

Constantin von Economo's 90th death anniversary

O 90º aniversário da morte de Constantin von Economo

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ABSTRACT

The year of 2021 marks 90 year since the death of the neuroscientist Constantin von Economo, whose research in various areas was extremely relevant for the field of neurology. He described lethargic epidemic encephalitis, published an atlas of the cytoarchitecture of the human cerebral cortex, and conducted multiple studies in neuroanatomy, neurophysiology, and clinical neurology. Von Economo's genius extended into other nonmedical fields such as aeronautics, and he had renowned artistic skills.

Keywords: History; Neurology; Parkinson Disease, Postencephalitic; Influenza Pandemic, 1918-1919.

RESUMO

O ano de 2021 marca o 90º aniversário da morte do neurocientista Constantin von Economo, ou Constantin Freiherr (Barão) von Economo. Von Economo realizou várias pesquisas de grande relevo na área da neurologia, com a descrição da encefalite letárgica epidêmica, a publicação do atlas sobre a citoarquitetura do córtex cerebral humano, além dos seus múltiplos estudos em neuroanatomia, neurofisiologia, bem como na neurologia clínica. A genialidade de von Economo se estendeu para outras áreas não médicas, com o seu grande interesse em aeronáutica, como piloto de avião, além dos seus reconhecidos dotes artísticos.

Palavras-chave: História; Neurologia; Doença de Parkinson Pós-Encefalítica; Influenza Pandêmica, 1918-1919.

INTRODUCTION

Amid the global COVID-19 pandemic, neurological complications including acute encephalopathy resulting from severe acute respiratory syndrome coronavirus 2 recall the cases of encephalitis lethargica (EL) described in 1916 and 1917, which were initially related to the Spanish flu¹. These cases described more than 100 years ago by Constantin von Economo aroused major research interest, particularly on the etiopathogenic mechanisms of this illness, which remain enigmatic (Figure 1)¹. The description of these cases has made von Economo famous, but his contributions to neurology were much broader, and led him to three nominations for the Nobel Prize in Physiology and Medicine¹⁻⁴. The year 2021 marks the 90th anniversary of von Economo's death.

BARON CONSTANTIN VON ECONOMO (1876-1931)

Constantin Alexander von Economo (Figure 1) was born on August 21, 1876, in Brăila, Romania. His family, which descended from the Greek aristocracy, moved first to Trieste (part of the Austro-Hungarian Empire at the time) and later to Vienna^{4,7}, where von Economo graduated in Medicine in 1901. In 1903 and 1904, he was a resident in internal medicine under Carl Wilhelm Nothnagel. As his interest in neuroscience grew, he completed several internships in various countries across Europe. In Paris he attended the neurology services of Pierre Marie, Fulgence Raymond, and Alexis Joffroy; in Germany he interned with Alois Alzheimer and Emil Kraepelin (in Munich), and with Hermann Oppenheim and Theodor Ziehen (in Berlin)^{4,7-10}. He also attended other neuropsychiatric services in Nancy

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Extracted from https://commons.wikimedia.org/wiki/File:Constantin_von_economo.jpg and https://commons.wikimedia.org/wiki/File:Economo_encephalitis.jpg
Figure 1. Combination performed by the authors from von Economo's photo, his publication on lethargic encephalitis¹¹, and later publications on the same issue.

(with Hippolyte Bernheim), Strasbourg (Albrecht von Bethe), and in Trieste (Carl Isidor Cori). He returned to Vienna with this experience in the field and worked as an assistant at the Psychiatry and Nervous Diseases Clinic at Vienna's General Hospital from 1906, under the direction of Julius Wagner-Jauregg (who won the Nobel Prize for Physiology and Medicine in 1927)^{4,7-10}. That same year von Economo was granted the title of Baron ("Freiherr") and his name became Constantin Freiherr von Economo. In 1913, he became associate professor of Psychiatry and Neurology at the University of Vienna. In 1919 (at age 43) he married Princess Karoline von Schönburg-Hartenstein^{4,7-10}. Two years later, von Economo was appointed as full professor of Psychiatry and Neurology at the University of Vienna, where he organized his line of academic research; this culminated in the creation, in 1931, of the Department of Brain Research, which he coordinated. Five months later he died at the age of 55, from a myocardial infarction complicated by a stroke. He was buried in Trieste^{4,7-10}.

MAIN CONTRIBUTIONS TO NEUROLOGY

Von Economo made very significant scientific contributions to neurology. His paper entitled *Die centralen Bahnen des Kau- und Schluckaktes*¹¹, the first in his capacity as a graduated physician, is one of the first studies in the history of brain research to attempt to describe the brain centers of mastication and deglutition¹². In this paper, he had already shown his interest in the functions and anatomical connections of the substantia nigra. He suggested that the coordination and succession of all alimentation movements are performed as a whole in the substantia nigra, with the involvement of cranial nerves (facial, hypoglossal, vagus, trigeminal)¹². In 1917, he first published an article in *Wiener Klinische Wochenschrift* describing cases of a rare disease occurring during 1916–1917, which he defined as lethargic epidemic encephalitis (later known worldwide as von Economo encephalitis) (Figure 1)^{4,7-13}. Two additional publications neuropathologically and clinically defined this

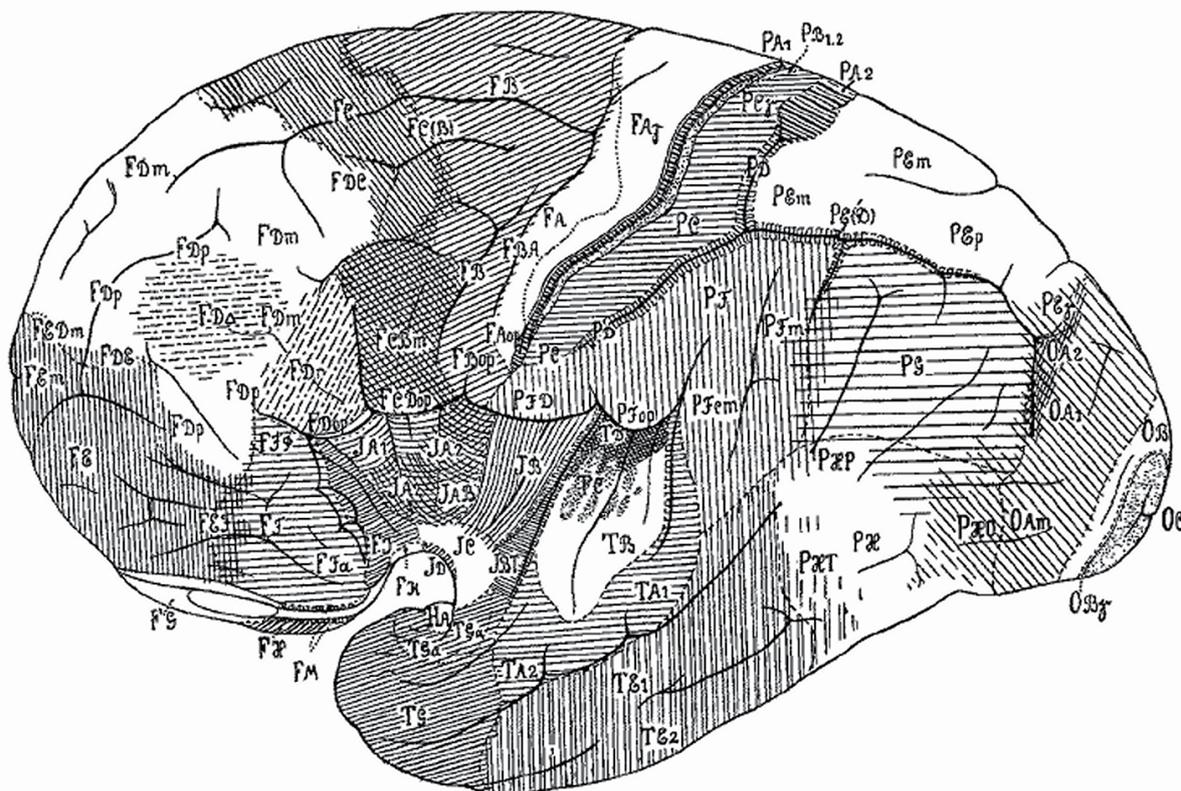
disease^{4,7-10,14}. He described the clinical presentation in three forms: somnolent-ophthalmoplegic, hyperkinetic (with chorea, myoclonus, and myorhythmia), and amyostatic-akinetic (characterized by the presence of parkinsonism and at times oculogyric crisis and psychosis)^{13,14}. Von Economo also defined the principal neuropathological changes, with special involvement in the midbrain and substantia nigra, as well as the basal ganglia and hypothalamus later^{13,14}. In 1925, von Economo and Koskinas published a phenomenal atlas of the cytoarchitecture of the adult human cerebral cortex, defining five structural cortex types and 107 different areas (Figure 2)^{8-10,15,16}. This seminal work was a revolutionary presentation of new information in the cytoarchitecture of the cerebral cortex, updating and greatly improving the pioneering works by Meynert and especially Brodmann from 16 years earlier¹⁵. Von Economo also defined a special type of neuron known as the bipolar spindle neuron (or von Economo neuron) located in the fronto-insular and anterior cingulate cortex^{8-10,17}. Observing patients with lethargic encephalitis, who suffered from excessive sleepiness or “craving for sleep”, von Economo admitted the possibility of a sleep center. Anticipating our most modern concepts of sleep regulation, he speculated that the sleep center might also be responsible for the “readiness to dream”¹⁸. Furthermore, he published essential work on movement disorders, with neuropathological studies on Parkinson’s disease, the basal ganglia,

post-hemiplegic chorea, and Wilson’s disease^{4,8-10,19}. One of his last lines of research addressed evolutionary neuroanatomy, postulating the theory of “progressive cerebration.” He investigated neuronal microstructural changes related to what he defined as “elite brains”, distinguishing these from “average brains”^{8,10,20}.

VON ECONOMO: A POLYMATH

Besides his scientific career, von Economo was a balloonist and an accomplished pilot. He flew balloons and later became an airplane pilot, and in 1912 became the first Austrian to obtain an international pilot’s diploma^{4,7,9,10}. He served as president of the Austrian Air Club. During World War I, von Economo served firstly on the Russian front, and later as a pilot on the southern front in the Tyrol region. He was also artistic, as his various works in the field of neuroanatomy clearly demonstrate^{4,7,9,10,18}.

In conclusion, Constantin Freiherr von Economo was a neuroscientist of extraordinary intellect and scientific production who made magnanimous contributions to neurology through his description of lethargic epidemic encephalitis, the publication of his atlas on the cytoarchitecture of the adult human cerebral cortex, as well as multiple studies on neuroanatomy, neurophysiology, and clinical neurology. His exceptional skills extended into other nonmedical fields including aeronautics and arts.



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