

BOOK REVIEW

Kate MacCord, *How Does Germline Regenerate?*

Chicago: University of Chicago Press, 2024. Pp. 168. ISBN 978-0-226-83051-3. \$26.00 (paper).

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This short, nicely written and accessible book focuses on one persistent scientific debate and probes some of its most controversial implications: the nature and origin of germ lines and the conceptual and ethical issues they involve. More specifically, the book addresses one persistent and controversial claim: the supposed separation between germ and somatic cells, which is epitomized by the notion of the Weismann barrier. The concept holds that whereas germ cells can eventually become somatic cells, somatic cells cannot become germ cells. There is a fundamental and essential distinction between germ and somatic lines so that only the former can regenerate damaged cells or generate new ones. The scientific community – most notably embryologists and geneticists – has widely accepted the idea, which shaped the way heredity was understood throughout the twentieth century. Yet McCord's book convincingly shows that the Weismann barrier is a more normative than empirical claim. By revisiting both well-known and lesser-known episodes in the history of germ cell science, she demonstrates that both scientific consensus and the evidence in favour of the Weismann barrier were, and are, less straightforward than is commonly believed.

After August Weismann in the late nineteenth century, embryologists of all stripes quarrelled about the technical and experimental issues related to the reliable observation of germ cells themselves. The evidence about the alleged universality of the Weismann barrier has been a matter of intense and persistent dispute. In fact, a broad overview of the metazoan world shows that the Weismann barrier is not *the* rule, but *one* important rule among other possibilities. Germ cells can regenerate via other germ cells, but also through pluripotent cells and transdifferentiation of somatic cells. If anything, decades of experimental research demonstrates that germ cells might be much less special than is usually held.

We can draw at least two fundamental lessons from McCord's book. First, in scientific practice, normative claims often overshadow empirical findings. Without careful historical and conceptual checking, the 'ought' can easily win over the 'is'. Scientific dogmatism can surreptitiously infiltrate even the most empirical and experimental enterprises. Second, if the Weismann barrier is questioned (as it should be), then important and disturbing bio-ethical implications emerge for human genome editing: if somatic cells can become germ cells, we might unintentionally modify the genome by editing somatic cells. The complex conundrums linking germ cell science, bioethics and society more generally cannot be addressed here and, in fact, the book itself scantily touches upon them. I would rather dedicate a few words to the thorny issue of normativity and the relevance of history and philosophy of science for scientific practice (which are related to the ethical

questions). MacCord's book, in fact, must be situated within the philosophical tradition I call HPS for scientists. The basic idea informing the tradition is that the road to scientific truth (whatever truth is) is studded with epistemic obstacles that can only be overcome by an interdisciplinary effort that embraces the service of historians and philosophers. By revisiting the past, scientists can become aware of the fundamental presuppositions underpinning their convictions – their taken-for-granted beliefs – and readdress them more critically. In other words, HPS for scientists aims to assist scientists' conceptual practices while limiting the risks for dogmatic drifts that are inherent in specialized activities.

This book successfully delivers what the HPS-for-scientists tradition purports to achieve. Yet one might wonder whether the tradition itself should be expanded to include considerations normally deemed external to scientific practices and cogitations: social and economic factors that might bolster normative stances such as the Weismann barrier. One might conjecture that the persistence of normative positions is not only due to a lack of pertinent information (whether historical, empirical or conceptual), but is functional to a specific socio-economic research environment. Put differently, normative postures also persist because they resonate with a wider, extra-scientific agenda. We should not forget that the biological debate over what is inherited and what is acquired was far from neutral and intersected all sorts of ideological, economic and social considerations. At the end of the book, McCord tangentially hits the nail when she notices that the debate on germ cell science is related to a multibillion-dollar quest for therapeutics. It is reasonable to think that the tenacious persistence of the Weismann barrier also has something to do with some wider socio-economic constraints.

One can justifiably wonder what happens to scientific 'truth' (whatever that means) when private interests drive science. In other words, one might ask why the Weismann barrier turned out to be so successful even though conclusive evidence was lacking. Why do taken-for-granted beliefs become invisible in some cases but are eventually exposed in others? What kind of extra-scientific factors ensure or facilitate the persistence of normative claims, if they in fact do? Perhaps, to answer these questions, we would need to complement an HPS for scientists with HPS for society. In this case, together with a historical analysis revealing the taken-for-granted presuppositions affecting the research, we would also have an analysis showing how wider concerns prompt empirical hypotheses to become normative stances and, finally, dogmatic assertions increasingly impervious to experimental assessment. In short, when we deal with scientific issues that are directly relevant to society at large, we might expect that extra-scientific factors play an epistemic role that cannot – and should not – be dismissed. If we want to understand why some options turn out to be more successful than others, internalist accounts might not be enough.

Although the book does not delve into what historians and philosophers have misleadingly called 'external' factors (as if there were clearly delimited internal factors), it offers a serious and competent analysis of a topic that has not received the attention it deserves. Scholars and the wider public alike need to be informed about the contents, prospects, virtues and risks of an economically onerous biomedical enterprise. Germ cell science is extremely important and has a tremendous impact on many sensitive branches of medicine and the life sciences. McCord's book opens a seminal and large window on this too often neglected world. Hopefully more studies will follow in her footsteps.