

Book Review – Immunity: How Elie Metchnikoff Changed the Life of Modern Medicine, Written by Luba Vikhanski. Chicago Review Press, 2016, \$26.99 (Can \$31.99) Hardcover. ISBN 9-781613-731109

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Émile Roux said of Elie Metchnikoff : ‘In Paris as in Petrograd, as in Odessa, you have become a leader of thought, and you have kindled in this Institute a scientific focus that has radiated afar....More even than your science, your kindness attracts....The Pasteur Institute owes you much: you have brought to it the prestige of your renown, and by your work and that of your pupils, you have greatly contributed to its glory,’ (Cazenave 1991: 24). These words resonate with the appraisal of Metchnikoff by the author of, ‘Immunity: How Elie Metchnikoff Changed the Course of Modern Medicine’. Luba Vikhanski’s biography of Elie Metchnikoff chronicles his personal life and remarkable discoveries: his early interest in science, marriages, years at the Pasteur Institute, his theory of immunity and the action of cells he called ‘phagocytes’, his efforts to curb the spread of cholera and other diseases, his controversial theories on ageing and longevity and of course his research on gut microbes and influence on the global interest in yoghurt.

In describing the young Metchnikoff, Vikhanski presents him as a child with an unquenchable interest in science and with a fervent desire to make his own mark in

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the scientific world. From a Jewish background and born in Malorossiya or 'Little Russia' Metchnikoff was constantly in frail health. Though Metchnikoff was offered a prestigious post to lead the Odessa Bacteriological Station and to be director of a bacteriological institute to be founded in St. Petersburg, his delicate health, the harsh Russian winters, discrimination against Jews and other "obstacles" (Metchnikoff 1921: 136) made him inclined to choose to reside and work in the milder and more welcoming Paris at the Pasteur Institute. Working initially without pay, it was at the Pasteur Institute that Metchnikoff developed his theory of 'Immunity', and his insightful work on probiotics and yoghurt. His longstanding interest in observing living creatures would prompt Metchnikoff's discoveries of the behaviour of white blood cells in the human body and the process of what he called 'phagocytosis', that breaks down harmful bacteria in the human body. Encouraged by the dissident Baltic German zoologist and evolutionary morphologist, Nicolaus Kleinberg, Metchnikoff injected different materials (human blood, carmine or indigo dyes) into different transparent animals (star fish larvae, marine worms, gelatinous medusas and so on). He was struck by the fact that the animals' mobile cells always surrounded and 'ate up' the invading particles. This led to Metchnikoff's formulation of the theory of *phagocytosis*.

Elie Metchnikoff is generally regarded as the father of gerontology, phagocytosis, probiotics and innate cellular immunity. As one of the founding fathers of immunity, Metchnikoff, a zoologist and ardent Darwinian, was concerned with the cure and prevention of disease and how to prolong life. His work was valuable in a time when infectious diseases such as tuberculosis, flu and pneumonia were the foremost causes of mortality. Further, scientific understanding of the human immune system

was still underdeveloped. Metchnikoff's research was to contribute to a clearer understanding of probiotics and germs. Progressing from investigation of inflammation in frogs and guinea pigs, infectious diseases in monkeys and ageing in dogs and humans, Metchnikoff then explored gut microbiota and germs in animals. Metchnikoff's perception of germs and inflammation was contrary to the prevailing view in medicine that they caused illness: his theory of inflammation was premised on the struggle between phagocytes and microbes being a curative reaction of the human body. This was to be a crucial perspective on the human body's natural defense and immunity.

Launching the first systematic study of ageing, Metchnikoff was the first to coin the term 'gerontology'. In 1908, he published his second book, 'The Prolongation of Life; Optimistic Studies', in which he explores disease caused by intestinal auto-intoxication by putrefactive microbes in the gut, and their links to ageing. Metchnikoff proposed that an alkaline environment would prevent auto-intoxication of these microbes. An advocate of Metchnikoff's work in this area, John Harvey Kellogg, elucidated, "Metchnikoff's experiments show that he knew lactic ferment (yogurt) has such a great vitality that...a person who is suffering from autointoxication may... (use it to) drive out the poison-forming germs." (Kellogg 1908: 269). Not surprisingly, there were numerous advertisements for the lactic ferment capsule around this time.

Graduating from New York University (NYU) in 1989, Israeli born Luba Vikhanski worked as a medical journalist specialising in covering bio-medical research, experience that may have motivated the undertaking of this biography, and which

has certainly contributed to her ample account of the work and life of Elie Metchnikoff. Given her background as a freelance science journalist, Luba Vikhanski is able to deliver an intriguing and entertaining narrative of Metchnikoff's life - with empathy and humour. The book is divided into 5 sections with short chapters of on average 4 or 5 pages, filled with vivid quotes that bring Metchnikoff to life. While this format appears to produce too many chapters (48 of them) for an average sized book, this does not affect the credibility or enjoyment of the account. There are a few photographs, mainly black and white, that provide deeper insight into the Metchnikoff and some of the main people in his life. The book concludes with notes that provide more detailed information on the names and sources cited within the chapters. Written mainly for a scientific audience, it adopts a style of narration also suitable for the lay reader. The author's enthusiasm for the subject is obvious throughout the book. This makes the reader feel as though the writer is closely connected to the subject and not, as in some biographical works, merely documenting factual information.

The publication of 'Immunity: How Elie Metchnikoff Changed the Course of Modern Medicine', is timely in light of the celebration of Metchnikoff's life by the Pasteur Institute in - 'The legacies of Elie Metchnikoff: symposium at the Institut Pasteur Paris, September 26, 2016.' The biography is a welcomed addition to the more intimate biography published by Metchnikoff's second wife, Olga (1921), and the very technical contribution of Tauber and Chernyak (1991), as it is aimed at lay readers. The biography is a book to be read by all interested in medicine, science and the work and multiple achievements of the renowned scientist Elie Metchnikoff.

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