behind sexual identity and sexual attraction and summarizes which traits seem to be genetically based, or inherent, and which traits are currently evidenced as being socially influenced. His overview is honest, that science may not be unbiased in its assessment or agenda, and it is part of our role to think carefully about the information we hear. Although not a theologian, he gives a gentle discussion of several interpretations of biblical themes including traditionalist and revisionist interpretations. The role of church community is also described, with both positive and negative examples.

In closing, Jones again revisits the spiritual and scientific themes that have guided his life. His focus is not on a specific theological interpretation, or any specific philosophy. In fact, he created a bioethics center at his university to further bioethical discussions with participation by those with broad backgrounds and perspectives. In many of his chapters, he presents multiple perspectives to emphasize that these are not simple topics with simple answers, yet within this complexity his goal is to help people develop a "compass" and "a set of guardrails" (p. 165) as they navigate ethical topics and decisions.

Jones ends the book with a discussion of those who are sidelined or marginalized by expressing their views, especially when they are not considered mainstream. If we cannot speak with each other on topics in which we disagree, it is easy to push people out of conversations, push them to the margins. He talks about how people with contradictory views are pushed out of jobs or positions, whether in churches, corporations, businesses, or governments. It is important to continue discussions, to learn to listen to each other, even when we disagree. He closes with his two favorite verses again (cited above—Luke 18:17 and 1 Cor. 13:2), which nurture in us the humility to remember that we know only a little, and remind us of the limitations of our knowledge.

This book is a thoughtful read, and helpful for the reader who wants to think more clearly about, and better articulate, one's stances on bioethical issues. It does not give easy answers, because there aren't any, for, in many cases, there are competing ethical challenges. Indeed, the reader may leave the book with more questions than answers. Yet, it is hopeful—that we can grow in our faith while listening to and supporting others in the midst of such complex issues.

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**AS GODS: A Moral History of the Genetic Age** by Matthew Cobb. New York: Basic Books, 2022. 442 pages. Hardcover; $35.00. ISBN: 9781541602854.

It can sometimes be difficult to tell where science fiction ends and science begins when discussing developments in genetic engineering. Consider genetic manipulation of human embryos leading to heritable genetic changes in children, gene-drive-based disruption of whole ecosystems, and the creation of positive mutations in dangerous human pathogens. These are all experiments that have already been conducted. The children are born. The gene drives have been released. More virulent strains of deadly pathogens have been created.

In the introduction to *As Gods*, Matthew Cobb explains:

> My motivation in writing this book has been to explore my own fears about these three areas. Each of them worries me in different ways, but I recognize that many of my concerns are similar to those expressed by people faced with previous applications of genetic engineering, most of which turned out to be either exaggerated, or at least to be controllable by careful regulation and strict safety procedures. (p. 3)

*As Gods* recounts the major developments in the history of molecular biology, including the discovery of molecular tools (restriction enzymes, reverse transcriptase, etc.), the first recombination of bacterial and viral DNA, and the Asilomar Conference held to discuss the safety of recombinant DNA technologies.

Much of the first eleven chapters of the book covers the history of genetic engineering from the 1960s through the Covid pandemic. Attention is given in these chapters to the patenting and privatization of genetic products, the development of genetically modified foods, and attempts at gene therapy. In the second half of the book, Cobb dedicates space to the three concerns introduced at the start of this review. He offers two chapters (12 and 13) to the "botched experiment that mutated three healthy embryos" (p. 2) conducted by Dr. He Jiankui and one chapter each to the topics of "Ecocide" (chap. 14) via gene drives and "Weapons" (chap. 15) that result from mutating pathogens.

Throughout the book, Cobb recounts this history with a combination of keen historical investigation, personal narrative, and social commentary. Cobb has written other books of history (*Eleven Days in August* and *The Resistance: The French Fight Against the Nazis*) and other books on the history of science (*The Idea of the Brain: A History* and *The Egg and Sperm Race: The Seventeenth-Century Scientists Who Unravelled the Secrets of Sex, Life and Growth*). He is a skilled storyteller who has rigorously pursued the primary sources in order craft a narrative with characters, tension, and resolution.

But Cobb was himself present for some of these meetings and conferences. Entering the discipline in the late 1970s, he has been part of the community making these moral decisions and conducting the experiments. His own biological research involves a genetic investigation of the sense of smell in fruit flies. When he describes historical events to which he was not a personal witness, he often supplements the printed record with interviews of firsthand participants.

Throughout the book, Cobb continuously contextualizes the history he narrates within the broader culture that was shaping it. For example, in chapter 5, Cobb describes how popular culture directly affected the practice of science.

Harvard was considering plans to build a new genetic engineering lab. He writes,

> At the end of May 1976, there was a university-wide meeting to discuss the plans. This was attended by a Cambridge councilor, Barbara Ackermann, who just happened to have watched *The Andromeda Strain* on television the night before. *The Andromeda Strain* film she watched was based on the 1969 book by Michael Crichton that depicts a deadly outbreak of a novel pathogen. Alarmed by what she heard at Harvard, Ackermann raised the issue with fellow councilors. (p. 92)

The resulting delays to the building plans were so extensive that "by the time the building work was completed [the scientists were] able to do the experiments in ordinary laboratory space" (p. 97).

The author is not a passive narrator of the story. He has a clear perspective and is unafraid to share it. For example, in chapter 13, "Aftermath," when discussing people who support human embryo modification, Cobb writes,

> There is one gang of fantasists who mix cryptocurrency funding and transhumanist nonsense in a toxic, nauseating nightmare, claiming that they will use CRISPR germline editing to produce babies who will live to be "super-centenarians." (p. 274)

Throughout the book, Cobb's genuine concerns about advancements in genetic engineering are rooted in the same fear that has stalked the discipline since its inception: safety. Four times in this discipline, scientists have voluntarily paused their work and embraced a moratorium in order to develop means to conduct the research safely.

While the subtitle of the text describes the book as a "moral history," it offers more of a history of insufficient moral consideration regarding important moments in molecular biology. The field has been willing to consider how to progress safely, but there has been surprisingly little consideration of what experiments should not be done. As a book of history, it is not Cobb's responsibility to offer his readers a robust moral framework for evaluating advances in gene editing. Instead, the history he recounts illuminates the need for such a framework.

The striking title of the book comes from an essay by Steward Brand who said, "We are as gods and might as well get good at it" (p. 338). Cobb agrees, and adds, "In genetic terms at least, being a god is relatively straightforward these days; getting good at it is another matter" (p. 338). In recounting the moral history of this field, Cobb encourages us, the next generation of scientists taking up the discipline, to remember to consider why we do our experiments, not just how they are done. In the closing chapter, he implores us to remember that in genetic engineering, "we have a choice whether to employ it or not, whether to permit its development or not. Just because we *can* do something does not mean that we *should* [emphasis original]" (p. 362).

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## Evolutionary Theory

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**HIDDEN DEPTHS: The Origins of Human Connection** by Penny Spikins. York, UK: White Rose University Press, 2022. xiii + 456 pages. Paperback; £29.15. ISBN: 9781912482320. Electronic: Free under Creative Commons Attribution + Noncommercial 4.0 license, https://doi.org/10.22599/HiddenDepths.

In *Hidden Depths*, Penny Spikins explores the evolution of the positive emotional aspects of our humanity in the context of our relational connectedness with others. As an archaeologist, she documents the evolution of humans from the physical evidence found at archaeological sites, which she then relates to our modern behavior, to the behavior of hunter-gatherer cultures, and to past humanoids such as Neanderthals, as well as to the evolution of animals, of other primates, and of other social mammals such as dogs. By focusing on the evolution of positive emotions, for example, generosity, empathy, tolerance, and altruism, she gives the lie to Tennyson's description of nature as red in tooth and claw.

The book's layout is unusual: each chapter has its own abstract, summary, and reference list, somewhat like a series of journal articles put together into a volume; however the overarching work is coherent—the book builds its case in a logical and informative manner—and the issues are addressed well. The nine chapters are laid out in three parts: the first deals with the positive emotions within groups; the second addresses the benefits and costs of these positive emotions beyond immediate groups; and the last explores other potential human evolutionary pathways.

In Part 1, chapter 1, Spikins discusses the neurobiological basis for compassion and empathy, along with their evolutionary basis and advantage. Developing empathy in close-knit family groups leads to generosity and caring behavior. Human empathy is compared to empathic expression in primates, and to convergent evolution in other social species. Next, Spikins provides the archaeological evidence that human ancestors cared for their wounded and ill (as documented in the bones uncovered today). I found this second chapter provided essential insight into humanity's deep history with ideas I have not seen elsewhere. Then, in the third chapter, the impact of human interdependence on these positive emotions is reviewed, leading to a discussion of the importance of trust. These three chapters are based on early hominoid evidence, when we started diverging from other primates. The first part of the book thus covers our history from about two million to 300,000 years ago, when modern humans began to emerge.

Part 2 discusses the importance of positive human emotions in interactions with larger communities and how we moved from seeing others as a threat to seeing others as an opportunity for benefit, leading to increases in tolerance. Chapter 4 discusses the physiological changes that led to fewer avoidance behaviors and more approach behaviors.