

# Hermann von Schrötter (1870-1928): Inventor of the Sealed Cabin

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The Austrian flight surgeon Hermann von Schrötter was born on August 5, 1870, in Vienna, Austria. The son of the well-known laryngologist Leopold von Schrötter (1837-1908), he studied medicine and natural sciences at the universities of Vienna and Strasbourg, where he graduated with a Ph.D. He went on as a surgical assistant of Carl Gussenbauer at the Medical University Hospital of Vienna and thereafter as an assistant at the Third Internal Medicine Clinic of his father. His clinical expertise was highlighted by a publication about bronchoscopy with Adolf Loewy in 1905. This was a pioneering method with diagnostic and therapeutic purposes, revolutionizing clinical otolaryngology and pulmonology. Hermann von Schrötter published more than 120 scientific papers in the fields of science, laryngology, physiology, hygiene, and internal and aviation medicine.

Hermann von Schrötter started with research on caisson disease as early as 1895. His first balloon rides lasted over 3 hours and led him up to 3500 m (11,500 ft) in 1896 and 1897. At this time he had already communicated with the Berlin-based meteorologist Richard Assmann about the medical effects of altitude ascents. His colleague Arthur Berson looked retrospectively at altitude ascents up to 9150 m (30,000 ft) in 1894. Von Schrötter requested Berson to perform animal experiments on upcoming rides in 1897. He attended an altitude ascent 4 years later with Berson and Süring up to 7500 m (24,600 ft), with further investigation in the altitude chamber located at the Jewish Hospital in Berlin. Altitude physiological issues were examined by him and a renowned publication on mountain sickness followed in 1899.

In 1902 von Schrötter participated in the Third International Scientific Conference on Aviation in Berlin, where he introduced a freeze-resistant mask for high altitudes for balloonists. On this occasion he undertook several scientific balloon ascents together with Berson, Süring, and Zuntz. In 1903 von Schrötter saw the need for the use of a sealed cabin for further balloon ascents to the stratosphere, as Berson and Süring became unconscious at an altitude of 10,500 m (34,500 ft) despite using oxygen.

Hermann von Schrötter introduced the writing test under hypoxic conditions into scientific evaluation: in 1905 he mentioned that handwriting at a pressure of 240 mmHg was shaky, blurry, of barely legible print, and that some words were written twice and wrong. As an outcome, he set the limit for altitude ascents with pure oxygen breathing at about 12,000 m (39,400 ft), a level accepted in scientific literature for the next several decades.

In October 1908 von Schrötter represented Austria at the International Tuberculosis Congress in Washington, DC. His colleague Nathan Zuntz from Berlin provided a lecture at this Congress on the physiological effects of high altitude climate. Both of them took part 2 years later in the Tenerife altitude expedition in 1910, joined by Arnold Durig and Joseph Barcroft. In 1909 von

Schrötter published the "Hygiene of Aeronautics" (*Hygiene der Aëronautik*), the year of the first International Aeronautical Exhibition (I.L.A.) in Frankfurt, Germany.

During the Balkan Wars (1912-1913), von Schrötter served as a Senior Medical Officer and in 1916 he headed a Reserve Medical Hospital in Jerusalem. After the war he served at the Malaria Hospital in Wieselburg, then at a Reserve Hospital in Vienna. In 1919 he was released from military service.

Hermann von Schrötter reported on aeromedical experiences in World War I in his book *On the Sanitary Requirements for the Flying Service* (*Ueber sanitäre Erfordernisse für den Fliegerdienst*), published in 1919. He served as a medical assistant to the Chief of the Austrian Air Force in aeromedical tasks. The protection of the flyer and his habitat, the aerodrome, were his main goals. He called for the use of fully tested material and aircraft to keep the morale of the pilots and their observers maintained. He suggested the limitation of aircraft types used to improve standardization of flight operations. He criticized the Austrian pilots for not wearing flying helmets (as they felt they were not fashionable enough), despite the fact the Italian and German pilots did. For safety reasons von Schrötter also requested the introduction of German "Heinecke" rescue parachutes. For cold protection he asked for the use of facial masks, gloves, and leather clothing, as well as "valuable innovations" in the form of electrically heated clothing. Oxygen protection masks were also effective in terms of pilot protection in the case of chemical weapons exposure or cockpit fires. Another important task was to organize first aid for deployed air forces in hostile environments. Detailed plans for air bases were taken into account in the air forces in the next several decades as the use of a grid system was used to locate the crash site for ambulances.

Hermann von Schrötter habilitated, i.e., qualified as a professor, in 1925 for internal medicine at the University of Vienna. Due to severe lung disease he retired the same year and married the concert singer Marguerite Alice Coroze. The pioneer of aviation medicine died of tuberculosis on January 7, 1928. The German Society for Hyperbaric and Diving Medicine annually bestows its scientific "Hellerr-Mager-von Schrötter Award."

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