

'POPULAR' JOURNALS AND COMMUNITY IN AMERICAN ASTRONOMY, 1882-1951

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Abstract: Popularization fulfils several important roles beyond those recognized in the culturally-dominant view. Apart from its intended purpose of diffusing scientific knowledge among various audiences, popularization serves practitioners, especially when exercised in the format of a disciplinary 'trade' journal.

'Trade' journals inform researchers about developments occurring in areas of knowledge production beyond their immediate specialties. Such journals offer routine assessments and reviews of current investigations, innovations, and issues facing researchers and educators alike. These outlets attract new recruits into the profession, through encouragement of research methods and the explication of lingering problems. Most importantly, they serve to shape, direct, and influence peer-level dialogues and decisions upon future courses of action, including the research process itself.

In an inversion of the culturally-dominant view of popularization, such trade journals comprise an essential, if little-recognized, component of disciplinary professionalization.

Keywords: popularization, *Sidereal Messenger*, *Popular Astronomy*, William W. Payne, Carleton College, American Astronomical Society, trade journals

1 INTRODUCTION

In the late nineteenth century, three leading astronomical journals were founded, edited and privately published by William W. Payne (1837–1928; Figure 1), founder of the Department of Astronomy and later Director of the Goodsell Observatory at Carleton College in Northfield, Minnesota. Payne's three journals, *The Sidereal Messenger* (1882-1891), *Astronomy and Astro-Physics* (co-edited with George Ellery Hale), and *Popular Astronomy* (1893-1951), brought national and international recognition to the liberal arts College through the mid-twentieth century.

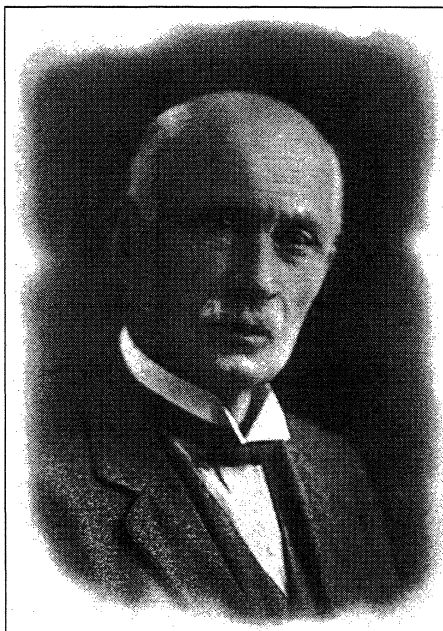


Figure 1: William W. Payne, founding Editor and publisher of *Popular Astronomy*, 1893-1910 (Reproduced from *Popular Astronomy*, 36, f.267 (1928). Courtesy, Carleton College Archives).

When launched in 1882, Payne's *Sidereal Messenger* was the only astronomical journal issued in the United States, whether popular or research-oriented. Benjamin Apthorp Gould's *Astronomical Journal*, which was founded in 1849 and suspended in 1861, was only revived in 1886 (Hermann, 1971). Nor was a national association of professional astronomers (the American Astronomical Society, or AAS) to be established until 1899. Before that occasion, many of the nation's astronomers belonged to a 'Section' within the larger, antecedent American Association for the Advancement of Science (AAAS).

Payne's journals appeared during a time of rapid disciplinary and institutional growth that included significant changes in research practices (i.e. the emergence of observational astrophysics). But they did not merely chronicle those developments. In the coming decades, they were to become an integral part of the American astronomical community, whose subsequent rise to a position of world leadership was likewise achieved during the period from 1860 to 1940 (see Lankford, 1997).

Payne's *Sidereal Messenger* and its principal successor, *Popular Astronomy*, became the discipline's first 'trade' journals. Long before its publication ceased in December 1951, *Popular Astronomy* had become the unofficial journal of the AAS. Associated with Carleton College for fifty-nine years, *Popular Astronomy* was published without interruption through the Great Depression and the Second World War. Nonetheless, its post-war survival was not guaranteed, and it ceased production just six months after the unexpected death of its final editor.

2 THE CULTURALLY-DOMINANT VIEW OF POPULARIZATION

In what has been termed the 'culturally-dominant' view, sociologist Stephen Hilgartner (1990: 519) has argued that the process of popularization is, "... at best, 'appropriate simplification'—a necessary (albeit low status) educational activity of simplifying science for

the non-specialist ... [while at worst it may encompass] the distortion of science by such outsiders as journalists, and by a public that misunderstands much of what it reads."

The dominant view of popularization rests upon an overly simplistic, dichotomous model of science communication (Nelkin, 1987; Shinn and Whitley, 1985), which contrasts the development of genuine scientific knowledge with the dissemination of simplified accounts for the public. This dichotomy not only demarcates the intellectual properties of 'genuine' from 'popularized' science, but also reinforces the political authority of scientists against "... challenges by outsiders...[including] policy makers, journalists, [and] technical practitioners ...", along with scholars from other disciplines and the public (Hilgartner, 1990: 530, 533).

A selective body of literature has examined the growth and influence of popular accounts of American science, extending from the early Republican period to the mid-twentieth century and beyond (e.g. see Greene, 1958; Kuritz, 1981; LaFollette, 1990; Lewenstein, 1992; Whalen and Tobin, 1980; Zochert, 1974). Such studies have documented changing audience perceptions, assumptions and expectations concerning scientific knowledge and its practitioners. Far less attention, however, has been paid to the contents and significance of disciplinary 'trade' journals that served more specialized (and lower-circulation) audiences. Nonetheless, these journals provided a "... major route of communication among scientists." (K. Figlio, quoted in Whalen and Tobin, 1980: 202, f.n. 2).

3 PAYNE AND ASTRONOMY EDUCATION AT CARLETON COLLEGE

Born at Somerset, Michigan, in 1837, William Wallace Payne earned Bachelor's (1863) and Master's (1864) degrees from Hillsdale (Michigan) College, with proficiencies in mathematics and foreign languages (Hillsdale College, 1863).¹ While a teacher in local township schools, Payne studied law and received his LL.B. degree from the Chicago Law School in 1866. He then relocated to Mantorville, Minnesota, and formed a law partnership with Robert Taylor, but became discontented with the practice. He then returned to teaching and launched his first journal, the *Minnesota Teacher and Journal of Education* (ca. 1867-1871), which in other hands was later transformed into the *Western Journal of Education* (Fath, 1928; Greene, 1988).

In 1871, Carleton College President, James W. Strong, hired Payne as a Professor of Mathematics and Natural Philosophy at its Northfield campus in Minnesota. Remarkably, Payne soon undertook the construction of an astronomical observatory, although the Congregationalist College, founded in 1866, consisted of but three buildings (Headley and Jarchow, 1966; Leonard, 1904). By 1878, a small wooden observatory was completed, which housed a clock, a 7.6-cm (3-in) transit instrument, and a 20.3-cm (8-in) Clark refracting telescope. Time signals derived from astronomical observations were first relayed by telegraph from the unfinished structure in 1877. This service, which grew into the largest of its kind in the

northwest, eventually provided time for more than twelve thousand miles of railroad lines.

During the 1880s, astronomy was the most vital and important of the College's various academic programs. In 1880, Payne offered an "... advanced course of study in Pure Mathematics and Practical Astronomy ..." (President's Annual Report, 1880: 11) that attracted his first students. In 1882, "... original astronomical work [included] ... double star observations ... daily sketches and observations of sunspots ... [and] comet observing and [orbital] computations." (President's Annual Report, 1882: 15). Payne secured additional funding to purchase a larger transit instrument, and then set his sights on a new and larger observatory (President's Annual Report, 1883), the construction of which was begun in 1886. Four years later, funds were secured for the installation of a 41-cm (16-in) refracting telescope—then the sixth-largest in the nation and the twelfth-largest in the world. The new brick observatory (Figure 2) was named after the College's founder, Deacon Charles Moorehouse Goodsell (Greene, 1988; Payne, 1891). In 1894, Payne received an honorary Ph.D. from Hillsdale College, and Carleton College awarded him an Sc.D. at its Golden Anniversary in 1916.

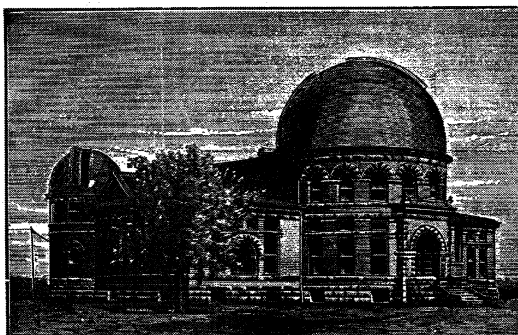


Figure 2: Goodsell Observatory, Carleton College, Northfield, Minnesota (after Payne, 1891, 84; reproduced with permission of the Editors, *Astronomical Society of the Pacific*).

4 THE SIDEREAL MESSENGER (1882-1891)

In 1882, Payne launched the first of three journals that were to spread Carleton's name throughout the astronomical community, both at home and abroad. His institution was one of many that partook in the wave of post-bellum observatory construction that swept across the United States (see Bell, 2002). A host of factors, including the generation of surplus capital, improved means of transportation, and rapid settlement of the western frontier, contributed to the growth of institutions of higher education and the spread of research programs relating to the physical and biological sciences.

Within the discipline of astronomy, the employment of celestial photography, the rise of astrophysics, and a number of other technological and scientific developments significantly aided the observatory movement. In the western states, astronomers were more widely separated, but they generally enjoyed superior observing conditions to those experienced by their eastern counterparts. Yet, not a single popular or research-oriented astronomical journal addressed the

needs of the professional astronomers or collegiate/secondary instructors.

It was possibly a summer's experience in observatory practice acquired at the Cincinnati Observatory (under Director Ormond Stone) that sparked Payne's desire to publish an identically-named journal to the one that was issued between 1846 and 1848 at Cincinnati by Ormsby MacKnight Mitchel (McCormach, 1966; Shoemaker, 1991). However, Payne neither mentioned the prior existence of, nor his desire to emulate, Mitchel's earlier *Sidereal Messenger*. Across a gap of thirty-four years, tremendous cultural and scientific differences separated Mitchel's and Payne's journals. Substantial growth of the nation's astronomical community, along with attendant changes in the size and distribution of America's population, were readily apparent. In turn, the level of cultural authority and support for science had dramatically improved (Bruce, 1987). These factors and others suggested that a greater chance of success awaited Payne's venture into astronomical journalism. Yet, one similarity united the two men's efforts: each editor strove to direct his journal's contents toward both scientific and popular audiences.

Payne's *Sidereal Messenger* (along with *Popular Astronomy*) came to be adopted by the American astronomical community for reasons that were neither fully articulated, nor perhaps anticipated, by its founder. Having no pretensions whatsoever as research-grade publications, Payne's journals nonetheless followed an established pattern among contemporary periodicals that were created for the diffusion of scientific knowledge among colleagues, instructors, and the general public alike.

Historians Matthew Whalen and Mary Tobin have identified three 'general science periodicals' (*The American Naturalist*, *Popular Science Monthly*, and *Science*—all published during the era before they were transformed into branches of the Science Press by James McKeen Cattell) as representative of a particular genre. Each journal, they noted, "... originated under the auspices of a private, self-appointed editorship acting in the name of a scientific community ... who saw a need for conveying both a sense of and a meaning for the mission of science to the public and to their colleagues." (Whalen and Tobin, 1980: 198; c.f. Whalen, 1981: 15-16). With substitution of the word 'astronomy' for 'science' in the preceding sentence, no better, nor more succinct, description might be fashioned, to characterize the actions and approach of Payne and his publication of *The Sidereal Messenger*.

The *Messenger* was never conceived as a purely 'popular science' journal, nor was it directed toward a general readership. Upon completing its third year of publication, Payne (1884: 304) reiterated that his objective was not to maximize the number of subscriptions; by contrast, he had deliberately "... failed to interest hundreds of people ..." who might otherwise have become subscribers had the journal's contents been presented as "... chiefly popular and unscientific." He viewed his intended audience as an amalgam of readers, encompassing "... teachers of astronomy, in colleges and high schools ... student[s] of astronomy ... persons ... in every vocation of life, that have a love for the elements of this great science

... [and the] amateur observer." (Payne, 1882-1883: 20-21, 298). Under the third rubric, Payne may be categorized as a noted 'translator' or 'cultural transcriber' of scientific information, whose likes have included a host of scientists, journalists, and administrators (see Whalen, 1981: 15, 23).

Payne (1882-1883: 19) also made it clear that his publication had none of the pretensions of a research journal. *The Sidereal Messenger* was "... in no sense a rival for the place or patronage of such periodicals as the [*Astronomische*] *Nachrichten* ...", which were devoted to the needs of the 'practical astronomer'. He intended his journal to serve "... other public interests ... besides those that are mainly theoretical or professional." (Payne, 1882-1883: 20). The *Messenger's* avowed purpose was "... to select that which is best, new or useful, from the mass of work that is going on ... and present the same in a terse or plain way, avoiding the use of technical terms, and the details of research as much as possible." (ibid.). Payne (ibid.) believed that such information could benefit astronomy educators, who often lacked "... the means of knowing the kind or extent of work carried on in observatories in this country and abroad." This knowledge provided an essential supplement to most textbooks, which Payne (1882-1883: 20) judged to be "... quite erroneous ...". In defending the *Messenger's* contents, Payne (1884: 304) argued that "... an astronomical journal, to be worthy of the name, must maintain a scientific character worthy of the attention and support of the leading workers ... in this or any other country."

Among those helping to advance the scientific enterprise through the conduct of systematic observations of the heavens were avocational individuals termed 'amateur astronomers'. As historian, Thomas R. Williams (2000: 13), points out, a "... substantial record of scientific effort and achievement [can be found] among U.S. amateur astronomers in the later decades of the nineteenth century." Successful observers (of the calibre of Sherburne Wesley Burnham and Edward Emerson Barnard), who first earned distinctions as amateurs, were sometimes "... absorbed into the emerging discipline and found employment as professional astronomers." (Williams, 2000: 10). It was also toward scientifically-minded amateurs and students alike that the *Messenger* was pitched. Subscribers were promised ten numbers per year, each consisting of at least 24 pages, for a subscription price (including postage) of \$2. Payne's premiere volume well exceeded that forecast (it totalled 314 pages!), prompting the Editor to remark that the "... amount of excellent matter coming to hand ... [along with] substantial aid and encouragement ..." he received, had proven "... as unexpected as it has been gratifying." (Payne, 1882-1883: 298).

However, the number of Payne's subscribers cannot be determined today, as the circulation figures themselves were never divulged, not even to Carleton's President.² Probable reasons for this silence can only be surmised. *The Sidereal Messenger* was seen as Payne's "... own responsibility, and is to be maintained ... without any expense to the College." (President's Annual Report, 1882: 14). As a privately-run business venture, its publication therefore lay exclusively in Payne's hands, with the implication that circulation figures were none of the College's

business. Nonetheless, Payne must have reached an agreement with his administration over the *Messenger's* indirect costs because by 1890 about one-third of his time as Observatory Director was devoted to the journal's production and distribution (see President's Annual Report, 1890: 12). At this time, Payne reported that the *Messenger* was "... still self-sustaining although the average cost per number ... [was] ... more than one hundred dollars." (ibid.). These expenses were partially offset by the College's growing reputation, which resulted from the *Messenger's* success. On page 10 in the President's Annual Report for 1883 it was stated that the journal is "... patronized by the leading astronomers in America and in Europe ... [and has] done much to bring the Observatory and the College into wide and favourable notice."

After four years of publication, Payne reported that the journal was self-supporting, and each monthly issue of one thousand copies was profitable (President's Annual Report, 1886: 20). By 1889, the *Messenger's* annual subscription price was raised to \$3, while monthly issues were increased from thirty-two to forty-eight pages (President's Annual Report, 1889: 12), and by 1891, the journal's circulation had again "... materially increased ...", and foreign subscriptions proved "... unexpectedly large ..." (President's Annual Report, 1891: 8), perhaps because of the expanded coverage given to astrophysical topics. Payne's reluctance to disclose circulation figures lasted through the sale of *Popular Astronomy* to the College in 1910.

4.1 Disciplinary Growth at Carleton College

One of Payne's chief ambitions in launching *The Sidereal Messenger* was to secure copies of foreign journals and observatory publications on an exchange basis, and bring "... to the Observatory every important astronomical publication in the world, and reports from all observatories in all countries." (President's Annual Report, 1887: 14). This successful strategy allowed Payne to acquire a substantial astronomical library at his small and isolated institution—when the costs of procuring such subscriptions otherwise lay beyond the College's fiscal means—and to grow the collection from some 1,130 items in 1884 (President's Annual Report, 1884: 14) to more than 1,740 by 1891 (President's Annual Report, 1891: 7). Over four hundred volumes in the initial collection were on loan to the Observatory, while a similar number belonged to Payne personally. Gifts and purchases accounted for the remainder of the library's original collection. The library was an invaluable resource for the College's advanced students and encouraged the type and amount of original astronomical work that could be pursued,³ while incoming journals and reports obtained by exchange offered Payne a steady supply of astronomical news from domestic and foreign sources, thereby fostering production of the *Messenger* and in turn expanding the number of subscribers.

Even the revival of Gould's *Astronomical Journal* in 1886 had no detrimental impact on the *Messenger*. If anything, its reappearance enhanced the latter's mission while raising the status of American astronomy. The monthly size of Payne's journal was

increased to 48 pages by 1888, and its circulation likely increased as well. By 1891, Volume 10 of the *Messenger* had grown to 524 pages. Nor was a contest waged among American astronomers over the relative merits of subscribing to Payne's or Gould's journal. The success of both popular and research venues indicates that each style of communication had become a necessary component within the burgeoning astronomical community. Meanwhile, Payne's efforts to recruit advanced students led to the creation of a temporary 'school' of mathematics and practical astronomy, and this produced six Carleton Ph.D.s before the practice was discontinued after his retirement (Headley and Jarchow, 1966: 215).⁴

The Sidereal Messenger was created in an era before science journalism became recognized as a profession (for instance, the 'Science Service', a syndicated network created by Edwin W. Scripps, was only set up in 1921—see Nelkin, 1987: 86-91), and its feature articles were contributed by a network of American and international astronomers; many were likely commissioned by the Editor. Two important aspects regarding these submissions must be emphasized. First, by having respected astronomers contribute to its pages, the accuracy of its science content was assured. Second, potential authors knew that their works would be read and judged by colleagues, and not simply presented to the public. This latter factor imparted a degree of responsibility to the writing task that might otherwise have been lacking, and served to minimize the amount of sensationalism allowed. The monthly format adopted by Payne remained largely unchanged throughout the *Messenger's* history, and it was essentially duplicated in the creation of *Popular Astronomy*.

4.2 Format of *The Sidereal Messenger*

A detailed, quantitative portrait of the *Messenger's* contents lies beyond the scope of this study. Instead, a synopsis of its principal types of reports is sketched below. Included were: (a) review papers, intended to provide concise summaries of research in both the 'old' and 'new' astronomies; (b) descriptions of new instrumentation and techniques, including spectral analysis, photographic photometry, and the measurement of stellar parallaxes; (c) laboratory results, such as Michelson and Morley's experimental failure to detect the Earth's motion through the ether; (d) leading essays, derived from addresses of AAAS officers, or speeches delivered at observatory dedications; (e) professional meeting reports, featuring coverage of newly-founded regional (Astronomical Society of the Pacific) or international (British Astronomical Association) gatherings of astronomers; (f) pedagogical issues concerning the prescribed teaching of astronomical concepts; (g) recent and forthcoming celestial events, especially observations of solar and lunar eclipses, comets, asteroids, and double stars, along with their orbital elements and ephemerides; (h) historical contributions, comprising essays on individuals or institutions of chiefly American or European heritages; (i) obituary notices; (j) news and awards of the profession; (k) projects and guidelines for amateur astronomers; and (l) book reviews.

The above characteristics exhibit the major attributes of a disciplinary 'trade' journal serving a

professional clientele. The diversity of subjects and viewpoints represented in *The Sidereal Messenger's* pages reveal the rapidly evolving interests and expertise of the American astronomical community. Without question, both European and American astronomers became the *Messenger's* principal subscribers, and were to remain its successor's greatest avenue of support.

5 ASTRONOMY AND ASTRO-PHYSICS (1892-1894): A FAILED MERGER

As evinced by *The Sidereal Messenger's* final volume (1891), astrophysical topics had begun to acquire a prominent following among American and European researchers (e.g. Anonymous, 1891; Huggins, 1891; Keeler, 1891). That same year marked the entry of perhaps the most influential American astronomer of his generation onto the astrophysical scene—twenty-three year old George Ellery Hale (Osterbrock, 1993; 1997; Wright, 1994).

Hale acutely sensed the need for a professional journal devoted exclusively to astrophysical research, but he could not raise sufficient funds to undertake its production alone. His principal competition was none other than *The Sidereal Messenger*, which, though "... far from satisfactory as a research journal ... dominated the astronomy field." (Osterbrock, 1995: 3; cf. Osterbrock, 1984). Payne suggested that the two journals should be united, with Hale and his associates responsible for the astrophysical contents. A completely new journal, called *Astronomy and Astro-Physics*, would be created, and the *Messenger* would cease publication. *Astronomy and Astro-Physics* was nonetheless owned and published by Payne at Northfield. Subscriptions were \$4 per year for ten numbers (as before), with 80 pages per issue promised. As the successor to the *Messenger*, the first volume of *Astronomy and Astro-Physics* was numbered 11, and it attracted some 520 paid subscribers, 100 of whom were from outside the United States (Osterbrock, 1995: 3).

As the journal entered its second year, Payne (1893: 90) noted optimistically that its subscription list had "... increased ... more than twenty percent ...", a result which was seen as "... most encouraging." But this bubble was about to burst, for the number of subscribers—and in particular amateurs—began to drop away in the second year. It was not simply the technical nature of astrophysics that accounted for this loss, for many of the papers that appeared under 'General Astronomy' were also highly mathematical (e.g. Coakley, 1892). Payne reported to Carleton's President that "... our publication has grown too expensive and too technical for the great number of interested readers and students ..." who formerly subscribed to the *Messenger*. He thus announced the possibility of issuing "... another publication wholly popular in character ... prepared expressly for amateur astronomers, teachers, students, and popular readers." (President's Annual Report, 1893: 12). It was to be called *Popular Astronomy*, and the contents would be "... in no sense professional, except to be accurate in statement of fact, and principle without being technical in terms ...", while employing the best writers "... that can be procured for compensation." Ten numbers, each of 48 pages, were promised (Payne, 1893: 377).

After three years, Hale had mustered enough support to break away from Payne and transfer his operation to the University of Chicago, which is where *The Astrophysical Journal* was issued, starting in 1895 (Osterbrock, 1984; 1995). Though scarcely concealing his feelings of regret, Payne (1894: 871) declared that this decision evidently reflected "... that which is best for astronomy in general." To President Strong, however, Payne confided that the real cause of the sale of *Astronomy and Astro-Physics* lay in the fact that its publication had become so cumbersome "... that its managing editor [himself] could not well meet its constantly increasing responsibilities ... [and] discharge other college duties faithfully." (President's Annual Report, 1895: 2). *Popular Astronomy*, he noted, had already acquired a "... larger circulation than either of its predecessors ...", with one-eighth of the subscribers located in sixteen countries other than the U.S.A. (ibid.).

6 POPULAR ASTRONOMY (1893-1951)

During its first three years, *Popular Astronomy* was edited by Payne and Charlotte R. Willard, head of Carleton College's time service (Willard, 1893-1894). Willard conducted the monthly column, 'The Face of the Sky', where celestial data were furnished by Herbert C. Wilson (1858-1940), an alumnus of the College (1879) who earned a Ph.D. in astronomy at the University of Cincinnati (1886) and was hired as an Assistant Professor in 1887 (Gingrich, 1940a). Willard then married Arakel G. Sivaslian, a Turkish-born student who in 1893 had received the first Ph.D. in astronomy awarded by Carleton College. They moved to Turkey where Sivaslian served as Professor of Mathematics and Astronomy at Anatolia College (Headley and Jarchow, 1966: 215; Leonard, 1904: 237). After Willard's departure, Wilson became the Associate Editor of *Popular Astronomy*. Payne (1893-1894: 45) hoped that, like *The Sidereal Messenger*, this journal would "... bring the scholars and the popular readers of astronomy nearer together in common interest." Astrophysics was not neglected and a civil attitude was maintained toward Hale's new venue, as when Payne (1894-1895: 283) noted that "*The Astrophysical* [sic] *Journal* ... makes an excellent beginning ..." The awarding of the Janssen Prize to Hale for his invention of the spectroheliograph was likewise reported (Anonymous, 1894-1895).

6.1 Pedagogy and Community

In December 1892, Payne was chosen to represent the discipline of astronomy on a subcommittee of physics, chemistry, and astronomy educators chaired by Johns Hopkins University chemist Ira Remsen, which reported to Harvard University President, Charles Eliot (Anonymous, 1893). Payne's appointment likely arose from his prominence as Editor of *The Sidereal Messenger*, along with his recognized classroom experience and pedagogical interests. Eliot chaired the National Educational Association's Committee on Secondary School Studies, popularly known as the 'Committee of Ten' (Krug, 1964). At its conclusion, the Physics, Chemistry, and Astronomy Subcommittee recommended that secondary-level astronomy instruction should be reduced from a college prerequisite to an elective subject, with physics and chemistry elevated

to front rank. However, no explicit rationale for this decision was offered (Bishop, 1977; 1979).

In the national fervor which arose over publication of the Committee of Ten's *Report* (1893), pedagogical issues acquired a much higher profile in the pages of *Popular Astronomy* than they had received in *The Sidereal Messenger*, and this is reflected in Krug's (1964: 66) claim that "... from 1894 to 1905 almost every treatment of matters educational was referred to, compared with, or distinguished from the report of the Committee of Ten." Thus, essayists defended or criticized a variety of instructional strategies, ranging from the textbook-recitation approach to an increasing emphasis on laboratory teaching methods. Uniting many of these disparate themes, however, was the almost-universal acceptance of the mental discipline model of pedagogy and its rationale of support for astronomy education in the nation's secondary schools and colleges. But in the years after 1900, astronomy education underwent a dramatic decline following collapse of the mental discipline model, and it was largely eliminated from the American secondary curriculum until advent of the space age (see Marché, 2002).

For those subscribers involved in the instruction of students (and these included a growing percentage of astronomers), *Popular Astronomy* offered the most widely-accessible, disciplinary forum on that subject. Over the next two decades, the journal's pages were increasingly devoted to potential solutions by which a revival of astronomy education might be accomplished. One of the most vocal proponents of that task was Smith College Observatory Director, Mary Byrd, who was awarded a Ph.D. from Carleton College in 1904. Byrd examined many aspects of this issue, and wrote prolifically to try and bridge apparent gaps in the pedagogical literature (e.g. see Byrd, 1903-1907; 1913).

6.2 Popularization and Other Scholarly Tools

Throughout his editorship of Carleton's astronomical journals, Payne recognized the need for a regular review of current astronomy that effectively combed the expanding literature of the field. Back in 1887, he had published a paper by Princeton University astronomer, Charles Augustus Young, titled "Ten years' progress in astronomy, 1876-1886" (Young, 1887). Payne (1904a: 8) argued that by "... sifting this continual harvest ..." of books and journals, leading problems of the discipline could be brought, in condensed form, before a ready readership. Such a task, he realised, required the "... aid of many specialists." When initially unsuccessful at finding anyone willing to accept this challenge, Payne (1904b) presented results from his own modest literature survey, and he subsequently was successful in commissioning one such review, by British astronomer Edward Walter Maunder, although this was to be the last report of its kind to appear under Payne's tenure (Maunder, 1907).

Payne's desire to publish such information for English-language readers may have been inspired by the appearance of the German-language *Astronomischer Jahresbericht* (AJB), a Berlin publication that Walter Freidrich Wislicenus initiated in 1899.⁵ Along

with printed summaries of general and historical works, the *Jahresbericht* reported on developments in astronomy and astrophysics, as well as geodesy and nautical astronomy. The *Jahresbericht* also contained extensive bibliographies of astronomical subjects, plus an index of researchers. Payne had also commissioned a six-month bibliography, which was published in *The Sidereal Messenger* and reflected the prominence of astrophysical topics (Winlock, 1891).

Scholarly tools such as annual reviews, bibliographies, and even 'trade' journals themselves, arose in order to foster and improve the levels of communication and research within larger academic specialties or disciplines. All reflected the attainment of particular stages of professional development, through which a representative community inevitably passed as a function of its evolving size and maturity. These tools become indispensable aids for the maintenance and support of that community's further development. Viewed from this perspective, Payne's attempts to proffer such wholesale information to subscribers foreshadowed the future institutionalization of these tools among the discipline. In 1963, long after Payne's death and the demise of *Popular Astronomy*, the series, *Annual Review of Astronomy and Astrophysics*, was launched by Annual Reviews, Inc.

6.3 Popular Astronomy and the American Astronomical Society

Founding of the American Astronomical Society (AAS) in 1899 (under the original name, the Astronomical and Astrophysical Society of America, or AASA) has been traced to the written suggestion from U.S. Naval Observatory Director and AAAS Past-President, Simon Newcomb, to George Ellery Hale, and the new society was unofficially begun at the gathering of astronomers convened for the dedication of the Yerkes Observatory on 21 October 1897 (Berendzen, 1974; Osterbrock, 1999). Yet, two earlier regional societies, namely the Astronomical Society of the Pacific (founded in 1889) and the Astronomical and Physical Society of Toronto (founded in 1890 but reincorporated as the Royal Astronomical Society of Canada in 1902), preceded the establishment of this viable, national society (Jarrell, 1988; Osterbrock, 1978).⁶ Newcomb (see Moyer, 1992) was elected the AASA's first President, and his "... graceful, somewhat florid, backward-looking ..." keynote address at the Yerkes Observatory dedication (Osterbrock, 1999: 11) was printed in *Popular Astronomy* (Newcomb, 1897-1898).

Throughout Newcomb's tenure as President (1899-1905), the AASA remained relatively small (never exceeding 160 members), and this allowed the Society to retain its 'club-like nature'. Historian, David H. DeVorkin (1999b: 22), has argued that Newcomb managed his office "... without much flair ...", instead directing his principal attention towards "... reforming the Naval Observatory." Names of persons present, titles of papers presented, officers elected and a brief summary of the Society's first official meeting on 6-8 September 1899 appeared in *Popular Astronomy* (Anonymous, 1899), but little else was reported there in the early years.

The youthful Society had no journal of its own, so its first official proceedings were not published until the occasion of its tenth anniversary (AASA, 1910). The discipline's leading research journals, the *Astronomical Journal* and the *Astrophysical Journal*, each predated the Society's founding, and both were independently edited and retained by institutional homes for decades to come. No regular publication of AASA meeting abstracts was advanced under Newcomb, but occasional summaries of papers were printed in *Science*. The Society's fourth meeting (1902-1903), held in conjunction with the AAAS, was attended by Herbert C. Wilson, and his report included the titles and selective notes regarding the thirty-six submitted papers (Anonymous, 1903).

Harvard College Observatory Director, Edward Charles Pickering, was elected the Society's second President in 1905. At Harvard, he had organized the "... world's largest spectroscopic, photographic, and photometric programs in astronomy." (DeVorkin, 1999b: 20), and under his guidance the Society "... began to create [research] committees to deal with the professionalization of their science." (DeVorkin, 1999b: 24). In turn, the Society's relationship with *Popular Astronomy* was to be significantly strengthened through two separate initiatives crafted by Wilson (which are described below), and these brought lasting benefits to Society members and raised the number of journal subscribers.

6.4 Sale of *Popular Astronomy* to Carleton College

As his seventieth year approached, Payne anticipated retirement from active duties at the College. In a letter to the Board of Trustees dated 11 September 1908 Payne tendered his resignation, to take effect 1 October 1908. Efforts by Executive Committee members to dissuade him from his decision failed, and they noted that "... his mind was made up and his purpose unchanged." (Board of Trustee Minutes, 1908: 33). But they did arrange for him to receive an annual allowance of \$1,150, which was secured from the Carnegie Foundation for the Advancement of Teaching (see Page, 1908; Payne, 1908a, 1908b). Nonetheless, Payne remained the owner, editor, and publisher of *Popular Astronomy*, a post he might have retained for an indefinite period of time (Anonymous, 1909: 181).

Payne's plans were soon changed, however, when a directive from President Theodore Roosevelt was issued that the U.S. National Bureau of Standards conduct routine tests on the accuracy of all portable watches. In a replay of his Carleton appointment, Payne was hired in May 1909 to establish an astronomical observatory and time service for the Elgin National Watch Company in Illinois. The Elgin Observatory commenced operations in 1910 and Payne's engagement as Director was extended indefinitely. Payne eventually retired on 1 November 1926, but this time on full pay for life and with the title of Director Emeritus (Neidigh, n.d.: 3; Payne, 1927).

Payne's acceptance of the Illinois appointment finally severed his relationship with the longest-running astronomical journal he had founded, edited, and published. As a result, the "... purchase of *Popular Astronomy* from Professor Payne ..." was referred to the College's Board of Trustees, whereupon

an undisclosed settlement price was negotiated (see Board of Trustees Minutes, 1909: 49). Though a highly unusual move for the College to make, Carleton's administration stressed the recognition of their institution achieved through Payne's editorship of the three journals. But as we shall see, under Wilson's tenure, that momentum was further cultivated in ways not attempted during the 'Payne era'.

In a final gesture that capped the significance of his published contributions, Payne supervised the assembly of a complete index to the twenty nine volumes he had edited through 1908. Publication of the index was funded by a \$100 gift via Edward Pickering from the International Science Fund of Harvard College Observatory and a \$200 donation from G.R. Agassiz of Boston (*General Index ...*, 1909). Thus did *Popular Astronomy* finally pass out of Payne's hands, after completion of the May 1910 issue (Payne, 1910). Thereafter, its annual cover sheet carried the tribute, 'Founded by W.W. Payne'.

7 WILSON, *POPULAR ASTRONOMY*, AND THE AAS

With the June 1910 issue, Herbert Couper Wilson (Figure 3) became Editor of *Popular Astronomy*. Two Assistant Editors were added: Ralph Elmer Wilson, who was Herbert Wilson's son, and Curvin H. Gingrich (1880-1951), who was hired in 1909 as an instructor to replace Payne. Ralph Wilson retained his post for little more than two years, while Gingrich remained at Carleton for the duration of his career and succeeded Herbert Wilson as the Editor of *Popular Astronomy* in 1926.

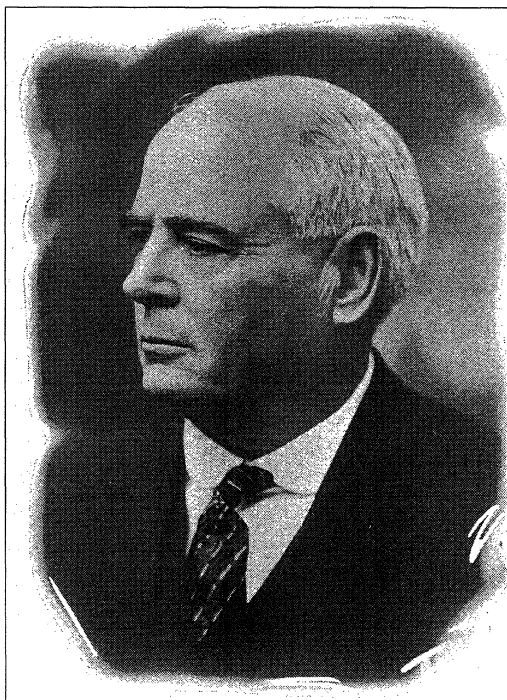


Figure 3: Herbert C. Wilson, second Editor of *Popular Astronomy*, 1910-1926 (Reproduced from *Popular Astronomy*, 48, f.231 (1940). Courtesy, Carleton College Archives).



Figure 4: Thirty-fourth meeting, American Astronomical Society (AAS), hosted 8-10 September 1925 at Goodsell Observatory (Reproduced from *Popular Astronomy*, 33, Plate XXX (1925). Courtesy, Carleton College Archives).

In coming years, Wilson spearheaded two significant editorial initiatives that enabled *Popular Astronomy* to assume a more integral role within the American astronomical community. The first of these was his decision (after the Society's sixteenth meeting in December 1913) to publish the abstracts of all papers delivered at AAS meetings, thereby ending the previously haphazard means by which these reports were publicized (Anonymous, 1914). Though unofficial in nature, abstracts printed by Wilson often appeared years in advance of their official publication in the Society's proceedings, thereby aiding a more rapid announcement of authors' works beyond the confines of meeting halls. After this trend became established, stronger incentives existed for professional astronomers and institutions to become regular subscribers.

By this means, the journal's visibility and legitimacy within the astronomical community were significantly enhanced. Wilson's first initiative went a long way toward making *Popular Astronomy* the unofficial journal of the AAS. For a period of seventeen years (1914 to 1930), until the practice was suspended (almost certainly for economic reasons), *Popular Astronomy* became the principal repository for rapid-style AAS communications. The final appearance of meeting abstracts accompanied a report on the Society's forty-fourth meeting (Anonymous, 1930-1931), and subsequently they were published in the *Astronomical Journal* (which was acquired by the Society in 1941), starting with Volume 51 (1944-1946). This policy remained in effect until the *Bulletin of the American Astronomical Society* was created in 1969, with the explicit purpose of "... publish[ing]

abstracts of papers presented at meetings of the Society and its Divisions." (Schwarzschild, 1969: 1).

A second initiative crafted by Wilson significantly strengthened relations between the Observatory, the Northfield community and the wider astronomical establishment. This was his consolidation of the Society's official publications at Northfield after 1915. As previously noted, the Society's first volume of official proceedings was not issued until observance of its decennial anniversary in 1909. Containing the "Organization, Membership, and Abstracts of Papers, 1897-1909", it was published at Ann Arbor, Michigan (AASA, 1910), by Society Secretary, William J. Hussey, the volume's co-editor with Pickering. A second volume was issued by the same press in 1915.

Before Pickering's death in 1919, however, Wilson secured the Society's permission to allow its proceedings to be issued under his direction by the Northfield News, publishers of *Popular Astronomy*.⁷ This action confirms and extends David DeVorkin's (1999b: 20) assessment that, during this era, the Society "... remained very much an eastern and mid-western power block, centered on Pickering and his circle." Starting with Volume 3 (AAS, 1918), which bore the amended title, *Publications of the American Astronomical Society*, all volumes issued through 10 (AAS, 1946), edited by Dean Benjamin McLaughlin and Curvin H. Gingrich, were published at Northfield. Publication dates reveal the sluggishness and irregularities in this process: Volume 4 was published in 1923, Volume 5 in 1927, Volume 6 (1931), Volume 7 (1933), Volume 8 (1936), Volume 9 (1939) and Volume 10 (1946). Thus, for twenty-eight years, the Society's official *Publications*, and its unofficial

journal, *Popular Astronomy*, were edited and published under the auspices of Carleton College.

One of the high points of Wilson's career occurred shortly before his retirement, when in 1925 the Goodsell Observatory hosted the 34th meeting of the AAS (Figure 4; Anonymous, 1925). Carleton 1892 alumnus, Anne Sewell Young, who was Director of the Mt. Holyoke College Observatory and a Councillor to the Society, attended the meeting, but Payne was notable for his absence. Had the former Director and journal editor been in attendance, he might have taken pride in seeing the institution he founded welcome the nation's leading society of professional astronomers, including several other Carleton alumni. While Payne's roles were not formally acknowledged in the proceedings, the host institution did owe an enormous debt of gratitude to him for establishing its Department of Mathematics and Astronomy and its observatories, and for the three astronomical journals that he had founded, edited, and published. Carleton's hosting of the AAS meeting offered symbolic recognition of Payne's lasting influence upon the American astronomical community (and beyond).

8 GINGRICH, *POPULAR ASTRONOMY*, AND THE AAS

Following Wilson's retirement in June 1926, Curvin Henry Gingrich (Figure 5) succeeded him as Editor of *Popular Astronomy* (Greene, 1988; Leonard, 1951). A graduate of Dickinson College in Carlisle, Pennsylvania, Gingrich had earned his Ph.D. from the University of Chicago in 1912. He received editorial help from Carleton alumnus Edward Arthur Fath (1880–1959; class of 1902), who became a second Associate Editor of the journal in October 1920, when he was hired to teach at Carleton. Fath had earned a Ph.D. from the University of California in 1909, and pursued research in photoelectric photometry. He eventually succeeded Wilson as Director of the Goodsell Observatory, and was the author of a standard astronomical textbook (Fath, 1926) that passed through several editions. Fath ceased his editorial responsibilities at the end of 1938 (even though he did not retire from the College until 1950), and his vacancy was never filled by another Carleton astronomer. As a result, the first important break occurred in the Department's cycle of involvement with the journal—a factor that was to have important repercussions, and led to the eventual demise of the publication.

Upon assuming the editorship, Gingrich (n.d.: 1) presented a tentative program for *Popular Astronomy* to Carleton President Donald J. Cowling, arguing that the periodical occupied "... a position almost unique among magazines in this country and in the world." Carleton's publication was "... virtually the official organ of the American Astronomical Society ..." on account of its prompt publication of "... abstracts of all papers read before the society ... and periodical reports of observatories." (ibid.). Without exaggeration, Gingrich (ibid.) could claim that the journal's contents offered "... a body of material not only of interest to all astronomers, but potentially indispensable to those desiring to keep pace with astronomical development."

Gingrich steered the journal for the next twenty five years, through its most difficult period, which encompassed both the Great Depression and the Second World War. But despite enormous social and economic changes that lay ahead, *Popular Astronomy* retained an almost identical format and received the continued support of his administration. Pre-war subscriptions to the journal reached a peak of 1,200, including some 200 foreign subscribers (Greene, 1988: 20), approximately twice the concurrent AAS membership.

In the wake of Fath's departure as Associate Editor and with war looming, Gingrich (1942c) announced that ten astronomers, "... representatives of various fields and of different sections of the country ...", had consented to serve as 'collaborators'. They were Leon Campbell, Alice H. Farnsworth, Edward A. Fath, Alfred H. Joy, Dean B. McLaughlin, Charles P. Olivier, John H. Pitman, Charles H. Smiley, Robert J. Trumpler and George van Biesbroeck (Gingrich, 1941), and their names appeared for the first time on the masthead of Volume 50 (1942). Gingrich's initiative, which aimed to keep the journal alive in coming years, reflected the greatest extension of its editorial responsibilities beyond the confines of Carleton's campus. It likewise represented the strongest measure of voluntary support that the journal received from the American astronomical community. By instituting this co-operative measure, Gingrich (1942c: 1) hoped that "... the position of *Popular Astronomy* will be strengthened and its sphere of usefulness extended." By the time the periodical closed in 1951, the number of collaborators had grown to twelve, nine of whom had maintained their association from 1942.



Figure 5: Curvin H. Gingrich, third (and final) Editor of *Popular Astronomy*, 1926-1951 (Reproduced from *Popular Astronomy*, 59, f.343 (1951). Courtesy, Carleton College Archives).

9 OTTO STRUVE AND THE AAS

It might come as a surprise to learn that a steady stream of contributions to *Popular Astronomy* emanated from no less a figure than Otto Struve (1897–1963), then Director of the University of Chicago's Yerkes Observatory and Managing Editor of the *Astrophysical Journal* from 1932 to 1947. During his tenure at Yerkes, Struve managed to build that institution into one the nation's top astronomical research facilities (Osterbrock, 1997). So, why did a leading research astronomer, Observatory Director, and Editor of the discipline's most prestigious scientific journal, devote considerable attention to the welfare of a 'popular' astronomical magazine?

The answer is that Struve had long recognized *Popular Astronomy* as a strategic communications link within the AAS, whose importance was not diminished during periods of national hardship and emergency. Thus, it was for the sake of preserving the integrity of the Society, and the astronomical community as a whole, that Struve came to exercise his considerable influence and support for the Carleton journal.

Gingrich and Struve held a number of professional traits in common, the principal one being that both were Editors of the most widely-read and -respected journals in their field. Struve (1933) wrote to Gingrich, "I realize from my own experience that an editor's job is not an easy one, especially at a time like the one in which we are living." A close working relationship developed between these men, borne of mutual respect and commitments of unstinting service to their discipline and institutions. Even though their respective facilities shared distinctly unequal levels of prestige, Struve seemingly displayed a high regard for Gingrich's efforts and provided considerable support for the latter's publications, which did not go unacknowledged. It is not clear whether Gingrich engaged in a similar correspondence with Benjamin Boss, the Editor of *The Astronomical Journal* from 1912 to 1941, or with his successor, Yale University's Dirk Brouwer.

Along with furnishing abundant news from the astronomical community, Struve composed a number of feature articles for Gingrich on the status of particular fields or problems within contemporary astronomical research. Such review articles accomplished multiple purposes, then as now. They offered to non-specialists an opportunity to be brought up to date on research extending beyond one's own area of expertise. Investigative techniques were summarized, while future directions of research could possibly be foreseen. In Struve's case, these reports surveyed results in stellar astronomy or spectroscopy, along with current work on the interstellar medium (Struve, 1935; 1937). He also occasionally refereed material submitted to Gingrich (see Gingrich, 1939; Struve, 1939).

After receiving a paper titled "The problem with Phi Persei" from Struve (1941), Gingrich (1940b) responded that "... we are always pleased to receive a paper from you and shall plan to publish it at the earliest opportunity." An address delivered by Struve before the Cincinnati Astronomical Society on "The story of Pleione" (Struve, 1943b) was likewise submitted to *Popular Astronomy*, and Gingrich (1943a) replied that he thoroughly appreciated Struve's

interest. A very different type of article emerged from Struve's pen when he submitted an essay on "Astronomy faces the war" (Struve, 1942). His analysis offered, in Gingrich's (1942a) opinion, "... exactly the kind of article which we need." Gingrich (*ibid.*) again thanked Struve for his "... continued helpful attitude toward our publication."

In the following year, Gingrich (1943b) wrote to Struve about his plan to publish a series of review papers "... summarizing the progress made in the several fields [of astronomy] up to the present time." Gingrich's nominal purpose was to commemorate the principal developments that had transpired during the fifty-year history of *Popular Astronomy*. But Gingrich (1942c) was also mindful of the effect of the Second World War on astronomy, and he wrote: "... the world has now come upon a time when, to the best of our knowledge, the astronomical journals, except those in England and America, have practically ceased to exist." To prevent his own publication from suffering an identical fate, Gingrich was forced to shift the balance of coverage from newer to older research, in order to ensure that full-length issues appeared on a regular basis and his subscribers were satisfied. Struve (1943a) responded that he "... shall be very glad to cooperate in the plan which you have outlined." However, Struve's original piece, entitled "Fifty years of progress in astronomy" (Struve, 1943c), evolved into something more ambitious than anticipated and ended up as the introductory paper for Gingrich's series. A still more comprehensive outcome of the war-time efforts by Struve and Gingrich to synthesize a half-century of astronomical knowledge was later realized with the publication of Struve and Zeberg's (1962) widely-utilized compilation, *Astronomy of the Twentieth Century*.

10 THE FIFTIETH ANNIVERSARY CELEBRATION OF POPULAR ASTRONOMY, 1943

The fiftieth anniversary of *Popular Astronomy* was celebrated amidst the depths of the Second World War. Gingrich (1943c) prepared an account of the journal's founding by Payne and its subsequent production under Wilson and himself. In reviewing the 500 published issues, he remarked (with evident surprise) that "... one naturally expects conditions at the end of a fifty-year interval to be different from those at the beginning ... [yet] the form, size, and general appearance of this [500th] issue are strikingly similar to those features [contained] in the first issue." Such a testimonial affirmed that the periodical's format was satisfactorily envisioned by Payne and had achieved stability under his guidance. *Popular Astronomy*, although maintained by differing editorial hands, had withstood the test of time, despite enormous changes in the nature and content of astronomical research over the same fifty-year period. Gingrich (1942d) reiterated that the journal's steadfast mission rested on the continued presentation of new facts, "... in order to keep those who are interested abreast with current developments and discoveries." This was surely the task of any disciplinary trade journal.

In a letter to Struve written on 23 November 1942, Gingrich (1942b) announced that the journal's golden anniversary issue will contain "... a series of brief statements from those who have been acquainted with

this magazine through the years." True to his promise, this special issue contained forty-five contributions solicited from astronomers worldwide (Struve being one of them). While Gingrich's selection naturally reflected favorably on *Popular Astronomy*, many respondents nonetheless spoke of the journal's significant contributions to the American astronomical community. MIT astronomer, Harlan True Stetson, expressed the opinion that "... this periodical has made an important contribution to the rise of astronomy in the United States, and it well deserves the recognition and esteem in which it has been held throughout the astronomical world." (Gingrich, 1943c: 8). Lick Observatory Director (and Editor of the *Publications of the Astronomical Society of the Pacific*), Robert Grant Aitken, argued that the journal's uninterrupted appearance represented no small achievement (Gingrich, 1943c: 10), while Mount Wilson Observatory Director, Walter Sydney Adams, expressed his belief that the journal had "... filled a most useful place in astronomical literature, combining articles of technical merit with those in simpler language." (Gingrich, 1943c: 15). *Popular Astronomy's* role as an invaluable organ for disseminating results by certain groups of professional and amateur astronomers was commented upon by Harvard College Observatory Director, Harlow Shapley, who felt that such contributions "... cannot be over-emphasized." (Gingrich, 1943c: 16).

One of the most reflective reactions came from Otto Struve, who—perhaps more optimistically than realistically—argued that a close friendship had long existed between *Popular Astronomy* and *The Astrophysical Journal*, both of which had sprung from Payne and Hale's failed *Astronomy and Astro-Physics*. Struve thus declared that "*The Astrophysical Journal* takes pleasure in extending cordial greetings to her older sister upon her fiftieth anniversary." (Gingrich, 1943c: 64). But in a departure from other authors, Struve ventured that *Popular Astronomy* offered "... what no other journal now provides: the dissemination of astronomical information ... [in order] to elevate the minds of people from the immediate problems confronting them to the contemplation of the wonders of the universe." (Gingrich, 1943c: 64-65).

As the fiftieth anniversary of Yerkes Observatory drew near, and with it Struve's impending resignation as Observatory Director and Managing Editor of *The Astrophysical Journal*, he composed what was arguably his 'swan song', and furnished *Popular Astronomy* with his most elaborate contribution, titled, "The story of an observatory" (Struve, 1947b). Struve (1947a) specifically asked for this essay to appear before his resignation on 1 July 1947, and Gingrich (1947) acceded to this request. Historian, Donald Osterbrock (1997: 289), has argued that Struve's account, "... like [those of] most directors writing about their institutions ... [had aimed] not so much to make sure all the facts were absolutely correct as to give a positive picture of the current situation, and in that [Struve] succeeded admirably." Later, in mid-1950, Struve became Chairman of the Astronomy Department at the University of California-Berkeley.

11 TRANSFER OF POPULAR ASTRONOMY TO THE AAS?

One of Struve's last and potentially most significant interactions with Gingrich and *Popular Astronomy* concerned a proposal that likely stemmed from the former's election as AAS President in 1946. As early as 1941, Struve had recommended that ownership of *The Astrophysical Journal* be transferred to the AAS, a decision that was postponed until 1972 (Abt, 1999). In the spring of 1950, however, Struve approached Gingrich about the possibility of transferring production of *Popular Astronomy* from Carleton College to the AAS, thereby transforming it into an official organ of the Society (see Gould, 1950). Struve was almost certainly aware that Gingrich was also approaching retirement age and that no immediate successor stood in line to assume his editorial post. Struve's proposal revealed his personal estimate of the publication's value to the AAS membership, along with the seriousness of purpose that he associated with the journal's continued production. Struve even recommended an expansion of its offerings so as to attract more teachers of astronomy.

Struve's proposal was forwarded to Carleton's President, Laurence M. Gould, who then wrote to Gingrich: fearing the loss of reputation to the College that would accompany such a change, he opined, "... we do not want to transfer *Popular Astronomy* to the [American] Astronomical Society or to any other society." (Gould, 1950). Struve's suggestion possibly forced Gingrich to confront his administration as to the degree of continued support that it could be expected to provide. Gould (ibid.) assured Gingrich that Carleton "... has every expectation of continuing to support *Popular Astronomy*." But in light of the unexpected events that transpired, had Struve's suggestion been adopted, the rapid demise of *Popular Astronomy*, in little more than eighteen months time, might have been forestalled.

12 THE END OF POPULAR ASTRONOMY, 1951

With the close of Carleton's 1950-1951 academic year, Gingrich completed twenty five years of service as Editor of *Popular Astronomy* and more than forty years as an instructor. Having reached the age of 70 (like Payne before him), he had planned to retire, but continue indefinitely as the journal's Editor. Those plans, however, and the fate of *Popular Astronomy*, were abruptly severed when Gingrich suffered a fatal heart attack on 17 June 1951, after an illness of only one week (Leonard, 1951). The sudden vacuum created by Gingrich's death was exacerbated by the absence of an Associate Editor to co-ordinate the multitude of responsibilities. The burden of questions surrounding the journal's operation fell upon Ralph L. Henry, Editor of the College's publications, and Carleton's President, Gould. At first there was no indication that the journal would come to an end, and the initial task was to produce the year's remaining issues, which rested upon a dozen or so collaborators.

But subscription renewals and other business details brought matters to a head, as did the lack of copy for further issues, and Henry (1951a) advised Carleton's Business Manager, Bruce Pollock, that "... there can hardly be any issues of the magazine after December." Further actions taken by the Board of

Trustees also blocked a potential avenue for salvaging the journal, by rendering it "... impossible for us to approach a new board of editors who could get manuscripts for us." (ibid.). On 15 November 1951, Henry (1951b) had the dubious distinction of informing people closely associated with *Popular Astronomy* that the College was to suspend publication with the December (1951) issue.

An eleventh-hour bid to keep the journal afloat surfaced from Charles Anthony Federer Jr., founding Editor of *Sky and Telescope* and *Popular Astronomy*'s principal competitor as a mass-market astronomical periodical. But rather than attempting to gain control of *Popular Astronomy* by himself, Federer made a strong pitch to have the journal's publication resumed by the Rensselaer Polytechnic Institute of Troy, New York (Gould, 1951; Henry, 1951c). However, these negotiations broke down and the sale never materialized. Instead, Federer acquired some 333 prepaid subscriptions to *Popular Astronomy*, which were subsequently fulfilled by *Sky and Telescope* (Pollock, 1952). Thus, the venerable *Popular Astronomy*, which was launched fifty-nine years earlier by Payne and survived the Great Depression and the Second World War, abruptly ceased publication just six months after Gingrich's death. So far as is known, neither Struve nor the AAS attempted to rescue *Popular Astronomy* during this interval.

13 EPILOGUE

One of the most intriguing (if contrafactual and unanswerable) questions to be pondered concerns the potential fate of *Popular Astronomy* had Gingrich not died without an editorial successor in place and had the journal's production remained at Northfield. Might *Popular Astronomy* have survived to witness the advent of the space age, or beyond? Subscription records argue in support of this contention. While wartime subscriptions dropped to just below 1,000, they rebounded sharply to 1,410 by June 1950 (Gingrich, 1950). At this same date, AAS memberships reached ~700, or approximately half the number of journal subscribers. Without question, Carleton's journal had acquired a strong contingent of loyal followers who showed no signs of cancelling their subscriptions.

Nonetheless, portentous changes in the form of 'Big Science' began to affect the American scientific community and the AAS during the post-war years (Capshew and Rader, 1992). The late 1950s (and beyond) witnessed an enormous influx of astronomers, physicists and aerospace engineers into the Society as the space age unfolded. Applications of former military technologies, starting with the V2 rocket program, co-ordination of the International Geophysical Year (1957-1958), *Sputnik* and creation of the National Aeronautics and Space Administration (NASA) heralded the opening of the electromagnetic spectrum to wavelengths previously inaccessible by ground-based astronomical instruments (e.g. see DeVorkin, 1992; Launius, Logsdon, and Smith, 2000; Leverington, 2000; McDougall, 1985; and Sullivan, 1961). Concurrently, the establishment of multi-institutional consortia (like AURA), funded chiefly by the National Science Foundation, led to the creation of the first national observatories (Edmondson, 1997;

McCray, 2004). The impact of Government patronage on post-war U.S. science policy revealed to AAS leaders that "... the structure and scale of pre-war astronomy in America held little relevance for the future." (DeVorkin, 1999c: 120). The era of 'Big Science' soon overshadowed and rendered obsolete many pre-war instructional programs and institutions.

Former Carleton College Archivist, Mark Greene, has argued that it was perhaps for the best that *Popular Astronomy* ceased publication when it did. He suggests that the journal had outlived its usefulness and become an 'anachronism', analogous to the College's Goodsell Observatory and Astronomy Department which had nurtured its existence for nearly sixty years but had themselves "... clearly and inevitably lost [their] national significance." (Greene, 1988: 21). Greene notes that it took Carleton College four years to secure a replacement for Fath, but he does not indicate why. Perhaps it was because there was a widespread perception that any new Carleton appointee would be expected to revive *Popular Astronomy*. If that were the case, then the journal's reputation had become a liability that frustrated hiring committees until its final demise had become a certainty.

Had *Popular Astronomy* continued publication at Northfield, its production and distribution likely would have outstripped the human and financial resources available within the College and the Northfield community. Memberships in the AAS soared into the thousands after 1960. Out of necessity, *Popular Astronomy* then would have become an official journal of the AAS and its production transferred elsewhere (as Struve had once advocated), or else it would have ceased publication altogether. Such was the fate of *The Astronomical Journal* and *The Astrophysical Journal*, both of which were eventually acquired and managed by the AAS. The era had most likely reached an end when a monthly disciplinary trade journal could be produced almost single-handedly by a lone editor who also retained instructional and administrative duties at a liberal arts college and relied on assistance from a local newspaper company to get the publication printed.

In 1975, Carleton's Goodsell Observatory was listed on the National Register of Historic Places as a site where important contributions were made to Minnesota astronomy education and the 'scientific literary field' encompassed by Payne's journals (Greene, 1988: 24). This award is perhaps the only recognition of its kind ever bestowed upon a scientific journal that embraced the adjective 'popular' within its title.

14 CONCLUSIONS

This case study has demonstrated an *inversion* of the culturally-dominant view of scientific popularization. By serving practitioners within a scientific discipline, the two principal journals founded, edited and published at Carleton College by William W. Payne, namely *The Sidereal Messenger* and *Popular Astronomy*, became the American astronomical community's first 'trade' journals. Their most steadfast clientele was the era's professional astronomers, many of whom later belonged to the American Astronomical Society (AAS). These periodicals

routinely helped to shape, direct and influence communications and decision-making processes among disciplinary leaders and others involved in policy developments. Trade journals and other scholarly tools such as annual reviews and bibliographies comprise an essential—if sometimes overlooked—component of disciplinary professionalization, and complement the establishment of professional societies and the creation of research-grade journals.

Trade journals inform researchers and practitioners about developments that occur in areas of knowledge production beyond their immediate specialties. These journals offer routine assessments and reviews of current investigations, innovations and issues facing practitioners and educators alike. More succinctly, trade journals foster as well as chronicle disciplinary actions within a profession, especially during periods of transition, such as during the rise of late-nineteenth-century astrophysics. These outlets serve to attract new recruits to the profession, through the encouragement of research objectives and the explication of lingering problems and issues within their fields.

The Sidereal Messenger and *Popular Astronomy* brought national and international recognition to Carleton College. By contrast, *Astronomy and Astrophysics* symbolized the short-lived failure to unite the features of a research-grade publication and a trade journal into a single compendium. In the early twentieth century, *Popular Astronomy* began to function as the AAS's unofficial journal, when rapid publication of meeting abstracts and the Society's official proceedings were consolidated at Northfield (Minnesota) under Herbert C. Wilson.

Thanks to Curvin H. Gingrich's concerted efforts, *Popular Astronomy* was guided through the Great Depression and the Second World War, but the very existence of the journal proved contingent upon his continued survival. After he died suddenly in 1951 the journal folded, ending a fifty-nine year association with Carleton College. Only one year earlier, the College administration had politely but firmly refused Otto Struve's request that they relinquish control of the journal to the AAS. But even if Gingrich had not died suddenly, it is unclear for how long the College would have maintained its support for this publication in the light of post-war scientific developments characterized as 'Big Science'.

15 ACKNOWLEDGEMENTS

I am indebted for the helpful assistance provided over the years by Eric Hillemann and Susan Garwood-DeLong from Carleton College Archives for permitting me to examine and copy the President's Annual Reports, Board of Trustees Minutes and other files pertaining to the history of its Astronomy Department, journals and personnel. Judith L. Bausch, Librarian at the Yerkes Observatory, granted similar privileges regarding its Papers of the Director. Dr. Jerome A. Fallon, Hillsdale College's retired Archivist, graciously supplied copies of the College's 1863 catalogue and list of the school's graduates. Liz Marston, Elgin Area Historical Society and Gail Borden Public Library, furnished a copy of Ray S. Neidigh's publication on the history of the Elgin Observatory. Thomas R. Williams (Rice University) read an earlier draft of this paper and offered valuable suggestions for

strengthening its core arguments. A condensation of these results was presented before the Sixth Biennial History of Astronomy Workshop, University of Notre Dame, in 2003 June. I am also grateful to the Woodman Astronomical Library, Department of Astronomy, University of Wisconsin-Madison, for providing unfettered access to its collection of historical journals. Without the help of these individuals and institutions, this investigation could not have been undertaken or completed.

16 NOTES

1. Payne is listed as one of eleven male and three female graduates of the 'College Course' who received their diplomas in June 1863 (Hillsdale College, 1863). A biographical file on Payne is held at the Carleton College Archives in Northfield, Minnesota.
2. All subscription records and an extensive correspondence were apparently discarded after Payne's resignation. Towards the close of his second year of publication, Payne admitted that his circulation, "... though not large ... [was] very general and slowly, but steadily growing." (President's Annual Reports, 1884: 9).
3. Payne noted that this subscription exchange strategy "... ought to and does make the Observatory library a place to be sought above all others for the latest and best information on the themes of Astronomy." (President's Annual Reports, 1887: 14).
4. The six graduates were: Arakel G. Sivaslian (1893), DeLisle Stewart (1895), Anna D. Lewis (1896), Edwin C. Norton (1896), Mary E. Byrd (1904), and Florence E. Harpham (1909).
5. More than a century earlier, however, the *Astronomisches Jahrbuch* had been issued by the Royal Academy of Sciences in Berlin. It began in 1776, under the direction of Johann H. Lambert.
6. Jarrell (1988: 79) has written that, "... despite its name ... [the APST] behaved like a national organization, akin to the earlier version of the RAS in Britain." From the start, APST members "... forged links with professionals everywhere." (Jarrell, 1988: 80).
7. Unfortunately, Wilson's correspondence was not preserved at Carleton College; consequently, documentation of this initiative has not been traced. Neither Pickering's correspondence nor AAS records has been examined for corroborative evidence. Each volume of the Society's *Publications* retained its own editor(s).

17 REFERENCES

The following abbreviations are used:

- AAS = American Astronomical Society
- AASA = Astronomical & Astrophysical Society of America
- CCA = Carleton College Archives, Northfield, Minnesota
- YOA = Yerkes Observatory Archives, Williams Bay, Wisconsin

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