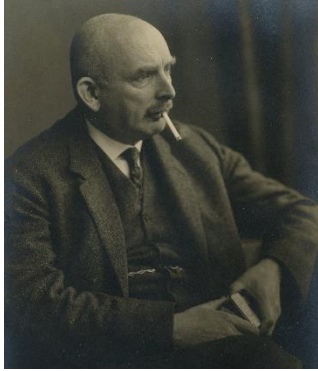


## Hans von Baeyer (1875 – 1941)

### On the 80<sup>th</sup> Anniversary of his Death



Heidelberg, circa 1935  
Photo by Robert Herbst

Hans was a pioneer of orthopedics in Germany, and the founder of a modern orthopedic clinic in Heidelberg. The clinic was exemplary, transforming the “home for crippled children” into a centre for rehabilitation. He was recognized for ingenious prosthetic devices for victims of war and the physically disabled. He was also noted for contributions to surgery involving tendons. He was highly respected by staff and patients alike.

His special talent was a practical understanding the mechanics of muscles and muscle groups that he used to help both surgeons and athletes. He enjoyed making models of joints by whittling, and building innovative representations for teaching the actions of muscles. He combined this with a passion for helping the physically disabled with every means at his disposal, including surgery, artificial limbs, and occupational training, as well as advocacy.

He was also an active university professor and authored some 80 scientific publications. Throughout, he took great pains with his use of language. For example, he proposed the term “misshapen” (Fehlform) to replace the word deformity, and it has been used since. He also enjoyed word-play, calling insufficiently trained orthopedists “pseudopedists.”

In 1933, at the age of 58, Hans’s career was suddenly interrupted. He lost his positions at the university and clinic in the Nazi frenzy to cleanse official positions of all Jews and those with Jewish ancestors or spouses – there were two connections to families of Jewish ancestry in his family tree. He opted to return to private medical practice in 1935, but never recovered from the injustice done to him. He died 6 years later.

#### Notable Innovations

- At the clinic in Heidelberg, he had a slide installed alongside the central spiral staircase to make it easier and enjoyable for handicapped children to descend, motivating them to further exercise.
- For pain in the sole of the foot (metatarsalgia), he developed an insole with special padding that remains the go-to treatment (commercialized by Dr. Scholl’s, and replacing the old foot-binding).
- While a military doctor in 1915 in the Witches’ Cauldron (Champagne, France) where tens of thousands died, he designed a special vehicle to provide plaster bandages close to the battlefield.

#### Contributions to the Study of Human Movement

- He argued for a focus on *synhapsis* (joining together) to underline that a *combination* of mechanical forces in our body is required to cause a single effect. The study of synhapsis fills the gap between the findings of anatomy (such as the arrangement and action of isolated muscles), and the observation of highly complex movements (such as running). Moreover, external forces must always

be taken into account (such as friction and gravity), along with the purpose or goal of movement, and the success in meeting it.

- He recognized a feature of body design, namely that movement is reciprocating: forward and stop, and backward and stop. This is made much more economical by introducing *resonance*: having a secondary elastic muscle attached to the limb, so that after we use the strength of the primary muscle to move the limb, and then we relax, the limb returns to its resting place without more effort. Traditional prosthetics did not resonate in a natural way – the wearer had to move the limb back to the resting position, which was a tiring process.
- He proposed that the connections of mind, body, and environment can be studied by observing the movement of a person's limbs. But this is complex: when I make up my mind to bend my arm, I leave it to my subconscious to work out the details of how to achieve the bending. Moreover, a single movement can be performed by different muscles, and most muscles perform different actions depending on external factors, such as whether the limb is touching a stationary object. In fact, the body is inseparably bound to the environment, and the mind confronts both together. We thus have the sequence of *mind – body – environment* or its reverse.

### **Career Timeline**

**1901** completed medical studies in Jena and Munich; thesis on poisoning with chromic acid; assistant at the Physiological Institute in Göttingen

**1902** published 3 papers on the physiology of nerves

**1903** worked in the Surgical Institute in Munich; headed the new orthopedic division

**1908** post-doctoral thesis (Habilitation) in Munich with experimental work on the incorporation of foreign matter in the body

**1914** served as military doctor in the Prussian Army; sent to Trier (Rhineland-Palatinate) to improve conditions in military hospitals; worked on the treatment of fresh gunshot fractures

**1914** published *Children's Gymnastics*; five editions until 1928

**1916** in charge of military hospital for orthopedics in Ettlingen (Baden); active in surgical repairs, the construction of artificial limbs and devices, and occupational training

**1917** moved to Würzburg (Bavaria), becoming associate professor and director of the local Institute for the Care of Cripples

**1919** first professor of orthopedics at the University of Heidelberg, and head of a new orthopedic clinic

**1919-1922** built the innovative and beautiful clinic in Heidelberg with Karl Caesar, professor of architecture

**1924** major lecture on the *Theory of Movement and Orthopedics* at Graz Orthopedic Congress; set out the functional connection of muscles in a "linked chain"

**1925** published *Orthopedic Treatment of Nerve Diseases*

**1929** opened the Wielandheim next to the clinic, a home for the physically disabled emphasizing rehabilitation

**1929** published with Helene Kunst: *Guide to Care of Cripples with Legal Provisions*

**1930** published *The Living Arm* (forthcoming in English in 2021 from Kiener Verlag), showing muscle-mechanical relationships in the arm with simple illustrations, for both doctors and participants in sports

**1930** President of the German Association for Orthopedics

**1933** government expert on racial research determined that a paternal grandmother and a maternal grandfather were Jewish

**1933** major lecture on *Synhopsis [joining together] in General Limb Mechanics* at the London Congress of the International Orthopedic Society, published in 1940

**1934** forced early retirement from university and clinic

**1935** began private practice in orthopedics in Düsseldorf

**1935** published *Fundamentals of Orthopedic Mechanics* providing principles for the construction of orthopedic devices

**1941** died shortly before reaching the age of 66

### Family Life



In 1918, at the end of the First World War, Hans and his wife Hildegard, now with three sons and a daughter as well as a nanny, moved to a lovely big house facing the Neckar River in Heidelberg.

We know that Hans loved to own the latest automobile and would use any excuse to go out for a spin. He liked boating and photography. But he was emotionally rather reserved. In 1923, his son Erich aged 14 sketched him, showing this trait in a few strokes.

Contact with his children was infrequent but warm and caring. Hildegard had more time for the children, but she was also busy presiding over the running of the household and numerous social engagements. Day-to-day warmth was provided by the nanny. As they grew up, the children developed close friendships outside the family. Such a pattern was not unusual for that social milieu at that time.

### Youth

Hans had a famous father, the chemist Adolf von Baeyer. The family lived in a large home next to his father's lab in Munich for all of his youth. Yet he did very poorly in school and was sent away to a succession of boarding schools. He was also thin and weak as a youth and was sent to a sanatorium far from home. He suffered bouts of deep homesickness. But the gangly youth loved mechanical tinkering and cycling and sailing. He also indulged in all sorts of pranks and practical jokes. He suffered numerous physical injuries along the way, yet he endured and persevered. In his early twenties, he finally became a solid, hardworking student, went to medical school and became a physician.

### The Magician

Hans loved practical jokes throughout his life. At a dinner party for a famous German author known for his spiritualist streak, the guest of honour reached for the salt. As his hand approached, the salt cellar moved just a tiny bit farther away. Startled, the guest tried again, and again the cellar gently slid away from him. The famous author became irritated and exposed the invisible thread that led from the cellar to the host. The guest was not amused and never returned to the house.

## **An Unforeseen Impact on Modern Medicine**

To get a good background for the study of medicine, Hans spent a year working in his father's chemical lab. He and a colleague discovered a previously unknown precipitate, which his father called "dirt" and discouraged them from investigating, but they persevered and published an article on it in 1897. This was the first of the bisphosphonates. Hans could not know at this time that he would become an orthopedist, or that the medical uses of the bisphosphonates would become, after his death, extremely important in orthopedics for the treatment of bone deterioration.

## **The Tree of Andry**



This is an international symbol of orthopedics since the 1700s.

The Tree of Andry is a bent sapling attached to a stake in order to help it grow straight. Like so much of Hans' work, this symbol emphasizes rehabilitation rather than just support for abnormality. It is found, for example, on the cover of the booklet commemorating the 1972 golden jubilee of the Heidelberg orthopedic clinic he founded.

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