

spaces allow men to interact with other men as men, and women to interact with other women as women, while also allowing young men to learn from older men and young women to learn from older women. Interestingly, both of these first two claims are supported by historic Christian teaching as well.

Finally, she advocates against hormonal birth control, not only because the physiological effects on women are often unhealthy, but also because of the effect of estradiol on the environment (p. 208). Once again, Christian teaching about stewardship both of one's body and the creation as a whole dovetail with her ideas here.

Harrington's book is comprehensive, weaving together aspects of marketing, technology, and sociology to provide a revised story of what it is to be male and female. Her research includes everything from personal interviews to Twitter feeds to peer-reviewed journals and studies, the details of which are included in her extensive endnotes. Although she writes in the context of the United Kingdom, she does, at times, refer to work done in the United States, noting the politicized nature of her ideas in that context.

The comprehensive nature of the book along with the lack of a clear thesis, is at times confusing. She is clearly critical of progressive feminism and the prevailing gender ideology that she associates with it, criticism that is lately being leveled by other women who were sold a story by gender studies gurus.¹ Her association of this story with the free-market system and the technology giants embedded in that system is interesting. But it seems, at times, as if she were trying to write two books: one defending male and female as ineluctable categories of nature, and one blaming tech-dominated markets for their profit-based interests in promoting the alternate paradigm of denying sexed differences. Trying to do both muddied the waters in ways that were not always helpful and sometimes confusing.²

Scientific specialists in the area of sex and gender may be more critical than I of the studies she cites. From my nonspecialist perspective, I appreciated that she not only took account of scientific studies from peer-reviewed journals, but also included personal reflections from her own experience, as well as that of others, and included opinions and experiences she

learned of through various social media outlets. In general, these are not stories we are told.

As a Christian theologian, I found her insights both surprising and interesting. Surprising because they comport remarkably well with a Christian worldview despite the fact that she is not a Christian. It was also interesting because the new Gnosticism she describes is diametrically opposed to the historic Christian affirmation of the goodness of the material world, including our material bodies. She unknowingly affirms both the biblical teaching that humans are created male and female, and the biblical understanding that humans flourish when they live within the boundaries set by our Creator.

Although her language is at times crass, and some of the examples she offers may be offensive, this book is pro-women as women—including our bodies—and as such, is also pro-men. I would recommend this book to a wide variety of people, including social scientists, technology experts, and theologians. For Christians who feel marginalized by current cultural pressures toward a nonsexed society, pressures that are even supported by many churches, this book will ring true with respect to the historic teachings of the church on sex and gender. It will also encourage them that their basic instincts about sex and gender are, in fact, in line with God's created intentions for humans.

Notes

¹For a Christian perspective on this, see, for example, Abigail Favale, *The Genesis of Gender* (San Francisco, CA: Ignatius Press, 2022).

²For a helpful look at the problem of big tech companies and their undue influence via social media on young people, a problem that is especially pronounced in young women as Harrington writes, see the Center for Humane Technology's various resources on this topic, including the 2020 film, "The Social Dilemma," <https://www.humanetech.com/>.

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MODIFYING OUR GENES: Theology, Science and "Playing God" by Alexander Massmann and Keith R. Fox. London, UK: SCM Press, 2021. vii + 151 pages. Paperback; \$21.49. ISBN: 9780334059530.

Book Reviews

Modifying Our Genes: Theology, Science and "Playing God" is a thought-provoking exploration of the ethical, theological, and scientific implications surrounding human genome editing. Written by Alexander Massmann, a theologian, and Keith R. Fox, a scientist, this book examines the topic clearly and is comprehensible even for those without a background in genetics or bioethics. While their ethical considerations are biblically based, they also draw upon arguments in philosophy and other fields to facilitate a more inclusive debate.

Chapter 1 discusses the overall significance of genome editing using CRISPR-Cas9, and lays out key themes discussed in subsequent chapters. Developed by Emmanuelle Charpentier and Jennifer Doudna just over a decade ago, CRISPR-Cas9 greatly simplifies the process of making alterations at precise locations in DNA compared to previous methods. While this molecular tool can be used to genetically modify body cells in children or adults (somatic gene editing), these alterations are not passed on to future generations, unlike alterations to human embryos (germline gene editing), which are of greater ethical concern to Massmann and Fox.

For the benefit of the layperson, chapter 2 provides a basic primer in genetics and the CRISPR-Cas9 method. The authors note that over 10,000 different inherited human diseases are caused by a defect in a single gene and would be the most feasible targets for therapeutic genome editing. However, many human traits and disorders result from a complex interaction between multiple genes and are less amenable to genetic intervention. Moreover, Massmann and Fox point out that environmental, lifestyle, and developmental factors work together with genes to determine human traits and diseases – we are not simply a “product” of our genes alone! They describe, in simple terms, how the Cas9 protein uses a guide RNA to precisely direct the position of a double-stranded cut in DNA, and how repair of the cut by nonhomologous end-joining leads to short deletions or insertions that usually inactivate the gene. Repair of the cut by homologous recombination is less clearly explained in this book. The authors also do not mention base editing or prime editing at all. These variations of CRISPR-Cas9 technology, reported in peer-reviewed journals by 2019, correct mutated copies of genes without making

double-stranded cuts in DNA or requiring a corrective donor DNA molecule.

In chapter 3, the authors briefly summarize the successes so far with therapeutic genome editing in children or adults, especially for genetic disorders involving the blood, such as sickle cell anemia, beta thalassemia, and leukemia. For disorders involving other body tissues and organs, they note the challenge that must be overcome in delivering gene editing tools to enough cells to achieve a therapeutic effect. The problem with delivery is greatly reduced, however, if genome editing is done on embryos.

While safety concerns tend to dominate many ethical analyses of genome editing, especially for germline gene editing, that is not true for Massmann and Fox. The authors acknowledge that technological improvements may eventually reduce the error rate in the editing process to an acceptable level. They reject germline gene editing on other grounds, even for medical purposes. Among their most compelling arguments is that using this technology to edit out “debilitating” characteristics could cause greater stigmatization and marginalization in our society for people with disabilities or serious genetic disorders. In support of this concern, the authors cite negative attitudes toward babies with Down syndrome in Denmark where free prenatal tests are available and 95% of babies diagnosed with Down’s are aborted. From a Christian perspective, they invoke Matthew 25:31–46 in saying that those who are left behind by medical progress, or who are excluded, or who are looked down upon are among “the least of these” and are worthy of our care. On page 64, they call for a renewed effort to include people in society with chronic illnesses and disabilities as we continue to make progress in somatic gene editing.

Massmann and Fox maintain that genetically modifying human embryos carrying a disease mutation is unnecessary if healthy embryos can be identified by preimplantation genetic diagnosis (PGD) following in vitro fertilization, even if it leads to an increase in the number of unused and discarded human embryos. Some may view their preference for PGD over germline gene editing as inconsistent with their concern about stigmatizing those with disabilities, especially since it results in the destruction rather than the “healing” of some human embryos. All they could say in response to that criticism is that both

PGD and genome editing require embryo selection. They advocate limiting the use of PGD to medical considerations, preferably to avoid the birth of a child with a very severe disease. This is consistent with their view (p. 63) that “a meaningful and fulfilled life will be made more difficult by conditions that cause significant and persistent pain.” On page 62, they suggest that it may be possible to select sperm without a harmful mutation before in vitro fertilization to increase the number of eligible healthy embryos for implantation. However, they give no explanation for how this selection might be done without destroying the sperm cells in the process, and no reference is provided.

In chapter 4, Massmann and Fox consider the possible use of somatic or germline gene editing for introducing nonmedical enhancements, such as improved athletic ability, memory, and life span. They argue that genetic enhancements could exacerbate social inequalities for underprivileged people, leading to diminished social participation and reduced political or economic opportunities. They challenge the assumption that greater physical and mental capabilities will produce more fulfilling lives and reiterate their concern that it could lead to discrimination against people living with genetic diseases or disabilities. The authors also question whether it is appropriate for parents to choose enhancements for their children. Would children become more like commodities than precious gifts, subject to our own design or will? Considering these arguments, the authors suggest limiting genome editing to medical and therapeutic procedures, which they define as any intervention that restores or preserves the function of an organ.

Chapter 5 focuses on the history of eugenics around the world. Massmann and Fox note that the murder of about 200,000 disabled people by the Nazis was not motivated by considerations of race or concerns that future generations might inherit a genetic impairment. Instead, it was motivated by economic considerations (the cost of care for the disabled and their lack of productivity) and an “ableist” mentality that emphasizes independence and physical functioning while marginalizing dependence, weakness, and vulnerability. The authors express concern that far-reaching genome modifications, especially genome enhancements, will reinforce an ableist mentality in our society, leading to antidisability prejudice.

In the final chapter (chap. 6), Massmann and Fox consider human dignity, arising from our creation “in the image of God,” and its implications for advancements in biotechnology. They maintain that human dignity is more than just a respect for personal autonomy; it also includes a moral call to work for the benefit of others and to take care of our own bodies and personal health. The authors assert that society should not allow technologies, such as genetic enhancements, to be marketed freely if there is a significant health risk, even if individuals have given informed consent. On the other hand, they note that as God’s image-bearers we can use science to “tame the destructive forces and to restore order where chaos threatens life” (p. 130). The authors conclude that as we employ new technologies to overcome disease and infirmity, we must do so in a way that respects the dignity of patients as well as of the scientists who develop the technologies and the caregivers who administer them. We must also ensure that our zeal for increased levels of function does not lead to the exclusion of those with disabilities.

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GOD AND GAIA: Science, Religion and Ethics on a Living Planet by Michael S. Northcott. New York: Routledge, 2023. 271 pages. Paperback; \$40.00. ISBN: 9780367627744.

Biodiversity loss, water pollution, and declining soil health are major indicators of the ecological crisis facing our planet today. Science can be consulted to address these issues; however, as Michael Northcott argues in his latest book, *God and Gaia: Science, Religion and Ethics on a Living Planet*, unless science resists its scientism it will only exacerbate the current ecological crisis.

Northcott, an ordained Anglican priest and Professor Emeritus of Ethics at the University of Edinburgh, has written extensively on environmental issues.¹ In *God and Gaia*, Northcott explores the Gaia theory of James Lovelock—that “the Earth and her creatures are active agents in the generation of conditions which make the Earth habitable for Life” (p. 2)—from a religious ethics perspective. In effect, “God” in the book title does not indicate that the author will be taking a specifically Christian angle on the Gaia