

immunology

Edited by Francesco Bottaccioli

PNEI NEWS

The new knowledge of science and health

BRUCE S. MCEWEN (1938-2020): A NEW KIND OF SCIENTIST

rivista della società italiana di psico - neuro - endocrino - immunologia diretta da Francesco Bottaccioli



**BRUCE S. MCEWEN (1938-2020)
UNO SCIENZIATO DI TIPO NUOVO**



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In memoriam of Bruce S. McEwen

Page 3. Bruce S. McEwen: a “molecular sociologist”.

Francesco Bottaccioli

Page 5. Integrating sociology and biology. Interview with Craig McEwen.

Combining together different disciplines in order to better understand the effect of stress and finding effective tools to prevent it. Bruce McEwen devoted the last part of his life working on this project in collaboration with his brother Craig, sociologist and teacher at Bowdoin University of Brunswick (Maine). In this exclusive interview to Pnei News, Craig explains how, together with Bruce, they analyzed the impact of social distress in its physiological, sociological and molecular aspects.

Paola Emilia Cicerone

Page 8. Social structure, adversities, toxic stress and intergenerational poverty: a model for early childhood.

Why do the children of poor parents have greater probabilities of being poor? Adversities occurring in early childhood due to social situations and structure affect the organism's systems and the brain development through chronic stress. Social factors have an impact on biological processes that influence the reproduction of social patterns.

Craig A. McEwen, Bruce S. McEwen

CORONAVIRUS

Page 35. Lessons learned from the ongoing epidemic.

Francesco Bottaccioli

RESEARCH

Page 37. Winter sea bathing is good for the immune system and psyche.

EXPLORE has recently published a research lead by our partners of Liguria and the University of Genoa documenting the positive effect of winter sea bathing based on psychoneuroendocrineimmunological parameters.

Ilaria Demori, Tommaso Piccinno, Daniele Saverino, Erika Luzzo, Stefano Ottoboni, Davide Serpico.

EDITORIAL

Bruce S. McEwen, a molecular sociologist

Francesco Bottaccioli, Sipnei Founder and Honorary President, University of Aquila and University of Turin

In his autobiography published by the Society of Neuroscience¹, Bruce Sherman McEwen calls himself a “molecular sociologist”. Such a definition may sound at first rather extravagant as he achieved a first bachelor’s degree in chemistry (Oberlin College – Ohio) and later a PhD in cell biology (Rockefeller University – New York). However, sociology and chemistry were part of the McEwen family environment as we may well read in our interview to his brother Craig. Craig McEwen (sociologist) confesses that he actually wanted to study chemistry! In his biography, Bruce tells that the father George, University teacher of English Literature, considered himself a “frustrated physicist” and transmitted to his children his passion for science. The mother, Esther, studied French Literature and was passionate in art history. She was clearly the source of passion for the humanistic culture.

The first seeds: the intuition to combine chemistry and psychology

At a certain point of his scientific studies, Bruce felt the need for a break and decided to take a course on physiologic psychology. He will write that this course will plant the seeds leading to behavioural neurosciences. The teacher who planted the seeds was Celeste McCollough, a young scholar investigating the visual system mechanisms. One of her students was also Larry Squire who will then become a famous neuroscientist of memory and the author of a fundamental text of neuroscience.

Other seeds were planted when he was a research student at the department of Physiology, University of Michigan, where Bruce studied the mitochondria and the effect of carnitine in the production of energy. The results of his investigation appeared in a paper published by Nature² when he was 21 years old. He will develop this research line along his entire life trying to identify the anti-depressive effects of L-carnitine³.

At the Rockefeller University where he spent all of his carrier (except for a short study parenthesis in Sweden) he was able to broaden the study on mitochondria in the Laboratory of Alfred Mirsky and Vincent Allfrey. Here he was exposed to the concept of epigenetics and the pioneering discoveries of Conrad Waddington. Waddington works were obscured until the end of the Sixties, however his mentor, Allfrey, was encouraging them with specialistic researches.

This investigation line will be the foundation of McEwen’s most important contributes of the last twenty years⁴.

Hormones and brain

The fame of Bruce Mc Ewen is certainly tied to the study of hormones and their relationship with the brain. His fundamental discovery dates back to 1968 when he identified the receptor of cortisol in the limbic system and precisely in the hippocampus of the brain of the laboratory

animal. This discovery was published in *Nature*⁵ and marked the birth of neuroendocrinology and research on stress. This discovery happened in a very exciting and lively environment.

Twenty years before, supported by experimental data, the British Geoffrey Harris had hypothesized that the pituitary gland did not work autonomously but was controlled by the brain⁶. This thesis had been dismissed by the scientific community as they considered it as unfounded, nowadays one would label it as “pseudoscientific”. Fortunately, as it often happens the researchers, especially the youngest ones, started to speculate that the brain was in contact with hormones. The discovery of Bruce McEwen of the hippocampal receptor for the cortisol led to considering the brain as an endocrine organ regulating all the neuroendocrine axes and which is influenced by the circulating hormones.

Few years ago, the *Journal of Endocrinology* had published an extensive essay devoted to Harris and to “sixty years of neuroendocrinology” where McEwen wrote: hormonal feedback on brain does not only regulate the functions of hypothalamus but it also influences the neurological, cognitive and emotional functions [...] we need to redefine neuroendocrinology as a field studying also the two-way brain body communication via the neuroendocrine, immune, neurovegetative and metabolic system⁷.

These words summarize the path that led science from neuroendocrinology to neuroendocrineimmunology and then Psychoneuroendocrineimmunology

The redefinition of the concept of stress

At the end of the Eighties, Elliot Stellar, a prestigious academic invited Bruce McEwen to join the MacArthur Foundation Research Network on Health and Behavior, a centre investigating the relationships between social context and individual health.

The laboratory of McEwen becomes the world leading research centre investigating the allostatic load⁸ produced by stress especially on the brain contributing with two fundamental findings to the advancement of science: 1) the demonstration that stress alters the structure of the brain with a retraction in hippocampus and an elongation in amygdala⁹, the demonstration that the dentate gyrus of hippocampus is the production site of new nervous cells (neurogenesis)¹⁰. Lastly, I would like to shortly remind the fundamental line of research on stress, brain and immunity carried on together with Karen Bullock (who became his wife)¹¹.

A molecular biologist able to investigate the entire human being living in a social context. Bruce McEwen represented certainly a new kind of scientist that we engage to help flourishing for the sake of humankind.

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