Science and James McKeen Cattell, 1894 to 1945

Michael M. Sokal

Summary. Cattell took control of *Science* in 1894, turned it into America's most important scientific journal, and edited it for 50 years.

When the publication of *Science* was allowed to lapse in March 1894, its future looked bleak (*1*). That it survived and became a success can be attributed in large part to the 50-year editorship of James McKeen Cattell.

In 1894, Cattell was an unknown quantity in the American scientific community. In the summer of that year, when the American Association for the Advancement of Science met with a "committee of the founders and friends of the journal *Science*" with a view to supporting the periodical, Cattell's name was not mentioned. The AAAS committee's chairman, W J McGee of the Smithsonian's Bureau of American Ethnology, recommended that an annual subsidy be paid to *Science*, and urged several changes in the journal's policy (*2, 3*). He argued that *Science* should publish AAAS papers and announcements, should have active associate editors from each of the Association's sections, and should have its editorial and business policy directed by a AAAS-appointed committee. The report, with McGee's recommendations, was adopted and most members assumed that N. D. C. Hodges, *Science*'s previous editor, would resume that position (*4*).

Even before the AAAS meeting, Alexander Graham Bell and Gardiner G. Hubbard, previous backers of *Science*, had decided to transfer ownership of *Science* to Cattell (*5*). Hodges was in agreement, and in November Cattell began gathering his editorial committee (*6*). In structuring this group, Cattell sought a large group of active members and ignored McGee's plan to have a AAAS-appointed policy committee, thus establishing his independence. On 4 January 1895, the third issue of *Science* to be labeled volume I, number 1, appeared. Cattell called the volumes he edited *Science*'s "new series," and the issues of *Science* published today are numbered from Cattell's first issue.

Who was Cattell? One member of the AAAS committee later remembered him as (*7*):

> a strange but attractive young man, who came into my office . . . in the autumn of 1894 like a meteor out of a clear sky, and astonished me by inquiring whether he might not undertake the resuscitation of the defunct journal "Science."

Others were equally surprised when Cattell took over *Science* and even today, after extensive research, it is still not totally clear why Cattell wanted to edit the journal.

The Education of an Editor

Cattell was born in 1860, the son of William C. Cattell, then professor of ancient languages at (and later president of) Lafayette College, Easton, Pennsylvania, and Elizabeth McKeen Cattell (*8*). His maternal grandfather, James McKeen, was a prosperous businessman. The Cattells were financially independent and James, even as a young professional, was always sure of the personal income that Hodges had never been able to count on. Cattell studied at Lafayette, and on graduating in 1880 he went to Germany to study philosophy (*9*). At Göttingen and Leipzig he grew interested in the scientific approach to philosophical questions then emerging as experimental psychology. In 1882 he won a fellowship at Johns Hopkins University, Baltimore, and during the 1882–1883 academic year he did distinguished work in the university's newly established psychological laboratory. In May 1883 he lost this fellowship to his classmate, John Dewey, in part because of his continual bickering with Daniel Coit Gilman, the university's president. Later that year he returned to Germany, and in 1886 he became the first American to earn a Ph.D. in experimental psychology from Wilhelm Wundt at Leipzig.

Cattell then moved to St. John's College, Cambridge, where he studied British psychology, lectured on the new German work in the field, and established the first English laboratory in experimental psychology (*10*). He also fell under the influence of Francis Galton, who was interested in the physical and physiological differences between people. Cattell, adopting Galton's framework, began to study psychological differences using some of the techniques he had used in Germany. He thus developed the concept of mental testing, a term he coined in 1890 (*11*), which represented his most important scientific contribution (*12*). Meanwhile, in 1889 he became professor of psychology at the University of Pennsylvania and, in 1891, moved to Columbia University in New York. At both institutions he performed much important research in psychology (*13, 14*), and at Columbia, as professor of psychology through 1917, he established a major doctoral program in the subject. Early in 1894, with James Mark Baldwin of Princeton, he founded the *Psychological Review*, which he edited through 1904. Thus in 1895 when he took over *Science*, Cattell brought several strengths to the journal. He had an excellent reputation among psychologists and was also becoming known in the New York scientific community (*15*).

The First Year Under Cattell

In taking over *Science*, Cattell arranged for the AAAS annual subsidy of $750 to be paid to him for 1895 (*16*). His editorial board, of which he made excellent use, included scientists with ties to the federal scientific agencies as well as emerging research universities. Among the first group were Simon Newcomb, Director of the Nautical Almanac Office, Thomas C. Mendenhall, former Superintendent of the Coast and Geodetic Survey, C. Hart Merriam, Chief of the Biological Survey, John Shaw Billings, previously Assistant Surgeon General, and John Wesley Powell, former Director of the Geological Survey and Director of the Bureau of American Ethnology

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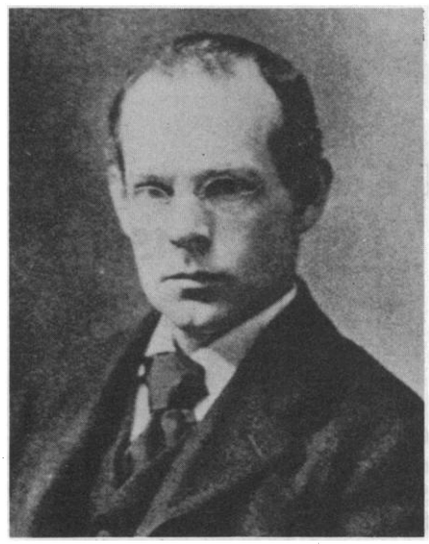
(*17*). Of those connected with universities, Newcomb and Billings had taught at Johns Hopkins while Ira Remsen and William K. Brooks were professors there, Robert S. Woodward, Henry F. Osborn, and Cattell himself were all professors at Columbia, and Edward C. Pickering, William M. Davis, and Henry P. Bowditch all held chairs at Harvard (*18*).

Since *Science* had no professional editorial or reporting staff for many years, Cattell relied on the editorial board to write much of the sort of material that is today included in the News and Comment and Research News sections. In addition, Cattell and his board solicited many of the papers that today would be published as articles or reports (*19*). In some of Cattell's very first issues, the editorial content was somewhat meager, but he soon developed a series of formats that allowed him to publish a useful periodical.

The dominant format that Cattell used in his first years was regular articles. He could not rely on submitted material and so regularly requested the formal addresses that had been given before major scientific societies (*20*). *Science* published in its first year major papers that had first been presented before the Philosophical Society of Washington and the American Mathematical Society (*21*) and, as requested by McGee, he continued to publish AAAS material, including AAAS presidential addresses (*3, 22*). As the journal gained in reputation, submitted papers replaced formal addresses as the prevalent articles in *Science*, but even today, it regularly publishes AAAS presidential addresses and Nobel Prize talks (*23*).

Cattell also regularly published unsigned editorials, many of which were written by members of his editorial board. These were not labeled as such but they usually appeared as the first article in an issue and could be identified by the leading (that is, extra space) between the lines. During the first year of publication Cattell wrote a major editorial reviewing the importance of the forthcoming AAAS meeting. Many other early editorials were related to Association affairs (*24*). Within a few years, however, Cattell and others were to be writing editorials on much more controversial subjects.

Another major format that *Science* utilized was Current Notes on various topics. From the first issues of 1895, W. M. Davis contributed Current Notes on Physiography and Daniel G. Brinton, Current Notes on Anthropology (*25*); these two series continued regularly in *Science* for many years. Other such series appeared occasionally—Cattell even wrote a few on psychology for his second volume (*26*)—but few had the continuity of Davis's and Brinton's. These Current Notes served much the same function as the Research News section does today, keeping the scientific community informed on the latest research in the fields they covered.



James McKeen Cattell, circa 1895. [From H. Cirker and B. Cirker (*146*), courtesy of Dover Publications]

The journal also regularly included reports on the meetings of local scientific groups, such as the Iowa Academy of Sciences and the Biological Society of Washington (*27*). These reports often included long abstracts of the papers presented at the meetings, and thus resembled today's Reports section of *Science*. Regular reviews of scientific journals were published in *Science* under Cattell (*28*), and these helped scientists keep current in a day when relatively few abstracting periodicals were published. The early book reviews, however, published under the rubric "Scientific Literature," varied greatly in quality. In some issues, this section was simply a list of books received, much to the dissatisfaction of several publishers (*29*).

Of greater importance was *Science*'s correspondence section, which was filled with meaningful discussion and controversy from its first year. In 1895, Cattell published several series of letters debating such topics as causes of evolution (*30*), the working of the human eye (*31*), and priority claims in American psychology (*32*). By publishing such discussion Cattell both explicitly stressed the value of controversy (*33*) and established a tradition that continues today (*34*).

The most interesting section of *Science* during Cattell's early years was Scientific Notes and News (*35*). It reported on the comings and goings of American scientists, news that meant much when there were fewer than 5000 scientists in America and when AAAS membership was under 2000. Hodges had published similar notes, but Cattell, with his extensive contacts, expanded this section. It reported scientific appointments, the progress of scientific exploring expeditions, and gifts and bequests to the scientific institutions. In an effort to play a major role in the federal scientific community, *Science* regularly published announcements of Civil Service examinations for scientific positions, and the subsection Educational News did much to serve the needs of those at universities. As Cattell and his journal gained confidence, this section included extensive editorial comments, often taking positions more forcefully than the leaded editorial articles. Usually unsigned, these notes sometimes led Cattell into trouble. However, the section was composed primarily of news items gathered from Cattell's own extensive reading and correspondence, as well as excerpts from the daily press and from such journals as *Nature*. Members of his editorial board regularly submitted items for this section, but Cattell did not rely solely on them. He used his acquaintances throughout the American scientific community to solicit contributions to this section, and urged his friends to write him whenever they knew of noteworthy items (*36*). He discontinued Hodges' category of "contributing subscribers," who earned the journal by submitting material for publication; all who received *Science* while Cattell owned it paid for the privilege, but Cattell got his contributors to submit more material than Hodges did.

A Journalistic Coup

Cattell reestablished *Science* as a useful and viable journal within a year. The formats he used—none of them original with him—were the basis for the journal's continued existence, but they did not guarantee expansion or even ultimate success. Then, early in 1896, *Science* took advantage of a major scientific discovery and achieved a journalistic coup.

On 8 November 1895, Wilhelm Conrad Röntgen discovered x-rays; on 28 December 1895, a first report of Röntgen's experiments appeared in a German journal (*37, 38*). The American popular press

first reported this work in January 1895, the *Electrical Engineer* published the first specialized article on x-rays on 8 January 1896 (*39*), and by the end of that same month, *Science* published a long report from Germany on "The x-rays" (*40*). This article, by Hugo Münsterberg, a German-born psychologist and professor at Harvard, was dated 15 January and provided a detailed account of many recent European experiments. Münsterberg and Cattell were good friends, and this article illustrates how Cattell's ties with the members of the American scientific community served him well. *Science* pulled off a coup that no other American journal equaled.

In the succeeding months, *Science* expanded its coverage of x-ray work, presenting what may have been the first published x-ray photographs in the United States (*41*). It reprinted *Nature*'s translation of Röntgen's original article, and published major papers on the latest x-ray research by Michael Pupin of Columbia University and Arthur W. Goodspeed of the University of Pennsylvania (*42*). Soon afterward, the journal printed a report by Cattell's brother Henry, himself a well-known pathologist, of the medical and surgical uses to which x-rays had been put (*43*). In all, though *Science* was not the first journal to report on Röntgen's discovery, it quickly became the journal that had the broadest coverage of research going on in the field (*44*). The *Electrical Engineer*, for example, soon limited itself primarily to publishing regular reports of Edison's work (*45*). X-rays were a "hot topic," and Cattell's *Science* was the one journal that American scientists could turn to for complete coverage of it.

Science's success with x-rays stemmed primarily from Cattell's continual contact with American scientists. Münsterberg, Pupin, Goodspeed, and Henry Cattell were all his friends, and he continually sought to widen his circle of acquaintances. In the early years of publication, Cattell distributed among his scientific colleagues postcards and notepaper that they were asked to use for reporting to *Science* items of current interest. By 1900, Cattell published regular reports on wireless telegraphy (*46*), on new chemical elements (*47*), and on the *International Catalogue of Scientific Literature* (*48*). In the early 20th century, *Science* published such major articles as Hugo de Vries's reports of his rediscovery of Mendel's work and of his own mutation theory (*49*).

Cattell also nurtured his ties with less prominent scientists, never knowing when one might provide him with something important. One example will serve. Throughout the late 19th century, scientists at the Blue Hill Meteorological Observatory regularly observed high-altitude atmospheric phenomena by means of kites. In 1896, the director of the observatory, Henry H. Clayton, began sending *Science* reports of these observations and of new altitude records set by his kites. Cattell regularly published these reports (*50*), although they were neither exciting nor probably even interesting to most of *Science*'s readers, and by 1900 such material was not needed to fill the journal's columns. Cattell, however, continued to publish the reports, earning Clayton's appreciation and benefiting by Clayton's sending him, on 28 December 1903, an article about the Wrights' flying experiments at Kitty Hawk. This article, which analyzed the Wrights' airplanes in terms of the details of kite design, appeared rapidly in *Science* and provided the American scientific community with a new perspective on the Wrights' work (*51*).

EDITORIAL COMMITTEE: S. NEWCOMB, Mathematics; R. S. WOODWARD, Mechanics; E. C. PICKERING, Astronomy; T. C. MENDENHALL, Physics; R. H. THURSTON, Engineering; IRA REMSEN, Chemistry; J. LE CONTE, Geology; W. M. DAVIS, Physiography; O. C. MARSH, Paleontology; W. K. BROOKS, Invertebrate Zoölogy; C. HART MERRIAM, Vertebrate Zoölogy; S. H. SCUDDER, Entomology; N. L. BRITTON, Botany; HENRY F. OSBORN, General Biology; H. P. BOWDITCH, Physiology; J. S. BILLINGS, Hygiene; J. MCKEEN CATTELL, Psychology; DANIEL G. BRINTON, J. W. POWELL, Anthropology.

Cattell's original Editorial Committee for *Science*, 1895. From *Science*, new series, volume I, title page (1895).

Science and the Federal Government

Within a few years, through editorial articles that had previously urged attendance at AAAS meetings, Cattell used *Science* to try to shape the policies of the scientific agencies of the federal government. In attempting to determine government science policy, Cattell was aided by, or followed the lead of, members of his editorial board in federal service. Many of the editorials were written by these members, one of whom, Simon Newcomb, urged in a series of 1901 editorials that the U.S. Naval Observatory become a research-oriented national observatory. The journal also published excerpts from the observatory's annual reports and selections from newspaper articles (*52*). *Science*'s campaign had the support of many American scientists, and while the status of the observatory was not changed, a professional Board of Visitors was appointed and a naval officer with training in astronomy, Stimpson J. Brown, became its director (*53*).

Less successful was Cattell's effort to free the Bureau of Fisheries from political control. Established in 1871, the agency did excellent scientific work during its early years. However, during the presidency of Grover Cleveland, this tradition was lost and its directorship became a patronage plum. In 1897, with the inauguration of William McKinley, *Science* began publishing letters and editorials calling for the appointment of a professional director (*54*). McKinley, however, used the position to reward George M. Bowers, a Republican politician who had supported him. Bowers had no scientific credentials and Cattell reacted strongly to the nomination (*55*):

> President McKinley has, as has been feared, nominated the person from Martinsburg, W. Va., named Bowers for United States Fish Commissioner. Efforts should still be made to prevent confirmation by the Senate, but that talkative body has no time to listen, and only irrelevant accidents are likely to intervene. It is within the limits of possibility that a man chosen by lot from a penitentiary would make a better chief executive then the present "incumbrance," and it is quite possible that Mr. Bowers may become a competent Fish Commissioner. His record should not be prejudged and he should be given all possible assistance by men of science. No subsequent events can, however, excuse Mr. McKinley. Those having knowledge of his flabby character will not be surprised when he does a weak and foolish thing, but it is humiliating to know that the President of the United States can deliberately and with full knowledge perform an illegal act.

Cattell was attacked for this comment, especially by the members of his editorial board working in federal agencies. Newcomb's and Powell's letters were particularly critical, and Cattell published Powell's retort, apologized for the tone of his remarks, but also insisted that Bowers' nomination should be withdrawn (*56*). It was not, and Bowers served for 15 years, learning his job well, and earning the respect of the scientists who worked under him (*57*). In 1901, when McKinley was assassinated, *Science* published a "mourning note," which one scientist called a "gem of perfect cutting" (*58*). Despite this attempt at apology, Cattell's attacks—and especially their tone, which so quickly became personal—began to alienate him from some members of the scientific

community, just as his earlier bickering cost him his Johns Hopkins fellowship. Similar incidents were to cause him trouble in the future. Meanwhile, *Science* continued to try to influence federal science policy and another example will help illustrate how Cattell used his position.

In 1902, two federal agencies—both part of the Smithsonian Institution—sponsored work on anthropology. The Department of Anthropology of the National Museum, headed by William H. Holmes, focused its attention on artifacts, and the Bureau of American Ethnology, directed by John Wesley Powell, concentrated on such nonmaterial aspects of culture as myth, ritual, and language. This division of labor suited both agencies and made possible much of the excellent work done during the late 1800's in American Indian anthropology (*59*).

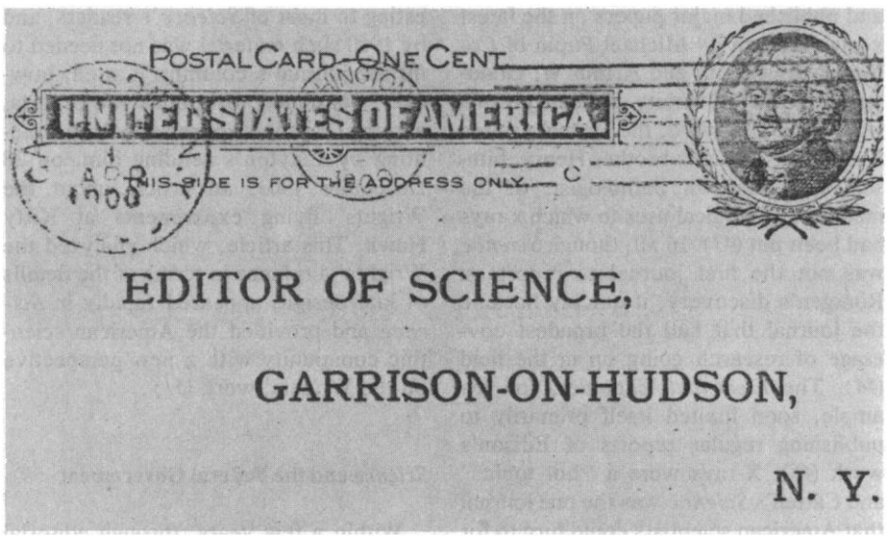
In September 1902, Powell died and most government scientists assumed he would be succeeded by W J McGee, his long-time deputy. McGee himself felt he deserved the appointment and his personal position within the American scientific community—he was Newcomb's son-in-law—led him to expect it. However, he did not reckon with Samuel P. Langley, the Secretary of the Smithsonian. Langley wanted to consolidate his control over the Bureau, which had operated under Powell as an independent agency, and therefore abolished the position of Director of the Bureau and appointed Holmes as its head. In doing so, Langley greatly disturbed American anthropologists, who feared that the Bureau's interests would be swamped by the Museum's. Holmes himself was not sure whether he should accept the position, but finally he did. Consequently, cultural anthropologists such as Franz Boas began plotting to get Langley to change his mind (*60*).

Cattell entered the controversy almost immediately. He had helped arrange Boas's initial appointment at Columbia University (*61*) and he owed McGee much for his role in his own acquisition of *Science*. Boas and McGee recognized *Science*'s position in the American scientific community, and they began sending Cattell material to use against Holmes and Langley (*62*). *Science*'s campaign began in October 1902 with the reprinting of a report from the Washington *Times* that attacked Langley and supported McGee (*63*). In the middle of November, Cattell interviewed Langley in Washington in an attempt to influence government scientific policy directly (*64*). Langley was not dissuaded, and 1 week later *Science* published Boas's long letter, criticizing Langley's actions on scientific grounds (*65*). The same issue included a long editorial, probably by Robert S. Woodward of Columbia, which attacked all aspects of Langley's administration of the Smithsonian (*66*). *Science*'s concerns now went beyond the issue of Holmes's appointment, urging the restructuring of one of the oldest American scientific institutions. During the next few months, *Science* published three editorials that criticized the Smithsonian's management and called for a general reform (*67*). At least one was written by Simon Newcomb, and information for the others came from Alexander Graham Bell, a member of the Smithsonian's Board of Regents (*68*). At Bell's urging, Cattell kept the identity of his informant confidential. But the fact that Bell "leaked" the Regents' deliberations to Cattell, even if he did so to gain support for his own views, is a significant indication of *Science*'s importance.

The point is not that Cattell's and *Science*'s views were accepted. In fact, Langley prevailed and the Bureau contracted while the Museum expanded (*69*). Furthermore, when Langley died in 1906 and Cattell sought the Smithsonian secretaryship, his candidacy was not taken seriously (*70*). The point here is that *Science* took a stand and pressed for it. Perhaps even more important, as a result of Cattell's contacts with Bell, *Science* became the journal that American scientists read to find out what was going on in federal science. Similarly, *Science* conducted a long discussion in 1902 about the proposed Carnegie Institution (*71*) and regularly concerned itself with other private plans to support science. The journal's success and Cattell's role in it was recognized in 1901 by his election to the National Academy of Sciences. He was the first psychologist elected but his position as editor of *Science* clearly played a larger part in his election than his research (*72*).

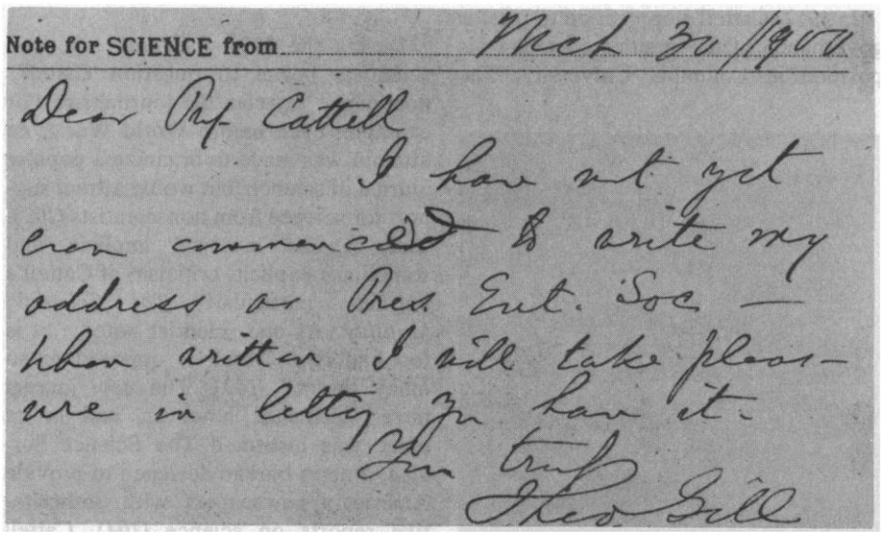
The AAAS, Other Journals, and Other Interests

A few years after Cattell became the editor of *Science*, changes took place in the AAAS that were to affect the journal. In 1897, Leland O. Howard, a distinguished entomologist with the U.S. Department of Agriculture, became the Association's Permanent Secretary (that is, Executive Officer). Howard set out to expand the Association (*73*), since it had long lain moribund, and of its approximately 2000 nominal members, only about 1200 paid dues (*74*). Starting with the AAAS's annual meetings, Howard and Cattell organized the annual Convocation Week whereby the meetings of scientific and scholarly societies would all take place in one city under AAAS auspices during the calendar week after Christmas. By doing this, Howard and Cattell meshed the societies' schedules with those of the increasingly important research universities, to the benefit of both (*75*, *76*). Convocation Week was quite successful. For example, at the AAAS meeting in New York in June 1900 only 434 people attended, but when the Association next met in New York, in December 1906, attendance more than doubled (*77*).



Science postcard (front). [From James McKeen Cattell papers (*2*)]

More important was the decision of Howard and Cattell to follow the recommendation of McGee's 1894 committee and make *Science* the AAAS's official journal. Under the arrangement they worked out in 1900, *Science* guaranteed publication of the AAAS's official papers and news, as well as abstracts of many of the talks presented at AAAS meetings; Cattell retained editorial control and ownership of the journal. AAAS members received *Science* at no increase of dues, then $3. For each member's subscription to *Science* the AAAS paid Cattell $2; that is, only 40 percent of the $5 subscription rate he had charged individuals and continued to charge libraries (*78*). This arrangement reduced the income of both *Science* and the AAAS, but it was hoped that membership in the AAAS would increase because of the added attraction of a subscription to America's leading scientific periodical. For Cattell, an increased AAAS membership meant a larger guaranteed circulation and, therefore, increased attractiveness to advertisers and higher advertising rates. His arrangement with the AAAS was therefore a gamble, and the stakes were high.


Note for SCIENCE from Mch 30 1900

Dear Prof Cattell

I have not yet
even commenced to write my
address or Pres Ent. Soc —
when written I will take pleas-
ure in letting you have it.

In haste
Thos Gill

Science postcard (back). [From James McKeen Cattell papers (*2*)]

AAAS membership did indeed rise rapidly, and although Cattell began publishing lists of new members of the AAAS in *Science*, he soon abandoned the practice because the lists were too long (*79*). By 1906, when the first edition of *American Men of Science* included about 4000 names, AAAS membership was more than 5000 (*77*). In 1916, as he approached retirement, Howard circulated a chart that showed the increase in the Association's membership during his term (*80*). The turning point was clearly 1901, when *Science* was first included with AAAS membership.

From 1901 Cattell devoted more of his time to editorial work. In that year, his program of anthropometric mental tests was shown to be useless, yielding results that literally correlated with nothing (*81*). This result killed his career as a psychological tester and redirected his efforts away from experimental psychology. He had already, in 1900, taken over the *Popular Science Monthly*, a magazine that since 1872 had popularized Darwinian and other scientific ideas (*82*). At that time the magazine resembled today's *Scientific American* more than it does the *Popular Science* of the 1980's, and its publishers had been losing money on it for many years (*83*). When Cattell took it over, he used his *Science* contacts to build up *Popular Science Monthly*'s circulation and to improve its contents (*84*). He also published in it editorials that he could not print in *Science*, where any editorial comment would be read as coming from the editorial board (*85*). Only Cattell's name appeared on *Popular Science Monthly*'s masthead, and he felt free to attack, for example, Langley's administration of the Smithsonian in terms inappropriate for *Science* (*86*).

In 1903, Cattell started what became *American Men of Science*, first published in 1906 and continuing today as *American Men and Women of Science* (*87*). For Cattell, this volume was more than a directory: it was a source of data for his studies of the origins and background of scientists, themselves a continuation of his interest in the study of the differences between people (*88*). Just as important, Cattell attempted to rate scientific distinction, starring 1000 scientists listed in the first edition of *American Men of Science* as the most distinguished in the country (*89*). This system helped the American scientific community order itself in the early years of the 20th century, and represented one of the earliest statistically based studies in the sociology of science (*90*).

In 1904, Cattell gave up his share of the editorship of the *Psychological Review*, and helped establish the *Journal of Philosophy, Psychology, and Scientific Method*, later continued as the *Journal of Philosophy*. In 1907, he assumed the editorship and ownership of *The American Naturalist*, a third journal that was on the verge of failure. It had been founded in 1866 and, after Cattell took it over, it became an important voice in the development of genetics and evolutionary theory in the United States (*91*).

Cattell did not edit these journals by himself, and none had any permanent paid staff as long as he owned them. He conducted them from his home in Garrison-on-Hudson, New York, bringing together many temporary and part-time assistants. He recruited graduate students from Columbia, and their help, especially with *American Men of Science*, contributed to his success. Similarly, when his children became old enough, they worked on the journals. The fiancée of one of his sons apparently broke her engagement when she found that Cattell expected her to edit *Science*'s book reviews after her marriage. At the center of this activity was Josephine Owen Cattell, his English-born wife. For many years, she was the unpaid and unrecognized managing editor of *Science* and the other journals, and all who knew Cattell knew how much the journals depended on her work. Not until the mid-1920's was her contribution recognized in print, and her name did not appear on *Science*'s masthead until after her husband's death (*92*).

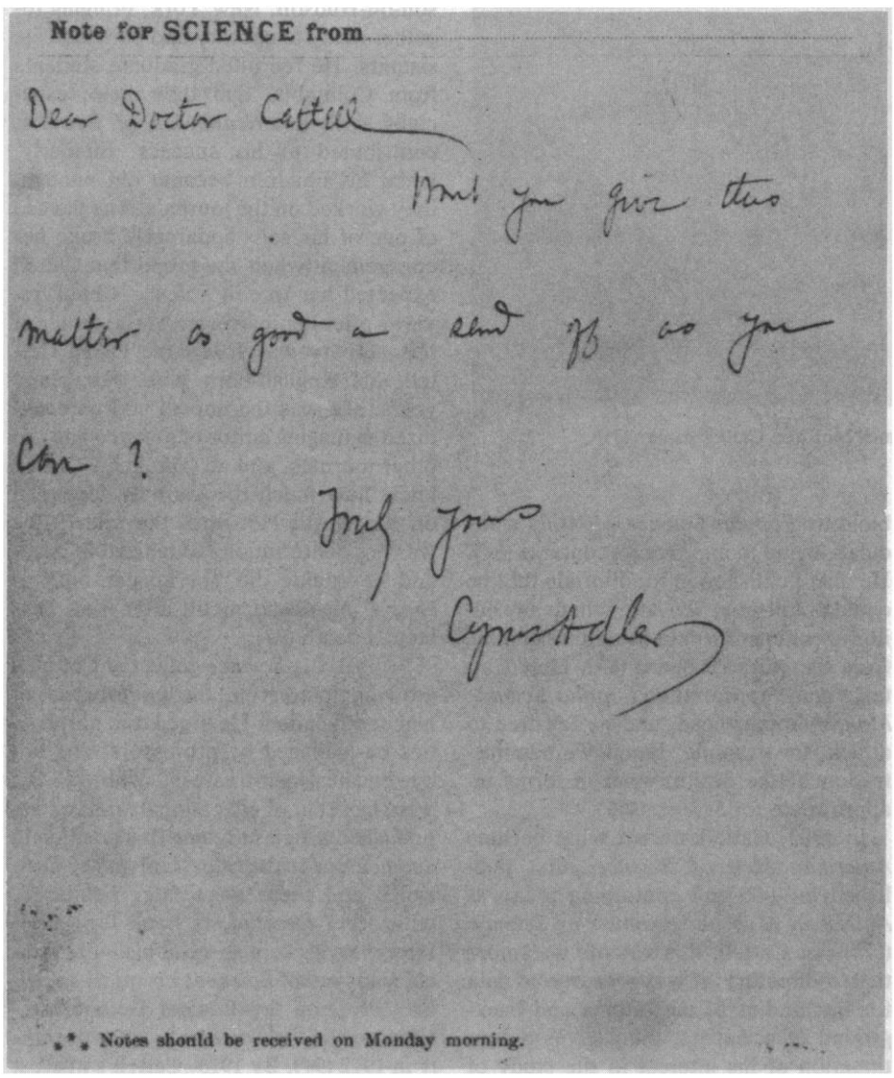
From 1901, *Science* reflected Cattell's growing interest in the governance of higher education. He urged that universities be managed by professors, and not by businessmen-trustees, who he felt were ignorant of educational matters. He published articles arguing this position in *Science* under the title "University Control," and these were later published, with other material, in book form (*93*). However, he kept some of his more radical ideas out of *Science*; his quasi-socialist "Program for Radical Democracy" appeared in the *Popular Science Monthly* in 1912 (*94*). By 1915, Cattell's interest in education led him to establish *School*

and Society, a journal for professional educators, modeled after *Science*. It published news on educational affairs, much like *Science*'s Scientific Notes and News, and attempted to become required reading for educators the way *Science* was for scientists. *School and Society* never lived up to Cattell's hopes for it, but it never lost him money (*95*).

Also in 1915, Cattell sold the *Popular Science Monthly* name to Waldemar Kaempffert, the science journalist, and founded *The Scientific Monthly*. This new journal was designed less to popularize science—hence its new name—and more to "review scientific progress and advocate scientific educational and social reforms" (*96*). It was edited for scientists and Cattell made this journal available to AAAS members in place of, or in addition to, *Science*. Though many members chose to receive it, it never replaced *Science* as the AAAS's principal organ (*97*).

Meanwhile, in 1914 Cattell helped organize the AAAS's Committee of One Hundred on Scientific Research, serving as its first secretary. His goal was that the Committee should raise large sums of money to be distributed in many small grants to a wide range of working scientists. It was thus to differ from such groups as the Carnegie Institution which supported large-scale science projects, for example, the Mount Wilson Observatory and the Geophysical Laboratory in Washington (*98*). To Cattell, concentrations of scientific activity did little other than gratify the businessmen-philanthropists who, he believed, were ignorant of science. Just as he felt that universities should be under professional—that is, professorial—control, he argued that the governance of science should be left to scientists. His views, although they received support from scientists and educators, did not prevail (*99*).

In 1917, Cattell's opposition to trustee governance of universities cost him his position at Columbia University. The specific incident that led to his dismissal also led to his canonization among the saints of American academic freedom (*100*). Significantly, this episode had little or no effect on his editorship of *Science*. Even those who felt that Cattell deserved to be fired argued that his dismissal was unrelated to the journal. His colleagues disagreed with him, but found it "difficult to understand how the journal *Science* would get on without Cattell," stressing "his great services in the cause of science in this country," and urging that scientists "should unite to do something to express our appreciation of his vast labors for *Science*" (*101*). In all, this incident brought out expressions of appreciation that Cattell had rarely received previously.


Note for SCIENCE from

Dear Doctor Cattell

Must you give this matter as good a send off as you can?

Truly yours

Cyrus Adler

*** Notes should be received on Monday morning.

Science notepaper. [From James McKeen Cattell papers (*2*)]

Science in the 1920's and 1930's

During the 1920's several American scientists began to question Cattell's dominance in scientific journalism. For example, even before World War I, an attempt was made to organize a popular journal of science that would attract support for science from nonscientists (*102*). This scheme involved implicit, and sometimes explicit, criticism of Cattell's journals, particularly *The Scientific Monthly*. As one scientist noted, "it is too bad that Cattell is opposed to so many things" (*103*). The new journal never appeared, however, and in its place was instituted The Science Service, a news bureau designed to provide America's newspapers with authoritative reports on science (*104*). Cattell served on the Service's board of directors, for many years as chairman. But as might be inferred from this episode, the center of the American scientific community had moved away from Cattell. To be sure, he was active in psychology, founding The Psychological Corporation in 1921 (*105*), and in AAAS affairs, working closely with Burton E. Livingston, the plant physiologist who had become the Association's Permanent Secretary in 1920 (*106*). But the focus of American scientific organization had shifted to the National Academy of Sciences and its National Research Council, which had played a major role in World War I and which had close ties with the philanthropic foundations (*107*). Cattell was a member of the National Academy, but while it was under the de facto control of George E. Hale, its foreign secretary (*108*), Cattell was really an outsider. He sometimes criticized the Academy and Council for what he felt were its elitist

policies, and urged that the AAAS, as a more broadly based organization, should play a larger role in the governance of science (*109*). But these attacks, usually published in *The Scientific Monthly* and often as much personal as substantive, had little effect on the Academy and Council, or on Cattell and *Science*. These attacks helped alienate Cattell from other scientists, but *Science* was still widely read and Cattell himself was seen by lay people as a spokesman for the scientific community. In 1926, H. L. Mencken mentioned Cattell as one of six men in the United States whom he would have liked to see nominated for the presidency. And a year later, he was one of only 25 Americans selected to tour the Soviet Union on a cultural exchange (*110*).

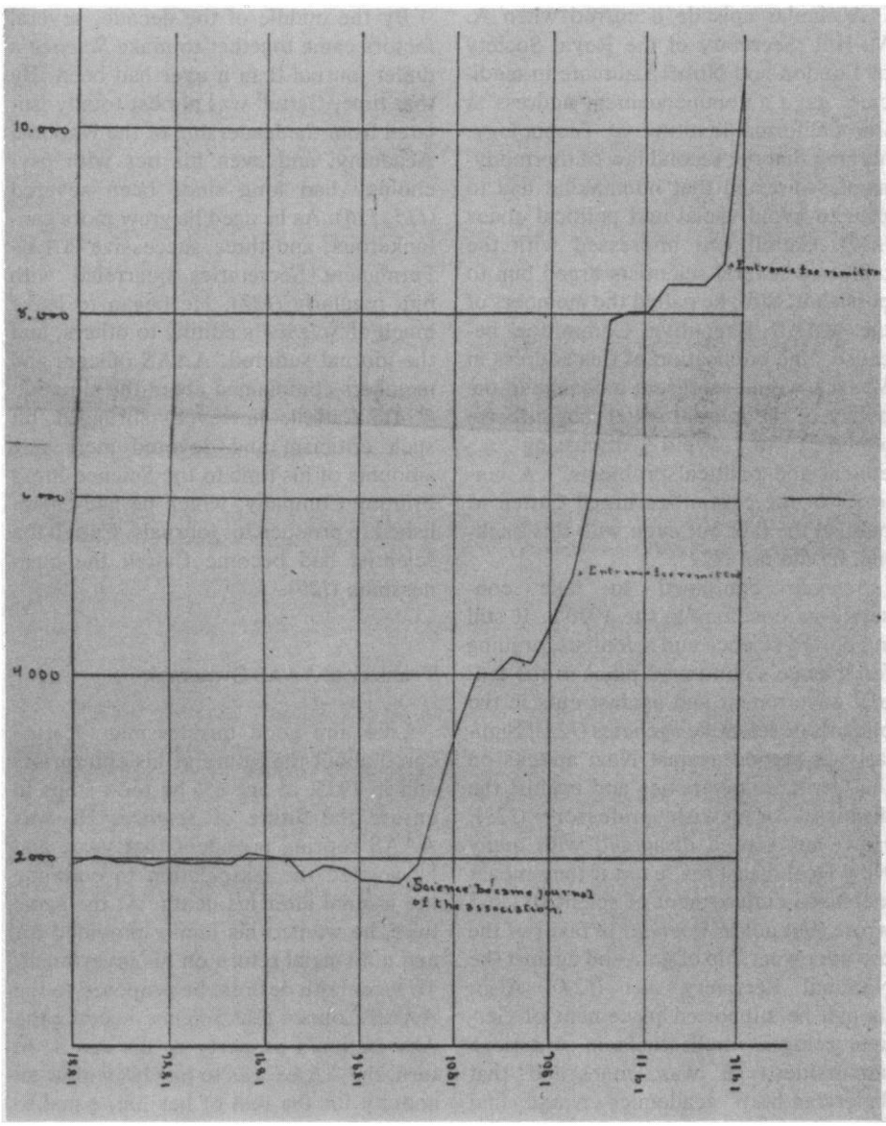
Science in the 1920's underwent a gradual change that made it a more staid journal that still supported science and scientists but ignored many of the issues about American society and science's role in it. Cattell by this time had changed his views and come to believe that science was politically and ethically neutral, divorced from and above political and social issues. He now often cited Humphry Davy's trip through France during the Napoleonic wars as an example of the extent of internationality of science. Though he felt that governments should support scientific research, he argued, in contrast to his earlier positions, that science itself had little to say about larger questions, even those related to scientific issues (*111*).

There were several reasons for this change in Cattell: he was bitter about his firing from Columbia (*112*); his Psychological Corporation, an attempt to apply psychology to practical problems, was floundering (*105*); and he felt that the American scientific community, which had evolved in a direction opposite to that he had argued for, could not be trusted (*113*). Cattell was also affected by the negative results that the AAAS had experienced when it tried to apply science to social issues.

For example, in 1919, *Science* published the annual address of the president of the Ohio Academy of Sciences, zoologist Maynard M. Metcalf. The address attacked the gold standard, the private ownership of land and of all other natural resources, and federal taxation policy, all in the name of "the scientific spirit" (*114*). Several members of the AAAS resigned upon publication of this article, citing its "spreading of socialistic, Bolshevic, I.W.W. [Industrial Workers of the World] and prohibition propaganda," and even the Association's Permanent Secretary worried about the article. As Howard wrote to Cattell, "A Russian Jew (of bolshevist tendencies) . . . was inquiring for a copy of *Science* containing Metcalf's article the day after it appeared and seemed to derive much pleasure in its publication" (*115*).

A similar incident occurred in December 1919, at the Association's St. Louis meeting. The question of the United States joining the League of Nations was raised at several sessions, with speakers on both sides of the issue arguing that science "proved" them to be correct. Hoping to prevent a similar situation from occuring in the future, the AAAS Council urged "that sectional officers avoid placing on their programs papers relating to acute political questions on which public opinion is divided" (*116*). This resolution was supported editorially by many St. Louis newspapers, and Cattell and the AAAS president, Simon Flexner, felt that they had prevented further difficulties for the AAAS (*117*). Cattell and his colleagues took the view that the AAAS should focus on science and on ways to support it instead of its ethical and political roles. And such a statement well characterizes Cattell's own editorial policy for *Science* from the mid-1920's.

These episodes, and Cattell's reaction to them, help explain why *Science* and the AAAS downplayed the social relations of science movement that developed in Britain during the 1930's (*118*). While *Nature* published editorials calling for greater social responsibility on the part of scientists, and the British Association for the Advancement of Science held symposia on related topics, *Science* bypassed these questions. In fact, in its



L. O. Howard's own chart of the increase of AAAS membership, 1881–1916. [From James McKeen Catell papers (*2*)]

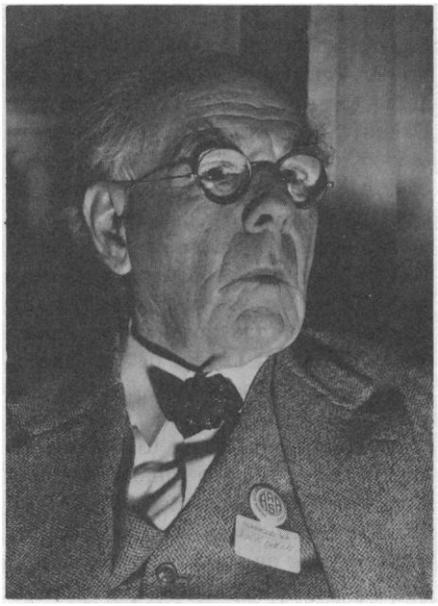
regular reports on BAAS activities, *Science* sometimes omitted these discussions. Cattell did not censor scientists. Instead, he exercised his editorial control and downplayed material he thought less important. The foreign origin of this discussion influenced Cattell's policy, but he also slighted similar American efforts. In 1940, in contradiction to his earlier campaigns for academic freedom, he refused a request from Boas to print a statement issued by an American Committee for Democracy and Intellectual Freedom. As he wrote to his old friend (*119*):

> It seems best . . . to confine *Science* to its proper field of the advancement of the natural and exact sciences, and not take up there economic, social, and political problems on which the opinions of scientific men are divided.

Cattell added that he agreed with Boas but noted that "this [agreement] may be due to the emotions, rather than to scientific evidence."

A similar episode occurred when A. V. Hill, Secretary of the Royal Society of London and Nobel Laureate in medicine, gave a commencement address at the California Institute of Technology, arguing that the second law of thermodynamics directed that humankind had to plan to avoid social and political chaos (*120*). Cattell was impressed with the talk, and several scientists urged him to publish it. Still, he polled the members of the AAAS Executive Committee because "the publication of this address in *Science* would represent a change in the policy of the journal which has hitherto aimed . . . to avoid discussing . . . ethical and political problems." A majority of the committee urged Cattell to publish the talk but even with this backing, he did not (*121*).

Science continued to take conservative positions in the 1930's. It still supported science and scientists, arguing for science's continued place in the federal government and against cuts in the budgets of scientific agencies (*122*). Similarly, it argued against Nazi attacks on the German universities and against the dismissal of Jewish professors (*123*). However, Cattell disagreed with many New Deal measures, even if they meant increased employment of scientists, and wrote (but not in *Science*) in favor of the private ownership of gold and against the National Recovery Act (*124*). Also, though he supported placement of German refugee intellectuals in American universities, he was concerned that American-born academics would find themselves swamped by foreign influence (*125*).



James McKeen Cattell, 1938. [Photo, Black Star]

By the middle of the decade, several factors came together to make *Science* a duller journal than it ever had been. By that time, Cattell was almost totally isolated from the leadership of the National Academy, and even his ties with psychology had long since been severed (*113, 126*). As he aged he grew more cantankerous, and three successive AAAS Permanent Secretaries quarreled with him regularly (*127*). He began to leave much of *Science*'s editing to others, and the journal suffered. AAAS officers and members complained about the situation (*128*). Cattell, however, shrugged off such criticism and devoted increasing amounts of his time to the Science Press Printing Company, which he had established to produce his journals. Cattell the scientist had become Cattell the businessman (*129*).

Transfer to AAAS Ownership

Like any good businessman, Cattell cared about the future of his enterprises and in 1925, at age 65, he took steps to ensure the future of *Science*. He was AAAS retiring president that year, and he wanted the Association to continue the journal after his death. At the same time, he wanted his family provided for and a financial return on his investment. To meet both desires, he proposed to the AAAS Council that *Science* become the Association's property at his death. In turn, the AAAS was to pay his widow an annuity for the rest of her life, equal to one-half of the average annual net profits of *Science* for the 5 years immediately before his death (*130*). These terms impressed the AAAS Council and a formal agreement was prepared. In 1936, a similar agreement was reached with regard to *The Scientific Monthly* (*131*). In 1938, these agreements were combined and modified. The annuity was limited to 10 years but it was to be paid to Josephine Owen Cattell or, in the event of her death, to her estate. More significantly, the new agreement called for the amount of the annual payment to increase as the purchasing power of the dollar decreased (*132, 133*).

In 1939, Cattell relinquished control of *The Scientific Monthly*, as permitted by the contract. He and his wife began to collect an annuity based on the journal's meager profits and their son, Ware Cattell, who had earlier worked on the *Monthly*, took over as its editor as a AAAS employee (*134*). Meanwhile, the AAAS began to reconsider its agreement with Cattell. From 1938, its Permanent Secretary was Forest R. Moulton, an astronomer who, after a distinguished academic career, became a successful manager for several commercial concerns (*135*). Moulton was the AAAS's first full-time Permanent Secretary and he reexamined the agreements between the Association and Cattell in detail. Through 1940 and 1941, Moulton and Cattell exchanged letters about the contracts and, though they remained cordial, there was clearly tension between them (*136*). In July 1943, these tensions peaked when Moulton fired Ware Cattell for not doing his job as editor of *The Scientific Monthly*. The younger Cattell sued the AAAS for damages and collected a good portion of his unpaid salary (*137*). For the rest of the year Cattell listed his son on the masthead of *Science* as Assistant Editor, in part to insult Moulton. At the beginning of 1944, then, relations between Cattell and the AAAS were at a nadir.

On 20 January 1944, at the age of 83, Cattell died and *Science* soon afterward published a long series of obituary notes (*138*). The control of the journal passed to the AAAS, but the Association, caught unprepared despite Cattell's advanced age, continued the journal with Josephine Owen Cattell as de facto editor, though without her being listed on the masthead. The contract between the AAAS and the Cattells required the Association to begin payments of about $18,000 annually at a time when all other costs were rising. This inflation resulted in increases in the payments to Cattell's widow and estate and by 1954, when the annuity was finally completed, the AAAS had paid about $270,000 to the Cattells (*139*).

Meanwhile, the Association had to decide on the editorial future of *Science*. Several distinguished scientists were considered (*140*), but in September 1944 the AAAS announced that Charles S. Stephenson, a retired Navy physician, was the new editor of *Science*. Within a month Stephenson was fired—before he had even edited an issue—and today it is not clear what happened (*141*). He later sued the AAAS for breach of contract and the Association eventually settled out of court for $2000 (*142*). In January 1945, *Science* announced the appointment of Josephine Owen Cattell and her son Jaques Cattell as editors for the year, while "the problems of office space, the securing of office equipment, the employing of competent personnel, all of which have become steadily more difficult to solve in Washington" were faced (*92*). The AAAS Council considered appointing Josephine Owen Cattell permanent editor of *Science*, but her age (74 years) and the difficulties inherent in her move to Washington were cited as reasons why the position was not offered to her (*143*). In October 1945, the Council appointed Willard Valentine editor of *Science* (*144*).

Science in Cattell's last decades did not equal in quality the journal of his first years, and the tensions of the 1940's between the Cattell family and the AAAS did not improve the situation. The AAAS's missteps during its first year of direct control tarnished *Science*'s reputation, and it took the Association several years to define its relation to the journal (*145*). The result is the *Science* of today, whose strengths are in large part based upon the foundation that Cattell established for the journal from 1895.

References and Notes

1. See S. G. Kohlstedt, *Science* **209**, 33 (1980).
2. Unless otherwise noted, all manuscript materials cited in this article are part of the James McKeen Cattell papers, Manuscript Division, U.S. Library of Congress, Washington, D.C.
3. Report of the Committee, 22 August 1894 (*2*).
4. F. W. Putnam, *Proc. Am. Assoc. Adv. Sci.* **43**, 464 (1894).
5. G. H. Grosvenor, *Natl. Geogr.* **124**, 526 (1963); J. M. Cattell to A. G. Bell, 6 November 1894, Alexander Graham Bell papers, Manuscript Division, U.S. Library of Congress. Bell apparently was not directly involved with this transfer, though he later remembered getting $25 from Cattell for the journal's name.
6. J. M. Cattell to A. G. Bell, 30 November 1894, Bell papers.
7. R. S. Woodward to J. M. Cattell, 13 January 1920 (*2*). See also R. S. Woodward to J. M. Cattell, 7 November 1894 (*2*).
8. M. M. Sokal, Ed., *An Education in Psychology: James McKeen Cattell's Journal and Letters from Germany and England, 1880–1888* (MIT Press, Cambridge, Mass., 1980).
9. Approximately 10,000 Americans studied in Europe between 1865 and 1914, all seeking an education in science and scholarship that was not then generally available in the United States. See (*8*), introduction.
10. M. M. Sokal, *Proc. Am. Philos. Soc.* **116**, 145 (1972).
11. J. M. Cattell, *Mind* **15**, 373 (1890).
12. For example, see E. G. Boring, *A History of Experimental Psychology* (Appleton-Century-Crofts, New York, ed. 2, 1950), pp. 532–540.
13. V. A. C. Henmon *et al.*, *Arch. Psychol. No. 30* (1914).
14. A. T. Poffenberger, Ed., *James McKeen Cattell: Man of Science* (Science Press, Lancaster, Pa., 1947), vols. 1 and 2.
15. M. M. Sokal, unpublished paper, New York Academy of Sciences, March 1977. See also D. Sloan, *Isis* **71**, 35 (1980).
16. F. W. Putnam, *Proc. Am. Assoc. Adv. Sci.* **44**, 394 (1895). Cattell failed to get this subsidy paid after 1895, though in 1899 he arranged for Bell to grant him an additional $500. R. S. Woodward to J. M. Cattell, 19 August 1897 (*2*); A. G. Bell to J. M. Cattell, 6 February 1899 (*2*).
17. See A. H. Dupree, *Science in the Federal Government: A History of Policies and Activities to 1940* (Harvard Univ. Press, Cambridge, Mass., 1957).
18. Other universities were also represented. Robert H. Thurston was a professor at Cornell, O. C. Marsh taught at Yale, and Daniel G. Brinton was on the faculty of the University of Pennsylvania. Except for Joseph Le Conte, of the University of California, the board was therefore composed entirely of easterners until 1897. In that year, Charles L. Bessey, a distinguished botanist at the University of Nebraska, joined the board.
19. While most members of this board were active, some were not, but Cattell never replaced a member unless he died or resigned. For example, I. Remsen never responded to Cattell's requests for "current notes" on chemistry. But when he offered his resignation, Cattell would not accept it, probably in part because of Remsen's position and the difficulty Cattell would have had in replacing him. See I. Remsen to J. M. Cattell, 7 October 1897, 20 October 1898, 7 November 1898 (*2*). Similarly, Cattell kept T. C. Mendenhall on his board, despite the fact that, as president of a small polytechnic institute, he was out of the mainstream of American physics. His first choice for the position was Albert A. Michelson, who would not serve, and he knew how difficult it would be to find a physicist who would take Mendenhall's place [see (*6*)]; J. M. Cattell to Henry Crew, 27 July 1934 (*2*).
20. For example, George F. Atkinson to J. M. Cattell, 19 July 1897 (*2*).
21. G. B. Goode, *Science* **1**, 4 (1895); E. McClintock, *ibid.*, p. 85.
22. D. G. Brinton, *ibid.*, p. 2.
23. For example, see K. E. Boulding, *ibid.* **207**, 831 (1980); P. L. Kapitza, *ibid.* **205**, 959 (1979).
24. See *ibid.* **2**, 113 (1895); *ibid.* **4**, 205 (1896).
25. W. M. Davis, *ibid.* **1**, 174 (1895); D. G. Brinton, *ibid.*, p. 47.
26. J. M. Cattell, *ibid.* **2**, 13 (1895); *ibid.*, p. 99. Another important series, which focused on inorganic chemistry [for example, *ibid.* **1**, 542 (1895); *ibid.* **4**, 472 (1896)], was written by James Lewis Howe, a professor at Washington and Lee University who had been Cattell's classmate at Göttingen (*8*).
27. See *ibid.* **1**, 11 (1895); *ibid.*, p. 334.
28. For example, see *ibid.*, p. 28 (1895); *ibid.*, p. 112.
29. For example, Macmillan Company to J. M. Cattell, 1 November 1904 (*2*).
30. *Science* **2**, 100 (1895); *ibid.*, p. 124; *ibid.*, p. 219; *ibid.*, p. 271.
31. See *ibid.*, p. 487; *ibid.*, p. 555; *ibid.*, p. 667; *ibid.*, p. 692.
32. See *ibid.*, p. 626; *ibid.*, p. 627; *ibid.*, p. 735.
33. J. M. Cattell, *ibid.*, p. 189.
34. For example, W. C. Cooper *et al.*, *ibid.* **208**, 129 (1980); H. K. Kang, P. F. Infante, J. C. Carra, *ibid.* **207**, 935 (1980).
35. Cattell did not use this title until his fifth issue, but used it continuously from that time. See *Science* **1**, 137 (1895).
36. For example, Carl Barus to J. M. Cattell, 14 August 1897 (*2*).
37. W. C. Röntgen, *Sitzungsberichte der physikalisch-medizinischen Gesellschaft zu Würzburg* (1895).
38. W. C. Röntgen (A. Stanton, Transl.), *Nature (London)* **53**, 274 (1896).
39. *Electrical Engineer* **21**, 51 (1896). This journal was edited by T. C. Martin, an engineer and journalist with close ties with Edison, and it therefore might be considered *Sciences*'s first cousin.
40. H. Münsterberg, *Science* **3**, 161 (1896). A week before this article appeared, a short note on the topic was published (see *ibid.*, p. 131).
41. See *ibid.* **3**, plates 3 and 4 (1896).
42. W. C. Röntgen, *ibid.*, p. 227; M. Pupin, *ibid.*, p. 231; A. W. Goodspeed, *ibid.*, p. 236. See also E. B. Frost, *ibid.*, p. 232.
43. H. W. Cattell, *ibid.*, p. 344.
44. R. Molongoski, unpublished paper, Worcester Polytechnic Institue, October 1979.
45. For example, *Electrical Engineer* **21**, 162 (1896).
46. For example, *Science* **6**, 662 (1897); *ibid.* **7**, 791 (1898); *ibid.* **8**, 409 (1898).
47. For example, *ibid.* **1**, 55 (1895); *ibid.*, p. 309; C. F. Brush, *ibid.* **8**, 485 (1898).
48. For example, C. Adler, *ibid.* **6**, 184 (1897); *ibid.* **10**, 165 (1899).
49. H. de Vries, *ibid.* **15**, 721 (1902).
50. For example, H. H. Clayton, *ibid.* **3**, 325 (1896); *ibid.* **5**, 26 (1896).
51. H. H. Clayton to J. M. Cattell, 28 December 1893 (*2*). See also H. H. Clayton, *Science* **19**, 76 (1904).
52. For example, *Science* **13**, 1 (1901); *ibid.*, p. 41; *ibid.*, p. 113; *ibid.*, p. 195; *ibid.*, p. 234; *ibid.*, p. 276; *ibid.*, p. 314; *ibid.*, p. 437; *ibid.*, p. 438; *ibid.*, p. 634.
53. See *ibid.* **13**, 6 (1901).
54. For example, *ibid.* **6**, 817 (1897); *ibid.*, p. 918; *ibid.*, p. 954; *ibid.* **7**, 58 (1898); *ibid.*, p. 129; *ibid.*, p. 169.
55. See *ibid.* **7**, 205 (1898).
56. S. Newcomb to J. M. Cattell, 15 February 1898; Charles D. Walcott to J. M. Cattell, 18 February 1898 (*2*); *Science* **7**, 279 (1898).
57. See *Science* **7**, 313 (1898); *ibid.*, p. 348; see also (*17*).
58. See *ibid.* **14**, 425 (1901).
59. This entire incident, including *Science*'s role in it, is reviewed in C. J. Hinsley, Jr., *Savages and Scientists: The Smithsonian Institution and the Development of American Anthropology, 1846–1910* (Smithsonian Institution Press, Washington, D.C., 1980).
60. Bureau of American Ethnology Investigation Papers, National Anthropological Archives, Smithsonian Institution, Washington, D.C.
61. Report of the (Columbia University) Committee on Anthropology, 18 November 1898 (*2*).
62. For example, W J McGee to J. M. Cattell, 27 September 1902, 4 November 1902 (*2*); F. Boas to J. M. Cattell, 5 July 1902, 23 December 1902 (*2*). See also W J McGee to F. Boas, 8 November 1902, W J McGee papers, Manuscript Division, Library of Congress, Washington, D.C.
63. *Science* **16**, 676 (1902).
64. Memoranda of "informal talks with Mr. J. McKeen Cattell," 13 November 1902, Samuel P. Langley and Richard Rathbun (Assistant Secretary) (*60*).
65. F. Boas, *Science* **16**, 828 (1902).
66. See *ibid.*, p. 801.
67. See *ibid.*, p. 961; *ibid.* **17**, 284 (1903); *ibid.*, p. 476.
68. S. Newcomb to J. M. Cattell, 24 November 1902, 14 January 1903 (*2*); A. G. Bell, "Smithsonian Letterbook, 1903," pp. 17, 20, 42, 64, 66, 85, and Bell papers.
69. C. J. Hinsley, unpublished paper, Cheiron: The International Society for the History of the Behavioral and Social Sciences, May 1976.
70. For example, "Professors of Columbia University to the Regents of the Smithsonian Institution," 30 April 1906 (*2*). See also Nathanial L. Britton to S. Newcomb, 5 May 1906; A. G. Bell to S. Newcomb, 8 May 1906; J. M. Cattell to S. Newcomb, 9 May 1906; Simon Newcomb papers, Manuscript Division, U.S. Library of Congress, Washington, D.C.
71. See N. Reingold, in *The Organization of Knowledge in Modern America, 1860–1920*, A. Oleson and J. Voss, Eds. (Johns Hopkins Press, Baltimore, 1979), pp. 313–341.
72. J. S. Billings to J. M. Cattell, 13 September 1897, 6 February 1901, 16 February 1901 (*2*).
73. L. O. Howard, *Fighting the Insects: The Story of an Entomologist* (Macmillan, New York, 1933), p. 226.
74. L. O. Howard to J. M. Cattell, 22 July 1916 (*2*).
75. See, for example, *Science* **13**, 641 (1901); *ibid.*, p. 996.
76. Convocation Week might be compared with today's Canadian Learned Societies Conferences, held at the end of each academic year. See M. G. Scully, *Chron. Higher Educ.* (25 July 1979), p. 3.
77. *Proc. Am. Assoc. Adv. Sci.* **57**, 15 (1906).
78. J. M. Cattell to L. O. Howard, 23 September 1899 (*2*). See also J. M. Cattell, *Science* **64**, 345 (1926).
79. For example, *Science* **13**, 811 (1901); *ibid.*, p. 902; *ibid.* **14**, 59 (1901); *ibid.*, p. 255.
80. L. O. Howard to J. M. Cattell, 22 July 1916 (*2*).
81. See (*8*), and C. Wissler, *Psychol. Rev. Monogr. Suppl. No. 3* (1906).
82. See W. E. Leverette, thesis, Vanderbilt University (1963).
83. F. L. Mott, *A History of American Magazines*,

vol. 3, *1865–1885* (Harvard Univ. Press, Cambridge, Mass., 1938), pp. 495–499.
84. See, for example, Carl Barus to J. M. Cattell, 7 May 1900 (*2*); Thomas C. Chamberlin to J. M. Cattell, 8 May 1900 (*2*).
85. See, for example, J. M. Cattell to S. Newcomb, 16 December 1903, Newcomb papers.
86. *Pop. Sci. Mon.* **62**, 186 (1902).
87. See S. S. Visher, *Scientists Starred, 1903–1943, in American Men of Science* (Johns Hopkins Press, Baltimore, 1947).
88. For example, J. M. Cattell, *Science* **24**, 658 (1906); *ibid.* **77**, 264 (1933).
89. See S. S. Visher, *ibid.* **106**, 359 (1947).
90. A. Thackray, in *Toward a Metric of Science: The Advent of Science Indicators*, Y. Elkana *et al.*, Eds. (Wiley, New York, 1978).
91. L. C. Dunn, *Am. Nat.* **100**, 481 (1966); *ibid.* **101**, 427 (1967).
92. *Science* **101**, 8 (1945).
93. J. M. Cattell, *ibid.* **23**, 475 (1906); *ibid.* **35**, 797 (1912); *ibid.*, p. 842; *University Control* (Science Press, New York, 1913).
94. ———, *Pop. Sci. Mon.* **80**, 606 (1912).
95. W. W. Brickman, *Sch. Soc.* **79**, 1 (1954).
96. J. M. Cattell, *Pop. Sci. Mon.* **87**, 307 (1915).
97. ———, *Science* **88**, 428 (1938).
98. On the committee of 100, see H. Plotkin, *Isis* **69**, 44 (1978); and, for example, *Science* **39**, 680 (1914); *ibid.* **41**, 315 (1915). On the Carnegie Institution and Cattell's concerns about it, see (*71*).
99. See, for example, T. Veblen, *The Higher Learning in America* (Huebsch, New York, 1918).
100. C. S. Gruber, *AAUP Bull.* **58**, 297 (1972); *Mars and Minerva: World War I and the Uses of Higher Learning in America* (Louisiana State Univ. Press, Baton Rouge, 1975).
101. H. F. Osborn to R. S. Woodward, 10 October 1917; R. S. Woodward to H. F. Osborn, 11 October 1917, 19 October 1917, Henry Fairfield Osborn papers, American Museum of Natural History, New York. See also H. F. Osborn to J. M. Cattell, 2 October 1917 and 10 October 1917 (*2*).
102. See, for example, G. E. Hale to C. D. Walcott, 12 December 1916; G. E. Hale to Edwin B. Wilson, 10 January 1917, George Ellery Hale papers, California Institute of Technology Archives, Pasadena, Calif.
103. E. B. Wilson to G. E. Hale, 22 January 1917, Hale papers.
104. See R. C. Tobey, *The American Ideology of National Science, 1919–1930* (Univ. of Pittsburgh Press, Pittsburgh, 1971).
105. M. M. Sokal, *J. Hist. Behav. Sci.*, in press.
106. B. E. Livingston, *Ecology* **29**, 227 (1948).
107. See D. J. Kevles, *The Physicists: The History of a Scientific Community in Modern America* (Knopf, New York, 1978).
108. N. Reingold, *Trans. Kans. Acad. Sci.* **71**, 235 (1968).
109. J. M. Cattell, *Sci. Mon.* **14**, 567 (1922).
110. *Am. Mercury* **11**, 159 (1927); *Sch. Soc.* **27**, 779 (1928).
111. J. M. Cattell to E. G. Conklin, 3 March 1939 (*2*).
112. *AAUP Bull.* **8**, 43 (1922).
113. M. M. Sokal, *Am. Psychol.* **26**, 626 (1971).
114. M. M. Metcalf, *Science* **49**, 551 (1919).
115. L. O. Howard to J. M. Cattell, 8 July 1919 (*2*).
116. *Science* **51**, 48 (1920).
117. S. Flexner to J. M. Cattell, 26 January 1920 (*2*).
118. This point is well documented in W. McGucken, unpublished paper, University of Akron.
119. J. M. Cattell to F. Boas, 1 June 1940 (*2*).
120. *Sci. News Lett.*, 20 July 1940, p. 46.
121. J. M. Cattell to "Members of the AAAS Executive Committee," 20 June 1940 (*2*).
122. For example, *Science* **78**, 162 (1933); *ibid.*, p. 240.
123. For example, *ibid.* **77**, 492 (1933); *ibid.*, p. 528; *ibid.* **78**, 7 (1933); *ibid.*, p. 52; *ibid.*, p. 460.
124. J. M. Cattell, *Sch. Soc.* **38**, 676 (1933).
125. J. M. Cattell to A. V. Hill, 1 December 1933 (*2*).
126. M. M. Sokal, *Am. Psychol. Assoc. Monitor*, July/August 1979, p. 3.
127. See J. M. Cattell to Charles F. Roos, 17 September 1932 (*2*); J. M. Cattell to Henry B. Ward, 3 December 1936 (*2*); J. M. Cattell to Forest R. Moulton, 13 January 1939 (*2*).
128. B. E. Livingston, *Science* **99**, 155 (1944).
129. M. M. Sokal, unpublished paper, Eastern Psychological Association, April 1979.
130. J. M. Cattell, *Science* **64**, 342 (1926).
131. See *ibid.* **86**, 133 (1937).
132. J. M. Cattell, *ibid.* **88**, 428 (1938).
133. Such an inflation clause, unique or rare at the time, is now common. The president of the AAAS in 1938 was Wesley C. Mitchell, the distinguished economist who had written extensively on economic fluctuation [see *Business Cycles* (Univ. of California Press, Berkeley, 1913)], and his ideas might have influenced Cattell.
134. F. R. Moulton and Ware Cattell jointly edited the journal from 1939. For some unknown reason, James McKeen Cattell's name was also listed as editor through 1942.
135. A. J. Carlson, *Science* **117**, 545 (1953).
136. F. R. Moulton to J. M. Cattell, 20 April 1940; J. M. Cattell to F. R. Moulton, 10 October 1940 (*2*).
137. Civil Action No. 21, 508, U.S. District Court, D.C., filed 6 October 1943. See also *Science* **102**, 5 (1945).
138. *Science* **99**, 151 (1944), pp. 151 to 165.
139. G. P. Graham and Company, AAAS Auditor's Report for . . . 1954, Historical Files, AAAS Headquarters, Washington, D.C.
140. See F. R. Moulton to Kirtley F. Mather, 7 February 1944, Kirtley F. Mather papers, Harvard University Archives, Cambridge, Mass.
141. *Science* **100**, 337 (1944).
142. Civil Action No. 28, 471, U.S. District Court, D.C., filed 10 April 1945.
143. F. R. Moulton to Roger Adams, 5 April 1945, Historical Files, AAAS Headquarters.
144. *Science* **102**, 387 (1945).
145. See J. Walsh, *ibid.* **209**, 52 (1980).
146. H. Cirker and B. Cirker, *Dictionary of American Portraits* (Dover, New York, 1967).
147. I thank the WPI Chapter of Sigma Xi for support; M. L. Aldrich, H. Cravens, D. J. Kevles, S. G. Kohlstedt, H. Nussbaum, H. Plotkin, J. L. Sturchio, J. Walsh, and D. Wolfle for critical readings of earlier drafts of this article; and S. Orszulak for secretarial help.

Science in Transition, 1946 to 1962

John Walsh

At the end of World War II the American Association for the Advancement of Science faced a double challenge. As a scientific organization, the AAAS had to adapt to the drastically altered postwar circumstances of American science. At the same time, the association was obliged to master the tasks of publishing a major scientific periodical. Although *Science* had been the official journal of the AAAS since 1900, it had been sent to members under an arrangement with James McKeen Cattell, the previous owner and editor. The transfer of control of *Science* to the AAAS at the beginning of 1946 coincided with the opening of an era of unprecedented expansion for American science. Although the association's leaders recognized that unparalleled opportunities existed for the AAAS and its periodicals, initially, at least, the response was uncertain. And, until the AAAS could establish its own identity, it was unable to turn full attention to the management of *Science* or seriously address the question of what sort of publication it should be.

The period under discussion falls into two major phases. Figures on circulation and advertising revenue show that for nearly a decade after the war *Science* went through the doldrums. From 1946 to 1954 the magazine had a half dozen editors (Table 1), none of whom had sufficient time or independence of action to exert decisive influence. In these same years the association dealt inconclusively with fundamental policy questions of control and financing inherent in the relationship between the AAAS and *Science*.

In 1953 an open conflict between the AAAS's elected officials and its chief administrative officer had the side effect of beginning a cycle of significant change. The key figure in initiating the new phase was Dael Wolfle, who joined AAAS as executive officer in 1954 and served for a crucial period as acting editor of *Science*. Under Wolfle a series of steps were taken which affected both the editorial and the business operations of *Science* and proved decisive in imparting momentum to the magazine. In 1958, after Graham DuShane had assumed the editorship of *Science* and with Wolfle as publisher, *Science* was combined with *The Scientific Monthly*, a second AAAS periodical, resulting in a further strengthening of *Science*. By the early 1960's a steadily rising flow of advertising income had created conditions for expansion: a modus vivendi had also been established in AAAS-*Science* relations. The readership of *Science*, however, had not in-

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0036-8075/80/0704-0052$01.00/0