

BOOK REVIEW

CULTURE CLASH: LAW AND SCIENCE IN AMERICA, STEVEN GOLDBERG,
New York University Press (1994) (255 pages) (\$29.95).

Reviewed by
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In 1956, physicist C.P. Snow introduced his seminal observations on the split between science and the rest of the world in a series of lectures.¹ Snow noted that scientists and non-scientists constituted separate cultures and in assessing each other, formulated “misinterpretations which are dangerous.”² While citing such problems as world equality and economic development, both Snow and his contemporary, Bertrand Russell believed that the most immediate danger of the schism was global destruction through the new technique of atomic fission.³ These ruminations reflect an abiding fascination with science and its relationship to society, characterized by on commentator as seldom managing to bridge “the large and dark domain of public ignorance” which pervades the subject.⁴

In *Culture Clash: Law and Science in America*, Steven Goldberg revisits the “paradoxical” nature of science in the contemporary setting of post-cold war America.⁵ Goldberg, a Professor of Law at the Georgetown University Law Center claims that the paradox manifests itself in the wide financial and social support which science receives despite the fact that it frequently delivers ambiguous

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¹ See C.P. SNOW, *THE TWO CULTURES AND THE SCIENTIFIC REVOLUTION* 1 (1961) (citation omitted).

² *Id.* at 6.

³ *Id.* at 48; BERTRAND RUSSELL, *THE IMPACT OF SCIENCE ON SOCIETY* 75 (1953). Russell emphasized that a clear “choice [must be made] between Reason and Death. And by ‘Reason’ I mean willingness to submit to law as declared by an international authority.” *Id.* at 76.

⁴ Jacques Barzun, *Forward to STEPHEN TOULMIN, FORESIGHT* 9 (1961).

⁵ STEVEN GOLDBERG, *CULTURE CLASH: LAW AND SCIENCE IN AMERICA* 1 (1994).

or disappointing returns. Goldberg's thesis, similar to Snow's, is that while science and law dominate contemporary culture, their interaction is rarely considered, and hence often appears mysterious. When subjected to "cross-cultural" examination, these disciplines reveal very different goals and processes; however both law and science share a common ground at the point where the public becomes involved—either as a source of funding or as the recipient of its products. In either case, "the primary social testing ground for scientific developments with public policy implications" is the forum of public policy and law.⁶

Goldberg begins his analysis with the significant undertaking of offering comprehensive definitions of legal and scientific reasoning. These definitions are important, as they remain a theme throughout the book, and arguably constrain the development of its conclusions. Science, the author observes, is held in popular awe because of its seemingly progressive nature. It appeals to our collective intellects by representing a body of knowledge which is at once cumulative and testable against objective criteria.⁷ Goldberg admits that some "important modern scholars" would reject the simplicity of this definition in favor of a more culturally-dependent, cognitively relative version. Nonetheless, without further explication, the author dispenses with these revisionists as "even from this perspective, science ends up appearing a good deal more progress oriented than other fields of human endeavor."⁸

Consistent with this paradigm, the author characterizes science as a relatively cohesive community that reaches consensus through self-governance, based upon shared norms and a belief in the value of progress. An additional implication of this definition is that scientists derive primary satisfaction from the discovery of knowledge, and not from direct social approbation. In this light, the link between science and technology becomes tenuous, "whereas science can directly aid society [through practical applications], traditional scientists cannot rely on that as a sole or even fundamental motivation for their work."⁹ Scientists, in Goldberg's view, do science for the sake of science itself.

In contrast, law is described as not fundamentally concerned with knowledge for its own sake, but as a means of peaceful dispute

⁶ *Id.* at 5.

⁷ *Id.* at 8.

⁸ *Id.* at 8-9.

⁹ *Id.* at 13.

resolution.¹⁰ Consequently, law focuses upon social accommodation and procedural integrity, and is not amenable to the precision which accompanies scientific investigation. On the contrary, law's solutions are pragmatic and accommodating, frequently trading aesthetic elegance for acceptable results.

As an example of the legal process meeting scientific progress, the author explores *Daubert v. Merrill Dow Pharmaceuticals*.¹¹ Still the subject of controversy, the 1993 United States Supreme Court decision confronted the issue of whether "non-traditional" science, that is, techniques which are not "generally accepted within the scientific community,"¹² could be the subject of expert witness testimony. The question led to heated debate among scientists. The traditional scientists argued that "pseudoscience" or "junk science" should be excluded from the courtroom. In opposition were those scientists convinced that limiting this information would constitute dangerous censorship, perpetuating a stifling scientific orthodoxy. In the end, the court crafted a judicial compromise, holding that scientific acceptance, publication, and testing were indeed factors in the consideration of scientific testimony. Nevertheless, the task of admitting such evidence was committed to discretion of the trial judge.

Goldberg uses *Daubert* as an example of a relatively painless resolution of a law and science conflict. The author convincingly argues that in such situations, "[t]here is no reason why lawyers and scientists cannot comprehend the different nature of the other's work and appreciate it when it is being done well."¹³ While many problems can be reconciled within the framework of compromise, more intractable issues "arise when law and science begin to infringe on each other's turf."¹⁴ This situation occurs, the author explains, when the values held by lawyers collide with those which animate scientists. Not surprisingly, these instances usually occur when there is social concern around an issue involving high levels of technical information. The author expands upon this premise by presenting contemporary conflicts which in his opinion, "arise largely from vastly different legal attitudes toward basic

¹⁰ *Id.*

¹¹ 113 S. Ct. 2786 (1993); see GOLDBERG, *supra* note 5, at 20-23 (examining *Daubert*).

¹² The "generally accepted" criteria, known popularly as the *Frye* test, is derived from *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

¹³ GOLDBERG, *supra* note 5, at 23.

¹⁴ *Id.*

research as opposed to the application of that research."¹⁵

Professor Goldberg offers a comprehensive and worthwhile overview of science's intimate involvement with the American experience. He traces America's collective fascination with science to our Constitutional Framers' intrigue with the Enlightenment.¹⁶ The discoveries of Newton and Galileo not only changed science, but served as the inspiration for citizen-scientists such as Jefferson, Franklin, and Rush, who believed that the tenants of knowledge and progress provided fundamental tools for the construction of an effective democracy. For the author, the most dramatic impact of the sciences upon government takes place within the Constitution, specifically within the First Amendment.¹⁷

A review of early Constitutional writings reveals that the Framers held fast to the belief that scientific progress was concurrent with the preservation of civil liberty.¹⁸ The author concisely lays out writings of Jefferson and other founders which detail the need to protect scientific advancement by guaranteeing non-interference in its ability to publish. Goldberg illustrates how this concern has not been lost in the courts, citing *Roth v. United States*¹⁹, among other cases, to demonstrate how such competing and contentious value judgments as obscenity are dealt with safely outside the forum of scientific inquiry.²⁰

In addition to the passive protection, Professor Goldberg shows how the early Congress, working in conjunction with perceived Constitutional dictates, set precedents for active governmental support of scientific and quasi-scientific endeavors such as military research, weights and measures, surveying, and the promotion of invention.²¹ Aside from these activities, which are justified through the Constitution's national defense clause,²² Congressional coinage power,²³ and the patent clause,²⁴ the author demonstrates a more subtle, but equally pervasive, link of science to the improvement of general welfare through Congress's spending power. This wider power first manifested itself in the creation of

¹⁵ *Id.*

¹⁶ *Id.* at 26 (citations omitted).

¹⁷ *Id.* at 28.

¹⁸ *Id.* at 28-29.

¹⁹ 354 U.S. 476 (1957).

²⁰ GOLDBERG, *supra* note 5, at 29.

²¹ *Id.* at 31-32.

²² U.S. CONST. art. I, § 8, cl. 12.

²³ U.S. CONST. art. I, § 8, cl. 5.

²⁴ U.S. CONST. art. I, § 8, cl. 8.

the Department of Agriculture and land grant colleges.²⁵

From early federal involvement to present governmental initiatives, science has enjoyed a privileged political position, which is consistent with what the author terms its "central role" in the American tradition.²⁶ Scientific research has been vested with bipartisan approval as a necessary force for social equality, progress, and hope. Consequently, Congress has accorded unique legislative status to the funding and regulation of scientific projects.

The foremost method of governmental funding of scientific research is through agency regulation. Goldberg notes that "agency control over science funding is so well established that deviations from the pattern attract considerable attention."²⁷ According to the author, this arrangement reflects a long-held belief that science should not be the pawn of special interests or political agendas. In the majority of situations, this arrangement is advantageous to the public for "it is in fact true that expert agencies are better able to manage incremental decisions in this field than are elected officials."²⁸ Goldberg finds none of this broad delegation to be problematic, and reminds the reader that not since the 1930's has the Supreme Court found any congressional delegation to be unconstitutional.

Given the substantial interconnection between science and the federal bureaucracy, it may be surprising that there is no single supervisory entity or "Department of Science." Goldberg believes that the absence of this type of entity is beneficial, as agency liaison assures the bi-directional flow of information between Congress, the executive branch, and science practitioners. Moreover, the ubiquitous and diverse administrative system of scientific funding works, according to Goldberg, protect research from "undue [political] pressure for immediate results."²⁹ Without such insulation, basic research might quickly become the victim of ephemeral budgetary and policy concerns, possibly leading to disastrous results like Lysenkoism.³⁰

Goldberg states that the arrangement that characterizes agency-based scientific funding presents an extraordinary situation

²⁵ GOLDBERG, *supra* note 5, at 36-37.

²⁶ *Id.* at 38.

²⁷ *Id.* at 45.

²⁸ *Id.* at 46.

²⁹ *Id.* at 51.

³⁰ *Id.* at 53. Specifically, Lysenkoism was the use of political pressure to exclude modern Western genetics from Soviet research endeavors, thus impeding the progression of this field. *See id.*

that is non-existent in other administrative contexts. Indeed, in reviewing agency decisions, Goldberg posits that the courts have abdicated any control. The source of this uncommon forbearance can be traced to the process of peer review which dominates the allocation of scientific funding. Unlike conventional competitions, this method is unique in that it is not adversarial in nature. Rather it relies greatly upon the stature of the applicant and her standing within the scientific community. As with Goldberg's definition of science itself, peer review decisions are based upon consensus and community self-governance.³¹ Thus, Goldberg explains, when "those decisions are challenged in court, the research agencies who are being sued argue vigorously and successfully that outsiders should stay on the outside."³²

To support his claim, Goldberg offers examples of court decisions which allowed wide agency latitude in granting or denying funding applications. In one case, the applicant, called to military service, returned to find that the Veteran's Administration had cancelled his research grant, seemingly due to the existence of negative rumors regarding the quality of his work. In reviewing the matter, the court of appeals declined to reach the merits, invoking a seldom-used provision of the Administrative Procedure Act that exempts from review agency action committed in its discretion.³³ For the author, this case stands for the proposition that even if charges of inter-collegial slander and conspiracy are incorrect, they remain outside of the judiciary's self-defined sphere of review.³⁴

Through these observations, Professor Goldberg illustrates how basic scientific research is fostered through unique legal protection. In contrast with other administrative law matters, such as Social Security benefits claims, scientific research appears very much immune from heavy judicial scrutiny. Consistent with his earlier claim regarding the special place of science in American culture, the author claims that "[t]he fundamental reason for this abstinence is that the area of basic scientific research is one of the few in American life in which something approaching consensus still exists."³⁵ Thus, through Constitutional and administrative pro-

³¹ *Id.* at 56-59.

³² *Id.* at 57.

³³ See *Kletschka v. Driver*, 411 F.2d 436, 440-41 (2d Cir. 1969).

³⁴ The author cites additional cases to demonstrate instances of "judicial abdication," including allegations of sexual and political viewpoint discrimination and unreasonable preference in choices of investigative subjects. GOLDBERG, *supra* note 5, at 59-61.

³⁵ *Id.* at 66.

cess, Goldberg convincingly demonstrates how the law has engaged in a form of social engineering, relinquishing any claim to power in favor of the unencumbered ability of science to proceed at its own pace and presumably, to contribute to the greater progress of the nation.

Goldberg offers similar observations in his review of science's relationship to religion. The author offers concise examples to demonstrate that throughout American history, the law has favored scientific progress, even against formidable pressure to do otherwise. Characteristically, this predilection is traced to the Framers' embracement of Enlightenment principles.³⁶ Jefferson, Madison, and Franklin are shown not so much to be anti-religious, but cautious in the face of historical ecclesiastical suppression of scientific progress. Thus, states Goldberg, "the Jeffersonian wall between church and state was designed in part to protect American Galileos."³⁷

In modern times, this protection can be observed in the evolution controversy. Goldberg presents the decision of *Epperson v. Arkansas*,³⁸ a challenge to a state statute prohibiting the teaching of evolution, as an example of how the Supreme Court has dealt with perceived threats to science in the name of religion. According to Goldberg, although little evidence existed in the record to indicate that the statute was enacted for religious purposes, the Court nevertheless found such an intent.³⁹ Significantly, an amicus brief was submitted and signed by 179 scientists urging this conclusion.⁴⁰

More recent challenges to evolutionary theory, in the form of "creationism," have met with similar results. In the 1987 Supreme Court case of *Edwards v. Aguillard*,⁴¹ the scientific community, including seventy-two Nobel Laureates, filed briefs urging the Court to reject the view that a literal interpretation of Genesis enjoyed equal footing with evolutionary theory. According to form, the Court struck down the Louisiana statute mandating identical treatment and found, consistent with *Epperson*, a state-sponsored religious purpose.⁴²

Goldberg argues that scientific challenges to religion succeed due to the value assigned to science by the courts. This observation

³⁶ *Id.* at 69.

³⁷ *Id.* at 71-72.

³⁸ 393 U.S. 97 (1968).

³⁹ GOLDBERG, *supra* note 5, at 74.

⁴⁰ *Id.*

⁴¹ 482 U.S. 578 (1987).

⁴² GOLDBERG, *supra* note 5, at 76-77.

is given further weight by his consideration of establishment clause challenges to state sodomy laws, which uniformly fail.⁴³ Religion, in the author's opinion, is deeply involved in our social view of homosexuality and is supported by the courts in this instance. Thus, "[t]he establishment clause cannot be understood solely as a statement about religion; its content depends upon the context in which religion is operating."⁴⁴ In the *sui generis* realm of scientific endeavor, it appears clear that the context powerfully favors its advocates.

Although it is clear that a preference exists for the role of scientific research within American society, the exploration of scientific application is altogether different. Goldberg effectively demonstrates that conflict results when science encounters the sphere of public policy, and law-intensive resolution becomes the foremost priority. Unlike funding decisions, regulatory agencies do not stress consensus or peer review.⁴⁵ Rather, institutions such as the Environmental Protection Agency and the Nuclear Regulatory Commission "tend toward the adversary approach that mirrors legal norms."⁴⁶ Likewise, the courts assume an entirely different and greatly more active role in the supervision of the dissemination of science.

This differential is termed a *regulatory gap* by the author, as the substantial chasm between basic research and eventual application.⁴⁷ Where in the former instance, basic science is left by tacit agreement to the community which conducts the work, the product which affects the public is the subject of intense interest and judicial evaluation. A necessary byproduct of this delineation is a conflict between scientific and legal values, making "the transition from theory to practice in the realm of science and technology . . . remarkably rocky."⁴⁸

With this pronouncement, Goldberg introduces a preeminent theme of his book: the necessity for *science counselors*.⁴⁹ According to the author, these individuals would be scientists pursuing active research. These scientists also would be sensitized to social issues affecting their endeavors. Unlike more "visible" science advocates, science counselors would not leave their laboratories, but would

⁴³ *Id.* at 77-78.

⁴⁴ *Id.* at 78.

⁴⁵ *Id.* at 89.

⁴⁶ *Id.*

⁴⁷ *Id.* at 94.

⁴⁸ *Id.* at 95.

⁴⁹ *Id.* at 103 (citation omitted).

continue to practice science. Goldberg enunciates, “[t]hey may be ordinary scientists who have absorbed the notion of social constraint into their very concept of what a scientist does.”⁵⁰ Goldberg follows this proposition with a set of diverse examples to demonstrate that the modern regulatory gap is vast and has “tremendous consequences for public policy in America today.”⁵¹ Goldberg accentuates the need for science counselors in his examples.

The first example which Goldberg offers is the Human Genome Initiative. This “massive government undertaking” involves the microscopic mapping of the human structure.⁵² As is characteristic for all examples in the book, the author presents a careful explanation of the specific techniques involved and quickly links them to probable social implications. In the case of genetic mapping, Goldberg points to the de-centrality of the endeavor as dictated by the fragmented structure of basic science funding. The author notes that the multiplicity of funding agencies may encourage choices available for specific research, but also cautions that such plurality will make future regulatory policies more difficult.⁵³ Issues involving questions of privacy versus public health will no doubt come to the fore as will problems regarding the deterministic aspects of genetic modeling and the ethical quagmire of eugenics. These difficult questions can be aided, states Goldberg, through the liaison of science counselors “trying to perform the important function of calming down public expectations about what genetics can do and of pointing up some dangers in pushing genetic capabilities to their limits.”⁵⁴

Similarly, nuclear fusion has been the focus of popular enthusiasm as a future energy resource. Goldberg succinctly describes the fundamentals of this technology, with careful attention to the programmatic aspects of its development.⁵⁵ According to the author, science counselors have already helped lay foundations for this technology’s introduction; however, the regulatory gap, in his opinion, will be dramatic if fusion is ever introduced into mainstream use. A primary stumbling stone will be choices involved in the type of confinement system that will be employed.⁵⁶ According to Goldberg, this problem will occur because the current legal

⁵⁰ *Id.* at 106.

⁵¹ *Id.* at 96.

⁵² *Id.* at 112.

⁵³ *See id.* at 120.

⁵⁴ *Id.* at 129.

⁵⁵ *Id.* at 132-34.

⁵⁶ *Id.* at 136-38.

processes are not structured to pressure the scientific community to consider which of the possible alternatives will be socially acceptable. Specifically, Goldberg points to the failure of Congress and the courts to provide adequate methods of technology assessment, including the development of early environmental impact statements.⁵⁷

A final example of science and legal policy comes from the field of artificial intelligence.⁵⁸ Goldberg devotes considerable attention to the fascinating developments in computer-based cognition. It is beyond the scope of this review to detail each segment of this exploration; however, important parallels are drawn between our developing conceptions of human awareness by and through technology. Specifically, the author provides interesting insights into the current debate concerning the legal definition of death, skillfully contrasting contemporary thought about the dynamics of human interaction with recent studies regarding computer cognition.⁵⁹ This chapter, well worth reading in its own right, provides perhaps the most imaginative and convincing argument for the need of professionals educated in both law and science to help society confront the fantastic possibilities that technology will present.

Through example and analysis, Goldberg presents a compelling portrait of science and law as separate in character, but mutually reliant. Modern science provides society with the hope—and often the reality—of progress. Law shields scientific research from interference by religious zealotry and the normal demands of the political process. When hypothesis is transformed into application, law allows for the voices of society at large to be heard and weighed against the purported benefits of the technology. Goldberg correctly states that this relationship is “deeply embedded in our laws and custom.”⁶⁰ His own evaluation of the situation is not critical of this two-tiered situation, and his suggestion of a science counselor reflects a desire to maintain the “freedom” of basic research by keeping it insulated from “outside” interference.

This quiescence is not without its problems. Goldberg does not dwell on contemporary sociological work, which presses the need to critically question “not merely how science works but whether science is working as well as it could, especially given the

⁵⁷ *Id.* at 139.

⁵⁸ *See id.* at 151.

⁵⁹ *See id.* at 172-77.

⁶⁰ *Id.* at 179.

ever-changing and ever-more-important roles that science plays in society."⁶¹ One aspect of this *social epistemology*⁶² is the question of to what degree science ought to be accountable to its consumers. To the extent that basic science research remains isolated from the public forum, a status which Goldberg seems to support, there will remain not only a gap between technology and development, but between science and the rest of the world.

While certainly basic science must be encouraged by a sort of trust relationship with the community-at-large, this arrangement need not be as lopsided as Goldberg suggests with his science counselor proposition. Drawn only from the ranks of scientific practitioners, it is questionable as to how bilateral the counselor-layperson dialogue will be. It is equally troublesome to note that while Goldberg supposes that scientists can become educated in the issues of law and policy, he apparently does not accord similar ability to professionals from the legal community. The entire issue of the desirability of encouraging or discouraging this type of isolation is, of course, too great for the scope of this review, but it is one which might have been a worthwhile consideration in the work. It is certainly linked to the issue of law and the future of science for "[w]ithout succumbing to anti-intellectualism, a democratic society must always be suspicious of conceptions of knowledge in which the most valued forms of knowledge are the least accessible . . . only to an elite set of consumers (e.g. other professional knowledge producers and, indirectly, their patrons)."⁶³

Equally troubling is Goldberg's apparent readiness to accept that the scientific research process is without internal fault or the need for closer scrutiny. Initially, it is clear that the advent of such modern processes as gene-splitting and nuclear research can cloud the borders between applied and basic sciences. A mistake in a "basic science" experiment may have profound societal effects of, until recently, unthinkable proportion. This reality, at the very least, provides a cautionary note to the proposition that basic research does best when left to itself.

On a more metaphysical level, there is deep controversy as to whether basic science itself is as "pure" in character as most of its biographers and apologists have assumed.⁶⁴ There exist numerous

⁶¹ Steve Fuller, *Social Epistemology and the Research Agenda of Social Studies*, in *SCIENCE AS PRACTICE AND CULTURE* 390, 395 (Andrew Pickering ed. 1992).

⁶² *Id.* at 391.

⁶³ *Id.* at 397 (citation omitted).

⁶⁴ See, e.g., MICHAEL POLANYI, *PERSONAL KNOWLEDGE* (1957).

studies which suggest that research is conducted with internal, political agendas and in variance with avowed norms and standards.⁶⁵ Such questioning has great implications in society's decision regarding at what stage to regulate, and "[i]t is easy to fail to see the need for regulating science if we presume that science generally works as it ought to."⁶⁶

None of these observations is intended to detract from the usefulness and creativity found in this book. In all, Professor Goldberg has made an important contribution to the study of law and science. Its focus on modern content makes it highly readable and relevant to this new field which promises to grow within the coming years.

⁶⁵ See generally Joan H. Fujimura, *Crafting Science: Standardized Packages, Boundary Objects, and "Translation"*, in *SCIENCE AS PRACTICE AND CULTURE* 168 (Andrew Pickering ed. 1992).

⁶⁶ Fuller, *supra* note 61, at 407.