# Hans-Jörg Rheinberger, *Epistemologie des Konkreten. Studien zur Geschichte der modernen Biologie*

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(Review/Recension/Rezension)
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**Hans-Jörg Rheinberger**

***Epistemologie des Konkreten.***

***Studien zur Geschichte der modernen Biologie***

**Review by**

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In his new book, Rheinberger considers the relationship between experimental objects, methods of investigation, and the progress in the biological sciences in the 20th century. In this context, he provides a general historical and philosophical reflection on scientific concepts, models, and theories and the conditions for their development. His book contains four main parts that focus on different aspects of the mentioned relationship. First, I shall provide an overview of these four parts and then I shall comment on Rheinberger's book in general.

In the first part, Rheinberger regards the historical reflections on scientific knowledge of Ludwik Fleck, Edmund Husserl, Gaston Bachelard, and Georges Canguilhem. In this context, he reconsiders the observation, the recognition, and the understanding of nature as a forming process of the experimental object. This, however, does not lead to a naive constructivism. Moreover, the experimental object may transform the methods of epistemology, and the prevailing methods of investigation transform the concepts of the objects in question. The following three parts illustrate these general considerations by focusing on the scientific progress in biology in the 20th century.

In the second part, Rheinberger presents four case studies in the context of genetics and reproduction biology. Thereby, he focuses on scientists of this

research field between 1900 and 1945 who worked at or were in connection with the KaiserWilhelm-Institut for biology in Berlin-Dahlem. Thus, Rheinberger reconstructs the progress and the development of this initially leading institute for genetics and reproduction genetics and the work of, among others, Carl Correns, Max Hertmann, Alfred Kühn, and Gernot Bergold. In this context, Rheinberger elaborates on the self-dynamics of experimental systems – the dependency of the scientific progress on the experimental systems the scientists work with. To put it another way, both the scientific progress in a certain field depends on the choice of the experimental system, and the experimental system determines the direction of the scientific progress. For instance, the Ephestia-system led Kühn to investigate later on other questions than those ones he intended to analyse with the flour mouth (Ephestia kuehniella).

In the third part, Rheinberger considers the relationship between apparatus and theory in molecular biology. Among others, the concept of the gene changes in the context of the methods of investigation. As an important case in point, radioactive markers enable the scientists to ask questions about genes no one would have asked before radiolabelling was possible. Thus, a new method of investigation may have a great impact on conceptual changes and scientific progress. In this context, Rheinberger regards the dependency between genetic hypotheses, precise and imprecise concepts, and their developments on the one hand, and the apparatus and developments of methods of investigation on the other hand. These considerations take also heed of the relationship between the industry of apparatuses and their customers such as research institutes as another influential component in the scientific progress.

In the final part, Rheinberger goes into the relationship between certain instruments, experiments, and the objects of scientific research. He thus elaborates on the impact of different types of instruments for the progress in biology. For instance, he elaborates on the influence of the microscope and physiological apparatuses, and considers certain experimental objects such as

preparations. Rheinberger hence analyses the relationship between artificiality and naturalness of the objects of investigation. He therefore returns to the point from which he started at the beginning of the book. Facts are made – the usefulness of experimental objects in order to achieve scientific knowledge and progress depends on the context of investigation.

Let me finally comment on Rheinberger's book. Against the background of his general considerations on the concept of science and scientific progress in the first part of the book, Rheinberger outlines in many interesting cases the self-dynamic of experimental systems and their relationship with the then-prevailing scientific methods, instruments and concepts. He thus provides an illuminating consideration of his general perspective on the concept of science and the scientific progress in biology in the 20th century. This perspective first and foremost the context dependency of experimental systems in the biological sciences, as Rheinberger points out by means of a consideration that neither lacks on generality nor on profound and interesting details. To conclude from these details to some generality is, however, not always that easy. There, Rheinberger's Epistemologie des Konkreten could be more concrete – without turning into a naive constructivism. After all, experiments have the purpose to discover what there is in the world. In this context, on the one hand, the generality of Rheinberger's book seems to be the consequence of some vagueness. On the other hand, this vagueness may be intended: as Rheinberger points out, it is often the vagueness of concepts and perspectives that is useful for the progress in science.