

Albert Munsell
Alexander Ector Orr Munsell

In 1894 Albert Munsell married Juliet Ector Orr, daughter of the wealthy industrialist Alexander Ector Orr, and they had a son and three daughters. The son was named Alexander Ector Orr Munsell (1895-1983), after his maternal grandfather, and was referred to within the family as Ector. After he was grown acquaintances referred to him as A.E.O. Munsell, while later close friends called him Alex. In the future he was to carry on his father's work and much later become involved in radical politics. The family traveled to Europe during the summers. They were in Paris in 1897 when Ector was 2 years old and the second child, Margaret, was born.

Juliet's father, Alexander Ector Orr (1831-1914), is of interest because he passed along wealth to his children and grandchildren, but also because he had a strong sense of public duty, which he also passed on to his decedents. Both factors would affect the future of the Munsell Color Company. Orr was born in Ireland of Scotch-Irish descent and came to the United States with business letters of introduction. He became president at various times of the South Brooklyn Savings Institution, New York Safe Deposit Company, the New York Life Insurance Company and was a director of many companies. New York Governor Tilden appointed him to a commission to investigate management of the state canals and the commission exposed several frauds. Orr urged legislation reducing tolls on canals, later making them free. As chairman of the New York rapid transit board he struggled to get a subway system built and was referred to as the father of the New York subways. He had a strong interest in humanitarian projects. He was president of the Brooklyn Academy of Music, Vice-president of the Long Island Historical Society, trustee of the Brooklyn library, and supported a number of philanthropies, including the Society for the Reformation of Juvenile Delinquents and the Long Island State Hospital.

In April of 1917 Albert Munsell gave up the studio at 221 Columbus Avenue in Boston, which he had occupied since 1901. John Singer Sargent was its next occupant. The A.H. Munsell Color Company was incorporated in 1918 and papers filed at the State House in Boston. The company had three stockholders, Albert Munsell, Arthur S. Allen and Ray Greenleaf. Munsell was the president and held 51% of the stock as compensation for his patents and copyrights. Care was taken, as Albert Munsell had always done, that the business and research parts of the company be kept separate. Income from sales and

royalties was important to Munsell, but color education was his main concern. The last entry in Munsell's diary was February 16th, 1918 and he died on June 28th of that year.

In response to a request from Arthur Allen made in 1918 and approved by Albert Munsell, the Bureau of Standards in 1920 published, "An Examination of the Munsell Color System," providing spectrophotometric data on nine grays and three samples of each of the ten major hues. At the end of his life, Munsell was still interested in any scientific method that might improve the Munsell system. There was an interest by both the Munsell Company and the Bureau of Standards in using the emerging science of color measurement to verify spacing in the Munsell system

From 1918 until 1921 Munsell business was handled in New York by Arthur Allen and Ray Greenleaf with a business manager, D. E. Kennedy, still in Boston. This did not work well and the company was reorganized as the Munsell Color Company, with all the stock held by the Munsell family and with Kennedy as president. Allen and Greenleaf urged Munsell's son, Alexander Ector Orr Munsell, to take over management of the company.

Alex Munsell was a handsome young man, who, during his spare time as a freshman at Harvard University, exhibited what would prove to be a lifelong interest in helping the poor by teaching English to Spanish-speaking workmen. In his junior year Alex married a Wellesley student, Margaret Jean Dodd, and then was drafted to serve in the army during World War I. Before leaving for duty he helped to deliver the first of their three sons. Alex spent what would have been his senior year at Harvard in the medical corps in France. On returning he took an advanced chemistry course to qualify for entrance in Harvard Medical School and it was in the fall of this year that he was contacted by Arthur Allen and asked to take charge of the Munsell Color Company. He agreed to give up his plan to become a doctor. He was not interested in art or in business, but he was very interested in science. An interest that proved important to the future of the Company and also to the future of commercial color.

In July of 1921 Alex took charge of the company in Boston and in October he hired as his assistant Dorothy Nickerson (1900 – 1985), a young woman who was to become important to the company. Dorothy had not known Albert Munsell but noted that, "He was loved and respected by his students to an unusual degree; they never fail to speak of him with admiration and affection, and I have met several of them." (100) In November the Swede, Ferdinand A. Carlson, joined the

company to hand paint the Munsell color papers. Carlson ground the pigment powders in oil to make the paint and coated it on a large sheet of paper that he had first sealed with a clear coat. (89) The sheet was cut into the proper size and each small color chip pasted by hand on the charts. This laborious, but exacting, process continued in New York and later while the company was located in Baltimore, Maryland.

Alex Munsell attended the 1921 meeting of the Optical Society of America and met Irwin Gillespie Priest (1886 – 1932), chief of the Colorimetry Section of the Optics Division at the Bureau of Standards. The Colorimetry Section had been established specifically for the government to help companies deal with color problems. A history of the Bureau (*Measures for Progress*, 1966) states that “available to Priest and his group were the Lovibond scale...and the recently published Munsell color system, both of them excellent but of narrow application and and uncertain foundation.” Albert Munsell’s work was part of the beginning of color science in the United States.

Joseph Williams Lovibond, whose father was an English brewer, invented the Tintometer in 1885 as a way to standardize the color of beer to ensure its quality. The color of the beer was matched with light transmitted through tinted glasses selected from graduated scales in red, green and a violet-blue. The Colorimetry Section of the Bureau of Standards calibrated 500 of the red and yellow glasses to give them a scientific foundation. The company, Tintometer Limited, is still in England, with a branch in Germany, and markets spectrophotometric colorimeters for determining the colors of liquids and pastes. Their instruments are used in conjunction with ASTM and ISO quality standards for oil, diesel fuel, and kerosine colors.

With his knowledge and background Priest became a strong influence on young Alex Munsell. At a meeting of the Optical Society of America Alex Munsell heard about development of the Keuffel and Esser direct reading visual spectrophotometer and ordered one on the spot. Spectrophotometers analyze a color by reading the percent of reflectance at each wavelength, or small band of wavelengths, throughout the visual spectrum, compared with reflectance from a standard white. The difference in reflectance is recorded between the white, which reflects all wavelengths, and a particular color, which absorbs some wavelengths and reflects others. At that early time there was no way to automatically record a reading, each setting had to be made by eye. Dorothy Nickerson, Munsell’s assistant, who operated the visual spectrophotometer in the New York laboratory, reported, “...it would take ten painstaking visual matches at every 40, 20,

or sometimes 10 nanometer intervals, to measure a single color sample! The ten visual matches for each point usually were punched directly into an adding machine that sat on the table beside the spectrophotometer... Yet those were exciting days, for we knew that we were pioneering.” Today spectrophotometers require no visual judgements and all calculations are automatic.

In 1922 the entire company moved to New York City with plans to expand the sale of educational materials; however, Alex Munsell did not like managing the business and Dorothy Nickerson has reported that it was not profitable, so it was arranged that Favor, Ruhl and Company in Chicago would take over sales of children’s supplies, while the Munsell Company retained the sale of the planned *Atlas of the Munsell Color System*, color charts, disks and Munsell publications. The Munsell Research Laboratory was also established as a memorial to Albert H. Munsell with funds contributed by Alex Munsell, his mother and his sisters. Forming a research laboratory separate from the company was a further effort to separate business issues from research.

The 1923 edition of *A Color Notation*, which had first been published in 1905 and copyrighted again in 1913, was published. In 1924 the company moved again, this time to downtown Baltimore where there was more space for the research laboratory and also to be close to the both Bureau of Standards in Washington, D.C. and to John Hopkins University in Baltimore. Alex Munsell planned to do graduate work in physics and psychology at John Hopkins University to better prepare himself for work on the color system. Dorothy Nickerson also took courses there.

In Baltimore the Munsell color system was re-studied in conjunction with the Bureau of Standards and concurrently color science in the United States began to mature. Between the years of 1923 and 1926 Nickerson reports that there were seven people who worked at various times on color research at the Munsell Research Laboratory and seven others in the colorimetry section of the Bureau of Standards, and all were supported largely by funds from the Munsell family.

By 1926 it was decided that all the information necessary to complete the *Munsell Book of Color*, which was to replace *The Munsell Color Atlas*, had been obtained and the Munsell family ceased regular funding of the Munsell Research Laboratory. Without the Munsell family support, funds for the Research Laboratory were limited and Alex Munsell let staff members go, including his assistant, Dorothy Nickerson. The only researcher remaining with the Munsell Research Laboratory between 1926 and 1930 was Dr. Isaac Hahn Godlove (1892-1954). He was a major figure in color science, active in the major national societies that encouraged communication

about color science through meetings and publications, and the author or co-author of forty-seven technical articles on color. After his death a major Inter-Society Color Council prize was established in his name to be presented to individuals with a lifetime of achievement in technical color.

After leaving the Munsell Company, Dorothy Nickerson was employed in 1927 as Color Technologist in the Production and Marketing Administration of the U.S. Department of Agriculture with major responsibility for the Cotton Division. This turned out to be fortunate for her and for the Munsell Company. Although it is difficult to believe today, agricultural products, and especially hay and cotton, were the main U.S. exports during the 1920-1930s. The price of cotton depended on its color—the whiter, the more expensive. The grade and price of hay also depends on its age and thus its appearance; making it important that the color of different grades of alfalfa, timothy, Johnson grass, and clover be standardized. Even the freshness and quality of meat is related to its color appearance. All sorts of agricultural products: tomatoes, oranges, lemons, etc., were brought to Nickerson's laboratory for measurement.

Walter Spry managed the Munsell Company when the 1929 edition of the Book of Color was published and after Spry died in 1938, Blanche Robertson (later Bellamy), a close friend of Dorothy Nickerson, became manager. Blanche had joined the Munsell Company in 1922 shortly after the move to Baltimore. During these years Sidney M. Newhall, on the staff of the psychology department of John Hopkins University, served as advisor on technical and business matters.

As Albert Munsell had found thirty years earlier to obtain consistent results, instruments should replace humans in making color judgements. These instrumental color measurements must, however, be adjusted to represent what the average human would see; and since a color's appearance is affected by the illumination, both the observer and the light source must be specified. When Munsell discovered these things there was no way to solve them. The necessary basic research was done in several countries between 1920 and 1930, much of it in the United States at the U.S. Bureau of Standards and the Munsell Foundation Laboratory, and in England by Walter Stanley Stiles (1901 – 1985) and John Guild () at the National Physical Laboratory (NPL). Some vital work was done, also in England, by William David Wright (1906 - 1997) at the Imperial College for Science, Technology and Medicine.

In September of 1931 an international conference was held in Cambridge, England, under the auspices of the Commission Internationale de L'Éclairage, or in English, the International Commission on Illumination, (CIE). At that conference a Standard Observer to represent the average person's color vision and also several standard light sources were to be established. The representative of the United States to that CIE meeting was Irwin Priest, head of the Colorimetry section of the Optics Division of the Bureau of Standards. Nickerson reported that most of the data carried by Priest to this meeting had been obtained through work partially, or wholly, supported by the Munsell Research Laboratory. He had color matching functions derived from studies where individuals used combinations of three primary light sources to match the visual spectrum, wavelength by wavelength. These matches were to be used in establishing the Standard Observer, but there had not been time to reconcile differences before leaving for England.

Priest arrived in England a week early to visit the British National Physical Laboratory prior to the CIE Conference. During discussions there was disagreement over which set of color matching functions should be used represent the color vision of the Standard Observer. W. D. Wright, presented data he had obtained in 1928 by recording tri-stimulus responses of ten observers using the primaries 460 nm, 530 nm and 650 nm; and John Guild presented responses obtained in 1931 from seven other observers using the primaries 460 nm, 550 nm, 630 nm. Both sets of matches were obtained using a 2 degree visual field. There was good agreement between the two sets of data and both showed that every wavelength could not be matched without reducing somewhat the saturation of certain spectrum colors. Since the two sets of primaries could be related mathematically by a set of linear transforms, NPL proposed that the mean of the two sets of data be used to represent the Standard Observer. Priest objected believing that there was not enough data yet to make that decision; however, Wright and Guild could answer his objections and Priest finally agreed. The combined data was presented and approved at the CIE session, so color perception for the whole human race is represented by the vision of seventeen Englishmen.

(Appendix II in 47)

Later the CIE adjusted the three primary colors so all colors will fall within the area covered by their combinations, which was not true of the Wright/Guild primaries. To achieve this the primaries themselves must be unreal, in the sense that there is no real light source that emits these colors. Over the years these decisions proved to be a good ones, even though in rare circumstances a measurement based on the Standard Observer indicates that an object has one color, while people see it differently; however, there is no reason so far to think that a different

standard observer would always coincide with human vision either. William A. Thornton (1923–2006), in developing fluorescent lamps for Westinghouse Corporation, worked with crystal sources that, in the electric field within the tube, emit a very narrow band of wavelengths. In this situation the discrepancies between the measured color using the Standard Observer and what viewers actually see can be quite large. Thornton spent a number of years beginning in 1992 exploring possible improvements in the Standard Observer without coming to a final recommendation.

During the 1931 CIE Conference three Standard Illuminants were also established: Source A representing incandescent lamp light at 2,854 K, Source B representing noon daylight at 4,870 K and Source C representing average daylight when the sky is overcast at 6,770 K.

On the trip back from this conference in the fall of 1931 Priest suffered a heart attack and died in 1932. Nickerson felt that Alex Munsell lost his sense of direction after Priest's death. She believed that papers with Alex Munsell listed as co-author were largely written by Priest. Alex continued to be interested in the science of color and the Munsell color system, but his main focus turned to philanthropy.

After Priest's death Deane Brewster Judd (1900 - 1972) became head of the Colorimetry Section at the Bureau of Standards. Judd's work at the Bureau covered vision, color-blindness, color measurement, color standards, and studies of uniform color spacing. He was a major figure in five national societies and received major awards from each of them. He published more than 100 papers, authored *Color in Business and Industry* in 1952 and co-authored the 1963 edition with Günther Wyszecki. After Judd's death the U.S. Bureau of Standards published a large volume, edited by David MacAdam, containing fifty-eight of Judd's major papers on color with an introductory summary of each by MacAdam. (MacAdam 94)

The printing, photography, movies, textile and fashion industries were all having severe problems creating, reproducing, and controlling color. Many companies and individuals were members of national societies, such as the Optical Society of America, the Color Association of the United States, the Graphic Arts Technical Foundation, the Illuminating Engineering Society and the Federation of Societies for Coatings Technology, all organizations where color was a big issue. Each industry had its own needs and nomenclature, but all facing the same underlying color problems. The Inter-Society Color Council (ISCC) was formed, also in 1931, to address the

common need for information and communication. Alex Munsell and Dorothy Nickerson were founding members and Alex was its first treasurer. ISCC meetings encourage an exchange of information about color between different fields. Delegates from national organizations were encouraged to propose work on a color problem in their field that would benefit from participation by experts from other fields.

Alex Munsell's Inheritance

In 1932, the year following the CIE conference and the formation of the ISCC, Alex Munsell made a trip to Scandinavia with his mother, which concluded with four days in the Soviet Union. In Russia he felt, "a patient, generous sincerity...afire with a theoretical form of emotionalism which wills to stop at nothing short of a scientific and theoretical Utopianism." (97) The pair were in Russia before the rigged trials of former senior Communist Party leaders for treason, which took place between 1936 and 1938. Stalin used these trials as a cover for executing his rivals for power. What had begun when the Munsells were in Russia was the forced collectivization of farms and industry with the attendant hunger and death, the scope of which was not revealed until many years later. The Communist Party believed that the cornerstone of progress was the state ownership of all land, forests, waters, subsoil and industry. In theory without private or corporate ownership, the profit motive would be eliminated and everyone would work for the common good. What actually happened was the concentration all power inside the communist government.

At that time many intellectuals in the United States and Europe were captivated by the idea of a country where everything was shared, where there would be no poverty, and no need for government. They did not believe the reports of governmental brutality that were slowly filtering out of Russia. So although his grandfather, Alexander Ector Orr, was certainly a capitalist, Alex Munsell believed, along with many others, that capitalism is based on repression. He believed that the press in the United States was controlled by the government and did not report accurately on what was happening in Russia. Alex Munsell was a deeply religious man, yet he supported a regime that intended to do away with religion. He joined the Communist Party sometime in the late 1930s.

Alex Munsell and his family, which included three sons, had been living in a comfortable home in the Green Spring Valley area near Baltimore. His wife told reporters that in good times his income from investments was as much as \$100,000 a day. But Alex continued to be concerned

about the poor. In 1930 he helped to found and then financed the Maryland Unemployment League, and among many other charities, he operated a free restaurant for the unemployed. Then in 1934 Alex Munsell became one of the heirs to his grandfather's \$7,000,000 legacy. It was a religious impulse combined with an interest in socialism that led Alex to decide that instead of using his inheritance he wanted to experience "the reality of being poor."

He settled a half of his inheritance on his wife and three sons, and then spent fifteen months giving the rest of his money away. A headline on the Boston Post on November 23, 1934, read "MILLIONAIRE LIVES ON \$21 A WEEK." The story continues, "Munsell gives away all but \$105...Deciding he was miscast as a financier A.E.O Munsell of Baltimore gave away \$1,000,000. He is living in a flop-house in New York and said he is 'enjoying the experience.'" A New York newspaper found him sitting on a cot knitting a sweater and quoted him as saying, "Now, like millions of others, I am looking for a \$25-a-week job. In seven weeks the last of my inheritance, which has dwindled to \$27 a week, will be stopped, and I'll be standing on my own feet." A relative reported that Alex was ordered out of the transient home because he had overstayed the allowed two weeks, but he at the last moment was given a job as bookkeeper.

Alex was foresighted enough to have himself evaluated by a psychiatrist before he began distributing his money so he could not be stopped on the ground that he was not capable of making responsible decisions. When interviewed and told that he had been declared mentally sound his wife said, "His statement about having been examined by alienists (psychiatrists) interests me. I know there is some inaccuracy in that. He is not telling all of it." She also offered, "Well, I would never let him starve, but whatever comes, I would certainly give him no amount of money." She said that she would not divorce him and referring to his mother, Julia Munsell of San Francisco, who was wealthy, "I hardly think his mother will ever leave him her money." His wife was wrong. She did divorce him later, "I tried to establish a happy home...but he was more interested in helping out the whole human race;" and his mother did leave him a fourth of her fortune.

In October of 1941 General Electric proposed that the American Standards Association (ASA), now the American National Standards Institute (ANSI), adopt the Munsell system as an American standard with the spectrophotometer recognized as the primary standard for measurement. The spectrophotometer, using the CIE conversions, could measure accurately any suitably prepared sample, while the Munsell system would provide color samples and notations based on hue,

value, and chroma, which can easily be visualized. This standard was adopted as ASA-Z44-1942. (101) Its current version is ANSI Z 138.2.

Later the American Society for Testing and Materials (ASTM) published a national voluntary standard, D 1535, "Practice for Specifying Color by the Munsell System," which is kept current and contains an excellent description of the Munsell system and its uses. This standard can be purchased from ASTM International headquarters in West Conshohocken, Pennsylvania.

The Japan Color Research Institute studied the Munsell renotation system with the approval of the Optical Society of America. In 1958 the Munsell color system was accepted by the Japan Industrial Standards (JIS) and published as JIS Z8721, "The Book of JIS Color Standards" containing 1930 colors.

With the Munsell color system part of national standards, Alex Munsell wanted to remove any possible suspicion of commercialization from the company, so in 1942 the Munsell Color Foundation Incorporated was established. The Munsell family turned over all their stock and policy decisions to the Foundation. "This was done after a well-attended meeting at which many leaders in the color field confirmed the fact that such a move would be welcome and supported." (Nickerson) The National Bureau of Standards, the Inter-Society Color Council and the Optical Society of America each agreed to appoint a Special Trustee to serve on the Foundation's Board of Trustees and Alex Munsell served as a trustee representing the donors. The remaining three trustees were selected to represent a wide range of color interests. All served without remuneration. The Foundation was non-profit and had no endowment other than the contribution of stock. It was assumed that as the Munsell Company grew the income above operating expenses would revert to the Foundation and, along with any outside contributions, would be used to fund further color research. Business did increase about tenfold by the 1960's but since making the *Book of Color* was expensive and prices were kept as low as possible to make the system widely available, there were very little profits to turn over to the Foundation.

The By-Laws of the Munsell Color Foundation were originally written in 1942, amended in 1969 and again in 1970 (Copyright 1976). The amendment dropped the requirement for special trustees representing color organizations. All Foundation trustees became trustees-at-large. Since the Munsell Company was still not making much money beyond what was needed to run the company, the Munsell Foundation could only make small research bequests each year, not grants

large enough to make a significant contribution to color research. The seven trustees, including Dorothy Nickerson, Deane Judd and Alex Munsell, began to explore other arrangements.

The Kollmorgen Period

Norman Macbeth, Jr., also one of the Munsell Foundation trustees, owned the Macbeth Corporation. He began buying stock of Kollmorgen Electro-Optical from the widow of its founder. The company, founded in Brooklyn, New York, in 1916, had produced the first submarine periscope. At this time Kollmorgen had facilities in Massachusetts, Vermont, Milan, Florence and Bologna, and produced various optical sensors and measuring instruments, and especially densitometers, which were also a mainstay of the Macbeth Corporation. Kollmorgen and the Macbeth Corporation were merged based on the stock Norman Macbeth owned and overlapping product lines. Norman Macbeth became the chairman of Kollmorgen Instruments Corporation, headquartered in Connecticut (?), but the Macbeth Color and Photometry Division remained in New Windsor. Kollmorgen also bought Instruments Development Laboratory and Davidson & Hemmendinger Incorporated, which had been producing the colors for the glossy Munsell Book of Color.

It seemed that the new Kollmorgen Corporation would be a major factor in industrial color. The Munsell Foundation trustees led by Dorothy Nickerson approached Norman Macbeth and reached an agreement in 1968 that the Munsell Company would be sold to Kollmorgen. Alex Munsell, who agreed to the sale, resigned in 1969 to pursue his other interests. Money from the sale of the Munsell Company would flow into the Munsell Foundation and the trustees began considering how the money could best be used to advance color science.

It was agreed by Kollmorgen that the tradition of integrity of Munsell products would continue and the company itself could remain in Baltimore, although it was placed under the Macbeth Color and Photometry Division in New Windsor, headed by Warren Reese, who made Nick Hale the president of the Munsell Company at the time of the agreement. Hale had moved the company from cramped quarters in downtown Baltimore to parts of three buildings, still in the city, but further north. The top floors of the buildings were rented, but in the basement and lower floors the company finally had enough space.

In 1970 Kollmorgen completed the sale by paying the Munsell Foundation \$235,000 for the Munsell Company. Dorothy Nickerson arranged a retirement package for Blanche Bellamy.

Other employees, some senior to Bellamy, received nothing unless they remained with the company. In this case they received the modest amounts in the Munsell profit-sharing plan and came under the less generous Kollmorgen pension system.

Alex Munsell in New York

In June of 1980 a testimonial luncheon was held by a group headed by the Reverend Lee H. Hall in honor of Alex Munsell's half a century of anti-war and communist activism. He was 84 years old. A summary of his life was provided, which was written and copyrighted by Alex Munsell himself, and there were short testimonial statements by other activists. Mention was made of his New Year's card that read, "I am capable of going on forever. I have plenty of more probabilities up my sleeve."

Although he was no longer connected with the Munsell Company or Munsell Foundation, Alex Munsell still had an interest in the Inter-Society Color Council (ISCC), occasionally attending when meetings were held in New York city. In 1981 he arrived at the 50th anniversary ISCC meeting dressed in a blue Mao Tse-tung suit since he had been picketing somewhere. He did not have enough money to pay for the luncheon and protested the increase in prices. His lunch and attendance fee was paid and he handed out copies of his typewritten statements on "Life, Liberty and the Pursuit of Happiness and the current lack thereof".

Dorothy Nickerson had kept in touch with Munsell and his wife Marion even though she did not agree with their beliefs. In 1970 Alex wrote to thank her for a copy of her history of the Munsell Company and then expounded on his political beliefs. She replied, "As for the rest of your letter – while this expresses your own point to view – it seems a narrow one to me. Instead of rod and cone vision, it seems to me that what you have developed may be more nearly likened to "tunnel vision," for you insist upon seeing all the world in such a narrow and restricted manner. To me the one greatest commandment is 'Love your neighbor as thyself,' and this includes what you call the Capitalist-Imperialists" quite as much as the 'Poor and Unfortunate.'"

When Alex, Alexander Ector Orr Munsell, died of a heart attack in March of 1983 Dorothy Nickerson wrote a memorial reminding ISCC members of his generosity and personal commitment to the science of color.

