Ethics and Science

Who owns your genes? What does climate science imply for policy? Do corporations conduct honest research? Should we teach intelligent design? Humans are creating a new world through science. The kind of world we are creating will not simply be decided by expanding scientific knowledge, but will depend on views about good and bad, right and wrong. These visions, in turn, depend on critical thinking, cogent argument, and informed judgment. In this book, Adam Briggle and Carl Mitcham help readers to cultivate these skills. They first introduce ethics and the normative structure of science, and then consider the "society of science" and its norms for the responsible conduct of research and the treatment of human and animal research subjects. Later chapters examine "science in society" – exploring ethical issues at the interfaces of science, policy, religion, culture, and technology. Each chapter features case studies and research questions to stimulate further reflection.

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Ethics and Science

An Introduction

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For Mom and Dad, who gave me the gift of a love for learning.

– Adam

For all my students, who (strangely enough) often seem like parents in the ways they stimulate my love for learning.

– Carl

Zwei Dinge erfüllen das Gemüt mit immer neuer und zunehmenden Bewunderung und Ehrfurcht, je öfter und anhaltender sich das Nachdenken damit beschäftigt: *Der bestirnte Himmel über mir, und das moralische Gesetz in mir.*

Two things fill the mind with ever new and increasing wonder and awe, the more often and persistently I reflect on them: the starry heavens above me and the moral law within me.

–Immanuel Kant, *Kritik der praktischen Vernunft* II, Beschluß
(*Critique of Practical Reason*, II, Conclusion) 1788

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Preface

This volume aims to introduce students of science and philosophy to issues that are sometimes thought peripheral to real science or real philosophy. As an introduction, it necessarily simplifies, hopefully in a manner that stimulates further reflection. With regard to those who doubt the centrality of ethics to science or science to ethics, our claim for centrality is argued from multiple perspectives. But most importantly, given the central influence of science on the character of the contemporary world and of ethics in human affairs, not to reflect on the ethics–science relationship is to limit self-understanding in the technoscientific human condition.

A brief word is in order here about how we conceive of both science and ethics as actors on the social stage. As for science, since the 1970s the interdisciplinary field of science, technology, and society (STS) studies has been arguing that science cannot properly be understood solely as a cognitive enterprise or method of knowledge production. Science is situated in economic, cultural, and political contexts that it both reflects and influences. Science and society co-construct each other through ideas and scientifically based technologies in ways that make ethics all the more relevant, even crucial, to the self-understanding of scientists. From an STS perspective, science must be recognized as technoscience, a view implicit in many of the arguments to be explored.

Ethics too is something more than theory and analysis. In the chapters that follow, ethics is understood to involve two mutually related tasks. First, it seeks to make explicit certain beliefs about human conduct in and in relation to science in order to commend efforts to live them out. This is what might be called inspirational ethics. As Aristotle says, ethics is concerned not just with knowing the good but in becoming good (*Nicomachean Ethics* II, 2, 1103b29). What is wrong with calling attention to important

beliefs about the good and then encouraging oneself and others to work toward enacting those beliefs?

Well, one might retort, how do we know those beliefs are the right ones to enact? There are, after all, a variety of beliefs about the good and about right conduct. This is where the second understanding of ethics comes into play. It might be called critical ethics. It points out that moral beliefs, including scientific norms, are themselves socially and historically constructed. This forces us to challenge our beliefs. With a different history or social context would they be the same? The possibility of alternatives promotes philosophical work to transform belief into knowledge – classically defined as justified true belief – by reflection and criticism. We can appeal to Aristotle again here, who was all too aware of the challenge that perhaps moral beliefs "exist only by convention and not by nature" (*Nicomachean Ethics* I, 3; 1094b17).

Yet to recognize the challenge need not lead to relativism or a skeptical rejection and paralysis. To replace unquestioned beliefs by questioned and questionable ones can also give birth to efforts to appreciate and enact their salience in new ways. Existential uneasiness about the foundations of belief need not give rise to nihilism, although it will commonly replace aggressive certainty in commitment with more nuanced action. One way of living out beliefs is exchanged for another. In its questioning, philosophy can sponsor taking up the good with deeper courage. Doubt can be an antidote to fanaticism that nevertheless grounds its own convictions.

At the close of the nineteenth century, William James contrasted science with ethics along these lines. In science, there is no pressing need to act, so it is better to remain skeptical and not make up our minds than risk believing a falsehood. But "moral questions" often cannot wait for "sensible proof." Here it may be necessary to risk error and act rather than continue to reflect. Of course, the extent to which this science–ethics contrast still holds in the context of twenty-first-century "Big Science" is itself something that should give pause.

There is thus at the heart of this book a paradox about the phenomenon or experience of becoming good: the more one wants to be good, the more one finds it difficult – the recognition of which, if one avoids cynicism and despair, is precisely part of becoming good. In some measure, the paradox was discovered in the writing itself, as we were forced to face the difficulties of being good in and with science. Our desire to do so grew in

proportion with our reflection on what this entails. It is a paradox learned rather than assumed, and one with a pedigree of learned ignorance that traces back to Socrates. Socrates never failed to ask questions.

To restate a point of importance: The practice of science or technoscience will depend on guiding ethical visions. The strength of these visions will depend, in turn, not solely on acceptance or affirmation but on reflective thinking, cogent argument, and informed judgment. The book in hand aspires to help cultivate these skills among people living today in a tangled web of ethics and science. To this end, *Ethics and Science: An Introduction* aspires

- to provide an informative (though necessarily selective) snapshot of emerging engagements in the co-construction of an ethical science, broadly construed;
- to promote critical reflection that brings science and its practices more deeply into the presence of ethics and philosophy; and
- to foster greater understanding, critical thinking, and open-minded dialogue among scientists and nonscientists alike, so as to contribute to a more self-aware and responsible democratic citizenry in a technoscientific age.

There are two near antecedents of this volume. One is the *Encyclopedia of Science, Technology, and Ethics*, a four-volume work edited by Mitcham with over 700 entries, many of which are obviously related to the present text. The other is Briggle's *A Rich Bioethics,* a monograph dealing in depth with one special aspect of the ethics–science relationship. Our collaboration began at one moment with the encyclopedia and on another, with early work that eventuated in the monograph. Briggle served as a research assistant on the encyclopedia; Mitcham was a member of the committee advising the dissertation that eventually became *A Rich Bioethics*. The fruitfulness of these endeavors led us to imagine collaboration on the present project.

A diversity of other articles and books also witness more extended origins. Over the course of the last decades both authors have ventured numerous discussions regarding science, technology, and ethics. No doubt arguments, ideas, and perhaps even phrases have been picked up from these other works – but with an effort to rethink and integrate them enough into the present volume that they do not require rigid citation.

Our initial idea was to do a monograph to bridge ethics, science, and technology. We continue to think such an interdisciplinary, synthetic book is needed. But after writing within that framework for two years it became too unwieldy. The result is that – given the intensity of an academic life overly blessed with opportunities for teaching, research, and service – we have worked on this project for more than five years, much longer than once anticipated. We credit the forbearance of Cambridge University Press as we worked our way slowly toward the volume in hand in the midst of many other activities and responsibilities.

This book has taken shape within a growing constellation of similar texts. Roughly, we see three types of books dealing with ethics and science:

- First, there are textbooks on specific aspects of ethics and science such as bioethics and research ethics. Construing science more broadly adds works on engineering ethics, computer ethics, environmental ethics, and more. Some of these, especially in the area of research ethics narrowly construed, are the product of commissions formed to draft reports, proposals, or curricula to promote ethics in science; others are anthologies.
- Second, there are extended monographic studies of particular cases and issues. A significant number of these deal at length with high-profile events. Examples include Gary Taubes' *Bad Science: The Short Life and Weird Times of Cold Fusion* (1993), Daniel Kevles' *The Baltimore Case: A Trial of Politics, Science, and Character* (1998), Eugenie Samuel Reich's *Plastic Fantastic: How the Biggest Fraud in Physics Shook the Scientific World* (2009), and Rebecca Skloot's *The Immortal Life of Henrietta Lacks* (2010).
- Third are more general analyses and arguments regarding the ethics of science or technoscience. This is a category with roots in the Enlightenment defense of modern science against religious or political control, but that began to take on new life and form in the twentieth century. Examples range from Henri Poincaré's *La valeur de la science* (1905) through Jacob Bronowski's *Science and Human Values* (1956), Everett Hall's *Modern Science and Human Values: A Study in the History of Ideas* (1956), and Hans Jonas's *The Imperative of Responsibility: In Search of an Ethics for the Technological Age* (1984) to Philip Kitcher's *Science, Truth, and Democracy* (2001).

Although the present book belongs primarily to the first category, more than most in that set it also incorporates perspectives from the second and third by placing research ethics in broad historical, sociological, and policy contexts. It considers responses to the challenges of scientific research as these have emerged in North America, Europe, and beyond – an especially important point given the increasingly global setting of scientific research and technological development. It regularly links science with its engineering and technological involvements, to the point of including a chapter on engineering ethics. It is also unique in its chapter on the place of science in culture and its chapter on attempts to give a scientific account of ethics.

Indicative of the importance we place on case studies, each chapter opens and closes with a case of some sort: initially to set the stage, finally to promote continuing reflection. These references to imaginative or real-world cases are designed to illustrate, in concrete fashion, the types of questions discussed in each chapter. References to the opening case are often woven into multiple sections of a chapter; end-of-chapter cases are designed at once to reflect back and to move reflection forward. At the ends of chapters there are also a few questions designed to stimulate further deliberation. All cases and questions can be further used as the basis for classroom discussions, quizzes, or research papers. The bibliography at the end of the book includes, for each chapter and case study, a few suggested texts we recommend for anyone wishing to learn more about the issues. Suggestions for Chapter 4 also include video and online resources that we have found helpful in teaching about the responsible conduct of research and research misconduct.

Chapters often cross-reference one another to lend coherence to the overall discussion. Yet each chapter is written so that it could be used independently. Chapters may thus be read in an order different than that in which they appear here. As explained in Chapter 1, chapters are also clustered in ways that suggest other use blocks.

One particular pedagogical practice we especially recommend is to make use of codes of ethics and other ethics declarations. The Appendix ("Ethics Codes") points readers to sixteen of the most influential codes and declarations. Ethics codes are sometimes frowned on by philosophers as simplifications that impede ethical reflection and by scientists as unnecessary. In a provocative study of medical and other procedural checklists, however,

Atul Gawande argues persuasively that clear directions and guidelines can improve performance of technoscientific tasks. Although Gawande does not extend his moral argument for checklists to include ethics checklists such as codes of conduct, the extension is easily made. In our experience, asking students to construct their own ethics codes or checklists can be a salutary conclusion to a class on ethics and science.

Another suggestive connection would be to link codes of conduct in the form of manifestos and constitutions with the formation of social movements. Ron Eyerman and Andrew Jamison, for instance, have argued for understanding social-movement behavior in terms of "cognitive praxis" – a term they use "to emphasize the creative role of consciousness and cognition in all human action, individual and collective."[1] The conscious articulation of codes of conduct can make its own contribution to such creativity.

For encouragement and assistance in writing *Ethics and Science* we first thank our students. Many chapters, sections, arguments, and ideas received trial runs in classes conducted at the Colorado School of Mines and the University of North Texas as well as in special classes and seminars at the University of Colorado, Boulder, University of Twente (Netherlands), Universidad Internacional Menéndez Pelayo and Universidad del País Vasco–Donostia/San Sebastian (Spain), European Graduate School (Switzerland), and Tshinghua University and Dalian University of Technology (China). Among scholar colleagues who have made special contributions through discussions or critical readings, the following deserve special recognition: Andoni Alonso, Thomas Boyd, Keith Brown, Sarah Fredericks, Robert Frodeman, Britt Holbrook, Thomas Kowall, Robert Mackey, René von Schomberg, Roel Snieder, and Katinka Waelbers. Douglas Dupler provided a critical reading of most chapters. Our copy editor James Thomas deserves further thanks. Doris Schroeder suggested the map metaphor in Chapter 2.

Finally, Hilary Gaskin, our editor at Cambridge University Press, has from start to finish exercised a strong guiding hand and contributed measurably to the character of the volume. In this age of too much self-edited electronic publishing, we are fortunate to have had an editor who worked with us at every step of the way to make the book better than it would have otherwise been.

[1] Eyerman and Jamison 1991, p. 3.