

Matter and Life: Historico-logical Issues in Post-1800 Physics and Biology

Workshop organized by Bohang Chen (Ghent University)

Feel free to join in!

Ghent University, August 27, 2018

Location: room 05.03.110.079, Blandijnberg (first floor)

<https://goo.gl/maps/RPgc3PowH7q>

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Program and abstracts

10:00-11:00

Boris Demarest (University of Amsterdam): **Leben as Kraft: Force in German Physiology 1770-1850**

Abstract: One of the major focal points of late 18th and early 19th German debates in (the philosophy of) the life sciences is the controversy over the need for special forces in order to account for the phenomena associated with “Life”. Within these debates, it was frequently suggested that “Life” needs to be understood through a “Life Force”. The notion of a “Lebenskraft” became common parlance, and survived great changes and upheavals in the life sciences in the period. The concept is widely regarded as falling into disrepute due to the efforts of figures such as Justus Liebig, Hermann von Helmholtz and Rudolf Hermann Lotze. Philosophical historians of science have long wondered whether the discarded notion hindered or furthered scientific advance, and what metaphysical commitments its proponents incurred in suggesting it. In this paper, I want to explore the meaning and history of this concept in a different manner, in light of a project on the conceptual history of vitalism I am advancing with Charles Wolfe. I will try to disentangle the different philosophical debates on which the notion of Lebenskraft draws, as well as the different concepts of “force” that stem from these debates. Specifically, I will suggest that the notion of a Lebenskraft emerged at the crossroads between the concept of force as active essence, stemming from 18th German metaphysics, the concept of force as a hypothetical general resource of nature, stemming from post-Newtonian debates on the scope of mechanicism, and the concept of force as the measure of physical change, stemming from analytical mechanics. I will suggest that the decline of the concept of

Lebenskraft is related to a regimentation of the concept of force such that these various meanings come apart. Additionally, I will draw attention to the different philosophical and scientific purposes that the concept of a Lebenskraft was meant to serve, and that are obscured by the entanglement between the various meanings of force.

11:00-12:00

Marij van Strien (Wuppertal): **The status of determinism in physics at the start of the twentieth century**

Abstract: Several authors, including Forman, have pointed out that already before the introduction of quantum mechanics in the mid-1920s, there were a number of physicists who were prepared to accept pure chance in physics. In this paper I argue for a more general weakening of determinism in physics by the early twentieth century. In particular, I compare the conceptions of determinism of Mach, Boltzmann and Poincaré, and show that they are not committed to determinism as an established result of physics. Rather, in different ways, they conceive of determinism as a type of regulative principle.

(lunch break)

14:00-15:00

Leonardo Bich (University of the Basque Country): **An operational approach to defining life**

Abstract: Despite numerous and increasing attempts to define what life is, there is no consensus on necessary and sufficient conditions for life. Accordingly, some scholars have questioned the value of definitions of life and encouraged scientists and philosophers alike to discard the project. As an alternative to this pessimistic conclusion, we argued that critically rethinking the nature and uses of definitions can provide new insights into the epistemic roles of definitions of life for different research practices. This talk discusses the possible contributions of definitions of life in scientific domains where such definitions are used most (e.g., Synthetic Biology, Origins of Life, Alife, and Astrobiology). Rather than as classificatory tools for demarcation of natural kinds, it highlights the pragmatic utility of what we called 'operational definitions' that serve as both theoretical and epistemic tools in scientific practice. In particular, it examines contexts where definitions integrate criteria for life into theoretical models that involve or enable observable operations. It shows how these definitions of life play important roles in influencing research agendas and evaluating results, and it argues that to discard the project of defining life is neither sufficiently motivated, nor possible without dismissing important theoretical and practical research. Moreover, it shows how definitions built on the organisational perspective – such as those based on Ganti's Chemoton and on

autonomy and open-ended evolution—fit the theoretical and epistemological requirements for operational definitions.

15:00-16:00

Bohang Chen (Ghent University): **In Search of Life in Matter: A Kantian Clarification of the Post-Kantian History of Vitalism and Physics**

Abstract: this talk consists of two parts. The historical part summarizes the post-Kantian history of vitalism and physics. It identifies several theoretical efforts to search for life in the material world. First, in the late eighteenth and the early nineteenth centuries some philosophers in the tradition of Naturphilosophie, such as Joseph Henry Green, conceived of life through the models of gravity and electromagnetism (field), and argued that life was either identical or analogous to gravity and electromagnetism. Second, in the late nineteenth century energeticists such as Eugenio Rignano understood life as a type of bio-specific energy governed by its own laws of energetics. Third, contemporary to energeticists, scientists like Ralph Lillie, motivated by the statistical interpretation of the second law of thermodynamics, speculated that life operated like Maxwell's Demon. According to these speculations, life might violate the rule of determinism specified in traditional physics, and there might be new laws for life at the level of individual particles. Fourth, the rise of quantum mechanics further supported such speculations. Some physicists like Pascual Jordan contended that indeterminism in biology was an "amplification" of quantum indeterminism. Others like Erwin Schrödinger requested new laws for biology at the quantum level of individual particles.

The logical part offers a Kantian clarification of these efforts, through the determinism-chance antinomy and the constitutive-regulative distinction. First, in the previous four types of theoretical efforts to search for life in matter, life has been associated with either the idea of indeterminism (unpredictability, instability, creativity, chance, etc.), or the idea of law/determinism (structure, organization, stability, etc.). However, determinism and chance, as Kant argued, do not constitute an empirically meaningful antinomy. In empirical research, as later logical empiricists like Ernest Nagel further contended, determinism needs to be viewed as a regulative principle, while chance should be interpreted in accordance with the frequency view of probability. Second, again in the previous four types, compared to different conceptions of matter, life alone cannot be associated with any determinate consequences, and it therefore fails to be a constitutive principle. Yet the human experience of life is not eliminable, so life might be treated as a mere regulative principle which, as Kant intended, alludes to the system of natural purposes.

16:00-17:00

Adam Tamas Tuboly (Institute of Philosophy, Hungarian Academy of Sciences): **Knowledge Missemiation: Frank, Stebbing and Joad on the Philosophy of Physicists**

Abstract: It is widely accepted now that logical empiricists were highly interested in the cultural and broader political context of scientific knowledge. One way of pursuing that interest was to evaluate and criticize those popular works that aimed at the dissemination of scientific knowledge. As these works usually transferred philosophical insights and conclusions as well, logical empiricists thought that they have something to say in order to secure modern science from old and falsely conceived metaphysical underpinnings.

In my talk, I will reconstruct and discuss three widely different though related criticism of James Jean's and Arthur S. Eddington's popular writings. The physicist-turned-philosopher and logical empiricist Philipp Frank criticized these authors from the viewpoint of positivist philosophy of science and argued for a somewhat neutral but a socially sensitive reading of science. Susan Stebbing was closely related to logical empiricists, and she was one of the most important figures of the early development of analytic philosophy in England. In her book, *Philosophy and the Physicists*, she criticized Jeans and Eddington from a philosophical point of view but based her insights mainly on the clarity of thinking, the preciseness of presentation, that is, on the theory and method of communication. Finally, C.E.M. Joad, being one of the most well-known public intellectuals of England, wrote often about the intersections of philosophy and science. He attacked the physicists not for pursuing metaphysics, but because of the erroneous metaphysics and for the negligence of values in science and human life.

The three lines of criticism represents three different forms of philosophy, social engagement and scientific outlook. Nonetheless, all of them thought that the newest results of science are of utmost importance for society and thus the knowledge dissemination strategies of scientists have to be chosen carefully.

17:00-18:00

Fons Dewulf (Ghent University): TBD

18:00-18:30 **Conclusion**

Charles Wolfe (Ghent University)

Maarten Van Dyck (Ghent University)

Gertrudis Van de Vijver (Ghent University)

18:30-19:00 **Final Discussion**