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Hans Berger: From Psychic Energy to the EEG

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In lieu of an abstract, here is a brief excerpt of the content:

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Hans Berger

from psychic energy to the EEG

David Millett *

Electroencephalography has served as one of the fundamental tools of clinical neurology for over a half-century. The spontaneous electrical rhythms of the mammalian brain were first demonstrated in the 1870s by Liverpool physiologist Richard Caton, and were subsequently investigated by Napoleon Cybulski, Adolf Beck, Fleischl von Marxow, and others. The development of the human electroencephalogram (EEG), however, can be traced to only one man: the German psychiatrist Hans Berger (1873-1941). Although Berger's work has been the subject of anniversary reflections (Gloor 1969; Jung 1963), a more comprehensive view of this unusual man and his remarkable invention is only now beginning to emerge (Millett 2001). Understanding Berger's path to the EEG within the context of his own scientific era and life experiences highlights both the familiar and the foreign in Berger's story, and provides a historical prelude to the modern investigation of the brain and its functions. Indeed, a century after Berger's first psychophysical experiments, the connection between cerebral blood flow and neural activity, a critical relationship for Berger's psychophysical research, is fundamental to modern functional brain imaging. **[End Page 522]**

□ Berger's work on the human EEG was part of a 40-year program of psychophysical research, beginning in the late 1890s. By the time Berger recorded the first human EEG in the mid-1920s, his own life had become a strange dualism. The University of Jena had been Berger's institutional home for nearly three decades, and Berger had served as Professor of Psychiatry and Director of the University Psychiatric Clinic since the end of World War I (Figure 1). Yet Berger became isolated in Jena as a result of his eccentric research program, the contentious circumstances of his professorship appointment, and his brooding, introverted personality. While he recorded his poetry, scientific aspirations, and spiritual reflections in his diaries and secretly pursued his scientific dreams in the laboratory, Berger's rich, introspective private life was completely insulated from his austere public persona. Berger followed a strict, conservative, and routinized approach to his professional duties as a psychiatrist, completely separating his clinical obligations from his real passion for psychophysical research. Raphael Ginzberg, a young physician who worked at the Jena University Hospital from 1926-1932 and frequently served as a subject for Berger's EEG experiments, later described this enigma of a man:

In the small medical world of Jena, nobody, least of all Berger's associates, expected him to make a great scientific discovery. What could we expect from a chief who was tense, who hardly spoke to us, whose only topic of conversation **[End Page 523]** was hospital affairs, who was always anxious to avoid trouble, who was seldom able to help us with complicated cases? He never overlooked a deviation from established routine, nor would he ever take any step that was not in accordance with this routine. His days resembled one another like two drops of water. Year after year he delivered the same lectures. He was the personification of static. (Ginzberg 1949)

It is perhaps difficult to imagine that this same man—"the personification of static"—was solely responsible for the invention of a technique that would revolutionize clinical neurology and psychological research, but there can be no doubt that the human EEG resulted from Berger's strange and solitary journey.

Berger was born in 1873 to Paul Friedrich Berger, chief physician of the regional asylum in Coburg, located in the heart of Thuringen. His maternal grandfather was the famous poet Friedrich Rückert, whose verses provided a constant source of inspiration for Berger throughout his life. Although details of Berger's childhood are sketchy, he appears to have been a generally happy and introspective child. As he neared graduation from the gymnasium at the age of 18, Berger planned to pursue a career in the natural sciences and aspired to become an astronomer. Thus, despite his father's position, a career in medicine did not interest...

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