ABSTRACTS

Joint Commission 3

Models of Data, Theoretical Models and Structural Relationships in the History of Genetics
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According to the most popular version of the history of genetics – the so-called “traditional account” (Olby 1979), “orthodox image” (Bowler 1989), or “official story” (Lorenzano 2013) –, “classical” (“formal” or “Mendelian”) genetics is a discipline whose history had happened in a continuous, accumulative and linear way. Since its assumed origins with the work of Mendel, through the work of the so-called “rediscoverers” de Vries, Correns and Tschermak, and of the English Mendelian Bateson to the work of Morgan and his school, genetics had been passed without frictions. So much the problems and intentions of research of the aforementioned investigators as well as, in a higher or lower degree, the meaning of the fundamental concepts used by them and the conceptual systems out of which the concepts get their meanings, are assumed to be constant. Since more than thirty years the above interpretation is seriously discussed and questioned by historians of genetics, so that at the present time we have a wide variety of positions with respect to it from the suggestion of modification of some particular points to the whole revision of the traditional historiographic account. Among the historians of genetics there are those who emphasize the existent discontinuities and ruptures between (at least some of) the developments carried out by the abovementioned researchers. The aim of this communication is to present an analysis of the history of genetics in terms of structural relationships between the models of data and theoretical models of the different successive proposals, in a way that would be possible to capture and to make precise the idea that between them there are discontinuities and ruptures – of the kind pointed out by the opponents of the “traditional account” – as well as continuities – which allows to understand the existence of such an account –.

What did the "Rediscoverers" discover in 1900? A New Analysis of the Birth of Genetics
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Traditionally, historians regard 1900 as the year of the birth of genetics when de Vries, Correns, Tschermak independently rediscovered Mendel's laws of heredity. However such a rediscovery story was challenged seriously. Many historians (e.g. Hans-Jorg Rheinberger 1995, Roberts 1929) have shown that all the three rediscoverers have read Mendel's paper before the completion of their experiments, so they in fact did not INDEPENDENTLY rediscover Mendelism. On the other hand, it is very dubious what the rediscoverers really discovered in 1900. Recently more and more historians realize that Mendel’s work was in fact about development rather than heredity. If so, it is problematic to maintain that the rediscoverers rediscovered the laws of heredity, given that Mendel’s laws are not about heredity. In this paper, I aim to propose a new way to analyse and understand the birth of genetics. Firstly, I shall propose and defend a new interpretation of the origin of genetics (1865-1900) by arguing that 1) Mendel’s work was about development; 2) the rediscoverers’ work were about heredity. Secondly, I shall redefine the Kuhnian notion “exemplar”, and propose a new philosophical analysis of the birth of genetics in 1900 in terms of exemplar to interpret the change from Mendel to the rediscoverers. Thirdly, I shall show why my exemplar-based approach is better than the theory-based approach in analysing the origin of genetics.

What do Wound Repair, Chimeras, and Embryonic Stem Cells Have in Common?
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Bioethicists might see all three topics as socially fraught, raising ethical questions about the sanctity of individual life. Historians might provide contextualization, drawing stories from archival and published records. Philosophers are likely to draw on theoretical interpretations, perhaps pointing also to underlying epistemological assumptions. Biologists, meanwhile, will keep looking for more data and interpretive frameworks.

This talk will look at these three 20th century cases. Inspired by World War II, Ross Harrison wounded frog embryos to determine whether cells would add new cells or would re-differentiate as different kinds of cells. How much could one learn about normal development from abnormal wound repair? In the 1960s, Beatrice Mintz stuck together embryos from different mouse varieties to make chimeras, and more recent work on genetic chimeras

shows how tremendously adaptive a developing embryo can be when taken apart and put back together in different combinations. This work has challenged simplistic assumptions about what it is possible to do and to know about individual organisms and their parts. In 1998, James Thompson cultured human embryonic stem cells, following previous work on mouse cell lines. His cultured cells seemed to be immortal and to promise tremendous capacity for regenerative medicine, even though they were completely artificial and do not exist in nature.

In each case, the researchers assumed that producing artificial results would prove epistemologically rich, leading to understanding of normal development. In each case, the researcher was fascinated by what makes a whole organism and how the parts relate to that whole. The historical details about the biology inform philosophical reflection about how we understand, and how we should study, life. Drawing on historical, philosophical, and biological perspectives together give a much richer picture of how the science works and what these cases have in common.

Karl Pearson's phenomenalism : Its impact on the theories of heredity and evolution in the early 1900s

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Karl Pearson (1857-1936), the most theoretically inclined among the British biometricians, also wrote a number of philosophical texts, The Grammar of Science (1892, and a considerably revised edition in 1900). Together with the Ernst Mach's writings, Pearson's Grammar of Science, was a major source for the descriptive or phenomenalist conception of science. The purpose of the present talk will be to articulate Pearson's scientific philosophy with biometrical work on heredity and evolution. The first section will summarize Pearson's philosophy of science, which explicitly characterizes science as "a description and conceptual classification of our perceptions", and a kind of knowledge which, strictly speaking, explains nothing. I will relate this thesis, commonly associated with Mach, to the philosophical thoughts of William Rankin, the Scottish philosopher who had previously opposed (1855) "abstract" and conjectural" theories. The second section of the paper will explain the chronology of Pearson's involvement in statistical biology, and the role played by his philosophical conceptions in this new scientific field. The cases of heredity and evolution should be distinguished, because these two fields were in a different epistemological situation just before 1900. Darwin's theory of evolution offered an example of genuinely explanatory science, structured according to the Newtonian ideal of vera causa — or rather the notion of vera causa elaborated by several 19th Cy British philosophers and physicists. At the same time, the theory of heredity was a rather speculative field, consisting of a number of rival hypotheses about the physiological basis of inheritance; it also included Galton's statistical theory of heredity, typically descriptive and not explanatory. Pearson's contribution was to offer a statistical treatment of the majority of parameters involved in both the theory of heredity and the theory of evolution. By doing this, Pearson converted a lot of concepts with strong causal connotations in a system of descriptive formulae relating a number of pleasurable magnitudes. This operation was obviously in agreement with Pearson's philosophical conception of scientific theory as a classification of "abstract" or "descriptive" statements. The last section of my paper will examine the two "laws" that Pearson considered as the most comprehensive laws in biology, the "law of ancestral heredity" and the "fundamental theorem of selection" (not to be confounded with Ronald Fisher's "fundamental theorem of natural selection" formulated thirty years later). For Pearson, the law of ancestral heredity was a necessary component of his fundamental theorem of selection. Taken together, these two laws made possible to transform Darwin's theory into "a genuine scientific theory" through a short mathematical formula articulating Darwin's concept of "variation", "heredity", and "selection". For Pearson, the major merit of this reformulation was to eradicate the notion of "explanation", in the sense that himself and other physicists and philosophers (Rankine, Mach, Duhem) gave to this terms. The conclusion of the paper will briefly provide a few elements of the institutional and the political context of Pearson's statistical theory of heredity and evolution: emergence of biometry as a new scientific field on his own right, and social debates about race and eugenics.