

## Ernst Gräfenberg (1881-1957)

Ernst Gräfenberg was a physician and researcher who studied sexology, the study of human sexuality, in both Germany and the United States during the first half of the twentieth century. Gräfenberg researched the use of intrauterine devices as a form of contraception, and he developed the Gräfenberg ring. The Gräfenberg ring was one of the first intrauterine devices that effectively prevented pregnancy without causing infection, and it became the forerunner of all modern intrauterine devices, or IUDs. Gräfenberg also studied the role of the urethra in female orgasm. He was one of the first researchers to discuss female pleasure in a scientific manner, and, more specifically, he was one of the first to write about the erogenous zone on the anterior vaginal wall, colloquially called the G-spot. Through the technology he developed and the ideas he proposed, Gräfenberg advanced knowledge of female anatomy, pleasure, and reproduction, enabling researchers and professionals to better understand and cater to females' reproductive and sexual needs.

Gräfenberg was born on 26 September 1881 in Adelebsen, Germany, to Minna Gräfenberg and Salomon Gräfenberg. Both of his parents were Jewish, and they raised all eight of their children in the Jewish faith. Gräfenberg's father owned a hardware store in the small town of Adelebsen, and he was the town's mayor from 1889 to 1893. In 1893, the Gräfenberg family moved to Göttingen, Germany, where Gräfenberg attended high school and later began his medical studies. According to Beverly Whipple, a researcher who studies sexology and its history, very little is known about Gräfenberg's personal life. However, he was briefly married to an author named Rosie Waldeck, and they did not have any children.

In 1900, Gräfenberg began studying medicine in Munich, Germany, and Göttingen. In January 1905, Gräfenberg passed his medical exams, and on 10 March 1905, he earned his doctorate from a university in Göttingen, graduating *summa cum laude*, the highest academic honor awarded at most universities. The journal *Anatomische Hefte* (Anatomy Journal) published his doctoral thesis, "Die Entwicklung der Knochen, Muskeln und Nerven der Hand und der für die Bewegungen der Hand bestimmten Muskeln des Unterarms" (The Development of the Bones, Muscles and Nerves of the Hand and the Muscles of the Forearm Responsible for Hand Movements), later the same year. After earning his doctoral degree, Gräfenberg briefly practiced ophthalmology, the branch of medicine concerned with treating diseases of the eye, at the University of Würzburg in Würzburg, Germany.

Still in 1905, Gräfenberg moved to the University of Kiel in Kiel, Germany, to study gynecology, the branch of medicine concerned with the health of the female reproductive system. There, he studied under Richard Werth, who researched various aspects of female anatomy including the development and morphology of uterine muscles, and Hermann Johannes Pfannenstiel, who established the Pfannenstiel incision, a surgical technique that, as of 2022, doctors commonly use for Caesarian sections in the US. Gräfenberg wrote and published at least twelve papers while studying at the University of Kiel, including studies about the development and spread of cancer through the blood and the physiology of egg implantation. Gräfenberg completed his gynecological training at the University of Kiel in 1910.

In 1910, Gräfenberg moved to Berlin, Germany, to work as a gynecologist and study the physiology of reproduction. However, he put his gynecological work on pause during World War I. During the war, Gräfenberg served as a sanitation officer for the German army in Russia, but due to his medical skills, he often assisted with the delivery process of local pregnant Russian individuals. Gräfenberg also studied the thoracic and abdominal gunshot wounds of soldiers he encountered, and over the duration of the war, he published seven papers describing what he observed.

For his efforts during World War I, Gräfenberg received both the first-class and second-class Iron Cross, which are military decorations the government of Germany awarded to civilians and soldiers as symbols of recognition during wartime in the nineteenth and twentieth centuries. While the state of Germany awarded millions of individuals with the second-class Iron Cross during World War I, far fewer received the first-class Iron Cross to commemorate their efforts, and those who did receive it were primarily military officers.

After World War I ended in 1918, Gräfenberg returned to Berlin to continue working as a gynecologist and further his research on various aspects of female anatomy and physiology. During that period, he studied topics such as the relationship between the acidity of vaginal secretions, more commonly known as vaginal discharge, and the ovulation cycle. By 1920, Gräfenberg had established his own gynecological practice on the Kurfürstendamm, a busy and prominent street in Berlin.

In the early 1920s, Gräfenberg developed what he called the Gräfenberg ring, an intrauterine device that was a safer and more effective alternative to existing forms of contraception such as condoms, douches, and stem pessaries, an intra-cervical contraceptive that doctors prescribed in the late 1800s and early 1900s. A variety of factors motivated him to develop the device. According to Russel J. Thomsen, an author who wrote about IUDs and Gräfenberg's role in developing them, Gräfenberg cared about using medicine to study and benefit females during that period of his life, which inspired him to focus his thoughts and efforts on topics like birth control. Additionally, according to Thomsen, Gräfenberg discussed that effective contraceptives were key to treating females' sexual problems because the technology would alleviate many of their mental and physical inhibitions around sex. Thus, Thomsen suggested that Gräfenberg's development of the Gräfenberg ring was a direct response to the plight of females at the time.

In order to develop the Gräfenberg ring, Gräfenberg formed loops of silk threads and inserted them into patients' uteruses at his private practice in Berlin. The rings prevented pregnancy by acting as foreign objects in patients' bodies. Their presence in the uterus triggered an immune response. In that response, immune cells would attack all foreign cells in the area, including sperm and eggs, which then prevented the processes of fertilization and implantation from occurring and, thus, prevented pregnancy.

In December 1928, Gräfenberg presented the Gräfenberg ring in Berlin as a part of a birth control course that Margaret Sanger hosted. According to Embryo Project Encyclopedia authors Claudia Nunez-Eddy and Lakshmeeramya Malladi, Sanger was a proponent of birth control and eugenics, and she was a founder of Planned Parenthood, a nonprofit organization that, as of 2022, provides reproductive healthcare and sexual education globally. After his lecture in Berlin, Gräfenberg continued giving similar lectures in other European cities, including London, England, and Frankfurt, Germany.

Though the Gräfenberg ring was a safer and effective alternative to existing contraceptives, many German gynecologists criticized Gräfenberg for using it. According to Whipple, they did so because they assumed the device had similar side effects as the intra-cervical devices that doctors had been prescribing at the time. Intra-cervical contraceptives in the 1920s rested in the cervix between the uterine cavity and the vagina. Because of the location of those devices, any external contaminants that entered the vagina could travel across the device and into the uterus, which caused many users to develop infections. The infections then often led to inflammation, injury, and occasionally death. The Gräfenberg ring differed from those technologies because it was an intrauterine device, not an intra-cervical device, which means Gräfenberg designed the ring to fit entirely within patients' uteruses rather than in the cervix. Therefore, the device did not come into contact with external contaminants, so it did not cause infections like other contraceptives of the time.

Despite criticism, Gräfenberg continued prescribing his own patients with the Gräfenberg ring in the late 1920s and early 1930s, and he further improved the technology by forming the devices out of coiled silver wire wrapped with silk, rather than out of silk alone. The silver wire that he used to create the rings contained impurities of tin, cadmium, and copper. Approximately twenty-six percent of the silver wire was made up of copper, and later research indicated that the copper likely contributed to the ring's effectiveness. In addition to the inflammatory response that the silk ring

triggered, the copper ions in the silver rings decreased sperm cells' motility, therefore reducing the cells' ability to pass through patient's cervical mucus. Decreased sperm motility prevented sperm cells from reaching the location of the patient's eggs, which in turn prevented fertilization. Gräfenberg reported that the silver ring was very effective at preventing pregnancy, with only 1.6 percent of individuals becoming pregnant while using it.

As antisemitic sentiment began to spread through Germany in the 1930s, Gräfenberg gradually began to lose his ability to practice medicine there due to his Jewish identity. From 1930 to 1933, in addition to running his private practice, Gräfenberg was a chief physician at the Berlin-Britz Municipal Hospital in Berlin, Germany, where he managed the hospital's gynecological department. However, in 1933, he and two other chief physicians were fired because of their Jewish faith.

Gräfenberg managed to continue running his private practice on the Kurfürstendamm until 1937 when German officials arrested him for alleged foreign currency offenses, including the smuggling and selling of German postage stamps abroad. On 9 November 1938, the district court of Berlin charged him with large fines and sentenced him to three years at the Brandenburg-Görden prison in Brandenburg, Germany. After hearing of Gräfenberg's arrest, Sanger, with whom Gräfenberg had maintained a relationship since the late 1920s, helped pay a ransom and negotiate his early release. Gräfenberg was imprisoned for almost two years and then released on 15 August 1940. Upon his release, he traveled to the US as a Jewish refugee.

When he reached the US in 1940, Gräfenberg took the steps necessary to establish himself as a physician there. He briefly lived in Los Angeles, California, before moving to Chicago, Illinois, where he began working as a pathologist and preparing to take the Medical Board Examinations. After passing the Medical Board Examinations in 1941 at sixty years old, Gräfenberg relocated to New York City, New York. There, he opened his own gynecological practice and began working with the Mount Sinai Medical Center in Mount Sinai Hospital in New York City, which, as of 2022, is one of the largest hospitals in the US.

In 1950, Gräfenberg published an article titled "The Role of the Urethra in Female Orgasm" in the *International Journal of Sexology*, in which he describes an area of the female anatomy that later researchers named the G-spot. In the paper, Gräfenberg states that various researchers had previously estimated that between 10 and 80 percent of females were sexually frigid, or unable to reach sexual climax. He explains that those researchers each used different criteria when determining which females counted as frigid, so their estimated percentages were incomparable. For example, some researchers only considered vaginal orgasms when estimating the percentage of females who were frigid, and that resulted in a much higher estimate than that of researchers who only considered females frigid if they could not experience any type of sexual satisfaction. In the article, Gräfenberg argues that sexologists did not know enough about the mechanisms of final climax to help solve existing problems related to female satisfaction.

In "The Role of the Urethra in Female Orgasm," Gräfenberg goes on to explain that the female body has many erogenous zones, or areas that contribute to sexual climax, that researchers had not considered previously. Specifically, he claims that every female has a distinct erogenous zone in the anterior vaginal wall along the course of the urethra that they or their partner can easily stimulate, and he argues that the zone contributes to orgasm. He also describes the concept of female ejaculation, and he explains that stimulation of the zone in the anterior vaginal wall may cause the fluid emissions that often escape females' urethras during intercourse. Gräfenberg concludes by stating that he hopes the paper will show that the anterior wall of the vagina along the urethra is a distinct erogenous zone that doctors should consider when treating female sexual deficiency.

In writing "The Role of Urethra in Female Orgasm," Gräfenberg was one of the first individuals to discuss female sexuality in an anatomical manner. However, according to Roy J. Levin, a professor who studied female sexual arousal in the England for years before retiring, researchers and doctors largely ignored Gräfenberg's findings for decades after he published the article.

In 1953, doctors diagnosed Gräfenberg with Parkinson's disease, which is a degenerative disease of the brain that causes shakiness and difficulty with walking, talking, and coordination. According to Whipple, the diagnosis forced Gräfenberg to give up his medical practice. He spent the remainder of his life working closely with the Margaret Sanger Research Bureau in New York City, the largest

contraceptive clinic in the US at the time. He also associated with Alfred Kinsey, an author and professor who spent much of his life studying sexology, and Kinsey's Institute for Sex Research established at Indiana University in Bloomington, Indiana. As of 2022, researchers at the Kinsey Institute still focus much of their work on topics in the field of sexology.

Gräfenberg published a total of forty-five papers during his life. Those publications explored a variety of topics related to female anatomy and physiology, including egg implantation, vaginal secretions, contraceptives, and female pleasure. Gräfenberg also worked to develop many technologies related to women's health. Those technologies included one of the first ovulation tests, as well as various forms of contraceptives such as the cervical cap, a plastic dome that patients could self-insert into the vagina to physically block sperm from entering the uterus, and the Gräfenberg ring. Though controversial when Gräfenberg began prescribing it in the 1920s, the Gräfenberg ring was one of the first IUDs routinely prescribed to patients. Even though, as of 2022, doctors do not still prescribe the Gräfenberg ring, it did lead to the development of future IUDs. In 2020, approximately 10 percent of females in the US between the ages of fifteen and forty-nine used IUDs. The availability of safe and effective birth control methods like IUDs and the resulting transition of parenthood becoming a female's choice played a large role in the women's rights movement and the move towards gender equality in various countries worldwide.

According to Google Scholar, as of 2022, over 350 publications had cited Gräfenberg's 1950 paper, "The Role of the Urethra in Female Orgasm." However, researchers had published fewer than a dozen of those articles prior to 1980, showing that at the time of its publication, Gräfenberg's paper received little attention. Then, in 1981, a group of six researchers who studied various issues related to female sexuality, primarily at Dalhousie University in Halifax, Canada, published the article, "Female Ejaculation: A Case Study." Through the exploration of a case study, the authors explained that the area along the urethra that Gräfenberg discussed in his 1950 article is indeed a distinct erogenous zone, and they named the area the Gräfenberg spot, more commonly called the G-spot, after Gräfenberg.

The following year, two coauthors of that article, John B. Perry and Beverly Whipple, as well as Alice Kahn Ladas, a researcher who studied various aspects of women's health, wrote a book titled *The G Spot and Other Recent Discoveries About Human Sexuality* that popularized the term G-spot. Both publications sparked a debate about whether the G-spot is in fact a distinct anatomical structure, and researchers and doctors continue to engage in the debate as of 2022. Though researchers have found that the zone is highly sensitive, they have not proven that it is a discrete anatomical structure. Regardless of the debate, Gräfenberg was one of the first researchers to discuss female pleasure in an anatomical manner, and his paper is one of the foundational pieces of literature on the topic of female pleasure and in the field of sexology.

Gräfenberg died on 28 October 1957 in New York City.

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