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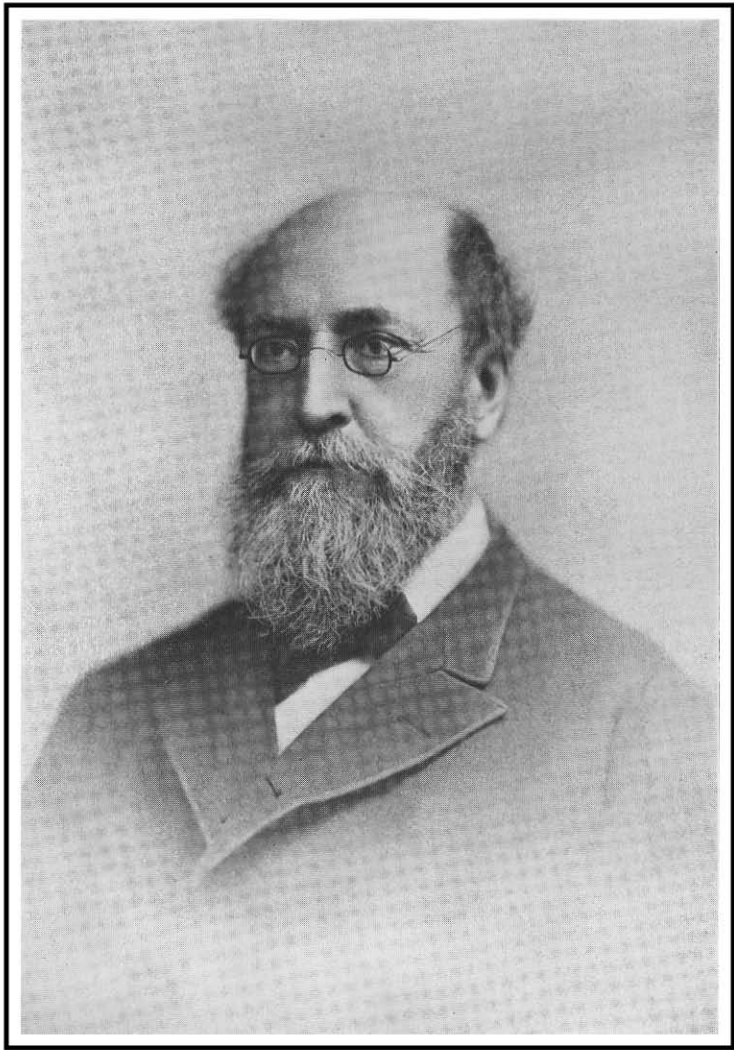
BIOGRAPHICAL MEMOIR BENJAMIN APTHORP GOULD

1824-1896.

BY

GEORGE C. COMSTOCK.

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*B. A. Gould*

## BENJAMIN APTHORP GOULD.

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Benjamin Apthorp Gould was one of the incorporators of the National Academy of Sciences, a conspicuous figure in its early annals as well as in the history of American science; or *Science in America*, as Gould is careful to say. Untoward events have so delayed the preparation of his biography that in considerable measure material once available for that purpose seems now irretrievably lost, and a quarter century after his death his career must be studied and his achievements told by a stranger who never saw him and who labors under unexpected difficulties in obtaining adequate material. There is a dearth of that intimate information commonly to be obtained from relatives and close family friends, and its place must here be taken by published memoirs and the recollections courteously supplied by some of his professional associates. In great part this sketch is, from necessity, based upon secondary sources such that inevitably much is lacking that would illumine the man's character, and even in its formal parts, such as the bibliography, entire completeness can not be assured.

B. A. Gould, jr., as he early indited his name, was born in Boston on September 27, 1824, of sturdy English ancestry that upon both sides had been long resident in Massachusetts. Inspired with a lifelong interest in genealogy, local history, and antiquities, he prepared and twice published a Gould genealogy and from the second, revised and enlarged edition of this work, it appears that both his father and his mother were descended in the sixth generation from the Pilgrim Fathers of a date not long subsequent to 1620. These ancestors had been substantial citizens, landholders and leaders in their communities, and their chief seat appears to have been the estate at Topsford, not far from Boston, established by the immigrant ancestor, Zaccheus Gould. The more remote ancestry may be traced back through English rural records for an additional six generations, during which they appear as substantial yeomen, established not far from London, drawing from the soil their living and by will transmitting their modest estates from generation to generation. The earliest known appearance of the name antedates the discovery of America.

At the modern end of the line the father of B. A. Gould, jr., also a Benjamin Apthorp Gould, having graduated from Harvard College in 1814, became head master of the Boston Latin School, which he conducted successfully for many years, during which he acquired a reputation for unusual scholarship, based upon his work as editor of numerous classical texts. He married in 1823 Lucretia Goddard and to them were born four children, the eldest of whom is the subject of this memoir. Failing health led the father to withdraw from his academic career and after a journey abroad for recuperation he established himself in Boston as a merchant in the East Indian trade. The activities and interests of the parent, here noted, found strong reflection in at least the earlier parts of the son's career.

During the father's absence from home the youthful Benjamin was entrusted to the care and guidance of an aunt, Hannah Gould, who is described as a poetess of some fame and a woman "characterized by a cheerful, frolicsome spirit and earnest piety." Gould speaks of her with much respect and she appears to have had large influence in molding the lad's temperament to her own standards and likeness.

Trained in the Latin School in which his father had taught, and imbued with a lifelong respect and fondness for its lore, the lad entered Harvard College at the age of 16 and there followed for some years the cult of the ancient tongues in which he had been reared. But in increasing measure his interest shifted to physics and especially to mathematics which, under

the inspiring influence of Benjamin Peirce, he pursued during the entire four years of his college course. This increasing interest in mathematics and physical science finds reflection in a dissertation, of his senior year, upon the publications of the British Association for the Advancement of Science. One or more of these volumes seem to have fallen into his hands and to have greatly impressed him.

His student life appears to have been a normal one, in accordance with the standards of the time. Tales of his precocious attainments, such as his translation of an ode of Horace at the tender age of 5 years and his freshman attempt at computing a comet orbit, are fairly enough offset by his ignominious failure at the blackboard when Peirce endeavored to exhibit his attainments before a visiting committee of dignitaries, and by the matter of record, that the college administration rusticated him for a considerable term because of his relation to some student pranks. The personal relations and friendships formed during this period were an abiding influence and joy throughout his later life. By parental arrangement his freshman chum was Francis Parkman, the future historian. He became corresponding secretary of the Harvard Natural History Society and, odd as it now seems, was appointed its curator for botany, mineralogy, and conchology. His interest in the biological sciences appears to have been strongly aroused for, as he long afterward told a friend who commented upon his unexpected knowledge of trees, "I narrowly escaped being a botanist instead of an astronomer." A major influence at this period was exerted by a local preacher who aroused or confirmed in him a strong moral and ethical conviction that abided through life and one phase of which found expression in his enthusiastic adherence to the Unitarian Church.

Gould was graduated from Harvard in 1844 and the immediate sequel to his college days was quite conventional; he became a teacher in the Boston Latin School and proceeded to an A. M. degree in course. But a single year sufficed to convince the young man that his purposes in life were not to be realized along these temporary lines of least resistance. He had found himself, and with clear vision and single purpose he turned toward preparation for a career in which the development of science in his native land was a dominant purpose, a purpose that later found repeated expression in speech and print. A decade afterwards he records that in arranging his plans he had sought and received advice from Sears C. Walker, and with strong emphasis he approves the advice thus given to "study foreign languages, for thus alone can you keep pace with the progress of modern science."

To his contemporaries the plans then formed must have seemed Quixotic, for, to quote Gould himself, "I believe I may say that a single instance of a man's devoting himself to science as the only earthly aim and object of his life, while unassured of a professor's chair or some analogous appointment upon which he might depend for subsistence, was wholly unknown." Despite this lack of precedents for his chosen career Gould appears to have acted wisely and well. In July, 1845, he sailed for Europe with plans for a prolonged period of study and travel. His family connections furnished him credentials and introductions that opened wide the doors of scientific circles in the Old World. After brief periods spent under the influence of Airy at Greenwich and of Arago and Biot at Paris, he passed on to Germany, in whose academic life he seems to have found his chief inspiration, and this mainly in two institutions. He spent a year at Berlin registered as an assistant in the observatory at the time when Galle's visual discovery of Neptune, made through its modest telescope, thrilled a multitude of minds less ardent than his own. During this residence in Berlin it was his great good fortune to win the friendship and esteem of the venerable Alexander von Humboldt, then at the height of his fame and influence. Through the benevolent exercise of this influence Gould was transferred to a new environment and came into new relations that were to be decisive for his career. Prof. Carl Friederich Gauss, one of the great mathematical astronomers of all times, received the young man into his own inner circle of disciples, indeed into his own home at Goettingen, and filled his mind with enthusiasm for the problems of planetary motion then current. The first fruits of this enthusiasm are to be found in a series of some 20 papers published in rapid succession during the years 1848-1851 (see bibliography), dealing with the observation and motion of

comets and minor planets, or asteroids, as they were then commonly called. Gould received from Goettingen his degree, doctor of philosophy, in 1848, his dissertation being entitled "Untersuchungen über die Gesenseitige Lage der Bahnen der zwischen Mars and Jupiter sich bewegende Planeten." The work shows small trace of its author's future power and its approval by Gauss as an adequate inaugural dissertation may perhaps be construed as evidence of the master's capacity to look beyond the immediate present.

The life at Goettingen was followed by some months of travel, from Italy to Russia, in which the young doctor, adding to his first-hand knowledge of men and things, came in especial measure under the influence of Argelander, at Bonn, and formed with him a peculiar friendship that was largely influential in determining the purposes and plans of his maturer years.

Returning to America via France, a momentary glimpse at the kaleidoscope of Gallic life revealed to Gould his friend Biot engaged in politics and, by chance, exhibited Louis Napoleon swearing allegiance to constitutional government and taking a place in the extreme left of the constituent assembly. He brought back to his home a mind well trained in the physical science of the day and filled with an enthusiasm that was to find fruitful expression in half a century of honorable and distinguished toil. But Europe had given to him much more than professional training. The genial disposition, his by inheritance, had formed on every side warm friendships that were severed only by death. Few were the astronomers of note not included in the circle of his personal friends and correspondents, and upon his numerous returns to Europe these friendships were refreshed and extended in unusual measure. He brought home also an acquaintance with and facility in the use of foreign tongues that was later to stand him in good stead. French and German were at his instant command, and to these was added later an equal command of Spanish. His Italian, while less fluent, was serviceable and his own jest, of later date, somewhat extends this tale of tongues. To a friend seeking linguistic aid and suggesting that Gould perhaps had some knowledge of Spanish, he replied with a twinkle of the eye and a gesture of the hand toward the row of ponderous Resultados del Observatorio en Córdoba, "Oh, yes; for many years I published chiefly in Spanish, and Arabic." A hasty and withal skeptical examination of the quarto volumes revealed that, in truth, their contents were mainly expressed in numerals of the Arabic notation.

The change from life in the scientific circles of Europe to the wholly different environment and conditions offered by the Massachusetts of that day was a sore trial to the young man. He knew on leaving Europe what was before him, but the reality proved even more depressing than anticipation had pictured it. His disappointment and bitterness of spirit found expression soon after his return in a letter to Humboldt, but there is in it no suggestion of altering his plans. An honorable mode of escape was opened to him a little later, as was learned long afterwards from the deceased man's letter books. Gauss offered him a professorship at Goettingen, which was declined. Renewed a little later and coupled with the promised directorship of the Goettingen Observatory, Gould hesitated, consulted his friends Peirce and Agassiz, who advised him to accept and, yielding to their judgment, he did accept the very flattering offer, but only to reconsider and withdraw the acceptance in order that he might carry out his original plans to serve science in America.

But we have overrun the chronological sequence of events. Landed in America and faced with the challenge of a wholly unconventional career, Gould found his first obligation to be the winning of his daily bread. For two years this was accomplished by teaching mathematics, French, and German at Cambridge, presumably as a coach. But this bread-and-butter pursuit was enlivened and seriously burdened by his establishment, in 1849, of the *Astronomical Journal*, a periodical of irregular appearance, devoted to the publication of research in astronomy. The preamble, printed over Gould's name, states that "The enthusiasm of astronomers and the liberality of friends of science in America have enabled me to commence the *Astronomical Journal* with the full conviction that it will be permanently supported." "In the earnest hope that the establishment of the *Astronomical Journal* may be hereafter referred to as an era for astronomy in America I commend it to the sympathy and cooperation of the lovers and votaries

of science." The hopes thus expressed have been in substance fulfilled. The Journal has been largely influential in developing and dignifying American astronomy and its inception and early success redound greatly to Gould's credit. But its career has been very unlike that foreshadowed in the first of the preceding quotations. For nearly a dozen years Gould's unremitting effort and his pecuniary sacrifice maintained the Journal at a high level of scientific quality and prestige, conjoined to a very low level of financial stability. An occasional published note from the editor sets forth from time to time his precarious condition and in July, 1861, in the throes of civil war, when "no American is able to investigate or study now with the calmness which success requires," the editor announces that he is compelled to suspend publication, but he hopes for an early resumption. That hope remained unrealized for a quarter century, and its ultimate fruition must be told in a later part of this memoir. But even at this stage of its career the Journal had justified the enthusiastic words of his eulogist: "He inspired a new breath into American astronomy. The new atmosphere which he brought with him from Germany, where he caught the spirit of the great masters under whom he studied, became gradually transfused through the States. His enthusiasm for the introduction of better means and methods of research was caught by his compatriots, their courage in the effort to regenerate our science was sustained, and transmitted through various channels to the next and to the present generation."

The 20 years that followed Gould's return to America present him as a man of multifarious interests and activities for which a bond of union is to be found only in his own strong and versatile personality. In 1852, the failing health of his friend and mentor Sears C. Walker brought Gould into relations with the United States Coast Survey and soon afterward, as Walker's successor, into responsible charge of its longitude determinations. For this work Walker had commenced experimenting with the new electric telegraph and Gould, devoting himself with characteristic ardor to the advancement of astronomical technique, developed and applied the new device in the work of the survey until, as Loewy, his eulogist, stated to the French Academy, he had made some 15 determinations of telegraphic longitude before Europe commenced to use the method. Gould's somewhat irregular, part time, relations with the Coast Survey continued until 1867 and were brilliantly crowned, at the very end, by his execution of the first telegraphic determination of trans-Atlantic longitude ever made. His report upon this determination shows Gould at his best, with a firm grip upon essential principles but struggling against accident and adverse circumstance. He took for himself the European end of the line, and buried in the almost unbroken fog and rain of the Irish coast he waited week after week for a glimpse of a star or a swing of his magnetic needle to be made under the influence of a current closed or opened in Newfoundland. When patience found its reward in a completed observing program he turns from astronomy to physics in an attempt to utilize his new data for the improvement of electrotechnics, and also he turns to psychology in a study of the personal equation with particular reference to its lack of constancy when that virtue is most required.

The same year that marked Gould's entrance into the Coast Survey contained also the beginnings of what later was to prove to him a period of stress and trial, of recrimination and chagrin, carried through some years of apparently fruitless labor. The details of this experience are voluminously set forth in his vigorous and at times acrimonious "Reply to the statement of the trustees of the Dudley Observatory." This reply should be compared with the no less acrimonious "Statement" itself, and the unprejudiced reader of both volumes can hardly fail to be embarrassed by their irreconcilable accounts of the early history of a great institution. In substance we witness in them a lawsuit fought out of court, and the present writer's relation to a quasi legal controversy must be that of clerk rather than judge or jury.

In the decade prior to 1850, Ormsby Macknight Mitchell had built up in Cincinnati an observatory that brought fame to him and prestige to the city that had given pecuniary support to his work. Certain Albanians, i. e., citizens of Albany, in the State of New York, animated with honorable civic pride, sought to rival and perchance outdo the western contribution to science by building upon the banks of the Hudson another observatory that should not only redound to their personal credit but should make in their city a center of light and learning.

Money was needed for such a purpose and this they commenced to accumulate. Professional advice and guidance were also needed and for this they naturally turned to Mitchell, soliciting him to accept the directorship and determine the character of the institution that was to be. Mitchell listened, sympathized, and apparently entered into engagements with them that later he was loath to fulfill. Late in the year 1852, through Sears C. Walker, he approached Gould, proposing that the latter associate himself with the Albany enterprise as colleague and eventual successor to himself. The proposal was declined but in such fashion that it was more than once renewed, with increasing emphasis upon the suggestion that here was a great opportunity for the upbuilding of science in America, an opportunity that apparently was on the verge of failure for lack of a man able and willing to improve it. In the end, after months of discussion had stretched out into years, Gould, yielding, consented to ally himself with the enterprise, but in such fashion that he might retain his residence in Cambridge and his active duties with the Coast Survey and the *Astronomical Journal*. Through a nebulous and ill-attested agreement between the observatory trustees on the one hand and four prominent American men of science on the other, viz, Joseph Henry, Benjamin Peirce, Alexander Dallas Bache, and B. A. Gould, jr., these gentlemen undertook to act, without compensation, as a scientific council for the observatory, with Gould as their executive officer. Bache, as head of the Coast Survey, adopted the observatory as one of its stations, loaned instruments to it, and stationed at Albany officers who, while discharging their regular survey duties and utilizing for that purpose the facilities afforded by the observatory, were free to devote, and did in fact devote to it, much of their spare time. Gould was among these officers and speedily he became known as director of the Dudley Observatory, devoting to it his time and efforts, and in its service, and partly at its expense, going abroad to order suitable instruments for its equipment.

Divergent views of the value and functions of an observatory, delay, and fruitless expense in its equipment, some lack of harmony within its personnel, led in time to strained relations between the trustees and director, and the widespread financial depression of 1857 furnished a medium admirably suited to the growth of ill will. Efforts to improve the situation were not lacking. Henry, Peirce, and Bache of the scientific council, standing firm in support of their fellow member, explained to the trustees that an admittedly unfortunate situation was due to untoward circumstances for which the director was in no way blameworthy. A strong body of local sentiment, both within and without the board of trustees, stood firmly behind the director, proffering support not only to his administration of the observatory but to his other activities as well. He was urged to bring the *Astronomical Journal* to Albany and to take up his residence there in a house expressly provided for that purpose. Gould, accepting these proposals, moved to Albany early in 1858. The *Journal* had preceded him by about a year, under an arrangement and guaranty for its continued publication announced by Bache at the dedication of the Dudley Observatory. The guaranty proved to be worthless and events rapidly shaped themselves for worse instead of better. Following a hostile newspaper campaign of some months' duration, charges of incompetence, disloyalty, and sloth were made against the director by certain trustees. These were vigorously repudiated by the scientific council, which brought to the director's defense the chief if not the only technical competence available for judgment of the matter.

Inevitably Gould's relations with certain influential persons became greatly embittered and only a few months after taking up his residence at Albany, the trustees, by a divided vote, declared his relations with the observatory ended. A week later they also voted to dissolve the scientific council. The council and the director, holding that they possessed vested rights in the matter that no action of the trustees could impair, refused to yield possession of the observatory and, in effect, Gould became a recluse in his own home, fearing to leave it by day lest in his absence it should be seized by the enemy. The trustees appear to have resorted to legal process for his ejection and then, mistrusting the law's delay, to have taken the matter into their own hands with recourse to violence. Gould's statement is that on "the 30 of January (1859) I was driven from my dwelling by a hired band of rioters, acting without form or pretense of

law—a mere brute force’—scattering and destroying his papers as well as doing indignity to his person.

A somewhat voluminous literature has grown about the events here briefly summarized and concerning it two comments seem in order: (a) The opinion of astronomers wholeheartedly supports Gould’s scientific administration of the Dudley Observatory, i. e., the essential part of the controversy, and the part upon which their judgement possesses unique technical competence. But to this consensus of opinion there were two conspicuous exceptions. To Gould’s chagrin two astronomers of note, Bruennow and Peters, took sides with the hostile majority of the trustees, and he notes that both these men are of foreign birth and training, recent comers to a new environment of which they had little understanding. (b) The exacerbated temper manifest in the controversy suggests the presence behind it of elements not publicly avowed. Local tradition still names as such an element Gould’s faculty for mimicry and mordant characterization.

The Dudley Observatory had been an added burden to his already overtaxed pecuniary resources and during his unsalaried connection with it Gould had carried on, with compensation, a prior undertaking to reduce, discuss and save from oblivion the work of Lieut. Gilliss, United States Navy, who, in the years 1849-1852 had conducted a “U. S. naval astronomical expedition to the Southern Hemisphere.” A major purpose of this expedition was to determine the solar parallax from observations of Mars and Venus, executed in Chile in accordance with a well-conceived plan. As an essential supplement to the data thus acquired Gilliss had counted upon similar observations being simultaneously made at observatories in the Northern Hemisphere and he was grievously disappointed by failure of the expected cooperation. This mishap seriously impaired the value of his laborious work and rendered inapplicable the methods planned for its utilization. By arrangement with Gilliss, Gould took over the entire body of data, the scanty northern observations as well as the more complete southern material, devised new methods for its treatment and in No. III of the four quarto volumes devoted to making public the expedition and its work he sets forth those methods and their result. The discussion is admirable and accordant with the best traditions of his German teachers but in the light of more recent knowledge it seems only to illustrate the oft-forgotten adage that bread is not made from chaff. His data were quite inadequate and his result fell farther from the truth than were the current values of the sun’s distance that he sought to supplant. The compensation paid for the work, which is said to have been expended upon the Dudley Observatory, served only as a foundation for the charge of willful neglect of duty to it in seeking pecuniary gain through outside employment.

The Dudley Observatory episode having become a closed incident, in 1859 Gould returned to Cambridge and took up again the threads of his former life. He turned to more sedate employment, not embittered but, as his friends said, softened and sweetened by Albany and its harrassing vicissitudes. Outside the “Reply,” his own public comment on these events is singularly reserved and sober. A chance remark, made years afterward, that they “had taught him how to fight” probably does scant justice to his native quality. The first fruits of the new work, apparently executed in 1859 but not published until 1862, were his Standard Right Ascensions of Circumpolar and Time Stars, prepared for the use of the United States Coast Survey. Gould here inaugurated, for the benefit of his longitude work, a practice of fundamental importance for the astronomy of precision, viz, the introduction of systematic corrections to star catalogues. In untechnical language, he was one of the first to grasp and successfully apply the idea, now a commonplace, that the coordinates of a hundred or a thousand stars observed and published at a particular observatory are not finished data, but only raw material that may be greatly improved by collation and comparison with external evidence. The successful execution of this idea made the fortune of his star positions which almost at once were adopted and long and widely used by astronomers as standards.

In mitigation of the rigors of such serious work, Gould joined with certain young professors who, like himself, were German University trained, in setting up, under the shadow of Harvard College, bachelor quarters that speedily became the talk of the town and long remained one



of its traditions. The local repute of "Cloverden" with its classic accessories and bacchanalian revels is not unduly travestied in the phrase, *Gemüthlichkeit* established on Plymouth Rock. The Bohemian quality of the den seems, to a generation two degrees further removed from puritanism, not to have exceeded the limits suggested by its literary offspring, the well known ballad of the "One Fish Ball."

The closing months of 1859 brought to Gould a great blow, that for some years forced him to withdraw, in considerable measure, from scientific work. His father died, leaving a mercantile business in such precarious condition that the son was forced to take immediate charge of it in order to ward off serious loss or even bankruptcy. One notes as a singular coincidence that almost simultaneously the English astronomer, Carrington, whose predilections and work bore a marked resemblance to those of Gould, was similarly summoned by a father's death to commercial pursuits which practically closed a highly promising scientific career. Not until 1864 did Gould extricate himself from a business engagement, which, though forced upon him, was assumed and prosecuted with a vigor and success characteristic of his versatile energy.

But during these years astronomical work was by no means abandoned. When the war in 1861 forced suspension of the *Astronomical Journal*, it opened to Gould a new line of effort. Maury, Superintendent of the United States Naval Observatory, a southerner by birth, abandoned his post and hastened to join in rebellion the forces of his native State. Behind him were left in deplorable condition the unreduced records of observations covering a considerable term of years. The last published observatory volume bore date 1859, but extended only to observations made in 1850. Capt. Gilliss, whose earlier cooperation with Gould has been noted above, took charge of the observatory after Maury's flight and, despairing of bringing up its arrears of work with the means at his disposal, he caused the fugitive records and papers to be collated, copied, and turned over to Gould for discussion, much as he had done with the records of his own Chilean expedition. The contract for this work was executed on October 9, 1861, and in the notice prefixed to the observatory volume bearing the imprint 1863, Gilliss notes that "All unpublished astronomical observations made prior to 1861, except the Zones, are ready for the press." The Zones could not be rendered useful to astronomy without further observations. With due respect to those other current obligations which were unquestionably discharged, Gould's hours and hands must have been strenuously employed in the early sixties.

Among those other obligations is one of peculiar interest and importance in Gould's life. In 1861 he married Mary Apthorp Quincy, daughter of Hon. Josiah Quincy, of Boston, a brilliant and noble woman of rare attainments whose intelligent sympathy with, and collaboration in, his purposes were a great factor in his subsequent career. The first outward manifestation of this factor in his professional activity was the erection, through her aid, of a private observatory near Cambridge, equipped with a large meridian instrument which was employed by Gould for some years, 1864-1867, in observing the positions of stars near the north celestial pole. But this contribution proved to be only the beginning of her long continued sympathy, stimulus, and aid, whose fruition is commemorated in the words prefixed by Gould two decades later to his Cordoba Zone Catalogue, "This catalogue of southern stars, the fruit of nearly 13 years of assiduous toil, is dedicated to the beloved and honored memory of Mary Apthorp Quincy Gould, to whose approval and unselfish encouragement the original undertaking was due, by whose sympathy, self-sacrifice, and practical assistance its execution was made possible, who bravely endured privation, exile, and afflictive bereavement that it might be worthily finished, but who has not seen its completion." What a pity that this tribute could not have been rendered within her lifetime.

Another interest embedded in those days of commercial activity must not be omitted. On March 3, 1863, President Lincoln approved an act to incorporate the National Academy of Sciences, naming B. A. Gould of Massachusetts as one of the 50 incorporators chosen as representative of American science. Tradition asserts that Gould was active in securing establishment of the academy. He certainly became active in its affairs from the very beginning of its corporate life. In January, 1864, at the first scientific session held by the academy he presented to it for publication an extensive and important paper entitled "Reduction of the Ob-

servations of Fixed Stars," made by Joseph Lepaute D'Agelet at Paris in 1783-1785. In this paper, published by the academy as its first memoir, Gould rescues from oblivion a meritorious series of observations made at an epoch when such work was rare, and which by lapse of time had become an important part of the material then available for the study of stellar motions. In August of the same year Gould presented to the academy its first biographical memoir, a eulogy of Joseph S. Hubbard, the first of its incorporators to be removed by death.

Following the completion of his commercial career, Gould suddenly appears in an unexpected rôle for which his prior training seemed to himself of doubtful adequacy, viz, actuary to the United States Sanitary Commission, charged with accumulating from the military and naval service of the United States extensive data relative to the physical character and quality of the men composing it. The commission's statistical bureau, of which Gould took charge in July, 1864, was a very considerable organization whose personnel contained more than a sprinkling of names subsequently famous. Its immediate duty was to collect, tabulate, and discuss vital statistics, e. g., the distribution among the troops, of age, stature, nativity, color of eyes, length of bone, pulmonary capacity, etc., and in Gould's words its "action was controlled by a constant regard to those hygienic and physiological laws which are already known, and by an anxious desire to discover and apply such other laws as might affect the welfare and success of our soldiers." Gould's energy and organizing power made amends for the scant familiarity with those "known laws" which he publicly confesses and deplors; and the "Statistical Volume," Volume III, issued by the commission, gives abundant illustration of the astronomer seeking to apply to new problems in a new field such familiar tools as empirical equations and the method of least squares.

Formidable obstacles to the work of his bureau speedily developed, apparently through professional reluctance to communicate valuable data to a rival organization, and the actuary found himself cut off first from the records of the Surgeon General's office and a little later, by direct order of the Secretary of War, from the records of The Adjutant General, United States Army. Despite the barriers thus opposed to him Gould succeeded in collecting, organizing, and publishing a great body of data whose value and influence are still held by competent scholars to be of the first importance.

It was while engaged in this work that Gould's attention and purpose were captivated by the beginnings of what was to become the *magnum opus* of his life. That part of the heavens visible from Europe had been surveyed and charted by astronomers, among whom his own masters and friends held a conspicuous place. Something of the same kind had been done by his friend Lieut. Gilliss for the region surrounding the south celestial pole, but between this area and that covered by the northern surveys lay a broad expanse of sky which, if not an absolutely virgin field, was at least one known only in the most fragmentary way. For its systematic exploration and the cataloguing of its stars Gould possessed both the will and the technical competence. As the project grew in his mind from a dream into an ardent purpose, he was assured that his Massachusetts friends were prepared to put at his disposal considerable sums of money for its achievement. The scheme involved, necessarily, his own expatriation for a time during which he should erect somewhere in the Southern Hemisphere a temporary observatory and should in two or three years make there the needed observations and then bring home his data for such study and treatment as should prove needful to bring forth their results and to fill the last great gap in the exploration of the sky. For information and counsel in the matter he turned to his friend Sarmiento, then minister of the Argentine Republic, resident in Washington. Were the local conditions in Argentina satisfactory for such a project? Would its Government welcome such a scientific expedition? What would be its status after reaching that country, etc.? The response was most encouraging. The Argentine Government would not only welcome the undertaking, it would adopt it as its own child, erect and maintain its observatory, not for a term of years only, but indefinitely, as a national scientific foundation. But the negotiations thus briefly summarized were spread out over many months, during which Gould's relations with the Sanitary Commission and with the Coast Survey were terminated and during

which he commenced ordering from Europe, upon his personal responsibility, the instruments required for the proposed work.

Meanwhile there came into the science of astronomy a new method of research with which Gould became early identified and with whose development he is closely associated. Lewis Rutherfurd, of New York, a pioneer in photography, had applied that art to the heavens and, overcoming very considerable difficulties by means of improved technique, he had obtained excellent large-scale photographs of limited areas of the sky. Much impressed by these photographs, Gould volunteered, in February, 1866, to investigate their possible utility as a new method of astronomical research. Rutherfurd had already designed and constructed apparatus for measuring the positions of the star images on the plates, and upon Gould devolved the task of investigating the new tools as well as the subject-matter to which they should apply, and of pushing both tools and plates to the utmost limit of attainable precision. A preliminary account of his first conclusions, based upon photographs of the Pleiades taken in March, 1866, was presented to the National Academy of Sciences in August of the same year, but much further labor was required before definitive results, from the photographs for the Praesepe group as well as the Pleiades, could be realized. After long delay, intended to secure to Rutherfurd the opportunity for prior publication, these final results were published by the academy in 1888, as a part of its memoirs for 1870. Here, in Gould's supplement to Rutherfurd's work, was shown for the first time that the photographic plate, when developed after exposure to the stars, gives not merely a picture of the sky but an accurate reproduction of it adapted to measurements of the highest precision. Mueller, one of the masters of modern astrophysics, characterizes this work in the words "Durch diese Arbeiten, welche zum ersten Male an einem grösseren Material die Anwendbarkeit der Photographie zu exacten Messungen am Himmel bewiesen, hat sich Gould auch in der Geschichte der Astrophysik einen hervorragenden Ehrenplatz verdient."

The scientific work accomplished by Gould in the 22 years following his first return from Europe must be designated by any just critic as distinguished in character and remarkable in amount. Consequent to this record, the year 1870 found him a man of middle age, established position and repute, but with his major work not yet seriously entered upon. An index to his outlook upon life at this period may be found in two notable addresses. In one of these, upon the physical character and constitution of the sun, delivered as a series of lectures before the Peabody Institute of Baltimore, he shows, as nowhere else, his interest in and familiarity with the new phase of astronomical research then coming into vogue which we now call astrophysics. That he did not actively engage in this new line of research was due to no lack of sympathy or appreciation of its promise. His address as retiring president of the American Association for the Advancement of Science, delivered at the meeting of 1869, is largely devoted to an exposition of his outlook upon the larger intellectual and spiritual interests of life. The "conflict between religion and science" filled the air of that day with its clamor, and Gould improved the opportunity offered by his position in American science to set forth earnestly and vigorously his conception of the relations between the intellectual and the spiritual life. Upon questions of this kind no man may pronounce definitive judgment, and the interest that still inheres in the address is not to be sought from this side. It is, rather, an *apologia pro vita sua*, an expression of the intellectual side of his own spiritual life.

Five years had now elapsed since his first approach to the Argentine envoy with the inquiries above noted. Sarmiento meanwhile had returned to his own land as its president and, for the development of its educational system, he had inaugurated a policy of emphasizing the natural sciences, with stress upon the element of research. Two years after this statesman assumed his high office, at his invitation Gould sailed for the Argentine, via Europe, to execute the projects that had been taking shape in his mind since 1865. Narrowly escaping entanglement in the Franco-Prussian War of 1870, he arrived at Buenos Aires as the southern winter was changing into spring and found his destination still far away. Proceeding by boat up the La Plata to Rosario, and thence northwestward by a newly constructed railway across the pampas, he found in Cordoba, the site chosen for his work, a mediaeval Spanish city of 30,000

people, set down in the new world but perpetuating in it the life and ideas of a bygone time. Capable of supporting life in a primitive but fairly comfortable fashion, the place was almost wholly devoid of accessories for a scientific establishment. Mechanical facilities of every kind, light, power, machinery, and skilled labor were almost unknown, and local assistance was of small avail save for the aid given by one or two Cordobans who had been educated in Europe. Foreseeing these conditions, Gould had made provision against them by ordering from home and from Europe not only the instrumental equipment required for his work, but much of accessory supplies, extending even to the framework of his proposed observatory. Most important of all, he had organized and sent on by ship direct from Maine to Argentina a party of four young men to be his assistants and collaborators in the proposed work. While they were not technically trained astronomers, Gould notes with much appreciation that a college education had prepared each of them for the rapid development of efficiency in his new environment.

Gould's early estimate that three years would suffice for the accomplishment of his observing program was soon made obsolete. War in Europe, pestilence and quarantine in America, produced extraordinary delay in receipt of his shipments. The five American astronomers found themselves beneath the southern stars but with no instruments for observing them, and with small prospect that any such equipment could arrive and be installed for many months to come. With characteristic vigor Gould rose to the emergency. Once before he had faced something of the same kind when the long delay in mounting the instruments of the Dudley Observatory had caused him to study the northern heavens with the naked eye and to set down in catalogue form the approximate position and degree of brightness of each star that should later be observed when the appropriate instrument was available. He now resorted to a similar idea for the virgin southern sky but with a difference of purpose and from a new view point that mark his own development in the intervening years. At Albany he had insisted that while the natural history of the sky may possess some interest, it is not the proper and serious work for an astronomer; "the study of the *motions* of the heavenly bodies is nevertheless the sole problem of astronomy." (Reply to the statement, etc., p. 95.) In accordance with this principle the naked eye work at Albany was a mere skirmish preparatory to a real campaign of observations that should be undertaken later. *Per contra* the Cordoba work was conceived as a serious problem in itself. It was to be a photometric work wherein certain empirical standards of stellar brightness set up by others among the northern stars should be extended into the southern sky by means of a carefully arranged program of observations with the naked eye or opera glass and in terms of these standards, revised and corrected if need be, there should be determined with all possible precision the brightness of every southern star visible to the naked eye. His own myopic vision might suffice for the work at Albany but he deemed it inadequate for that at Cordoba. The thousands of tedious observations required for this work were therefore executed by his associates while Gould planned, superintended, and inspired the work from beginning to end.

The final results of this work were published, under the special title *Uranometria Argentina*, in Volume I of that splendid series of *Resultados del Observatorio Nacional Argentino en Córdoba*, the first 15 volumes of which present the chief results of his life and work in South America. No attempt can here be made to abstract their contents but we may note that the *Uranometria*, completed in 1874 but not published until 1879, commanded the immediate and enthusiastic appreciation of astronomers throughout the world as a notable contribution to their science. At one stroke, Gould had raised our knowledge of the aspect of the southern sky to a parity with that which in the northern heavens had been attained by the labor of many astronomers through many years. He had rearranged the boundaries of its constellations as well as classified their content and with his new data had formulated and studied a wide range of problems extending from technical photometry to the structure of the universe.

The National Academy of Sciences took the unusual step of expressing through formal resolution its appreciation of this work accomplished by its absent member, and the Royal Astronomical Society (London) in 1883 bestowed upon Gould its gold medal in recognition of

the work. In presenting this medal the president of the society justly remarked that while the Uranometry "will be accepted for many years as the chief authority upon questions of \* \* \* magnitude \* \* \* it is certain from its very success to \* \* \* incite to efforts which must ultimately lead to its being replaced by something \* \* \* yet more accurate." Within our own generation we witness the partial fulfillment of this forecast. Gould's photometric methods have given way to others more precise which, however, verify the substantial accuracy of his work within the limits to which it could pretend. Some of his conclusions, such as the probable variability of most stars, and parts of his cosmogony must probably be modified or abandoned, but such is the law of progress and despite such change the Uranometria Argentina will long remain a landmark in the astronomy of the nineteenth century.

But we have overrun the course of events. Slowly, and under the stress of obstacles that sometimes looked like opposition, an observatory was built in the outskirts of Cordoba. Long delayed instruments arrived, were mounted into place and, two years after Gould's arrival in South America, a beginning was made upon the chief purpose of his expedition, the zone observations. Just as topography may be rapidly sketched upon a map after a sufficient number of well-defined reference points have been accurately plotted upon it, so in the sky when fundamental reference stars are available the zone observations furnish a facile method of interpolating among them *ad libitum* the hitherto unknown positions of other stars. But Gould found himself in the position of the geographer whose reference points are few and ill determined. The southern sky in that day was nearly void of material suited to this purpose and he must therefore determine for himself the positions of his fundamental stars while in the act of using them for reference. Thus there came about a great extension of the work originally planned and its division into three fairly distinct categories: (1) The accurate determination of the positions of a large number of fundamental stars, a program in which his own observations were to be largely supplemented by a collation and discussion of all available material that could be found in the work of others; (2) the zone observations, these were first reduced with provisional positions of the fundamental stars and afterward laboriously computed a second time when better data had been obtained for the reference points; (3) the construction of a *Durchmusterung* for the southern heavens, i. e., a second zone catalogue less accurate but more extensive than the first in which there should be found a complete muster roll of every star in the southern sky brighter than a given limit. The observations required for this program extended over many years and in making them, although ably assisted by his colleagues, Gould himself took a major part, involving more than a million independent judgments made with his eye at the telescope. The reduction and publication of this work required an even longer period than its observation, but the printer's "copy" for 15 bi-lingual volumes, Spanish-English, of *Resultados* was completed under Gould's own care and the volumes passed through the press, although the last of them barely reached his eye before it closed in death. These volumes must remain as Gould's chief monument. They worthily continue and complete the brilliant introduction furnished by the *Uranometria Argentina* and it is difficult to foresee an epoch in which they will cease to be the chief foundation upon which is built a knowledge of stellar motions in the southern heavens.

The execution of such a program brought with it through sheer lapse of time a change of personal relations to environment. The astronomical expedition, conceived as a scientific raid for the exploitation of a vacant field, became transformed almost into a missionary enterprise for transplanting and permanently establishing northern science in a southern field ready and eager to receive it. The camp became a residence with permanent quarters for the staff and a home for the director's family. The hearty cooperation of Mrs. Gould brought within the cultured influence of this home not only the observatory staff and their immediate neighbors but much of what was best in the social and official life of Argentina. Personal friendships here established paved the way not only to public support of the observatory but to a rapidly developing circle of relations in which Gould became an unofficial adviser and guide to the development of physical science in Argentina, a relation which flourished over a dozen years and more, up to the time when, with completed program, he returned to his native land.

In one respect Cordoba proved a sore disappointment. Its sky, while sometimes marvelously clear, revealing to the unaided eye stars of unprecedented faintness, was, upon the whole, no more free from clouds than that of Boston. In 1870 the data by which this condition might have been foretold did not exist. South American climatology was still in the embryo and one of the first extensions given to Gould's scientific program was the creation of a weather bureau and meteorological service for the Argentine. The Government, responding cordially to his advances in the matter, entrusted to him the establishment and development of such a service. Starting under conditions the reverse of favorable, with a competent personnel almost wholly lacking and with conditions of transportation so crude that the shipment of even a thermometer to a remote station was a hazardous undertaking, there was built up by slow degrees a modern meteorological bureau. Up to the time of his final departure from South America Gould retained active charge of this service, trained his own successor, one of his young American aids, and transmitted to his able hands not only an efficient bureau but a well-developed climatology for America south of the equator.

Almost immediately after his arrival in Argentina Gould was appointed by its Government to verify the standards of weight and measure actually in use throughout the Republic and to this duty there was added a large amount of work in determining the geographical positions of State capitals and in connecting by direct exchange of time signals the trans-Atlantic longitudes of the east and west coasts of South America. With a keen interest in the use and extension of the metric system Gould served Argentina as its representative on the International Commission for Weights and Measures and in similar matters made his influence felt in humbler bodies such as science clubs and organizations of engineers and surveyors.

It was perhaps with foresight of these other similar opportunities and demands that, just before leaving home, Gould, at the mature age of 46, allied himself with the order of Freemasons, a body with which he maintained active connection during the remainder of his life. At Cordoba he served as worshipful master of the Lodge of the Southern Cross and during the last decade of his residence abroad he acted as an official intermediary between the Freemasonry of North and South America. These relations must have rendered substantial aid to his South American career for, serving the Argentine Government under four different administrations, Gould maintained excellent relations with all of them and found in all a generous measure of support for his scientific work that seems to have been realized with increasing difficulty by his successors. He testifies to the cordial support given him by the Argentine Government at a time of war at home and abroad, and to the uniform sympathy and courtesy of a people strange to his modes of life and thought. While the extent to which these relations were aided by his Freemasonry must remain a matter of conjecture, that they were not its sole end and purpose is shown by his subsequent career at home where an admiring commentator notes with marked approval that "he served his lodge from its humblest office to the highest." He received with much pleasure his complimentary election to the thirty-third degree of the Scottish Rite, became deputy grand master of the grand lodge of Massachusetts, and declined to become a candidate for the office of grand master of the same lodge only because he felt himself ill adapted to the office. This lack of adaptation was doubtless because public speech was a burden to him and was undertaken only under compulsion. As a lad he had not been permitted to "speak his piece" at the college commencement "for lack of rhetorical ability," and his masonic brother notes with perhaps a touch of glee, as one who had caught great Jove nodding, "his rare and diffident attempts to speak in lodge \* \* \* anything less oratorical can not well be imagined."

Gould's relation to his assistants and his feeling for them is illustrated in the following condensed excerpts from an unpublished letter of February, 1884, which also brings into relief his own strong convictions of immortality: "A flash of lightning took from us one of the finest and noblest young men I ever knew, Chalmers W. Stevens, one of my mainstays whom I loved as a younger brother or son, and whose devotion to the work has been intense. I had promised him six months leave of absence and in May he was to start. Yesterday we buried him in the Protestant Cemetery lately opened here. The concourse was very large for he was a universal

favorite. And tears flowed very freely. To-day I have had the terrible duty of writing to his old father in New Hampshire that the son he was so proud of is not coming. It would not in the least surprise me were they to meet in the other world before they could have met in this."

The spirit here shown may be regarded as an exceptional manifestation called forth by a tragic event. But even in the more ordinary routine of life at Cordoba Gould's relation to his immediate environment, the observatory staff, contained much that was cordial and stimulating albeit mixed with metal of a different quality. Diverse though not irreconcilable impressions of the man and master find expression after the lapse of many years in the words of two of his assistants. To one of these "He was a difficult master to serve; his methods were often indirect. He did not develop a loyal feeling among us, while I was there, rather the reverse," and there are suggestions of sarcasm as a lash in frequent use. Quite different are the words of another: "I believe that Dr. Gould accomplished systematically and intelligently all that was possible under the circumstances. He was very hard working and painstaking, methodical in the care of books, papers, records, and generally inspired his assistants with an excellent disposition to do everything possible."

Black sheep there were among his assistants who plundered or sought to plunder from their colleagues both prestige and pelf. But happily these were of alien race and every American assistant proved loyal to his trust. They frequented the director's home and shared its sunshine and its showers. In sorrow they sympathized in the bitter bereavement that came to that home in 1874 through the drowning of the two older Gould children, girls not yet in their teens. While on a birthday outing one of the girls, playfully venturing into the river, Rio Primero, not far from their home, was caught and swept away by its swollen torrent. The sister and the nurse, hastening to her aid, were similarly engulfed and the disaster was complete even before word of it could be brought to the near-by parents. Three children, Alice Bache, Benjamin Apthorp, and Mary Quincy, survived this terrible disaster and all were still living in 1921. But the solace they brought to Gould's later years could never completely efface the shock given to the parents by the tragic death of the older girls. Under its depressing effect Gould returned to Boston late in 1874 for a brief vacation in which to recuperate his forces. He was received with open arms by his old friends and townsmen and at a public banquet given in his honor he made an address in explanation of his work and purpose in South America, from which some parts of the present memoir have been taken.

He returned to the Argentine with the shadow still heavy upon him and with an ever-growing burden. Nearly 10 years later, following Stevens' tragic death, he writes to a former colleague in the Sanitary Commission: "It will be harder than ever for me to keep on now in the dreary separation from my children and home. But there are two grand fellows left me. I am sure they will stand by and I mean to stick to my colors while strength permits. That the need of help is sorer than ever you will well understand." A great loss that had newly come into his life finds reflection rather than expression in these words. During a vacation home in 1883, Mrs. Gould passed away and on his return to Argentina his children were left in New England for training under the influences that had nurtured him. The increasing loneliness of these years was in some measure relieved by the very extensive correspondence which he maintained with a wide circle of friends and fellow scientific workers in the Northern Hemisphere. The collection and publication of this correspondence, if feasible, would be an admirable contribution to the history of astronomy in the nineteenth century.

But as the hours grew darker the end of his exile was near at hand and in 1885 he severed his official relations with Cordoba and turned homeward, a broken man with shattered nerves, but with interest in life unshaken and with the power and will to work still strong within him. Not all that he had planned to do under the southern sky was complete but the omissions were few and inconsiderable. His major work, relating to star positions, was finished even to the printer's "copy." Some proposed investigations involving stellar spectra had perforce been crowded out of his program, but in the midst of his official duties and despite their pressure he

had found time to begin his proposed private work in astronomical photography; its completion was reserved for future leisure.

The work done upon the Rutherford photographs, in the late sixties, led Gould to borrow the lens that had produced these plates and to take it with him to South America for similar work upon the southern sky. But the pressure of duties incident to his early residence in Cordoba left no leisure for collateral work and the photographic apparatus long rested undisturbed in its packing box. When finally opened the lens was found broken across the middle with no clue to suggest how or when the accident had occurred. Prolonged and partially successful attempts at its repair were finally abandoned and a new lens ordered. But much time had been lost, and even after the new lens had tardily arrived and was put to work Gould's feelings were outraged by the treachery of an assistant, privately employed by him for the photographic work. Nevertheless, by 1885 some 1,400 photographs of southern star clusters had been obtained with the new lens, and the plates were brought back with him for measurement and study. This work, extending over the remaining decade of Gould's life, was, by the care of friends, published after his death, in the noble quarto volume that bears the title "Photographic Observations of Star Clusters from Impressions Made at the Argentine National Observatory. Measured and Computed with Aid from the Argentine Government, by Benjamin Apthorp Gould, 1897." The work is devoted to an accurate determination of the positions of stars in certain regions of the sky where they are crowded together in unusual degree. It lays the foundation for problems of stellar motion that are still far from solution, and as such foundation it is worthy to stand as its author's last contribution to astronomical science. At a much later date, all of these Argentine photographs were sent for further discussion to Prof. E. C. Pickering.

It is perhaps a misnomer to call the Cordoba photographs Gould's last work unless there be bracketed with such statement mention of a very different phase of his activity subsequent to 1885. Carrying out a long-cherished purpose, in 1886 he resuscitated the *Astronomical Journal* and announced in the preamble to its seventh volume: "The publication of the *Astronomical Journal* was discontinued in 1861, with great reluctance, yet with undoubting hope, that the suspension would be not only temporary but brief. In August, 1869, the arrangements for its reestablishment had been fully matured when they were interrupted by circumstances known to astronomers. The delays thus occasioned have been unexpectedly long, but after the lapse of 25 years all impediments seem to be at last removed, and no reason is apparent why the resumption may not now be regarded as permanent." It must have been with a feeling of profound satisfaction that Gould penned these lines and his faith has been justified by the event. Under his editorial care, supplemented by that of his long-time pupil, friend, and colleague, S. C. Chandler, the *Journal* flourished for a decade, and to the present day his successors have conducted it in his spirit for "the advancement rather than the diffusion of astronomical knowledge."

Again taking up his residence in Cambridge, Gould found himself in the succeeding decade a prominent citizen of the larger community, Boston, and a public character in its civic and social life. His return was celebrated by a public dinner in his honor in which Boston's best participated by speech as well as by presence and at which the venerable Oliver Wendell Holmes recited a poem, written for the occasion, whose opening lines, despite their lurking humor, seem fairly to represent the prevailing temper:

Once more Orion and the sisters Seven  
Look on thee from the skies that hailed thy birth.  
How shall we welcome thee whose home was Heaven  
From thy celestial wanderings, back to earth?

The scientific staff of the United States Coast Survey sought to have Gould placed at the head of that organization, but in vain. His remaining years were to be spent in the home of his youth, and there, supplementing his extended scientific and professional relations, he speedily became interested and active in many local organizations that collectively must have imposed large demands upon his time, e. g., in addition to his active participation in Masonry, already



noted, he became an organizer and first president of the Colonial Society of Massachusetts, president of the American Metrological Society, vice president of the Bunker Hill Monument Association, vice president of the Massachusetts Society of Cincinnati, an active member of the American Antiquarian Society, etc. It was during this later period of his life that Gould gave considerable attention to the pseudoscience of astrology. This activity, however, seems to have found small public expression and connotes, presumably, nothing more than pure curiosity concerning a phase of human interest in the sky that never outgrew the chaos of primitive ideas.

In the summer of 1896 he met with a slight accident in the streets of Boston, whose effects, while not in themselves serious, persisted in the partial incapacity of one foot. He treated the matter lightly but on November 26, 1896, as he left his room to go and join in the festivities of a Thanksgiving dinner at the home of his youngest daughter, the foot failed him, he fell down a flight of stairs and received a shock from which he never rallied. Death ensued within a few hours.

Quite naturally his departure was the occasion for many a tribute to his life and work and the widely varied character of these tributes testifies to his many-sidedness. From his local associates in organizations of the type noted above, I select a few that are typical of many: "His erudition upon the subject of the early settlers of this community was a source of surprise to those who knew him only as a scientific man." "He was a delightful companion, being endowed with conversational gifts of a rare quality." "He was ever ready with fitting anecdote, apt quotation, or witty rejoinder." He was one "ever ready to enliven his talk with a merry jest but whose profound religious convictions could not fail to impress themselves upon all whom he met." "He was fond of poetry and when in the mood would often cap a sentiment with a quotation." Others comment upon his remarkable memory, retentive to an extraordinary degree, of many things other than history and poetry. Perhaps none of these tributes more aptly illustrates the social side of his character than do his own words to a local organization, that so long as he was its president "a good dinner and good wine should never be wanting as an adjunct to" its meetings.

To his professional work and scientific achievements tribute is paid in numerous journals and through the transactions of academies and learned societies that had, in life, enrolled him in their membership, *honoris causa*. The complete list of these and other like honors is too long for reproduction here but typical among them are:

The Royal Society, London;  
The Royal Astronomical Society, London;  
Académie des Sciences, Institut de France.  
Bureau des Longitudes, Paris;  
K. Akademie der Wissenschaften, Berlin;  
K. Akademie der Wissenschaften, Wien;  
K. Gessellschaft der Wissenschaften, Goettingen;  
Académie Impériale des Sciences, St. Petersburg; etc.,

to which should be added the order *Pour le Merite*, Prussia, an honor rarely bestowed upon a foreigner.

While such expressions of affectionate esteem are pertinent to a judgement of the whole man, it is the purpose of this memoir in chief part to set forth and insist upon the more serious and sterner parts of his character. To present him as a man of clear intelligence and strong will, *vir tenax propositi*, whose life was given whole-heartedly to one purpose early defined and never abandoned, the upbuilding of science in his native land. With such an outlook upon life, there is inevitably associated a firmness of conviction regarding matters small as well as great, that may be courteous but must be inflexible. There goes with it, also, a certain insistent demand for recognition of personal achievement that sometimes prompted Gould to lay a heavy hand upon the presumptuous or careless wight who ventured to attribute to another the product of his own mind and pen. Varying phases are these, of one primal impulse, a sense of duty, a categorical imperative, that ruled his life.

To the record of this career there must be appended one further item. Through the subsequent action of a daughter, Miss Alice Bache Gould, there was created and vested in the National Academy of Sciences a trust fund of \$20,000 to be known as the Benjamin Apthorp Gould fund, the income from which is devoted, in perpetuity, to aid research in those branches of astronomical science to which the father's career was related. His works do follow him.

## BIBLIOGRAPHY.

The following bibliography is for convenience divided into four sections, viz:

- A. Major works, for the most part independently printed.
- B. Minor articles, usually contributed to periodical literature.
- C. Notices of new books.
- D. Obituary notices of astronomers.

The titles under the last two categories, C, D, for the most part relate to articles contributed to the *Astronomical Journal* by Gould as its editor. For dates subsequent to 1890 they are commonly unsigned, and in view of S. C. Chandler's activity in aiding Gould, some doubt may be entertained as to the real authorship of the later titles.

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- Orbit of Flora.  
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