FOREWORD

In the course of a research into the origins of our knowledge of electroencephalography, a special interest focussed naturally on the two earliest discoverers: Richard Caton whose first announcement of the "Electric currents of the brain" appeared in 1875, and the independent discovery of these currents by Adolf Beck during his work for a doctoral thesis finished in 1890 and published in 1891. As recounted elsewhere, neither of these forerunners of what has become a field of world-wide scientific importance, attracted much attention in Europe and none at all in England or the United States. In the case of Beck's thesis the barrier of the Polish language no doubt contributed to this lack of recognition in the one case, although both men, Caton and Beck, were nearly half-a-century ahead of the climate of their times in their views about meaning of electrophysiological findings in terms of functions of the brain.

This research into history was encouraged by the discovery that each of these distinguished men was survived by a daughter and, in 1958, a journey was made in search of them. Both were found and, especially pertinent to the subject of this publication, was the delight of meeting Mme Beck Zakrzewska in Kraków, and enjoying her hospitality and generous reminiscences of her father's life and tragic death. In the Appendix to this volume will be found a personal note contributed by this daughter of a very famous physiologist.

Adolf Beck, born in 1863, joined the department of physiology at the Jagiellonian University in Kraków, in the Austrian sector of partitioned Poland, in 1886 where he began his work for a doctorate in general medical science under the leadership of the famous physiologist, Napoleon Cybulski. In 1888 he began the experiments which were to lead to his doctoral thesis.

It is of interest that both these early discoverers of the electroencephalogram started out to look for something else: namely the 'negative variation' of Du Bois Reymond; that is: the response evoked by sensory stimulation. Both workers were successful in finding the evoked response but both had the acumen to observe that the baseline was never steady.

The oscillations they saw (but could not photograph for they had no cameras) were the EEG, a remarkable achievement in this age before the invention of electronic amplifiers.

Beck's thesis, published by the Polish Academy of Sciences and Letters, gives us more experimental detail (as required for a doctorate) than Caton's three reports in medical journals and now, thanks to the work of Dr. Binek and Dr. Barlow, this material becomes available in English.

Of the many striking observations made by this young doctoral student, the modern electroencephalographer notes his finding of the continuous 'oscillations' in the brains of unanesthetized rabbit and dog, of the vulnerability of these oscillations to anesthetics, and their reaction to sensory stimulation — what EEGers 50 years later were to call 'desynchronization'. ("... during stimulation of the eye with light," he wrote, "the previously described rhytmic oscillation ceased. However this phenomenon was not the consequence only of stimulation by light, but appeared with any kind of stimulation of other afferent nerves...") Another reminder of the technical restraints of the times is that the light stimulus was a magnesium flare.

In a brief note published in the Zentralblatt für Physiologie (1) a year before his full thesis appeared, Beck specifically noted his finding of what we now call the EEG:

"Even in the very first experiment I noticed — and repeated experiments all confirmed it — that the difference in potential between the electrodes when applied to two given points on the cortex of the hemispheres was not a stable level of potential; there was a continuous waxing and waning oscillation taking place which neither was related to the respiratory rhythm nor was it synchronous with the pulse, nor finally was it in any way dependent on movement of the animal, since it was present in curarized dogs."

The thesis and the short preliminary note in the Zentralblatt (1) were not Beck's only publications in electrophysiology for later, together with his professor, Cybulski, he extended the research on brain potentials to the study of monkeys and dogs (2–4) and this work formed the subject of a report they made to the Third International Physiological Congress in Berne in 1895. This was to be their last joint experimental work for, in the same year, Beck accepted the Chair in the newly organized department of Physiology at the University of Lwow in Galicia, also in the Austrian sector of partitioned Poland.

Electrophysiology remained a major scientific interest and publications followed that dealt with electrogenesis in the rods and cones of the retina (5), in attempts to localize the sensation of pain by extirpa-

tion experiments on the cerebral cortex (6) and (with a colleague, Bikeles) researches on the cerebellum (7). A long series of papers on electrophysiology appeared in scientific journals in the years 1890–1917 [1].

In addition to his scientific work Beck became prominent in the affairs of the university, serving as Dean in 1904 and 1905, as Rector in 1912 and 1913, and again in 1914 when the first World War struck his native land. Some hint of these stressful times is given by his daughter in the Appendix together with the ultimate tragedy of his death in 1942.

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Dr. Binek's knowledge of the 19th century Polish language and Dr. Barlow's scientific knowledge of this field gives all English-speaking people access to this classic thesis. The help of Dr. Stefan Sołtysik with the final manuscript is acknowledged with great appreciation.

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8. BRAZIER, M. A. B. 1961. A history of the electrical activity of the brain: the first half-century. Pitman Med. Publ. Co., London. 119 p.

[1] For some description of these works in English see (8).

Adolf Beck as a young man, at the period of his doctoral work.