His interest in research in the field of surgery let him continue his experimental investigations on the growth and inner structure of bone. In 1868 he qualified as a professor at the Charité and started as a private lecturer. Contemporary witnesses characterized Julius Wolff as an enthusiastic and inspiring teacher. Orthopaedic surgeons and other people travelled from far away to hear his lectures.

After decades of research Julius Wolff published his main work with the title "The Law of Transformation of Bone" in 1892. On 150 pages it contains the experimentally well supported and excellently described key message that:

"As a consequence of primary shape variations and continuous loading, or even due to loading alone, bone changes its inner architecture according to mathematical rules and, as a secondary effect and governed by the same mathematical rules, also changes its shape."

Simplified this "Wolff's Law" says that structure and shape of bone permanently adapt to the loading conditions. Wolff regarded this transformation law, which had also been influenced by Rudolf Virchow (1821-1902), as a "brick to complete the building of Charles Darwin" (1809–1882). Wolff's still classic work established orthopaedics as an independent discipline. He initiated the German Orthopaedic Society but shortly before its foundation in 1902 Julius Wolff died after a stroke.
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