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EDWARD SALISBURY DANA

Three generations of service to science, spanning practically all the nineteenth century and the first third of the twentieth, came to an end with the death of Professor Edward Salisbury Dana on Commencement Sunday, 1935. Beginning with the appointment of Benjamin Silliman to the chair of Chemistry and Geology at Yale in 1802, continuing with his son Benjamin, and then through the Danas, father and son—all four authors, investigators, teachers, and editors—it constitutes an unusual record in scientific annals.

In the matter of inheritance, Edward Dana stood at the crossing of a number of notable family lines. The Danas, tracing descent from Richard Dana, who settled in the town of Cambridge at least as early as 1640, and from Anne Bullard, his wife, gave to the world many distinguished sons, among them authors (notably Richard Henry Dana, Jr.), ministers, a United States senator, a governor of Maine, a professor of Chemistry at Dartmouth, and a well known editor, Charles A. Dana, who was also assistant secretary of war in 1864-1865.

James Dana, of the fourth generation, born in 1780 at Ashburnham, Massachusetts, settled at Utica, New York, as a hardware merchant, and died there in 1860. He took to wife in 1812 Harriet Dwight, of Williamsburg, Massachusetts. James Dwight Dana, eldest of their ten children, and father of Edward, was born in 1813. Attracted to Yale by the renown of Silliman, he entered with the class of 1833, and remained to become the foremost American geologist, as well as one of the world's leaders in that science. He held the professorship of Geology until his retirement in 1890, and died in 1895, at the age of eighty-two.

Henrietta Frances Silliman, Edward Dana's mother, was the daughter of Benjamin Silliman and the granddaughter of General Gold Selleck Silliman, of Fairfield, Connecticut, a personal friend of George Washington. Her mother was

Harriet Trumbull, of a family long distinguished in Connecticut history. Of his grandmother Silliman, Dana said that she was "a devoted mother of a serious nature and deep religious feelings and beliefs," while his grandfather Silliman was described by him as "a man of broad mentality, high ideals, and deep religious convictions. A very genial, lovable personality who made a strong impression on his children and grandchildren."

Both the Trumbull and Silliman lines trace direct descent from John Alden and Priscilla Mullins, and date their coming to America from the arrival of the *Mayflower*.

Edward Dana's life is readily divisible into four periods. During the first one (1849-1873) he grew to manhood and acquired the education necessary for a man who was to teach science in a university. He was born on November 16, 1849, in the house which his father had built on Hillhouse Avenue, across Trumbull Street from the Silliman home, and in this house he lived throughout most of his life. His christian names were given him in honor of one of his father's closest friends, Professor Edward E. Salisbury, the first professor of Sanskrit in America. He died of arteriosclerosis on June 16, 1935, as his College class was gathering for its sixty-fifth reunion. On October 2, 1883, he was married to Caroline, daughter of William Brooks Bristol, a member of a family long prominent in the legal profession in New Haven; she died in 1916. They had three children, Mary Bristol (now the wife of Alexander C. Brown of Cleveland), James Dwight, and William Bristol. Dana is also survived by a sister, Maria Trumbull Dana, a brother, Arnold Guyot Dana, seven grandchildren, and one great-grandchild.

In appearance, Edward Dana was somewhat shorter than his father, but had the same quickness of movement. His full head of hair, gray to white in the thirty years that the writer knew him, framed a somewhat ruddy face, lit by a pair of wide-open, very blue eyes, which were usually smiling. A generous mouth showed the humor that was one of his marked characteristics. Intellectually alert, interested in the world at large, modest, keen to the last about all advancement in scientific matters, friendly and charming of manner, "Eddie" or "Ned" Dana, as he was affectionately known among College men, was a remarkable and lovable man.

Of himself, he said that one of his strongest characteristics was his love of Nature, inherited both from his parents and

from his maternal grandparents. He was a famous walker, finding in this pastime the rest and recreation his uncertain health needed, and climbing Pemetic Mountain on Mount Desert Island in his eighty-fifth year. Continuing the custom of his father—and, indeed, of all the professors who lived on Hillhouse Avenue in those early days—he acted as his own mail carrier, and every morning, rain or shine, his sturdy gray-clad figure could be seen coming up the avenue with the day's grist of mail for the JOURNAL, his only concession to winter weather being the addition of a sweater under his suit coat. His feeling for Nature was well expressed in the foreword to *Walks and Rides in Central Connecticut and Massachusetts*, a little book published in 1932, which grew out of his father's *The Four Rocks, with Walks and Drives around New Haven.* He says:

"It is encouraging that amid the complexities of modern city life the natural charm of the country keeps a nearly universal appeal. One author has recently said of the love of beauty: 'It is the greatest gift a human being can have. Life is full of beauty and the happiest people are those who know how to collect it.' . . . There are many forms of beauty, appealing to those with senses keenly alive and minds well trained, but the beauty of Nature alone is open to all and demands the least previous knowledge. While the love of the beauty of Nature is given to different individuals in varying degrees, there is no limit to its increase, and this should go on as long as life lasts."

This intense love of Nature found fullest expression during the summer months, which he spent at Seal Harbor, Maine. The Mount Desert country had been brought to his notice in the nineties, when he was in search of relief from hot weather, which affected his health. A visit to the island brought enchantment, and in 1896 he built one of the first summer homes on the cliffs above Seal Harbor, and thus became witness to its development into the fashionable resort of to-day. Here his wife and he found their earthly Paradise, and here they both are buried.

Dana's delight in Nature was at its peak only when it was shared, as was his joy in books, in poetry, and in music. He had a rare gift for companionship. He was, moreover, a lifter of burdens, be they mental or material, and he was never too busy to lend an interested and sympathetic ear to those on whom the shadows fell thick. It was his pride, also, that he had ironed out many a misunderstanding between

others, often with the light touch of humor that so successfully dissolves such mists. Because of this deep store of kindliness, a host of friends, cultivated through his long life by frequent contacts and by active correspondence, find the world he has left a sadder place.

It will never be known to what extent Dana helped the needy in New Haven, although he was a generous contributor to the Community Chest from its inception. It is also known that he frequently aided members of the University and their families when they were in need, and that after the Great War his heart opened to the families of his teachers in Vienna. In 1929, on his eightieth birthday, the Vienna Academy's greeting to him ran:

"We recognize you as the master and leader of American mineralogists, and we of Vienna may rightfully claim Edward S. Dana as one of ourselves. Since 1873 bonds of personal friendship have been formed between you and a number of physicists and mineralogists in Vienna. . . With this circle of friends you have kept faith during one of the saddest times which Vienna and Austria have ever experienced. When the State was finally unable to protect Austrian scholars of world-wide fame and their families from bitter need, you have remembered your friends and, with the courage of a kind heart, have been one of the first to collect funds for their support. We all think of you with lasting gratitude."

Dana prepared for college at the venerable Hopkins Grammar School in New Haven, and in those early years he was already interested in collecting ferns and lichens. Entering Yale College in 1866, he says he "sat on the benches" and found his college years "full of interest, pleasure, and reward." Near the close of his freshman year he was given the Hurlbut Scholarship and he was graduated with a Philosophical Oration stand. Popular with his classmates, he was elected to five societies, Brothers, Delta Kappa, Phi Theta Psi, Psi Upsilon, and Scroll and Key. During these college years, he formed warm friendships, notably that with Robert W. de Forest, former director of the Metropolitan Museum of Art, which was to endure throughout their lives.

Leaving college, Dana entered the Sheffield Scientific School to take up graduate studies, giving special attention to Mineralogy under Professor Brush (1870-1872). In May, 1872, he went abroad, and after traveling about during the summer he settled down in October at Heidelberg for the

winter and summer semesters. The following winter term he studied Mineralogy and Chemistry at Vienna under Tschermak and Lang, and in April, 1874, he returned to New Haven to take the M.A. degree. While he was at Vienna, a remarkable incident occurred, of which he wrote Doctor Waldemar Schaller recently as follows: "I smile sometimes when I think of the young American student sitting at an alcove table in the Hofmineralien Cabinet while Kaiser Wilhelm, Prinz von Bismarck, and Kaiser Franz Josef walked around the room, chatting familiarly together."

During the summer of 1875, Dana made an extensive reconnaissance trip with George Bird Grinnell as a member of Captain Ludlow's expedition from Carroll, Montana Territory, to the Yellowstone National Park. What they saw in the way of geology is interestingly told in forty-two pages of the Ludlow volume, and forms one of the only two geological reports Dana ever wrote. The fossils they collected were described by R. P. Whitfield.

After his return from abroad, Dana began his productive period of research (1874-1892), but as it was necessary for him to earn a living, and as there was no opening at Yale in Mineralogy (and, although, as he remarked, he was most proficient in Greek!), the fates decreed that he should take a tutorship in Mathematics, Physics, and Chemistry, which he held until 1879. In that year he became assistant professor of Natural Philosophy, and in 1890 was made professor of Physics, holding that chair until his retirement in 1917. It seems curious that, with his great reputation in Mineralogy, his teaching career should have been devoted almost wholly to another science.

The years between 1880 and 1893 were Dana's most strenuous ones, because, in addition to his teaching, he was defining terms in Physics and Mineralogy for the Century and Webster dictionaries, turning out many papers on research in Mineralogy, and writing text-books. The strain finally proved too great for his strength, and in March, 1893, he became nervously prostrated, a breakdown that necessitated the cessation of all work. From that time on, his health was a matter of concern, as was his father's before him. Accompanied by his wife, he sought health in Europe from the fall of 1893 until the beginning of 1895, when he resumed his duties, but he found that all of his hoped-for research work must be given up. In these later years (1893-1917), he

said that his work consisted of a moderate amount of teaching, a good deal of administration in the College faculty and in the Peabody Museum, and the editorship of the AMERICAN JOURNAL OF SCIENCE. In January, 1902, he had a second breakdown and again was compelled to give up college work until September, 1903, when he took up a very limited amount of teaching and carried it on until his retirement in 1917. His emeritus years (1917-1935) were devoted largely to the JOURNAL.

As has been stated, Dana's chief work as a teacher was done in Physics. Nevertheless, from 1880 onward he did teach Mineralogy to a small class of College seniors in the Peabody Museum lecture room, where he had installed a table for blowpipe analysis. Dean Charles H. Warren of the Sheffield Scientific School, one of his students in elementary Physics and Mineralogy, says that he was "a delightful teacher and gave a human touch to Physics which was not then and is not now particularly characteristic of teachers of that subject." Professor D. Albert Kreider, one of Dana's colleagues in Physics, adds the following:

"Professor Dana was conspicuously successful as a teacher. From 1874 to 1917 he was in charge of the course in elementary Physics in Yale College, perhaps the most arduous course to handle successfully with the general student. In spite of the inherent difficulties encountered by beginners in the subject, combined with the mathematical requirements, the course in Physics under Professor Dana continued to draw large divisions even during the development of the elective system and its introduction of many courses in which the standards were much less exacting.

"Always bright and vivacious, Professor Dana took his position at the lecture table with a brisk step and pleasant smile. With a minimum of formality he picked up the threads from the previous exercise and proceeded without notes, at high speed and with the rapt attention of the students to the end of the hour. His method was first, by a quiz, to locate the boundary between understanding and uncertainty, and to excite the student's interest. This led naturally to a discussion in which the class was induced to assist. Dana's own contributions to these discussions were marvels of lucidity. Dexterous with the crayon, he would, with the minimum strokes, clarify every essential detail. Finally, with the student prepared to comprehend what he was to see, there

followed such experimental demonstration as the relatively limited apparatus of his day afforded. He was a master in every form of presentation. Admittedly his method was not economical of time or energy, but it was effective."

Regarding Dana's research work in Physics, Professor Leigh Page, another of his Yale colleagues, remarks as follows:

"Dana was occasionally led to investigations of a more strictly physical character. Such for example, are the studies 'On the Thermo-electrical Properties of some Minerals and their Varieties,' undertaken in conjunction with A. Schrauf. Earlier authors had reported that the same mineral was positive or negative with respect to copper. Suspecting that the variability of the previous results was due to the presence of impurities, Schrauf and Dana show that the change in position of a mineral in the thermo-electric series is directly connected with a change in density, which they take as representing a change in chemical composition.

"Professor Dana's duties as a teacher of undergraduate Physics led him to issue in 1881 *A Text Book of Elementary Mechanics for the Use of Colleges and Schools.* In this text he presented the fundamental principles of the subject accurately and in logical order, and in as clear, simple and concise a form as possible. The book attracted the favorable attention of reviewers, and was used successfully for many years.

"As editor of the AMERICAN JOURNAL OF SCIENCE, Professor Dana attempted to maintain its tradition as a general scientific journal covering all branches of science. Many important contributions in Physics were published in the JOURNAL, notably the epoch-making papers of Henry, Gibbs and Michelson. Even after the institution of journals devoted to Physics alone, many noteworthy papers on Physics appeared in the JOURNAL, and, during the entire period of Professor Dana's editorship, the accounts of current physical discovery, published under the heading 'Scientific Intelligence,' and the reviews of current literature in Physics, continued as valuable and, in many respects, unique features of the JOURNAL."

Dana considered that his inborn taste for the natural sciences came to him from both his father and his mother. When he was a boy, his father was already the most philosophical mineralogist and geologist in this country, and it was but natural that minerals and rocks should have been among

his playthings, and that this interest should have followed him into his college years. In his "delightful" post-graduate years in Sheff, he found further stimulation from Professor Brush, another close friend of his father. Here, too, he developed an interest in Chemistry and in the optical properties of minerals, studies that he continued to pursue for two years longer under the best masters in Germany and Austria. Completing his dissertation, *Trap Rocks of the Connecticut Valley,* Dana received Yale's Ph.D. degree in 1876. This paper and an earlier one blazed the way for the development of a new science in America, namely, Petrology. Regarding these studies, still another of Dana's colleagues, the late Professor Louis V. Pirsson, had this to say:

"The first investigation of a rock and its constituents from the petrographic point of view was made in 1872 by Professor E. S. Dana and published in the AMERICAN JOURNAL OF SCIENCE. The title of this paper was 'On the Composition of the Labradorite Rocks of Waterville, New Hampshire.'" During the next two years Dana studied microscopical petrography in Europe, and his memoir on the Connecticut traps, cited above, was "the first important memoir in this science published in this country."

At this juncture it will be of interest to trace briefly the upwelling of Mineralogy at Yale during the nineteenth century, into which Edward Dana was born. Previous to 1798, there were no collections or teachers of Mineralogy in America, and Benjamin Silliman tells us that in 1802-1803 he found it "almost impossible" to have a common stone or mineral correctly named. He had in his possession a "candle box" of unlabeled stones, and with these in hand he traveled to Philadelphia, then the scientific Mecca, to see Professor Adam Seybert, who had just returned from the Mining School at Freiberg with the lore gained from Abraham Gotlob Werner, the world's greatest authority on minerals and mining, and a most alluring lecturer on those subjects.

The actual upbuilding of the science of Mineralogy in America began with the great collector, Col. George Gibbs, of Rhode Island. Gibbs had traveled widely throughout Europe in 1805-1807, gathering minerals right and left, and buying two famous collections, that of Gigot d'Orcy of France and that of Count Grégoire de Rajamowsky of Russia, returning home triumphantly with the most extensive and most valuable mineral collection in all America, a distinction

that it held for three-quarters of a century. Soon Silliman was at Newport, admiring and studying the Gibbs collection, and finally he made arrangements for its display at Yale College in 1810. In 1825, the entire collection was purchased by friends of Silliman and the College. This collection, coupled with the inspiring teaching of Silliman, Brush says, did "more to create an interest in and disseminate a knowledge of Mineralogy in this country than any other single agency."

Even with this great collection available, however, there still remained a drawback to the spreading of mineralogical knowledge, since no up-to-date text-book on the subject was published in America until 1816, when an excellent text on Geology and Mineralogy was written by Professor Parker Cleaveland of Bowdoin College.

The mineral lore of Gibbs and Silliman was inherited by James D. Dana, and it was constantly furthered by him through his famous *System of Mineralogy*, first published in 1837, a book which by 1883 had placed Dana among the foremost mineralogists of his day, its appearance being, according to Brush, "an event of surpassing importance in the development of the science."

From the elder Dana the torch of Mineralogy at Yale passed on to George J. Brush, who published in 1874 a *Manual of Determinative Mineralogy*. Brush was an inspiring teacher, and during the decade 1864-1874 his disciples spread his teaching to many other institutions of learning. Through Brush there was thus developed in the Sheffield Scientific School during the middle part of the nineteenth century the greatest school of Mineralogy in America. What was accomplished by the two Sillimans and James D. Dana in Yale College between 1835 and 1901 is strikingly shown by the 100 research papers and books treating of Mineralogy published during those years; while from the school of Mineralogy in the Sheffield Scientific School came between 1849 and 1901 no fewer than 200 similar publications. These 320 articles by instructors and students at Yale had 52 different authors, most of whom were leaders in the science; and nearly all these publications appeared in the AMERICAN JOURNAL OF SCIENCE.

With this background and inheritance, it is small wonder that Edward Dana found Mineralogy an enticing field, and it is fitting that an appreciation of his accomplishments therein should come from the present professor of Mineralogy at

Yale, William E. Ford, collaborator in later years in the *Text-book of Mineralogy*. Professor Ford says:

"Dana's first mineralogic paper was published in 1872 when the author was only twenty-two years old. It was a description of the crystals of the mineral datolite found at Bergen Hill, New Jersey. Many of his succeeding papers (47 in number) during the years from 1872 through 1890 were concerned with the crystallographic and optical descriptions of minerals. Noteworthy are those on the crystallographic and optical characters of chondrodite, on the twin crystals of staurolite and pyrrhotite, on the crystallization of danburite (the first complete description of the crystallography of this mineral), on crystals of monazite from North Carolina and of stibnite from Japan, on the crystals of gold and of the native copper from Michigan, on the crystals of brookite from Magnet Cove, Arkansas. Included in the papers of this period are the descriptions of the new minerals beryllonite and durdenite, both papers written in collaboration with H. L. Wells.

"The mineral locality at Branchville, Connecticut, was first discovered in 1876 and two years later Brush and Dana began the publication of a series of papers describing this astounding deposit. Only one other mineral occurrence in the United States, that of the zinc ores at Franklin, New Jersey, can be said to have excelled it in its interest and importance, and indeed few deposits in the world have contained so many new and interesting mineral species. The Branchville papers were five in number. The first four appeared in rapid succession from 1878 to 1880, while the last was published ten years later, in 1890. From Branchville some fourteen different minerals were described by the authors, nine of which were at that time new species. It is interesting to note that with the exception of two or three all these minerals have since been found at one or more other localities. One of the papers was devoted to a detailed description of the spodumene found in the deposit, with its very interesting alteration products. For all these papers Dana furnished the crystallographic and optical data.

"Important as Dana's research was, his greatest contributions to mineralogical science were in the books he published. Because of these and their influence his fame became world-wide. Following in his father's footsteps, his first book was the *Text-book of Mineralogy*, published in 1877. It contained

not only descriptions of the minerals but chapters on Crystallography, Optical Properties, Chemical Tests, etc. It at once became the most important text-book of the subject that had been published in English. Twenty years later, after the publication of the sixth edition of the *System*, the Text-book was entirely rewritten for its second edition. The section on Crystallography in particular was greatly changed and became the first important modern treatise on this subject. This book has since appeared in two later editions.

"Another of his books is *Minerals and how to Study them*, appearing in 1895. This little book is skillfully written and still is one of the best of the elementary introductions to the subject."

Dana's outstanding contribution to mineralogical science, according to Professor Ford, was his publication in 1892 of the sixth edition of the James D. Dana *System of Mineralogy*, with 1134 pages. On it his fame securely rests. "This book, while based upon the previous editions by his great father, with further help from Professor George J. Brush, was entirely rewritten, and because of the rapid growth of mineralogical research during the preceding twenty years was of necessity much enlarged. It was a very great task for one man to accomplish, practically unaided. He is said to have worked about ten years upon the book and at such pressure as to have seriously injured his health. He, himself, has told that in the reading of the final proof the discovery was made that during the casting of the plates some of the minus signs placed above certain of the crystallographic indices had been lost. This necessitated the added burden of a most careful checking of the entire proof in order to make certain that all such errors had been corrected.

"One of the most important contributions made by this book was in the character of the crystallographic descriptions. Dana had all the crystal constants and interfacial angles recalculated, a great work in itself. Many errors in previous descriptions were in this way discovered and in many instances new and better crystal orientations were discovered and adopted. He set a standard in this part of the work that has had a great influence upon all succeeding crystallographic investigation. The book showed great judgment and discrimination in the selection and arrangement of its material, always a most difficult task in writing a book of this character. His success is evidenced by the constant reference in the literature

to 'Dana' in controversial matters. One of the most notable features of the book is its extraordinary accuracy. During the more than forty years since its publication very few errors, even those of a typographical kind, have ever been discovered. It at once became the leading mineralogical treatise in any language and in many ways has remained unchallenged. Without question it has been the one book most universally referred to as an authority by mineralogical investigators during this period. Through it Dana influenced the science more than any other individual of his generation. In 1899 he published the first appendix to this edition of the *System.* Two other appendices have since appeared, in 1909 and 1915. At the present time the seventh edition is in preparation."

The Dana *System of Mineralogy*, according to the late Professor S. L. Penfield, has served to make Yale University "known throughout the entire scientific world as a center for Mineralogy, and it is doubtful whether any other place at home or abroad has exerted a like influence." Professor Charles Palache, of Harvard, in a letter, remarks that the Dana *System* "is the Bible of every mineralogical institute which I have ever been in." Dr. Waldemar T. Schaller adds that, great as was the reputation of James D. Dana, "it did not overshadow that of his son. I have been told by others and found it true myself in 1912, that every European mineralogist has Dana's *System of Mineralogy* on his desk. I well remember how pleased he was when on a visit to Washington we showed him a copy of his book so much used that it was all frayed and worn and literally worked to pieces. He was so gratified that on his return he had a new copy sent us with his compliments. I think I have worn out three copies during the thirty years I have been on the United States Geological Survey."

Earlier in this article, mention was made of the fact that, in addition to teaching and research, Dana was called on for a great deal of administrative work of various kinds. In 1876, the first Peabody Museum building was completed, and as the large collection of minerals belonging to Yale College, of which the elder Dana had long been curator, needed to be transferred to the new Museum, Edward Dana, in anticipation of this transfer, was made curator of Mineralogy in 1874. The revised installation was shown in a large room on the first floor, and when the writer saw it for the first time in

1892, he thought the installation and the collection the best he had so far seen. This mineral collection had long been acknowledged to be the largest and the most important scientifically in America, and around it the Peabody Museum had grown. Accordingly, a good deal of Dana's time went into the husbanding and expanding of this collection, and into the building up of a meteorite collection, which now has about 325 separate falls. From this curatorship Dana retired in 1922.

Again following in his father's footsteps, Dana was made a member of the Board of Trustees of the Peabody Museum in 1885, becoming the secretary of this Board in 1895, and, after the death of Professor O. C. Marsh in 1899, taking his place as chairman, an office that he held until 1929. He was deeply interested in the Museum's welfare, and his part in the negotiations that led eventually to the building of the new Museum is brought out by Dean Jones later in this memorial.

Important administrative duties in Yale College devolved on Dana as early as 1883, and in time he became the "perennial committee man." In later years he rose to be a power behind the throne in College affairs, and it was evident that this was a rôle that he loved to play. To his service for the College between 1883 and 1922, Dean Emeritus Frederick S. Jones bears the following testimony:

"Among the important duties imposed upon Professor Dana by the Faculty, we find him appointed in 1883 to revise the regulations of the College; in 1884-85 to revise the course of study; to adjust the hours of junior and senior recitations and to correct and regulate the activities of the junior societies. In 1886 he recommended rules for the abatement or remission of the tuition of needy students; in 1887 he outlined the changes in required studies, formulated the rules for the regulation of undergraduate dramatics, and was appointed a member of the Standing Committee on Honors. Later on he took personal charge of the undergraduate choices of elective subjects, arranged the division of large courses into smaller units, passed upon applications for changes in electives, and prepared a detailed program of semi-annual examinations. In short, Mr. Dana was always the available man for special duty. When it became necessary to consider the appointment of a successor to Dean Wright, Mr. Dana became chairman of the committee to recommend a candidate and he conducted all negotiations with the nominee. The recommendation of this

committee was adopted by the Faculty and approved by the Corporation without dissent.

"When Mrs. Stephen V. Harkness offered to build the Memorial Quadrangle on a site provided by the College and adjacent to the old campus, the College wished to acquire the site of the Peabody Museum on High Street. Professor Dana had been a trustee of the Peabody Museum since 1885 and chairman of the Board since 1899; he was also chairman of the College Committee on Ways and Means for many years; loyal to both interests, he offered an equitable and feasible solution of the problem, fixed the compensation to be paid by the College to the Peabody Trustees and acceptable to all concerned, and approved by the Corporation, thus enabling the College to proceed with the construction of the quadrangle.

"The two College committees of prime importance were the Committee on the Course of Study and the Committee on Ways and Means, and they were in large measure responsible for the educational and financial policies of the College. Mr. Dana was a member of both and chairman of the former from 1906 to 1917, and of the latter from 1911 to the time of his retirement. In his annual report of 1916-1917, the Dean says of Professor Dana:

"'No member of the Faculty has been more influential in shaping the Course of Study. His services as chairman of that important committee, and as chairman of the Ways and Means Committee have long been recognized and appreciated by his colleagues. As the senior member of the Permanent Officers he gave his best thought and energy to the educational and financial problems of the College. Tolerant, sagacious and tactful, with exact knowledge of the history of the growth and development of all departments of the University, he was an indispensable member of every committee which has had to do with interdepartmental relations.'"

The field in which Dana labored longest was the administration and editing of the AMERICAN JOURNAL OF SCIENCE. This journal was founded in 1818 by Benjamin Silliman, "the guardian of American science," and maintained by him alone until 1838. He was then joined by his son, Benjamin Jr., and in 1846 by his son-in-law, James D. Dana, and these three ran the JOURNAL together until the death of the elder Silliman in 1864. The younger Dana was added to the staff in 1875

and aided Benjamin Silliman Jr. and the elder Dana to maintain the JOURNAL until 1885, when Silliman retired. The Danas, father and son, were proprietors and editors of the JOURNAL until the death of James D. Dana in 1895. From that year on, Edward Dana assumed the full burden of what he felt to be a family responsibility, and he carried it until 1926, when, in consequence of his serious illness, the magazine was turned over to Yale University. With his recovery, he resumed the financial responsibilities and helped with the reviews and correspondence; the editorship of the JOURNAL was for a short time in the hands of Professor Alan M. Bateman, then in those of Dr. Ernest Howe, and since the latter's death in 1932 it has been assumed by Professor Richard S. Lull.

The AMERICAN JOURNAL OF SCIENCE has long been known as the "Silliman-Dana family child," and now, after 117 years of fostering care, it passes to the complete custodianship of the University, accompanied by contributions toward its maintenance from the Silliman, Dana, and Bristol families, and from Editor Howe. Of care of the JOURNAL in its earlier days, Daniel C. Gilman, biographer of James D. Dana, said, feelingly: "It has not been free from difficulties. No pecuniary assistance ever came to it from the treasury of Yale College. . . Its income was not sufficient for the payment of a publisher." The business affairs devolved upon the Silliman and Dana families, but these very cares, he adds, "brought the editors into the best relations with the investigators of the country."

When the JOURNAL celebrated its centenary in 1918, one of its chroniclers pointed out that it had then published a little more than 92,000 pages of scientific matter, including upward of 1500 distinct articles on Geology, exclusive of the many hundreds of papers on Mineralogy. What a vast treasure house of geologic knowledge is stored up in these 194 volumes, and how well the editors have lived up to the proposed "Plan of Work" stated in the opening volume! Not only is it the oldest continuously published scientific journal in this country, but it has proved itself to be, as George P. Merrill says in his history of American geology, "perhaps the most important geological periodical in America"; its pages alone, he adds, afford a fair idea of the gradual progress and expansion of the Earth sciences.

During the first half of the nineteenth century, Benjamin

Silliman was the generating center for Geology, and during the later half this place was taken by James D. Dana and Edward S. Dana, who, by their research and their text-books, and in the pages of the JOURNAL, were the exemplars and counsellors of the geologists and mineralogists of America.

That such signal accomplishments as these should have received high honors is axiomatic, but the modesty with which these honors were worn is far from common, Dana always insisting that, whereas his father was a "creator," he himself was but a "plodder." He is known to have refused honorary degrees, even from his Alma Mater. Apparently he never put together a complete list of the scientific societies to which he had been elected, and the following is probably not a total list.

His election as corresponding member of the Vienna Reichsanstalt came in 1874, and this same year he was elected to the Sociedad Mexicana de Historia Natural. At the age of thirty-four, he was placed on the roster of honorary members of the ancient Mineralogical Society of St. Petersburg. Acclaim in his own country came also in that year, with his election to the National Academy of Sciences, the greatest honor that can be given to an American scientist. At his death, he was the second oldest member, the oldest one having been elected in 1883. He was also an honorary member of the American Academy of Arts and Sciences (Boston), the American Philosophical Society (Philadelphia), the Geological Society of America, and the Physical Society of America; a foreign member (1894) of the Geological Society, London (corresponding member 1888); and a member of the Edinburgh Geological Society, the Mineralogical Society of Great Britain, the Philosophical Society (Cambridge), and the Vienna Academy. He was honored at the 300th anniversary of the University of Dublin. In 1925, the Mineralogical Society of America elected him Honorary President for life; in 1934 the Mineralogical Club of New York City made him an honorary life member, and the American Museum of Natural History gave him the same distinction. The Yale Corporation, meeting on the day of his death, passed a resolution of which the following are the closing words: "Foremost American mineralogist of his time, he brought to himself and to the University widespread recognition in the world of science."

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