Carl Gottfried Hartman (1879–1968)

Carl Gottfried Hartman researched the reproductive physiology of opossums and rhesus monkeys. He was the first to extensively study the embryology and physiology of reproduction in opossums when little was known about this mammal. Hartman worked in Texas where opossums, the only marsupial that lives in North America, were abundant. The female opossum delivers her fetal opossums in her pouch, where one can easily observe their development. After studying opossums for thirteen years, Hartman investigated the reproductive physiology of rhesus monkeys, also known as macaques. This research led to the discovery of when ovulation occurs, as well as its relation to the human menstrual cycle. Later research on scientific methods of birth control relied heavily on Hartman's discoveries about primate and human reproduction.

Hartman was born on 3 June 1879 in Reinbeck, Iowa, and he had six siblings. His father practiced medicine as a rural country doctor and he was a parson. Carl Hartman studied for his bachelor's degree at the University of Iowa and at Wartburg College. Shortly thereafter, however, Hartman moved with his family to Austin, Texas where he attended the University of Texas at Austin. He received his Bachelors of Science in 1902 and his Masters of Science in 1904.

Upon completing his masters, Hartman served as the superintendent of Travis County School in Texas for four years. In 1909 he moved to Huntsville, Texas to teach biology at Sam Houston State Teacher College. He returned to the University of Texas in Austin in 1912, where he taught zoology as he worked toward his PhD in embryology, which he completed in 1915, the first person to earn a PhD from the university. Hartman married Eva Matilda Rettenmeyer in 1919, and together they had several children. He taught at UT Austin until 1925.

Hartman began researching opossums while he worked and studied at UT Austin. In all, he studied greater than a thousand female opossums and collected several thousands of their eggs. Due to a lack of funding, Hartman collected opossums in the wild, housed them in his makeshift laboratory, and observed them at all hours of the day. As the animals were abundant in Texas, he even sold them to other researchers interested in studying them. Those sales helped Hartman raise money to support his research and lay the groundwork for his later research on primate physiology and reproduction. Hartman would later consolidate his thirteen years of research in a book titled Opossums in 1952. In it, Hartman described a wide range of reproductive physiology findings about opossums.

Hartman eventually became interested in studying primate reproductive physiology. In 1925, as he was planning a trip to the Philippines to collect monkey embryos for a new research study, George Streeter from the Carnegie Institution of Washington (CIW) asked Hartman to move to Baltimore, Maryland and to develop a primate colony in Streeter's laboratory. Hartman accepted.

While at CIW, Hartman collaborated with Streeter and researcher Chester Heuser studying the embryology, physiology, and reproduction of rhesus monkeys. By 1927, Hartman had accurately recorded the duration of pregnancy of Rhesus monkeys, something never before accomplished.

Hartman became the expert on keeping rhesus monkeys, which to that point had not been used extensively in scientific research. As keeping the monkeys was uncommon, his colony changed the way that laboratory animals were kept. In 1933, he published the plans he devised for housing the monkeys in CIW's publication, Anatomy of the Rhesus Macaque. In particular, the Rockefeller Institute used Hartman's suggestions to alter its laboratory animal practices.

More influential, however, was Hartman's continued research on primate reproduction; he made a number of important discoveries regarding human and monkey reproductive cycles. He discovered

that human sperm and ova die rapidly after they are released, and he determined the speed of sperm movement within the female genital tract. He worked with George Corner on the development of the corpus luteum, a part of the ovary that forms during the menstrual cycle. He discovered that monkeys and humans bleed when a fertilized embryo implants in the uterine wall, a phenomenon that now named Hartman's sign.

Hartman determined when in the primate menstrual cycle ovulation occurs, laying the scientific foundation for gauging fertility in the rhythm method. Contrary to one contemporary hypothesis, Hartman confirmed that ovulation does not coincide with menstruation, a fact that would later influence scientific research on birth control. His research led him to publish an article entitled "Catholic Advice on the Safe Period" in 1933, in which he reviewed two Roman Catholic clergy writings in support of the safe period—the theoretical time during which a woman, without using contraceptives, is able to engage in sexual intercourse without the risk of becoming pregnant. The rhythm method consists of abstaining from sexual intercourse for the first fourteen days of the menstrual cycle, with the first day of the menstrual cycle being the first day of bleeding, or menses, and during the last three to four days before the onset of the next menses.

In the early 1900s, there were several theories about how best to determine when ovulation would occur. Some argued that ovulation could be estimated by counting backwards twelve to seventeen days from the expected onset of the next menses. Others estimated that ovulation occurs approximately fourteen days into the cycle. It was generally agreed that, for any of these methods to be effective, couples needed to practice complete abstinence during the fertile period, when women are most likely to conceive.

Hartman argued in "Catholic Advice" that the safe period had not been proven conclusively and the exact measure of ovulation time for any woman could not yet be predicted. He believed it impractical to attempt to determine when ovulation will occur by counting backwards, supporting this claim with his own research with rhesus monkeys, as the reproductive system in rhesus monkeys is similar to that found in humans. As post-ovulatory phase of the menstrual cycle is much more variable than the pre-ovulatory phase,counting forward from the first day of the cycle was much safer than attempting to count backwards from the assumed start of the next cycle.

Hartman published a number of other important works while at the Carnegie Institute. In 1932, he compiled his primate research in a cutting edge monograph on the menstrual cycle and pregnancy in rhesus monkeys. In 1936, Hartman published The Time of Ovulation in Women: A Study on the Fertile Period in the Menstrual Cycle, which was about human reproduction. In 1941, his colleagues George Streeter and Chester Heuser published their study Development Horizons, the first complete survey of primate embryos, using Hartman's data.

Hartman retired from CIW in 1941 and became head of the Department of Zoology and Physiology at the University of Illinois, in Chicago, Illinois. He received the Squibb Award for his research in endocrinology in 1946. After leaving the University of Illinois in 1947, he joined the Ortho Research Foundation in Raritan, New Jersey, where he studied hormones and fertility; he retired as the Director Emeritus in 1957.

After retiring, Hartman continued to research in the field of reproductive physiology by consulting for the Margaret Sanger Research Bureau in New York City, New York. His career capstone, based on fifty years of research, was entitled Science and the Safe Period: A Compendium of Human Reproduction. The compendium was summary of timed ovulation in women, and was published in 1962. It focused on the anatomy and physiology of human reproduction, with a strong emphasis on ovulation and the fertile period. It also highlighted Hartman's dedication to the study of contraception.

Hartman died on 2 March 1968 in Plainfield, New Jersey at the age of eighty-eight. The Carl G. Hartman Award is awarded annually for research and scholarship in reproductive biology. It is the highest award given by the Society of the Study of Reproduction.

Sources

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