

Enrollment Began

Starting Out

This Chapter recounts Charles Olivier's efforts, from 1911 to 1918, to enroll observers in a volunteer meteor research association, the American Meteor Society (AMS). It documents his outreach to existing astronomical and meteorological organizations whose members were potentially interested in meteoric astronomy and who possibly could be coaxed to join.

Olivier had a very ambitious goal: no less than gathering scientific data on every meteor which fell over North America and its adjacent waters. He hoped that volunteer citizen scientists would accomplish a great deal, but to improve chances of achieving that goal, he asked members of all organizations with scientific interests related to astronomy to relay meteor observations their members happened to make in the course of official or academic activities.

Charles Olivier had just been awarded a Ph.D. in astronomy in June 1911. His busy agenda began with finding a collegiate-level academic post to begin his career in academe. Once on a faculty, he intended to continue research in double star and meteor astronomy which he had begun at the University of Virginia's Leander McCormick Observatory.

Astronomy, the University, and Professor Olivier

Mathematical (gravitational) astronomy had for centuries been an institution in universities and colleges. The science and universities were inseparable and mutually beneficial. Universities provided financial support and incentives of increased academic rank to astronomers whose research had advanced the science. In return, astronomers' scientific accomplishments enhanced universities' reputations in academe.

Institutions of higher learning, in the nineteenth and early twentieth centuries, were charged with developing undergraduates' moral–ethical behavior as well as their intellect. College and university professors accepted a quasi-parental role when biological parents sent their adolescents to be educated; professors were “in loco parentis,” in place of the parents. Like parents, they were expected to mold an adolescent into a mature adult capable of leading a principled and productive lifestyle after graduation. In keeping with this philosophy, professors sought not only to impart specific information, but also to motivate students to expand humanity's intellectual resources, to create new industries and products, but failing these, students should at the least become competent people who did not waste time foolishly. To accomplish all these objectives, professors often used pointed criticism in the classroom when students were lazy and failed to measure up to their academic or ethical standards.

“In particular, Professor Olivier believed in the therapeutic value of work: laziness was a fatal character flaw. He mentioned his conviction on this issue in a 1935 letter, “It all helps to keep people busy in things of value and out of mischief, to say the least. After all, that is excuse enough for anything in my opinion.”

After earning his doctorate and starting his academic career, Charles Olivier assumed the role students' parents expected of him as a professor: perfecting their children's character. He regarded his students as partially prepared for life and he used his influence as well as classroom instruction to encourage students' character and intellectual development. Olivier pursued these goals when he was in the classroom and whenever he communicated with AMS members. He assumed his meteor volunteers to be approximately of college age and when he used AMS reports to teach members meteor astronomy, he was mindful of his mentoring role too; he regarded it as his responsibility to shape members into productive adults. With these motives in mind, Professor Olivier conducted the AMS like a university classroom and he regarded most people who came into contact with him as his students.

First Academic Post

Even before he was awarded a Ph.D. in June 1911, Olivier applied for a faculty position at Agnes Scott College in Decatur, Georgia, just outside Atlanta. He was appointed to begin that fall at the small all-women liberal arts college that advertised itself to have “Advantages equal to those offered by the best colleges for men.”¹ The change from the all-male student body at UVA to Scott's all-female one was no doubt a welcome change for the young professor.

¹Source for his appointment: Full Text of *Agnes Scott College Bulletin: 1912–1913*: http://archive.org/stream/agnesscott19121913agne/agnesscott19121913agne_djvu.txt. Accessed 11/8/13. Olivier's presence on the faculty is also recorded in the college's Bradley Observatory faculty listing: Agnes Scott College, Bradley Observatory, Emeritus Faculty <http://www.agnesscott.edu/bradleyobservatory/faculty-staff/emeriti-faculty/index.html>. Accessed 11/7/13.

Agnes Scott College, during the years Olivier taught there (1911–1914), enrolled young women from Virginia south along the Atlantic seacoast to Florida and west through the Gulf states as far west as Arkansas. In 1912, enrollment was 178 and it rose to 208 the next academic year. The college's administration intended to maintain a high instructor-to-student ratio so that faculty could give each student more attention.² Professor Olivier participated in some of the college's social life. He was mentioned as an "honorary member" of the Virginia Club, students who were Virginians and whose "favorite occupation was to show verbal loyalty to our State." He was also asked to chaperone a "party of teachers and girls to Stone Mountain" Georgia, a shrine to the Confederacy which has a bas-relief sculpture of Confederate military heroes cut into the rock of a mountainside.³ The handsome young professor was likely a favorite with the female student body.

Dr. Olivier's teaching responsibilities were two: classes in descriptive astronomy and practical and theoretical astronomy. In the former class, a four-inch (10-cm) refractor was used in nighttime laboratory exercises to show the young women telescopic views of celestial objects that were prominent in the night sky at the time. The second course was more rigorous because it was more mathematical in nature. The college catalog promised, "Its completion will fully prepare a student for regular graduate work in Astronomy in any university."⁴ Olivier no doubt felt most acutely the absence of an observatory-class telescope at Agnes Scott; the college did not get one until 1930.⁵ Despite the lack of research equipment, Olivier pressed on with a campaign to expand meteor research studies in the USA.

Friends at McCormick Observatory

See Figs. 1, 2.

Charles Olivier remarked how well Ormond Stone was able to discern young men's promise for careers in mathematics and astronomy. Stone encouraged their academic careers, as he had Olivier's by awarding them Vanderbilt Fellowships so that they could study mathematical astronomy in preparation for professional astronomy careers. Three of these bright young men were Olivier's contemporaries while all were under Stone's tutelage at the Leander McCormick Observatory

(Footnote 1 continued)

The claim about "advantages" was printed in the college's 1912 annual yearbook, the *Silhouette*: Full text of "Silhouette (1912)" The 1912 *Silhouette* also contained the administration's pledge to keep resident student enrollment to 300 or less. The year book was found at: http://archive.org/stream/silhouette191200agne/silhouette191200agne_djvu.txt. Accessed 11/8/13.

²Ibid. and for 1913, the source is: Full Text of *Agnes Scott College Bulletin: 1912–1913*, op.cit.

³"Silhouette 1912," op.cit.

⁴*Agnes Scott College Bulletin: 1912–1913*, op. cit. above, on p. 76.

⁵<http://www.agnesscott.edu/bradleyobservatory/faculty-staff/emeriti-faculty/index.html>. Accessed 11/7/13.

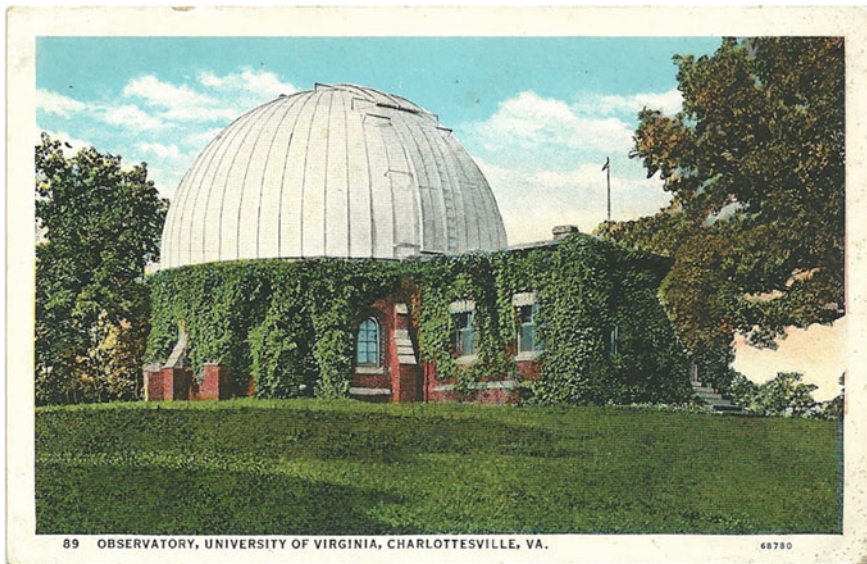


Fig. 1 Leander McCormick Observatory, on Mt. Jefferson at University of Virginia, circa 1915–1928. This is how McCormick Observatory appeared when Charles Olivier and his friends were graduate assistants. *Source* Lake County (Illinois) Discovery Museum, Curt Teich Archives

(LMO): Palmer Hampton Graham, Thomas McNider Simpson, Jr., and James Brookes Smith. In 1942, Olivier recollected about starting up the American Meteor Society (AMS) and he commented, “(it was) started by me in 1911, and the first members were a small group of personal friends.”⁶ They were Olivier’s observatory assistant colleagues: Graham, Simpson, and Smith. Just like Olivier, these three McCormick Observatory astronomers-in-training were rigorously trained in mathematics, observational methods with telescopes (practical astronomy) and were taught to compute orbits (Fig. 3).

McCormick Observatory Colleagues

Each of the men held separate meteor watches, but occasionally they joined Olivier as leader in a coordinated observation. One of these collaborations was carried out when James Brookes Smith and Thomas McNider Simpson joined Olivier in simultaneous observations of the 1915 Perseid meteor shower. The three men watched Perseids from August 9 to 13, between midnight and 2 a.m. Olivier observed from Charlottesville; Simpson from Randolph–Macon College in Ashland, Virginia, and

⁶Olivier, C.P., *Meteor Notes, PA*, volume 50, 1942, p. 436.

Fig. 2 Vanderbilt Fellows Residence, *Source* Author's photographic archives



Smith watched from Hampden-Sydney College, in a village of the same name, southwest of Richmond, Virginia. They hoped that some of their plotted meteors would prove to be the same Perseids and allow trigonometric calculation of the meteors' heights.⁷ Hoping to measure more meteor heights, Smith joined Olivier in December 1915 in a second joint observation of the Geminid meteors.

Six years after these two attempts, Dr. Olivier published the results: four of the 1915 Perseids had been observed simultaneously by Olivier and Simpson. Olivier asked that Simpson calculate the meteors' heights from his position, just as Olivier

⁷Olivier, C., Observations of Perseids in 1915, *Publications of the Astronomical Society of the Pacific*, volume 27, 1915: 224–226.

Fig. 3 J. Brookes Smith's meteor plots of Orionid meteors on October 18, 1914. The star map is one he copied from Winslow Upton's *Star Atlas* (1896) onto tracing paper. The constellation Orion is located near the right edge of the lower portion of the map. *Source* Courtesy of the American Meteor Society Ltd. Archives



did from Charlottesville. In this way, one calculation was a “check computation” of the other and ensured that the observations and resulting meteor heights were accurate. Olivier declared measures of one Perseid’s height to be “splendidly consistent,” and one was “probably about correct” when the two obtained heights were averaged. However, two measures were ruined by observational errors. Results for the 1915 Geminid meteors were similarly mixed with one meteor’s height judged to be accurate, but a second’s only approximately correct when both observers’ height results were averaged.

As University of Virginia (UVA) grad students, Graham, Simpson, and Smith earned their keep at McCormick Observatory by “...devot(ing) approximately half time to work of the observatory,” and in return, they were supported financially by a Vanderbilt Fellowship. “The Vanderbilt Fellows each received \$35 per month for ten months in the year. They were graduate students and received in addition the remission of the University fees and living quarters on Observatory Mountain. In spite of the small emolument from the fellowships, they were much sought after,” explained Stone’s successor Samuel A. Mitchell.

Thomas McNider Simpson, Jr. (1882–1965), must have been very bright and ambitious because he graduated Randolph–Macon College in 1901 at age 19. He began graduate studies at the UVA in 1901 and was a Vanderbilt Fellow from 1901 to 1905, the same years Charles Olivier was an undergraduate student. They were fraternity brothers in three fraternities at UVA. And, two archival letters from Simpson to Olivier, dated 1916 and 1918, made it clear that they had a cordial relationship based on similar interests. After he earned a master’s degree from UVA

in 1907, Simpson earned a doctorate in mathematics in 1917 at the University of Chicago. He enlisted in the American Expeditionary Force during World War I. In 1919, he returned to Randolph–Macon College as professor of mathematics, which he continued until 1960, and from 1939–1952 was dean there.

In 1902, as a Vanderbilt Fellow, Simpson, was assigned to use the 26-inch (66 cm) McCormick telescope with an instrument called a photometer to measure the brightness of 14th magnitude stars. This duty was to fulfill McCormick's role as part of a cooperative program coordinated by Edward C. Pickering at Harvard College Observatory. In another astronomical study, Simpson used the 26-inch Clark refractor to measure a comet's changing positions during February and March 1903.⁸ He made one other AMS-related meteor watch, in addition to the 1915 collaborative study mentioned earlier. This was on August 9, 1916, when he saw five Perseids during an hour-and-55-min watch. Simpson's report to Olivier concerning this watch suggests that it was to support another of Olivier's efforts to measure Perseid meteor heights⁹ (Fig. 3).

James Brookes Smith (1885–1963) was most often cited as “J. Brookes Smith” and sometimes as “J.B. Smith” in the earliest AMS reports and Olivier's longer monographs about Parabolic Meteor Orbits. Smith began his undergraduate studies at UVA in 1902, a year after Charles Olivier, and he received his B.A. degree in 1906. His full name appeared in a 1910 UVA course catalog listing him as an astronomy instructor during the years he was a Vanderbilt Fellow. In 1911, with his M.A. degree, Smith was appointed an assistant professor of mathematics at Hampden-Sydney College. He was a World War I veteran and after the war, he joined the life insurance industry, ultimately becoming an actuary.

J.B. Smith was Olivier's earliest collaborator when both were undergraduates in 1904. Smith counted Perseids for Olivier, from Charlevoix, Michigan on August 10 and 11, and these results were helpful in establishing the meteors' hourly rates of fall.¹⁰ Smith, and another observer, plotted Orionid meteors on October 18 from Dudley's Mountain, Virginia, a site that was eight miles distant from Olivier's UVA

⁸Simpson, Thomas McNider, Observations of Comet 1902d (Giacobini), *Astronomical Journal*, volume 23, 1903; p. 104.

⁹Simpson's vital statistics are from Virginia Gravestones, http://viriniagravestones.org/view.php?id=5321&printer_friendly=true. Graduated in 1901 from Randolph–Macon College, and later became math professor and faculty dean there, <http://www.rmc.edu/Offices/president/inauguration/regalia.aspx>. Vanderbilt Fellow 1901–05 in (Olivier 1933). Doctorate in 1917, Mathematics Genealogy Project, <http://genealogy.math.ndsu.nodak.edu/id.php?id=6054>. All Web sites were accessed on 12/30 and 31/2011. Friendship and fraternity brother with Olivier: 1916 and 1918 dated letters to Olivier were addressed ‘Dear Charlie,’ and closed with ‘fraternally.’ Simpson's two letters were found in a storage box marked ‘1910–1920’ in the AMS Archives. Charles Olivier and Simpson belonged to Phi Beta Kappa, Sigma Xi, and Sigma Alpha Epsilon. Simpson's biographical facts and dates of faculty appointments are in his brief biography in *Who Was Who in America, Volume IV*, Chicago: Marquis Who's Who, Inc., 1968; p. 866.

¹⁰Olivier, C.P., 175 Parabolic Orbits and other results deduced from over 6200 meteors; *Transactions of the American Philosophical Society, N.S. Vol. 22, Part 1*, 1911, Philadelphia: American Philosophical Society, p. 13.

observation site. The two Michigan observers plotted 115 meteors, and 35 of them were serendipitously the same as ones Olivier plotted. Olivier published the trio's feat in *Popular Astronomy (PA)*, and he hoped the effort would lead to determining the meteors' real atmospheric paths, but the outcome of this project is unknown.¹¹

The astronomical record shows that Smith was a Vanderbilt Fellow, a paid astronomer, from 1909 through 1915. As a duty of his fellowship, Smith participated in a second project coordinated by Edward C. Pickering. In this one, McCormick observatory fellows contributed magnitude (brightness) estimates of long-period variable stars especially at times when the stars were at minimum light and were not visible in smaller telescopes. Smith used the 26-inch to make 93 visual estimates during 1909–1911.

Smith's AMS meteor contributions were made from 1911 to 1915. While on Hampden-Sydney College's staff, he plotted 1911's Leonids and 1912's Lyrid meteors. The 1911 and 1912 data appeared in the 126 Parabolic Orbits; Olivier's first meteor research memoir published following his dissertation. In addition to the collaborative study of the 1915 Perseids mentioned earlier, he observed the 1914 Eta Aquarids and Orionids, as well as the 1915 Geminids. The AMS' Archives contains Smith's meteor plots of the 1914 Eta Aquarids and Orionids. He used tracing paper to make star maps copied from astronomer Winslow Upton's *Star Atlas*, showing how early meteor observers needed to prepare a star map for each watch in the years before printed maps were available for meteor plotting.¹²

Palmer Hampton Graham (1887–1984) was almost always mentioned as "P.H. Graham" in AMS reports and elsewhere. Graham earned a B.A. degree from Emory and Henry College in 1909 and was a McCormick Vanderbilt Fellow from 1911 to

¹¹Olivier, C.P., Orionids at University of Virginia, *PA*, volume 12, 1904, pp. 680–681.

¹²Smith's undergraduate years are documented in *Directory of Living Alumni of University of Virginia, 1931*: http://xtf.lib.virginia.edu/xtf/view?docId=2005_Q1/uvaBook/tei/boo2179313.xml;chunk.id=d28;toc.depth=1;toc.id=d9;brand=default. Smith's given name, 'James,' his listing as UVA instructor and possessing an M.A., are from 1910 *University of Virginia Record*, dated February 1910, under "Officers of Instruction and Administration" on p. 24. This information was found online at UVA's Library site, http://xtf.lib.virginia.edu/xtf/view?docId=2005_Q2_1/uvaBook/tei/; his Vanderbilt fellowship dates were from *Olivier, 1933*, p. 297, in References. Notice of his appointment at Hampden-Sydney College is from *Notes of the American Mathematical Society*, February 1911, p. 270, which was found at <http://www.ams.org/bull/1911-07-05/.../S0002-9004-1911-0205702.pdf>. Smith's variable star work is mentioned in Mitchell, 1935, volume 6, on p. 8. All Web sites mentioned here were accessible on 12/29/2011. Smith's birth and death dates were found using Ancestry.com's genealogical resources. His birthdate was found in the World War 2 Registration records (from National Archives data), using the name 'J. Brookes Smith.' His date of death (September 1963) was found under 'James Smith' in the Social Security Death Index, when the birthdate of March 11, 1885, was entered into the Ancestry search engine. Insurance industry occupational information was found in the 1920 and 1930 US Censuses, as well as the WW2 Registration. His signature on the Registration card suggests that he preferred 'J. Brookes Smith' as his identifier. Ancestry.com data was accessed on 1/14/2012. Smith's tracing paper star maps were found in an AMS Archives storage box marked '1910–1920.' Upton's *Star Atlas*: Upton, Winslow, *Star Atlas Containing Stars Visible to the Naked Eye*. Boston: Ginn & Company, 1896.

1914. His work at the observatory overlapped one year with Olivier's who finished his Ph.D. in 1911. After earning an M.A. from UVA in 1914, Graham stayed on through 1915 and was listed as a candidate for the Ph.D. degree, but did not earn one. Instead, he joined the faculty of Agnes Scott College as a professor of physics and astronomy in 1916. Graham interrupted his academic career in 1917 to join the American Expeditionary Force to fight in World War I. He was a second lieutenant in the Aviation Section of the Signal Reserve Corps from 1917 to 1918. After the Armistice in November 1918, he returned to Agnes Scott College, but left in 1920 when appointed a mathematics instructor at the Washington Square College of Arts and Science at New York University (NYU). The majority of Graham's academic career was at NYU where he progressed from assistant professor to associate and finally a full professor of mathematics. He also served in administrative roles as Head of the Mathematics Department and acting dean for two multi-year appointments just before his retirement in 1953. Rounding out an impressive academic career, Graham authored texts in advanced mathematics, trigonometry, and analytic geometry while at NYU. Professor Graham died in San Mateo County, California, in 1984 at age 96.¹³

¹³**Graham's** vital statistics are from Family Tree Maker at Genealogy.com and the dates came up after 'Palmer H. Graham married Kathleen Knight' was entered in the Google search engine. Family Tree Maker is at <http://familytreemaker.genealogy.com/>. Graham is listed as number 3275 under 'Descendants of John Decrabtre'. This site was updated on 7/8/2010 and was accessed on 12/22/2011.

Graham's A.B. degree from Emory and Henry College, in addition to having the M.A. from UVA: enter 'p h graham astronomy Agnes Scott college' into the Google engine and select from the options 'Full text of Agnes Scott College Bulletin' Catalogue 1916' which is attributed to Archive.org (accessed 1/1/2012). In addition, Prof. Graham's 1953 retirement announcement stated that he was an Emory and Henry College graduate in 1909 and that he earned his M.A. from UVA in 1914. Graham's NYU retirement announcement was provided by NYU Archives at the Brobst Library at <http://www.nyu.edu/library/bobst/research/arch>. Contact Archives at university.archives@library.nyu.edu.

Graham's Fellowship years are mentioned in Olivier (1933).

His candidacy for the Ph.D. is mentioned in *University of Virginia Alumni News*, volume 3, No. 5, p. 57 on 11/11/1914. The *News* was published by the Colonnade Club at UVA.

Joining Agnes Scott College in 1916 was also verified in the same manner as his A.B. and M. A. degrees above. The document was from the *Agnes Scott College Bulletin, Catalogue 1916–1917*, under the heading 'Officers and Instructors 1916–1917'. This information was accessed on 1/1/2012.

Second Lieutenant in WWI information from, *Air Service Journal*, volume 1, 12/27/1917, p. 793. This source resulted from entering 'lieut palmer h graham' in the Google search engine. The information was on page, http://books.google.com/books?id=Zsc_AAAAYAAJ&pg=PA793&lpg=PA793&dg=lieut+palmer+h+graham&source=bl&ots=zeQagHRTBV&sig=r2ok1.

Appointed to NYU in 1920, from Notes and News, *American Mathematical Monthly*, volume 27, No. 10 (October 1920), pp. 382–384, published by Mathematical Association of America; Stable URL: <http://www.jstor.org/stable/2972572>. The text read, "Professor P.H. Graham, of Agnes Scott College, has been appointed instructor in mathematics in Washington Square College, NYU."

The description of Prof. Graham's NYU career is taken from his retirement announcement in 1953, access to which was described above.

Graham's contributions to astronomy were limited to his tenure at McCormick Observatory, 1911–1915. Like J. Brookes Smith before him, he was assigned to make visual estimates of variable stars' magnitudes during 1911 and 1912, the final years Ormond Stone directed McCormick Observatory. Graham used the Clark refractor to make more than twice as many magnitude estimates as Smith, 193 versus Smith's 93. After Stone retired in 1912, Samuel A. Mitchell assumed the observatory's directorship and inaugurated the use of photography to replace the visual studies made before him. During Graham's last years at McCormick, 1914–1915, Mitchell's research program consisted of making stars' parallax measurements from photographic plates obtained with the 26-inch Clark. Graham's photographic work was credited in Mitchell's article about the observatory's first parallax measures using photography.¹⁴ Later in 1921, Mitchell published a book-length monograph about the observatory's parallax project, in which 260 stars' parallaxes had been measured; in it, Graham was credited with making exposures of stars throughout 1914 and 1915.¹⁵

Graham's meteor watching career was brief in comparison with the volume of observational work he completed for Directors Stone and Mitchell. His one meteor observation was of the 1911 Orionids; but Olivier scrupulously credited him in a 1913 AMS report and in Olivier's monograph, 126 Parabolic Orbits.

In Summary

Dr. Olivier's graduate school colleagues, Simpson, Smith, and Graham, helped him fill out the AMS' ranks and by providing some observational support from 1911 to 1916. In addition, professors Smith and Simpson's collaboration with Dr. Olivier during the multi-site 1915 Perseid and Geminid programs were the first such efforts conducted using Olivier's standardized observational procedures.

Society for Practical Astronomy

In 1911, 27-year-old Professor Charles Olivier was intent on correcting the mistaken notion about stationary radiants which was accepted by many in the meteoric field. He was eager to enlist volunteer observers in a program that would

¹⁴Mitchell, S. A. "Parallaxes of 260 Stars derived from photographs." In *Publications of the Leander McCormick Observatory*, volume 3, 1–695. Charlottesville, Virginia: University of Virginia, 1921.

This source was accessed on 11/9/2012 from, <http://adsabs.harvard.edu/abs/1921PMcCO...2..157M>.

¹⁵Mitchell, S.A. "Stellar Parallax Work at the McCormick Observatory." In *Publications of the Leander McCormick Observatory*, volume 2, 157–164. Charlottesville, Virginia: University of Virginia, 1921. This source was accessed on 11/9/2012 from, <http://adsabs.harvard.edu/abs/1921PMcCO...3....1M>.

consistently use the stringent meteor observing procedures he had employed for his dissertation research. He began his search for observers by appealing to members of the Society for Practical Astronomy.

Society for Practical Astronomy and How the American Meteor Society Began

A Chicago teenaged amateur astronomer could have claimed credit for the first observing squad of what became the American Meteor Society. Thirteen-year-old Frederick C. Leonard (1896–1960) began the Society for Practical Astronomy (SPA) in 1909, and he publicized it in *Popular Astronomy* (PA) in August 1911 in hopes of developing it into an international organization. Leonard “...hope(d) to bind together in one strong society all of the astronomical amateurs in America and elsewhere...(to) encourage and help to promote amateur work in general.” Leonard’s goal was nothing less than forming a worldwide organization of actively observing amateurs who wanted to share their observations in the SPA’s journal, the *Monthly Register*, which Leonard edited.¹⁶

November 1911’s issue of *Popular Astronomy* contained a notice that Dr. Charles P. Olivier had agreed to lead the Meteor Section of the SPA. *Popular Astronomy*’s editor, Herbert C. Wilson noted Olivier’s credentials to lead meteor enthusiasts. “(Olivier’s) thesis was entitled “175 Parabolic Orbits and other results from over 6200 Meteors.” Having observed this large number of meteors himself, Dr. Olivier is well fitted to give practical advice to those who wish to begin the fascinating study of these mysterious objects.” Wilson concluded the announcement with the suggestion that amateurs who were interested in “systematic observation of meteors are urged to write Dr. Olivier and enroll as members of the Meteor Section.”¹⁷

At the same time as he assumed, leadership of SPA’s meteor section Olivier formed the American Meteor Society (AMS). He explained that he had “become convinced that the time had come for cooperation in the study of meteors in America and (was)...encouraged to make the attempt by several astronomers.” To invite observers, Olivier had sent letters to amateur and professional astronomers he believed might be interested in meteor studies. Olivier wanted to create an organization distinct from the SPA in which he could supervise members’ observational methodology so that it was in conformance with scientific principles. In 1913, in his first “Report of the AMS,” he acknowledged those who were SPA members, but he said that there were also “others” who had responded to his solicitation letters.

Olivier outlined an ambitious agenda for AMS contributors. He promised them, “(w)hen we have secured several thousand observations, it is our purpose to publish the ...results and their full discussion in a single paper, each observer receiving... full credit for his contributions. Meanwhile, brief reports...will be published at

¹⁶Leonard, F.C., *Popular Astronomy* (PA), vol. 19, pp. 455–456.

¹⁷Wilson, H.C., *P.A.*, vol. 19, p. 586.

The American Meteor Society Bulletin No. 2

For the information of members the following tables have been constructed the first mostly from W.F. Denning’s results, with some corrections, the second and third copied from *Das Meteorphaenomen* by C(harles) Birkenstock. In Table 2 have been added notes relative to the showers’ appearances in 1913. Having eliminated the nights spoiled by moonlight, I recommend the dates mentioned for observations.

TABLE I

Showers	(No. days)	Date of Max	Hourly no. of all meteors on this date	In 1913, observe
QUAs	2	Jan 2	28	----- (no notes)
Lyrids	4	Apr 18	7	Full moon useless to try.
ETAs	8	May 4	7+	May 2 to 7, ? a.m. to dawn
Del Aquari	3	July 28	27	July 27 to 30, mdnt to dawn
Perseids	35	Aug 11	69	7/28 to 8/8 in am; 8/8-13, 10 p.m. to dawn
Orionids	14	Oct 18	21+	Oct 25 to 28, 11 pm-moonrise
Leonids	3	Nov 14	21	Nov 14 after mdnt, but moon Full
Andromedes	2	Nov 24	16	Nov 23 & 24, 8 pm to mdnt.
Geminids	14	Dec 11	23	Dec 5 to 7, mdnt to dawn.

TABLE II

Hourly numbers for the whole year						for 6 pm rate listed was 3.8				
Hour	7	8	9	10	11	12	13	14	15	16
No. of meteors	4.6	5.6	6.8	8.2	9.8	11.5	13.1	14.4	15.0	14.8

TABLE III

Hourly numbers for each month											
Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
8.6	5.6	6.5	6.4	6.0	6.1	11.1	20.6	9.8	14.1	13.3	14.8

Tables II and III will give the observer information as to the number of meteors he can hope to see on a given date and at a given hour. For more detailed information see Popular Astronomy, Oct, 1911, pages 524, 525. Observers are strongly urged to attempt observations on as many of the dates mentioned as possible, since cloudy weather will surely spoil many of them. File this paper for further use. Charles P. Olivier, Agnes Scott College, Decatur, Georgia

Fig. 4 American Meteor Society Bulletin No. 2. *Source* Courtesy of the American Meteor Society Ltd. Archives

intervals.” Olivier concluded his report by “extend(ing) a hearty invitation to all in America who are interested in meteors...” to write him in order to join the AMS. In the AMS’ earliest years, Olivier relied upon descriptive meteor shower information from European sources to share with volunteers. In late 1912, he furnished members with Bulletin Number 2, a listing of major meteor showers compiled by W.F. Denning but amended by him with suggestions about the best dates in 1913 upon which to make observations. Bulletin 2 also summarized hourly meteor rates compiled by a Belgian amateur meteor observer, Charles Birkenstock (Fig. 4).

First Amateur Members of the Hybrid SPA-AMS

By March 1912, Olivier announced eight SPA Meteor Section members, including himself, to the rest of the SPA membership.¹⁸ When Olivier published 126 Parabolic Orbits of Meteor Streams (126PO) in 1914, it was the “single paper” he had promised AMS’ participating observers. In it, he acknowledged the SPA, “because it was through being appointed Director of its Meteor Section that I have been able to secure the assistance of most of (AMS’) best observers...” He scrupulously insisted that credit for the SPA members’ work belonged to the SPA even when it appeared in AMS reports.¹⁹ The five observers who were originally SPA members and who were cited in 126PO were Nels Bruseth, Alan P.C. Craig, James W. Hanahan, E.A. McDonald, and Latimer J. Wilson. These men were observational generalists who, in addition to watching meteors, reported their observations of the zodiacal light, auroras, planets, and variable stars²⁰ to other sections of the SPA concerned with those topics.

Of this group, *Latimer James Wilson (1878–1948)* was best known because his visual and photographic planetary work was often published in *PA*. Leonard appointed him Director of the SPA Planetary Section because of the quality of his planetary drawings. During World War 1, he worked for the Eastman Kodak company improving techniques and materials for telescopic photography. Following the war, Wilson returned to planetary studies and during the 1920s applied his photographic expertise to them. Wilson made a brief meteor career debut in 1912 but then he went on a hiatus. He rejoined the AMS in 1929 anticipating the expected Leonid storms during the 1930s. He photographed the 1932 Leonids in collaboration with visual observers who hoped to be able to measure the meteors’ heights in the atmosphere. His last reported meteor watch was for the 1936 Perseids. During that campaign, he assumed leadership of the Kentucky–Tennessee meteor group and earned a commendation from Dr. Olivier for leading it when Sterling Bunch, its long-time leader, moved to another state.²¹ In appreciation, Olivier appointed him regional Director for Kentucky and Tennessee in 1937.

¹⁸Olivier listed members in a notice in *Monthly Register of the Society for Popular Astronomy (MRSPA)* in a letter dated March 28, 1912. Source: Leonard, F. and H. Levinson, Eds., *MRSPA*, Volume 4, No. 3, January and February, 1912, p. 20, List of Members of the Meteor Section.

¹⁹Olivier printed identical meteor reports in *Monthly Register of the SPA* and in *Popular Astronomy*, to ensure that SPA members received acknowledgment in their club’s journal. He continued this practice until the SPA disbanded during World War I.

²⁰Nels Bruseth and Alan Craig were early members of the American Association of Variable Star Observers (AAVSO) which began as did the AMS, as a section of the SPA. Craig was the earliest AAVSO participant, in April 1912. By October 1, 1912 he had contributed 281 magnitude estimates and by October 1, 1913 he contributed 983 more. Nels Bruseth reported 84 variable star magnitude estimates in September 1913. Source for 1912: Olcott, WT, Annual Report of the AAVSO for the year ending October 10, 1912, *PA*, volume 20, 1912, p. 615; for 1913: Olcott, Annual Report for year ending October 10, 1913, *PA*, volume 21, 1913, p. 591.

²¹Olivier, Charles P. “Meteor Notes from the American Meteor Society.” *Popular Astronomy*, volume 45, 1937: 159.

GEMINID METEORS PLOTTED BY NELS BRUSETH

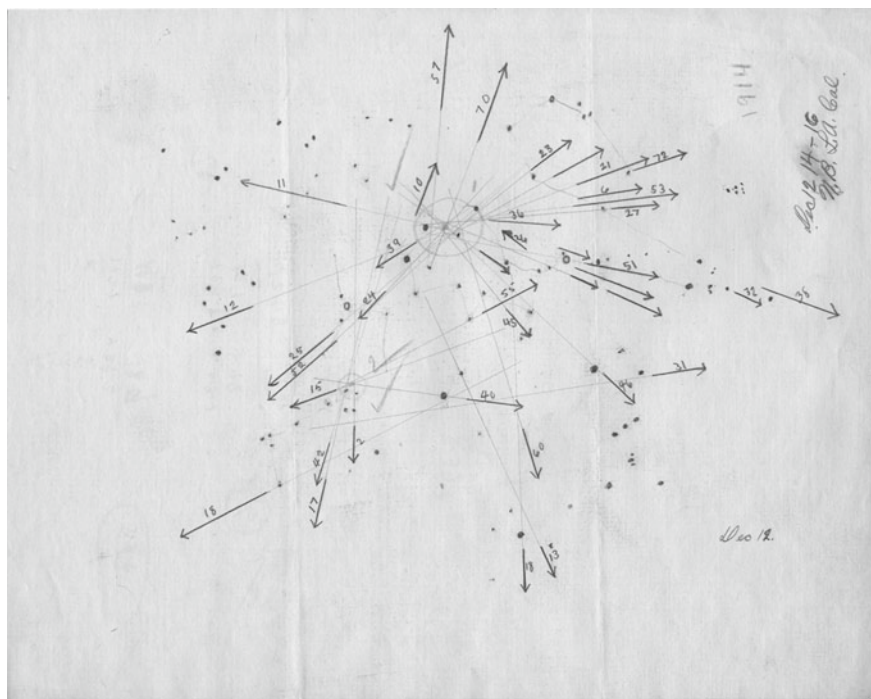


Fig. 5 Nels Bruseth plotted Geminid meteors on the night of December 12–13, 1914, from Los Angeles, California. His notation “14–16,” next to the date on the map, is the time period during which he plotted the meteors, i.e., 14 h to 16 h standard time on December 12. Bruseth’s times correspond to 2–4 a.m. Pacific Standard Time on December 13. The circle in the top center of the map is the Geminid radiant revealed by Bruseth’s plots. The map is hand-copied from an unknown reference star atlas. Copying maps from published star atlases was a standard practice among observers until printed maps became available in 1915. *Source* Courtesy of the American Meteor Society Ltd. Archives

Wilson’s body of work was so highly esteemed that he was invited to become a member of the American Astronomical Society and the Societe Astronomique de France (the French Astronomical Society)²² (Fig. 5).

²²A short biography of **Latimer Wilson** is in *Biographical Encyclopedia of Astronomers* (Hockey, et al., 2007, volume 2, pp. 1226–1227; New York: Springer). Wilson’s work for Kodak, see: Wilson, L., *Popular Astronomy*, 1919, volume 27, p. 478; for an example of one planetary photographic study: Wilson, L. J., Photographing Jupiter, *Popular Astronomy*, 1927, volume 35, p. 359; re: AMS membership: Olivier, CP, Meteor Notes, *Popular Astronomy*, 1929, volume 37, p. 467; re: photographing Leonids: Olivier, CP, Meteor Notes, *Popular Astronomy*, 1933, volume 41, pp. 337–338; re: 1936 Perseids: Olivier, CP, Meteor Notes, *Popular Astronomy*, 1936, volume 44, p. 502; being regional director: *Popular Astronomy*, volume 46, p. 154.

Nels Bruseth (1886–1957), exemplified the diverse backgrounds from which SPA meteor observers came. Bruseth was a US Forest Service Ranger whose 35-year career was spent in his native state of Washington. His life's work as a naturalist and recorder of local Native Americans' folklore was memorialized when a state park was named in his honor. One biography described Bruseth as "an amateur painter, anthropologist, photographer, geologist, and musician," and in addition, he was an author of newspaper articles and an ethnographic book in 1926. His observational work for the AMS began in 1913, continued through 1914 and 1915, and ended in 1916 when he began his Forest Service career.

One technique Dr. Olivier used to encourage high performance from AMS members was to select a year's star performer and praise him lavishly in the AMS' annual report published in *Popular Astronomy*. Bruseth was the first AMS member to receive this special attention. "It is with special pleasure that attention is called to the splendid record of Mr. Nels Bruseth of Silvana, Washington," Olivier enthused. "In the eight months of 1913 that he was a member he has sent in observations of 540 meteors made on 23 nights of regular work and many other nights of intermittent work," the AMS Director reported. Bruseth continued his prodigious observational rate in 1914 and he recorded 340 out of a total of 540 meteors reported in 1914, for 63 % of the AMS' 1914 data. Bruseth reported another 140 meteors in 1915, the last year he contributed data.²³

Alan Philip Carson Craig (1898–1959) lived in rural Riverside County, California, where his father owned and operated a fruit farm. Craig's adolescent years were spent doing chores on the farm, but in 1918, he moved to Long Beach, California, where he worked as a machinist's assistant for a shipbuilding company. He returned to the Corona farm in 1920. Ten years later, he was managing an oil company in San Bernardino, California. Alan Craig died at age 61 in Orange, California.

Craig watched meteors in 1912 and 1913 when he was 14 and 15 years old. His meteor watches were frequent in 1912: He observed Delta Aquarids, Perseids, Orionids, and Leonids. His contributions dwindled in 1913, only watching the Perseids. After 1913, his name was missing from the lists of AMS observers for ten years. But, during the two-year period 1923–1924, he made a final contribution to the AMS: magnitudes of 11 meteors he saw while engaged in telescopic work.²⁴ While

²³Online sources document **Nels Bruseth's** life. His vital statistics: www.nwhikers.net/forums/index.php. Once at this site, go to the 'Pacific NW history' link and then enter 'Bruseth' in the search box. This site was accessed on 11/29/2011. Bruseth's biography is on University of Washington's Special Collection library site: <http://digital.lib.washington.edu/findingaids/view?docId=BrusethNels0228.xml>. It was accessed on 11/7/2012. In re: Bruseth's 1913 meteor total, Olivier's and the author's counts differ. The author's count is 556 meteors accumulated over 33 observation sessions. Olivier appears to have labeled as "intermittent work" the nights when Bruseth observed less than a full hour and for nights when clouds were present. The author's count was made from data in 126PO, pp. 459–460. Bruseth's data for 1914 and 1915 are cited in Olivier, 349 Parabolic Orbits, in endnote above. The statistic "63 % of AMS' 1914 data" was also computed from data in Olivier, 349 Parabolic Orbits.

²⁴Olivier, Charles P. "Report of the American Meteor Society for 1923 and 1924." *Popular Astronomy*, volume 33, 1925: 240–243.

he watched meteors for the SPA, he was the Director of its aurorae, gegenschein, and zodiacal light section and he exemplified SPA members' enthusiasm for making reports about several astronomical subjects. In a 1913 SPA report in *PA*, Craig published Bruseth, McDonald, and his own zodiacal light reports for 1912–1913.²⁵

James Wilson Hanahan (1859–1947) was a Winnsboro, South Carolina, attorney, who practiced before South Carolina's Supreme Court as early as 1882 and was still litigating there as late as 1913. AMS reports indicate he was an active observer only during the 1912 Perseids. Articles in the SPA's *Monthly Register* and *PA* show that he had an interest in star clusters, nebulae, and the zodiacal light as well as meteors. He appears to have maintained an astronomical interest into late life because when he was 70 he sent *PA*'s zodiacal light reporter the details of observations he made in 1913.²⁶

Edwin Archibald McDonald (1859–1936) was a Presbyterian evangelist and missionary in Mexico, Guatemala, and Puerto Rico. He graduated from Iowa State College in 1882 and became an ordained minister in 1898. About 1906 he was assigned to Isabela, Puerto Rico and it was from there that he reported meteor watches of the 1913 Delta Aquarids and Perseids. He saw 153 meteors during the seven nights he watched for Perseids in August 1913. Besides meteors, he observed Mercury, Venus, and Jupiter in 1910 and the zodiacal light on 28 dates in 1912 and 1913. In addition to being a productive naked eye observer, he was an advocate for placing a large telescope at Puerto Rico's southerly latitude. Although he had an

²⁵ **Alan Craig's** WWI draft registration revealed his full name, birth date, residence, and occupation in 1918. All this information was found in Ancestry.com's online database, *World War I Draft Registration Cards, 1917–1918*, Provo, UT: Ancestry.com Operations Inc., 2005. Ancestry's online data came from US Selective Service System, *World War I Selective Service System Draft Registration Cards, 1917–1918*, Washington, DC: National Archives and Records Administration (NARA), M1509. His registration location was *Los Angeles County, California*; Roll: 1531190; Draft Board 1. Data about his life in 1910, 1920, and 1930 also came from Ancestry.com's online database, but originally from the US Censuses at NARA. His date and place of death were also found in Ancestry.com which obtained its data from the State of California, *California Death Index, 1940–1997*, Sacramento, CA: State of CA Dept. of Health Services, Center for Health Statistics. All Ancestry.com data was accessed on 1/14/2012. Alan Craig's zodiacal light report was in Craig, Alan P.C., Annual Report...Section for the study of Aurorae...in the SPA; *Popular Astronomy*, 1913, volume 21, pp. 600–606. His telescopic meteor work was mentioned in: Olivier, Charles P., Report of the American Meteor Society for 1923 and 1924, *Popular Astronomy*, volume 33, 1925, p. 241. It is also available at <http://adsabs.harvard.edu/full/1925PA.....33..240O>.

²⁶ **James Hanahan's** career is documented in the following sources. (1) *Reports of Cases Heard... by the Supreme Court*, volume 16, List of Attorneys; 1883, Columbia, SC: R.L. Bryan Co, Google eBooks.; (2) *The Southeastern Reporter*, volume 79, 1914, St. Paul, MN: West Publishing Co., Google eBooks.; (3) *Monthly Register of the SPA*, Listed members of Nebula Section, volumes 4–8, Chicago: SPA; and (4) Glanville, W.E.; Zodiacal Light Observations, *Popular Astronomy*, volume 37, 1929, pp. 493–4; at the <http://articles.adsabs.harvard.edu/> site. All the foregoing online sources were available on 8 Nov 2011. Hanahan's full name, birth date and date of death were given in his death record, which was accessed on the Ancestry.com Web site on 1/16/2012: *South Carolina Death Records, 1821–1955*, Provo, UT: Ancestry.com Operations, Inc., 2008. The original source was State of South Carolina, *South Carolina Death Records*, Columbia, South Carolina from the South Carolina Department of Archives and History.

optical telescope in mind, his notion anticipated the Arecibo 1000-foot radio telescope which began operation in Puerto Rico in 1963!²⁷

To summarize SPA members' contributions, Bruseth, Craig, Hanahan, McDonald, and Wilson reported a grand total of 1,308 meteors in the years 1912–1913. Their work comprised 46 % of the AMS' data for the years 1911–1913, and 57 % of its data for 1912–1913.²⁸

American Astronomical Society

It was crucial for the AMS's success to have the American Astronomical Society (AAS) as an ally because its members were Dr. Olivier's professional colleagues and they were the established professional astronomical community in the USA. AAS policies, its members' opinions, and their informal relationships wielded considerable influence about the types of astronomical research that would be pursued and how monetary resources would be allocated to research. As a practical matter, AAS members had considerable influence over the production of meteoric data. Most were academics who directed students' classroom activities and assigned nighttime laboratory exercises which could include meteor observations. In addition, the professors presented lectures to the general public and if they chose, could suggest public and amateurs' participation in meteor observation. The AAS's leadership and membership's support for the AMS were crucial if the AMS was to thrive. Dr. Olivier worked hard to earn colleagues' respect and secure their support.

Early History of the AAS

The AAS was a successor organization to an earlier assemblage of astronomers and astrophysicists, the Astronomical and Astrophysical Society of America (AASA).

²⁷**E.A. McDonald's** history came from the following sources. (1) Rev. E.A. McDonald (obituary), *Ames Daily Tribune and Times*, Ames, Iowa, Saturday, June 6, 1936, online on the IAGenWebProject; (2) *The Presbyterian Ministerial Directory*, 1898, volume 1, Edgar Sutton Robinson, editor, Cincinnati: Armstrong and Fillmore; (3) *105th Annual Report of Home Missions, Presbyterian Church in the USA General Assembly*, 1907, New York: Presbyterian Church; (4) McDonald, EA, Observations of the Planets in Porto Rico, *Popular Astronomy*, 1911, volume 19, pp. 189–190; and (5) Craig, APC, Annual Report of the Section for the Study of Aurorae, etc., *Popular Astronomy*, 1913, volume 21, pp. 600–606. Discovering his birth year and full name was the result of a long search on Ancestry.com's online database: both were found in the Mack family tree listings, to which he was related by marriage to Susan Elizabeth Smith.

²⁸**46 % of AMS data:** The total number of meteors observed 1911–1913 (2817) was used to calculate this statistic. This total is listed on p. 460 of *126PO* (also known as Olivier, C., 126 Parabolic Orbits of Meteor Streams, *Publications of the Leander McCormick Observatory*, volume 2, pages 457–475. Charlottesville, Virginia: University of Virginia, 1914). **57 % of AMS data:** This statistic was derived from the grand total number of meteors seen by SPA members (=1308, as in the text above), minus 102 'miscellaneous' meteors seen by Bruseth and Craig on p. 460 (1308 – 102 = 1206); and this result, 1206, was divided by the total number of meteors reported by all 1912–1913 observers cited in *126PO* (=2121): $1206/2121 = 0.56.9 \%$.

Just as the earlier organization's name implies, classical astronomers and the new astrophysicists decided in an organizational meeting, held at Cambridge, Massachusetts, in 1898 to form a society in which they could exchange research results and engage in collegial bonding. That meeting was preceded by one the previous year held at Williams Bay, Wisconsin, when the Yerkes Observatory's 40-inch refractor was dedicated. Young George Ellery Hale (1868–1938) was the organizational and promotional genius who conceived of the organization that became the AASA. He promoted and arranged the 1897 and 1898 meetings and his political and diplomatic skills enabled him to persuade older and more influential colleagues like astronomer Simon Newcomb (1835–1909) and astrophysicist Edward Charles Pickering (1846–1919) to back the concept.²⁹

The AASA's first formal meeting was held at Yerkes Observatory in early September, 1899 and Simon Newcomb, the best-known American astronomer was elected President. Two Vice Presidents, both astrophysicists, including Hale, were elected. The Secretary and Treasurer were classical astronomers. Four councilors were elected but only one, Ormond Stone, was a classical astronomer, the other three were astrophysicists. The mixed composition of the AASA is important to understand because it reflected a tension between the two "astronomies" that was to persist throughout the organization's and professional astronomy's history. Even so, astrophysicists dominated the first leadership team and this indicated Hale's intention that astrophysics would be preeminent in twentieth century astronomy.³⁰

The Luminous Meteor Committee

Simon Newcomb retired as the AASA's President at the end of 1905 and Edward C. Pickering of Harvard College Observatory succeeded him and continued in the post until he died in 1919. During his administration, Pickering created committees of astronomical specialists so that they could standardize their practices. The first formed was the Luminous Meteors Committee (LMC), established in 1908. "Luminous meteor" was the terminology used in the nineteenth century for what today is simply called a meteor, and it stemmed from classical times when any phenomenon occurring in the atmosphere, such as rain or lightning, was called a "meteor." The LMC Chairman was Cleveland Abbe (1838–1916) who was trained in the USA and in Europe as an astronomer, but became a specialist in meteorology and who pioneered weather forecasting in the USA³¹. Other Committee members were Henry Allen Peck (1863–1921), a Syracuse University astronomer who collaborated with Abbe on fireball studies³²; and William Lewis Elkin (1855–1933),

²⁹AAS Meetings before there was an AAS: the pre-history of the society' Osterbrock, Donald E., in *The AAS' First Century*, David H. DeVorkin ed., Washington, D.C.: American Astronomical Society; pp. 3–16.

³⁰*Ibid.*, pp. 16–19.

³¹Much more about Abbe is written in the next chapter about the Weather Bureau.

³²*Who Was Who In America*, volume 1, Chicago: AN Marquis Co; 1943, p. 952.

a Yale astronomer who before becoming a meteor specialist had a highly regarded career in astrometry.³³

Dr. Elkin's work, conducted from 1893 to 1909, was remarkable because he was the first astronomer to use an equatorially mounted photographic apparatus specifically designed to locate shower radiants, determine meteors' heights in the atmosphere, and provide data to calculate meteors' orbits and velocities. The accuracy of some of Elkin's results was impaired by an insufficient baseline between sites where equipment was operated and because of some mathematical and photographic measurement problems. But his use of photography was an immense advance over naked eye methods used on the cusp of the twentieth century.³⁴

In 1909, the LMC³⁵ produced a report in which it "proposed for serious consideration" that a cooperating group of "astronomers, meteorologists, and physicists" in the USA and Canada should work toward the development of a series of photographic stations, perhaps 100 miles apart, in which meteors within 45° of the zenith could be photographed.

The committee cited several earlier photographic techniques used in the USA and Europe that could become part of an established network of meteor cameras in order to determine meteor velocities. Abbe's report closed with a suggestion that "a year or two" be dedicated to finding the cheapest photographic devices and most accurate methods that could be employed in a prototype. Further, Abbe urged the AASA to designate the LMC members as the experts in these matters and who, in addition, would raise the funds necessary for the experimentation mentioned in the proposal.³⁶

In 1910, the LMC report to the AASA mentioned a "photographic apparatus" would be completed soon. And in 1915, Chairman Abbe reported that the renamed Meteor Committee was ready to employ the Eastman Kodak Company to manufacture a "photographic meteorograph."³⁷ Unfortunately, despite the reported progress, no operational product was ever produced (Fig. 6).

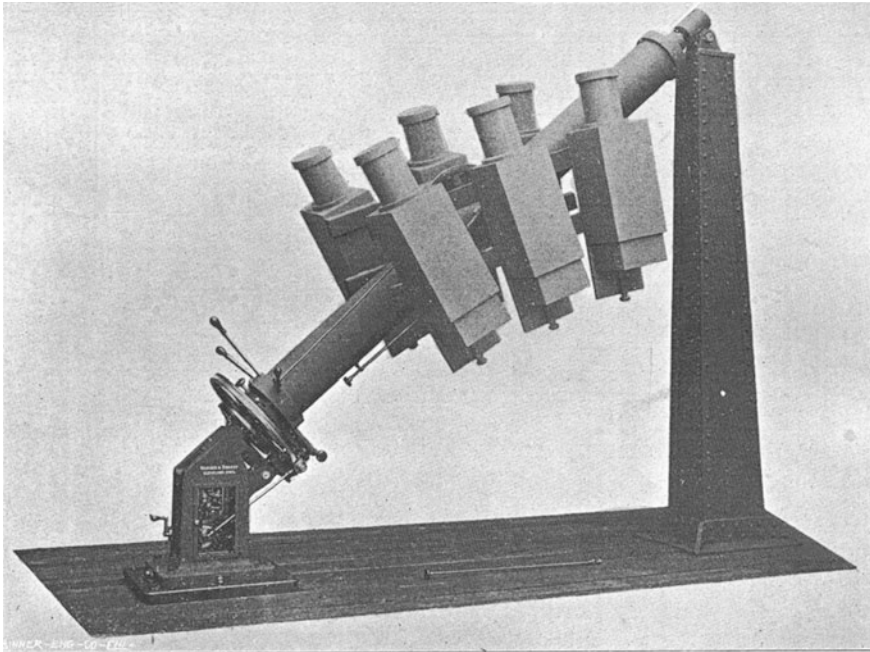
³³The Pickering Years, David H. DeVorkin, in *The AAS' First Century*, David H. DeVorkin ed., Washington, D.C.: AAS; pp. 24 and 27.

³⁴Olivier, C., Results of the Yale Photographic Meteor Work, 1893–1909, *Astronomical Journal*, volume 46, No. 1061, 1937, pp. 41–57.

³⁵In 1909 the LMC had additional members: EC Pickering, his brother William H. Pickering and Edward Emerson Barnard.

³⁶Progress Report of the LMC, to the AASA, dated August 17, 1909; by Cleveland Abbe, Chairman. From the Charles P. Olivier (CPO) correspondence file of the American Philosophical Society (APS).

³⁷AAS Meetings, to December 1920, Brant Sponberg, Edited and expanded by Paul Routly. <http://had.aas.org/aashistory/7meetings.html>. Select #18 on the Web site to access this source. Accessed September 23, 2012.



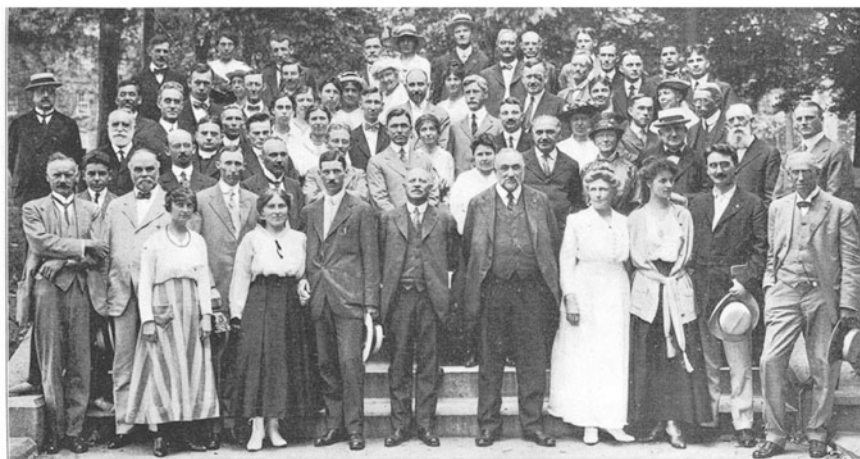
INSTRUMENT FOR THE PHOTOGRAPHY OF METEORS FOR THE YALE OBSERVATORY.
POPULAR ASTRONOMY, No. 11.

Fig. 6 This image is of William Lewis Elkin's photographic device for recording meteor trails. Elkin was awarded a grant from the J. Lawrence Smith Fund of the National Academy of Science for its construction by Warner and Swasey. The use of an English equatorial mounting allowed exposures to continue even when the cameras crossed the meridian. The cameras followed the stars by means of a weight-driven clock drive. Elkins began work with the device by photographing 1894s Perseid display. This remained the most sophisticated meteor-dedicated photographic apparatus for several decades. *Source* Image courtesy of Carleton College Archives

Charles P. Olivier, the AASA, and the American Meteor Society

In 1911, the same year he earned a Ph.D. in astronomy, Charles P. Olivier's name appeared in the organization's membership list published in a report about its December meeting in Washington D.C.³⁸ Soon after joining the AASA, Olivier began to earn his place in the astronomers' professional association. In November 1913, when Olivier was assistant professor of physics at Agnes Scott College in Decatur, Georgia, he received a letter from Philip Fox, the AASA's Secretary. Fox

³⁸Astronomical and Astrophysical Society of America, *Popular Astronomy*, volume 20, 1912, p. 131.



MEMBERS AND VISITORS AT THE SWARTHMORE MEETING OF THE AMERICAN ASTRONOMICAL SOCIETY,
AUGUST 30 TO SEPTEMBER 2, 1916.

POPULAR ASTRONOMY, No. 239

Fig. 7 Portrait of attendees at the 19th meeting of the AAS in 1916. Thirty-two-year-old Charles Olivier is in the *top row, fourth from the right*. This is the meeting at which he became Secretary of the Meteor Committee. Phillip Fox is in *top row, first on the right*. Henry N. Russell is just below Fox. President Edward C. Pickering is in the *front row, fifth from the right*. Frank Schlesinger is the man just above Pickering's left shoulder. Samuel A. Mitchell is the man diagonally to Pickering's *upper left*. Joel Stebbins is in the *second row, fourth from the left*, with a dark mustache and goatee. *Source* Image courtesy of Carleton College Archives

informed Olivier that he had been appointed by President Edward C. Pickering "as a local committee" to arrange for the Society to meet in Atlanta one month later, at the end of December 1913. Fox asked Olivier for information about hotel lodgings for the members as quickly as Olivier could manage to get it. Olivier did as he was directed and the AASA met in "a classroom of the Georgia Technical College (and) in the parlors of the Piedmont Hotel."³⁹

Pickering was in Atlanta, but because he was also President of the American Association for the Advancement of Science, and scheduled to address that organization, he could not be present for AASA meetings. Evidently, the Society's proceedings went well and a poster session that was held was described as "a pleasant feature" of the meeting. Olivier worked hard at short notice to make arrangements, but only 12 members were able to attend because "...Atlanta seemed

³⁹In 2012, the author made several phone calls to Atlanta institutions of higher learning. There is no Atlanta college known by this name and no present metropolitan Atlanta college's online history mentions "Georgia Technical College" as an earlier name. In particular, a historian at Georgia Institute of Technology, "Georgia Tech," denied that GIT was ever known as "GTC." The Piedmont Hotel was demolished in 1966: http://en.wikipedia.org/wiki/Piedmont_Hotel. Accessed September 23, 2012.

rather remote..." to astronomers who were mainly located in the northeast USA or the Midwest⁴⁰ (Fig. 7).

Despite Olivier's efforts on the AASA's behalf and the AMS' growing number of meteor observations reported in 1914⁴¹, Olivier had not yet been inducted into the Luminous Meteor Committee. For some unknown reason, the LMC had not yet embraced Olivier and his three-year-old AMS. It would take another two years for the newly renamed American Astronomical Society to acknowledge Olivier and the AMS' accomplishments.

In 1916 Olivier and his Society were formally accepted as reputable contributors in meteor matters and worthy of recognition by the AAS. Olivier announced, in *Popular Astronomy*, that "the American Astronomical Society, recognizing the value of the American Meteor Society's work, appointed (Olivier) Secretary of its Meteor Committee. This was done to show its appreciation and...its official sanction..."⁴² The shift to a still more influential AAS role came when Acting Secretary Joel Stebbins informed Olivier that he had been appointed Chairman of the Meteor Committee by President Edward Pickering, in a letter dated November 6, 1917. Olivier's American Meteor Society was now an accepted institution of American astronomy.⁴³

Chairman Olivier's Program

In 1919, two years after being named Chairman of the Meteor Committee, Dr. Olivier, delivered the Committee's report to the AAS' 23rd meeting at Ann Arbor, Michigan. His report was a clear and frank assessment of then-current meteoric astronomy and what the AAS and practitioners of meteor science would need to do in the future to achieve more precise results. He began the report with a statement about what had been achieved.

Practical work in meteoric astronomy may be divided roughly into two parts, first those problems that can be satisfactorily solved by methods now in use which do not require instrumental help, second those which require photography, used in connection with

⁴⁰Philip Fox to CPO, dated November 11, 1913, APS correspondence file; and AASA, Report of the 16th Meeting, *Popular Astronomy*, volume 22, 1914, p. 129.

⁴¹126 Parabolic Orbits of Meteor Streams (126 PO), *Publications of the Leander McCormick Observatory*, volume 2, 1914; Charlottesville, VA: University of Virginia.

⁴²Olivier, C., The American Meteor Society in 1916; *Popular Astronomy*, volume 25, 1917, p. 166; and AAS Meetings, to December 1920, 19th Meeting, Brant Sponberg, Edited and expanded by Paul Routly. <http://had.aas.org/aashistory/7meetings.html>. To access this reference, click on "19" for Meeting 19, after you have obtained the Web site. Then, read the description of events at the meeting. Accessed September 19, 2012.

⁴³Joel Stebbins to CPO, APS' C.P. Olivier Correspondence file, Philadelphia, PA. Olivier also reported his promotion in Report of the American Meteor Society, *PA*, volume 26, 1918, pp. 191–192.

specially devised instruments. Many problems of the first kind have of late years been fairly well taken care of by the American Meteor Society. At least definite progress has been made toward their solutions in some cases.

Then, he made an unambiguous declaration about the need for photographic means to improve the field's knowledge of meteoric parameters, such as meteor orbits and velocities.

Problems of the second kind can only be satisfactorily attempted by men trained in astronomy. It has been proved quite definitely that no human skill is great enough to settle some of the problems, using mere eye estimations of path and mental estimates of time. It cannot be urged too strongly that until instrumental means are employed for both these data, accurate orbits, heights of appearance and disappearance (and) real velocities...will never be obtained, except with rough approximation...Such being the case, it is well to frankly admit we have little accurate knowledge about meteor orbits.⁴⁴

At this point in the report, Olivier reminded the AAS about the meteorograph that Cleveland Abbe had mentioned in his 1915 report to the Society.

Hence the need of better means of observing. The only instrument devised to date, so far as your committee knows, which would probably be satisfactory, is that invented by the late Prof. Cleveland Abbe. It is recommended that competent persons examine the drawings for the instrument, and if they prove acceptable, that two be made and placed at some regular observatory, in the hands of persons who will actually use them and report results. It will be necessary to secure the funds for their construction, but this difficulty could probably be overcome.⁴⁵

Despite Olivier's proposal, no meteorograph was ever built and deployed. Before World War 2, funding for scientific equipment was not easy to obtain, oftentimes only available through a professor's university and even then a request may not have been granted because the institution's endowment or donor sources were insufficient. Sometimes funds could be obtained from the National Academy of Sciences' funds, like the J. Lawrence Smith fund for astronomers, but the grant-seeker faced competition from colleagues and when a competitor was high ranking in the profession, prospects were dim indeed.⁴⁶ Presumably the meteorograph was doomed by scenarios of this kind.

⁴⁴Olivier, C., Report of the Committee on Meteors, *Popular Astronomy*, volume 28, 1920, pp.13–14.

⁴⁵*Ibid.*, p. 14.

⁴⁶A passage in *Popular Astronomy* reveals how Frank Schlesinger was able to obtain development money for a research device and for his research at Yale Observatory. Very likely, his prominence in the AAS and the National Academy of Sciences aided his requests for funds. "...we are constructing in our shops at New Haven a third measuring engine suitable for these (photographic parallax) plates, which we expect to be ready for use by January, 1931. This engine is being constructed with the help of a grant from the National Research Council, and the plates at New Haven are being measured with the help of grants from the American Association for the Advancement of Science, and from the Watson Fund of the National Academy of Sciences." (Schlesinger, F., Reports of Observatories 1929–1930; Yale University Observatory, *Popular Astronomy*, volume 39, 1931, p. 272.)

Dr. Olivier's 1919 Report to the AAS included two appeals to the professional astronomy community for assistance in recruiting more visual observers for the AMS. He asked AAS members in contact with amateurs to "call the attention of amateurs to the desirability of helping out...by joining the AMS." He also asked astronomy instructors whose courses included laboratory exercises to assign visual watches of meteor showers to students and to retain the records made during them. His second appeal was to "persons engaged in comet seeking and variable star work" who used low-power telescopes to record the magnitude and directions of meteors observed and report them to him at AMS headquarters.

Setting the Agenda for Future Meteor Research

In 1921, Professor Olivier listed the problems that meteoric astronomy needed to solve. These not only shaped the AMS' program but also the research agendas of future North American university programs for the next 50 years,⁴⁷

1. To determine accurate velocities of meteors,
2. To determine accurate radiant points,
3. The connection of given streams with known comets,
4. To determine accurate heights of appearance and disappearance in the earth's atmosphere,
5. To study meteor trains, especially to secure accurate velocities and directions of their drifts,
6. To secure spectroscopic information about meteors,
7. To secure telescopic data on the physical appearance of meteors,
8. To study the distribution of all meteors according to the month, day, and hour,
9. To secure data as to apparent velocity, magnitude, color, etc., and
10. To study the connection between meteors, fireballs, and meteorites.⁴⁸

Solving Problem 2 was central to resolving the debate about the existence of stationary radiants and was of primary interest to Dr. Olivier for the following ten years. He would ask AMS members to plot the paths of shower meteors in an effort to demonstrate radiants' movement. During the same decade, Olivier would ask Weather Bureau and Hydrographic Office personnel, as well as AMS members, to provide data relevant to Problems 4 and 5. In pursuit of Problem 7, Olivier would ask the American Association of Variable Star Observers (AAVSO) members to devote some of their energies to providing meteor magnitude data while they monitored stars with their telescopes.

⁴⁷Olivier sent a copy of the ten-point list to AAS President Frank Schlesinger in a letter dated August 18, 1920. So, Olivier's priority list for meteor research was in his hands before calendar year 1921.

⁴⁸Olivier, C., 349 Parabolic Orbits of Meteor Streams (and Report of AMS for 1914–1918), *Publications of Leander McCormick Observatory*, volume 2, 1921, pp. 224–225.

Index, Wash. Aug 28th 1913

Mr Chas. F. Olivier
Dear Sir—

Received your letter yesterday
Was very glad to hear how you succeeded with
the Perseids. Thanks for suggestions on maps for
plotting. I am anxious to get maps fit for the work
so far I have not seen what I wanted and so have
been dissatisfied with my plotting. Shall try to
secure Upton. Am sending you results of obs. met.

Map and plottings are as correct as possible
under circumstances.

Where can I get Upton's Star Atlas
Weather poor tonight cloudy. Written in haste.

Yours Truly
Nels Bruseth

Fig. 8 The above two excerpts are from a letter mailed to Dr. Olivier by Nels Bruseth dated August 28, 1913. *Top excerpt* Mr. Bruseth's comments about using a star map not specifically designed for meteor plotting reveal the frustrations with which observers contended. *Bottom excerpt* Winslow Upton's *Star Atlas* (1896) was a gnomonic map but as Bruseth's letter reveals was not easily available to observers (Bruseth's letter was found in an AMS Archives letter storage box, labeled '1910-1920'). Source for both: Courtesy of the American Meteor Society Ltd. Archives

Data collection for Problem 9 was accomplished when members completed a detailed data sheet in which an observer supplied magnitude, velocity, and color data for each observed meteor. AMS members also furnished the data for Problem 8 which Olivier used to compile hourly meteor rate tables. The tables were published in the 1960s and 1970s after decades of data collection.

Problems 1, 3, 6, and 10 needed professional astronomers' attention and required decades of work to attain results that professionals could accept as reliable. However, making an association between a comet and a meteor stream was sometimes achieved by naked eye observation alone, as happened in 1916 when two Wisconsin amateurs' meteor plots helped Dr. Olivier make the connection between a meteor shower and Comet 7P/Pons-Winnecke⁴⁹ (Figs. 8, 9).

⁴⁹Olivier, C., *The American Meteor Society in 1916*, PA, volume 25, p. 165.

THE AMERICAN METEOR SOCIETY

BULLETIN NO. 3

For the information of new members, who are just starting in the work, the following rules and suggestions are given:

- (1) Choose a place of observation with as free a horizon as possible, far from arc or other bright lights, away from city smoke and free from fog.
- (2) Use a lantern which is unaffected by wind, while a table and chair generally save time and promote comfort.
- (3) Provide a star-atlas, the recording maps, the recording blanks, a long rod or ruler, a watch, several sharp pencils, weights to hold down papers if windy.
- (4) Observe only on clear nights—that is when stars of the 5th magn. at least are visible. Haze and moonlight, cutting out all faint meteors, make observing inadvisable.
- (5) Except on rare occasions, observations of less than 1 hour are not recommended. Two to four hour periods are best. They should be continuous.
- (6) Use record blanks furnished, following instructions given on specimen copy.
- (7) The maps are furnished also. The meteor's path is shown in length

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and direction by an arrow as  with the proper number.

(8) As to tracing the meteor's path upon the map correctly, experience only will show how each separate case must be handled. However, the following plan is suggested.

The whole problem is merely to determine accurately the end points of the path. Joining these points gives the correct trace on the map. Hence if a meteor begins and ends exactly at two stars, the trace gives no trouble. This is not usually the case. But either end may often fall half way, or some other easy fraction of the distance, between two stars. Then one can measure off this proportion on the map and plot as before. But a better way is this, especially for those who have to use maps traced from an atlas whose projection is bad for the region needed. It is never difficult to find some *one* point in the meteor's path. Then glancing backwards along the rod held parallel to the path in the sky one readily picks up some star at a distance from which the meteor seemed to come. These two points determine its direction. Using the first star as reference point, one can estimate how many degrees of the path lay behind and how many before said star, and so an excellent plot is obtained. This method used with care largely or entirely eliminates the projection errors from the radiant deduced, if the meteor begins within from 20° to 40° of it. This method is recommended for observers unable to obtain specially prepared meteor maps, on the central projection. We are now able, however, to furnish such maps to our members.

For experienced observers or members who have sent in several reports, maps will be furnished on request.

Members are strongly urged to read the chapters on meteors in such standard texts as Young, Moulton, Todd and others. The articles on meteors in the *Encyclopædia Britannica* will be found excellent.

Many helpful articles often appear in *Popular Astronomy* and some of the foreign astronomical journals.

In closing it may be well to recall to the members the conditions of membership, which are only two:

- (1) That each member shall observe meteors when he reasonably can.
- (2) That the original records, both maps and blanks, are to be sent in on the first of each month, oftener if large numbers of meteors have been secured. The observer may keep copies of his work, and if he so desires, the originals will eventually be returned in exchange for the copies.

In order to avoid delay in handling mail at the Observatory here, members are requested to put in the upper left hand corner of each envelope their names, followed by A. M. S. All communications should be addressed as given below.

CHARLES P. OLIVIER,
Leander McCormick Observatory.

Fig. 9 AAS ADDENDUM 1: American Meteor Society Bulletin 3 Courtesy of the American Meteor Society Ltd. Archives

R.K. Young's Gnomonic Star Maps

Before 1915, meteor watchers plotted observed meteors on star maps copied from available star atlases. Unfortunately, not all atlases used a map projection appropriate for this purpose. Excerpts (above) from Nels Bruseth's letter to Dr. Olivier, dated August 28, 1913, exemplifies the frustrations such star maps created for AMS observers. In an attempt to help observers compensate for inappropriate maps, Dr. Olivier wrote a detailed set of instructions to be followed by giving explicit directions about meteor path plotting. (See AAS ADDENDUM 1: AMS Bulletin 3, especially item 8.)⁵⁰

But, in 1915, Dr. Reynold Kenneth Young (1886–1977), a Canadian member of the AAS, developed star maps using the gnomonic or central projection.⁵¹ Maps of this type allow drawing a straight line so that it accurately represents the actual path the meteor took on the sky. Drawing a meteor's path on any other map projection introduces errors that lead to the erroneous deduction of the meteor radiant. Even using the appropriate star maps, Young urged Olivier to alert AMS members about a plotting error that could be made if an observed meteor's path crossed the boundaries of adjacent maps. In such a case, care was needed when the meteor's path was extended backward toward its radiant on the adjoining map.⁵²

Dr. Young's first set of 13 maps depicting the northern sky were published in the January 1915 issue of *Journal of the Royal Astronomical Society of Canada* (*JRASC*). A second article containing 20 maps was published later in 1915, and the additional seven maps extended coverage to the southern sky.⁵³

Maps and Publicity

By May 1915, Dr. Olivier had used a portion of a grant from the J. Lawrence Smith Fund of the National Academy of Sciences to purchase sets of the 13 northern sky maps. (See AAS ADDENDUM 2 for a comparison of Young and the AMS' charts.) Olivier published an article in *Popular Astronomy*, on May 4, 1915, in which he described the value of meteor observing and promised each amateur contributing data full credit for work sent to him at Leander McCormick Observatory. Olivier furnished instructions about how to record meteor data in the article. Further, he

⁵⁰Olivier, C., 349 Parabolic Orbits of Meteor Streams (and Report of AMS for 1914–1918), *Publications of Leander McCormick Observatory*, volume 2, 1921, p. 209.

⁵¹Olivier and Young met while they were graduate student Fellows at Lick Observatory in 1910. Lick Bulletins authored by Olivier and Young bear dates from January to October, 1910 and show that the men were in residence at Lick during the same year. *Lick Observatory Bulletins*, volumes 5 and 6, Berkeley California: The University Press, 1910; pp. 182 and 185 of volume 5 and pp. 66, 73, 75 and 76 of volume 6.

⁵²Letter to CPO from Reynold K. Young in AMS Archives.

⁵³A Gnomonic Star Atlas, *JRASC*, volume 9, 1915, pp. 7–10 plus 13 maps; and A Meteor Star Atlas, *Publications of Dominion Observatory*, volume 2, 1915, pp. 159–164 plus 20 maps.

promised to send meteor data record blanks to interested amateurs at no cost and to provide a set of Young's maps for ten cents. Olivier promised free maps to AMS members who "have sent in a fair number of observations..."⁵⁴

Two months after Olivier's article in *PA*, the McCormick Observatory's Director Samuel A. Mitchell wrote a similar article for the July 1915 issue of *Scientific American*. Mitchell's article, directed to a readership of generalist science hobbyists, probably also resulted in inquiries from people who were not *PA* subscribers.⁵⁵

Amateurs' responses to Olivier and Mitchell's articles were rapid and intense. By September 1915, "not less than 100 people (wrote) asking for maps, information, etc., most of them signifying their intention of observing in accordance with (AMS directions)," Olivier reported in an issue of *PA*. In the same article, he listed 21 people who had in fact submitted meteor observational results.⁵⁶ When he reported the society's progress during 1916, Olivier listed the names of 42 data-providing AMS members. The observers' list included three women foreshadowing future participation by a number of women citizen scientists.⁵⁷ Olivier's efforts had paid off; the AMS no longer was a small cadre of amateur meteor devotees and it had emerged as an entity independent of the Society for Practical Astronomy whose members it had shared.

Dr. Olivier was quick to send record forms and Young's star maps to the southern hemisphere. A letter from Bernhard Hildebrandt Dawson (1890–1960), a double and variable star astronomer at La Plata, Argentina, thanked Olivier for sending him a supply of the AMS materials during the summer of 1915.⁵⁸ Dawson was an early AMS contributor, having sent data he secured on August 1, 1913, when he recorded 46 meteors during a 2-h-and-25-min watch from Argentina.⁵⁹ Dawson also sent meteor data in February and March 1914 and a last time in July 1916.⁶⁰ Olivier was especially grateful for data from the southern hemisphere where he always had few contributors.

Olivier had obtained 2000 sets of the gnomonic maps for distribution. Edwin Brant Frost (1866–1935), who had hosted Olivier at Yerkes Observatory in 1913, learned of this supply and asked Olivier to send ten sets of star maps so that he would have them on hand for students and summer observers at the observatory in 1917.⁶¹ Olivier also received a request for the maps from Ernst Julius Opik (1893–1985) in 1923, when Opik was at the Astronomical Observatory at Tartu, Estonia. Opik became a prominent meteor researcher in the 1930–1950s time period.

⁵⁴Olivier, C., *Meteoric Astronomy, Popular Astronomy, volume 23*, 1915, pp. 356–360.

⁵⁵Mitchell, S., *Systematic Observation of Meteors, Scientific American, volume 113*, July 10, 1915, p. 48.

⁵⁶Olivier, C., *Results of Meteor Observations for July and August, 1915, PA, volume 23*, pp. 567–568.

⁵⁷Olivier, C., *The American Meteor Society in 1916, PA, volume 25*, 1917, pp. 163–166.

⁵⁸Bernhard H. Dawson to CPO, May 5, 1916, APS Correspondence file of CPO.

⁵⁹Olivier, C., *Report of the American Meteor Society, Popular Astronomy, volume 22*, 1914, p. 91.

⁶⁰Olivier, C., 1921, *op.cit.*, pp. 226–232.

⁶¹EB Frost to Charles P. Olivier, letter dated November 2, 1917, APS correspondence file of CPO.

Rewards from Enlisting the Assistance of AAS Members

Dr. Olivier’s campaign of publicizing the AMS’s role and offering low cost or free observational materials, as well as urging colleagues to press students and amateurs into the AMS ranks, paid him dividends in meteor data. From 1914 to the end of 1918, AMS members had contributed 22,008 observations⁶² (Table 1):

The tabulated data above, contributed by a total of 66 AMS members, were summarized and discussed in Olivier’s 70-page monograph entitled 349 Parabolic Orbits, which was subtitled, Report of the AMS for 1914–1918. This memoir was also a compilation of several publications that Olivier had published in *Popular Astronomy* and elsewhere during the report period. Its results included another criticism of the stationary radiant claim and the data reduction techniques that Olivier believed led to it. As he had done in his dissertation, Olivier insisted upon the one-night procedure for finding radiants, but he liberalized his radiant criteria by accepting radiants obtained under limited circumstances on three consecutive nights.⁶³

Academic Colleagues Contributed

Not only did AMS members contribute meteor records, but so did AAS members, either their own observations or by relaying data from students or members of the public. Dr. Olivier welcomed any source of meteoric data and seemed intent on capturing all possible sources for his database.

Contributions from two influential AAS members exemplify this point. Frank Schlesinger, the AAS President who succeeded Pickering, relayed a June 1930 fireball report that he received from an astronomy graduate student at Yale, where Schlesinger was Department Chairman. The student, who was in New Haven, Connecticut, saw a blue-green fireball that remained stationary for 20 s before disappearing. Olivier wrote to Schlesinger that he was delighted to receive a second

Table 1 Meteor observations submitted by AMS members (1914–1918)

1914	540 meteors
1915	5003
1916	10,184
1917	4231
1918	2050
Total	22,008

⁶²Olivier, C, Annual Report of the American Meteor Society for 1918, *Popular Astronomy*, volume 28, 1920, pp. 15–16.

⁶³Olivier, C, 1921, op. cit., pp. 205–209.

report of the same fireball, seen from Leonia, New Jersey. Both the Connecticut and New Jersey observers gave sky coordinates for the fireball, thus permitting Olivier to calculate its endpoint over Leonia and its height in the atmosphere.⁶⁴

A second example was in 1922, from famed astrophysicist Henry Norris Russell (1877–1957), of Hertzsprung–Russell diagram fame. The fact that America’s then-leading astrophysicist would take the initiative to record a meteor display and report it to Olivier illustrates how effective Olivier had been in presenting meteors as a serious topic for his colleagues’ consideration.⁶⁵

Russell happened to witness a rare Lyrid shower rate outburst on April 21, 1922, and wrote Olivier immediately after seeing it. Russell was touring in Greece at the time and noticed the display while out for an evening walk. He watched closely for two short periods between 9:00 and 10:00 p.m. local time. From 9:20 to 9:40 he and his wife counted 35 meteors. From 9:55 to 10:10, he counted 28 meteors of which 26 belonged to a radiant he noted was “some eight degrees southwest of Vega.” He recalled seeing one first magnitude meteor, several of the second magnitude, and the remainder brighter than the fourth magnitude. He added “the brighter ones left distinct trails, lasting for half a second to a second.” Although Russell did not plot the meteors on a star map, he estimated that the radiant was approximately five degrees in diameter.⁶⁶

Russell’s report was seconded by two observers at Drake Observatory in Des Moines, Iowa, who reported two nights of enhanced Lyrid activity on April 21 and 22, 1922. Dr. Olivier took note of both reports in his AMS annual report for 1922. In 1935, Olivier expanded on the two observations, commenting that the display on the 21st was “...the best display of Lyrids recorded since...April 23, 1803. Further, Olivier explained that the declining rates seen by Russell on the 21st and the steadily decreasing rates the Iowans saw on April 21 and 22 indicated that the “...the maximum was over early in the night (for Europe) of April 21 (1922).”⁶⁷

⁶⁴Frank Schlesinger (FS) to Charles P. Olivier (CPO), letter of June 25, 1931; CPO to FS, dated November 9, 1931, APS correspondence File for Charles P. Olivier; Olivier, CP, Meteor Notes, PA, volume 39, 1931, p. 605.

⁶⁵Olivier wrote a thank you letter to Russell as evidenced by a letter from Russell on June 23, 1922. The letter was in the American Philosophical Society’s Olivier letter files. Apparently Olivier attempted to lure Russell into an investigation of stationary radiants. Russell responded, “As to the question of stationary radiants, I may look into the matter someday, but I have really too much on hand at present to justify excursions into new fields. (However) I am decidedly of the opinion that further observational evidence is necessary before we can be sure of their reality. You have done admirable work in pointing out the unsoundness of Denning’s methods.”

⁶⁶H.N. Russell to CPO, letter dated April 21, 1922, APS file of CPO’s correspondence.

⁶⁷Olivier, Report of the AMS for 1922, PA, volume 30, p. 174; Report of the AMS for 1919–1925, *Publications of the L. McCormick Observatory*, volume 5, 1929 and 1935, pp. 17 and 25.

Summary

By 1930, Dr. Olivier had earned a place of respect in the American Astronomical Society, because of his service to the organization, his advocacy for meteoric research and because of his effective leadership of the AMS.⁶⁸ He and the AMS had become important to the AAS, and he had engaged the membership's attention about meteors as a legitimate subject for research (Figs. 9, 10).

American Association of Variable Star Observers

A Brief History of Variable Star Observers and the AMS to about 1940

Introduction—AAVSO's Origin

Just as Frederick Charles Leonard's Society for Practical Astronomy (SPA) had a meteor observer's section, the SPA had a Variable Star Section (VSS) for which Leonard invited William Tyler Olcott (1873–1936) to be director in 1911.

While directing the VSS, Olcott simultaneously founded his own organization, the American Association of Variable Star Observers (AAVSO) on October 10, 1911. Olcott remained with the SPA until 1913 when he left to concentrate his efforts on the AAVSO. When he resigned, many of the VSS observers abandoned the SPA with him, perhaps because of a perception that the AAVSO was associated with professional astronomers, like Edward Pickering at Harvard College Observatory.⁶⁹

Simultaneous Memberships

The AAVSO had, even in 1912, many energetic and productive amateur astronomers who contributed a great number of magnitude estimates of variable stars. But amateurs seldom have an undivided passion for a single subject of astronomical

⁶⁸Dr. Olivier was also an expert in double star and long-period variable star research and published scientific papers in both topics. He was a member of the International Astronomical Union's Double Star Commission.

⁶⁹Williams, Thomas R. and Michael Saladyga, *Advancing Variable Star Astronomy (AVSA)*, 2011, New York: Cambridge University Press; pp. 23 and 27. The author wishes to acknowledge Drs. Thomas R. Williams, past President of the AAVSO and Michael Saladyga AAVSO's archivist, for providing invaluable historical information about the AAVSO during the preparation of this chapter.

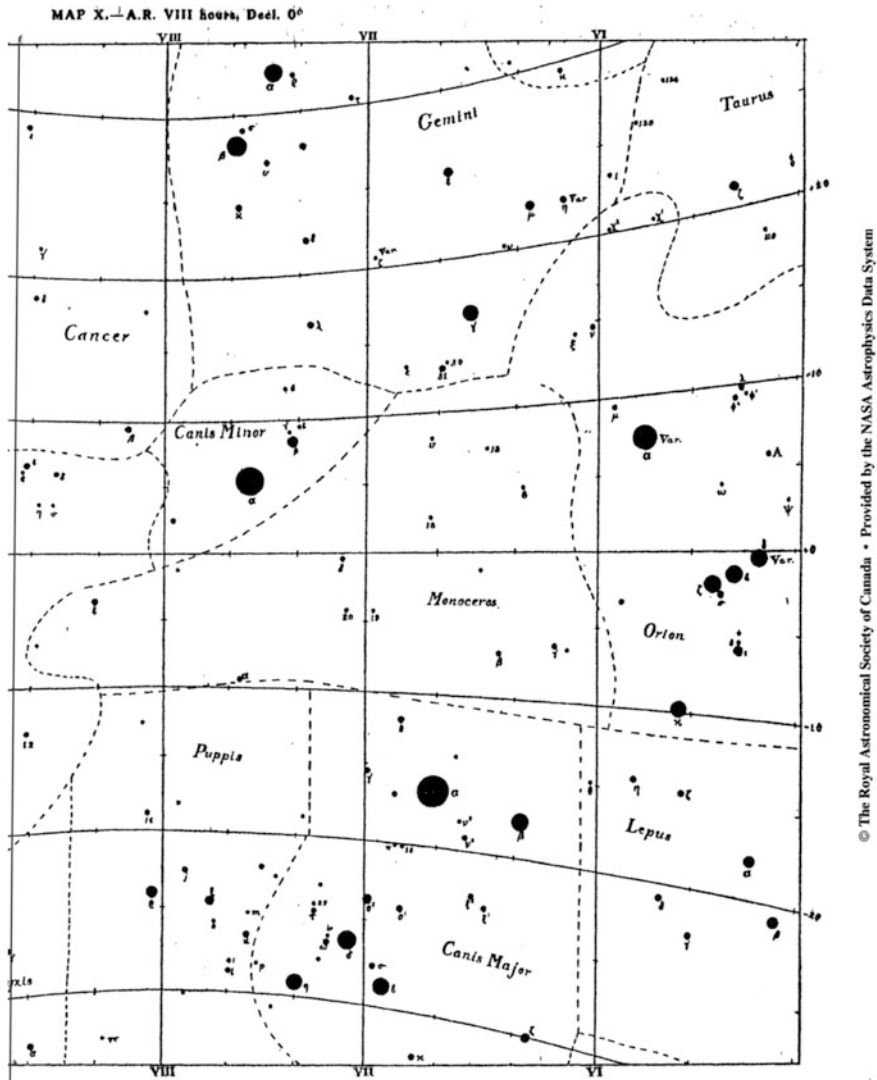


Fig. 10 a AAS ADDENDUM 2: comparison of young's and ams charts. R.K. Young's Map 10, as published in the *Journal of the Royal Astronomical Society of Canada*. Compare this map detail with the version adapted for use by the AMS on the next page. This map image is courtesy of the *Journal of the Royal Astronomical Society of Canada*. **b** AAS ADDENDUM: comparison of young's and ams charts. This AMS version of Map 10 has been slightly modified to allow AMS members to make observational notes on the right margin. Source Courtesy of the American Meteor Society Ltd. Archives

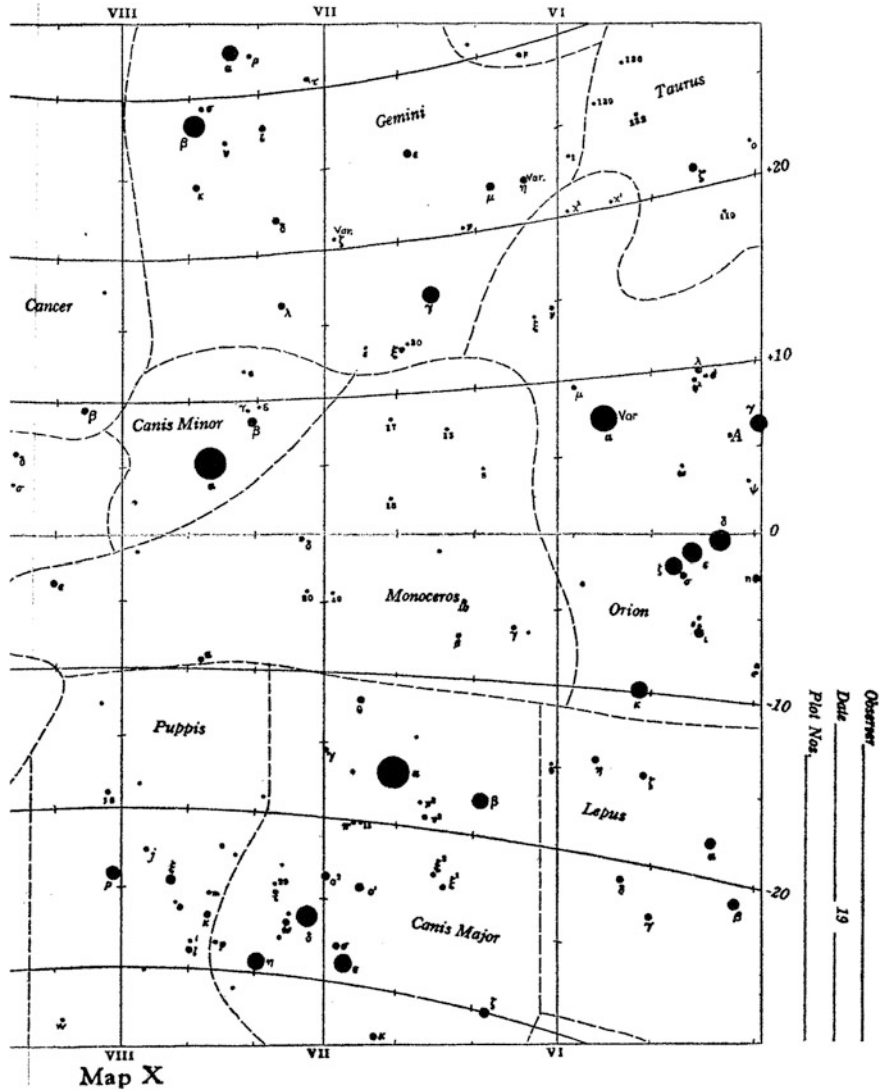


Fig. 10 (continued)

observation and they often join several different contemporaneous organizations. This was true of the amateurs in the years after 1911 and several were members of both the AAVSO and the AMS. An interesting example was none other than Frederick Leonard.

Frederick Leonard did not appear to harbor any animosity toward Olcott and became an AAVSO member in 1914. Leonard contributed magnitude estimates to it in 1914 and 1916, even while he led the SPA's VS Section, which Olcott had

deserted in 1913.⁷⁰ Leonard also allied himself with Dr. Olivier's meteor organization and was listed as an AMS member in 1915, while Olivier was still head of SPA's Meteor Section. Leonard contributed meteor plots on August 6 and 9, 1915, while visiting Olivier at the McCormick Observatory in Virginia.⁷¹

Three more examples of amateurs with multiple memberships are worth mentioning. The first two were Alan P.C. Craig and Nels Bruseth; both of whom were in the first cohort of SPA Meteor Section and AMS observers. Craig reported meteors to Olivier in 1912 and 1913. At the same time, he belonged to the SPA/VS and AAVSO, under Olcott's leadership from 1912 to 1914. Craig contributed 1700 variable star magnitude estimates to Olcott. Bruseth plotted meteors for the SPA and AMS from 1913 to 1915, and he reported 374 magnitude estimates to Olcott's AAVSO during 1913 and 1914. The third amateur with simultaneous memberships was Howard O. Eaton, an early member of the AAVSO who continued in its membership for many years. He contributed meteor plots to the AMS briefly in August 1915. Craig, Bruseth, and Eaton were, respectively, the AMS and AAVSO's first, second, and third "dual members," that is, amateurs who not only were members of both organizations, but who contributed data to each during the same year.⁷²

Trial affiliations with one or more meteor and variable star societies were rife in 1911–1915 as observers tried out contemporaneous organizations for the most satisfying "fit" of their interests with the amateur organizations' programs.

Olivier's Invitation to AAVSO Members

Perhaps noting amateurs' tendency to "roam," Dr. Olivier participated in at least one SPA convention in order to raise his and the AMS' visibility among the SPA's amateur astronomers. He presented a talk to the second SPA convention in August 1915 to support its mission and perhaps in the hope that he could attract more of the SPA's data-producing amateurs to the AMS.⁷³

⁷⁰Williams and Saladyga, *AVSA*, p. 23 and AAVSO annual reports for years ending 1915 and 1916; *PA*, vol. 23, p. 616; and vol. 24, p. 601.

⁷¹Olivier, 349PO/Report of the American MS for 1914–1918; *Publications of Leander McCormick Observatory*, vol. 2, 1921, pp. 203 and 226.

⁷²'Dual member' is the author's concept and neither the AMS nor the AAVSO used this term or made efforts to identify such members. For simplicity, the author is omitting reference to the SPA in this definition, even though that organization existed during the years Craig, Bruseth and Eaton belonged to the AMS and AAVSO. Sources for Craig and Bruseth were: Olivier, 126 Parabolic Orbits; and Olcott; Annual Reports of the AAVSO for 1912, 1913 and 1914, *PA*, vols. 20–23. Sources for Eaton: Ann'l Rep of the AAVSO for the year ending 1916; *PA*, vol. 23, p. 616; and Olivier, 349 Parabolic Orbits/ AMS during 1914–1918, *Publications of the L McCormick Obsy*, vol. 2, Charlottesville VA: UVA; 1921; pp. 203 and 226–227.

⁷³Williams and Saladyga, *AVSA*, p. 22.

Dr. Olivier made an appeal to AAVSO members too. By December 1917, he had been named Chairman of the AAS' Meteor Committee and as Director of the AMS, Olivier was in a prestigious position to appeal to the AAVSO for assistance. He asked the AAVSO's members to assist him in an investigation of the faint meteors they happened to see while making magnitude estimates of variable stars. In June 1920, Olivier contacted the AAVSO's Council, its policy making and officer-selecting body. George Waldo, Jr., reported Olivier's contact in a report about the Ninth Annual Meeting in November 1920. Mr. Waldo reported to AAVSO members, "The Secretary read a communication from Professor C.P. Olivier of the U. of VA, Charlottesville, VA, asking for the cooperation of the AAVSO in observing telescopic meteors. The communication pointed out that the very nature of the work of observing variables made it possible to render real service with no additional effort in this respect, the members being able to locate with great precision the position of any meteor that swept across the field of their instrument and also to estimate its magnitude with a fair degree of exactness. It was recommended by the Council that the members undertake to report any observations thus made, and a vote to that effect was passed unanimously."⁷⁴

AAVSO Members Responded

Several AAVSO members responded promptly and enthusiastically to their Council's recommendation. Nine variable star observers (VSOs) reported 46 telescopic meteors from late 1920 through 1921.⁷⁵

True to his promise, Olivier thanked the VSOs and the AAVSO; "it is (because of) the kind cooperation of (the AAVSO) that we are able to report so many telescopic meteors for 1921." He added, "In addition to the magnitudes, which were the data most desired, in many cases observers sent in careful notes of the paths, velocity and appearance of these telescopic meteors."⁷⁶

Many of 1921s telescopic observers contributed data for several years. Reverend Tilton Bouton (1856–1948) reported a total of 68 telescopic meteors from 1920 to 1932. Leslie C. Peltier (1900–1980) contributed from 1921 until 1933 for an

⁷⁴George Waldo, Jr; the Ninth Annual Meeting of the AAVSO, *PA*, vol. 28, 1920, pp. 623–624. And Dr. Michael Saladyga, AAVSO archivist, in an email to the author, dated 3/19/2012, reported that AAVSO headquarters had received a "... *plea for meteor observations to be sent to AAVSO observers.*" as early as June 1920. The 'plea' may have taken the form of AMS Bulletin 1 which Olivier addressed to the organization's members. Saladyga is coauthor of the definitive centennial history of the AAVSO, *Advancing Variable Star Astronomy*, Cambridge U Press, 2011.

⁷⁵The nine were T.C.W. Bouton; Chandra, R.G.; McAteer, C.Y.; Olcott, W.T.; Peltier, L.C.; Peters, J.L.; Suter, R.O., Jr; Vrooman, H.W.; and Watson, P.S. Professional astronomers belonging to the AAVSO contributed another 34 meteors: Alden, H.L.; Campbell, L.; and Young, Miss A.S. UVA astronomers Mitchell, S.A. and Olivier contributed another 8 meteors, for a grand total of 88.

⁷⁶Olivier, Report of the American Meteor Society for 1920 and 1921, *Popular Astronomy*, volume 30, 1922, pp. 153–155.

aggregate of 517 telescopic meteors. An Indian AAVSO member, Radha Gobinda Chandra (1878–1975), reported 101 during an observational career of 1921–1938.⁷⁷

Dr. Olivier carefully collected the AAVSO's telescopic contributions and published a summary, perhaps the first of its kind, in his 1929 monograph of AMS members' data. He summarized magnitude data from 796 meteors, submitted by 18 amateurs from the AAVSO and five professionals between 1919 and 1925. Leslie Peltier and Leander McCormick Observatory astronomers each contributed three-eighths of the meteor magnitudes in the study. Olivier's analysis of meteors ranging from the eighth to the 13th magnitudes led Olivier to believe that "... there are nearly equal numbers of telescopic meteors of each magnitude, beginning at about 8 magnitude, and that there is no decided increase such as we find in the numbers of stars and ordinary (naked eye) meteors as we go to fainter magnitudes. This result was totally unexpected, yet being based upon 796 meteors certainly deserves serious consideration..." Drawing upon his own experience, Olivier opined, "the writer has never been able wholly to convince himself that telescopic meteors...are a class just as near as naked eye meteors. Is it possible that some such telescopic meteors are really comparable in mass with ordinary meteors, but many times as distant (and therefore dimmed to fainter magnitudes)?" In response to his own rhetorical question, he tentatively concluded, "If so, it would extend our atmosphere to heights not now believed..." This was an astonishing realization in an era, circa 1935, when the upper boundary of earth's atmosphere was unknown.⁷⁸

Some AAVSO Members Join the AMS

The monthly appearance of Meteor Notes in *Popular Astronomy (PA)*, beginning December 1926, and Dr. Olivier's repeated entreaties to the AAVSO for telescopic meteor observations, persuaded several VSOs to join the AMS' naked eye meteor watches. The approaching Leonid meteor storm predicted to occur in the early 1930s no doubt also influenced the VSOs to participate in a scientific analysis of Leonid results as members of the AMS.

For one or both of these reasons, dual membership in the AAVSO and AMS increased after 1926. The author's study of both organizations' memberships from 1919 to 1935 revealed intermittent dual membership from 1919 to 1926. However, dual membership became stably established, occurring in each succeeding year, from 1927 to 1935. The mean number of dual members 1919–1926 was one, and from 1927 to 1935, the mean number was eight. Although dual membership numbers stabilized 1927–1935, it never surpassed 13 per year, and its percentage of the total AMS membership only averaged 21 % during the same years.

⁷⁷The data cited came from Olivier's Annual Reports of the AMS for the years 1920–1947 in *PA*.

⁷⁸Olivier, Report of the AMS for 1919–1925, *Publications of Leander McCormick Observatory*, volume 5, pp. 45–49. This monograph was first published in 1929 but the online version on the SAO-ADS Web site was a later edition published in 1935.

Fig. 11 J.L. Peters (1903–1988). Peters was a dual member of AMS and AAVSO. This image is from a group portrait of attendees at the 9th Annual Meeting of AAVSO on November 6, 1920. Seventeen-year-old Peters was first an AMS member and in 1920 made variable star magnitude estimates as a member of the AAVSO. Most dual members were under 30 years of age and many, like Peters, were less than 20 years old. *Source* The image is from *Popular Astronomy* courtesy of Carleton College Archives



The AAVSO Addendum at the end of this section about the AAVSO provides more statistical details and the sources of it (Fig. 11).

Even though the percentage was small, a few of the dual members had an important data-producing role which greatly aided Dr. Olivier during the 1930s Leonid epoch. VSOs like L.E. Armfield, and J. Wesley Simpson contributed telescopic meteor data and led groups of amateur meteor observers who contributed a great deal of naked eye data to the AMS. Sterling Bunch and Oscar E. Monnig's Texas observers contributed thousands of meteor records in the 1930s too. So the AAVSO members were a triple bonus for the AMS: in their own right, they provided telescopic and naked eye meteor data, but they were also leaders of groups of naked eye observers. And, at the time he joined the AMS as a 15 years old in 1928, no one could have guessed that dual member Clinton B. Ford would make a substantial financial bequest to the AMS after his death in 1992.

Dr. Olivier Returned the Favor

The AAVSO–AMS history was not simply a “one-way street,” with only the AMS benefitting. Dr. Olivier and some AMS members assisted the AAVSO, in what was a mutually beneficial relationship between the two organizations.

Olivier was elected by AAVSO members to become a member of its Council and he served in this role from 1935 to 1939.⁷⁹ While serving, in 1936, AAVSO

⁷⁹Olivier is listed as an AAVSO member who contributed VS estimates in 1931: Campbell, Leon, *Monthly Report of the AAVSO, PA, volume 39*, 1931, p. 347.

President and HCO Director Harlow Shapley consulted with Olivier about the appointment of two VSOs to the chairmanship of AAVSO programs: L.E. Armfield to a Nova Search program and L.H. Matthias as chair of a photographic program.⁸⁰

In addition, Dr. Olivier contributed to VS research during and after his directorship of Flower Observatory (1929–1954). Olivier and his staff pursued three programs related to variable stars. The Observatory’s 18-inch refractor was used for observations of faint long-period variable stars, to determine the light curves of eclipsing variable stars, and for the determination of positions and magnitudes of comparison stars in the variable stars’ fields. Comparison stars’ positional and magnitude data allowed the construction of variable star field charts, and in 1960, Olivier aided the AAVSO by permitting it to copy these charts. In 1961, he sent additional charts to the AAVSO for it to reproduce. The entire contribution of data provided the basis for the development of many new AAVSO star field charts, allowing hundreds of new variable stars to be added to the AAVSO observing program.⁸¹

AAVSO ADDENDUM—dual members 1919–1935			
Year	No. dual memberships	Total no. AMS members ^a	Percentage (dual/total)
1919	1	7	14
1920	3	13	23
1921	2	10	20
1922	1	7	14
1923	0	2	0
1924	0	5	0
1925	2	6	33
1926	0	13	0
1919–1926	Mean percentage of dual memberships = 13		
1919–1926	Mean no. dual memberships = 1.1		
1927	4	17	24
1928	5	23	22
1929	8	37	22
1930	7	36	19
1931	8	40	20
1932	8	50	16
1933	10	77	13
1934	13	48	27
1935	9	34	27
1927–1935	Mean percentage of dual memberships = 21.1		
1927–1935	Mean no. of dual memberships = 8.0		

^aThe author does not count professional astronomers who affiliated with the AMS in the ‘total number of AMS members.’ In a similar way, ‘dual members’ only are counted if they were amateur astronomers.

⁸⁰Councilorship: AVSA, p. 347; membership as prerequisite to Councilorship: email to RT from TRW, dated 3/18/2012; and consultation with CPO by HS: APS letter; HS to CPO, 1/27/1936.
⁸¹Williams and Saladyga, AVSA, p. 225 and Olivier, CP; Report on the Department of Astronomy and the two Astronomical Observatories during the directorship of Charles P. Olivier;’ typewritten document dated 1952 March 9, p. 4.

The Weather Bureau

Predecessor of the Weather Bureau

In the late 1840s, the Smithsonian Institution's first Secretary, Joseph Henry, conceived of, and fielded, a far-flung group of weather observers whose duty was to make daily telegraphic reports of weather conditions across the continental USA.⁸² Henry's goal was detect storm systems approaching from the Midwest that threatened the larger population centers of the eastern states. Some progress was made in organizing the effort before the Civil War, but it was suspended during hostilities. The project was revived in 1870 and Henry's organizational plan was given by Congress to the US War Department's Signal Corps to operationalize. Signal Corps enlisted personnel were trained in weather observation, dispersed to many Army garrisons around the nation, and ordered to make daily weather reports to headquarters near Washington, D.C.

Signal Corps Observers Reported Meteors

In late 1872, the War Department's Office of the Chief Signal Officer (CSO) began to publish the *Monthly Weather Review (MWR)* which contained weather summaries from across the continental USA. Beginning in 1874, weather observer reports about meteoric phenomena appeared monthly in the *Review*. Many of the reports were comprehensive but merely descriptive accounts of fireballs that lacked details that would have made them scientifically useful. However, the first scientific determination of a fireball's atmospheric path and altitude was published in the *Review* in 1886 by Johann Georg Hagen (1847–1930). Father Hagen was a Jesuit priest and astronomer at College of the Sacred Heart in Prairie du Chien, Wisconsin. He used seven observers' sightings as the basis of his analysis of a brighter-than-full-moon fireball seen on January 16, 1886.⁸³

⁸²Millikan, Frank Rives., Joseph Henry: Father of the Weather Service. Joseph Henry Papers Project. https://siarchives.si.edu/sites/default/files/pdfs/jhpp/JHP_Father_of_the_Weather_Service.pdf. Accessed February 22, 2016.

⁸³*Monthly Weather Review (MWR)*, volume 14, pp. 23 and 85–86. Hagen is best known as the author of a star atlas for variable star observations, *Atlas Stellarum Variabilium*, used in the late nineteenth and early twentieth century. A brief biography and extended discussion of his atlas is in Williams and Saladyga, *Advancing Variable Star Astronomy*, Cambridge, UK: Cambridge U Press; 2011, p. 16ff.

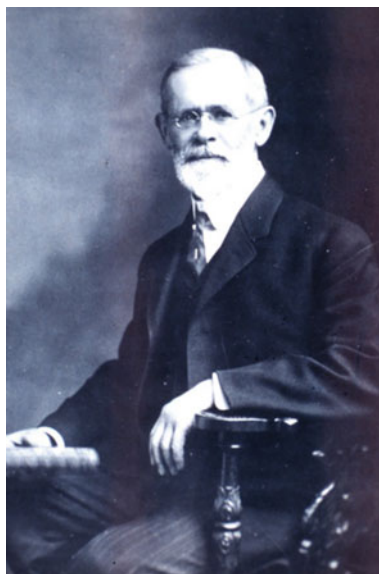
Scientific Advisor to Corps' Chief Signal Officer

The CSO recognized the need for scientific oversight of the Corps' storm monitoring duty and in 1871, hired Cleveland Abbe (1838–1916) as the Corps' scientific director. Abbe had trained as an astronomer, but devoted himself to meteorology when he became convinced that accurate astronomical observations could not be made until local atmospheric variations and their image distortions were understood. Abbe began this meteorological specialization when he was the Director of Cincinnati Observatory in 1869. He developed a method for synthesizing many locations' weather descriptions into coherent statements of "weather probabilities" or general predictions about imminent weather conditions in the eastern USA. His first two decades of work for the Signal Corps were a continuation of the work begun in Cincinnati⁸⁴ (Fig. 12).

Cleveland Abbe and Meteor Science at the Weather Bureau

In 1891, Abbe and the Corps' weather duties were transferred to the Department of Agriculture's new office, the Weather Bureau. A year later, Abbe was given

Fig. 12 Cleveland Abbe.
This portrait was made circa 1900. The image is courtesy of National Oceanic and Atmospheric Administration, Department of Commerce



⁸⁴Heidorn, Keith C. The Weather Doctor (Web site:) "Weather People and History, Cleveland Abbe: Ol' Probabilities of the U.S. Weather Bureau." <http://www.islandnet.com/~see/weather/history/cabbe.htm> copyright 2001. On the Weather Doctor site, locate and click on 'Weather People and History' link. Then on that page, click on "Cleveland Abbe" on left sidebar. Accessed February 22, 2015.

editorship of the *Review*. Increasingly, under his direction, the journal published more weather observers' summaries of meteor displays and descriptions of fireballs.⁸⁵ Abbe took a personal interest in gathering fireball data, using postcard correspondence with Weather Bureau personnel to seek precise data about fireballs' appearances and paths.⁸⁶ As time passed, Abbe delegated fireball studies to astronomers more familiar with the work.

In 1906, Henry Allen Peck (1863–1921), a Syracuse University mathematician and astronomer, agreed to assist Abbe by analyzing fireball reports, finding their ground paths and calculating their orbits.⁸⁷ Peck analyzed the paths of fireballs seen in 1873, 1906, and three seen in 1907 using data from weather observers and members of the public.⁸⁸ Peck's articles foreshadowed similar detailed analyses that Charles Olivier published beginning in the 1920s. Olivier used Abbe's postcard inquiry method to investigate fireballs' paths even though this approach attracted critics, which required his defense during the 1930s.

Monthly Weather Review as a Platform for Meteor Studies

As the *Review*'s editor, Abbe collected diverse meteorological topics from a myriad of observational and published sources. The *MWR* often contained abstracts or whole research articles by other meteorologists. Abbe reprinted articles describing meteor observation methods, and in his own articles, he specified the sorts of information that made meteor reports useful to an astronomer. He gave other scientists a platform to expound upon their work, especially the importance of meteor trains as the only available means to measure winds at extreme altitudes. William Harkness (1837–1903), Director of the US Naval Observatory gave readers "Hints to Observers of Shooting Stars." This 1899 article described how an observer should perform a meteor observation and today's observers would still find it useful.⁸⁹ In a March 1907 article, Abbe requested the Bureau's observers to report

⁸⁵Abbe's career path was found in *Who Was Who in America, volume 1*, fifth printing 1962, Chicago: A.N. Marquis Co; p. 1. Another biography is by Nathan Reingold in *Dictionary of Scientific Biography*, American Council of Learned Societies, New York: Scribners, 1970 edition; Volume 1, p. 6.

⁸⁶Many examples of Abbe's postcards are in the AMS Archives in a storage box labeled 'AMS 1898–1907.'

⁸⁷Abbe, Cleveland; Bright Meteors; *MWR, volume 35*, p. 120. A short biography of Henry Allen Peck is in *Who Was Who in America, volume 1, 1897–1942*, Chicago: A.N. Marquis Co, 1943, fifth printing 1962, p. 952. A special memorial edition of Syracuse University's *Syracuse Daily Orange* was published on November 18, 1921 praising Dr. Peck's character and contributions to the University. Several articles give some biographical information. The University Archives does not contain any of Peck's papers or correspondence.

⁸⁸Peck, H.A.; *MWR, volume 35*, 1908, pp. 121–123, 447–449, and 508–510; and *volume 36*, 1909, pp. 142–144.

⁸⁹Harkness, William, *MWR, vol. 27*, 1899, pp. 9–11.

meteor paths' precise locations among the stars or to note their beginning and end points with reference to buildings or landmarks so that the paths could be reconstructed.⁹⁰ And, an article about meteor trains appeared written by atmospheric physicist Charles Christopher Trowbridge (1870–1918)⁹¹ entitled “The Importance of Systematic Observation of Persistent Meteor Trains.” In this article, Trowbridge, who specialized in the study of meteor trains, described how an enduring meteor train was caused in the same manner as the emission of light following an electrical discharge through gas in a glass tube. In the article, Trowbridge advised observers of the train features that observers should report in order to further understanding the high-altitude atmospheric phenomenon.⁹² All of the preceding topics remained noteworthy for decades after they were written and Professor Olivier frequently impressed his American Meteor Society observers with their importance.

Abbe's Support for the AMS

Three years before the AAS gave Dr. Olivier a place in its Meteor Committee, Cleveland Abbe welcomed Olivier's Society as a useful contributor to meteor studies. In a 1913 issue of *MWR*, Abbe informed Weather Bureau personnel, “We are...pleased to know that Prof. Charles P. Olivier...has in fact organized the American Meteor Society...He desires to extend a hearty invitation to all who are interested in this subject, either because of its astronomical or its meteorological importance, and we hope that many will respond.”⁹³

In 1914, Abbe permitted Olivier to post a notice in *MWR* describing the goals of the American Meteor Society (AMS) and to invite Weather Bureau personnel to join it. Olivier was aware that some Bureau members had been watching meteors and used the opportunity to offer, “We would be very glad to secure any unpublished meteor records of any year whatever and to undertake their discussion and reduction.”⁹⁴ At least two Bureau observers, Robert M. Dole and Howard H. Martin, decided to accept Olivier's invitation and to donate data they had accumulated on their own initiative, to the AMS database.

Abbe published Olivier's manual, “Directions for Observing Meteors,” in 1915. These were the same standard observation instructions issued to AMS members and by publication in the *Review*, Abbe endorsed 31-year-old Olivier's program and his observational methodology⁹⁵

⁹⁰Abbe, Cleveland; Bright Meteors, *MWR*, volume 35, March 1907, p. 120.

⁹¹A brief biography of Trowbridge is in *Who Was Who in America, Volume 1, 1897–1942*, Chicago: A.N. Marquis Co, 1943, fifth printing 1962, p. 254.

⁹²Trowbridge, C.C., *MWR*, volume 37, January 1909, pp. 11–13.

⁹³Abbe, C., To Observers of Meteors: *MWR*, volume 41, January 1913, p. 162.

⁹⁴Olivier, CP, American Meteor Society, *MWR*, vol. 42, November 1914, p. 623.

⁹⁵Olivier, CP, Directions for Observing Meteors, *MWR*, vol. 43, June 1915, pp. 263–264.

After Abbe's death, Olivier praised him, writing that he was "always willing and glad to help younger men forward by all means in his power."⁹⁶ Abbe was consistently supportive as Olivier started his career in 1911, and in 1942, Olivier confided that he was one of the "younger men" that Abbe had encouraged. "I was under very deep obligations (to Abbe) for valuable assistance and advice in my early work on meteors," Olivier revealed. In return for his support, Abbe literally and metaphorically bequeathed the role of America's meteor astronomer to Olivier. In a reminiscence Olivier reported, "After the death of Professor Cleveland Abbe... several large envelopes filled with papers dealing with (meteors and fireballs) were turned over to me." During World War 2, Olivier often mined the contents of those envelopes to analyze and publish the old fireballs' parameters. And adopting Abbe's interest in meteor trains, Olivier frequently emphasized the importance and relevance of meteor trains to understanding air currents at extreme altitudes.⁹⁷ In his last year of life, 1916, Abbe gave Olivier space in *MWR* to report the "Work of the AMS, 1914–15." This was the last AMS annual report appearing in the *Review*, but in it, Olivier publicized AMS observers' meteor results and repeated his invitation to Weather Bureau observers to join him.⁹⁸

Hydrographic Office of the US Navy

Introduction

Dr. Olivier's goal was to capture information about all meteoric phenomena whether they were seen from land or sea sites. Altogether, AMS members, professional astronomers, variable star observers, and Weather Bureau observers comprised a comprehensive land-based meteor monitoring cadre for Olivier. All that remained for worldwide sky monitoring was for Olivier to secure a sea-based observer corps. The US Navy's Hydrographic Office (HO) was a logical governmental service to approach because recording meteorological and navigationally related astronomical events was required of Navy ships and their observations were preserved in the *Hydrographic Bulletin (HB)*. The *HB* published sightings of myriads of fireballs and meteors all of which Olivier was eager to collect for the American Meteor Society's (AMS) archives for eventual analysis and publication.

Very briefly, *hydrography* is concerned with describing and measuring various aspects of river and marine environments: currents' strength and directions,

⁹⁶Olivier, CP; Obituary Notice: Fellow Cleveland Abbe; *Monthly Notices Royal Astronomical Society (MNRAS)*, volume 77, February 1917, pp. 290–292. In another gesture of support of young Olivier's career, Abbe recommended that Olivier be named a Fellow of the Royal Astronomical Society: Letter from C. Abbe to A.S. Eddington, dated December 13, 1913 (in the Olivier correspondence file of the American Philosophical Society).

⁹⁷Olivier, Meteor Notes from the AMS, *Popular Astronomy*, volume 50, 1942, pp. 265–267.

⁹⁸Olivier, CP, 'Work of the AMS, 1914–15' in *MWR*, volume 44, 1916, p. 326.

prevailing wind directions and strength, hurricanes and waterspouts that pose a risk to mariners, and navigational hazards (such as wrecks, reefs, and shallows). Also relevant to the maritime weather environment, were unusual and dramatic astronomical events, such as meteor showers and fireballs that were observed from aboard ships.

Brief History of the Hydrographic Office

The formation of the modern HO began in 1842 after an earlier Depot of Charts and Instruments supervised by a Board of Navy Commissioners was disbanded by an act of Congress that year. When it did so, Congress ordered the Depot to become a department of the Bureau of Ordnance and Hydrography (BuO&H), under the command of Lieutenant Matthew Fontaine Maury (1806–1873). Between 1844 and 1854, BuO&H had a confusing list of informal titles: US Naval Observatory (USNO), the Hydrographical Office, the National Observatory, and the Washington Observatory. In 1854, the Secretary of the Navy decided that this confused entity should be given one name: the US Naval Observatory and Hydrographical Office. By 1866, the Hydrographic Office was administratively separated from the USNO. Dr. Olivier contacted the HO shortly after World War I.⁹⁹

Matthew Fontaine Maury, Lt., US Navy: Visionary First Director of Hydrographic Office

Maury was born on a Virginia farm in 1806, but due to a nearly fatal fall, he was deemed too frail to do farm work and was sent to a local school where his remarkable aptitude for learning was discovered. He joined the US Navy at age 19 in 1825 and by 1834 had served three sea duty assignments. He became an officer, a lieutenant in 1836 after writing a text about navigation. However, after sustaining a leg injury in 1839 he made good use of a two-year convalescence during which he studied mathematical aspects of navigation and proposed several organizational reforms of Navy procedures.

By 1842, when the Congress instituted administrative reforms of the Navy, Maury's scientific and organizational aptitudes were rewarded: the Secretary of the Navy placed him in charge of the Navy's Depot of Charts and Instruments. In this post, he supervised acquisition of telescopes for the Naval Observatory and

⁹⁹Anonymous, Records of the Hydrographic Office (Record Group 37), Section 37.3 General Records of the Hydrographic Office 1754–1950 (History), National Archives and Records Administration (NARA), Washington, D.C. from a NARA Web site accessed on February 22, 2016: <http://www.archives.gov/research/guide-fed-records/groups/037.html#37.3>.

supervised the production of excellent star catalogs. Historian Steven J. Dick wrote that Maury's guidance produced a national observatory (the USNO) on a par with England's and other European countries'. However, Maury's most memorable contribution was in the hydrographic field. By enlisting the cooperation of as many as 1000 sea captains, who were asked to keep detailed logs about wind directions and ocean currents, Maury was able to compile wind and current charts which greatly reduced ships' sailing time on long voyages, like on cruises to Australia. Maury's charts also reduced the time ships spent on ocean trips between San Francisco and New York via Cape Horn. Maury is regarded as being a founder of scientific oceanography. Unfortunately, his reputation suffered greatly when after a 36-year career in the US Navy, he resigned in 1861 to join the Confederacy with a rank of commander in the Confederate States Navy. Nevertheless, his far-sighted direction of the Hydrographic Office helped it to develop into an indispensable service for mariners.¹⁰⁰

The Hydrographic Office Aids the AMS

In his annual report for 1923/1924, Dr. Olivier announced "the AMS now receives, through the courtesy of the Hydrographic Office... copies of all reports of bright meteors and fireballs sent in by ships' officers."¹⁰¹ And during 1923 and 1924, the HO sent Olivier 38 fireball reports. It is not clear if the referred reports were abstracted from the *Hydrographic Bulletin* or whether entire issues were sent to Olivier.¹⁰² A National Archives online finding aid described the HBs produced during the 1923–1954 time period as consisting of "weekly printed compilations of navigation information intended for timely distribution to mariners to aid in safe navigation. Included are notices of ...ice conditions...currents, waterspouts, meteors and miscellaneous phenomena...."¹⁰³

According to Dr. Olivier, the HO took more than a casual role in meteor data collection. He wrote, "To stimulate interest in meteoric work, the *Hydrographic Bulletin* for several years has been publishing ... observations (of meteors), and as a

¹⁰⁰Dick, Steven J., Matthew Fontaine Maury, in *Biographical Encyclopedia of Astronomers*, Volume 2, New York: Springer, 2007, p. 750.

¹⁰¹PA, volume 33, 1925, pp. 240–241.

¹⁰²The AMS Archive box marked "1920s" contained at least one typed 1923 report sent to Olivier by F.B. Bassett, Captain, US Navy; Hydrographer from the Hydrographic Office in Washington D. C. In addition, a handwritten fireball report, dated July 12, 1927, was first sent to "Govt Hydrographic Office, Washington, D.C." by J.E. McGurk, 2nd Officer of the S/S Trinidadian and forwarded to Olivier was in the same Archives box. So it seems that there were multiple formats by which fireball data were sent to AMS Headquarters by the Hydrographic Office.

¹⁰³NARA, Hydrographic Bulletins, 1889–1954 at <http://research.archives.gov/description/1520434>, accessed on October 12, 2012. However, this page was not available on February 22, 2016 and was removed from the Web site because NARA Web personnel change information displayed periodically.

consequence their number is greater and accuracy higher.” In fact, in order to “... increase this interest (in meteors), the hydrographer, Rear Admiral W.R. Gherardi, US Navy, ... requested (Olivier) to outline some of the methods by which the data secured by observers may be turned to scientific account, particularly in the matter of calculating the heights at which such objects appear and disappear.”¹⁰⁴ Olivier explained the importance of those two heights: “When these have been determined, it becomes a relatively simple matter to calculate the length of path in the atmosphere and the average velocity.”¹⁰⁵ Admiral Gherardi published Olivier’s nine-page mathematical exposition as a supplement to the *Pilot Chart of the North Atlantic Ocean* in November 1931.¹⁰⁶ So, US Navy ships’ navigators had Olivier’s guide handy as they plied the North Atlantic’s waters, ready to use when fireballs were seen. Officers responded by furnishing 55 reports in 1927 and 59 in 1928.¹⁰⁷ Their reports continued until World War 2 was declared; the reports were stopped because ships’ geographical positions had been routinely reported and doing so during wartime would have violated security.

In addition to annual tabulations of the Navy’s fireball sightings, Olivier often quoted officers’ reports in his *Popular Astronomy (PA)* columns. Two such accounts are from the unexpectedly fine 1930 Leonid display seen by ships in the Caribbean Ocean and Gulf of Mexico. The first was a report Olivier received of an observation on November 16/17 from the ship:¹⁰⁸

“... Am. S.S. Ohioan, (near Haiti), between 12:30 and 3:30 a.m. (Eastern Time) which reported ‘Countless meteors observed all over the eastern heavens but the greatest number appeared in the vicinity of Leo...At times the earth and the whole sky was illuminated... The most remarkable meteor of the shower ...appeared at 2:50 a.m. in the Milky Way just above the Southern Cross...The coast of Haiti, 20 miles away, was visible as in daylight... This phenomenon appeared larger than the sun and was visible nearly a minute.’”

A second report was from the same morning as the Ohioan’s observation. An officer of the American Steam Ship C.A. Canfield, steaming in the Gulf of Mexico, informed Olivier that during a three-hour span,

“... about 150 meteors were bursting and zig-zagging across the heavens, leaving trails of fire. In some instances they lasted as much as two minutes before the sparks disappeared to the naked eye...”

Olivier frequently found ships’ officers’ data of sufficient quality to enable him to compute fireballs’ heights and path lengths. He often devoted space in *Meteor Notes*, his *PA* column, to demonstrate fireball trajectory solutions using data from the *HB*. One early example was the final data computed for a fireball seen on June

¹⁰⁴Olivier, *Meteor Notes* from the AMS, *PA*, volume 54, 1946, p. 141.

¹⁰⁵*Ibid.*

¹⁰⁶Olivier, *Methods for Computing the Heights and Paths of Fireballs and Meteors: Supplement to the Pilot Chart of the North Atlantic Ocean for 1931*, Washington, D.C.: Hydrographic Office, 1931. Dr. Olivier wrote that his formulas were “on the back of” the *Pilot Chart*.

¹⁰⁷*PA*, volumes 33, 1925, p. 241; 36, 1928, p. 133; and 37, 1929, p. 176.

¹⁰⁸Olivier, *Meteor Notes*, *PA*, volume 39, 1931, pp. 37 and 41.

22, 1927, by two ships’ officers in the Caribbean. Using the data provided, Olivier found the fireball’s path to have been 50.72 km. (31.5 miles) long and its height at first visibility was 71 km. (44 miles) and at disappearance it was 18.5 km. (11.5 miles) above the Caribbean. Further, he was able to compute the latitude and longitude at which a meteorite, if any, would have splashed into the water. To demonstrate the astronomical application of the observations, Olivier concluded his report by declaring that the meteoroid giving rise to the fireball “was a permanent member of the solar system” and not one that came from interstellar space, as was often the belief about fireballs before 1950.¹⁰⁹

New Members Join the American Meteor Society, 1915–1918

From 1911–1914, Dr. Charles Olivier depended heavily upon professorial colleagues whom he first met in graduate school to contribute observational data to the American Meteor Society (AMS). But, just as important were a small number of amateur observers from the Society for Practical Astronomy who kept the Society functioning during those early years. Table 2 illustrates the AMS’ tenuous hold on existence from 1911 to 1914.

Dr. Olivier devoted 1914 and 1915 to developing products for meteor watchers in hopes of attracting new membership. In 1914, he published “126 Parabolic Orbits,” containing meteor data produced by AMS members during 1911–1913. He discussed these data at length and showed readers how the AMS turned contributed observational data into scientifically useful findings about meteor radiants.

In 1915, Dr. Olivier, the Weather Bureau’s Cleveland Abbe, and the Leander McCormick Observatory’s Director Samuel A. Mitchell publicized the AMS in *Popular Astronomy*, the *Monthly Weather Review*, and *Scientific American*, respectively, and asked astronomy enthusiasts to join the AMS. Readers were informed that they would be given detailed observational instructions, data record forms and in 1915, copies of Dr. Reynold Kenneth Young’s gnomonic star charts upon which to record the meteor paths they observed. Prospective members were

Table 2 Annual AMS membership numbers during the Society’s first four years of existence

Year	Membership number
1911	3 (all were colleagues)
1912	5 (3 amateurs and 2 colleagues)
1913	5 (3 amateurs and 2 colleagues)
1914	4 (1 amateur and 3 colleagues)

Membership is separated by amateur or collegial identification

¹⁰⁹Olivier, Fireball of June 22, 1927, *PA*, volume 37, 1929, pp. 133–134.

also promised that their data would be acknowledged in another long memoir, like “126 Parabolic Orbits” that would be published by an academic or scientific press.

In 1915, readers’ responses were enthusiastic. In his discussion of summer 1915 meteor shower results, Olivier informed *Popular Astronomy* readers that, “...during the past two months not less than 100 people have written asking for maps, information etc., most of them signifying their intention of observing in accordance with (AMS procedures)...this makes a total of about 125 persons who are interested in the systematic study of meteors.” Olivier was gratified that the public response was so enthusiastic even though he recognized that most of the responders would not actually carry out meteor watches.

Dr. Olivier nurtured membership growth and retention by publishing annual reports in *Popular Astronomy*. The annual reports often praised individual observers for a productive year and especially when their initiative advanced meteor knowledge. In addition, Olivier corresponded with members to answer their questions and he encouraged members to spend more time engaged in meteor watches. The AMS archives contain many letters from members to Olivier all of which declared enthusiasm for the AMS’ goals and earnest desires to be taught methods to improve the quality of their observations.

Table 3 reports the number of data-contributing members from 1915 to 1922. The rosters for 1915 and 1916 showed the initial rush to join the AMS. By 1917, however, attrition had begun. Of course, the USA’s entry into the First World War (WW1) on April 6, 1917, played a role in this with many young men joining the war effort. And by 1918, only three AMS veterans of both 1916 and 1917 remained as members. The war’s effects were clearest in 1918 because, of the nine observers on the roster, one was a woman, five males were too young to serve in the military, and one man was too old. Indeed, Dr. Olivier, too, left the University of Virginia to serve on the scientific staff of Aberdeen Proving Grounds in July 1918. When he returned to academia in January 1919, he apologized to AMS members because involvement in war-related research made him “unable to give personal attention to meteor work” and “carry on the correspondence” necessary to maintain contact with members. During 1919 and 1920, he struggled to rebuild membership but did not achieve 1915–1916 levels.

Table 3 Numbers of amateur and professional astronomers on the AMS’ roster 1915–1922

Year	Membership number
1915	33 (30 amateurs and 3 professionals)
1916	38 (35 amateurs and 3 professionals)
1917	20 (19 amateurs and 1 professionals)
1918	9 (9 amateurs and 0 professionals)
1919	7 (7 amateurs and 0 professionals)
1920	14 (13 amateurs and 1 professionals)
1921	11 (10 amateurs and 1 professionals)
1922	9 (7 amateurs and 2 professionals)

Membership Roster and Statistical Summary for the Years 1915–1918

Statistical Summary of the 1915–1918 Membership

Dr. Olivier's appeals to North American citizen scientists, requesting their participation in the AMS' meteor observation program, resulted in 57 men and women enrolling during the 1915–1918 time period. The entire roster number was 61 when the four "veterans" from 1911 to 1914 membership were included as participants.

It was possible to determine chronological ages of 54 of the 57 "newcomers," i.e., the 1915–1918 Society entrants. Thirty-nine percent of the 54 were less than 20 years of age and when newcomers aged 20–25 were counted too, they accounted for 48 % of the 54. Doubtless the Society's low dues requirement helped these younger people to enroll.

Members lived in 21 of the 48 continental states, plus Washington, D.C. Five members were not US nationals: four were from Canadian Provinces and one from Argentina.

Ninety-five percent of the membership was amateur astronomers. Fourteen percent were women.

The 61 people on the roster were an occupationally diverse group. The largest subgroup, 30 %, was high school and college students. The rest of the membership was made up of low numbers (less than 10) of skilled trade workers, high school and college teachers, members of the professions, engineers and technicians, government workers, business people, and agricultural laborers.

Roster of Members

This roster consists of meteor observers whose names appeared in American Meteor Society annual reports published in *Popular Astronomy* magazine. They earned a listing because they submitted a meteor observation report that resulted from at least one night's watch during the membership year and had paid the American Meteor Society's (AMS) annual dues, typically a dollar (US). Dr. Olivier called those observers, "active members." Others who paid dues but did not make and report observations were sent a letter from Olivier to "bestir themselves" and actually record meteors.

Below, the author has modified Dr. Olivier's published rosters by adding an indication of long-term active membership. Members who submitted meteor observations for three or more years have their names listed in **bold** type. The author selected three years as the "cutoff" criterion for this distinction because it seemed likely that by the third year the observers were genuinely devoted to making a scientific contribution. And by the third year, the observers had developed meteor plotting skills that made their data more accurate and therefore valuable to Dr. Olivier. However, the author decided to deviate from this "three-year rule" in the

case of five AMS members who were highly productive during the two years they belonged to the Society. The Key below is a guide to help the reader identify these most diligent and long-term AMS members. Finally, biographies of these hardest working amateur observers appear in Part 2 of this book.

Key and Abbreviations

Bold = 3 years or more of data contributions. For the names in **BOLD** font, the location of a full biography is in Part 2. Most of these are in Chap. 9, “Associated or Enrolled 1900–1918.” Some exceptions are noted and the reader is directed to the biographies’ locations.

Italics = 2 years of high productivity (a total of more than 1000 meteors or collaborative work)

A (*) denotes a professional astronomer. The three men so designated in the roster were being paid to perform astronomical work at an observatory at the time of their citation in AMS reports. Remuneration for astronomical work is what distinguishes “professionals” from “amateurs” in this history.

Member	Residence	Years	Biographical notes ^a
Aldrich, Richard L.	Wichita, KS	1915, 1916	18 years old in 1915; a university student
Awde, Mrs. Beatrice	Watertown, NY	1916, 1917	43 years old in 1916; unknown occupation, a widow
Balch, Samuel W.	Montclair, NJ	1915	52 years old in 1915; a mechanical engineer
Ball, N.P.	Colton, CA	1918–1922	55 years old in 1918; a nurseryman. See Chapter 9
Barnes, Robert M.	Wheaton, IL	1917	47 years old in 1917; a baker (1870–1937)
Bedford, John L	Watertown, NY	1915, 1916	27 years old in 1915; a railroad conductor
Bessey, Mrs. Grace	Pensacola, FL	1915, 1916 1918, 1920	60 years old in 1915; a teacher in a private school. See Chapter 9
Blencoe, David A.	Superior, WI	1915	40 years old in 1915; a surveyor’s rodman
Bostick, John Benton	Dallas, TX	1916	41 years old in 1916; a surgeon in US Navy
Brooks, D.B.	Washington, DC	1915–1917, 1921	16 years old in 1915; a high school student in 1915. See Chapter 9
Brubaker, Mrs. Lula	Hunter’s Valley, CA	1915	40 years old in 1915; a public school teacher in 1910

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Member	Residence	Years	Biographical notes ^a
Bruseth, Nels	Los Angeles and Silvana, WA	1915	Biography in SPA chapter
Burge, Olaf	Wichita, KS	1916, 1917	15 years old in 1916; high school student
Carr, F.J.,	Swanton, VT	1915–1917 1927	22 years old in 1915; an assistant town clerk in 1920 and an AAVSO member. See Chapter 9
Carreau, Napoleon	Wichita, KS	1916	50 years old in 1916; an optician who aluminized Clyde Tombaugh's telescope mirrors
Chiles, E.G.	Cleburne, TX	1916	53 years old in 1916; a retail fuel merchant
Cole, C.S.	Pocono Pines, PA	1915	51 years old in 1915; an “agent” in 1883
<i>Crain, John Whitaker</i>	Denton, TX	1916	29 years old in 1916; a Weather Bureau observer who collaborated with H. H. Martin. See Chapter 9
Crombie, William T.B.	Athelstan, Que	1915	42 years old in 1915; a minister
Crownfield, Frederic	Brooklyn, NY	1916	14 years old in 1916; a high school student
*Dawson, Bernhard H	La Plata, Argentina	1916	25 years old in 1916; Astronomer at Cordoba Astronomical Observatory
Dole, R. M.	Raleigh, Chicago and Maine	1915 was 1st year in AMS	31 years old in 1915; a Weather Bureau observer whose meteor career started in 1899. See Chapter 9
Doolittle, Alfred Abel	Washington, DC	1915, 1916	44 years old in 1915; a high school biology teacher and later a biologist
Dunlop, Alexander R.	Kelwood, MB	1916	24 years old in 1916; a laborer on father's farm
Eaton, Howard O.	Madison, WI	1915	19 years old in 1915; a college student and AAVSO member
Fankhauser, Albert G.	Sioux City, IA	1916	24 years old in 1916; an assistant weather observer US Weather Bureau
Foster, F.A.	Detroit, MI	1917	Unknown, except that (s)he observed with Lonyo below
Gaines, E.	Norwood, OH	1918	Unknown
Gannon, E. Anna	Brooklyn, NY	1916	41 years old in 1916; a housewife
Grace, Gerald	Wichita, KS	1916	13 years old in 1916; a high school student

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Member	Residence	Years	Biographical notes ^a
Hamer, Frederick C.	Staunton, VA	1915	22 years old in 1915 and an insurance agent
Hempel, Miss K M	Elkader, IA	1917–1922	27 years old in 1917; helped keep her parents' house. See Chapter 9
Johnson, Harold I.	Hingham, MT	1915–1917	17 years old in 1915; a high school student. See Chapter 9
Koep, John	Chippewa Falls, WI	1915–1921, 1927	17 years old in 1915; a high school student. See Section 10
Kronenberger, G.F.	New York, NY	1916–1918	31 years old in 1916; a teacher, later a college professor. See Chapter 9
Lamb, R. C.	Franklyn, KY	1915	A 65-year-old <u>woman</u> in 1915. Unknown occupation
<i>Lambert, Raymond</i>	Newark, NJ	1915, 1916	18 years old in 1915; a student. Biography with Kronenberger's in Chapter 9
La Paz, Lincoln	Wichita, KS	1915–1918, 1924, 1930s	18 years old in 1915; a student in '15; later an astronomer/meteoriticist. See Chapter 9
Larkin, John	Croton on Hudson, NY	1915	46 years old in 1915; a lawyer
*Leonard, Frederick C.	Charlottesville, VA	1915	19 years old in 1915; McCormick Observatory intern; he cofounded Society for Practical Astronomy and later an astronomer/meteoriticist
Liffiton, Miss Doris	Lachine, Que.	1915, 1916	18 years old in 1915; unknown occupation
Lonyo, L.	Detroit, MI	1917	Unknown: Lillian Isabel was born in 1894 and her brother Louis George in 1904. Either one could have been the meteor observer
Ludeman, Clarence	Wichita, KS	1915, 1916	17 years old in 1915; a student and helped on family farm. A LaPaz associate
<i>Martin, Howard Homer</i>	Ft. Worth, TX	1916, 1917	27 years old in 1916. He was a Weather Bureau observer who collaborated with J.W. Crain for meteor heights. See Chapter 9
McPherson, William L.	Wichita, KS	1915, 1916	17 years old in 1915; a high school student
Merriam, Miss Helen	Hartford, CT	1915	30 years old in 1915; a teacher
Newman, Parsons N.	Frederick, MD	1916	19 years old in 1916; a college student; lawyer in 1930

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Member	Residence	Years	Biographical notes ^a
*Olivier, Charles P.	Charlottesville, VA		AMS' founder
Partello, J.M. T.	Inglewood, CA	1915–1917, 1920, 1921	61 years old in 1915; Colonel, US Army. See Chapter 9
<i>Pattison, Walter</i>	Wilmette, IL	1917, 1918	14 years old in 1917; became a university professor of Spanish literature. Biography with Kronenberger's in Chapter 9
Peters, J.L.	Holliston, MA	1917–1922, 1924	14 years old and a high school student in 1917. He was an AAVSO member too. See Chapter 9
Post, Emil	New York, NY	1916	19 years old in 1916; a college instructor in 1920 and a mathematics professor in 1940
Rasmussen, M	Amsterdam, NY	1915, 1916	38 years old in 1915; landscaping business
Simpson, Thomas McN.	Richmond, VA	1915	33 years old in 1915. mathematics professor who was trained by Ormond Stone. Biography in Friends At McCormick Observatory
Smith, J. Brookes	Hampden-Sydney, VA	1915	30 years old in 1915; a mathematics professor who was trained by Ormond Stone. Biography in Friends At McCormick Observatory
Taulbut, Anthony S.	Mission City, BC	1916	42 years old in 1916; a farmer and member of Royal Astronomical Society of Canada and Astronomical Society of the Pacific
Tomkins, T.K.	Glenside, PA	1917, 1920 1920s and 1930s.	35 years old in 1917; a commercial designer. See Chapter 9
<i>Trudelle, Philip</i>	Chippewa Falls, WI	1916, 1917	18 years old in 1916; a high school student. Bio with John Koep's in Chapter 9
Werhun, Wolodymyr W.	Hamton Station, SK	1915, 1916	15 years old in 1915; a clerk; married in 1923
Wohlwend, Henry	Knoxville, TN	1915, 1916	48 years old in 1915; a truck farmer
Young, Donald	Wichita, KS	1916	18 years old in 1916; a student at Fairmont College in 1916

^aMembers' ages and occupations derived from many Ancestry.com sources including the 1920 and 1930 US Censuses

Outcomes from Olivier's Membership Efforts 1911–1918

In 1915, professors Olivier, Mitchell, and Abbe's published appeals to citizen scientists to join the American Meteor Society (AMS) were greatly rewarded. Undoubtedly, Olivier's offers of Dr. Young's gnomonic star maps and his meteor record forms to actively participating amateurs were enticing inducements. As a result, 1915's total number of active members ballooned to 33 (30 amateurs and 3 colleagues) compared to 4 (1 amateur and 3 colleagues) in 1914. Offering the observational tools to willing observers produced a 1915–1918 combined membership that was nearly eight times that of 1911–1914 (60 vs. 8). Olivier had found the "bait" to attract productive "fish."

Of course, Olivier's many new participants contributed correspondingly more meteor hourly counts and plots on maps, than did members in the Society's early years. From 1915 to 1918, AMS members contributed more than 21,000 meteor observations, compared to 3200 provided by members during 1911–1914, an almost sevenfold increase over the founding members' total. By the end of 1918, AMS observers had made more than 24,000 observations using a single format of recording materials and in conformance with standardized observational procedures.

By 1920, AMS members' meteor plots on star maps resulted in a total of 650 meteor orbits, an aggregate from Olivier's reports published in 1911, 1914, and 1920. Dr. Olivier reported that meteor orbits he had calculated ("deduced") from radiants on members' meteor maps were made in conformance with standards he had described to the American Astronomical Society in 1917 and published on page 221 of "349 Parabolic Orbits," his 1920 research report. He believed that these criteria were in keeping with sound gravitational astronomical theory. The newer radiant criteria were more liberal than the standards he used for his 1911 dissertation: four meteors from a larger, two-degree diameter circle were now required to define a radiant if they occurred within a four-hour period on one night. In addition, he allowed three meteors on one night to be sufficient for a radiant, if two more were observed the following night at about the same time of night as the three the night before. Even with having liberalized the radiant definitions over six years, Olivier believed that the 650 deduced orbits were less liable to error than if they had been the result of observations made by observers using their own radiant procedures and without standard star maps and record-keeping formats.

The radiants resulting from standardized materials and procedures were crucial to Olivier's research plan. Many observers found the radiants, but they were Olivier's "discovery" too. Olivier's methods made it possible to gather many more radiants than he could have found himself, but they were made in the same manner that he would have done. He had "mass produced" 650 radiants that would show movement against the sky background in refutation of Denning's stationary claim. Olivier's active AMS members had begun to expunge the stationary radiant error that he was intent on removing from meteor catalogs.

Helpfulness with finding radiants was the chief outcome from observers during the first seven years of the AMS' existence. By 1918, Olivier had received modest cooperation with a request he had made for magnitudes of meteors seen by amateur and professional astronomers during variable star observations. Fourteen-year-old Alan Craig, a Society for Practical Astronomy/AMS (and AAVSO) observer, reported 43 telescopic meteors' magnitudes in 1912. The AAVSO's Harry C. Bancroft, Jr., reported eight in 1916 and Olivier's McCormick Observatory colleagues contributed 22 the same year. The largest contribution came from Olivier's loyal McCormick colleague, Harold Lee Alden, who by 1918 reported over 100 magnitude estimates made with Virginia's 26-inch refractor.

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