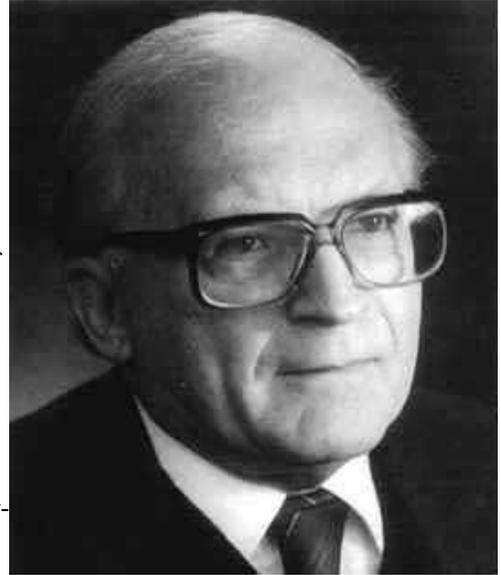


Hans Zassenhaus

The renowned algebraist **Hans Zassenhaus** (May 28, 1912 – November 21, 1991) was among the most prolific mathematicians of the twentieth century. He was the author of some 200 articles and books in the fields of group theory, Lie algebras, number theory, geometry of numbers, applied mathematics and the history of mathematics. Zassenhaus pioneered the use of computers as a research tool in mathematics, particularly in algebraic number theory, and wrote insightful papers on the teaching of mathematics, stressing that mathematics should be taught from the historical point of view. He contributed to the future of mathematics by directing the dissertations of forty-one PhD students. As his own interests were so varied, Hans always could think of problems that he generously shared with his students, whom he considered his colleagues.



Zassenhaus was born in Koblenz-Moselweiss, Germany. His family moved to Hamburg a few years after his birth. In 1930, he entered the University of Hamburg intent on studying atomic physics, but inspired by his teachers Emil Artin and Erich Hecke he chose mathematics instead. In his doctoral dissertation of 1934, supervised by Artin, Zassenhaus considered permutation groups whose elements are determined by three points. Today these are known as Zassenhaus groups. They form a part of the basis for the contemporary development of finite group theory. Even before completing his dissertation, he established himself as an outstanding mathematician by finding a new and beautiful proof of the Jordan-Hölder theorem. His celebrated “butterfly lemma” used in the proof ever since has been known as the Zassenhaus Lemma.

From 1934 to 1936 Zassenhaus taught at the University of Rostock while he prepared his book on group theory, which he began when only eighteen. Based on Artin’s lectures, *Lehrbruch der Gruppentheorie* (1937) became an instant classic. Zassenhaus was appointed Artin’s assistant at Hamburg in 1936, where he remained the next four years. However, Artin, whose wife was Jewish, was soon gone, a victim of the Nazis 1937 “New Official’s Law,” that provided the means of removing Jewish teachers and those related to Jews from the universities. Zassenhaus was under intense pressure to join the

Nazi party as a condition of retaining his appointment. Instead of joining the Nazis, whom he despised, he resigned his position and joined the German navy, working as a meteorologist throughout WWII. In 1943, he was offered the chair of mathematics at Bonn, but asked that the appointment be postponed until the end of the war. After the war, he did not accept the Bonn post, preferring that it go to someone who had lost a position under the Nazis. For a powerful first hand account of the struggles of the Zassenhaus family during the Nazi period, one should read the autobiographical account by Hans' younger sister Hiltgunt Zassenhaus, *Walls: Resisting the Third Reich – One Woman's Story* (1974). At seventeen, she defied the Nazis by refusing to give the "Heil Hitler" salute in her school and during the war used her position as a prison translator to help political prisoners by smuggling in medicine, food, warm clothing, vitamins and other needed items. She also took letters from the prisoners to their families, and thus succeeding in raising their morale and saving their lives. Hiltgunt later became a member of the German resistance movement. In 1974, she was nominated for the Nobel Peace Prize.

Zassenhaus returned to Hamburg and was appointed chairman of the department, and in 1949, he accepted a professorship at McGill University in Montreal. He stayed in Canada for ten years until he answered the call of Arnold Ross to join the faculty at the University of Notre Dame in South Bend, Indiana. At that time he was also appointed the Director of the Computer Center. In 1964, he followed Ross to The Ohio State University. Zassenhaus was appointed a research professor, a post he held until retirement. Besides contributing to Ross's summer programs for talented high school students, Zassenhaus organized the Ohio State-Denison Conference that has met biennially since 1970. The conference consists of three parallel sessions in combinatorics, group theory, and ring theory. Zassenhaus officially retired in 1982 but remained actively attached to Ohio State until his death in 1991.

There are many stories that Zassenhaus's friends, colleagues and students told about his brilliant naiveté. With the exception of the dreaded Nazis, Zassenhaus always assumed that people were decent, honest, and sincere, and sometimes this belief was mistaken, making him appear naive. After WWII, the mathematics department of the University of Notre Dame offered temporary refuge to various European mathematicians. Many of these spent a year or so at Notre Dame to improve their English so they could secure permanent positions at better salaries at other universities. For many years it was joked that the department was non-English speaking. Once a prominent visiting German mathematician gave a lecture at a colloquium held for the faculty and students. The talk proceeded well enough until at one point one of the Notre Dame faculty members, who not too long before had left Germany for the United States, jumped up and announced that the lecturer had made a

mistake. The visitor briefly examined what he had written on the blackboard and curtly announced that he had not made a mistake. His challenger insisted that there was indeed a mistake. The visitor insisted just as vehemently that there was no mistake. At the beginning of the disagreement the two antagonists spoke in heavy accented English, but as their debate became more heated, they lapsed into German. Zassenhaus, who had been enjoying the scene, immediately sprung to his feet, clicked his heels together, and for the benefit of the non-German members of the audience, translated the entire raging argument.

Zassenhaus was always a great favorite with students, not because he was a great teacher – he most certainly was not that, at least not in the classroom, but he was so generous with his ideas and seemed genuinely interested in his students, something of which not every professor could boast. In 1963 Zassenhaus conducted a seminar that was on the cutting edge of research. He lectured on theorems and theories that had not yet seen the inside of journals and most of his explanations were sketchy. It was generally agreed among the members of the class that the material was over their heads. If they hinted to Zassenhaus that this was the case, he would smile and urge them to see the big picture and not worry so much about the details, which was quite good advice.

One day Zassenhaus excitedly announced that the class was in for a rare treat. He had invited the prominent German mathematician Helmut Wielandt of the University of Tübingen, at the time a visiting professor at the University of Wisconsin, to lecture to the class. When the day arrived, Zassenhaus was almost giddy with excitement and delight. The delight was for his students; he had arranged for them to meet an outstanding mathematician and learn how he thought. He introduced Wielandt to the class, doing the students the honor of speaking each of our names. Wielandt asked Zassenhaus what the class knew so he could base his remarks on material with which they were familiar. Zassenhaus announced with great sincerity that he had already explored Wielandt's ideas that were soon to appear in a prestigious journal, so he could start from that point and describe the research he was currently doing. Wielandt did as suggested and even though the students' understanding was not at the level their teacher gave them credit for; it was a great privilege to be in the presence of two such prominent algebraists.

Quotation of the Day: “But in those moments of depression, my father's words flashed back into my memory, ‘He who knows the good and refrains from doing it, commits a sin. Then all doubts were lifted from me; and, as our work grew and

the challenges became harder, I was increasingly aware of a persistent turn of events that I at first took to be luck. It was as if we were guided and carried forward by invisible hands. Whenever we helped, help was given to us.” – Hiltgunt Zassenhaus Lohmann