

Friedrich Berthold Reinke (1862–1919): brilliant yet troubled anatomist of the vocal fold

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Abstract

Reinke's space is a critical laryngeal structure, and the eponym remains in current use in both clinical and research settings. However, little is known about the life of the German anatomist Friedrich Berthold Reinke. His name is missing from the otolaryngological histories, despite his work on the structure he described being responsible for a fundamental advance in our understanding of the larynx. Although brilliant, Reinke was described as impetuous and coarse by his colleagues, resulting in his academic career being cut short. Reinke's relative anonymity is thought to derive from the fact that he never defined himself as a laryngologist. Without question, Reinke's observations of the human vocal fold are substantive contributions, without which modern laryngology could not have evolved. This article aimed to summarise this brilliant yet troubled man's life and achievements, allowing appreciation for his singular genius and fundamental contribution to laryngology.

Key words: Friedrich Berthold Reinke; Vocal Fold; Larynx; Laryngology; Reinke Edema

Introduction

Reinke's space, otherwise known as the superficial lamina propria of the vocal fold, is a well-known physiologically distinct feature of modern laryngology, which is now recognised as an important component of malignancy propagation. It is also implicated in many other phonation disorders, including vocal fold oedema or Reinke's oedema. However, the eponymist Dr Friedrich Berthold Reinke (Figure 1), whose discovery is considered one of the most important functional features of the human larynx, is missing from otorhinolaryngological history.

The reasons for this laryngological anonymity are reflected in Reinke's wide-ranging interests, which were principally anatomical rather than clinical. Furthermore, Reinke's career was cut short because of his confrontational personality and disagreement with colleagues.

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Background

Friedrich Berthold Reinke was born on 11 April 1862 in Ziethen, Germany. Being the 9th of 10 children, he was regularly tormented by his older brother, Johannes, and was described as a disruptive child

(Figure 2) (as reported in the personal file of Friedrich Reinke (1900), located at the University of Rostock Archives, Germany).

Educated from home by his father until the age of 14 years, Reinke transferred to Goethe-Schule in Rostock, where he graduated in 1883 (Figure 3) (as reported in the personal file of Friedrich Reinke (1900)).

Reinke subsequently began his medical career, in 1883, at the University of Goettingen and Kiel. He graduated in 1891 following the completion of his doctoral thesis entitled 'Investigations into the relationship of the core forms of mitosis and amitosis described by Arnold' (Figure 4).¹

Following his graduation, Reinke completed an internship under Professor Edwin Klebs at the Pathology Institute of the University of Zurich. Klebs was famous in his own right for identifying *Corynebacterium diphtheria* (the cause of diphtheria), the genus of which, *Klebsiella*, bears his name.

On completion of this internship, Reinke served as a ship's doctor, returning to Germany in 1893 to complete a second internship in Dahman, Mecklenburg. Professor Albert von Brunn subsequently offered him a position of First Demonstrator at the Anatomical Institute of the University of Rostock.² It was there that he completed his Habilitation (a post-doctoral qualification that entitles the holder to supervise doctoral candidates), which was entitled 'Cellular studies (Zellstudien), an investigation



FIG. 1

Friedrich Berthold Reinke as a medical student, aged 24 years.

of the cell structure in the germ layer of the human skin? (Figure 5).³

Controversial professional life

Reinke was considered a brilliant anatomist and was quickly promoted to Extraordinary Professor of Medicine just four months after his appointment at



FIG. 2

Reinke brothers, Johannes (left), and Friedrich aged 9 years (right).

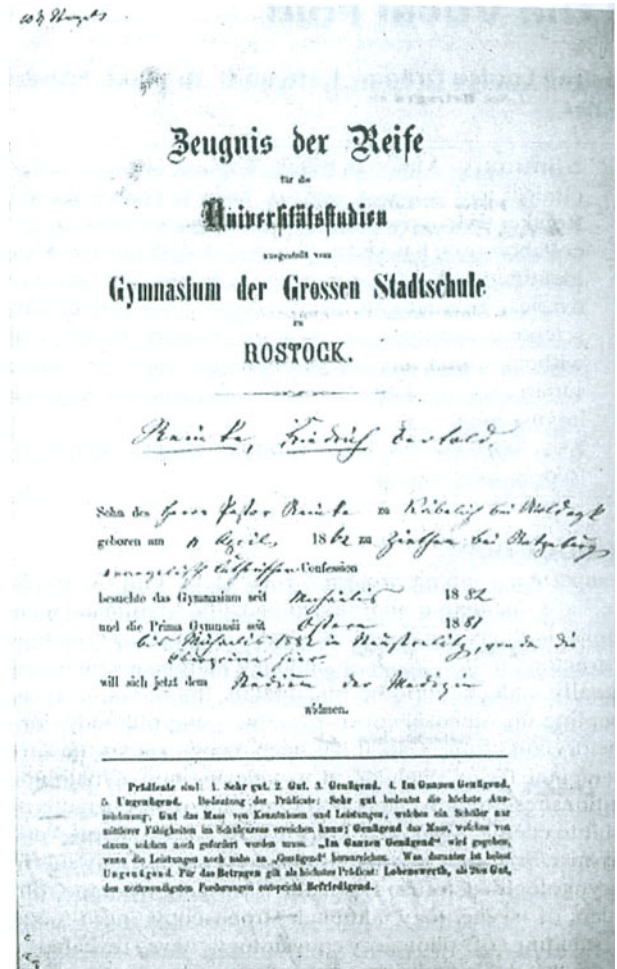


FIG. 3

High school graduation certificate.

the Anatomical Institute of the University of Rostock (as reported in the personal file of Friedrich Reinke: ‘A short memo’ (1900), located at the University of Rostock Archives). This title was an administrative error, as Reinke had affiliations with the Anatomy Department and not the School of Medicine. This error was to have significant consequences for Reinke in the coming years.

In 1895, Professor von Brunn passed away, and Reinke was appointed as Interim Director of the Anatomical Institute. During this year, the first of Reinke’s two landmark papers regarding laryngeal anatomy was published. The first paper was entitled ‘Investigation into the human vocal fold’, in which he describes the superior and inferior arcuate lines as the boundaries of the vocal fold epithelium, the tissue layer that is now known as Reinke’s space.⁴

The second article concerning the larynx was published in 1897 during an extremely controversial period in Reinke’s professional life. The work, entitled ‘On the functional structure of the human vocal fold with special consideration of the elastic tissue’ (Figure 6),⁵ came during a time when Reinke was not confirmed as Director of Anatomy and was displaced by Professor Dietrich Barfurth.

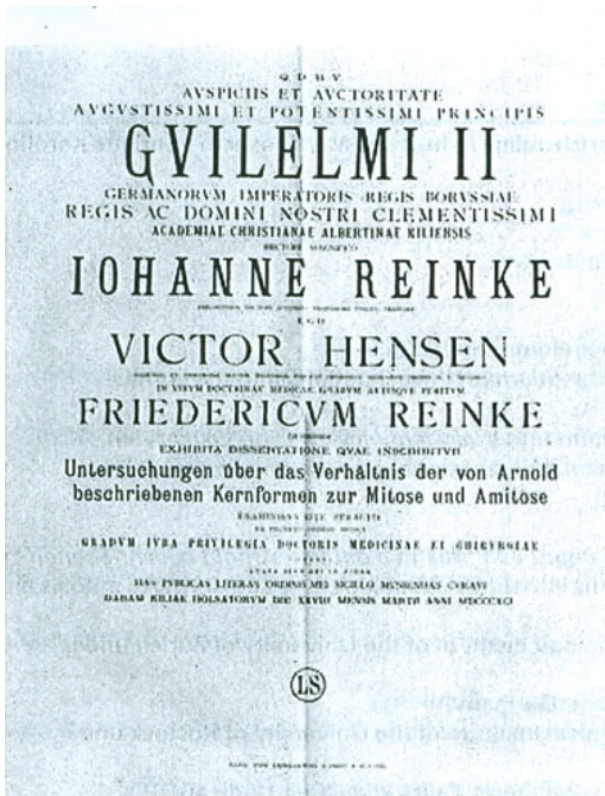


FIG. 4

Reinke's medical school graduation certificate.

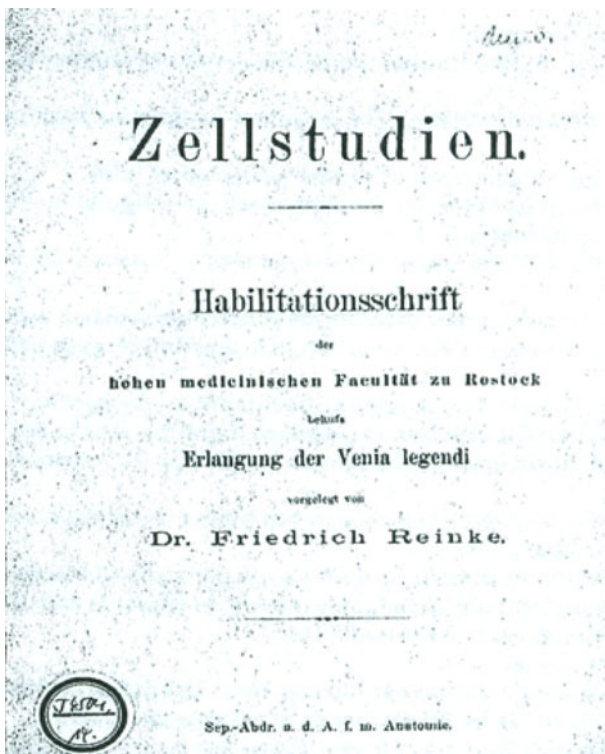


FIG. 5

Reinke's Habilitation (post-doctoral qualification).³

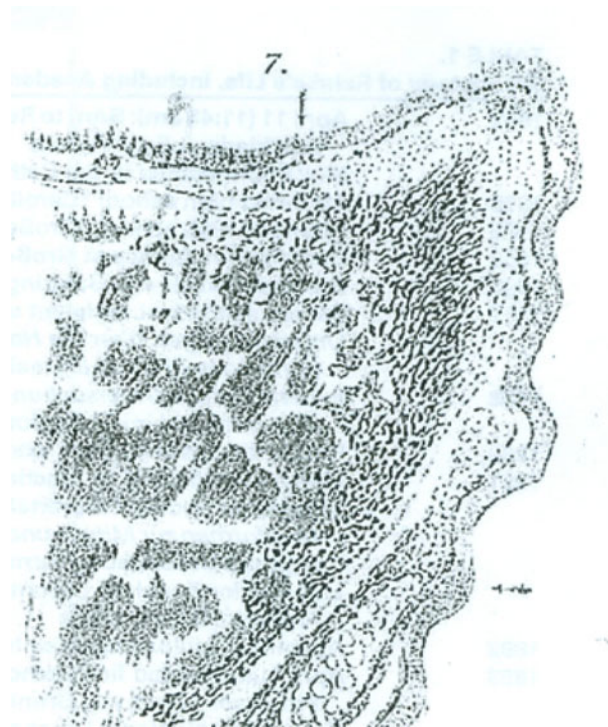


FIG. 6

Picture of the vocal fold from Reinke's work published in 1897, with the arrows depicting the superior and inferior arcuate lines.

Reinke met Barfurth's appointment as Full Professor and Director of the Anatomical Institute with great hostility. He had trouble accepting Barfurth's authority, seeing him as a colleague and not his superior. The following is an excerpt from a letter confirming Reinke's feelings towards his successor:

'I prohibit you to propagate the rumour, outside the institute, that you are my superior! Superior is a military term! You are the Director and I am a Demonstrator at the Anatomical Institute, thus we are colleagues Professor Barfurth' (as reported in the personal file of Friedrich Reinke: 'Dismissal notice from Prof Barfurth to Reinke' (1904; page 67), located at the University of Rostock Archives).

The dispute between Reinke and Barfurth became a constant problem; Reinke was described as impetuous, reckless and coarse by his colleagues. One further famous incident involved Reinke relinquishing his salary after refusing to prepare human fetuses for dissection, leading to further dispute with Barfurth (as reported in the personal file of Friedrich Reinke: 'Dismissal notice from Prof Barfurth to Reinke' (1904; page 67).

While Reinke suffered because of such confrontations and due to his difficult personality, his academic and intellectual prowess should be recognised as the essential qualities in describing his legacy. The volume and variety of publications were wide ranging, encompassing multiple systems and revealing a specialist interest in cell division, embryology and cellular

TABLE I
TIMELINE OF REINKE'S NUMEROUS PUBLICATIONS

Year	Publication title
1887	Investigations into the corneal formations of the mammalian skin
1888	Experimental investigations on the proliferation and advancement into the leukocytes
1891	Investigations into the relationship of the core forms of mitosis and amitosis described by Arnold (doctoral dissertation)
1893	Cellular studies (Zellstudien), an investigation of the cell structure in the germ layer of the human skin (Habilitation)
1896	Contributions to the histology of humans. Part 1: On building of crystalloids in the interstitial cells of the human testicle
1897	Contributions to the histology of humans. Part 2: On the functional structure of the human vocal folds with special consideration of the elastic tissue
1898	Concerning the direct nuclear division and nuclear decrease of human liver cells
1899	Short textbook of human anatomy for students and physicians
1900	Regarding mitotic pressure – Investigations into the cells of the blood capillaries of salamander larvae
1900	On the proof of the trajectorial nature of plasma radiations. A contribution to the mechanics of mitosis
1901	Fundamentals of general anatomy. The study of medicine on the basis of biological criteria
1906	Relations of the pressure of the lymph with the phenomena of regeneration and growth
1907	The quantitative and qualitative effect of ether lymph on the growth of the brain of salamander larvae
1907	Promotion and inhibition of mitotic cell division in normal and pathological tissue development
1908	Atypical development of the brain of the salamander larvae produced by ether
1912	The pathology of cancer
1913	Experimental research on mammals regarding the production of artificial blastomas

interaction (Table I).⁴ This is highlighted by Reinke's other eponym attached to crystals found in hilar cells of the human ovary and Leydig cells of the human testes. Interestingly, Reinke is not responsible for describing the pathological condition Reinke's oedema, which was

reported in the twentieth century and refers to oedema of Reinke's space.

While Reinke's title was Demonstrator of Anatomy, he appeared to ignore his teaching obligations in favour of research, regularly cancelling lectures without

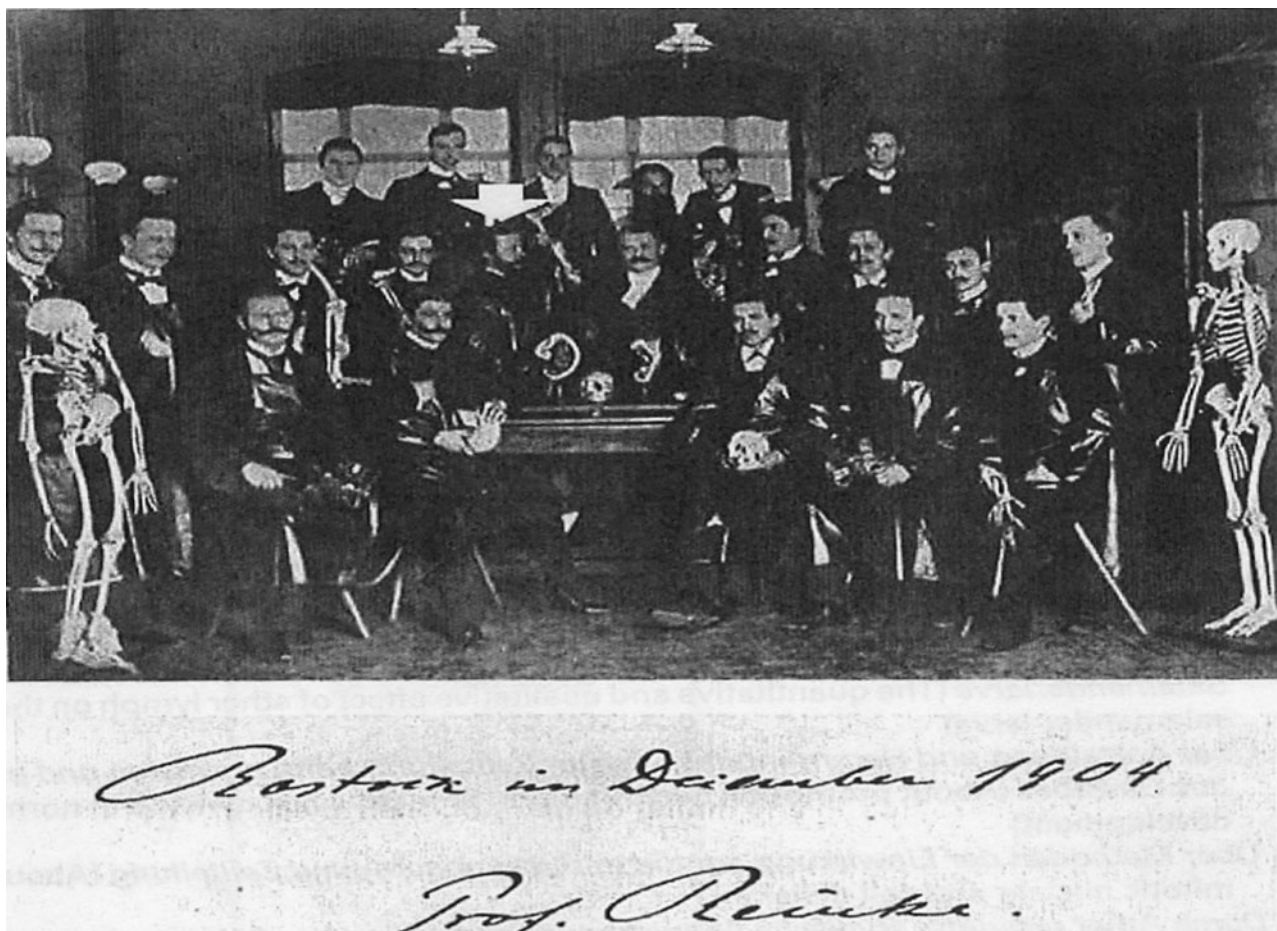


FIG. 7

Arrow depicting Reinke staring at his colleague Barfurth (right), prior to his suspension in 1904.

informing colleagues. This became a constant source of disagreement between himself and Barfurth, leading to his eventual suspension as demonstrator for misconduct in 1904. Reasons that were quoted include ‘friction with Barfurth, refusal to obey instruction and neglect of teaching’ (as reported in the personal file of Friedrich Reinke: ‘Dismissal notice of Barfurth and survey by Barfurth’ (1907), located at the University of Rostock Archives). [Figure 7](#) depicts Reinke in the company of his colleagues in 1904, not observing the camera but his associate, Barfurth.

Reinke continued to publish extensively on his investigations into cell division and tumour formation, but was finally dismissed from his professorship in 1914. The circumstances remain unclear, but seem to be a result of intervention from Barfurth.

Sadly, on 12 May 1919, aged 58 years, Reinke died of gastric cancer. The place of his death was in fact a charity institution named Paulinen Hospital, Wiesbaden, which suggests he died in poverty.⁴ This is a sad fact and unbecoming of the brilliant yet troubled mind whose academic achievements have allowed modern laryngology to evolve into the discipline it is today.

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