FREDERICK A. P. BARNARD.

An able critic has said of him: "Among the promoters of science and liberal culture in our time, few men have labored more efficiently and successfully than the present versatile and accomplished president of Columbia College."

Frederick Augustus Porter Barnard was born in Sheffield, Mass., on May 5, 1809. His father, Robert Foster Barnard, was a lawyer of eminence, and served in the Massachusetts Senate, and his mother was the daughter of Dr. John Porter, of Salisbury, Conn. His ancestry on both sides was of English origin, and could be traced back to William the Conqueror.

His early education was begun in Sheffield, under the tuition of Dr. Orvill Dewey, and continued at Saratoga Springs, where he was sent at the age of nine, and there entered the academy. Incidentally his attention was directed to the printing office in that town, and he learned to set type. He was prepared for college at Stockbridge, Mass., by Jared Curtis, and then entered Yale. In 1828 he was graduated there, standing second in his class, but leading in pure mathematics and the exact sciences.

At once he began to teach at the Hartford Grammar School, and also contributed to the Hartford *Review*, then edited by the Quaker poet John G. Whittier, whose intimate friend he became. In 1830 he returned to Yale as a tutor, but after a year he accepted an appointment at the American Asylum for the Deaf and Dumb, at Hartford. This place he sought, owing to his loss of hearing, resulting from an illness, and also as the difficulty was hereditary in his family. He was called, in 1832, to the Deaf and Dumb Institution in New York City, and continued there for five years. The buildings were the same as those now occupied by Columbia College, to which institution he returned in after years.

In 1837 he was chosen to the chair of mathematics and natural philosophy at the University of Alabama, where he remained until 1848, when he was transferred to the charge of chemistry and natural history, which he held until 1854. Meanwhile he studied theology, and was admitted to holy orders in the Protestant Episcopal Church in the latter year. He was then called to the chair of mathematics and astronomy at the University of Mississippi, of which institution he was chosen president in 1856 and chancellor in 1858. While so connected, Jefferson Davis, afterward president of the Confederate States, was one of his colleagues. At the beginning of the civil war he severed his relations with the university and endeavored to come North. Efforts were made to induce him to join the Confederate government, but he refused all offers of appointments. He was denied a pass through the lines and compelled to remain in Norfolk, Va., until the place was captured, in 1862, by the United States troops.

He then went to Washington and was made director of the map and chart department of the United States Coast Survey, and by reason of his long residence in the South proved of great service in the preparation of maps used by the national armies. The chair of physics in Columbia College having become vacant in consequence of the expulsion of Richard S. McCulloh, who had joined the Confederate States, President Barnard sought that appointment, but the resignation of Charles King from the presidency of Columbia led its trustees, in May, 1864, to call President Barnard to that place. This office he filled until the close of the last collegiate year, when failing health compelled him to offer his resignation. Although unable to actively take part in the duties of the office, he continued nominally the president of Columbia College until his death. His clear judgment, remarkable executive ability, and fondness for work resulted in the remarkable development that has occurred in that institution since his connection with it. The School of Mines, perhaps the foremost scientific school in this country, was the first of the innovations to which he gave his earnest attention. The School of Political Science, the School of Library Economy, the department of women, known as the Barnard College, the gathering of the many departments into the magnificent buildings that now constitute almost a university at 49th Street and Madison Avenue, are largely due to him.

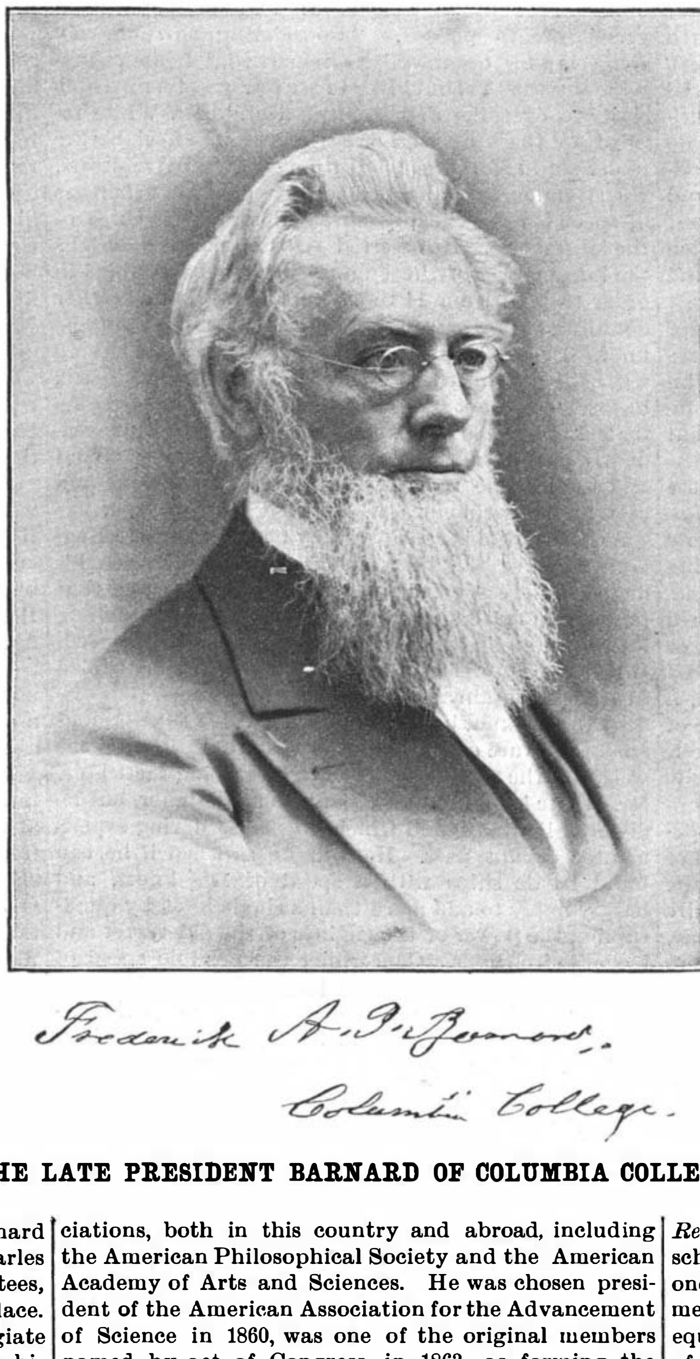
In other ways President Barnard likewise distinguished himself. In 1846 he was appointed by the Governor of Alabama as astronomer on the part of that State to assist in determining the boundary line between Alabama and Florida, and as the representative from the latter State did not qualify, President Barnard was employed by both States. His report, submitted to the legislatures of the two States, was accepted as conclusive. He served, in 1860, on the astronomical expedition sent to Labrador by the United States Coast Survey to witness the total eclipse of the sun.

While in Washington he was engaged in continuing the reductions of Lieutenant James M. Gilliss' observations of the stars of the southern hemisphere, and in 1863 had charge of their publication. In December, 1866, he was appointed by Congress to be one of the commissioners to the World's Fair held in Paris in 1867, and on his return made an elaborate report on "Machinery, Processes, and Products of the Industrial Arts and Apparatus of the Exact Sciences," which was published in the government reports. At the Centennial Fair, held in Philadelphia in 1876, he was one of the judges on instruments of precision, and in 1878 was Assistant Commissioner-General at the World's Fair held in Paris during that year, when the French Ministry conferred on him the decoration of the Legion of Honor.

The degree of LL.D. was given him by Jefferson College, Miss., in 1855, and by Yale in 1859; the University of Mississippi, in 1861, conferred on him the degree of S.T.D.; in 1872 that of L.H.D. was given him by the regents of the University of the State of New York; and in 1878 King's College, Canada, made him a D.C.L.

His name was on the rolls of numerous scientific associations, both in this country and abroad, including the American Philosophical Society and the American Academy of Arts and Sciences. He was chosen president of the American Association for the Advancement of Science in 1860, was one of the original members named by act of Congress, in 1863, as forming the National Academy of Sciences, was the chairman of its physical section in 1872, and foreign secretary in 1874–80. He was president of the Board of Experts of the American Bureau of Mines in 1865, and was president of the American Institute in 1872, also in 1873 of the American Meteorological Society. He served with Prof. Arnold Guyot as editor-in-chief of "Johnson's New Universal Encyclopedia," to which great work he contributed a large number of scientific articles, in addition to his editorial labors.

His contributions to scientific literature were many. He wrote for the *American Journal of Education* from its beginning, and his first paper in the *American Journal of Science* appeared in 1838. His works in book form include: "The School Arithmetic" (1829), "A Treatise on Arithmetic" (1830), "Analytic Grammar, with Symbolic Illustrations" (1836), "Letters on College Government" (1854), "Report on Collegiate Education" (1854), "Art Culture" (1854), "History of the American Coast Survey" (1857), "University Education" (1858), "Undulatory Theory of Light" (1862), "Metric System of Weights and Measures" (1871), and numerous reports on educational matters presented to the trustees of Columbia College.



Frederick A. P. Barnard.
Columbia College.

THE LATE PRESIDENT BARNARD OF COLUMBIA COLLEGE.

His death came on the afternoon of April 27, while resting quietly in his chair at his home, adjoining the college. The funeral services were held in St. Thomas' Church on the 2d instant, after which his remains were taken to Sheffield for interment.

His life-long friend, the poet Whittier, in 1870 wrote the following lines on him:

"Rich, from life-long search
Of truth, within thy academic porch
Thou sittest now, lord of a realm of fact,
Thy servitors the sciences exact;
Still listening with thy hand on Nature's keys,
To hear the Samian's spheral harmonies
And rhythm of law."

M. B.

Leather Tanning by Electricity.

A French firm (MM. Worms & Bale) have succeeded, after long endeavors, in applying electricity to the art of tanning in such a way as is claimed to accelerate the process. We are now able, says the *Electrician*, to give some further information as to the method adopted, and although our knowledge of the art does not enable us to offer any opinion as to the precise value of the invention, yet we are very hopeful that it will ultimately afford an important outlet for electrical apparatus. What is actually done is very simple. The rawhides are placed in large cylinders which revolve upon horizontal axles. Provision is made for passing a current through the drum, the electrolyte being a decoction of tannin. (Further electrical details are at present wanting.) The drum is kept slowly revolving until the process is complete. The time required varies with the nature of the hide. Light calf skins, sheep and goat skins, which used to require from four to six months, are said to be completely tanned in twenty-four hours. Horse and ox hides require from seventy-two to ninety-six hours, while by the old-fashioned bark process they would have taken twelve months or even more. As to the quality of the leather, several French leather merchants have stated that it is above the average in strength, and has all the solidity and suppleness of the best samples. Specimens of harness, etc., made from this leather will be shown at the Paris exhibition. Furthermore, in addition to the economic value of the immense saving of time, it is stated that the working cost per pound of dry leather will be only 3½ to 4 cents, as against 7 to 8 cents per pound, which is the figure now reckoned by the Bermondsey tanners. The number of hands required is said to be only about one-fifth, and the capital expenditure is largely reduced. It is evident that if only half this be true, there is, to say the least, "something in it."

As to the scientific aspect of the question, the exact nature of the *role* played by the electric current is not at all clear. Prof. S. P. Thompson, who has examined the process, suggests that the effect may be in some way to open the pores of the hides and so permit a more rapid access of the tanning solution, and also that its chemical activity may be increased by the electrolytic action. Mr. A. Zwierzchowski thinks that the current renders the gelatine more soluble, so that it is able to combine more rapidly with the tannin.

M. E. Leonardi, in a recent number of the *Revue Internationale de l'Electricité*, mentions several schemes of this nature, all of them failures, the earlier ones necessarily so, from the lack of an economical means of producing current, while others suffered equally from a lack of electrical knowledge on the part of the "inventors."

Nine-inch Guns at Close Range.

The result of the recent Resistance experiments has been kept very close by the Admiralty and the naval authorities, but it has transpired that the result of shells filled with high explosives and fired from the 9·2-inch breech-loading gun was something terrible. The casemates were of two descriptions, some representing coal bunker protection and others the protection that is to be given to the batteries of 47-ton quick-firing guns in the ships Trafalgar and Nile. It was estimated that the casemates would give fair protection against the 6-inch breech-loaders and lighter guns, used at reasonable ranges, and as the 6-inch breech-loading gun will penetrate 9·8 inches of armor, with backing, at 560 yards, or 7·9 inches at 1,700 yards, this was surely all that could reasonably be expected. To fire at the Resistance with the 9·2-inch breech-loading gun at 100 yards range meant dire destruction, as this gun can pierce 19·6 inches of armor with backing at 160 yards, or 15 inches of armor with backing at 2,620 yards. Its results on the Resistance, therefore, at point blank range, with shells filled with high explosives, may be imagined.—*United Service Gazette.*

Floriculture.*

The cultivation of flowers is an occupation that improves alike the body, mind and heart. It is an almost certain indication of purity and refinement.

Floriculture, or the cultivation of flowers, is an art based upon the natural sciences—botany, chemistry, and entomology. Although a knowledge of these and kindred sciences will give much aid, it will not of itself make a good florist.

When a student has learned all that lectures and books can teach, he still needs observation, practice, and experience to make him master of floriculture. It is not a rude, simple matter, but requires and rewards the fullest command of science and the knowledge of nature's laws.

What is needed in the cultivation of flowers is more study, more thought, more enthusiasm, with less attachment to old ways, methods, and practices, which, if ever desirable or judicious, have long ceased to be so. If those who love flowers will intelligently resolve that their cultivation shall and must improve, it will not be long before we have an art worthy of our country and the age in which we live.

We can afford to cultivate and study flowers if for no other reason than their cheerful surrounding. Many do without flowers because they think that they cost too much time and trouble, but one does not have to think long to be convinced that all things worth having cost considerable and that anything worth having is worth working for. Oftentimes the partial success or in many instances total failure in the cultivation of flowers is due to the fact that we try to do too much, that our gardens are too large and not sufficiently cared for. No one should have more ground devoted to a garden that can be kept in the highest state of cultivation. Excellence affords satisfaction and pleasure, while failure brings mortification and pain.

The same may be said of house plants or plants kept within doors during the winter. Too often do we see many plants crowded together in a poorly lighted window, compelling each plant to take on a form never intended by nature and foliage quite different from that desired by the owner.

One of the chief requisites in management of house plants is plenty of sunshine.

Next is an atmosphere neither too dry nor too close and a uniform temperature (lower at night than during day).

Some practical hints as to watering may be summed up as follows: Rain water is better than spring or well water. Hard water may be greatly improved by adding a drop or two of ammonia or a little soda, a small nugget about the size of a pea to every gallon of water used. As to time of day, morning is the best, and next is the evening. Never water house plants when the sun is shining brightly upon them; the supply of water must be regulated according to the demands of the plant; the condition of the plant and of the soil is the best guide. Never give water when the soil is moist to the touch. Nearly all plants require more water when in bloom than at any other time, more in a warm temperature than in a cold, and more when in a state of active growth than when at rest. Plants in open rooms usually require water once a day and some demand it twice, at any rate all should be examined with interest to water at least every day.

Cleanliness is essential. The leaves of plants should be kept free from dust, hence frequent washings are absolutely essential, although when watering never wet the flowers of a plant nor allow drops of water to stand on the leaves in the sunshine. Never allow water to stand in the saucers of the pots unless the plants are semi-aquatic. Watering is at least two fold. It supplies plants food or elements of fertility contained in itself and converts the plant food or nourishment of the soil into a liquid form, so that it may be absorbed by the roots. The roots of a plant must be kept moist, not wet.

When the drainage is the most perfect, plants will generally be the healthiest and will need watering the oftenest.

Give house plants as much light as possible during the day, and darkness with a lower temperature at night.

Plants require rest; a uniform temperature of 60 or 70 degrees in the daytime and 40 to 45 degrees at night will give the best results.

Turning the plants toward the light should not be done, unless done regularly. Besides light, house plants require a good supply of fresh air. Ventilation is absolutely necessary.

A word as to the restoration of cut flowers that have become wilted; the question is often asked, "How can I restore or refresh this flower?" It may be a rare flower, or one that is prized highly as the gift of a friend—in either case joy will follow its restoration. Cut flowers have frequently been restored to freshness, even when every petal is drooping, by placing the stems in a cup of boiling hot water and leave them until the petals have become quite smooth, then cut off the cooked ends and place in lukewarm water, and for this purpose pure rainwater is thought to be preferable. The freshness of cut flowers is due wholly to two conditions, either evaporation from the flowers must be prevented by inclosing in a case containing a saturated atmosphere or the evaporation must be supplied by moisture at the cut end or stem. This stem is composed mostly of woody fiber or cellulose, whose power to absorb water soon diminishes, hence to enable the stem to absorb the most water, the end must be frequently cut off.

* A paper read by George C. Watson before the Clyde Grange Natural History Society.

The Limit in Naval Speed.

An important controversy has arisen in England between two eminent naval experts respecting the speed of modern war ships recently designed. The battle ships which the Admiralty is now constructing were originally credited with a speed of 16½ knots, forced draught; but in working out the designs, Mr. White, director of naval construction, found it practicable to increase the speed to 17½ knots. Sir Edward Reed complained that the increase in speed was too slight in the new designs to be seriously considered, and contended that 20-knot battle ships could be built with a coal supply far beyond that which the proposed vessels are to possess. "Considering how cheaply speed is now obtained," he remarked, "I cannot myself deny that I should like to see our great ships able easily to overtake any enemy's fleet." Mr. White replied to these and other strictures in an elaborate paper read before the Institution of Naval Architects. He strenuously challenged the statement that increase of speed is to be cheaply obtained for battle ships of the largest size. He asserted that in the new designs the horse power of the engines had to be doubled in order to pass from 14 to 17 knots, and that a further doubling of power would not add much more than one knot. By quadrupling the power, battle ships having a speed between 18 and 19 knots might be produced; but this could not be considered a cheap increase. As for 20-knot battle ships, the great English designer evidently prefers to have some other expert try his hand and assume the responsibility for so hazardous and costly an experiment.

As Mr. White is considered by naval experts in England to have the best of this controversy with his disputatious critic, it may be reasonable to assume that progress in marine engineering is rapidly approaching its maximum limit in producing vessels of high speed. If the horse power of the engines has to be quadrupled in order to obtain a battle ship of 18½ knots, it is evident that 20-knot battle ships will involve so enormous an expenditure of power and so vast an addition to the weight of the machinery as to be utterly impracticable. Mr. White has been a most ambitious designer, but he discerns limits beyond which the most daring experimenter cannot pass. He will be satisfied if he can build battle ships with a speed of 17½ knots, and hardly hopes to add more than a single knot by quadrupling the power of the engines of the old turret and barbette ironclads. Concerning the possible speed of fast cruisers he has nothing to say, but his argument points unerringly to a limit beyond which experimenting is unscientific and foolhardy. The American cruisers, which are expected to make 19 or 20 knots, were practically designed by him when he was in the employ of the Armstrongs. Whether they will succeed in accomplishing that result is a question on which expert testimony is divided. But even if the Charleston and Baltimore are as fast as the designers anticipated they would be, it is hardly reasonable to expect any great advance in speed above 20 knots for war vessels.—*N. Y. Tribune.*

Warren de la Rue, D.C.L., F.R.S.

The death is announced of Mr. Warren de la Rue, at the age of seventy-four. A native of Guernsey, he was educated in Paris, and succeeded his father as head of the firm of Thomas de la Rue & Co., from which he retired in 1880. His earlier contributions to science were chiefly papers on voltaic electricity and the deposition of metals. Subsequently he published a memoir on cochineal, and, in conjunction with his friend, Dr. Hugo Muller, another on the constituents of rhubarb, among which they were the first to observe chrysophanic acid. But his name is most associated with the application of photography to the recording of celestial phenomena, on which subject he produced a large number of papers. In connection with Dr. Muller also he carried on a series of investigations upon the electrical discharge, using a battery of 15,000 chloride of silver cells, the results of which were given in a collected form in a lecture at the Royal Institution in 1881. Among the many honorary posts filled by Mr. De la Rue may be mentioned those as honorary secretary and afterward president of the Astronomical Society, president of the Chemical Society for two separate periods, president of the London Institution, and secretary of the Royal Institution. In addition, he was a member of numerous foreign learned societies.

Thomas Summers.

There has recently passed away a man, some record of whose life and works it is a duty to prepare. To make such a record adequate is difficult, if not impossible, because the man's modesty and reticence drew on him little attention. He slipped quietly through life doing a good work without boasting; how important that work was, few engineers perhaps realize outside of a limited circle.

Says *The Engineer:* Thomas Summers was born in London in 1825. He was educated as a boy at a Quakers' school, and subsequently he studied in the evenings at schools connected with the University of London; about this period he was articled to Mr. Haigh, who failed, and Mr. Summers finished his apprenticeship in the marine engineering works at Southampton of W. Altoft Summers. That gentleman retired from business about the year 1858, and died a few years ago. Mr. Altoft Summers had at different times three partners, namely, Mr. Groves, Mr. Baldock, and Mr. C. A. Day; the two former retired, and left the firm Summers & Day, under which title it was long known, and enjoyed a high reputation. Thomas Summers seems to have taken a leading place in the drawing office soon after his apprenticeship was completed, and he ultimately left the drawing office to become manager; under his hands the works developed rapidly, at one time employing over 2,000 hands.

Mr. Summers' strong point was marine engineering, and on it he has left his mark. During his career as a draughtsman he wrote a good deal for the few engineering journals which then existed, and his reputation extended rapidly. At last he was invited by the Turkish government to take private pupils to learn marine engineering, and to a limited extent he did this. He constructed the machinery for several Turkish gunboats, and also for certain Egyptian steamers. He fitted H. M. S. Pandora with her machinery. This vessel was subsequently bought by Mr.—now Sir Allen—Young for his Arctic explorations, and the Pandora was handed over to Mr. Summers for a thorough refit when she was being prepared for her Arctic voyage. In process of time Mr. Summers became a partner, and the firm took the title of Day, Summers & Co.

A large part of his work was done in connection with the Peninsular & Oriental Company and the Royal Mail Company, whose headquarters were to a large extent at Southampton. He was also employed by the West India Company, the Union Company, the Hamburg Companies, and the North German Lloyd's. A short time after the Great Eastern made her first trip she was put into the hands of the firm to make good many things in which she was defective and deficient, and she lay in Southampton water for this purpose for about six months.

Mr. Summers in an indirect way did a great deal to introduce the surface condenser. That was first used at sea by Hall many years before. It was taken up freely, if experimentally, long subsequently by various shipping companies, most eagerly by the Peninsular & Oriental Company. The experiment was a disastrous failure. The brass tubes in the condenser were literally eaten up by the soft water charged with fatty acids from the engines. The boilers also suffered severely. Mr. Summers solved the difficulty at a stroke by tinning the tubes, and ever since only tinned tubes have been used. We are not prepared to say that Mr. Summers was the actual inventor of tinning, but he, at all events, recognized the value of the system, and employed all his energies to get it tried on an adequate scale. The result is too well known to render it needful that we should dwell on it here. With the success of the surface condenser the road to compounding lay open. Mr. Summers traversed that road with his whole heart in his work, and his firm constructed hundreds of compound engines which took the place of the old type of machinery.

Mr. Summers was a great believer in giving accuracy of form and fine surface to propeller blades. Instead of being rough castings, he fitted ships with propellers chipped and filed and finished with great accuracy. The results were eminently satisfactory.

An interesting piece of work which he did was the construction of the engines of the Winans cigar ships, still lying in Southampton water. These engines were described in our pages many years ago; they were of the kind, perhaps, never exceeded for perfection of workmanship and design.

Mr. Summers, if not a prolific inventor, at all events produced several things which will live. Among these we mention the shear legs which have been fitted up for every civilized government in the world possessing war ships. These shear legs will lift a turret clear out of a ship, and replace it with another complete.

Mr. Summers enjoyed an unrivaled reputation for probity and straightforward dealing.

THE "regal red poppy" has recently been found to have the valuable power of binding with its roots the soil in which it grows in such a manner that it will prove most valuable in supporting embankments. Already several French engineers have undertaken the sowing of railway embankments with poppies.