Journal club

GOODBYE HOMUNCULUS

If there is one thing that I remember with mixed feelings from my biology classes, it is Nicolaas Hartsoeker's drawing of the homunculus from 1694, which shows a tiny man curled up inside a sperm, or animalcules as they were called then. Finally, a clear male contribution to human life had been discovered in the form of sperm, first observed under the microscope by Antonie van Leeuwenhoek and his students, among them Hartsoeker. Quickly, the idea came up that sperm could carry a miniature human being, which led to Hartsoeker's iconic sketch of the homunculus. Some researchers of the time even claimed to have seen preformed humans inside the sperm, and that the sperm of different species resembled the future animals they would give rise to.

We all know today that the idea of the homunculus was wrong. But it was not until the end of the nineteenth

Homunculus bidding farewell. Image adapted from Nicolaas Hartsoeker's original sketch from 1694. Courtesy of Melina Schuh, Medical Research Council (MRC) Laboratory of Molecular Biology, Cambridge, UK.

century that it was finally shown that both the sperm and the egg are equal participants in the generation of new life. The first convincing evidence was gathered between 1875 and 1879, when Edouard van Beneden, Oscar Hertwig and Hermann Fol described the process of fertilization of rabbit, sea urchin and starfish eggs. Their observations showed that the sperm and the egg nuclei unite during fertilization, revealing the cytological basis for why both the father and the mother pass on traits to their progeny. A few years later, Johannes Sobotta generated remarkably detailed and accurate drawings of the steps involved in the generation of a new mouse embryo, starting with the meiotic divisions of the oocyte and ending with the first mitotic divisions of the embryo. His drawings are so precise that they could be printed in any textbook today. These early publications represent milestones in our understanding of heredity, and paved the way for many key discoveries in the field of fertilization and embryology.

But is the homunculus still relevant? Obviously, nobody believes anymore that sperm carry miniature human beings. However, the homunculus is a reminder that science has been — and sadly still is — a mostly male domain and that a continued effort is required to increase the number of women in scientific leadership positions to safeguard the homunculus's final goodbye.

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