

Workshop
Heredity in the Century of the Gene
(A Cultural History of Heredity IV)

December 11-13, 2006

ESRC Research Centre for Genomics in Society, University of Exeter, UK

in collaboration with the

Max-Planck-Institute for the History of Science, Berlin, Germany

Organizers:

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The ESRC Research Centre for Genomics in Society (EGenIS) at the University of Exeter is inviting individual scholars to propose papers for a forthcoming workshop "Heredity in the Century of the Gene". This workshop, scheduled for December 11-13, 2006, is part of a series of workshops forming the backbone of a long term cooperative research project between the Max-Planck-Institute for the History of Science (MPIWG) in Berlin (Germany) and EGenIS. The project deals with the agricultural, technical, juridical, medical, and scientific practices in which the knowledge of biological inheritance was materially entrenched and in which it gradually unfolded its effects in successive periods. The overall aim is to arrive at a better understanding of the genesis of today's naturalistic conception of heredity.

Previous workshops in the series took place in Berlin in May 2001, January 2003, and January 2005 respectively, and dealt with the *longue durée* historical processes, by which the notion of heredity came to occupy the centre of biological thought in the first

place. While no general concept of heredity had been underlying the discourse of the life sciences (including medicine, anthropology and the moral sciences) in the eighteenth century, such a concept was slowly emerging in the first half of the nineteenth century. The second half of the nineteenth century was a period, then, in which various attempts flourished to theorize heredity by means of experiment, statistical analysis and mathematization.

With the fourth international conference, the project is entering what has become known as “the century of the gene” (Keller 2000). The advent of genetics, seen from a *longue durée* perspective, confronts us with a fundamental inversion, a kind of hourglass figure: up to the late nineteenth century, the knowledge of heredity took shape by a step-by-step aggregation and integration of discourses from various knowledge regimes; while from 1900 onwards it appears to be shaped by a highly-specialized discourse, the discourse of genetics, that colonized a variety of cultural domains with its concepts, standards, and technologies, often meeting with considerable scepticism and outright rejection. Genetics, as a specialised, scientific discipline, was neither determined by the confluence of contents and concerns stemming from the legal, economic, or political sphere, nor did it produce knowledge immediately applicable within these spheres. And yet there is no doubt that genetics has pervaded modern society and changed profoundly the ways in which inheritance was thought of and practiced.

The title we chose for the workshop – “Heredity in the Century of the Gene” – is supposed to capture these tensions by emphasizing that heredity and genetics need to be kept apart. While it is certainly true that the gene became the “central organizing theme of twentieth century biology”, it is equally true that a variety of non-genetic conceptions of heredity persisted in the twentieth century in areas like practical breeding, medical counselling and therapy, eugenics, and anthropology (including

cultural anthropology). Even in the life sciences proper, organic reproduction, development, and evolution remained topics not fully exhausted by a purely genetic understanding of heredity and variation (Moss 2003). To see these broader domains of hereditary knowledge, it is vital to create a critical distance to contemporary, genetic knowledge. Since it seems to be natural for the present-day observer, for instance, to account for parentage along genetic lines it becomes difficult to discern the revolutionary innovations that underlie this way of kinship reckoning and to uncover the social and political implications these innovations had. This seems to be the reason why one of the major, radical ruptures that went along with the advent of genetics, namely the shift from a developmental to a purely genetic understanding of the inheritance of sex, almost completely escaped historians of biology, and this although the impact that this rupture must have had on debates about gender difference, the respective power of nature and nurture, as well as the rejuvenation and degeneration of populations, are obvious.

To tackle such historiographical problems in a first step we would like to restrict the workshop to the era of classical genetics. This would include the pre-history of genetics in the last two decades of the nineteenth century, as well as the period of classical genetics proper, up until the end of WWII. The workshop will not, however, focus on disciplinary or conceptual developments in the first place. The focus will rather be on the *tools* of genetics and their provenances, metamorphoses, and trajectories. As tools can be regarded as the most basic element of culture, and as tools in particular are able to transgress cultural boundaries, we believe that this focus is the most adequate to capture the cultural dimensions of classical genetics. Two interrelated sets of tools come to mind as particularly relevant:

- 1) *Genealogical records*: The importance of genealogical records to the development of classical genetics, especially with respect to medical genetics, has long since been recognized. What is still missing, however, is an analysis of the specific ways in which genealogical relationships were represented within this context. It seems that some major innovations in the recording of kinship relations occurred in the late nineteenth century in clinical and agricultural settings. Medical genetics and eugenics endorsed programs of providing “scientific genealogies” of whole populations. Plant and animal breeders developed sophisticated registers to keep track of their productions. In 1912 George H. Shull, following Wilhelm Johannsen, addressed “pure lines” and “clones” as “purely genealogical terms,” and the “mapping” of genes onto chromosomes in the Morgan school was heavily dependent on the construction of sophisticated genealogies (Rheinberger and Gaudillière ed. 2005). All these new techniques provided powerful cultural images of determination and identity, images, however, which in the course of the twentieth century proved to have not only reinsuring, but also highly disruptive effects.

- 2) *Model organisms*: In recent years, model organisms have become the focus of science studies interested in the peculiar transdisciplinary nature of twentieth century life sciences. Although model organisms are often addressed as tools or instruments in this context, it is their representational, rather than their instrumental nature, that has been highlighted in these studies. Model organisms are seen as a resource for standardization and generalization. In genetics, however, model organisms function as tools also. Organisms of a certain kind are used, through hybridization, to manipulate organisms of another kind, and the objects of manipulation extend, characteristically, further down to characters

taken in isolation, to physiological pathways, and all the way down to the cytological level of chromosomes and chemical constituents of germ cells. In a sense one could maintain that this is the core rationale of genetics, a rationale that expressed itself in the frequent analogies that were drawn between synthetic chemistry and genetics in the first decades of the twentieth century. Organisms, under this perspective, were seen as entities that could be created at will by combining elementary building blocks, which in their various combinations would have determinate effects. A highly counter-intuitive, but all the more powerful image of managing and engineering life, including human life, gained prominence as a consequence.

By focussing on the tools of classical genetics we would also like to suggest taking seriously the instrumentalism that characterized much of early twentieth century genetic research. Thus it seems that what fell prey to the advances that genetics made in the twentieth century is the traditional concept of heredity. The more the materials and processes involved in inheritance were made visible in data collections and displays, and the more readily they were opened for manipulation, the less inescapable did the biological fate appear that a more deterministic concept of inheritance once seemed to imply. Today, with the powerful tools of biotechnology, biological inheritance again seems to become subject to forms of cultural inheritance, an analogy that was strongly denied by Wilhelm Johannsen when he introduced the notions of genotype and phenotype in 1911. Genetic heritage, it seems, is not anymore a heritage from the past weighing heavily on the present, but a heritage to be made use of in shaping the future. Genes, as much as they exemplify biological determinism, have offered the main route for its subversion.

Scholars who wish to contribute to the workshop are asked to send a paper proposal of 500-1000 words to the following address:

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Submission deadline is 31 March 2006.

We envision being able to respond to all proposals by early April 2006. Travel and accommodation costs of speakers will be covered.

References

Johannsen Wilhelm. 1911. "The genotype conception of heredity." *The American Naturalist* 45, 129-159.

Keller, Evelyn Fox. 2001. *The Century of the Gene*. Harvard University Press, Cambridge.

Moss, Lenny. 2003. *What Genes Can't Do*. The MIT Press, Cambridge.

Shull, George H. 1912. "Genotypes, Biotypes, Pure Lines and Clones." *Science, New Series* 35 (888), 27-29.

For a concise overview over the development of the gene concept in the twentieth century consult the entry for “gene” in the [Stanford Encyclopedia of Philosophy](#).

For in-depth information relating to the project “A Cultural History of Heredity” see <http://www.mpiwg-berlin.mpg.de/en/HEREDITY/index.html>. Contributions to the first three workshops were published in no. 222, 247, and 294 of the preprint series of the Max-Planck-Institute for the History of Science. A collective volume on the emergence of the concept of heredity is currently in preparation for MIT press. A draft version of the introduction to this volume has appeared as preprint no. 276. The preprints can be downloaded at <http://www.mpiwg-berlin.mpg.de/en/forschung/preprints.html>.