

Science's "New Garb": Aesthetic and Cultural Implications of Redesign in a Cold War Context¹

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New

On January 9, 1958, President Dwight D. Eisenhower delivered his State of the Union Address to the American people. Written in great part as a response to the Soviet Union's October 1957 launch of Sputnik, Eisenhower's speech acknowledged what he and many Americans perceived as a realignment of the world's political and geographic boundaries. Evaluating this astounding turn of events, Eisenhower observed, "Every human activity is pressed into service as a weapon of expansion. Trade, economic development, military power, arts, sciences, education, the whole world of ideas—all are harnessed to this same chariot of expansion." Referring to the organizing efforts of the Soviets, he continued, "The Soviets are, in short, waging total cold war."² In order to confront the specter of cold war, Eisenhower proposed that the United States would have to put the sciences in service to trade, economic development, and the military. The President concluded by observing: "The only answer to a regime that wages total cold war is to wage total peace. This means bringing to bear every asset of our personal and national lives upon the task of building the conditions in which security and peace can grow."³ On the road to peace, science and science education were two especially important areas that Eisenhower earmarked for increased government funding.

One year later, in the January 1959 issue of *Science*, Special Assistant to the President for Science and Technology James Killian Jr. reported, "He [Dwight D. Eisenhower] emphasized the importance of strengthening science education and of bringing our overall scientific and technological effort up to peak performance."⁴ This was, without doubt, good news for scientists and scientific research. Killian concluded: "As a result, the Science Foundation has been able to increase its support of basic research and expand its programs for science teacher training and other efforts contributing to the quality of science education."⁵

Killian's report was well received by the readers of *Science* and its publisher. Yet, in spite of a perceived threat from the Soviets, there were members of the scientific community and the American public who were deeply skeptical about the underlying motivations for expanding the role of science in the United States. Talk of a

1 I am greatly indebted to my colleague Ann Sobiech-Munson. Her willingness to read through an early draft of this article and to offer comments helped to further extend my thoughts. Part of the research for this article was funded by a grant from the Bioethics Program, Iowa State University, and by a 2006 postdoctoral fellowship at Dartmouth College. A version of this article entitled "Visual Style and Forms of *Science* in the Cold War" is forthcoming in *Visible Culture: Visual Narrative and Design Artifacts* Leslie Atzmon, ed. (Parlor Press). All efforts were made to contact the appropriate parties and to request permission to reproduce images appearing in this article.

2 Dwight D. Eisenhower, *State of the Union, 1958*, January 9, 1958; cited January 16, 2006, and available from: www.ku.edu/carrie/docs/texts/dde1958.htm.

3 Ibid.

4 James R. Killian, "Science and Public Policy," *Science* 129:3342 (January 16, 1959): 130. Prior to his post in the Eisenhower Administration, Killian had been president of the Massachusetts Institute of Technology between 1949 and 1959. Before that, he was editor of MIT's alumni journal *Technology Review* from 1930 to 1939.

5 Ibid.

more secure and peaceful society through science was countered, as Killian observed, by complaints that science only contributes to the “convenience and comfort of life, and not to its quality.”⁶ Killian countered such pessimism with the claim that “[s]cience has had a major part to play in shaping [a] basic American faith in creative change and improvement.”⁷ He continued, “My purpose is to stress the importance of those aspects of science which enhance the quality of our society; which encourage individuality in the midst of standardization; which enhance man’s excellence and dignity as well as his productivity.”⁸ Of course, the doubts raised by critics of the “better life through science” pitch expressed a deep anxiety about the expanded role of science and its adverse effect on culture: surely, human autonomy was threatened by the homogenizing tendencies of the scientization of culture. Killian pulled no punches in his response.⁹ Exploiting the mythos of manifest destiny, he asserted that, “If research is to flourish, these traditional American beliefs in the validity of progress become increasingly important.”¹⁰

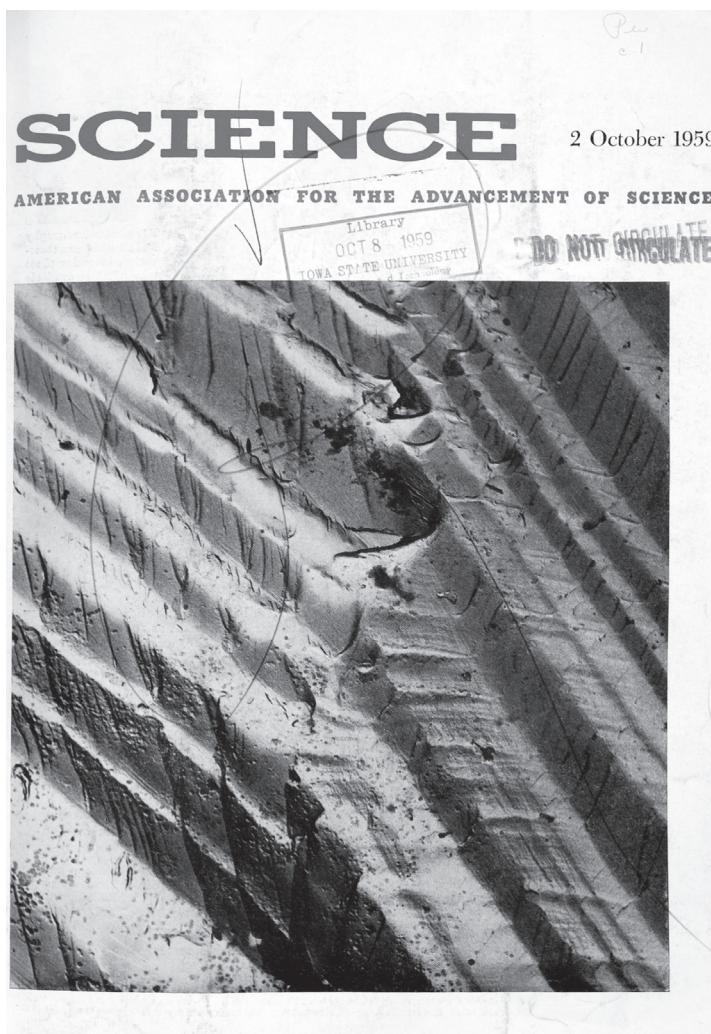
As if in response to a newfound value for science in American culture, the editorial board of *Science* voted that same year to redesign the journal. The decision resulted in the public circulation of a more appealing image of science. Yet, accounts of the “paratextual” alteration did not acknowledge the timeliness of a new direction for science research and funding in the United States.¹¹

In his editorial for the October 2, 1959, issue of *Science*, Graham DuShane introduced the redesign of the journal to its readers. (Figure 1) Entitled “New Garb,” the text explained the circumstances and decisions that led up to the new design, and described what readers could expect now that changes had been made. In addition to the increase in the size of individual copies (48 pages to 64 pages) and the rise in advertising placements, DuShane commented, “The most immediately obvious change is the cover.”¹² The introduction of a heavy stock, separate cover resulted from two innovations that addressed the reader’s interest. The first innovation was that the American Association for the Advancement of Science (AAAS) now could mail the journal to subscribers without the additional process and expense of wrapping and folding (which previously was required with the old self-cover). The second innovation would, in DuShane’s words, “permit us to carry cover pictures of subjects of scientific interest.”¹³ This was the greater attraction of the two for the subscriber. The new photo-cover required that the former display of the contents on the old cover move to the third inside page, a location that would remain for easy access, DuShane promised, in subsequent issues. This shift from text to image was a crucial editorial modification: it was a refashioning of the cover from the communication of the journal’s contents to a far less data-directed profile. As DuShane further clarified, “Some of these [images] we will draw from articles that we are publishing, but the great majority will have come from other sources.”¹⁴ While all of

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- 6 Ibid., 133.
 7 Ibid.
 8 Ibid., 136.
 9 Killian did not cite particular critics. The validity of “better life through science,” however, was sharply criticized by Daniel Boorstin in *The Image: A Guide to Pseudo-Events in America* (New York: Atheneum, 1971 [1960]).
 10 James R. Killian, “Science and Public Policy,” 136. A decade earlier, Harlow Shapley, president of the AAAS, criticized the “evil” phrase “manifest destiny” in Harlow Shapely, “Why Amend the Golden Rule?” *American Scholar* 17 (Spring 1948): 138. As Jessica Wang explains, the AAAS was not always invested in cold war ideology. Shapley’s “internationalism” was one such example of progressive leadership of the AAAS. See Jessica Wang, *American Science in an Age of Anxiety: Scientists, Anticommunism, and the Cold War* (Chapel Hill: University of North Carolina Press, 1999), 122–23.
 11 By “paratextual,” I mean the graphic design devices and publishing conventions that constitute the mediation of image and text in the form of a newspaper, magazine, catalogue, book, poster, brochure, or Website to an audience. Paratextual elements encompass every aspect of print media that comprises its delivery to and reception by an audience. “Paratext” is the material-visual thing on display in the bookstore, shelved in the supermarket, on the computer desktop, or open in a reader-viewer’s hands. See Gerard Genette, *Paratexts: Thresholds of Interpretation* (Cambridge: University of Cambridge Press, 1997).
 12 Graham DuShane, “New Garb,” *Science* (October 2, 1959): 829.
 13 Ibid.
 14 Ibid.

Figure 1

Cover of *Science* October 2, 1959. Reprinted with permission from AAAS.



the images reproduced on the “new” cover of *Science* were scientific in nature, more often than not, their origin from “other sources” left the cover of *Science* incidental to its contents.

Perhaps this is the reason why DuShane chose to refer to the redesign as “new garb,” meaning an external wrapping of a distinctive or elegant sort, and implying grace and style of presentation. The decorum of new introductions and reacquaintance in the editorial was, however, interrupted by a seemingly unusual caveat. As a way of accounting for what some avid readers—especially those from within the scientific community—may have seen as a frivolous alteration to a beloved organ of the AAAS, DuShane coyly confessed, “We feel something like an elderly lady (after all, we were born in 1883) who has ventured to appear in a somewhat more daring gown than has been her custom.”¹⁵ From his vague admission, we can take the decision of the editorial board’s adoption of a “new garb” for the journal as an attempt to revitalize the somewhat stiff delivery of traditional approaches to science reporting and research. “Like such

15 Ibid.

a lady," he continued, "we hope our new garb meets with favor; unlike her we won't mind sharp and constructive criticism."¹⁶

It is likely that, when writing for a primarily male audience in the late 1950s, DuShane's odd metaphors of lady and garb connoted grace and economy of means. The new, streamlined body of the journal, however intrepid, required less effort on the part of the reader, his attention easily directed toward the cover's bold image. In orthodox modernist terms, the use of photo-reproductions on the cover of *Science* more efficiently and immediately conveyed scientific information when compared to the old-style display of contents on past covers. Certainly, the old covers suited the scientific community, but were less attractive to the lay reader. Hence, the metaphor of daring female clothing to describe the new direction of the magazine, which signified its intended attention-getting purpose.¹⁷

While DuShane attributed the aesthetic change to the increase in the size of the journal, other events coincided with the redesign. These events linked the aesthetic turn of *Science*—from text to image—with the optimism of scientific progress and the urgency of cold war politics in the late 1950s.

I wish to position the 1959 redesign of *Science* within the context of the flourishing of research and an unwavering belief in progress. On the one hand, *Science's* "new garb," as DuShane referred to the change, responded to new initiatives and increased funding for scientific research. Such a response was an investment in the visual and aesthetic perspicuity of graphic design in communicating scientific discovery and knowledge. On the other hand, the aesthetic update of *Science* existed within an intermediate zone as an empirical trace of underlying realities exposed by new technologies of visualization and as signs of cold war ideology. In this, as I will argue below, images reproduced on the covers of the journal introduced dressed-up dreams of a future utopia blessed by scientific knowledge to the readers of *Science*. In its abstract, dream-like imagery, the newly refashioned journal deflected a rising skepticism and distracted skeptics who claimed that, like the covers, science was less invested in "truth" than in instrumental effectiveness. The beguiling covers masked the instrumentality of the cover design, its images, and the work that they were intended to accomplish. After 1959, the graphic design of the covers of *Science* exemplified what one critic characterized as science's need for public support, and its having to "thrive on publicity."¹⁸

A Science of Effect and Scientific Progress

In the pre-cold war years (dating back to 1883), a *Science* cover merely publicized science. Its enumeration of the contents of each issue of the journal was an accounting of scientific progress—both a report and a balance sheet—through the publication of research. The covers were introductions to scientific discourses that constituted ongoing debates within multiple fields of research and inquiry. In

16 Ibid.

17 A great deal can be said about DuShane's gendering of the journal. In fact, this issue alone is material for another article. For now and for the sake of brevity, I will suggest that DuShane's metaphor was reminiscent of a longstanding allegory for the enticing nature of science, dating back to the early modern period of Western scientific inquiry. Just as was the case in the 1950s in the United States, there existed a Neoplatonic tradition of portraying science as a woman. As Londa Scheibinger has explained, female science was the "natural" counterpart to the male scientist. Gendered female, science both inspired and puzzled the male scientist: thus woman as the icon of science was symbolic of scientific pursuit. DuShane's metaphorical image of the "elderly lady" daringly dressed to impress was in keeping with this tradition. Images produced during this period underscored the erotics of this tradition of scientific iconography, because the pursuit of scientific inquiry was akin to the pursuit of women. The images on the new covers were intended to beguile readers of *Science*. From this gender perspective, it was possible to conclude from DuShane's editorial that—wanting *Science* to stay in the game, so to speak—its "new garb" enhanced the appeal of the old girl, and would result in a broader audience for the journal. See Londa L. Scheibinger, *The Mind Has No Sex?: Women in the Origins of Modern Science* (Cambridge, MA: Harvard University Press, 1989), 119.

18 Alvin M. Weinberg, "Impact of Large-scale Science on the United States," *Science* (July 2, 1961): 161.

other words, *Science* made science public. Authors listed on the cover were “publicists” in the Kantian sense of speaking to an interested public capable of reasoned debate. While the old covers were no doubt concerned with impacting public opinion, their focus was on the rational discourses that constituted the practice of making scientific research available through the journal proper. In this context, *Science* was a medium for the promotion and public use of scientific research. A pre-cold war reader could expect to engage in the rigors of scientific research publicized on the old covers of *Science* as the contents of the journal.

From October 1959 on, the cover of *Science* was a means of stimulating desire in keeping with the science of effects used in late twentieth-century marketing and advertising. (Desire was the meaning and function of DuShane’s metaphor of the “daring gown.”) Within a cold war context, the new promotional realities of the journal were such that its cover was an instrument of publicity. The use of images often unrelated to the contents of the journal shifted its emphasis from the promotion and public use of scientific research to the promotion of science *as such*. Where *Science* in the pre-cold war context was a medium for consensus building, it was now, as Michel Foucault might say, an effect of power that operated on both a scientific public and a lay public though the materiality of its new design.¹⁹ Since, as DuShane admitted, most of the cover images would come from sources other than the articles inside, the covers of *Science* were free-floating signifiers disconnected from the specificity of the data represented within. *Science* and its effects were directed toward instilling in the public, broadly speaking, the idea of progress as a legitimate goal for the nation.

Killian’s evocation of an American belief in scientific progress was reminiscent of Vannevar Bush’s report, *Science the Endless Frontier* (1945). Bush argued that advances in science would result in a panacea for a full range of social ills, economic inequities, and labor strife. To achieve these goals, he wrote, “the flow of new scientific [knowledge] must be both continuous and substantial.”²⁰ Both Bush’s and Killian’s invocation of the bounty of scientific research as a universal remedy for the crushing enslavement of humankind echoed enlightenment views from Bacon and Descartes. Both enlightenment philosophers believed that humankind had a moral obligation to act on nature, and that those acts could be measured in terms of human progress.²¹ Although it had roots in European enlightenment thought, the United States possessed its own special brand of technological and scientific utopianism. Europeans did not envision a future that would be determined by technological and scientific advances.²² Americans envisioned such a future, not just enhanced but redeemed by technology and science, and as a nation they pursued strategies to make good on this possibility. One way to achieve this goal was for American mass media to reinforce the “invented tradition” of scientific progress by increasing the

19 See interviews published in Michel Foucault and C. Gordon, *Power/Knowledge: Selected Interviews and Other Writings, 1972–1977* (Brighton, Sussex, UK: Harvester Press, 1980).

20 Vannevar Bush, *Science, the Endless Frontier* (Washington, D.C.: United States Office of Scientific Research and Development, 1945), 5. Also see Vannevar Bush, “The Scientific Way,” *Technology Review* 49:8 (June 1947): 463–464, 482, 484, 486.

21 On the inheritance of enlightenment rationality and the myth of American progress, see Daniel Sarewitz, *Frontiers of Illusion: Science, Technology, and the Politics of Progress* (Philadelphia: Temple University Press, 1996), 104–5.

22 Howard P. Segal, *Technological Utopianism in American Culture* (Chicago: University of Chicago Press, 1985), 2.

reputation and visibility of science within American culture.²³ As Bush's report insinuated in his paraphrase of Frederick Jackson Turner's observation: "The frontier is the line of most rapid and effective Americanization," science and technology would, under the right political conditions, extend America beyond the continental United States.²⁴

Science effected Bush's "flow" of scientific knowledge through the public circulation of its images. It is, then, not by chance that the invented tradition of American progress through scientific research was supported by visual representations of never-before-seen horizons, territories, and trajectories. While Killian's rhetoric echoed a tradition of early enlightenment views of science and progress, his views were supported by already existing visual representations of science in magazines. When photographs were used to document scientific work and data, they were reminiscent of a tradition in the history of photography, allied with the history of science. Indeed, the best case that could possibly be made for public funding of science was a demonstrative one: a case where photographic images literally pictured the facts. The visual rhetoric of photography, as the public understood it, was one of "what you see is what there is." No form of representation suited the goal of advancing science and justifying massive expenditures better than photography. Since the nineteenth century, science has been guided by a belief in the objectivity of photography. An early modernist faith in the veracity of unaided imaging and mechanical reproduction contributed to the formation of an ideology of the nineteenth-century scientific atlas, a paradigm for scientific representation and mechanical documentation of nature.²⁵ The nineteenth-century atlases were, as Peter Galison and Lorainne Daston have reported, "manifestoes for the new brand of scientific objectivity."²⁶ In the cold war era, an early modernist belief in the truth-value of photography was transformed into a visual manifesto for scientific progress. In other words, cold war ideology recast the tradition of scientific progress into the marketing of science through the use of photography as a way to promote scientific achievement to the American public.

The shift was based on a political-aesthetic choice rather than on its strictly social value, as I will argue below. At the very least, the use of visual rhetoric to promote science was certainly in keeping with Eisenhower's commitment to funding the sciences, and on increasing spending on science education. While Bush and Killian regarded public and private support of science as having social value, Eisenhower's State of the Union address in 1958 underscored what was at stake politically when the government and, by extension, the public made such a commitment. The decision was institutional and its effects were political. Hence, it was not a choice that the public could have made in determining the future of science. If the public even possessed the collective force to reject Eisenhower and his administration's economic bolstering of science,

23 Eric Hobsbawm defines "invented tradition" to mean "a set of practices, normally governed by overtly or tacitly accepted rules and of a ritual or symbolic nature, which seek to inculcate certain values and norms of behavior by repetition, which automatically implies continuity with the past." Eric Hobsbawm, "Introduction: Inventing Traditions" in *The Invention of Tradition*, E. J. Hobsbawm and T. O. Ranger, eds. (Cambridge and New York: Cambridge University Press, 1983), 1.

24 Frederick Jackson Turner, *The Frontier in American History* (New York: H. Holt and Company, 1920), 4.

25 See Peter Galison and Lorainne Daston, "The Image of Objectivity," *Representations* 40 (1992).

26 *Ibid.*, 81–82.

such power was thwarted by the images that represented science to the public. The covers emphasized aesthetic appreciation first, and scientific knowledge second. However empirical, the abstractions that flowed through *Science* offered no prospect of choice, because their interpretations hinged on specialized knowledge unavailable to the lay public. This is not to say that *Science* did not exemplify scientific advances nor contribute to an expansion of the public's knowledge of the world and beyond. It is to say, however, that the context of cold war ideology situated these covers such that their interpretations were infused with extra scientific detail.

Cover Art?

In October 1959, the U.S. Postal Service delivered new issues of *Science* to its subscribers. The cover of the issue was strikingly different than the cover of any other science journal published in the late 1950s. Unlike traditional science journals, and more like popular magazines, *Science* now sported a cover photo below its masthead. As discussed above, this event coincided with the AAAS's renewed interest in its mission to "advance science" and the government's invigorated commitment to fund science and science education. As a result, the AAAS collaborated with government agencies to promote science to the American public.²⁷ One of the key initiatives in this effort was the newly redesigned journal.²⁸

Science was by no means unique in its use of photography. Prior to October 1959, other magazines such as *Science Illustrated* and *Fortune*, as well as popular magazines including *LIFE*, had responded to the perceived need for the greater visibility of science in the public sphere by using "full bleed" (full-page, no margin) photos of a "space pilot-to-be" testing a safety suit (January 6, 1958) and a photo of a cancer patient undergoing radiation treatment (May 5, 1958) to cite two vivid examples. In both cases, the popular press used photographs of "science in action"—a staged photo op that focused on men and machines—to convey the present and future benefits of research to the public.²⁹

Prior to January 1958, the AAAS also published *The Scientific Monthly*, which had used images on its covers since December 1946. Yet it was clear that the monthly did not garner the same prestige that *Science* had. Closer to the popularizing editorial philosophy of *Scientific America*, *The Scientific Monthly* was less focused on specialized knowledge than *Science*, and emphasized general trends over specific discoveries. It had a less distinguished audience than *Science*, appealing to readers on the periphery of the established scientific community rather than to core constituencies. Perhaps it was the case that the AAAS ran the risk of diffusing its audience by offering them two options, where one journal could capture more readers. Potential advertisers were aware of this problem. Why pay for ad space in two journals and double costs, when it would be more cost-effective to maximize visibility in one journal? Indeed, the AAAS

27 Bruce V. Lewenstein, "Shifting Science from People to Programs: AAAS in the Postwar Years" in *The Establishment of Science in America: 150 Years of the American Association for the Advancement of Science* (New Brunswick, NJ: Rutgers University Press, 1999), 199.

28 It is fair to make such a conclusion, since *Science's* direct competitor in the marketplace of ideas was the British journal *Nature*. The editors of *Nature*, at this time, felt no such pressures to redesign, or repackaging, the contents of this prestigious journal. That *Science* was redesigned, while *Nature* was not until January 1974, suggests that there existed a difference in political, cultural, and social factors that determined the public profile of each magazine. The editorial decision to redesign *Science* and use photographs on the covers points us to circumstances that underscore the historical and cultural specificity of the magazine.

29 It was common practice for journalists to dramatize the social, cultural, and economic advantages of science. Popular magazines, such as *American* and *The Saturday Evening Post* exaggerated the contributions that science could make to the standard of living in the United States. See Marcel C. LaFollette, *Making Science Our Own: Public Images of Science, 1910–1955* (Chicago: University of Chicago Press, 1990). In terms of stereotypical images of scientists working, see Bernard Schiele and Daniel Jacobi, "Scientific Imagery and Popularized Imagery: Differences and Similarities in the Photographic Portraits of Scientists," *Social Studies of Science* 19:4 (November 1989): 750.

decided to merge *The Scientific Monthly* and *Science* in late 1958, and then to redesign *Science* in response to dwindling circulation and a lack of new advertising revenue.³⁰ It also was the case that, with many readers subscribing to just one of the two journals, many scientific papers, reports, and editorials were missing segments of a potential audience. It soon became apparent to the editorial advisory board of the AAAS that it could maximize information distribution and impact by targeting a broader audience with a single journal.

In a letter to the editorial advisory board executive officer of the AAAS and publisher, Dael Wolfe and DuShane wrote, "It seems to us that the interests of the Association and its members, as well as of scientific communication in general, would be better served by a single weekly journal that would combine the best features of both *Science* and *The Scientific Monthly*."³¹ At this date, the editors and the board were not convinced that combining the two journals would require a new "look." Before the merging of the two journals took place, several issues were apparent to the editorial board with regard to the form and style of the magazine. Minutes from an editorial meeting in late 1957 stated, "The Board recommended that the combined journal be published under the title *Science* and on the same paper as the present *Science*. *The Scientific Monthly* would be mentioned on the masthead. The Board did not think cover pictures would be necessary."³² After the merger of the two journals, the editorial staff expressed concern that their efforts were not succeeding in reaching a broader audience than the AAAS had previously reached with *Science* and *The Scientific Monthly*. The Board's disregard for the value of images on the covers of *The Scientific Monthly* was readdressed in regards to *Science* and its future profile. As DuShane reported, "*Science* unquestionably stands well as a scientific magazine and it is probable that such status is dependent primarily upon the quality of the lead articles and reports. We have the problem of maintaining this prestige and at the same time attracting a large audience of readers."³³ DuShane assumed that, to further the interests and the mission of the AAAS—a mission that was enmeshed with the Eisenhower administration's interest in funding the sciences and science education—it was not enough to rely on the quality of the articles. Rather, in addition to editorial excellence, some other element had to be addressed in order to attract a broader readership. He concluded, "[W]e want to make the magazine more readable without detracting from its prestige."³⁴

The objective to make the magazine "more readable" was one that required that it adopt a form and style that also would entice a broader range of readers. The final cover photograph for *The Scientific Monthly* had a certain appeal (Figure 2). The deadpan quality of the Balanus-Fouled White Shrimp on the cover was similar to the "found" or "ready-made" images that appeared in French surrealist magazines such as Georges Bataille's *Documents* and André Breton's *Minotaure* from the 1930s. No doubt, straight scientific

30 Lewenstein, "Shifting Science from People to Programs: AAAS in the Postwar Years" 116, 32. While Lewenstein believes that the redesign was primarily for the benefit of the advertisers, questionnaires were circulated among subscribers to evaluate the new covers. This suggests that the editors were interested in the subscribers' reception. No such questionnaire was circulated to advertisers.

31 Letter of Recommendation from Dael Wolfe and Graham DuShane, December 21, 1956, Box R-2-2, Editorial Board and Board of Directors, 1958–1960, American Association for the Advancement of Science, Washington, D.C.

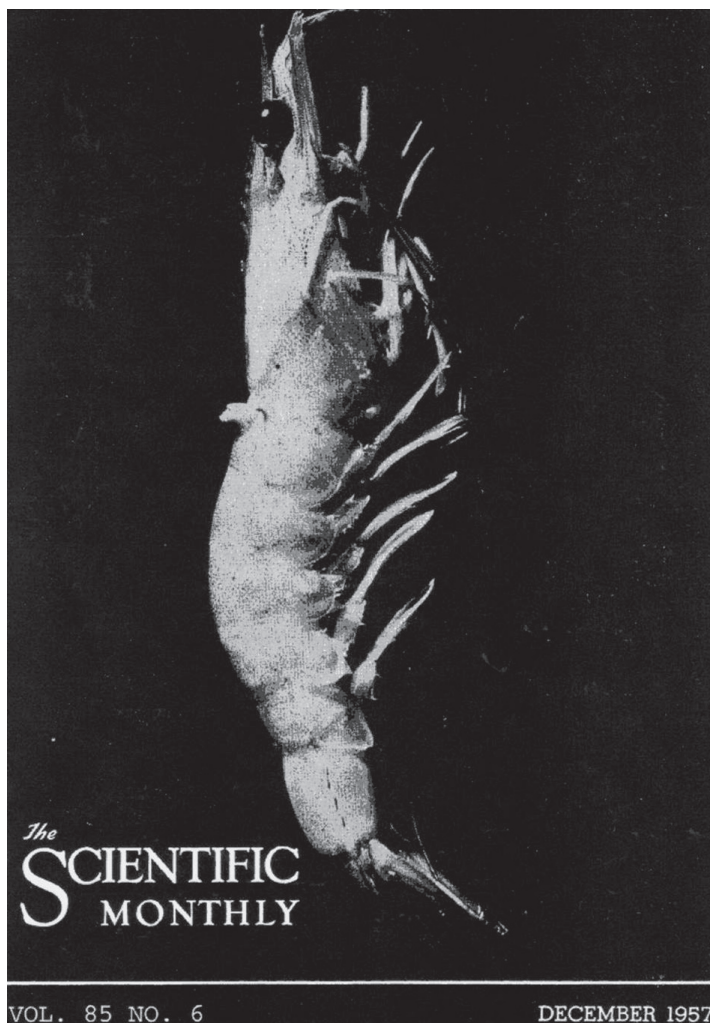
32 Annotated Minutes of the Editorial Board Meeting, October 5, 1957, Box R-2-2, Editorial Board and Board of Directors, 1957, American Association for the Advancement of Science, Washington, D.C.

33 Report to the Board and Agenda for the Meeting, November 1, 1958, Box R-2-2, Editorial Board and Board of Directors, 1957, American Association for the Advancement of Science, Washington, D.C.

34 Ibid.

Figure 2

Cover of *The Scientific Monthly*, December 1957. Reprinted with permission from AAAS.



images were arresting in their representations of unknown realms. The answer to the editor's dilemma was suggested in a memo from Wolfe to DuShane, Joseph Turner, and Robert Ormes; all members of the editorial board. Wolfe observed, "Illustrations are far from being the most important feature of either magazine, but they are a very obvious feature." Although he never put the case in exactly these terms, Wolfe's observation implied that the goal was to exploit the obvious, much as surrealist photographers had reproduced what Walter Benjamin called "profane illuminations" in their magazines.³⁵ He commented on the fact that the current incarnation of the magazine resembled a "technical publication" more than did the competitors of *Science*.³⁶ By October 1959, some of these issues had been addressed in the form of the design and layout of *Science*. In a memo to the AAAS Committee on Publications, DuShane wrote:

We have shifted from a self-cover to a separate cover on 70-lb. stock and have, in consultation with a designer, planned a new cover. We made it suitable for the display of a black-and-white picture in several possible arrangements

35 Walter Benjamin, "Surrealism: The Last Snapshot of the European Intelligentsia" in *Walter Benjamin: Selected Writings, Volume 2, Part 1, 1927–1930*, Michael W. Jennings, Howard Eiland, and Gary Smith, eds. (Cambridge, MA: The Belknap Press, 1999), 210.

36 Memo from Dael Wolfe to Graham DuShane, Joseph Turner, and Robert Ormes, February 21, 1958, Box R-2-2, Editorial Board and Board of Directors, 1958–1960, American Association for the Advancement of Science, Washington, D.C.

(white frame on all sides, bleed on two sides, bleed on three sides, bleed on right side only). The magazine title had to be designed in heavier type if it was to “carry” the color. We plan to use the same color, “artillery” red, in every issue.³⁷

A letter of solicitation for photographs was circulated in order to ensure a “flow of suitable pictures”: “We should like the photographs to be of both scientific interest and esthetic quality, and hope to escape from the banal kind of news picture which shows someone delivering a medal or a plaque to someone else, or pictures of buildings and meetings of no particular interest.” The letter adds, “To put it more positively, we hope to have photographs of the materials of science, and of interesting scientific instruments and their modes of operation.”³⁸ The preference for images of science, rather than science-in-action-type images, gave *Science* a graphic design style that was unique among its peer journals, and that contributed to the public’s awareness of the work of science.

Design and editorial policies were put into action with the October 2, 1959, issue, “when the new cover and the new typeface were adopted.” In order to judge the magazine’s progress towards gaining a wider audience, Wolfe and DuShane circulated a questionnaire about the February 1960 issue. Selected comments from the questionnaire included: “Your cover pictures are excellent” and “The present format represents a good compromise between catholicity, technical rigor, and popular appeal.” In summary, DuShane added, “Most of the comments were thoughtful, well-balanced, and constructive. The impression one gets from reading them is that the cover picture and new format are overwhelmingly approved of. Even though no question was directed to this point, many volunteered favorable comments.”³⁹ That the questionnaire never mentioned the new cover treatment, but that the changes were an issue for readers was significant to the goals of the journal and the AAAS. The editorial decision to play up the aesthetic qualities of scientific representation had the visual-rhetorical benefit of increasing the visibility of science within the public sphere.

The rise of images of science on the covers of popular magazines such as *LIFE* in the immediate post-Sputnik-launch years indicates that there was great interest in the visual representation of America’s progress on this front. These images were, for the most part, filled with scientists or others in the space program. Their appeal undoubtedly was related to their dramatic effect. These pictures showed the American public their tax dollars at work. *Science* took a very different approach. The magazine showed the actual data that science produced in the lab, through the microscope and telescope, and from x-rays. This was the real *work* of science. Here, the reader was given the data produced by and available to the scientists they observed working in more dramatic representations of science. In this sense, the reader could see himself or herself as a

37 Report on *Science* for the Joint Meeting of the Committee on Publications and the Editorial Board, September 24, 1959, Box R-2-2, Editorial Board and Board of Directors, 1958–1960, American Association for the Advancement of Science, Washington, D.C. There is absolutely no mention of the identity of the designer in any documents pertaining to the redesign of the journal. My thanks to AAAS archivist, Dr. Amy Crumpton for her help in trying to locate such documentation.

38 Letter quoted in *ibid.*

39 Report on *Science* from Graham DuShane, May 26, 1960, Box R-2-2, Editorial Board 1960, American Association for the Advancement of Science, Washington, D.C.

surrogate for the scientist, thus creating a greater sense of proximity to scientific research. Yet these same images *worked* in another way, in a manner that had less to do with observation and more to do with ideological motivations that promoted scientific progress, ever expanding territories, and endless frontiers.

Abstraction

Where more popular magazines of science used illustrations to convey complex data to readers, *Science* was unique in its preference for and use of images derived from advanced means of optical reproduction. On the one hand, the images were increasingly available with advanced optics and the technological colonization of images, perceptions, and meanings. Invisible micro-territories were more native to advanced imaging technologies precisely because it was the development of surface-penetrating apparatus that revealed unseen worlds to the human eye. On the other hand, these unseen worlds made their way onto the covers of *Science* because, as ostensibly objective representations, they could contend with the criticism of skeptics who could point to the abstractions and the obfuscations of the more common illustrated covers of popular science magazines.

Arthur Lidov's cover for *Fortune* magazine was one example that supported the skeptical view that science imagery was obscure. The cover for the June 1946 "Fundamental Science" issue of *Fortune* showed a vast and almost horizonless desert that framed, among other things, Newton's apple, sine-waves, and a three-dimensional model of magnetic field topology. The overall image was reminiscent of an Yves Tanguy painting, drawing on the visual tropes of uninhabited dreamscapes of orthodox surrealist painting. The unfamiliar territory of science, as it was depicted on the cover, underscored the surreality of the scientific enterprise and its often-puzzling imagery. Lidov's cover pictured science as a symbol-laden terrain that barely resembled experiences of the everyday world that Americans inhabited in the 1940s. Nevertheless, as the art director for *Fortune* Will Burtin knew, the invisible world was meaningful in its structuring of the "day-to-day existence" of many Americans.⁴⁰ No doubt, his intention as art director of the special issue was to underscore the extraordinary nature of the ordinary. Rather than convey scientific knowledge, the abstract nature of the diagrams and symbols arranged on the cover's representation of a bleak landscape would inspire awe in the face of scientific knowledge. Meanwhile, the abstractions on the cover signaled an ambivalence that was in striking contrast to the optimistic exuberance of the science in action covers.

During the same period that *Science* made its change, *Scientific American* used illustrations derived from photographic images of scientific data on its covers. But these illustrations were collages of images that were hardly matter-of-fact in their delivery

40 Will Burtin, "Burtin and Upjohn," *Print* 9 (May 1955): 36.

(Figure 3). John Langley Howard's painting-collage cover of lichen for the October 1959 *Scientific American* was one example of an illustration being preferred over a photograph, even when photographic representations were available. Like *Fortune*, the editors and art directors of *Scientific American* chose the illustrative over the photographic. Somehow the illustration softened the blow of scientific discovery. Howard's cover illustration for the popular magazine presented a humanized version of science through the interpretive hand and subjectivity of the artist, rather than a detached version of science documented by the mechanical objectivity of the camera. Howard's cover did not diverge too much from the more common display of science in action in popular magazines and arty collage covers for more specialized audiences by using scientific images that were the result of actual experiments, observations, tests, and other means of data-gathering.

Figure 3
John Langley Howard, cover of *Scientific American*, October 1959. Reproduction of cover is used with permission from Scientific American, Inc.



Howard's collage-inspired cover for *Scientific American* was reminiscent of the covers of magazines for more specialized audiences, such as Will Burtin's design for Upjohn's *Scope*. Beginning in 1941, Burtin took several freelance jobs, including Upjohn's house organ. Applying his knowledge of the world of science and technology to a publication for business that contained articles of interest to employees and customers, Burtin visualized the corporate interests of the pharmaceutical giant. His cover for the newly inaugurated *Scope* demonstrated how designers such as Burtin negotiated the relationship between research in medical science and its impact on humankind. Perhaps the first representation of what would later be known as a "test-tube baby," Burtin attempted to reconcile the clinical and objectifying work of medical research with a belief in the sanctity of human life. Burtin's compelling juxtaposition of a closeup photograph of a hand holding a test tube and an illustration of a cherubic baby is both brilliantly economical and alarmingly perverse. Here the complex play of planes—the black-and-white photograph of a test tube in the foreground, the color baby illustration and the masthead in the middle ground, and the hand in the background—mapped the interplay between science's celebration of life through knowledge and its objectification of life through research technologies. The result was a cover that lacked data specificity while promoting science as an industry for social change.

Were these covers for *Fortune*, *Scientific American*, and *Scope* pictures of the utopian spirit expressed in Bush's *Science, the Endless Frontier* and Killian's report published in *Science* in 1959? Through the use of illustration, the editors and the art directors of these three magazines intended their covers to convey the endless possibilities and social benefits of science. And yet in all three cases, a dark abstraction invaded these images. There existed three reasons why it was near impossible to explain away the lingering doubt embodied by pictures of science and scientific representation:

Reason 1: There was a sense that painting, especially painting inspired by surrealism, allowed for skeptical seepage in the face of the devastating results of science in the dawning of the postwar era. Paintings were understood as screen projections of atomic age anxieties such that postwar image-making was defined as a form of "apocalyptic wall paper."⁴¹

Reason 2: Modernist art in general has been characterized as a radical negation of the world, indicative of "culture in its death throes."⁴² In particular, modernist abstract painting took up "skepticism [by] turning the existence of the external world into a problem" for human consideration.⁴³

And, **Reason 3:** There has existed a longstanding discourse in science since the development of photography on the

41 See Harold Rosenberg, "The American Action Painters," *Art News* 57 (December 1958): 48.

42 See T. J. Clark, "Clement Greenberg's Theory of Art" in *Pollock and After: The Critical Debate*, Francis Frascina, ed. (New York: Harper & Row, 1985), 50.

43 Stanley Cavell, "The Avoidance of Love: A Reading of King Lear" in *Must We Mean What We Say?: A Book of Essays* (Cambridge: Cambridge University Press, 1969), 323.

irreducibility of veracity and empirical value in scientific representation. Photomechanical means of reproduction and representation raised questions about the reliability of hand-rendered or aesthetically motivated images.⁴⁴

One way to combat the skepticism directed at technological progress and scientific utopianism was for designers and editors to adopt photography and optical representation as primary modes of scientific representation and communication. Yet photography was by no means a prophylactic for the world-damaging compulsion of skepticism.⁴⁵ Skepticism persisted whenever photographs and photomechanical techniques were used to inform the public on science and its benefits to society.

Enigmatic Specificity

The October 2, 1959, issue of *Science* showed an electron micrograph of a fractured quartz crystal. This image was not an artist-rendered interpretation of the complex structure of quartz crystals, but was a scientific image produced in the lab. The image was taken as part of a study of fracture surfaces conducted at the National Bureau of Standards. The new cover of *Science*, with its image of a fractured quartz crystal, was not as mundane or as matter-of-fact to the eyes of an average *Science* reader in the late 1950s as the images that had graced the covers of *The Scientific Monthly*. The new cover image displayed texture and rhythm; its impressive appearance was matched by its inscrutability. The framing of the photograph on the *Science* cover gave the reader the impression that he or she was looking through a lens, peering into a mysterious and desolate world of craters and ridges. This could be an image of a mountainside or of a steep cliff. There was no immediate way of knowing, since the image itself provided no visual context for a proper interpretation of the spectacular view now made available to readers of the journal. And if one were to rely on vision alone, all the visual cues apparent to the reader pointed toward the visible and knowable world of the earth's rough terrain. This image possessed a kind of prosaic visual poetry that drew readers into the picture, but not necessarily into the journal itself.

Yet there was very little if any information in the photo-reproduction on the new cover of *Science* that indicated its context to the reader. What was there to see here? What was this view of? Was the reader looking at something close or far away, and was it something microscopic or telescopic? The cover art easily confused the macro-view with the micro-view. The caption explained:

Fracture surfaces are of considerable interest in determining the mode of energy dissipation once fracture has been initiated. The crystal was fractured in tension parallel to the basal planes. Replicas were made by the collodion-carbon double-replica technique, with palladium shadowing. The

44 Galison and Daston, "The Image of Objectivity" and Peter Louis Galison, "Judgment against Objectivity" in *Picturing Science, Producing Art*, Caroline A. Jones and Peter Louis Galison, eds. (New York: Routledge, 1998), 327–359.

45 Cavell remarks, in his own style, on the indexical nature of photography: "The reality of a photograph is present to me while I am not present to it; and a world I know, and see, but to which I am nevertheless not present (through no fault of my subjectivity), is a world past." See Stanley Cavell, *The World Viewed: Reflections on the Ontology of Film* (Cambridge, MA: Harvard University Press, 1971), 23.

picture shows “steps” meeting at an angle which suggests the presence of a boundary between twin domains. Fracture markings, similar to those occurring in many materials, appear along with cleavage planes, which are of particular interest in view of the extremely poor cleavage of quartz. Such planes are less prominent in fractures propagated along the other crystallographic directions.

This information appeared on the inside of the cover, thus delaying the reader’s accurate perception of the picture. Regardless of its duration, the delay in accurate perceptions of the cover image extended a horizon of understanding for the interested reader, whether scientist or layperson. The horizon was located not in the picture—no horizon was apparent—but in the long caption that informed the nonspecialist reader and the reader whose research area was not crystallography of what there was to see *in* the image.

The new *Science* cover was enigmatic in its specificity, making descriptions like the one above essential to seeing the image as a micrograph of fractured crystal quartz, rather than seeing it as a photograph of a cleaved mountain range (which it certainly resembled). Of course, a reader could see whatever he might choose to see in its fractured forms. As precise as the micrograph was, however, it’s uncertain whether or not the lens was affixed to a microscope or a telescope. Only the caption provided a clue as to how the reader was to view the image. Once the caption was read, the cover snapped into micrographic mode, thus extending human perception into an invisible and uninhabitable world. This forced the reader to see what was intended by the image. And yet, where the decontextualized nature of *The Scientific Monthly* covers lent the images a surrealistic quality, images such as the one that appeared on the October 2 cover of *Science* were visually confusing because the images always were viewed apart from their original context. For all intents and purposes, this was a form of abstraction in which the cover design concealed the source of the representation that resulted in more aesthetics than science. It was only when the caption was considered in relation to the image that the micrograph delivered its data, transporting the reader from the familiar and inhabitable world of mountains or cliffs (the only available source of reference for the uninitiated) to the unfamiliar and remote world of carbon crystals.

The interweaving of vision through human perception and human mimetic faculties results from, what Walter Benjamin observed as, a “gift for seeing similarity is nothing but a rudiment of the once-powerful compulsion to become similar and to behave mimetically.”⁴⁶ Benjamin saw this mimetic moment as a modern “transformation” of ancient forms of perception; a transformation accelerated by new technologies of representation. In other words, there exists a tendency for perceptions of new forms in science to mimic perceptions of archaic forms in art and religion. These

46 Benjamin, “Surrealism: The Last Snapshot of the European Intelligentsia,” 720.

archaic, fossilized forms shine through in immediate perceptions. A subscriber having received the newly redesigned issue of *Science* in October 1959 would have seen an image of a fractured quartz crystal, while simultaneously seeing a prehistoric landscape in its craggy cuts and plates. The coincidence of perception—of seeing the micrograph in the landscape and seeing the landscape in the micrograph—lent pathos to the image.

The two simultaneous perceptions happened within the context of cold war threats of nuclear warfare, where scientific images opened a psychic wound perpetrated by an anxiety about being bombed into the Stone Age. As Peter Hales has observed of the iconic images of mushroom clouds produced by atomic blasts at Hiroshima, Nagasaki, in the South Pacific, and in the Nevada desert of the United States; the horror of nuclear destruction was aestheticized in mass-media representations. According to Hales, the production of an “atomic sublime” as a visual subject for popular consumption was an infusion of visual excess in forms of cloudy abstractions that immunized the American public from the realities of nuclear annihilation.⁴⁷ The abstractions that Hales discusses also were present in less obvious instances of the graphic representation of the effects of science and technology. Their massing in the cumulative effects of schema retooled, what Benjamin earlier described as the human apparatus of apperception.⁴⁸ A new form of pattern recognition was established, and thus a new critical code compatible with cold war anxiety. In this sense, cold war covers of *Science*, however unintended, exhibited less explicit signs of what Joseph Dewey has described as an “apocalyptic temper” in American culture.⁴⁹ The covers of *Science* existed between imminent atomic destruction and technological manifest destiny. In stark contrast to Bush and Killian’s belief in science as having only the advancement of knowledge as its goal, the covers of *Science* were graphic means to cope with the unknowable future produced by science. Effecting such a transformation in images and in perceptions had everything to do with the mutability of signification and the framing of perceptions by historical events.

Symbolic Transformation

These newly sequestered images—traveling from lab to sitting room—made unseen worlds visually accessible to readers of *Science* extending their views into new levels of experience in an increasingly contained political sphere.⁵⁰ Yet to what extent were systems of worlds revealed by the micrographic and the instruments of the astronomical observatory? What infinite depths were explored in these images? And what inexpressible real presences were rejected by attempts at interpretation? How can we begin to address these questions when a complex set of ideas about science, nature, and the relation of humans to the world are profoundly mutable? The meaning of a science photograph is far from stable. As Georges

47 Peter B. Hales, “The Atomic Sublime,” *American Studies* 32:1 (Spring 1991): 5–29. Hales makes the case for aesthetic responses to atomic blasts as unethical denials of the realities of unimaginable pain and suffering; what he characterizes as the “separation of the atomic cloud from its destructive effects” (19). Yet, it is entirely possible that the circulation of beautiful and sublime images of nuclear holocaust were, in no small part, the only possible means to directly confront the ethics of such awe inspiring devastation. One sense of the ethics of transformation (or inversion) has been explored in Hugh Gusterson, “Nuclear War, The Gulf War, and the Disappearing Body,” *Journal of Urban and Cultural Studies* 2:1 (1991): 45–55.

48 See Walter Benjamin, “On the Mimetic Faculty” in *Walter Benjamin: Selected Writings, Volume 2, Part 2, 1931–1934*, Howard Eiland, Michael W. Jennings, and Gary Smith, eds. (Cambridge, MA: The Belknap Press of Harvard University Press, 1999).

49 Joseph Dewey, *In a Dark Time: The Apocalyptic Temper in the American Novel of the Nuclear Age* (West Lafayette, IN: Purdue University Press, 1990).

50 On cold war containment, see Paul N. Edwards, *The Closed World: Computers and the Politics of Disclosure in Cold War America* (Cambridge, MA: MIT Press, 1996).

Bataille observed when referring to Karl Blossfeldt's images in his remarkable *Art Forms in Nature*, "One would look in vain for relationships that convey a hidden comprehension of the things in question here. [...] It seems that the symbolic meaning of flowers is not necessarily dependent on their function."⁵¹ To put a fine point on the issue under discussion here, the ongoing symbolic transformation of the covers of *Science* exceeded their informational function.⁵²

A new context produced a new meaning. A "new garb" produced a new *Science*. And through its visual practices, *Science* contributed to the production of a new context in which science was understood. The journal repurposed industrial optics—a spiny oak-slug caterpillar (November 13, 1959), a Mach Zehnder interferometer pattern (January 15, 1960), and the Crab Nebula (January 19, 1962)—so that the "shock" of the distant but close image easily transformed into images of the technologically and scientifically driven progress of the United States. In the decades after Eisenhower's 1958 State of the Union Address, a politically trained eye could have seen the images reproduced on the covers of *Science* as illustrations for Killian's assertion that science would contribute to a less-regimented and more-individualized society. This perception was in apparent contrast to the pathos of the images as representations of a potential post-apocalyptic future that looked like the archaic past. The nuclear arms race that resulted from the mutual exploitation of science and technology for security and intelligence purposes by the United States and the Soviet Union raised the specter of annihilation that shined through the covers of *Science* during the cold war. This was the inexpressible real presence hidden beneath *Science's* "new garb."

The 1959 redesign of *Science* paralleled the new initiatives and increased funding for scientific research, furthering, as I stated above, the graphic fluency in communicating scientific discovery and knowledge. But at the same time, the new direction of *Science's* covers exemplified the aestheticization of science in its consolidation of multiple interests that arose from debates on matters of science policy and funding for scientific research. Intermingling with technological utopianism, cold war ideology, and atomic age anxiety; the donning of "new garb" transformed *Science* into an instrument of cultural policy.

51 Georges Bataille, "Le Langage Des Fleurs" in *Oeuvres Completes* (Paris: Gallimard, 1970), 174–75. Author's translation.

52 Some years after Bataille, the philosopher of science Charles Morris used the phrase "symbolic transformation" to describe the mutability of scientific images. He recounted that, after visiting Gyorgy Kepes's *The New Landscape in Art and Science* exhibition at MIT in 1951, "Works of art and science stood side by side, and matched. Here were the extremes of an imaginative person-controlled nonrepresentational molding of a medium, and the most objectively intended literal accurate mirroring of nonhuman process. And yet the textures and the structures come out alike." See Charles Morris, "Man-Cosmos Symbols" in *The New Landscape in Art and Science*, Gyorgy Kepes, ed. (Chicago: Paul Theobald, 1958), 98.