

Was There Really a Popular Science "Boom"?

Bruce V. Lewenstein

Two popular science magazines died in the summer of 1986: *Science 86* and *Science Digest*. Along with a host of contemporaries founded around 1979 and 1980, these magazines regularly drew the attention of scientists and journalists concerned about the "public understanding of science." As the magazines suffered their death throes, commentators both mourned the demise and anguished over the cause of death. The proximate cause was usually identified as a lack of advertising support—but this diagnosis does not do justice to the richness of the record surrounding the birth, life, and death of the "science boom" of the early 1980s.

In this essay, I will sketch the outlines of a history of "popular science" in this period—that is, those newspapers, magazines, and television shows directed at audiences without a professional need for information about science. For such productions, entertainment is a major goal. They also tend to be non-discriminatory in their selection of topics—including technology, applied science, medicine, and health all under the rubric of "science."¹

My goal in writing this account is to point to several recurring themes and areas needing further research. My research is based primarily on published sources and telephone interviews up through Fall 1986. Future scholars will have access to a much richer documentary record, and subsequent events may have further elaborated my story.²

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The Rise of the "Science Boom"

Was there a science boom? As the figures in Tables 1, 2, and 3 show, 15 magazines, 18 newspaper sections, and 17 television shows devoted to popular science first appeared between 1977 and 1984. Although similar publications and television shows did exist before 1977, this seemed an unprecedented number of new productions, especially in the newspaper and television fields.

Contemporary observers—focusing on the new magazines—early defined the activity as a "boom." Daniel Greenberg, wrote in *Science & Government Report* in 1979 that "Scientific magazines [are] bursting out all over." *Time*, in a 1980 cover story on Carl Sagan, said that "ennui" about popular science "has turned into enthusiasm." A 1980 newsletter from the Scientists' Institute for Public Information *SIPIScope*, carried the front-page headline "Suddenly, it's science!" *Columbia Journalism Review* observed in 1981 "Science hits the newsstand." Even academic journals (such as *Science, Technology, & Human Values*) published special issues "on public communication of science and technology."³

Most exciting to the observers—and most important for understanding cries about the ultimate "collapse" of the science boom—several of the new ventures breached the wall between productions directed at specific audiences (such as the members of the New York Academy of Sciences, or aficionados of astronomy) and ones intended for mass consumption by a general audience whose members held nothing in common but their supposed interest in science. On CBS, "Walter Cronkite's Universe," for example, brought a series of science shows (instead of one-time specials) to prime-time commercial network television, and

Table 1. Television series, ongoing in the United States.*

Title	First shown	Last shown	Where shown	Audience
COMMERCIAL TELEVISION				
Explorer	1986		cable	n/a
Mister Wizard's World	n/a		cable	n/a
Omni	n/a	1982	ABC	n/a
Quest	n/a	n/a	NBC	n/a
Science and Technology Today	1984	n/a	CNN	550,000 households
"Walter Cronkite's Universe"	1979	1982	CBS	14 million
PUBLIC TELEVISION				
Innovation	1983		WNET/PBS	n/a
Make Peace with Nature	1973		WKRC	n/a
National Geographic Specials	1965		PBS	13 million
Newton's Apple	1982		PBS	4 million
Nova	1974		PBS	7 million
OWL/TV	1985		PBS	n/a
Planet Earth	1986		PBS	n/a
Science Notes	1981		KQED	n/a
Smithsonian World	1984		PBS	5 million
3-2-1 Contact	1980		PBS	1.8 million
HEAVILY SUBSIDIZED				
How About	1979		syndicated (NSF)	10 million
Science Scene	1983		syndicated (ACS)	5 million
Science TV Report	1979		syndicated (AIP)	n/a

* The following tables include magazines, television shows, the newspaper sections devoted to popular science. The lists are intended to be inclusive though not exhaustive; I have tried to list most things that might reasonably be considered part of the popular science boom. I have left out magazines and television shows devoted solely to medicine and health. Sources: *Ayer's/IMS Guide to Periodicals and Standard Rate and Data Service, Consumer Magazine and Agri-Media*, various editions; Jerome, "Suddenly, it's science!" p. 4; Jerome, "Newspaper Science Sections," p. 10; Fred Jerome, ed., "Science in the video age," *SIPIScope* 14 (January-February 1986): 1-13, esp. insert between pp. 8 and 9. For additional information, see Jerome, "Science in the media"; Jerome, "Death of the Universe"; and "Science in the mass media: A selected guide," in Friedman *et al.*, *Scientists and Journalists*. [n/a = data not available]

attracted an audience of tens of millions; media commentators hailed the rescue of science from the relative ghetto of public television. The American Association for the Advancement of Science's *Science 80*, Time Inc.'s *Discover*, and the Hearst Corporation's *Science Digest* all targeted general consumers—the people that advertisers selling cars, electronic equipment, books, liquor, and other so-called "high ticket" items most wanted to reach. One study called the science magazines "the general interest magazines of a new age."⁴

Why did popular science break through to this new audience in the late 1970s? Although a definite answer will require a more detailed historical

analysis, I can suggest a few points to consider. First, there was a general, social precondition: the maturing of the World War II baby boom. As the first generation of middle- and upper-class workers uniformly educated in science and technology, the baby-boomers provided a ready audience for popular science. "This generation," said Allen Hammond, founder and editor of *Science 80* (later *81*, *82*, etc.), "having grown up with Sputnik, the environmental movement, the War on Cancer, the Space Program and the energy crisis, has come upon an information vacuum. The result is an explosive hunger for more information on science and technology." Other publishers, concerned

Table 2. U.S. newspaper sections in 1984 devoted to science, technology, or medicine.

Newspaper	Section	Date started	Circulation av. (1984)
Boston Globe	Sci-Tech	1983	515,000
Chicago Tribune	Tomorrow	1983	1,116,000
Cincinnati Post	Newscience	1983	136,000
Columbus Citizen-Journal	Medic One	1983	122,000
Columbus Dispatch	Discovery	1983	353,000
Commercial Appeal [Memphis]	Future Currents	1982	281,000
Dallas Morning News	Discoveries	1983	328,000
Detroit Free Press	Science/New Tech	1982	635,000
Detroit News	Science/Computers	1983	651,000
Evening Gazette [Worcester]	Today/Science-Health	1983	85,000
Globe and Mail [Toronto]	Science/Medicine	1984	311,000
Journal-News [Rockland County, NY]	Discovery	1982	44,000
Miami Herald	Science/Medicine	1981	425,000
New York Times	Science Times	1978	910,000
Newsday	Discovery	1984	525,000
Oregonian [Portland]	Science	1983	290,000
Plain Dealer [Cleveland]	Science-Health	1983	493,000
San Jose Mercury News	Science & Medicine	1982	290,000

more with the opportunities that the popular science magazines presented for selling advertising, put the same point slightly differently: "Boy, we're going to get this great elite market of young, upwardly mobile people who are interested in science."⁵

Second, magazine publishers and advertising agencies were seeking all types of magazines that appealed to well-defined audiences. The 1970s had seen the rise of "specialty" magazines, targeted at specific groups. Such magazines as *Sail*, *Ski*, and the various "city" or "regional" magazines (*Philadelphia*, *The Washingtonian*, *Texas Monthly*, etc.) provided advertisers with a means of getting the most effective exposure for their sales pitches; they allowed companies to direct advertising at the audiences most likely to be interested in their products. The science magazines, it was presumed, would offer another such audience, although few publishers considered precisely what products might be sold uniquely to the readers of science magazines.⁶

And, finally, "pack journalism" may have played a role. A regular theme in journalism literature is the frequency with which journalists, whose cultural values include a commitment to independence and inquiry, follow each other around to the same stories. This tendency has been especially noted among science journalists. Boyce

Rensberger, an award-winning science writer who has worked for *The New York Times*, the *Washington Post*, and *Science* 83, wrote that "the current surge of media attention to science is the result of a bandwagon effect." Rae Goodell, writing in 1981, argued that the new television series were "inspired in part by the early success of the new science magazines." A string of newspaper editors cited *The New York Times* "Science Times" section and the early successes of the science magazines to justify their own new science sections.⁷

Science journalists themselves recognized that they were in some ways responsible for the perception of a "boom." Edward Edelson, *New York Daily News* science editor, noted that "science writers have always been intense examiners of their own navels. Now they have large numbers of observers looking over their shoulders to help in the examination."⁸

In addition to these general trends, two specific items seem worth mentioning. First, several major news stories of the last decade were "science" stories—for example, the Three Mile Island nuclear accident, *The Progressive Magazine's* attempt to publish an article on the construction of an H-bomb, Mount St. Helens, Love Canal, and the "superfund" for environmental clean-up. Second, many of the new ventures were started by

Table 3. Science and technology magazines published in the United States.

Date founded	Title	CIRCULATION		
		1976	1981	1986
MASS CIRCULATION				
1888	National Geographic	8,990,341	10,560,885	10,449,396
1872	Popular Science	1,780,330	1,913,879	1,804,634
1967	Psychology Today	1,026,872	1,171,362	862,193
1970	Smithsonian	867,620	1,890,466	2,172,831
GENERAL SCIENCE				
1980	Discover	np	500,000	954,199
1977	Human Nature	np	cp	cp
1972	Human Behavior	80,000	cp	cp
1977	Omni	np	750,000	865,561
1980	Science & Living Tomorrow	np	75,000	cp
1979	Science 80/86	np	500,000	720,419 (cp)
1936	Science Digest	150,611	152,583	590,634 (cp)
1922	Science News	97,297	177,505	160,761
1962	Science and Technology	150,000	cp	cp
1961	Sciences (The)	n/a	35,000	65,000
1845	Scientific American	612,920	705,124	654,489
SPECIFIC SCIENCES				
1948	Archaeology	18,000	40,000	82,149
1973	Astronomy	617	104,919	135,086
1964	Chemistry	31,213	cp	cp
1969	Oceans	50,000	60,000	60,000
1978	SciQuest	np	51,000	cp
1941	Sky & Telescope	65,000	75,000	95,000
TECHNOLOGY				
1981	High Technology	np	300,000	309,000
1964	Spectrum	n/a	175,000	252,000
1981	Technology	np	n/a	cp
1981	Technology Illustrated	np	300,000	cp
1899	Technology Review	50,790	62,968	80,000
NATURE AND EXPLORATION				
1899	Audubon	257,331	400,000	379,432
1979	Geo	np	250,000	cp
1900	Natural History	358,713	460,896	496,090
1977	Quest	np	332,442	cp
1892	Sierra	140,000	190,000	297,929
FUTURE-ORIENTED				
1967	Futurist	n/a	n/a	n/a
n/a	Next	np	300,000	cp

(a) I have arbitrarily put magazines with circulations of over 1,000,000 in a separate category, as economic considerations make them compete with nonscience magazines in different ways. (b) *Chemistry*, an ACS publication, was replaced by *SciQuest*. (c) Several of these magazines changed format in the late 1970s, and began to seek advertising in the same market where the popular science magazines were competing. I have included *Science Digest*, *The Sciences*, and *Sierra* in my count of magazines that "first" appeared in the late 1970s or early 1980s. [n/a = data not available; np = not yet published; cp = ceased publication]

members of the journalism community. Although the scientific community quickly (and apparently enthusiastically) supported the popular science projects, it did not initiate them. *Discover* was started by veteran *Time* science editor Leon Jaroff.

"Walter Cronkite's Universe" and NBC's "Quest" both came from television network news staffs. *Science 80*, though published by AAAS, was produced by Allen Hammond, an editor on the staff of *Science*, and Eric Schrier, a journalist.⁹

Fall of the "Science Boom"

As the science boom started in the early 1980s, its prospects looked good. *Science 80* quickly shot past its original estimate of 300,000 circulation and hovered around 700,000. *Omni* and *Discover* also regularly sold over 750,000 copies. With each copy read by an average of between 2.0 and 3.7 people (according to some, however, disputed measures), around 3.5 million people were apparently regularly reading about science. On television, "Walter Cronkite's Universe" regularly received a 10 rating (considered acceptable for a magazine-format show), implying that more than 13 million people were watching each program.¹⁰

Even as the euphoria peaked in 1981 and 1982, however, signs of trouble appeared. Several magazines, such as *Technology* and *SciQuest*, folded. Television network executives killed both "Walter Cronkite's Universe" and ABC's "Omni" (produced by the magazine of the same name.). *SIPIScope* observed that the failures "raised serious questions about the future of science and technology coverage by the mass media."¹¹

But the science writing community refused to believe the signs of trouble, preferring to stay on the boom bandwagon. *SIPIScope's* Fred Jerome said "it would be premature to sound the death-knell for mass-media science." Although he admitted that some data suggested that only a limited audience was interested in science, he claimed that "there is considerable evidence that the general public is not inattentive to science and technology." *Discover* editor Leon Jaroff said "I still think there is a very big audience out there for science magazines, and I'm quite optimistic."¹²

To justify their lack of concern, most observers pointed to the difference between public interest in science and the commercial pressures on magazines and television. There is no reason for concern, said *Science* news editor Barbara Culliton: "That a couple of magazines were unable to compete . . . is disappointing. But it likely says more about the economics of magazine publishing than about public interest in science. Indeed, the very success of the majority of the new science magazines is evidence that a large readership is there." CBS producer Jonathan Ward explained that "Universe" failed because "it wasn't successful enough at building an 'evening.' We attracted people who didn't normally watch TV. They would watch us at 8:00, then switch over to PBS to watch the second half of 'Nova.' They didn't stay with CBS,

which is the name of the game in commercial television."¹³

A few of the failures, however, suggest that the scientific community did not always support efforts in the area of popular science. *SciQuest's* sponsor, the American Chemical Society (ACS), required that the magazine pay both its direct costs (printing, supplies, and so on) and indirect costs (such as space in ACS headquarters). Although the magazine's revenue was sufficient to cover its direct costs, the ACS was unwilling to subsidize the indirect costs, despite an explicit ACS commitment to the public understanding of science.¹⁴

By 1983, the major television networks were no longer producing science series; the science boom consisted primarily of the magazines and, increasingly, newspapers. With the frenzy of creation on a nationwide scale over, the field became somewhat better defined. Although individual observers constructed different lists, three mass-circulation, general science magazines appeared consistently: *Science 80*, *Science Digest*, and *Discover*.¹⁵

From 1984 on, advertising revenue began to drop, however, in large part because personal computer manufacturers cut back their advertising budgets in response to a general industry slump. By 1985, publishers of the three general science magazines recognized that they were in serious trouble. *Discover* fired both its business and editorial staffs and brought in new blood from Time Inc.'s *Sports Illustrated*. *Science Digest* tried to "reposition" itself as a "men's" magazine. (Positioning is the art of convincing advertisers that a magazine's audience meets certain criteria. *Science Digest's* goal was to present its readers as the type of male, high-spending, young professionals many advertisers seek.)¹⁶

Such drastic measures failed, however, to stem the financial bleeding. In Spring 1986, Time Inc. signaled, by offering to buy *Science 86*, that it was willing to commit more money. AAAS recognized that it could not match Time's resources and sold out for between \$5 and \$7 million. Hearst, struggling along in third place, sold out for \$2 million when its managers realized that Time (which had a reputation for accepting millions of dollars of losses before its projects made a profit) would be willing to buy out the competition. The industry "shakeout" periodically predicted since 1981 had hit, and *Science 86* and *Science Digest* died. The media reports were dramatic: Paul Zuckerman, an

executive at the New York advertising agency Doyle Dane Bernbach, told the *Philadelphia Inquirer*, "The science magazines didn't shake out. They fell apart."¹⁷

Although only two magazines actually died, observers could no longer retreat to optimism. The boom was over, its death recorded—and thus proclaimed—by the *Washington Post* (which covered *Science 86's* closing party on its society page), *The New York Times*, and other national media. Commentators began to propose explanations.

The Publishing Tripod

Because the deaths occurred among the magazines, most of the immediate analyses addressed a traditional publishing metaphor: the three-legged stool. According to this image, a publication is supported by three legs: advertising support, circulation (that is, readers), and editorial content. Although the balance among these legs may vary (an academic journal, for example, receives a much higher portion of its support from its readers than does a weekly newsmagazine), the legs of the tripod must all be present for a publication to succeed. This metaphor is helpful, not only for understanding how participants saw the issues, but also for drawing out some broader themes.

Advertising: The easy culprit

Many analyses attributed the failure of *Science 86* and *Science Digest* to the two-year decline in advertising revenue. As advertising fell, the argument ran, publishers who had structured their projects in the expectation of receiving profits faced the prospect of sustaining massive losses. To survive, they either had to seek new capital or kill their projects before the losses became too great.

"The magazines depended on computer and business advertising, which went through the floor," said Robert Cohen, a New York magazine consultant and publisher of the short-lived *Technology*. "Consumer advertisers were also pulling back," so the science magazines were "hit from both sides." *Science 86* had lost 50% of its advertising revenues over the previous two years. *Science Digest* showed a similar loss over the 1985–1986 period. Because of a generally poor

advertising market, publishers could not predict when a turnaround might occur.¹⁸

Most observers, but not all, attributed the advertising woes to an oversupply of magazines and an undersupply of advertisers. "Three or four consumer magazines were going after the same market," said Richard LePere, a Washington, DC, magazine consultant. "There was definitely a market out there—two million people were willing to plunk down their money."¹⁹ Advertising executive Paul Zuckerman put more blame on the magazines themselves:

It was too difficult to pick among the magazines. There was no separation. In the early days, I asked someone at *Science Digest* what the difference was between his magazine, *Discover*, and *Science 80*. He said, 'Read them and find out for yourself.' That's when I pulled up the drawbridge. That's his job and *he didn't know*.

But Zuckerman also pointed to another issue: the inability of the magazines to specify how their audiences could uniquely serve advertisers.

We, the advertisers, couldn't read what was in the so-called 'science category.' It had no unique niche. You have to meet a marketing need and they didn't do that. They were trying to force us into a category and we didn't understand it. So we turned them off.²⁰

This ability of advertisers to "turn off" editorially successful magazines suggested to some observers the need to look beyond immediate advertising problems to provide a better explanation of the fall of the science boom. As Dorothy Nelkin points out, "Public communication of science or anything else depends on soap, or cigarettes, or automobile advertising." Nelkin, who was on the AAAS board that approved the sale of *Science 86*, charged that "the public is really getting shortchanged."²¹

Others, like Allen Hammond, believed that "the way advertising is sold is a real part of the problem." Hammond was particularly upset about "syndicated research," the survey-derived marketing information used by many advertisers to select appropriate magazines for their ads. In syndicated research, he said, "they send surveyers out across the country . . . And they flash logos in front of people. 'Do you recognize this one? Do you recognize this one?'" Based on the results, they project actual readership. It's all plugged into the com-

puter. If you want to reach males, 30–40, with a certain income, just print out the top 15. If you're not in that list, they don't want to talk with you." But the system, he believes, is biased in favor of magazines seen widely in supermarkets, barber-shops, and high-traffic newsstands.²²

Different elements of syndicated research also drew an attack, especially the numbers on "readers per copy," an area where science magazines fared poorly. Unlike many mass circulation magazines, which are passed from one reader to the next, the science magazines tended to be kept for reference or future use. Gerald Hotchkiss, a former publisher of *Science Digest*, said that "media hype" helped "invite a television mentality of buying. Size [circulation] and reach [readers per copy] took the place of . . . [aiming at] influencing a limited group of people who have the real power and influence over sales."²³

The advertising community defended syndicated research, pointing to the benefits it brought to commercial magazine publishing. "In the old days, we had the 'selective' publications: *The New Yorker*, *Harper's*, *Atlantic*, and *Saturday Review*," said Zuckerman. But that label, beyond providing a vague sense of "culture" or "class," did little to help advertisers seeking particular audiences. "Now we're into lifestyles. We threw the shotgun away, we use a rifle. We want specific people, not households."²⁴

The debate about syndication reveals the tension between economic and intellectual goals in magazine publishing. Few magazines of Zuckerman's "selective" category have survived unscathed in recent years: *The New Yorker* and *Atlantic* have been sold to new owners, and *Harper's* survives only with a substantial subsidy from the MacArthur Foundation.

The popular science magazines may, in fact, have brought the troubles on themselves. Proponents like Hammond argued that treating science as a commodity did not serve the interests of the public. The nature of magazine publishing suggests that, by looking for advertising support, Hammond and other journalists creating popular science magazines had been the ones to claim that science was a commodity.

Circulation: A less obvious problem

Circulation is the second part of the magazine publishing tripod—and some analysts suggested

that the problems of the popular science magazines lay there. Publishers can achieve virtually any level of circulation by giving away subscriptions in special deals and spending millions of dollars to force magazines into newsstand distribution. The cost of maintaining circulation does not, however, always justify the cost of achieving circulation. "We could get to two million" said *Discover* publisher James Hayes; "but it would cost an arm and a leg to get there and three arms and three legs to stay there."²⁵

Many observers thought that the science magazines did just that. "There has to be a technical name for it," said consultant Cohen, "maybe in game theory, where all the players get caught in the same game, which is self-destructive. They all want to be number one in circulation, and of course they can't all be number one. But so they all have to be near one another." The major players got caught, Cohen said; "clearly there is a market for science, but the market is not large enough for all of them."²⁶

By 1986, the three general science magazines all had circulations between 500,000 and 1 million. Yet some editors and publishers suggested that a few hundred thousand might be a more natural circulation level. Citing marketing studies she had conducted in the late 1970s, former *SciQuest* editor Patricia Morgan raised questions about "the ability to do economical circulation buying for upwards of 300,000 circulation Interest in science was a fad. You have to work to understand science. It's not like home decorating."²⁷

Support for this idea also comes from *Science 80*, *Technology Illustrated*, and *Science Digest*, all of which had initial circulation goals between 200,000 and 400,000. In addition, one publication, *Science News*, although not competing directly with the popular science magazines, held its circulation between 150,000 and 180,000 for much of the science boom years.²⁸

Most people associated with the mass circulation consumer magazines claimed that subscription support was not a problem, citing a combined circulation for *Science Digest*, *Science 86*, and *Discover* of about two million. However, accurate circulation figures (as opposed to publicly announced figures) are some of the most tightly held numbers in the publishing business. Because advertising rates depend on circulation levels, publishers regularly use heavy promotion to increase circulation temporarily at crucial measuring points during the year, but the new readers are

often those least likely to continue "trial" subscriptions or newsstand purchases. Subscriptions (rather than newsstand sales) and their renewal rates are often cited to indicate the strength of a magazine's audience; they indicate how much turnover a magazine has among its readers. A given renewal rate, however, can be anything from the number of people who convert from a cut-rate introductory subscription to a regular subscription (typically, about 40%) to the number of people who, having already subscribed for three years or more, continue to renew (for a successful magazine, at least 60% or 70%).

For *Science 86*, the currently available evidence is contradictory. Publisher William Carey said that final promotions to maintain *Science 86*'s 700,000 rate base (the "official" circulation level) were proving very costly; others indicated that long-term renewal rates were as low as 42%. *Science & Government Report* said that actual, paid-up circulation when the magazine was sold was only slightly over 500,000. But Allen Hammond (who opposed the sale of the magazine) said that *Science 86* was doing very well; he claimed a long-term renewal rate of over 70%. Consultant Richard LePere has gone even further and claims that "it is categorically untrue that *Science 86* had bad renewal numbers. They had some of the best subscription economics in the business."²⁹

At *Discover*, Hayes also denied subscription problems, claiming that over half of *Discover*'s circulation came from long-term renewers. On the other hand, he acknowledged that *Discover* did not expect to triple its circulation once it had the market to itself. "We hope to extract the hard core science reader," he said. "I'll be disappointed if we don't end up with a million plus."³⁰

This optimism suggests that circulation was not a real problem—and that raises another of the deeper issues obscured by the rush to eulogize the popular science magazines. "Even if *Discover* ends up with only 1.1 million readers, and that's all the people interested in science," said former *Science 86* managing editor Ellis Rubinstein, "that compares favorably with the market for any other serious magazine. What is the true market for [the magazine] *Foreign Affairs*? Even *Esquire*, which isn't as serious as it once was, has only 700,000. One of the great tragedies is that the recent turn of events has permitted the myth to be perpetuated that there is no market for science. On the contrary, there is a bigger market than for almost anything else. The continuing of the myth is one of

the most frustrating things. And it's absolutely unsupportable."³¹

The concept of a limited audience for popular science is often traced to Jon Miller's research on the "attentive public" for science. For example, drawing on Miller's work, Jonathan Ward of CBS pointed out in 1984 that virtually all television science shows draw audiences of around 10 million viewers. He suggested that these are always the *same* viewers, hunting out science wherever it appears. Yet Fred Jerome has argued that "numerous readership surveys conducted over the past 25 years . . . repeatedly confirm that readers consider science articles 'among the most interesting of newspaper items.'" The conflicting evidence on the true popularity of popular science suggests that this area deserves considerably more study.³²

The editorial leg

At first glance, the third leg of the publishing tripod—the editorial product—seems an unlikely place to look for the causes of the failure of the popular science boom. These publications and shows won national awards (*Science 86* got two National Magazine Awards; "Walter Cronkite's Universe" received Peabodies, Emmies, and other television awards); they were regularly praised for the contribution they were making to a vital area of public interest.

Once again, some analyses suggested problems beneath the surface. "They used the word 'science,' but it's not really science," said Zuckerman. "Progress, technology, that's closer to the truth." He approved of *Discover*'s move in 1985 toward a "future, new technology" format. "*Discover* is on a better track now, lowballing science, highballing the future. They have the right philosophy: 'Here, Mr. Consumer, is what you need to know.'"³³

Owen Lipstein, who was *Science 80*'s general manager before leaving to start *American Health* in 1982, was less harsh, but he essentially agreed with Zuckerman's analysis. The science magazines "suffered from the perception that they were irrelevant. The science books were sometimes edited as though they were running for awards, not readers. They didn't contact the readers enough. 'What difference does it make to my life?' You always have to ask that." But Lipstein, along with Hammond, led an unsuccessful effort to buy *Science 86* before it died, and he says he would have made few changes had he bought the magazine.³⁴

Hammond acknowledged the charge that his magazine was "highbrow." But he pointed to the AAAS, his institutional home, and said that "to get really popular would have made AAAS uncomfortable. We had to produce something that the scientists liked, that a sophisticated audience would like. It was an ideologic strategy, but one that felt comfortable to me, since that's what I wanted to do anyway."³⁵

The need for popular science magazines to appeal to scientists points to a well-recognized problem in science journalism: The degree to which science writers identify with scientists, whose cooperation they need to understand and then explain intricately complex subjects about which they may know nothing. But, as Zuckerman and Lipstein suggested, the science boom may have carried the closeness between journalists and sources to an unacceptable extreme. William Bennett wrote in 1981 in the *Columbia Journalism Review* that "it would be silly for any of the magazines to identify itself as 'anti-science.' . . . But surely there are possible attitudes that are neither 'pro' nor 'anti.'"³⁶

Criticisms such as these still fail to explain fully the death of the science boom. Even taking the lowest estimates of loyal readers, the strength of the circulations implies that readers approved of what the magazines were producing. It was the advertisers who would not support the magazines.

The Context of Failure

Analyses based on the publishing metaphor of the three-legged stool provide a host of reasons for the failure of the science boom. None of these approaches, however, explain why it happened when it did—and why the failure of just two magazines, no matter how successful, was regarded as signalling the "sudden collapse" of an era in which "we [science journalists] had died and gone to heaven."³⁷

The perception of a boom started when several specific events and trends coincided. Without that particular confluence, the boom would not have started. The perceived end of the boom was similarly marked by a particular sequence of events.

As the new magazines rose quickly in the early 1980s, the venerable *Scientific American* began to suffer. For nearly 40 years, *Scientific American* had addressed itself to scientists, engineers, and others looking for detailed articles about special-

ties outside their own. Although it had never claimed to address a mass-circulation audience, *Scientific American's* long record of success and 1980 circulation of more than 700,000 made it a natural target for the newcomers of the science boom. Advertisers, especially, frequently grouped it with the newer publications for reasons of convenience. When the decrease in computer advertising hit *Scientific American* in 1984, the magazine's founders, publisher Gerard Piel and editor Dennis Flanagan (both in their mid-60s), decided to retire (although Piel remained chairman of the board).³⁸

The financial picture at the various popular science magazines did not improve during 1985. In mid-year, both *Science Digest* and *Discover* acquired new publishers, and *Discover* revamped its entire editorial staff and orientation. By February 1986, the AAAS had instituted cost-saving measures and considered such drastic measures as cutting *Science* 86 from a monthly to a bimonthly publication schedule. Then, in late March, *Scientific American's* continuing losses forced it to look for more capital. Although Piel would have preferred to keep the company privately held—his son, Jonathan, had become editor, publisher, and president of the company—the decision to sell the company was reportedly made at the urging of a shareholder who had purchased Flanagan's stock two years earlier.

Scientific American's sale drew major media attention to the problems of the science magazines, with articles about the sale in *The New York Times*, *Advertising Age*, and other publications. Advertisers became leery of committing themselves to placing ads in magazines that were no longer seen as "hot," that were no longer the place to be seen (for advertising is a very image-conscious industry). "All the media attention created a self-perpetuating prophecy," said Hayes; "the magazines were doing poorly, so it caused people to back off." William Carey recalled leaving a meeting with his advertising sales staff about this time "in a state of shock" at the dramatic drop in expected advertising revenues.

Time Inc. executives considered bidding for *Scientific American*, but soon realized that its audience was not the one that *Discover* needed for advertising sales purposes. Still, the approach to *Scientific American* apparently suggested to them that purchasing another science magazine might help their own fortunes. Around the beginning of April, Time executives came to Carey and asked

him whether the AAAS would be interested in selling *Science* 86. Carey stalled, but determined that "we had to do something by the end of June." *Science* 86 founder Hammond, working with former colleague Lipstein, began to prepare a proposal for buying the magazine from AAAS.

Shortly after the AAAS annual meeting in May 1986, at which apparently no decisions about the Time offer had been made, Time (perhaps upset at the slow pace of negotiations) leaked its offer to the press. The leak created, in Carey's mind, "a climate of crisis." The AAAS soon received a number of information proposals, but, again according to Carey, "in the end, the only party that wanted it badly enough was Time Inc." Hammond and Lipstein, whose efforts at putting together a purchase plan kept requiring revamping, later charged that the AAAS acted too hastily in accepting Time's bid, and in not allowing other potential bidders to present formal proposals. Carey and other members of the AAAS board defended their actions, arguing that various time limits and contractual agreements forced their hand.

The specific actions in this confluence of events thus raise two issues identified earlier: the media's role in creating the image of boom and bust, and the degree to which the organized scientific community actively supported popular science during the boom.

Media Responsibility

Much of the media coverage of the sale of the magazines contributed to a sense of "crisis"—at least among the central actors—that might not otherwise have existed. Carey perceived a "climate of crisis" generated by the media and causing advertisers to stay away from science magazines as they heard more and more about the problems of the category. AAAS board member Nelkin said that the sale "made a lot of press mostly because the science writers got exercised. People were looking for something to blame."³⁹

An advertising executive agreed that the media's preoccupation with the problems of one or two publications may have affected the entire span of science-oriented publications. In the late 1970s, said Leo Scullin, a senior vice president at Young and Rubicam, "everybody saw the opportunity at the same time, and that caught the eye of journalists, focused attention on the magazines. And it put enormous pressure and responsibility on the

editors to perform." In addition, he said, all the attention created a state of confusion that led advertisers unhappy about immediate results to pull out quickly and wait for the inevitable shakeout to happen.

Scientists' responsibility for the public understanding of science

Although AAAS board members defend their decision to sell *Science* 86 as necessary for the association's financial health, many people concerned about the public understanding of science worry that the association's action negates its own charge to promote that understanding. In a bitter column published in the *Washington Post*, *Science* 86 staff writer William Allman charged that by selling the magazines, "scientists have declared that they don't want to be a part of" the task of informing the public about science. "Presumably, they feel they have more important things to do. They don't."⁴⁰

Defenders of the AAAS action argued that even if the magazines had survived, they would not have succeeded in reaching the people who most need to learn about science. "The task of crusading for the popularizing of science to large audiences," said Piel, "has to await better education in our schools."⁴¹

It is frequently reported that the scientific establishment does not favor scientists who cooperate willingly with the press. And so it might not be surprising that the scientific community did not wholeheartedly support the new efforts. But solid research backing up this claim is rare. This area requires more research, both to produce solid support for the hypothesis and to understand its implications for the history of various efforts at publishing and producing information about science for the broad public.⁴²

The Future of the Science Boom

Explaining fully both the birth and death of the popular science boom will require an intricate understanding of the tensions between the commercial needs of publishing and the intellectual arguments of those promoting the public understanding of science. There is no evidence that the

boom's health reflects changing public perceptions of science or changes in public interest in science. Quite the contrary. For example, the number of weekly science sections in newspapers rose about threefold from 1984 to 1986. Frequently combined with "health" or "technology" sections, these sections appear to be attracting readers and advertisers more easily than did the magazines.⁴³

In addition, many of the magazines listed in Table 3 do remain healthy, especially those specialty magazines that serve readers with more tightly constrained interests or memberships. Among the obvious survivors are *The Sciences*, *Natural History*, and *Astronomy*. Each of these receives enough subsidy from its own sponsoring institution or from subscribers to support smaller circulations and less attractive advertising structures. Moreover, new publications have been launched in Winter 1986–87, such as *The Scientist*, intended for "the science professional," and *Hippocrates*, a magazine devoted to popular medicine and founded by one of *Science 80's* founders, Eric Schrier.

On television, the public broadcasting system continues to work around the advertising problem by seeking funding in other ways. "Nova" remains one of PBS's most popular series. Weekly shows like "Newton's Apple" and "Innovation" keep building larger audiences.

Even on commercial television, science is finding a place, usually as part of general interest programs. NBC has a regular science correspondent for the "Nightly News" and its morning "Today" show. CBS has a well-known science writer on tap as a science consultant. The magazine-format shows routinely include stories related to science. "We're successfully selling pieces on climate change, common cold research, technology of espionage," said Jonathan Ward, now an independent producer. "Basically, we provide the specialty science news bureau that the shows themselves don't support."

The science boom was real. Its "death," however, was only partially real. Those magazines and television shows that died did so because of commercial realities undermined by the uncertain support of scientific organizations and the insecurity of science journalists. And this episode—both the reality of what happened and the perceptions of the participants—can perhaps help us to understand better what we mean by "the public understanding of science."

Notes

1. Among the forms of popular science I am *not* considering are: popular writings by scientists such as Lewis Thomas, Stephen Jay Gould, or Carl Sagan; occasional articles about science in general-interest publications such as *The Atlantic* or *Smithsonian*; books in general; and materials, such as some Public Broadcasting System (PBS) specials, intended primarily for education purposes.
2. Transcripts of my interview notes will be deposited in the archives of the American Association for the Advancement of Science.
3. Daniel Greenberg, "Scientific magazines bursting out all over," *Science & Government Report* (15 January 1979): 1–2; Frederic Golden, "The Cosmic Explorer," *Time* (20 October 1980): 62–69; Fred Jerome, ed., "Suddenly, It's Science!" *SIPIScope*, Volume 8 (September–October 1980): 1–9; William Bennett, "Science Hits the Newsstand," *Columbia Journalism Review*, Volume 19 (January–February 1981): 53–57; "Special issue on public communication of science and technology," *Science, Technology, & Human Values*, Volume 6 (Summer 1981): 1–51. A few people have questioned whether a new boom had started; Earl Ubell, for example, has pointed to a string of television shows about science starting in the early 1950s. Jerome, "Suddenly, It's Science" p. 5.
4. Scott DeGarmo, in Fred Jerome, ed., "Science in the Media," *SIPIScope*, Volume 10 (Winter 1982–83): 1–19. See also Fred Pfaff, "Science Books Search for the Right Formula," *Marketing and Media Decisions* (October 1985): 53–57, 144–150.
5. Allen Hammond, in Jerome, "Suddenly, It's Science!" p. 6. Tom Bywaters pointed to the same issue, in *ibid*, p. 4. The final quote is from an assessment by William Saunders in Pfaff, "Science Books," p. 57.
6. For an introduction to the literature of magazine publishing, see Benjamin M. Compaine, *The Business of Consumer Magazines* (White Plains, NY: Knowledge Industry Publications, 1982); Compaine, ed., *Who Owns the Media?*, 2nd ed. (White Plains, NY: Knowledge Industry Publications, 1982); and Marjorie McManus *et al.*, eds., *Handbook of Magazine Publishing* (New Canaan, CT: Folio Publishing, 1977). Karen Heller, "Hot on the press," *Washington Journalism Review* (April 1984): 28–31, discusses the demographic approach to magazine publishing.
7. Sharon Dunwoody, "The Science Writing Inner Club," *Science, Technology, & Human Values*, Volume 5 (Winter 1980): 14–22 (several senior science journalists have told me that they discount this study—but, given the journalists' need to assert independence, denials may well constitute proof of the original point); Rae Goodell "TV Science: Fun,

- Games, UFOs—and Cosmos," *Columbia Journalism Review* (January/February 1981): 56–57; Fred Jerome, ed., "Newspaper Science Sections," *SIPIScope*, Volume 12 (Autumn 1984): 1–17.
8. Boyce Rensberger, in Jerome, "Suddenly, It's Science!" p. 2; Edward Edelson, in Jerome, "Science in the Media," p. 3.
 9. Hammond, though technically a member of the scientific community by virtue of a Ph.D. in geophysics, acted as a frustrated writer: "I had no place to write for as a freelancer . . . After *Human Nature* appeared and it turned out different than I had hoped it would, I decided to do something." Allen Hammond, telephone interview, 11 August 1986. On the origins of the various other publications, see Fred Jerome, ed., "Science in the media: Continuing the dialogue," *SIPIScope*, Volume 11 (Summer 1983): 1–9; Goodell, "TV Science"; Jonathan Ward, telephone interview, 6 August 1986; Horace Freeland Judson, "Science Friction," *The New Republic* (14 and 21 July 1986): 13–15.
 10. Fred Jerome, ed., "Death of the Universe," *SIPIScope*, Volume 11 (Summer 1983): 1–3; Pfaff, "Science Books," p. 57; Hammond interview; Ward interview; Judson, "Science Friction," p. 13.
 11. Jerome, "Science in the Media," p. 1.
 12. Fred Jerome, "Whatever Happened to the Science Media Boom?" *Technology Review* (12 January 1983): 12–13; Leon Jaroff, in Jerome, "Science in the Media," p. 11.
 13. Barbara J. Culliton, in Jerome, "Science in the media," p. 4; Ward interview.
 14. Patricia Morgan, telephone interview, 4 August 1986. The ACS does continue to support a wide range of other activities in the general field of public understanding of science.
 15. Pfaff, "Science Books"; Terry Bivens, "Survival of the Fittest Magazines," *Philadelphia Inquirer* (15 June 1986); 1–C, 10–C.
 16. Pfaff, "Science Books." Judson, "Science Friction."
 17. William Carey, telephone interview, 19 August 1986; James Hayes, telephone interview, 25 August 1986; "Hearst's Science Digest to close; Layoffs slated," *Wall Street Journal* (25 July 1985): 6. Bivens, "Survival of the Fittest," p. 1–C.
 18. Robert Cohen, telephone interview, 7 August 1986; Kim McDonald, "Science Magazines' Battle for Survival Claims an Early Casualty—'Science 86,'" *Chronicle of Higher Education* (16 July 1986): 6–7; Bivens, "Survival of the Fittest"; Pfaff, "Science Books."
 19. Richard LePere, telephone interview, 5 August 1986.
 20. Paul Zuckerman, telephone interview, 7 August 1986.
 21. Dorothy Nelkin, telephone interview, 20 August 1986.
 22. Allen Hammond, telephone interview, 11 August 1986.
 23. Pfaff, "Science Books," p. 57.
 24. Zuckerman interview.
 25. Hayes interview, 25 August 1986.
 26. Cohen interview.
 27. Morgan interview.
 28. Carey interview; MacDonald, "Science Magazines' Battle for Survival"; Bernard Goldhirsh, personal communication, June 1982; Jerome, "Suddenly, It's Science!"; Joel Greenberg, personal communication, October 1984. Greenberg, telephone interviews, 6 August 1986 and 15 October 1986. Although the audience for *Science News* overlapped with that for *Science 86*, *Omni*, and other popular science magazines, *Science News* does not fit the general pattern of these magazines in one crucial aspect. It carries very little advertising. "Paid advertising revenue . . . is so minor to us as to be virtually irrelevant," publisher E. G. Sherburne, Jr., wrote in a lead editorial after the magazine deaths of 1986. E. G. Sherburne, Jr., "A thank-you to our subscribers," *Science News*, Volume 130 (2 August 1986): 67.
 29. Carey interview; Hammond interview; LePere interview; Dan Greenberg, "Science 86: Did this magazine have to die?" *Science & Government Report*, Volume 16 (1 August 1986): 1.
 30. Hayes interview.
 31. Ellis Rubinstein, telephone interview, 7 August 1986.
 32. The most complete statement of Miller's work is in Jon D. Miller, Kenneth Prewitt, and Robert Pearson, *The Attitudes of the U.S. Public toward Science and Technology* (Chicago: National Opinion Research Center, Univ. Chicago, July 1980). For a recent summary of his work, see Jon D. Miller, "Reaching the attentive and interested publics for science," in Sharon Friedman, et al., eds., *Scientists and Journalists: Reporting Science as News* (New York: Free Press, 1986), pp. 55–69. See also Jonathan Ward, address delivered at Presidential Plenary Session, American Chemical Society National Meeting, Philadelphia, August 1984; and Jerome, "Whatever happened . . .," p. 13.
 33. Zuckerman interview.
 34. Own Lipstein, telephone interview, 8 August 1986.
 35. Hammond interview.
 36. Dunwoody, "The Inner Circle"; Bennett, "Science Hits the Newsstand."
 37. "Two science magazines die," *Science Writers*, Volume 34 (September 1986): 12; Sharon Dunwoody, "An editor's lament—" 7(2) *Sciphers* (1986): 1, 8.
 38. The sequence of events described here and in following paragraphs is based on both published sources and unattributable industry rumor. Though I cannot assure readers that this sequence is entirely accurate, I believe it to be the best explanation for

the information I have—and to be worth presenting for future historians to build on or modify. Among the published sources are: William Baldwin, "Chip off the old block," *Business Week* (13 February 1984): 156; Lee A. Daniels, "For sale: Scientific American," *The New York Times* (29 March 1986): 27, 29; Stuart J. Elliott, "Pressure finally gets to Scientific American," *Advertising Age* (7 April 1986): 79; Geraldine Fabrikant, "A venerable magazine's setbacks," *The New York Times* (16 April 1986): D1; Eric Schmitt, "Buyer for Scientific American," *The New York Times* (4 July 1986): D1, D3; Geraldine Fabrikant, "Time's fight to save Discover," *The New York Times* (9 September 1986): 29, 33; Judson, "Science friction"; Pfaff, "Science books"; Hammond interview; Carey interview. Piel interview. Hayes interview.

39. Carey interview. Nelkin interview.

40. William F. Allman, "Scientists fall silent," *Washington Post* (20 July 1986): D5.

41. Piel interview.

42. Three studies that touch on this issue are Warren O. Hagstrom, *The Scientific Community* (New York:

Basic Books, 1965), Stuart S. Blume, *Toward a Political Sociology of Science* (New York: Free Press, 1974), and J. C. Gaston, *The Reward System in British and American Science* (New York: Wiley, 1978). One recent study tries to quantify the degree to which institutional factors in science interfere with scientist/journalist cooperation; see Sharon Dunwoody and Michael Ryan, "Scientific Barriers to the Popularization of Science via Mass Media," *Journal of Communication*, Volume 35 (Winter 1985): 26–42. For the argument that scientists actively use popularization when it suits their needs, see Terry Shinn and Richard Whitley, eds., *Expository Science: Forms and Functions of Popularisation* (Dordrecht/Boston/Lancaster: D. Reidel, 1985).

43. Sheryl Burpee, SIPI, telephone interview, 21 August 1986. Detailed results from a SIPI survey that updates the survey reported in Jerome, "Newspaper science sections," were in press as I prepared this article. They were published in "Newspaper science sections spreading nationwide," *SIPIScope*, Volume 14 (Autumn 1986): 1–17, after this article went to press.