An Ocean Race of Seventeen Thousand Miles.

An ocean race between an American and an English clipper ship has just been heard from. The American clipper-built ship Young America and the English La Escocesa sailed from San Francisco for Liverpool on the 27th February last, laden with wheat. Distance 17,350 miles. The Young America made the passage in 106 days, and her British antagonist in 117 days. About $20,000 was wagered in San Francisco on the result. The running time for making the same distance by our fastest Atlantic steamers, without stoppage for coaling, would be 58 days.

Collecting Wild Animals for the English Market.

In London there are one or two concerns which make it a business to collect wild animals, in India and in other countries, which are brought to the English metropolis and kept in stock until sold to zoölogical gardens and menagerie proprietors in other parts of the world. From this source, Barnum and others recruit their exhibition stock. In a recent number of *Land and Water*, it is stated on the authority of a Singapore paper that: "For some time past an emissary from Mr. Jamrach, the celebrated proprietor of menageries, has been staying in Singapore. The business which brought him here is to purchase specimens of the *feræ naturæ* indigenous to the Malay Peninsula and surrounding countries. The result of his exertions may be seen at the yard attached to the *Hotel de la Paix*, where are assembled the animals and birds obtained up to the present time. These of themselves form a curious and very interesting collection, that has attracted a number of visitors. The gentleman in charge most courteously exhibits the creatures to those desirous of seeing them, and the amusement to be derived from a visit more than repays the trouble involved, as will be evident from the following list: Four large male and female tapirs from Malacca, two cassowaries from Macassar, three Victoria crowned pigeons from the Celebes, two orang outangs, two black parrots, a black panther, a young female elephant, a bear from Borneo, and a pair of Borneo fire back pheasants. Of the above, the panther, which is a very snarling, ferocious looking customer, and the elephant were purchased from H. H. the Maharajah of Johore. Young Bruin is comical looking, with already a tendency to practical joking. A short while ago, he slipped his collar, and, getting into a house where were some young children, evinced his playful tendencies by a desire to rub noses with them. The timid owner of the house ran for the two revolvers he keeps beneath his pillow, but before he had time to uncase them, Master Bear's keeper came up, and rescued his *protégé* from impending destruction. The little creature looks as harmless and innocent as a puppy. We hear that these animals, with a rhinoceros or two expected next week, will be shipped for England by the next steamer of the Ocean Steamship Company; and in addition to them, Mr. Jamrach's agent has entered into a contract with two local Nimrods (Messrs. Fernandez Brothers) to hunt and buy up, within the next six months, eight live specimens of each of the following animals, namely, rhinoceri, tapirs, tigers, and black panthers, and sixteen male and female Argus pheasants. The hunters for the rhinoceri have a number of pits dug for entrapping these animals; and if they fall in, that ardent naturalist, Mr. Frank Buckland, will probably ere long have the pleasure of chronicling the birth of another cockney rhinoceros.' "

Concrete Chimneys.

The first chimney ever built of concrete, and without scaffolding, has, according to the *Engineer*, been constructed at the Chain Cable and Anchor Testing Works, at Sunderland, England. The structure at the base is 7 feet 6 inches by 7 feet, and is carried up square to a hight of 22 feet 3 inches, up to which point no especial novelty in its construction is presented. The corners, however, are gradually cut away; and at the hight of 24 feet above the surface, the octagonal form of the tapering portion of the chimney begins. This part of the work was molded as follows: Panels three feet in hight and made of ¾ inch boards were hinged together at their outer edges in such a manner that, if the lines of the inner edges were produced, they, the lines, would come into one point at half the hight of this section of the chimney. These panels on the interior and exterior of the chimney formed shells, between which the concrete was packed. To fill up the intermediate space between the inner edges of the panels, wedges were introduced, which, as the concrete set, were gradually reduced in order to allow for the decrease in size. Stud bolts connected the wedges with uprights of the frame, and this reduction, made as above, was just sufficient to take off the holes through which the bolts passed.

When the shaft had been erected half its hight, the panels were reduced sufficiently to admit a second set of wedges of exactly the same dimensions as those first introduced, bringing the inner edges of the panels (produced as before) to one point at the center of the top of the chimney; that is to say, in a manner similar to that in which, at their original dimensions, they had been brought together at half the hight. The uprights, to which the panels were secured, were 6 feet in length; and as the latter were but 3 feet, the uprights had a continual hold of 3 feet on the completed work, thus insuring regularity of line.

The cement used was one part Portland cement to eight of gravel, and at one time these parts were increased to one to five. The chimney, when completed, was stuccoed with cement, and drawn in courses to imitate stone.

ROBERT WILHELM BUNSEN.

The labors of the savant whose career we are about to portray belong essentially to researches which are not exclusively chemical, or exclusively physical, but appertain to both, and have added largely to that branch of science known as physical chemistry. As Berzelius will always live in our memory as the founder of the electro-chemical system, Gerhardt as the discoverer of the theory of types, and Liebig as the originator of agricultural chemistry, so will Bunsen always be remembered as the one who has most contributed to the application of chemistry to physical inquiries. Like all men of great genius, the subject of our biographical notice was less occupied with the reinvestigation of phenomena and laws already known than with the exploration of new regions and the discovery of facts which, in themselves, indicated new scientific truths.

The discoveries which have done most to extend Bunsen's renown are those pertaining to spectrum analysis; but his name will always be recalled when we speak os the theories of periodical fountain springs, or of the phenomena of the absorption and combustion of gases, or of the chemical action of the different rays of the sun.

Robert Wilhelm Bunsen was born on March 31, 1811, in Göttingen, a town in Hanover, known by its famous university, in which his father occupied one of the chairs of languages.

ROBERT WILHELM BUNSEN.

At the age of seventeen he entered the university of his native town, in order to pursue physical and chemical studies; and after having passed through all the grades, he took the degree of doctor in 1833. In 1836 he removed to Cassel, in order to fill the chair of chemistry at the polytechnic school of that city, which had been vacated by Wöhler. Two years later, Bunsen was elected professor of chemistry in Marburg; and, in 1851, he removed in the same capacity to Breslau. In 1852 he was nominated professor of chemistry in the university of Heidelberg, which position he still holds.

His earlier labors were devoted to researches on double cyanides, on the various kakodyl compounds, and, in connection with Schischkow, on the gases of detonating compounds. He also discovered in the freshly precipitated hydrate of oxide of iron an excellent antidote for arsenic. In the domain of physics, we see him engaged in determining the specific weight of various bodies, in studying the law of the absorption of gases, and the influence of pressure upon the solidification of liquids. We owe to him important contributions relative to the combustion and diffusion of gases, etc. Bunsen is the discoverer of the galvanic battery which bears his name, and which is now most commonly in use, also of that wonderful instrument known as Bunsen's burner. In the summer of 1846 he undertook, with Descloizeaux, a voyage to Iceland, in order to investigate the periodicity of the fountain springs, especially that of the great geyser. The result was that beautiful theory of the geyser eruptions which was afterward illustrated experimentally by Müller in Freiberg. In 1859, Bunsen first prepared the metal magnesium on a large scale, and showed that it yields the most brilliant artificial light known, and that its photo-chemical action was one thirty-sixth of that of solar light. In conjunction with Roscoe, he determined the chemical action of the various rays of the sun.

The researches of Bunsen on spectrum analysis date from the year 1860. Since that time he has contributed a large number of exhaustive memoirs on this subject to Poggendorff's *Annalen* and to the *Annalen der Chemie und Pharmacie*, besides many special volumes.

Herr Bunsen, although now in his sixty-second year, enjoys excellent health, and is still unceasing in the pursuit of his investigations. His style of lecturing is very happy, and has always attracted a large audience. His modesty is unsurpassed; and even when speaking in his lectures on spectrum analysis, he never mentions having contributed anything to this science, but speaks only of the discoveries of his friend Kirchhoff. Among his pupils are Roscoe and Tyndall, who, as is well known, are among the most ardent laborers in the field of science.—*Science Record* for 1873.

A New Scientific College.

A new institution, somewhat on the plan of the Stevens Institute, Hoboken, N. J., is soon to be built at Birmingham, Eng., founded on the generous endowments of Sir Josiah Mason. The institution is to be called "Josiah Mason's College," or "Josiah Mason's College for the Study of Practical Science." Regular systematic instruction is to be given in mathematics, abstract and applied physics, both mathematical and experimental; chemistry, theoretical, practical and applied; the natural sciences, especially geology and mineralogy, with their application to mines and metallurgy; botany, and zoölogy, with special application to manufactures; and physiology, with special reference to the laws of health. The English, French and German languages will also be taught. The trustees have power to include mechanics and architecture and all other subjects necessary to carry out the objects of the founder. Mere literary education and instruction are excluded, as well as all teaching of theology and subjects purely theological. No principal, professor, teacher, or other officer of the college is ever to be called upon to make any "declaration as to or submit to any test whatever of his religious or theological opinions," nor are these in any wise to be considered either as qualifications or disqualification for holding any office, fitness to give the instruction required being the sole and only test. Provision is also made for giving lectures and opening classes for popular or unsystematic instruction, at which the attendance shall be open to all persons, "without distinction of age, class, creed, race, or sex." The founder's object being to promote the prosperity of the manufactures and industry of the country, the college will be open to qualified persons of all classes who have to rely on science, art, or manufactures for a livelihood, "especially the more intelligent youth of the middle class." Provision is also made, when the funds permit it, to provide instruction for females as well as males.

Comparative Heat and Brilliancy of the Sun and the Moon.

The Earl of Rosse, in a recent lecture before the Royal Institution, gave some interesting information concerning the various experiments heretofore made to detect the heat of the moon, and then described his own efforts in this line, which are the latest that have been made known. By means of a specula-mirror, a thermo-pile, and a pair of reflecting galvanometers, made on Sir William Thomson's plan, such as are used for sending messages over the Atlantic cable, the Earl was enabled to demonstrate the presence of heat from the moon, but the temperature of the lunar surface still remains far from being determined. My calculations, he says, lead me to estimate the heat from the moon as the eighty thousandth part of that from the sun. Bouger's experiments give the brilliancy of the full moon as the 300,000th of that of the sun, Wollaston gives it as the 80,172d, Zöllner as from 618,000th to 619,000th, and Bond as the 470,980th. The maximum of the lunar heat appear to be a little before full moon; the unequal distribution of its mountains and plains, perhaps, goes to explain this phenomenon.

Aniline Black.

BY CH. LAUTH.

Aniline black, being necessarily absolutely insoluble, cannot be fixed like another coloring matter, but must be formed in the place which it is to occupy upon the fiber. To mix, with a salt of aniline, oxidizing agents capable of producing the black, and to wash the yarn in such a bath until the color is developed, is a method which does not yield good results, because the black, instead of fixing itself upon the fiber, remains suspended in the liquid.

The improvement consists in fixing on the fiber an insoluble oxidizing agent, and passing it subsequently into the solution of a salt of aniline.

The agents in question are the higher oxides of manganese, binoxide and chloride of lead, etc. Binoxide of manganese has especially attracted my attention. To get an intense black, it is necessary to mordant in chloride of manganese at 40° B., working the cotton in this bath for an hour, wring out well and, without rinsing, pass it into boiling soda lye, at 12° B., holding lime in suspension. Or the cotton may be first mordanted in a boiling manganese bath, and then passed through cold alkali. After the fixation of the oxide, the cotton is washed in much water, and passed into a lukewarm chloride of lime bath, regulating the proportion of this agent so that it may never be found in great excess, which might injure the fiber. It is best to add the chloride of lime, little by little, till the manganese bronze is sufficiently intense.

I have endeavored to modify the conditions of fixing the manganese. I mention a single remarkable result. A tissue, mordanted with manganese and placed in a chamber filled with ammoniacal gas, is found of a deep brown when taken out, the protoxide of manganese becoming readily peroxidized under these circumstances.

Dyeing.—The yarns, charged with manganese and well washed to eliminate all uncombined matter, are steeped in a cold acid solution of aniline. The color is formed almost simultaneously. As soon as the bronze comes in contact with the aniline salt, the reaction takes place. The binoxide of manganese oxidizes the aniline, and the black formed takes the place of the metallic compound. The operation is finished in one or two minutes, but the yarn may be left an hour in the bath without inconvenience. The proportions to be employed vary according to the intensity of the black desired. When taken out of the dye bath, the cotton is well washed and passed into a boiling alkaline bath—soap or soda —to remove the last traces of acid and give the black its full beauty.

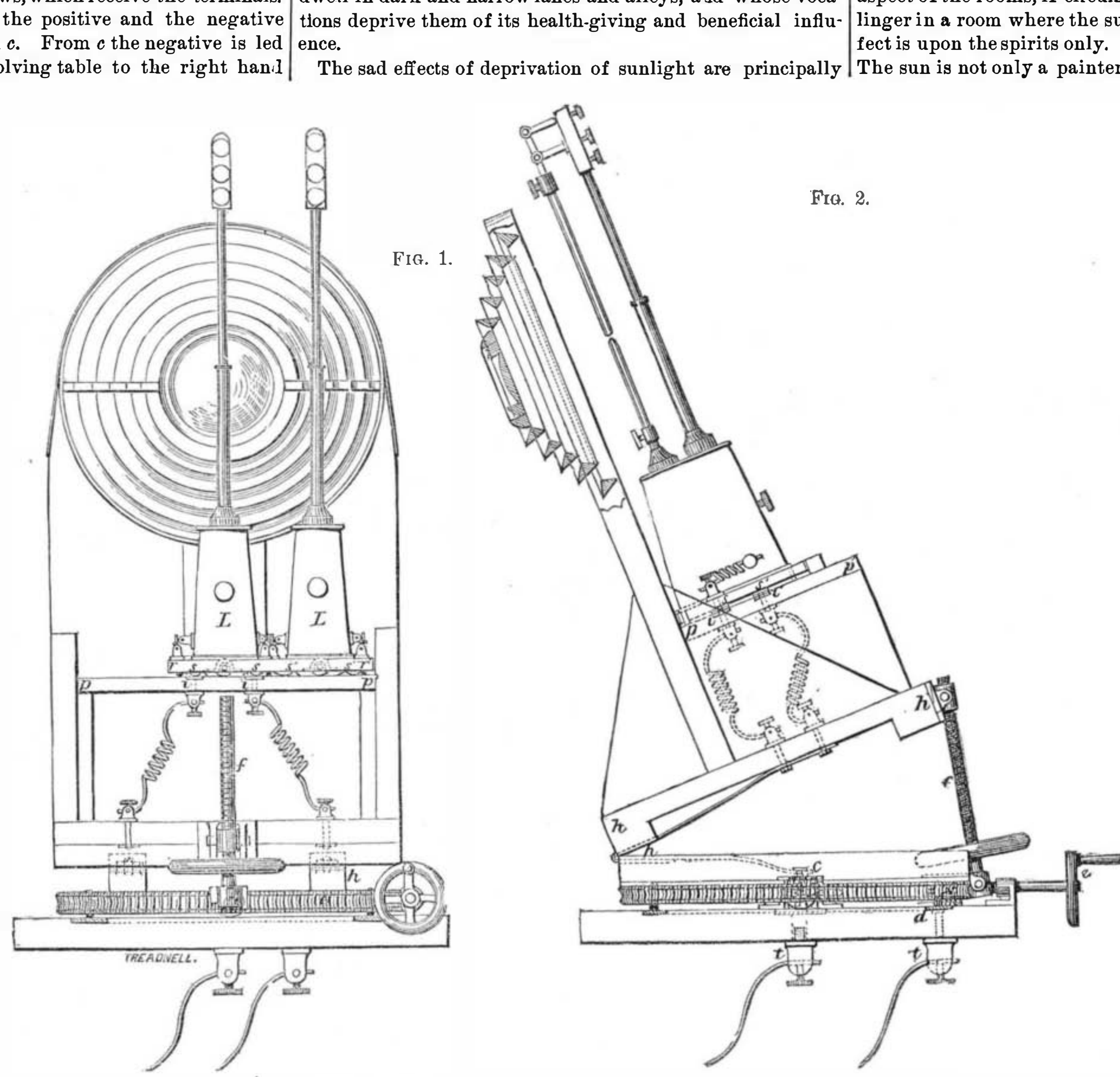
Bichromate of potash, at ¼ dram per quart, salts of copper, mercury, and chrome, and especially a mixture of chlorate of potash, a salt of copper, and sal ammoniac (½ dram of each per quart), increases the intensity of the black. This treatment is applied after the washing subsequent to dyeing, and is carried on for half an hour at a boiling heat. It is followed by a second washing and by boiling in soap lyes. The process described gives fine, solid blacks; it is speedy, and does not injure the fiber.

Cotton cloth mordanted in this manner may be used to determine the comparative value of commercial anilines.—*Chemical News.*

THE NEW ELECTRIC LIGHT IN LONDON.

The drawing shows the contrivance devised by Mr. C. W. Cooke for the exhibition of the electric light from the Westminster clock tower. We copy from *Engineering.* *t* and *t'* (Fig. 2) are two large binding screws, which receive the terminals. Two metallic strips conduct the positive and the negative current respectively to *d* and *c*. From *c* the negative is led through the pivot of the revolving table to the right hand hinge, *h*; the positive at *d* is in connection with a circular strip of copper, which leads it to the left hand hinge. Finally the hinges communicate with two studs, *i i*, sunk into the upper surface of *p p'*. Two regulators, *l* and *l'* (Fig. 1), are fixed to a rectangular mahogany board, *r r*, free to slide on rollers from *p'* to *p*. Each lamp carries two copper strips, so bent that the portion to the right rubs against the studs, and thus insures good contact when the flat part reaches them. Fig. 2 shows the metallic pieces of lamp, *l*, pressing upon these disks, and thus admitting the current. When it becomes necessary to change the carbons, the table, *r r*, is pushed from *p'* to *p*. The second lamp, *l'*, comes into position; its copper strips are in contact with the underlying studs, and the current passes through its carbons. The time required to effect this change is scarcely appreciable. The light can be directed to any object by means of the screw, *f*, and the worm and worm wheel, *e*. The former, *f*, enables the operator to project the beam at any angle of depression lying between convenient limits; the latter, *e*, gives him an azimuthal motion of any amplitude required. Fig. 2 also shows a vertical section. The central piece is a lens which refracts into parallelism the rays, which differ in obliquity. The prismatic portions perform an important office in reflecting the rays which make large angles with the principal axis.

FIG. 1. FIG. 2.



THE NEW ELECTRIC LIGHT IN LONDON.

John W. Foster.

John W. Foster, author of a new work on "Pre-historic Races of the United States," died at Chicago on the 29th ultimo, aged 58 years. He was well known for his scientific attainments, and has made important geological surveys for the government.

William Whiting.

We regret to announce the death, on June 29, of the Hon. William Whiting, member of Congress from Massachusetts, aged 60 years. In addition to his eminence as a patent lawyer, he occupied many important positions. From 1862 to 1865, he was solicitor of the War Department. He was the author of a work on "War Powers under the Constitution," which has passed through over forty editions.

The Crops.

During the past month the crops in some parts of the country, the South for example, have been injured by excessive rains, while in New England injury has been done by excessive dryness. In Plymouth county, Mass., great damages from fire in the woods have been experienced, about 60,000 acres having been burned over. Eight square miles were in flames at one time.

LIGHT AND LIFE.

The sanitary influence of light can scarcely be over-estimated. It is essential to the full development of nearly all animal and vegetable organisms. Plants when deprived of the influence of light become blanched and stunted in growth, the process of fixing the carbon in their tissues is arrested, a modification of the coloring principle takes place and they appear white instead of green. This is termed etiolation or blanching, and is applied by the gardener and horticulturist in the case of certain kinds of vegetables to improve their edible qualities.

A similar effect is produced upon animals by excluding them from the operation of light. Vitality is impaired and the development of the healthy bodily structure arrested. Naturalists tell us that in the course of healthy development the tadpole becomes a frog, but in the absence of light this transformation is prevented, and the tadpole remains a tadpole. From numerous experiments, both upon animals and vegetables, it has been proven that light is an important vital stimulant, favoring those complex changes in the organisms upon which healthy development depends. And though growth may proceed without it, there is both bodily and mental deterioration; a mental and moral etiolation, as well as a physical, occurs when the vital stimulus of light is withdrawn.

The inestimable importance of this agent upon life and health may be conclusively shown by comparing the robust forms and ruddy, bright, and happy faces of those who live among the green fields, and whose occupations necessitate regular exposure to sunlight, with the blanched, sallow countenances and emaciated, deformed bodies of those who dwell in dark and narrow lanes and alleys, and whose vocations deprive them of its health-giving and beneficial influence.

The sad effects of deprivation of sunlight are principally observed among those who are compelled to work in badly constructed shops and factories and the inhabitants of narrow streets, crowded alleys, confined courts, garrets and cellars where the light of the sun rarely penetrates. Similar consequences are observed in those who labor by night and sleep by day, as bakers and compositors connected with the daily press, whose occupation necessitates their employment during a greater part of the night.

The total exclusion of the sun's beams induces an impoverished and disordered state of the blood, favoring not only an arrest of physical and mental development, but also the generation of specific diseases. Under these circumstances the countenance becomes pallid, the membranes of the eye and lips bloodless, and the skin of a waxy color. Associated with these symptoms there is emaciation, muscular debility, and nervous excitability. The fibrin, albumen, and red blood cells become diminished in quantity, and the serum or watery portion of the blood increased, producing the disease known to physicians as anemia. The alteration of the physical composition of the blood and the enfeeblement of vital energy predisposes to the development of scrofula, chlorosis, rickets and consumption, diseases characterized by imperfect nutrition. Childhood being peculiarly a period of growth and development, it is especially important that children should have the fullest possible benefit of exposure to direct sunlight. Many of the diseases of the weak and emaciated children who are reared in narrow streets and crowded tenement houses of our large cities, are attributable to the deficiency of light and air. The sad effects of the absence of light are unfortunately not confined to those who, by the pressure of poverty, are compelled to dwell in localities and habitations where the solar rays vainly strive to enter. In many elegant mansions, whose occupants can command every luxury within the reach of wealth, we see the most ingenious means adopted for effectually excluding light, with the inevitable result of seriously impairing the health of the inmates. The nursery, where children necessarily spend so large a portion of their time, particularly during the colder seasons of the year, should be plentifully supplied with windows, and should be selected with special reference to the facility for securing the genial and cheering influence of the sun. Greenhouses are constructed so as to secure the greatest supply of light, and children require as much light as plants. Light is not only essential to the preservation of health, but is equally important in the treatment of diseases. There are a large number of disorders which may be greatly benefitted, if not cured, by free exposure to the light of the sun, while it certainly exerts an influence on the mind, favorable to recovery, which cannot be wholly explained by the mere cheerfulness and calmness it produces.

Florence Nightingale, in her admirable "Notes on Nursing," has pointed out the sanitary value of light to the sick. She says: "It is the unqualified result of all my experience with the sick that, second only to their need of fresh air, is their need of light,—that, after a close room, what hurts them most is a dark room. And that it is not only light but direct sunlight they want. I had rather have the power of carrying my patient about after the sun, according to the aspect of the rooms, if circumstances permit, than let him linger in a room where the sun is off. People think the effect is upon the spirits only. This is by no means the case. The sun is not only a painter but a sculptor. You admit that he does the photograph Without going into any scientific exposition, we must admit that light has a real and tangible effect upon the human body. But this is not all. Who has not observed the purifying effect of light, and especially of direct sun light, upon the air of a room? Here is an observation within everybody's experience. Go into a room where the shutters are always shut (in a sick room or a bed room the shutters should never be shut), and, though the room be uninhabited, though the air never has been polluted by the breathing of human beings, you will observe a close, musty smell of corrupt air, of air that is unpurified by the effects of the sun's rays. The mustiness of dark rooms and corners, indeed, is proverbial. The cheerfulness of a room, the usefulness of light in healing disease, is all important."

Dr. W. H. Hammond, in his lecture on hygiene, says: "In chlorosis, scrofula, phthisis, and in general every disease characterized by deficiency of vital power, light should not be debarred the patient. In convalescence from almost all diseases, it acts, unless too intense or too long continued, as a most healthful stimulant, both to the nervous and physical systems. The evil effects of keeping such invalids in obscurity are frequently very decidedly shown and cannot be too carefully guarded against by the physician. The delirium and weakness, by no means seldom met with in convalescents kept in darkness, disappear like magic when the rays of the sun are allowed to enter the chamber."

Sir David Brewster, in his eloquent address at the opening of the session of 1866–67 of the Royal Society, Edinburgh, uses the following language: "If the light of day contributes to the development of the human form and lends its aid to art and nature in the cure of disease, it becomes a personal and national duty to construct our dwelling houses, schools, workshops, factories, churches, villages, towns and cities upon such principles and in such styles of architecture as will allow the life-giving element to have the fullest and freest entrance, and to chase from every crypt, cell and corner the elements which have a vested interest in darkness."
—*Thomas H. Helsby, M. D., in Popular Journal of Hygiene.*

PROGRESS OF THE HOOSAC TUNNEL DURING THE MONTH OF JUNE, 1873.—Headings advanced westward, 131 feet; eastward, 126 feet. Total advance during month, 257 feet. Length opened from east end, westward, 14,084 feet. Length opened from west end, eastward, 9,540 feet. Aggregate of lengths opened to July 1st, 23,624 feet. Length remaining to be opened July 1st, 1,407 feet, being 87 feet more than one quarter of a mile.