Life's Greatest Miracle (2001), by Julia Cort and NOVA [1]

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The Public Broadcasting Station (PBS) documentary Life’s Greatest Miracle (abbreviated Miracle, available at http://www.pbs.org/wgbh/nova/miracle/program.html [4]), is arguably one of the most vivid illustrations of the making of new human life. Presented as part of the PBS television series NOVA, Miracle is a little less than an hour long and was first aired 20 November 2001. The program was written and produced by Julia Cort and features images by renowned Swedish photographer Lennart Nilsson [5]. It comes as a sequel to the award-winning 1983 NOVA production, The Miracle of Life, which exhibits Nilsson’s photography as well. The program showcases a combination of graphic animation, endoscopic and microscopic footage, as well as the story of a couple who are expecting a child. It features a number of new technological and scientific developments not present in its prequel, providing additional relevant information. By depicting human development in a clear and fresh manner, Miracle helps shed light on this indispensable aspect of life. Following is a description of the documentary, highlighting the key points of the film and explaining images featured in it.

Miracle is divided into eight sections. Section one, titled “Passing on Your DNA,” opens with a discussion of the prodigious natural drive to reproduce. This universal drive is recognized as a unifying theme for life on earth, and DNA is identified as the four-billion-year-old mastermind behind the entire operation. Sexual reproduction, unlike asexual reproduction (cloning [6]), practiced by most bacteria, results in gene shuffling and produces crucial variation. The discussion of the biological benefits of sexual reproduction is accompanied by the depiction of various organisms going about their reproductive processes. Recognizing the complexity of such processes, the film poses the question of what happens, and how? How, from such humble beginnings, do such complex and functional living systems arise? A closer look at the human testis begins to answer this question; detailed photographs reveal the tiny, coiled tubes that make up the male organ. These tubes produce about a thousand new, genetically unique sperm [7] every second through meiosis [8], which is digitally animated in Miracle and explained in the context of its significance to sexual reproduction.

After discussing the process of gamete production and the importance of sexual reproduction, Miracle takes a closer look at mating and the female reproductive system in section two, “The Egg’s Journey.” This section opens with Melinda Tate Iruegas and Sergio Iruegas, a couple expecting their first child. Intermittently throughout the film, the couple discuss their experiences, hopes, and feelings during the various stages of Melinda’s pregnancy [9]. Miracle then explains the significant differences between male and female reproductive systems. While Sergio, like all other healthy males, has been producing sperm [7] continuously since puberty, Melinda’s eggs all formed when she was a fetus [10]. A woman Melinda’s age (early thirties) has a few thousand left of her original millions of eggs, but normally only one is capable of fertilization [11] each month. Vivid video illustrates how a single egg [12] is selected, pampered by support cells in the ovary [13], and ushered into the fallopian tube where it awaits fertilization [11] by sperm [7]. Before any male may mate with a female and fertilize her egg [12], however, he must earn mating rights. Here, Miracle depicts the struggle between males as they vie for the chance to mate with a female, essentially competing for a chance to pass on their genetic material. The film explains that when a male succeeds in wooing a female and proceeds to mate with her, a series of chemical changes take place, culminating in the ejaculation of sperm [7], which allows for fertilization [11] of the egg [12]. The course of the sperm’s voyage is covered in the following segment.

Section three, “The Sperm’s Journey,” describes just that. Though the sperm [7] encounter a number of obstacles on their adventure, their ultimate success is largely dependent on the woman’s body. Once ejaculated into the vagina [14], the sperm [7] strive to escape the acidic environment; about 40% of the sperm [7] of a healthy male will be able to propel themselves toward the cervix [15] using their flexible, whip-like tails. Around the time of ovulation [16] each month, the protective mucus cap of the cervix [15] liquefies, creating channels that allow any present and able sperm [7] to enter. In addition, the uterine muscles contract in a wave-like fashion to help the sperm [7] progress into the fallopian tube. If the female has ovulated and an egg [12] is present, the sperm [7] that have traveled thus far will attempt to fertilize it. As the film points out, however, the sperm [7] that fertilizes the egg [12] is usually not the first sperm [7] there, but rather one of those that were caught in the fallopian cilia, modified, and gradually released. Once these sperm [7] reach the egg [12], they must get past the helper cells and penetrate the thick protein coating of the egg [12], called the zona pellucida [17]. Through animation, Miracle explains that entry into the egg [12] requires chemical forces as well as mechanical ones; that is, the proteins on the surface of the sperm’s cap must match up with the proteins of the zona pellucida [17]. Once this match occurs, the cap disintegrates and the membranes of the two gametes fuse, introducing the sperm’s...
Life’s Greatest Miracle is available on the PBS website, along with a number of other related resources. These include “Windows
on the Womb," a discussion of the various modern screening techniques used by medical professionals to assess the progress of the baby while in the uterus; a discussion of the stem cell debate; an explanation of how cells divide and how sex is determined; and a journal by a woman describing the various aspects of her pregnancy. The companion website to the film also provides other resources for curious minds.

*Miracle*’s prestige comes not only from its content, but also from its being a NOVA production. It has earned countless awards, among them numerous Peabody and Emmy awards. Julia Cort, the writer and producer of the documentary, won the 2001 Science in Society Journalism Award for her work on it. Since it follows the entire process of human procreation, *Life’s Greatest Miracle* is a useful resource, providing the public with accurate information about what goes on in the world of the embryo and fetus.

**Sources**


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