Phycological Trailblazer No. 20 Johannes Reinke

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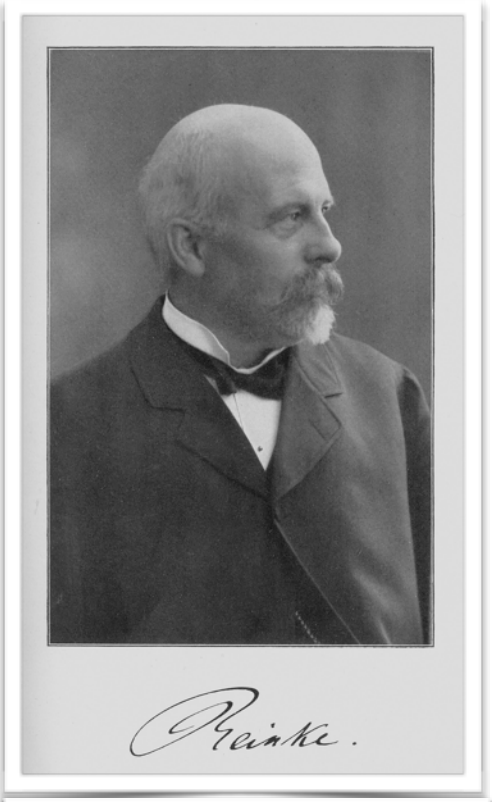
Johannnes Reinke was born on Feb. 3rd 1849, in Ziethen, Ratzeburg, northern Germany. He was the oldest of the nine children born to Theodor Reinke, a pastor, and his wife Elisabeth (Kaempffer) Reinke. On both sides of his family there had been many pastors in Mecklenburg going back to the Reformation (Benecke, 1932). Reinke was always proud of his mixed German-Slavic heritage. When he was only 8 years old, he began his botanical instruction under his father's tutelage. Early on he had a fascination with plant geography. He went on to take instruction from Prof. Johannes Roeper, a noted botanist of the time. But during his youth he also had a keen interest in politics and philosophy, areas that he would pursue and publish on later in his life.



Johannes Reinke (from Benecke, 1932).

Reinke's first publication was a sketchbook of the vegetation of Ratzeburg in 1869. With Griesbach, in 1873 Reinke published a German translation of Oersted's Danish text on fungi, lichens, and algae. He moved to Rostock in 1876 with the full intention of taking courses in theology, a direction that his father encouraged, and studying botany in his free time. But he very much disliked the theology courses and started sitting in on biology courses. He also took courses in philosophy, while he struggled in his studies of mathematics. It was lectures given by Franz Eilhard Schultze that inspired Reinke to later undertake research dealing with the nature of protoplasm. He also took time out to travel a great deal in northern Germany, including a botanical foray to Bonn, and he became acquainted with a wide circle of intellectuals. Besides his botanical pursuits, he also studied zoology and geology. During the war with France, Reinke enlisted in the infantry. After completing his degree in Rostock followed by his 'Habilitation', i. e., 'post-doctoral lecture qualification', in Göttingen, he became a professor of botany in Göttingen at the age of 24. After completing his studies, Reinke suffered some neurological problems (Benecke, 1932). But he was still able to publish a textbook on general botany in 1880, 'Lehrbuch allgemeinen Botanik'. It was in Göttingen that Reinke established the Institute of Plant Physiology that bears his name today.

Reinke was a broadly trained and broadly interested botanist, working not only with benthic marine algae but also with water molds, the anatomy of the flowering plant *Gunnera*, the orchid genera *Corallorhiza* and *Epipogon*, and the myxomycete A*ethalium*. The results of his research on *Aethalium* led him to a different interpretation than what had been previously believed. He was never afraid to let his research guide him into thinking along new lines of thought. He was very much occupied with understanding the nature of the composition and behavior of protoplasm in plants and fungi. He had some early papers (1873, 1879) on the apogeotropic roots of cycads and their endophytic *Anabaena*. He had numerous papers on light, especially in

Fig. 1. *Blasophysa rhizopus* Reinke. Pl. 23 in Reinke (1889a).

Fig. 2. *Spermatochnus paradoxus* (Roth) Kütz. . Pl. 35 in Reinke (1892).

the mid-1880s. He conducted experiments with living leaves, observing the breakdown of chlorophyll under certain light conditions. He experimented on culturing *Volvox* with the nitrogen-fixing bacterium *Azotobacter* (1903b). He also published on marine phytoplankton (1898a, b).

Reinke was first exposed to benthic marine algae when in 1874 he took a trip with two of his colleagues from Bonn to visit the Zoological Station in Naples. The seaweeds covering the rocks at Santa Lucia completely captivated him, and he decided to spend a winter working at the Station (Mollenhauer & Lüning, 1988). He was the first botanist to be a resident scientist there, and he returned as a guest researcher during the winter of 1875-1876 to study members of the brown algal families Dictyotaceae and Cutleriaceae. He studied patterns of apical growth in both Dictyotaceae and Fucaceae (1878a).

In 1877 Reinke participated in a scientific meeting in Münich, meeting such people as Carl Nägeli, Ferdinand Cohn, and Rudolf Virchow. It was here that Reinke heard of the work being done on anthrax by Robert Koch, and Reinke immediately recognized the significance of that research and its value for the Department of Public Health.

Reinke also was one of the co-founders of the Deutsche Botanische Gesellschaft.

In his 1878 study of members of the brown algal family Cutleriaceae occurring in the Gulf of Naples, Reinke articulated the strong possibility that the small, adherent *Aglaozonia* was a stage in the life history of *Cutleria*.

Papenfuss (1955) credited Reinke with his discovery of conjugation by the gametes of the brown alga *Zanardinia*. Feldmann (1949) credited Reinke (1888b) as being the first to notice the occurrence of a single plastid within the cells of Scytosiphonaceae (*Scytosiphon lomentaria* and *Petalonia fascia*), and Reinke stressed the systematic value of this character,

later used by Feldmann (1949) in establishing the order Scytosiphonales.

From the period 1888 through 1892, Reinke had several publications dealing with the marine algae of the North Sea and the Baltic Sea, especially Kiel Bay. From the Baltic Sea he (1888c) described several new genera: *Kjellmania, Epicladia, Pringsheimia* nom. illeg. [= *Pringsheimiella* von Höhnel], and the distinctive green algal genus *Blastophysa* (Fig. 1). He was especially interested in the brown algae, not just their systematics and develomental cycles but their cytology and physiology. He studied the anatomy of kelps and *Sargassum* (1875a, b, 1903a). He published on the Tilopteridaceae (1889c) and the Sphacelariaceae (1890, 1891a). A major work by Reinke was his 'Atlas deutscher Meeresalgen' (1889a, 1892)(Fig. 2). The fifty plates were executed by Paul Kuckuck and Franz Schütt. Reinke also carried out research on the island of Helgoland (Mollenhauer & Lüning, 1988).

Reinke's abiding interest in philosophy caused him, around the age of 50, to start writing a series of treatises and books on the subject of 'natural philosophy'. These contributions led him to becoming the 'father' of a new branch of science called 'theoretical biology'. All branches of sciences can be divided into two branches, or disciplines, namely, the empirical and the theoretical. The former includes carrying out experiments, the gathering of facts, making observations, and writing descriptions, whereas the latter deals with concepts, principles, models, and generalizations. It was Reinke (1901) who introduced the term 'theoretical biology" with a major book at the start of the 20th century. He also published on the relationship of philosophy and religion to science (1905, 1907). He wrote about the history of the Kiel Botanical Garden, with its origins in the early 17th century (Reinke, 1912).

In 1885 Reinke left the University of Göttingen for the University of Kiel, where he was professor of botany until his retirement in 1921. In his personal life, after his first wife of 25 years died, he married for a second time, this time to Luise Racine. By the time of his 80th birthday in 1929, he had been bestowed with numerous honors. After a long life rich with many accomplishments and much success, he died in 1931 at the age of 82 in Preetz, Holstein. Benecke (1932) wrote a detailed account of Reinke's life and gave a complete list of his publications.

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