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Edited by H. Tristram Engelhardt and Arthur L. Caplan

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INTRODUCTION

Patterns of controversy and closure: the interplay of knowledge, values, and political forces

H. TRISTRAM ENGELHARDT, JR., AND ARTHUR L. CAPLAN

For some time the analysis of science by philosophers, sociologists, historians, and others has been dominated by discussions about theory change and development. Metascientific studies have not progressed far beyond bitter wrangles as to the adequacy of such concepts as “paradigms,” “research traditions,” “themata,” and “theories” for adequately describing developments over time in various fields of scientific inquiry. In many respects these disputes have shed a great deal of light on the manner in which scientific ideas change and evolve, but they have also obscured important questions that need to be asked about conceptual development in science in order to understand this process fully and to facilitate the formulation of public policy with respect to science and technology.

This volume takes as its focus the notion of controversy. Controversies characterize intellectual change and developments within and about science. Disputes among scientists and between scientists and laymen are easy to locate in the history of science. Moreover, controversies play a central role in the way those who do science and those who depend upon its findings approach the subject. By analyzing controversies in and about science, this volume seeks to advance the analysis of scientific change beyond the sterile and confining boundaries of current disputes concerning the role of internal and external factors in fueling scientific change.

Science, ethics, and politics are marked by controversies. As one would expect, the ways in which controversies in each area arise as matters of dispute and approach solution appear to be somewhat divergent. Scientific controversies, for example, are usually seen to be the sorts of disputes that are to be resolved by appeal to facts and to rigorous reasoning concerning facts. Political controversies are held, by contrast, to involve issues properly amenable to resolution by negotiation. Ethical issues fall somewhere in between. Some of them

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are viewed as issues resolvable by appeal to the nature of reason or morality; others, by appeal to the facts of the situation. In addition, they are regarded, at least at times, as properly resolved through common agreement. In a number of instances, all three genres of controversy are intertwined. Many scientific controversies have heavy political and ethical overlays.

This volume is concerned with controversies of the latter character. Disputes concerning the effectiveness of Laetrile as a cancer drug, the question of whether homosexuality is a disease, the nature of the risks associated with the use of nuclear power, and the character of hazards presented by workplace pollutants have been taken as case studies. General themes have been sought by comparing such studies with less political examples, such as the debates in geology concerning continental drift. The contributors include philosophers, historians, sociologists, physicians, and a lawyer, as well as natural scientists. The result is a geography of controversies, fashioned by exploring case studies in order to determine under which circumstances different forms of rationality are pursued with success or failure, as well as where, for extra-epistemic considerations (i.e., concerns other than establishing an empirical truth), particular controversies come to a close. In outlining the interplay among these concerns, this volume maps the relations among scientific, moral, and political interests. It focuses on the ways in which scientific debates with heavy political or ethical overlays come to be regarded as having been resolved.

In this volume we have used the term *closure* to indicate the conclusion, ending, or resolution of a controversy. The term trades upon ambiguities. We use it in the eighth sense given by the *Oxford English Dictionary*: "a bringing to a conclusion; end, close" (q.v.). This sense is noncommittal in that it does not specify the means by which closure is achieved. However, the dictionary also lists more specific meanings pertinent to the analyses in this volume. The sixth sense defines closure as "an agreeing upon terms, a coming to an arrangement *with*; agreement, union, unity" (q.v.). The ninth sense is relevant as well: "the closing of a debate in a legislative assembly by vote of the house or by other competent authority" (q.v.). One of the tasks of this volume is to suggest distinctions among the various ways in which controversies are brought to a conclusion: by negotiation, by political procedure, or by the means supposedly more usual in scientific controversies, namely, the appeal to facts and observations.

It has been widely assumed that scientific controversies, even those with a heavy political and ethical overlay, are amenable to closure by appeal simply to facts and the rational consideration of facts. Indeed

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there has recently been a resurgence of objectivist views of ethics supporting the hope that ethical controversies can be resolved on the basis of reasons that can bind generally.¹ Also, much of Western public policy has presupposed that scientific controversies are resolvable by rational analysis and the investigation of the facts. Science has been presumed to be objective.² Yet it has become ever clearer that cultural assumptions influence scientific reasoning and findings, even apart from controversies that have explicitly interwoven scientific, political, and ethical issues.³ As a result, the nature of scientific controversies with heavy political and ethical overlays has been thrown into question – a matter of some importance, since understanding this problem is central to many issues of public policy-making. The essays in this volume reassess aspirations to rationality in such controversies.

These essays spring from a three-year series of meetings held at the Hastings Center. These meetings focused on better appreciating the ways in which the inner logic of scientific investigation, predicated upon a concern with evidence and with reasoning on the basis of evidence, involves values and political concerns. In great measure this involved approaching once more the traditional externalist – internalist debates of the history and philosophy of science. It also required examining the extent to which the movement of science toward more ample and secure knowledge claims is shaped, directed, or impeded by forces external to science, such as the values and political forces of the scientist's cultural milieu. Here the focus of

¹ John Rawls, for example, presumes that his device of the original position and the use of reflective equilibrium can disclose generally rationally defensible understandings of justice. It is true that Rawls qualifies this claim in some passages. However, his theory of justice has supported a major revival of views concerning the general rational defensibility of ethical claims regarding justice. See John Rawls, *A Theory of Justice* (Cambridge, Mass.: Harvard University Press [Belknap Press], 1971). A number of analogous accounts have developed. See, for example, Bruce A. Ackerman, *Social Justice in the Liberal State* (New Haven: Yale University Press, 1980), and Norman Daniels, ed., *Reading Rawls* (New York: Basic Books, 1981).

² Although many qualifications are in order, Karl Popper has been taken to defend a view somewhat similar to this. See his *Logic of Scientific Discovery* (New York: Basic Books, 1959).

³ H. Tristram Engelhardt, Jr., and Daniel Callahan, eds., *The Foundation of Ethics and Its Relationship to Science*, 4 vols. (Hastings-on-Hudson, N.Y.: Hastings Center, 1976–8, 1980). See also Paul Feyerabend, *Against Method* (New York: Schocken Books, 1975); Norwood R. Hansen, *Patterns of Discovery* (Cambridge: Cambridge University Press, 1961); Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 2d ed. (Chicago: University of Chicago Press, 1970); Larry Laudan, *Progress and Its Problems* (Berkeley: University of California Press, 1977).

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concern was upon those scientific debates that have explicit and heavy ethical and political overlay, a condition that characterizes a great proportion of the scientific disputes that gain general public attention. The goal of the project was to achieve a better understanding of the character of scientific reasoning in areas where its controversies are of direct importance to both public policymakers and to the public in general, and in so doing to gain a better understanding of an important area of science. Since the conclusion of these meetings, the essays have been refashioned to permit further exploration of the interplay of scientific, ethical, and political concerns.

Scientific controversies with a heavy political and ethical overlay

One of the first problems in the analysis of a scientific controversy with a strong political or ethical dimension is to determine the actual number and nature of the controversies involved. There is the problem of the individuation of controversies. What appears at first glance to be only one controversy may under closer examination be resolvable into two or more controversies. One might think, for example, of the public dispute concerning Laetrile, which in part concerned the efficacy of Laetrile as a treatment for cancer, a point explored in this volume by Robert Young. In part this dispute also concerned the additional issue of the right to choose freely one's own course of treatment, an issue explored in this volume by both Robert Schwartz and Baruch Brody. Thus at least two quite different controversies were intermingled in this dispute, one involving rules for establishing a scientific claim and the other involving political rules regarding access to particular medications. These two elements are, in principle, both distinguishable and separable. They are intermingled in one debate out of historical accident, owing to the drug control laws of the United States.

This is as one would expect when scientific debates are drawn into or blended with political disputes. When it originates in a libertarian view of the right of individuals to self-medication, an appeal to the efficacy of Laetrile may be only a rhetorical ploy. Given a more statist view, the issues of efficacy and risk become more germane. As a consequence, the political discussion has its own complex history, drawing in part from libertarian concerns, in part from the suspicions of Americans regarding established elites (in this case, the U.S. Food and Drug Administration), and in part from the idea that the state should function to protect the best interests of its subjects. The controversy can only with qualification be understood as an argu-

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ment focused on what should count as scientific evidence and how one ought to reason on the basis of such evidence.

When one is involved in a conflict of political forces, one is not immediately concerned with finding *the* correct answer. One is interested, rather, in theories of the state and in conflict management, in the sense of finding the most prudent and efficient balancing of forces. A scientific controversy with a heavy political and ethical overlay is not, then, one controversy but a scientific controversy (or controversies) plus a controversy (or controversies) concerning social and political theories and viewpoints. This becomes quite evident, for example, in the history of the Laetrile controversy as sketched in this volume by Gerald Markle and John Peterson.

We need therefore at the outset to frame some preliminary distinctions among the various ways in which controversies can reach closure. This will allow us to make better distinctions among controversies, as well as among the roles of various knowledge and value claims, in characterizing disputes. Tom Beauchamp (Chap. 1, this volume) characterizes five modes through which controversies end.

1. *Sound argument closure*: occurs if, and only if, a correct position has been reached in a context of controversy, thereby rendering opposition views incorrect.

2. *Consensus closure*: occurs if, and only if, a consensus has been reached, in a context of controversy through a means other than sound argument closure or some form of procedure or negotiation, that some position is best and that opposition views are incorrect.

3. *Procedural closure*: occurs if, and only if, a controversy is terminated by formal, procedurally governed efforts to end the sustained discussion that characterizes the controversy.

4. *Natural death closure*: occurs if, and only if, a controversy has come to an end through a gradual natural death, as by fading away because of waning interest.

5. *Negotiation closure*: occurs if, and only if, a controversy is settled through an intentionally arranged and morally unobjectionable resolution acceptable to the principals in the controversy.

A similar classification is offered by Ernan McMullin. McMullin stresses the difference between the roles played by factors that the participants in the controversy regard as epistemic (knowledge-based) factors, and therefore internal to the very understanding of science, and those that are recognized as nonepistemic factors, and therefore external to the undertaking of science as an endeavor of rational, empirical investigation. It should be noted that what may appear as nonepistemic factors to some may be viewed by others as

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epistemic factors. The concept of “epistemic” is context-dependent. For example, for those who credited the epistemic claims of late medieval theology, the appeal to Church authority in the effort to resolve the controversies raised by Galileo counted as an appeal to epistemic, not nonepistemic factors. McMullin offers a three-part classification of the termination of disputes concerning science and technology:

1. *Resolution*: A controversy is resolved when an agreement is reached on the merits of the case in terms of what the participants take to be standard epistemic factors.

2. *Closure*: A controversy reaches closure when it is terminated on the basis of nonepistemic factors, such as the authority of the state; the pride, ambition, or laziness of a controversialist; or the withdrawal of publication facilities.

3. *Abandonment*: Controversies may terminate through participants losing interest.

Beauchamp’s and McMullin’s classifications, although they differ, are helpful because they underscore the different roles played in controversies by epistemic and nonepistemic factors.

Timeless truth, historical realities, and the context-bound nature of controversy

One view of scientific controversies presupposes them to be purely rational debates in which those disputing agree on (1) how to acquire evidence relevant to the dispute and (2) how to reason with the evidence in order to reach a rationally defensible conclusion that will resolve the controversy. Such controversies present the possibility of a sound argument closure, in Beauchamp’s taxonomy, or one of resolution, in McMullin’s classification. In the case of the Laetrile dispute, one might think of the Federal Drug Administration (FDA) and the scientific establishment as constituting a single community of controversy that reached a resolution of the question about the efficacy of Laetrile on the basis of commonly shared rules of evidence and inference. Such controversies are commonly alleged to be apolitical and impersonal.

In many reconstructions of disputes, it is as if the various political, economic, social, and psychological differences among the persons participating in the controversy did not matter. Instead, the participants become placeholders for anonymous reasoners. The paradigm is that of a grand syllogism reasoned through by the scientific community, viewed as the epistemic equivalent of the impartial, rational, fully informed observer posited in ethical theory. In terms of

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such a view, and given a faith in the knowability of reality, a final and true answer is sought, which should in principle be available to terminate the controversy.

The rules for acquiring evidence and drawing conclusions, however, change in science over time. One must, as a consequence, qualify scientific controversies with a sociohistorical subscript to identify a scientific controversy with a particular scientific community, its rules for selecting evidence relevant to a debate, and its rules for reasoning on the basis of such evidence. That is, a scientific controversy becomes identified with a particular scientific community, understood as a group of stakeholders in a scientific debate who at a particular point in history share common rules of evidence and inference.⁴ A scientific controversy in this sense of a rational dispute is bound to a particular group that defines the dispute through the group's understanding of the possibilities for solving the controversy. In this process, as Everett Mendelsohn shows, controversies are subjected not only to external but also to internal political forces. Scientific and professional authorities and their conflicts influence the character of scientific debates and their forms of resolution, so that even when scientific controversies are somewhat shielded from external sociopolitical forces, there are still social and political forces internal to communities of scientists that must be taken into account.

One sees the range of such influences when one compares, for example, the case studies in this volume of the geologists' debate concerning the theory of continental drift, sketched by Henry Frankel, and the biomedical discussions in the Soviet Union analyzed by Loren Graham. Moreover, many of the controversies turn on conflicting metaphysical assumptions and philosophical viewpoints that are themselves historically conditioned. Here – at least with regard to scientific disagreements between behaviorists and Freudians – Alasdair MacIntyre is in agreement with Mendelsohn's portrayal of the interplay among scientific goals and philosophical and metaphysical presuppositions. The final resolution of a scientific controversy, if such is to be available at all, often requires the resolution of philosophical problems, and these themselves are embedded in a history of controversy. Further, as Garland Allen emphasizes, economic and other class interests shape the character of scientific controversies, in part by influencing the views of participants, in part by influencing patterns of research funding.

⁴ By *rules of inference* we mean established warrants for drawing conclusions from evidence so as to bring closure to a dispute concerning the significance of the evidence.

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These forces bind the sociology and history of scientific controversies with the epistemologies of such controversies, as is shown in this volume by Dorothy Nelkin, Allan Mazur, and Robert Rich. One must also, as Ruth Macklin, Tom Beauchamp, and Ernan McMullin warn, distinguish among the various kinds of interests at stake in scientific controversies. In fact, because of the diversity of interests of the participants, one must decide whose controversy it is. This marks a departure from examining scientific controversies *sub specie veritatis*, (i.e., from “the” supposed point of view of the “truth”), where truth is seen as univocal, ahistorical, and the property of “the” scientific community, to viewing truth as defined by a particular community through its particular sociohistorically conditioned rules of evidence and inference. One might think of the way in which Charles S. Peirce identified “the” truth with the ultimate conclusions of the ultimate scientific community.⁵ One appeals to that community as an intellectual possibility in criticizing actual communities and their rules of evidence and scientific reference. The scientific community best able to make true knowledge claims is thus an intellectual standpoint from which one both justifies and criticizes the deliverances of any particular community. Indeed it is for this reason that a scientific controversy that ends with closure in McMullin’s terms (i.e., on the basis of social forces, not on rational grounds), perpetually invites the reopening of the controversy on rational grounds (at least, if the termination of the controversy was not also justifiable on rational grounds). Of course, there is the additional problem that over the course of time the grounds for rational resolution themselves change.

The prescriptive and descriptive senses of closure

Since science frequently makes (or at least many individual scientists make) universalistic claims of delivering or seeking to deliver “the” truth about empirical reality, and since in many scientific undertakings there is great cross-cultural and transnational agreement among scientists concerning which rules of evidence and inference ought to be employed, one may overlook the need to identify the particular community of scientists engaged in a dispute. One may act as though the controversy involved “the” scientific community rather than *a* scientific community. Since science seeks a univocal account of empirical reality, this notion of “the” scientific community can

⁵ Charles S. Peirce, “Pragmatism and Pragmaticism,” in *Collected Papers* (Cambridge, Mass.: Harvard University Press [Belknap Press], 1965), 5.311, 5.316.

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function as a regulative ideal, as a goal toward which the effort of scientists is directed, even though the goal itself is unattainable.⁶ Yet one will need to recognize that the study of the theories of knowledge of particular scientific communities must involve history and sociology, since the rules of inference and evidence are historically and socially conditioned. As a consequence, one can distinguish two senses of sound argument closure of scientific controversies on the basis of the kinds of sound arguments:

1. *Sound argument closure in the strict sense*, which is the ideal. It would occur on the basis of rules of evidence and inference unconditioned by the history or culture of the participants. This is a regulative ideal, never actually achieved, but to which one can appeal in indicating how particular “sound” arguments depart from this goal.

2. *Sound argument closure in the broad sense*, in which the rules of evidence and rules of inference are historically, socially, and culturally conditioned. Actual communities resolve scientific controversies by appealing to rules of evidence and inference that are, as far as can be determined by the participants, correct and undistorted by the presuppositions of the participants. Historians and philosophers of science will, however, be able to disclose distortions.

The first is an ideal, a goal used in attempting to frame an atemporal view of scientific reasoning, of how reasoning ought to occur apart from the influences of particular social and historical circumstances. The second involves the actual sociohistorically conditioned reasonings that exemplify any particular controversy (e.g., how one would have reasoned had one been a physician in the eighteenth century accurately following the views of Thomas Sydenham and François Boissier de Sauvages). When one compares groups of scientists participating in disputes, some will appear to be closer and others farther from sound arguments in the strict sense.

In the case of the Laetrile debate, for example, disparate sets of arguments have been invoked by at least two communities of scientists: (1) those agreeing with the scientific establishment’s rules for identifying and assaying evidence in terms of that establishment’s statistically disciplined modes of data gathering; and (2) those relying on more clinical methods that appear to support the possible effectiveness of Laetrile. And, as has already been noted, differences in modes of identifying evidence and of arguing from evidence were

⁶ Alasdair MacIntyre, “A Crisis in Moral Philosophy: Why Is the Search for the Foundations of Ethics So Frustrating?,” in *Knowing and Valuing*, H. Tristram Engelhardt, Jr., and Daniel Callahan, eds. (Hastings-on-Hudson, N.Y.: Hastings Center, 1980), pp. 18–35.

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intensified by the fact that many members of the nonorthodox scientific community were also members of political groups with special civil libertarian concerns regarding the right to self-medication. The existence of differing political interests not only marks such a debate with a special complexity; it tends to skew the evidence for each of the competing groups.

Economic interests play a similar role, as has been shown by the history of the economic competition between orthodox and nonorthodox physicians or even among various proponents of orthodox medicine. Consider, for example, the nature of the controversy that would be engendered by a full-scale attempt to determine the efficacy of chiropractic. That chiropractic still thrives, often providing its own diagnoses and therapies, is only in part a result of differing views about what counts as science. Differences in scientific methodology are intensified by differences in economic interest that influence the psychology of discovery so that data are seen differently or different data are given to the observers.⁷

This point can be put even more generally. Scientists do not engage in science as disembodied knowers, a point developed at length by Stephen Toulmin.⁸ Differences in views of proper scientific method are often conjoined with membership in conflicting interest groups. The interest groups may be political, economic, or structured around special concerns of prestige and special personal investments. Consider the debates regarding the comparative efficacy of coronary bypass surgery and medical management of coronary artery disease.⁹

⁷ One should not forget how difficult it is to free science from the distortions of cultural, moral, and other expectations. A good example is the nineteenth-century assumption that masturbation is a disease. Reputable physicians were convinced of the data showing that this habit was a serious danger to health. See H. T. Engelhardt, Jr. *The Foundations of Bioethics* (New York: Oxford, 1985), pp. 157–64.

⁸ Stephen Toulmin, "How Can We Reconnect the Sciences with the Foundation of Ethics?" in Engelhardt and Callahan, *Knowing and Valuing*, pp. 18–35.

⁹ See Glenda K. Barnes et al., "Changes in Working Status of Patients Following Coronary Bypass Surgery," *Journal of the American Medical Association* 238 (1977): 1259–62; Marvin L. Murphy et al., "Treatment of Chronic Stable Angina," *New England Journal of Medicine* 297 (1977): 621–7; K. Detry et al., "Veterans Administration Cooperative Study of Surgery for Coronary Arterial Occlusive Disease: III. Methods and Baseline Characteristics, Including Experience with Medical Treatment," *American Journal of Cardiology* 40 (1977): 665–71; G. M. Lawrie et al., "A Debate on Coronary Bypass," *New England Journal of Medicine* 297 (1977): 1464; G. M. Lawrie et al., "Improved Survival beyond Five Years in 1,108 Patients Undergoing Coronary Bypass," *American Journal of Cardiology* 41 (1978): 355; R. C. Read et al., "Survival of Men Treated for Chronic Stable Angina Pectoris," *Journal of Thoracic Cardiovascular Surgery* 75 (1978): 1–16; M. E. DeBakey and G. M. Lawrie, "Aortocoronary-artery Bypass: Assessment after 13