OTHNIEL CHARLES MARSH.

BY A YALE CLASSMATE.

To write the record of a successful life, always a pleasant task, is doubly so when, as in this instance, the history is that of a life-long friend.

Othniel Charles Marsh, Professor of Paleontology in Yale College and President of the National Academy of Sciences, was born in Lockport, N. Y., October 29, 1831. His parents were Caleb and Mary Gaines (Peabody) Marsh, whose eldest and only surviving child he is. Both his parents were of New England descent, and he was connected with the Pope, Dodge, Spofford, and other prominent families. His maternal uncle was the eminent banker, George Peabody. From early youth he was addicted to athletic exercise, especially to hunting. He was a sportsman before he became a scientist; but this out of door life and contact with nature soon turned his attention to the study of the natural sciences, at the same time that it contributed robustness and vigor to his frame, which has enabled him in after life to perform without weariness an amount of thorough and efficient work under which a mere book-worm would have collapsed, and rendered him on subsequent expeditions to the Rocky Mountains the best shot of the party.

In 1852 Marsh went to the Philips Exeter Academy, at Andover, Mass., a celebrated training school, where he studied for four years and graduated as valedictorian of his class. Entering Yale College in the fall of 1856, together with most of his Andover classmates, he graduated there in the class of 1860 with high honor.

It was as a classmate at Yale that I first knew him. He was already a savant before he had attained his first scholastic degree. Without neglecting the studies of the curriculum, he found time to care for an aquarium which he kept in his room, and in which he cultivated aquatic life, both animal and vegetable, as material for his biological studies. Vacations were often, perhaps generally, spent in Nova Scotia in the study of the geology and paleontology of that then little known country, and it was on that soil that his first great discovery was made, the two celebrated vertebræ of the *Eosaurus acadianus*, the earliest vestiges of reptilian life yet known. At the end of his collegiate course, Marsh stood eighth in rank of scholarship in a class of 108 or, as it now stands on the triennial catalogue of Yale, 109 members, the largest and one of the ablest classes that had ever graduated there. As a rule in that class, a high stand in scholarship was not incompatible with excellence in other directions, and among the men of whom the world has since heard may be mentioned William Walter Phelps, whose rank on the appointment list was even higher than that of Marsh.

Although Marsh had always rightly regarded linguistic studies as a means rather than an end, yet his proficiency in classics was such as to entitle him on graduation to the Berkeley Scholarship, which was founded by the eminent English metaphysician, Bishop George Berkeley; and in accordance with the terms on which the income of that foundation is granted, Marsh, rather for the honor than the income, since his private fortune was ample, remained two years longer at Yale as a scholar of the house. Already he began to contribute articles to scientific journals, and his name became known in both hemispheres, so that when in 1862 he went abroad to continue his studies, he was recognized by the scientists of Europe as a brother.

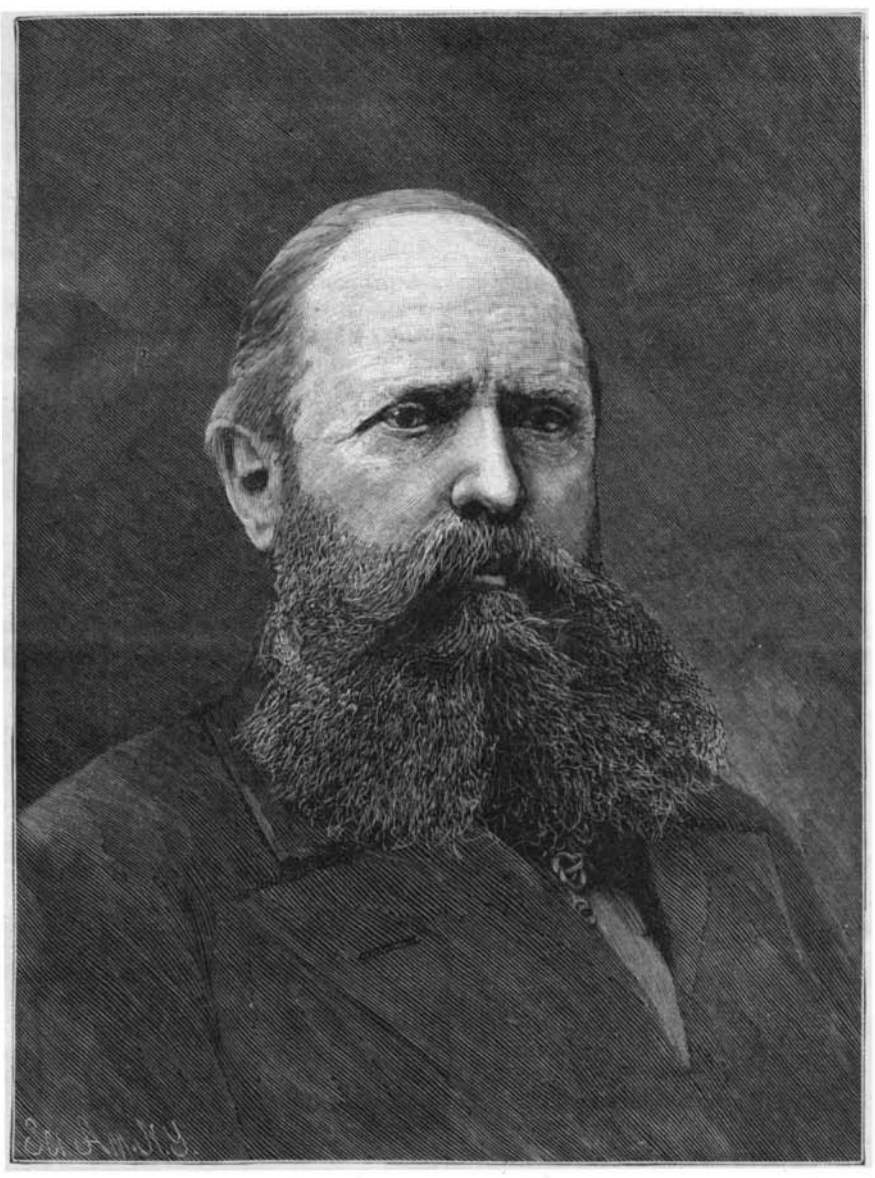
He remained for three years in the universities of Heidelberg, Breslau, and Berlin, and studied under the direction of Ehrenberg, Frose, Bunsen, Peters, Beyrich, and Roemer. His vacations, as usual, were employed in the field, much of the time among the Alps, and as usual he found something that others had overlooked.

In 1866 he was appointed Professor of Paleontology at Yale College, and still retains that professorship, the only person who has ever filled that chair at Yale. The fund which endows it comes from the estate of his uncle, George Peabody, as also does the endowment of the Peabody Museum of Natural History at New Haven, the Peabody Museum of Archeology and Ethnology at Cambridge, and the Peabody Academy of Science at Salem, Mass., to the success of all which he has contributed by his advice and plans.

Prof. Marsh began the work of his professorship by examinations of the Cretaceous and Tertiary fauna of New Jersey; but in 1868 he made the first journey to the region with which his name is most fully identified. He may well be said to have written his name across the Rocky Mountains, so numerous and valuable have been his discoveries there. On this first trip he obtained specimens of larval *Siredons*, and discovered that they underwent a metamorphosis into the *Amblystoma*, thus illustrating the evolution of one living species out of another. He was encouraged also by a rich find of fossils in Nebraska to prepare the Yale exploring party which left New Haven June 30, 1870, reached San Francisco October 19, and returned to New Haven December 19 the same year. Over one hundred new species of extinct vertebrates, most of them from two newly discovered Tertiary basins, were the results of this expedition.

The following abstracts are from a daily paper published within a week after the return of the party:

The Professor of Paleontology, or the science of fossils, in Yale College is O. C. Marsh, a young, fresh-looking gentleman of possibly five and-thirty years of age, who appears to the casual observer anything else than a devoted student of the petrified bones of past ages. But if one could obtain a glance at the Professor's cabinets, in College Street, he would everywhere see not only the evidences of great scientific acquirements, but valuable specimens of scientific treasures. As Professor of Paleontology in Yale College he is also Curator of the Yale Geological Museum, and as soon as he can perform the thousand offices of duty and of friendship which awaited him on his return from his summer's explorations in the Rocky Mountain regions last Saturday, he will busy himself arranging and describing the treasures he brought back with him. The discoveries made by Professor Marsh are of the greatest importance.



PROF. MARSH, PRESIDENT OF THE NATIONAL ACADEMY OF SCIENCES.

About a dozen subsequent expeditions were undertaken from year to year, but he finally preferred to send out trained explorers.

In 1874 he came in contact with the Sioux Indians, who at first drove him back, supposing he was prospecting for gold. On better acquaintance, however, Red Cloud spoke of him as being the only white man he ever met who kept his promises. He was led to attempt redress of the Indian grievances, and thus brought into conflict with the policy of Secretary Delano. The quindecennial history of the Yale class of 1860, published in 1875, says: "Secretary Delano began by calling our classmate 'a Mr. Marsh,' and ended by retiring to private life and political death in Ohio, where he is now known as 'a Mr. Delano.' This is the first instance in which a private citizen has successfully fought a department of the Government in his efforts to expose corruption, and *of course* the victor was a '60 man."

Prof. Marsh is a connoisseur in art as well as a leader in science. His beautiful mansion in New Haven is a well-stocked museum of painting and sculpture.

He is still a bachelor, though older than most of his classmates, who already boast the paternity of several hundred sons and daughters of Yale. His fine physique, robust health, and florid complexion still give him a youthful appearance, as the engraving, accurately reproduced from a life-like photograph, well shows.

He was Vice-President of the American Association for the Advancement of Science at the Nashville meeting in 1877, and President of the same at the St. Louis meeting in 1878.

As Vice-President, he delivered an address "On the Introduction and Succession of Vertebrate Life in America," and as retiring President at Saratoga, in 1879, an address "On the History and Methods of Paleontological Discovery," both which were milestones in the progress of science.

His larger published works are the elaborate monographs, published in the Geological Survey series, on "Odontornithes" and "Dinocerata."

He has also published over one hundred and fifty papers on scientific subjects, all favoring the evolutionary theory.

In April, 1878, he was elected Vice-President of the National Academy of Sciences, and on the death of Joseph Henry, later in the year, he succeeded Henry as President, which office he has ever since held, and is expected to preside at the annual meeting of the Academy in Washington, commencing April 20.

W. H. H.

Industrial Notes.

Damaskeening Metals by Electrolysis.—At one of the last sessions of the Societe Industrielle d'Aix-la-Chapelle a note was presented in which was described a method of damaskeening metal plates by electrolysis. The process is based upon the following principle: If we put two copper plates into a sulphate of copper bath, and connect one of them with the positive and the other with the negative pole of a battery, a transfer of metal from one to the other will occur. This granted, the process is as follows: A thin layer of an insulating substance (wax, for example) is spread over a plate of copper, and on this is drawn with an etching needle the design that it is desired to reproduce. The plate thus prepared is suspended in a sulphate of copper bath and connected with the positive pole of a battery. In a short time the plate will have been attacked everywhere where the copper was laid bare by the needle, that is to say, upon the lines of the drawing.

It requires a battery of two elements to bite in the lines of the drawing to the depth of a millimeter. After sufficient biting in, the plate is taken from the bath and treated with a few drops of hydrochloric acid, in order to remove all traces of oxide of copper in the lines of the drawing. After this, the plate is washed with water and suspended in a bath of silver or nickel and connected with the negative pole of a battery. The positive pole now consists of a plate of platinum. The silver or nickel deposits wherever the copper has been attacked, and, at the end of a certain time, the depressions will be entirely filled with the new metal.

After this it only remains to polish the plate, when it will be impossible to distinguish it from one that has been damaskeened by hand.—*La Lumiere Electrique.*

Artificial Stone.—Messrs. Thompson and Bryant form a good artificial stone by mixing in proper proportions Portland cement, powdered granite, blast furnace slag, and water containing silicate of soda. The mixture may be colored to suit the taste.

Iron Paint.—For painting walls or other objects exposed to dampness a composition is much used in Germany formed of very fine iron filings and linseed oil varnish. When the object to be painted is to undergo frequent changes of temperature, linseed oil and amber varnish are added to the first two coats.

This paint may be applied to wood, stone, or iron. In the case of the latter, it is not necessary to first free it from rust or oily matters.

Fireproof Composition.—Mr. S. J. Blanc, by treating furnace slag with boiling acid, obtains a jelly-like substance, of which he mixes 16 parts with 8 parts of silica, 23 of oxide of zinc, 23 of silicate of soda, and 30 of lime water. The product thus obtained he mixes with colors and varnishes, in order to render them incombustible, and, at the same time, impermeable to moisture.

Bleaching without the Use of Chlorine.—Mr. Thomas, of Elberfeld, describes the following process of bleaching without the use of chlorine: The materials to be bleached are submitted to a preparatory treatment, either a cold one in a stone or wooden back, or a hot one in an iron boiler, according to the degree of decoloration that it is desired to obtain. This treatment is

performed with a solution of caustic soda in the proportion of 3½ pounds to 100 pounds of the materials to be treated. The duration of this operation is about twelve hours.

The materials are next immersed in a hot bath of permanganate of potash for twenty or thirty minutes, and after this in a solution of one pound of borax in ten gallons of water, which has previously been saturated with sulphurous acid. In this latter bath they are allowed to remain from twenty to thirty minutes, after which they are thoroughly washed, and finally dried. —*Moniteur Industrielle.*

Preparation of Metals for Nickelizing.—Surfaces to be nickelized are usually polished before being submitted to the action of the bath. After this operation is finished they remain covered with a slight greasiness, which is often still further increased by contact with the hands. This is one of the principal causes of failure to obtain a perfect nickelization, and it is therefore essential to have the surfaces as clean as possible. The *Elektrotechnische Rundschau* says that the following process will always yield good results:

Prepare a hot solution of one part by weight of potash in ten of water, and place the object in this and allow it to remain therein for one or two minutes, and then wash with plenty of water. Next put it into a bath made by slaking quicklime in water and adding enough water to make the mixture look like milk. Then wash again with fresh water. Finally, place the object in a solution of one drachm of hydrochloric acid to a quart of water, and wash a third time with pure water. The surfaces will now be well adapted for receiving a nickel coating, and the only precaution to take is to prevent them from coming into contact with the hands or other greasy bodies.

What is Thought of It.

The encomiums passed upon the SCIENTIFIC AMERICAN by the press throughout the country are numerous and very gratifying to the conductors of this paper. It is but seldom that we occupy space for the reproduction of these kindly expressions, but occasionally we take occasion to recognize the courtesy of our contemporaries by copying from some of those papers published in diverse portions of the country. The papers named in the annexed list, and scores of others who have seen fit to say good words for the SCIENTIFIC AMERICAN, have the publishers' thanks.

The SCIENTIFIC AMERICAN is the very best publication in this country for those interested in science, engineering, mechanics, etc.—*Fulton Co. (N. Y.) Republican.*

The SCIENTIFIC AMERICAN certainly needs no one to "sing its praises," but notwithstanding this fact we feel it an absolute duty to the general public, at least that portion of it which has never seen or heard of the paper, to tell them that such a one is published, and that its true value cannot be overestimated. It stands at the head.—*The Practical Poultryman, Warsaw, Ind.*

That well known and most useful journal, the SCIENTIFIC AMERICAN, a paper that is alike interesting to the common reader, the artisan, and the student. Its columns are always practical and entertaining.—*San Antonio (Tex.) Light.*

SCIENTIFIC AMERICAN.—Every week this most valuable periodical presents whatever is new in the world of science, art, and manufactures. Full of practical information, it discloses to the thoughtful not only what has been ascertained, but also suggests the possibilities still to be revealed. With the growing attention to education in the industrial arts this periodical must attain a larger usefulness, and the reading world may realize that "Truth is stranger than fiction."—*Truth and Works, Phila.*

The SCIENTIFIC AMERICAN presents weekly to its readers the best and most reliable record of various improvements in machinery, while the scientific progress of the country can in no way be gleaned so well as by the regular perusal of its pages.—*The Fountain, York, Pa.*

A father can give his young son no better present than a year's reading of the SCIENTIFIC AMERICAN. Its good influence will undoubtedly show in the brain of his son, which will make him feel proud of him. Its contents will lead the young mind in the path of thought, and if he treads there a while, he'll forget frivolities and be of some account.

After the moral and religious instruction of the family is secured, we know of nothing more interesting and instructive than a record of the progress of modern science and its marvelous achievements. And we know no medium which presents such a record in so full and readable a manner as that well known weekly, the SCIENTIFIC AMERICAN, $3.20 a year, established over forty years. It will promote industry, progress, thrift, and intelligence wherever it is read. It is of special value to every machinist, mechanic, or engineer, but is also of use to the farming and mercantile community, on account of its illustrated notes on farming, fencing, farm buildings, implements, etc.

The SCIENTIFIC AMERICAN SUPPLEMENT is the same size, and of a somewhat higher and more technical grade. Price $5, or the two together for $7. Munn & Co., 361 Broadway, New York, are the publishers.—*Home and School, Toronto, Canada.*

Among the publications devoted to practical information, art, science, mechanics, chemistry, manufactures, and kindred subjects, none fulfills its aim more thoroughly than the SCIENTIFIC AMERICAN. Its copious letterpress is supplemented by admirable illustrations, and is the product of the best minds in the peculiar domain which it cultivates. The SCIENTIFIC AMERICAN is considered an authority by both specialists and the general public.—*The Standard, Boston.*

The SCIENTIFIC AMERICAN is the most practically useful publication of its kind in the country. Indeed, it occupies a field distinctively its own. Not alone for the machinist, manufacturer, or scientist, but it is a journal for popular perusal and study.—*The Tonica (Ill.) News.*

The SCIENTIFIC AMERICAN is the standard of all scientific and art questions throughout the civilized world. It is placed at a very low rate of subscription, $3.20 per annum, which places it within the reach of all.—*The Weiser (Idaho) Leader.*

The SCIENTIFIC AMERICAN is, beyond all competition, the leading scientific paper of America. It presents the latest scientific topics in an interesting as well as a reliable manner.—*Sunday Gazette, Akron, O.*

The SCIENTIFIC AMERICAN and the SCIENTIFIC AMERICAN SUPPLEMENT are publications of incalculable worth to every mechanic, artisan, and inventor. By reading these beautifully printed publications, with their pages filled with pictures and illustrations of new appliances and inventions, men gain ideas and knowledge that often prove fortunes to them.—"*Brick*" *Pomeroy's Democrat.*

The SCIENTIFIC AMERICAN, says the *Wolsey (Dakota) Journal*, is without a peer in its line, and is invaluable to mechanics and inventors.

The SCIENTIFIC AMERICAN remains without a rival in its special field. One will always find it full of valuable information that it would be difficult to get elsewhere.—*Christian S. S. Teacher.*

The SCIENTIFIC AMERICAN is the greatest journal of its class in the world.—*The Dakota Record and Advocate.*

The SCIENTIFIC AMERICAN is, without a doubt, the best scientific paper published in America and is interesting and instructive to all classes.—*Latrobe (Pa.) Advance.*

Our Patent System.

If some philosopher should propose a scheme by which, without any expense to the state, a small army of ingenious men might constantly be employed in devising means for adding to the wealth of the country and to the comfort of its inhabitants, he would be regarded as a person of almost superhuman wisdom. And yet the patent system of the United States is such a scheme, producing such results. Last year the patents granted for inventions reached the enormous number of 23,329, and most of these were for really useful devices that will effect a saving in time, money, and labor. It would be speaking within bounds to say that every year 10,000 men employ a considerable part of their working hours in making inventions, and to this class our wonderful industrial and agricultural progress is largely due. It is the genius of the inventor that has developed our manufactures, planted and reaped the prairies, and even fenced in the cattle ranges of the West. In his recent work on "Popular Government," Sir Henry Maine remarks that the power to grant patents by federal authority is one of those provisions of the Constitution which, though commonly overlooked by superficial critics, "have most influenced the destinies of the American people," and that it has made them "the first in the world for the number and ingenuity of the inventions by which they have promoted the useful arts." Practical men who study our industrial achievements come to the same conclusion. A few years ago a commission of Swiss manufacturers who visited this country returned home almost in despair of competing with us even in the manufacture of watches; and in their report they recommend, as of the utmost necessity, the creation of a patent system in Switzerland similar to our own. Sir William Thomson, President of the Mathematical and Physical Section of the British Association, has declared that "if Europe does not amend its patent laws, America will speedily become the nursery of useful inventions for the world."

The Boston *Weekly Advertiser*, from which the above is taken, expresses the opinion that the costs of a patent in this country seldom prevent an inventor from obtaining a patent, in consequence of his inability to pay the fees, although circumstances may require him to wait some time longer than he likes to, for lack of the necessary means.

Referring to the Patent Office, the editor adds: Small as the fees are, however, the income arising from them is sufficient not only to defray the whole expense of the Patent Office, but to leave a large surplus besides; and, therefore, there can be no excuse for the niggardly appropriations made by Congress for this department. The force is too small, so that inventors are kept waiting an unreasonable time for action upon their applications, and the salaries of the examiners are insufficient to attract such men as the duties of their office demand. If, therefore, any new legislation is to be had in respect to patents, it should be such as will increase the efficiency of the present system, already a source of revenue to the state and of immense benefit to the country. But the changes most often proposed, and embodied in five or six bills recently introduced in Congress, are of a directly opposite character, and calculated to impair, in some cases to destroy, the efficiency of the present law. They are indications of a feeling which crops out continually, here and there, especially in the West, that patents are instruments of oppression, and that the country would be so much the richer if they could be done away with.

It is true that the protection of a patent sometimes involves a certain hardship to innocent purchasers of an infringing article, but the hardship in this case is no greater than in other cases where innocent purchasers are victimized by thieves. The man who buys a stolen horse is obliged to surrender him to the rightful owner, and although this is a hardship, it is a necessary one. And a similar hardship is equally necessary in the case of a patent, for if innocent purchasers were not liable to suits for infringement, the infringing manufacturer and seller would stand as well in the market as the owner of the patent; and when the article invented was, as it very often, perhaps most often, is of such a character as to be made and disposed of easily, the value of the patent would practically be gone. In reality, it very seldom happens that an innocent purchaser is sued; but if his liability to suit were taken away, capitalists would not buy patents, and the prospective reward of the inventor would disappear. The capitalist is as indispensable to the inventor as he is to the workman; and it is impossible to destroy the property of the capitalist in patents without striking a fatal blow at the inventor behind him. The capitalist benefits incidentally by the patent law, but if this be a misfortune, it is an unavoidable one.

Those who wish to curtail the privilege of patent owners, or to abolish the system altogether, should bear in mind not only soulless corporations and rich capitalists, but the real object of the patent laws—the inventor. Commonly he is a poor mechanic, toiling late at night; often and often, as the law books record, struggling with poverty, illness, and discouragement, but buoyed up for years, may be, by the certainty of obtaining, if he succeeds, a patent that will have a market value. It is for the purpose of keeping this man to his task that our patent system exists. Without the hope of pecuniary reward, great in proportion to the value of his invention, he will either make no attempt to invent, or succumb to the first difficulty. In the establishment of M. Schneider, the famous ironworker of Creuzot, France, about 12,000 workmen are employed, but they are forbidden to take out patents for themselves, and the result is that they have never produced a single invention of sufficient value to be worth patenting by the proprietors.

A patent system, to be of any avail, must touch every workman in the country, and to this end the patent must, first, be obtained cheaply, and, second, be protected efficiently. If not cheaply obtainable, it will be beyond the reach of the workman; and unless fully protected, it will not be for the interest of the capitalist to buy the patent; consequently, there being no reward for the inventor, he will cease to invent. At present, our patent system combines both of these essential characteristics; to abolish either of them would be an act not only of injustice, but of folly.

Repairs of Railroad Cars by Contract.

At a meeting of the Master Car Builders' Club, at their rooms in New York city, on April 15, there was an informal discussion of the question of the advisability of introducing some system whereby car repairing of all kinds, including painting and varnishing, might be done by contract. There has been some slight attempt made in this direction by one or two companies, in special kinds of work, but the idea of thus covering the whole field of car repairs is now being entertained by a sufficient number of railroad men to insure a thorough discussion of the subject. One of the reasons especially put forward in its favor is that, once having a scale of prices adopted covering all the details of the work, the companies will not be likely to have as much difficulty with the men on account of strikes, as, under the proposed new contract system, the work would naturally be so divided as to come under the control of "teams," as it were, in the several departments, these teams contracting to do so much work, the company furnishing the material, and the men settling their own affairs as to the division of the pay among themselves.

Red Ink in Printing.

In ornate typography, red is growing in favor, and the tendency is to work in heavy masses of it. To produce a striking effect, more red is required than black. A recent number of the *Art Age*, in an elaborate review of the use of red ink, says, among other pertinent things, that the mistake most frequently made is in introducing red inappropriately in masses where it is neither ornamental nor part of the general composition.

To put it plainer, there is an increasing disposition on the part of printers who have a laudable desire to be progressive to use great masses of red merely for the sake of obtaining a glaring effect. A single line of red in a page of gothic produces a highly attractive effect. One heavy initial letter or line of red in a page is pleasing to the eye; any further addition of red in mass becomes a positive blemish, which repels.

Natural History Notes.

The Age of Fish.—Many statements have been made as to the great age that fish may attain. Some persons think that there are carp at Fontainebleau that date back to the time of Francis I., but the majority is skeptical in regard to this, and for good reasons. Professor Spencer F. Baird thinks that we may allow an age of 200 years for certain carp. There is nothing, says he, to prevent fish from living almost indefinitely, since they have no period of maturity, and grow every year of their life. In Washington there are goldfish that have belonged to the same family for fifty years, and they appear to be scarcely any larger than they were when purchased. In the royal aquaria at St. Petersburg, there are fish that are really 140 years old. Some of these are fully five times larger than they were when introduced, while others have gained but a fraction of an inch in length. It appears that in China there are sacred fish of still greater age.

A Gigantic Sea Weed.—Captain John Stone, commander of the ship Clever, recently carried to Montevideo some remains of a gigantic sea weed that he picked up near the equator. While overtaken by a dead calm in these regions, the sailors perceived an object floating on the surface at some distance from the ship. Manning a boat, they rowed out to it and found to their surprise that it was an alga of the extraordinary length of over fifteen hundred feet. From an examination of the specimens collected, botanists identified the plant as *Macrocystis pyrifera.*

Deep Water Fauna of the North Atlantic.—In a recent paper by Professor S. I. Smith on the decapod crustaceans dredged by the Albatross in the North Atlantic, the author remarks that at least a third of all the species taken came from depths greater than a thousand fathoms, and a number were remarkable for their large size. One Brachyuran had a carapace five inches long and six broad, and some specimens of an Anomuran measured, with outstretched legs, over three feet. Some of the species were nearly colorless, but most were of some shade of red or orange. As regards eyes, eight out of twenty-one had normal black ones, two had abnormally small ones, three had eyes with light colored pigment, and of the rest the function was doubtful. Of five species from below two thousand fathoms, one had normal, well developed eyes, while the eyes of the rest were small, imperfect, or doubtful. From these and other facts, Professor Smith draws the conclusion that, notwithstanding the objections made by physicists, some light penetrates to a depth of over two thousand fathoms, and, in view of the purity of the water in mid-ocean, he sees no reason why light should not reach that depth as easily as it does five hundred or two hundred fathoms nearer shore. However this may be, he finds that there is a tendency toward a radical modification or an obliteration of the normal visual organs in deep water species.

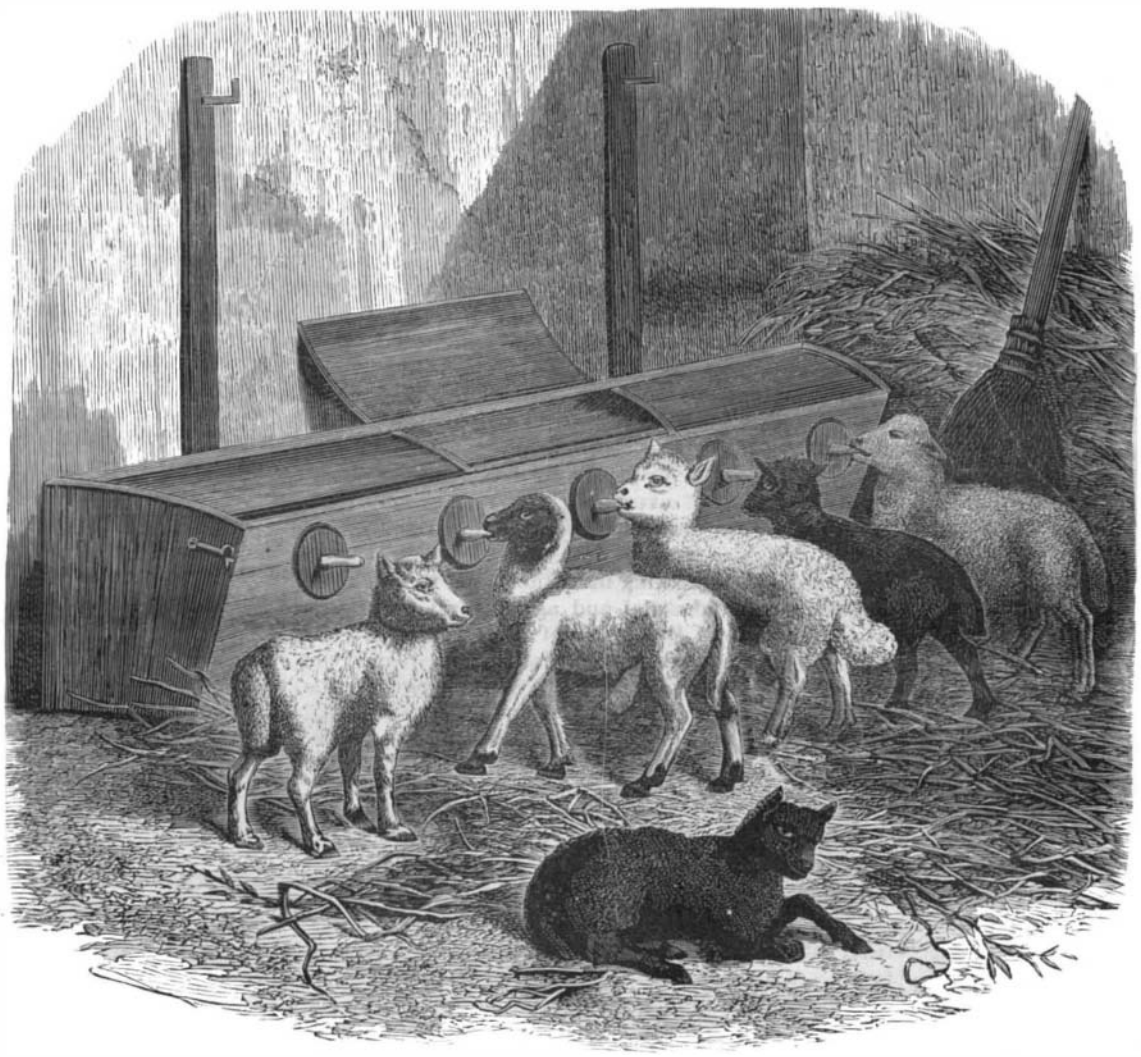
The Enemies of the Oyster.—In a recent number of *Science*, Mr. R. S. Tarr gives some interesting details in regard to the habits of two enemies of the oyster, studied by him—*Asterias Forbesii* and *Eurosalpinx Cinerea.* The former of these approaches the oyster, which naturally is powerless to move, and lies upon its shell. It then proceeds to attack its victim's stomach, and in so doing secretes a peculiar liquid that seems to weaken or kill the oyster, so that the latter remains with its shell partly open. After a while, the Asterias has absorbed sufficient of the oyster, and takes its departure, leaving its victim to perish. Getting hungry again, the Asterias begins upon another oyster, eating a small portion as before, and leaving the rest without ever returning to it. It appears that at times an oyster bed will be entirely taken possession of by these animals and be wholly destroyed in one night. Mr. Tarr thinks the only remedy is to find whether there is not some mollusk that the Asterias might like better than the oyster, and, if there is, to rear this in the vicinity of oyster beds in order to satisfy the starfish's voracity.

The Eurosalpinx, by means of its odontophore, bores a hole into the oyster's shell with amazing rapidity, and then scrapes out the flesh and feeds upon it. After a short period of rest it passes to another oyster, and so on. In both cases the victim is fatally injured, and soon dies. According to Mr. Tarr, these two enemies are the cause of very great mortality among oysters.

Influence of Electricity on Plant Roots.—It is a fact generally known to botanists that the roots of aquatic plants incline to one side or the other when an electric current is passed through the water in which they grow. Mr. Elfring was the first to observe this fact, as long ago as 1882. He found that the majority of the roots examined by him curved positively, that is, toward the anode; others, on the contrary, curved toward the cathode; and, finally, some exhibited an inclination whose direction it was difficult to determine. Mr. Elfring endeavored to explain this phenomenon by saying that the current, acting upon the protoplasm, produces a diminution in the turgidness of the cellules, and consequently a retardation in the growth; and this retardation being different at various points of the root, there results a curvature of the latter.

A little later, Mr. Brunchorst thought that he had discovered that the curvature depended solely upon the intensity of the current, that is to say, that a current of feeble intensity produced a negative curvature, and one of strong intensity a positive one.

More recently some researches on this subject have been made by Mr. Rischewi. According to the theory which he espouses, the curvatures are attributable to cataphoric action. This scientist bases his theory upon the well known experiment of Dr. Du Bois Reymond, in which two cylinders of coagulated albumen, placed between the electrodes, show an inflation at the negative electrode and a contraction at the positive. This phenomenon is due to the fact that the water in the cylinder moves, under the influence of the current, in the direction of the latter. Roots afford another example of such action. As the turgidness of the cellules increases on the side next the cathode, this side elongates, and a positive curvature is produced. The negative curvature is explained by the diffusion of the external liquid in the porous roots, this occurring on the side next the anode, when a current of feeble intensity is made to pass.



A NOVEL MODE OF FEEDING LAMBS.

The Velocity of Meteors.

About six weeks ago, we referred to the fact of an extraordinarily brilliant meteor having flashed across the sky in this neighborhood, and we invited communications upon it from any who might have observed it. It seems that upon the same night a similar meteor was observed in England. Now, under ordinary circumstances, there was nothing notable in this, for meteors are known to be continually falling, it having been calculated that many millions of them fall annually upon the earth. But that one should fall of exceeding brilliance, and described in almost identical language by correspondents in the *Times* and by ourselves, is worthy of note and of further inquiry. We recorded that such a meteor appeared at 27 minutes past 12 in the direction east-southeast from Cumballa Hill, from which place it was seen. It was subsequently reported from Rutnagherry that a meteor was seen there, but to the north. A correspondent wrote us from Mahableshwur, who reported that he saw a very bright meteor at half past 1 (local time), but the great difference in time pointed to some error in recording the exact appearance, or else proved that it was some other meteor that was seen. In England there was a meteor which seems to have passed over London about 5:5 P.M. Greenwich time, or 9:55 P.M. Bombay time; and it appears to have been traveling eastward. It does not seem beyond the bounds of possibility that the meteors seen here and in England were the same. The absolute difference in time would thus be 2 hours 32 minutes, which is equal to the time taken to travel the distance between these two points. Assuming this distance to be about 5,500 miles, the rate at which the meteor was traveling was about 35½ miles a minute in the earth's atmosphere. The rate at which meteors travel in interstellar space is about 40 to 50 miles per second. So that the difference between these two rates of speed shows the retardation due to the earth's atmosphere, always going upon the assumption that the meteor seen in England was the same as that seen here. To settle this point, it will be of interest to know if any one between Bombay and London noticed the brilliant meteor of the 16th of January, and it would also be interesting to know if any one saw it on the other side of India and further east. Though meteors or meteorites fall in such great numbers, it is very rarely that their history can be traced, and it appears that a service may be done to science by tracing out the path of this particular one, if so be that two points in its journey have been fixed.—*Times of India, March* 6, 1886.

NOVEL MODE OF FEEDING LAMBS.

The device for feeding lambs is so simple and so well delineated in our excellent engraving as to require but very little description.

It may be well to state that the reservoir containing the milk should be kept clean and sweet, and fed to the lambs at about the normal temperature of the animal.

The sooner after birth the lambs are introduced to this mode of artificial feeding, the less trouble will be experienced in the weaning process. The lambs should be fed regularly, not less than three times a day. In France, where the invention has been introduced quite extensively, it is said to have proved very satisfactory.

The Paris Metropolitan Railway.

The capital of the company for the promotion of the Metropolitan Railway for Paris is to be 50,000,000 francs. The plan comprises (1) an inner circle line along which the rails will pass, according to the nature of the ground traversed, underground through cuttings or over viaducts; (2) two great arteries destined to connect the stations of the great companies and intersecting Paris. One underground will connect the Gare de l'Est, pass through the district of the General Post Office and Halles, and terminate at Mont Parnasse Station; the other, which will be above the surface level, will connect with each other (1) the Saint Lazare and the Nord stations by a line which will pass through the Carrefour Drouot; (2) the two stations so united of the West and North with the Vincennes and Lyons stations by means of a line passing from the Carrefour Drouot and leading toward the Avenue Daumesnil by crossing the district of the Halles, which, serving as a point of intersection of the above-ground artery and the underground artery, will thus have exceptional advantages. The contemplated stations number 64, of which 28 are to be on the viaduct, 15 over open cuttings, and 21 over the underground way.