explanations. Jacques Fabien Gautier d'Agoty claimed that rather than each [sperm](#) ^[6] containing a single fully formed embryo, there is only one embryo contained in each discharge of [semen](#) ^[11], whose parts are present in the [semen](#) ^[11] but spread out. A talented anatomical illustrator, Gautier produced a plate of a miniature [horse](#) ^[24] he had seen in [horse](#) ^[24] [semen](#) ^[11], and in 1750 published an illustration of the preformed human embryo that he said could be seen in [semen](#) ^[11] discharged into water in a glass. In 1765, [Jean Astruc](#) ^[25] wrote in defense of spermism, saying that it was the only way to explain heredity. Astruc also described the homunculus present in [sperm](#) ^[6] as having no soul until the [sperm](#) ^[6] cell unites with the [egg](#) ^[26]. This solved neatly the problem of wastefulness, but invoked the competing theory of [epigenesis](#) ^[27] by making both the [sperm](#) ^[6] and the [egg](#) ^[26] required for [fertilization](#) ^[28].

The brief popularity of spermism marks an important episode in science history. Spermism^[5] never attracted as many adherents as ovist preformationism because of its problems with the implied wastefulness of God or Nature, and because no clear evidence could be found that a preformed embryo did exist within sperm^[6] cells. However, the spermists' work investigating the nature and function of sperm^[6] cells was instrumental in the progression of embryology^[8].