

Preface

This book is about the genesis and historical evolution of a biological concept: the concept of heredity and the phenomena it refers to. Heredity is the subject of a whole array of scientific disciplines, most notably genetics. Yet we want this book to be more than, and different from, the history of a scientific discipline and its fundamental ideas. A number of excellent books on this subject already exist, most of them written by geneticists who approached the history of their discipline in a manner that must be recognized as having been far from naïve.¹ François Jacob's *The Logic of Life* is likely to remain an unsurpassed example of this genre. In it, the molecular biologist and Nobel laureate identifies the "stages" (*étapes*) that knowledge of heredity and reproduction passed through from the sixteenth to the twentieth centuries. Inspired by the French school of historical epistemology, Jacob did not consider these stages as stations on "the royal road of ideas, retracing the confident march of progress towards what now appears to be a solution." Yet even Jacob's "history of heredity" (this is the subtitle of his book) possesses an unmistakable vanishing point, aiming, as it were, at a concept that was established only by modern molecular genetics: the genetic program. Taking this notion for granted, Jacob analyzes not only life itself, but also the history of its conceptualization as a succession of ever higher, or rather, ever

more deeply differentiated, structures, as a "series of organizations fitted into one another like nests of boxes or Russian dolls": visible structures, organs, cells, chromosomes, genes, and molecules, to mention only the most important ones.²

We will go beyond such diachronic history by describing the synchronic political, medical, and technological contexts in which knowledge of heredity was both generated and applied. What we will study is therefore less the history of a particular science or research program than the history of a "knowledge regime," which had its starting points in separate and heterogeneous contexts, coalesced along different paths, and then influenced other cultural domains in multiple ways.³ Along these lines, we do not see science as being different from, or even opposed to, culture. Rather, we regard it as one cultural domain alongside others, such as the arts, technology, or politics, all of which interact in the reproduction and transformation of social values. This does not amount to a denial of the very special nature of science. Our discussion will remain focused on the production of scientific knowledge as a cultural domain *sui generis*. Scientific values—"truth values," as philosophers of science would call them—possess their own peculiar nature, and their production tends to follow its own historical trajectories. To lose sight of the special character of science would risk losing sight of what makes it distinct and underlies its cultural power: the authority it claims to possess with regard to questions about nature, human nature in particular. We therefore support Henning Schmidgen in his reading of Georges Canguilhem's philosophy of science: "The meaning of a scientific concept does not simply reveal itself horizontally, with respect to other words and texts. It can be grasped only by recourse to the forces that now or in the past have taken hold of an 'object' (like health, heredity, or the mind)."⁴

This focus on cultural forces has consequences for our presentation of the history of heredity. In the first chapter, we outline our analytic framework by exploring some central metaphors that Francis Galton used in the latter half of the nineteenth century to defend his view that heredity was a subject in need of scientific scrutiny. The second chapter then takes a step back and tackles the question of why it was so late that heredity became a subject of biological speculation. At the same time, this chapter traces changes in the ways in which the generation and reproduction of organic beings was conceptualized in the seventeenth, eighteenth, and early nineteenth centuries, thus providing an important contextual background for the account of the history of heredity that we unfold in the subsequent six chapters.

This account will take the shape of an hourglass.⁵ In the early modern period, as we explain in chapter 3, thinking in terms of heredity started to take hold in a broad *epistemic space* that incorporated elements from different contexts, such as medicine, breeding, and trade. This development created a set of coordinates that made it possible to conceive of reproduction no longer only as personalized and individual generation of offspring, but also as the transmission and redistribution of a more or less atomized biological substance. Heredity thus not only moved into the center of the life sciences in the course of the nineteenth century, as we will show in chapter 4; it also assumed a powerful biopolitical dimension that we will explore in chapter 5. This conjunction created a research dynamic in the late nineteenth and early twentieth centuries by which the idea of heredity was condensed into *epistemic things*—most prominently, genes—that could be traced and manipulated experimentally. Chapters 6 and 7 survey the research technologies, as well as their political and economic contexts, associated with classical and molecular genetics, respectively—the two disciplines that have defined the twentieth century as the “century of the gene.”⁶

Finally, in chapter 8, we discuss how the reification of heredity is beginning to be reversed again in the current conception of the genome and in the strategies developed to study its interactions with the body. A spatialization of the concept seems to take place once more, this time, however, not in relation to disparate domains of practice brought together, but rather from within. Nowadays the epistemic space of heredity manifests itself in the increasingly complex internal structures and architectures of the cellular machinery serving the transmission and expression of traits. Both heredity and the gene may very well have seen their day as research objects at the forefront of bioscientific inquiry in this context, receding into the background of unquestioned assumptions. Under opposite signs, heredity has become the malleable matter of politics, familial affairs, and the marketplace once more. What used to be the bedrock and very substance of cultural traditions was for a while reduced to universal laws of nature, only to emerge as a repository for shaping the future of humanity.

In writing the history outlined in the preceding paragraphs, we have taken care to distinguish between representational regimes on the one hand and associated epistemic objects on the other. Time and again, we will use the notion of an “epistemic space”—that is, the broader realm in which a scientific concept takes shape—or refer to “epistemic things”—that is, the objects of a particular research technology or experimental system. Although such objects are again and again represented in texts,

images, collections, and experimental systems, they nevertheless elude full and final representation. If this were not the case, they would not be able to stimulate research, an activity that is always oriented toward what is not yet known.⁷ We believe that it is important to distinguish between epistemic objects and their discursive and institutional representation in what we called "knowledge regimes" above. It is, after all, from the gap between the two—the fact that an epistemic object can never be unambiguously defined and represented without receding into the background of universally recognized assumptions, standards, and technologies, and thus in fact ceasing to be scientifically interesting—that the history of a concept like heredity gains its fascinating dynamics.

Like every book, this one has its history. It presents our synthesis of the results of a long-term research project carried out at the Max Planck Institute for History of Science in Berlin and the ESRC Research Centre for Genomics in Society at the University of Exeter. This collaborative project was dedicated to the "cultural history of heredity" and was additionally supported by the Government of Liechtenstein (Karl Schaedler Grant), the German Academic Exchange Service, the British Council, the British Academy, the Arts and Humanities Research Council, and the Wellcome Trust. Five international conferences and a number of smaller meetings allowed us to meet with and draw on the expertise of colleagues from all over the world and from a great variety of disciplinary backgrounds.⁸

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