

Maksymilian Rose – neurologist, psychiatrist and renowned expert in cortical cytoarchitectonics

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Maksymilian Rose was born in Przemyśl on 19 May 1883. After completing his secondary education in Wadowice, he studied medicine at the Jagiellonian University, graduating with honours in 1908. In addition to being a brilliant student, he was also a committed activist engaged in the work of social and patriotic youth organizations. Already during his medical studies Rose became keenly interested in diseases of the nervous system. Consequently, he took up a position at Cracow's Neurology and Psychiatry Department where he worked as an assistant for a year after graduation. Rose spent the following two years abroad, continuing his education at neurology centres in Germany (Tübingen) and Switzerland. Rose's training at the hospital and laboratory in Tübingen seems to have had a decisive influence on his scientific interests, since he worked under the guidance of Prof. Brodmann, a distinguished investigator of cytoarchitectonics of the cerebral cortex. The stay in Tübingen probably determined the future professional career of the promising young scholar because, after returning to Poland in 1913, Rose applied for a position at the Descriptive Anatomy Unit in Cracow, headed by Prof. Kostanecki. After being accepted for the post, Rose embarked on his own research into the cytology of neurons in the cerebral cortex. During WW I, he was initially a military physician in the Austrian army, including two years as Head of the Neurology and Psychiatry Department, and then the chief physician at the Rallying Station of the Polish Legions. After the War, Rose resumed his research at the Anatomy Unit with great dedication, though without resigning from his medical practice in hospital departments of neurology and psychiatry. Similarly to many young researchers, Rose had to face a number of



difficulties in his studies: he had to fix the study material himself, then dehydrate and embed it in paraffin, followed by slicing, staining and photographing. Only then could the samples be studied and described. However, it is research into the morphology of the brain that particularly captured Rose's scientific interest and he focused his tireless energy on that area of study. From the very onset of his investigations, Rose concentrated on exploring the grey matter of the human and animal brain. He was specifically interested in the ontogeny and phylogenesis of cerebral cortex, assessed comparatively. He cherished hopes that his studies would produce practical and clinically useful conclusions. Although after years of research it turned out that Rose's expectations had only been realized to a modest degree, the cognitive value of his studies was undeniably high and Rose's research output was appreciated not only by neurology practitioners but also pathomorphologists.

During his short life, Rose published several dozen works, a part of them in the German language. The first study, *Histologische Organisation der Grosshirnrinde bei kleinen Säugern* published in 1912, contained a description of cortical cytoarchitectonics of mice, moles, guinea pigs and bats. In his later publications Rose discussed aspects of cerebral cortex in reptiles and birds. Based on such diverse research material, Rose demonstrated the genesis of differences in cortical structure. It was also then, at an early stage of his research, that he attempted to assign the differences to specific functional traits evident in selected animal species (for example the permanent junction of the striatum with the frontal cortex in birds). Within the same research area, Rose successfully captured several important aspects of the phylogenetic development of cerebral cortex and striatum, introduc-

ing his own scientific terminology (*cortex semiparietinus* and *cortex totoparietinus*). The pioneering study appeared in the work entitled: *On the histological principle of divisions of the cerebral cortex* (a German version of the title exists as well). As his knowledge expanded, Rose came to the view that it was possible to draw conclusions on the function of specific cortical fields, in cytoarchitectonic aspects, in different animals. It was a very modern and impressive claim in his days. It also earned the young researcher a worldwide acclaim. Further reports devoted, among other topics, to the insular cortex (in which Rose identified numerous and highly diversified architectonic fields) and structures within the rhinencephalon together with their physiological correlations in different vertebrates, contributed to creating the belief that studies conducted in the Cracow's brain research laboratory were of high scientific value. A direct implication of Rose's recognition in the scientific community was the job offer he received from Prof. Oskar Vogt to take up a position as head of one of the departments in Berlin's Kaiser Wilhelm Institute for Brain Research. Rose relocated to Berlin in 1925. While working in the Institute, he completed his PhD degree and was appointed a Member of the Institute's Scientific Board. He also worked as an editor of the *Journal für Psychologie und Neurologie*. After three years in Berlin, Rose returned to Poland despite fervent protests by German professors (e.g. Spielmeier, Nissl and Vogt), where he completed his *habilitation* thesis (1928) in neurology at the University of Warsaw.

It was also at that time that Rose established the Polish Brain Research Institute where, despite small premises, he was able to continue his morphological studies. In this period Rose devoted special attention to in-depth verification of Brodmann's cortical areas. He identified a number of often subtle differences in human cerebral cortex architecture justifying the introduction of a more detailed topographic map. He never gave up his comparative studies, though.

During the following three years Rose published two atlases of great value for experimental studies: *Atlas of cerebral cortex cytology in mice* and *Atlas of cerebral cortex cytoarchitectonics in rabbits*. Both atlases are richly illustrated. The book devoted to the rabbit brain contains a figure representing the projection of different cortical areas on the skull cap bones. During his studies of deep cerebral structures Rose prepared a topographic account of the rabbit diencephalon, identifying a total of 118 centres with different structures. He also set about developing a method for the quantitative analysis of scopes

of cortical areas, proposing his own way to calculate the volume of structures under study.

In 1931, Rose was appointed to take up the Chair of Psychiatry at the Stefan Batory University in Vilnius. He moved there, transferring the entire Brain Research Institute with him. In addition to duties involved in the running of the Psychiatry Teaching Hospital he soon had to assume new obligations after the formerly independent Neurology Teaching Hospital was closed and its departments were placed under the management of the Head of the Psychiatry Teaching Hospital. Prof. Rose, however, did not bend under the weight of his responsibilities. Quite the opposite: he added the extended care of patients to his routine scientific activities.

Rose expanded the hospitals and set up a new medical facility in Kojrany near Vilnius to offer treatment and rehabilitation to mentally ill patients. As the Head of both Teaching Hospitals he was greatly admired and liked.

Cytoarchitectonic studies of the cerebral cortex, a scientific discipline which appealed so strongly to Maksymilian Rose, is not researched extensively. In Rose's lifetime only four European institutions were acknowledged as scientific centres consistently pursuing research in this field of study, i.e. laboratories headed by C. von Economo in Vienna, K. Brodmann in Tübingen, O. Vogt in Berlin and M. Rose in Vilnius (later in Moscow – an institute also run by O. Vogt). Research in this area is difficult, while clinical applications are rather limited, particularly after the introduction of various neuroimaging techniques. As already mentioned, Rose hoped that he would find correlations between results of cytoarchitectonic studies and neurological symptoms/syndromes. Some of his observations seem to corroborate his claims. One such case concerns torsion dystonia in which Rose confirmed the atrophy of small striatal neurons. C. and O. Vogt's studies conducted in another member of the same family produced similar results, that confirms the pathogenetic involvement of the lesions mentioned above in this dystonia type.

Another example of the high value of cytoarchitectonic observations for neuropathological diagnosis was Rose and Bielschowsky's discovery of scattered central lesions in von Recklinghausen's disease and establishment of their glial origin.

It is also worth noting that the two authors stressed the importance of testing the level of oxidation ferments for the assessment of lesions affecting specific grey mat-

ter structures. Their publication on this topic definitely goes beyond pathomorphology proper. Unfortunately Rose did not pursue the neuropathological line of his studies any further.

Cytoarchitectonic studies, it was believed, had another practically oriented aspect, namely posthumous assessment of brains belonging to outstanding individuals (so-called 'elite brains').

Rose performed the first study of this type on the brain of Prof. S.T., who died in Vilnius and whom Rose had not known too well during his life. The study yielded a number of interesting findings. A disproportion was identified between the size (volume?) of certain cortical areas which probably correlated with the deceased professor's mental capabilities. For example, his poorly developed temporal gyrus (I) might have been the reason for Prof. S.T.'s little interest in music, while highly developed frontal lobes determined, so Rose claimed, the remarkable intellectual capacity of the deceased. Information collected *ex post* about Prof. S.T. seemed to corroborate conclusions drawn from Rose's cytoarchitectonic studies.

The studies referred to above were most probably the reason why Prof. Rose was entrusted with the task of examining the brain of Marshal J. Piłsudski who died in May 1935. Rose accepted the task, embarking on the macroscopic assessment of the study material with diligence and a great sense of responsibility. Microscopic tests, however, never followed.

Prof. Rose died suddenly, aged 54, during a break between his lectures on 30 November 1937, leaving behind a number of unfinished tasks, including his examination of the Marshal's brain.