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Contents:

(Illustrated articles are marked with an asterisk.)

THE VALUE OF SCIENCE.

Many persons have been deterred from pursuing scientific studies on account of the cry of utilitarianism and the reproach that attends upon anything practical. There is something quite unworthy of the age in which we live, in any such notion, as the progress of society and the advance of civilization in modern times depend chiefly upon the application of the discoveries of scientific men. We never know what use may ultimately be made of a discovery. What appears to us at the time as a trivial and insignificant fact, may become one of the links in a great chain of practical application.

When Oersted observed the deflection of the needle produced by the galvanic current, he could not have anticipated that a telegraph would grow out of so slight a circumstance. Faraday's discovery of induction gave us the present form of the telegraph, and also electro-plating and electro-chemistry. The black powder in the alkali manufacturers' vats in Paris, to which the name of iodine was given, was of no consequence when first discovered, but now we know that the grand application of photography depends upon it.

A few years ago a German chemist announced the discovery of sugar in the beet. The account was received, like a vast number of other announcements, as a useless fact, and rather disgraceful to the man who wasted his time in such insignificant labors. Now we know that the beet sugar industry is one of the most important, on the continent of Europe, involving millions of capital, and giving occupation to thousands of men.

The illustrious philosopher, Faraday, succeeded in condensing a number of gases. It was an interesting experiment, but certainly no one could have predicted that some day the question of furnishing cheap food to large cities would depend upon the application of this discovery, but such appears likely to be the fact. The best refrigerating machines, and the most practical methods of producing artificial cold, are founded upon the condensation of gases, especially of ammonia, by means of which we shall be enabled to transport frozen meat any distance.

But not only in the production of cold is Faraday's discovery available; we have in it the germ of a valuable motive power, that is capable of extensive application. Faraday also discovered benzol, and for many years no use could be devised for it; we now know that the whole aniline industry, with its magnificent array of colors, rests upon what appeared to be a useless discovery; and yet Faraday, who gave us our present form of telegraph, who enabled us to produce the richest colors, who put cheap food within our reach, and gave us a motive power available at all times, himself worked in poverty, and died a poor man.

Professor Tyndall has just aroused the attention of the world to the great question of haze and dust, and out of the agitation of this subject will eventually grow true methods of ventilation, the suppression of cholera and fevers, the proper care of the poor in tenement houses, and many improvements in the sanitary condition of mankind.

De la Rive, of Geneva, while experimenting in electricity, found that a bit of zinc would prevent the oxidation of iron, and he at once suggested its employment for this purpose. Out of this simple fact has grown the immense industry of galvanizing iron; but that is not all, for in the same battery De la Rive observed that the minute scratchings on one of the cups was accurately copied on the copper deposited upon it. He mentioned the circumstance; Jacobi took it up, and we now have electro-plating and galvano-plasty carried to complete success.

Pasteur has been devoting years to the study of fermentation, and as a result of his experiments, we are taught to know the true causes of disease and decay, and to invent the proper remedy.

The workers in copper were found to be exempt from cholera, and on investigation it was found that they breathed considerable sulphurous acid, and it was at once seen that this gas, which prevents fermentation and destroys the cholera germs, was what had afforded protection to the coppersmiths, and the same remedy was applied with success in cholera districts and in hospitals.

Sir Isaac Newton discovered the solar spectrum. It was an insignificant thing to throw a beam of light on to a screen through a hole in the shutter, and his neighbors thought he ought to have been better employed; but what a wealth of invention has grown out of this one fact. We now dissect our light, and apply each part as we want it. We can shut out the light and admit the heat. We can concentrate the chemical rays and take a picture. We can examine the spectrum and determine the composition of the sun, moon, and stars, and we shall, before long, separate the light and chemical rays from the heat, and shall store up the heat of the sun as our great motive power, after our coal and fuel have been exhausted. We cannot tell to what vast uses this discovery is destined to be applied.

Professor Schrotter, of Vienna, found that he could convert phosphorus into a red powder, which had many peculiar properties: It was not so poisonous to the workmen in the match factory; it did not ignite on friction, and could be easily transported from one place to another; it was not soluble in the same re-agents as the ordinary phosphorus; and it had powerful reducing properties. It was a trifling matter at first, but has since saved the lives of many a poor person in match factories, and served an important use in the extermination of vermin.

The catalogue of trifling discoveries is almost endless, and we have mentioned enough to show the importance of appreciating the labors of those whose whole life is devoted to the good of their fellow men.

In ancient times it was said, "The proper study of mankind is man," and acting upon that, the world stood still for centuries. The study of mankind led to metaphysical mysteries and superstitions, and it is only since science has dispelled these clouds and let in the light of observation, perception, and judgment, that man has begun to enjoy freedom from such thralldom as our early philosophers imposed upon him. One superstition after another passes away before the clear light of scientific inquiry, and it is not the man of science, but the metaphysician and inductive philosopher, who throw doubt and distrust and unbelief into our ranks. The value of scientific study is therefore two-fold; it gives us the comforts of civilized life, and overturns all doubt and superstition; "it proves all things and holds fast that which is good."

IS HYDROGEN A METAL?

About a year since, we published an account of the late Mr. Graham's researches on the occlusion of hydrogen by the metal palladium, from which he arrived at the conclusion that hydrogen was a metal in a gaseous form. In a recent issue we also gave an account of an interesting experiment performed by Mr. Loew before the Lyceum of Natural History in this city, from which it appeared that he succeeded in making a hydrogenium amalgam with mercury.

It is well known to chemists that when mercury containing a little sodium is treated with a solution of chloride of ammonium, the mercury apparently swells to a bulk very much greater than it originally possessed, and the radical ammonium, generated by the reaction of the chloride of ammonium with the sodium, appears to enter into combination with the mercury to form an amalgam, called the ammonium amalgam.

From this deportment of ammonium with mercury it has been maintained by eminent chemists that hydrogen, one of the elements of the radical ammonium, is probably a metal, which theory the investigations of Graham were pretty generally accepted as confirming.

In the discussion upon Mr. Loew's experiment above alluded to, Professor Seely took occasion to remark that he, together with others, entertained the opinion that there yet existed no proof calculated to substantiate the belief that hydrogen was metallic in its nature, and that the term "hydrogenium" which Mr. Graham applied to that element, was therefore inappropriate.

In a recent conversation, Professor Seely expressed the same opinion to us, adding that the so-called ammonia amalgam is nothing more than a *froth* of mercury, and that the hydrogenium amalgam of Mr. Loew is a similar *froth*.

To enforce his views he performed in our presence an interesting experiment. The mercury amalgam was made by him in a glass tube, to which a small air-tight piston had been previously fitted. After the reaction had taken place he subjected the same to a pressure of probably ten atmospheres by forcing the plunger into the tube. The amalgam deported itself exactly in accordance with Mariotte's law of the compression of gases, which certainly could not have been the case if the amalgam was other than a froth as claimed by Mr. Seely.

We deem this experiment as wholly conclusive that this apparent compound is really nothing but a mechanical mixture and not a true chemical compound as hitherto maintained.

We may add that Professor Wurtz, of this city, who had his attention called to the experiment of Professor Seely, has since been able to produce a froth of mercury by simple agitation of aqua ammonia with the metal first amalgamated with a little zinc.

HOW PEOPLE LIVE TOO FAST.

The word "fast" has latterly obtained a peculiar significance as indicating a tendency to general high living and indulgence in sensual pleasures. A man of reckless expenditure, who indulges himself in all that can gratify his sensual tastes, is a "fast man" in the common sense of the term. This expressive adjective has also been applied to those who habitually risk money in games of chance, and has in some instances been coupled with the names of others, who speculate in doubtful stocks.

We have come to the conclusion that sensual indulgence, exciting games of chance, or speculation in fancy stocks, are not the only ways in which men may live too fast.

Many a godly and devout divine is a fast man. Many an editor, lawyer, merchant, or scientific man, against whom no thought of suspicion exists as to the soundness of his moral character, is fast in as just, though not in so reprehensible a sense, as the man who wastes his substance in riotous living.

Fast living in the sense of such living as shortens life, is a much more common evil than it is generally regarded. We have been an observer of faces and character for a long time, as we have had opportunity in cars, stage-coaches, and our daily intercourse with men, and we believe that in the vast majority of cases it would be found that the rapidity of the pulse in Americans is above the normal standard. Every man's life may be measured by pulse-beats. He will live, accident excepted, to make a definite number of these, and his life will be shortened in proportion to the excess of work performed by his vital organs, in a given time.

Excitement, physical or mental, is the cause of the rapid rate at which most American people are living. The love for excitement is a vice, as positively evil in its effects as the love for strong drink, licentiousness, or gambling. It matters not what kind of excitement; all excitement is fast living, and begets a feeling of exhaustion in intervals of indulgence, which clamors for relief from some other form of stimulant.

Thus it is that the universal demand for artificial stimulants has increased, until there is perhaps not one in a thousand who does not resort to something of this kind. Alcohol, absinthe, opium, hashish, tobacco, coffee, tea, or whatever else it may be, is taken to support the system under the effect of nervous prostration, and to supply in another form the excitement which it craves.

Now all this is just the reverse of what should be the case. Instead of seeking excitement, health and long life demand that we should shun it. The natural, healthy condition of the mind and body is that of unruffled calmness. If excitements occur, they should be exceptional, not the rule of life. As soon as they become a necessity there is a diseased state of mind and body, and the candle begins to burn at both ends.

THE STEAM MAN.

Have we not heard somewhere in song of a wonderful steam arm, which hammered away all obstacles, and of a steam leg that walked the owner to death, and then walked away with his ghost? If our memory serves us, we have. We never expected to meet those wonderful members in the flesh, but no man knows to-day what is reserved for him to-morrow. We have lived to see steam legs, steam arms, steam body and breeches, steam coat, hat and choker, all combined to eclipse all that poets have sung or dreamed.

Passing up Broadway we saw large posters announcing the greatest wonder of any age, past, present, or future, which wonder was explained, in smaller letters, to be an imitation of the human form divine, impelled by steam, and approximating in agility the renowned Hanlon Brothers.

We paused, considered, entered the place of exhibition, and found the steam man in a perfectly nude state, with the exception of his hat. His other articles of dress were hung upon a line, as if to dry from them the prespiration they had absorbed in his severe exercise. We were at fault, however, in this supposition, as we were told by the steam gentleman's valet, who was giving his master a drink of benzine through a hole in his shoulder. This attendant told us that the grace of the steam man's movement, and the comeliness of his features had begotten a general desire in the minds of his admirers to see his manly proportions, and his modesty offering no protest he was accordingly disrobed for the benefit of the public.

We proceeded to take observations of his anatomy from divers points of view. The gluteal region, kindly protected from rude assaults of hostile boots in ordinary mortals, by thicker muscles than are found on other parts of the frame, was replaced on the steam man by a Behrens rotary engine, the contour of which would give, we may imagine, an outline—when covered by clothing—not unlike that demanded to sustain the resemblance to a man so far as this important portion of the human system is concerned.

This engine impels a screw, which actuates worm gears; the gears actuating eccentrics, which actuate the legs and feet, which actuate the entire man at a velocity of, we should say, about forty feet per minute, when doing his level best.

His legs are merely straight bars, with large blocks of iron

for feet, fastened rigidly to the legs. The legs are joined to the feet at the middle, so that the heels are as long as the front part of the foot; and to keep the figure from toppling over side-wise, a flat bar extends laterally from each foot.

To give the appearance of bending at the knee a toggle joint is attached to the front part of each leg, but this has nothing to do with the propulsion of the automaton.

There is nothing in the movement analogous to that of the human leg. One foot is raised and then advanced, the whole leg moving forward, not swinging, with the foot, each foot being alternately the pedestal or base upon which the body rests.

The fuel employed is some fluid hydrocarbon, and the boiler is concealed in the body. The smoke escapes through a hole in the crown of the hat. When the steam man is about to take a walk, his valet takes a pair of pinchers and after opening the throttle valve, seizes with the pinchers the end of a shaft which protrudes just below the abdomen, and giving it a partial turn, a most remarkable sound resembling the rumbling of wind in the bowels commences, and the steam man sets out upon his travels with a rather unsteady gait, and with extremely short steps. When he reaches the end of his limit the steam is shut off, and he is turned about face by his faithful attendant, and retraces his steps in the same manner as we have described.

On the whole, the steam man is a curious automaton, and very much more satisfactory than his predecessor exhibited two or three years since in this city, who could only stand upon fixed crutches, and kick like a spunky child suffering for a spanking.

WASHINGTON CONSIDERED AS A PLACE FOR AN EXHIBITION.

Hallet Kilbourn, Esq., has sent to us a copy of the interesting speech delivered by him at Lincoln Hall, Washington, in support of the somewhat melancholy project of holding an "International Industrial Exhibition" in that city.

Our readers are probably aware that Washington is situated on the Potomac river, about twenty-five miles above Mount Vernon. It is principally celebrated for being the capital of the United States, and was selected for that purpose by the "Father of his Country," in view of its retired and almost inaccessible situation. A railroad communication has, however, been opened since the death of Gen. Washington, and it is now much easier than formerly to reach the Federal Capitol, though it is still somewhat off the line of public travel.

In speaking of the characteristics of Washington city, Mr. Kilbourn refers thus to the "Market House:"

"Probably no one prominent object in the city commands so many opprobrious epithets, and is so universally conceded a nuisance, alike by citizens and sojourners, as the group of old sheds fronting five hundred feet along Pennsylvania avenue, and styled the Center Market. Mark Twain, in one of his lectures, said that, in all his travels around the world, visiting objects of interest in Christian and heathen lands, his national feeling was constantly buoyed up by the recollection that, at the national capital of his own proud Republic, there existed a structure whose equal was not to be found on the face of the habitable globe—the Center Market-house, on Pennsylvania avenue."

It seems, however, that four years ago the city authorities proposed to erect an elegant structure on the premises, and present a building, which would be a credit to Pennsylvania avenue, clean and commodious, for market purposes. Plans were adopted which would require the expenditure of several hundred thousand dollars, and the money was appropriated by the city. After the erection of the foundation, at an expense of several thousand dollars, Congress suddenly realized the fact that the old white-washed land-mark (and guide-post for meandering representatives) was about to disappear and a permanent structure to be erected in its place; whereupon the House stopped this outrage on civilization by unanimously passing a resolution putting a stop to the job.

It seems to us, therefore, in view of the facts that the idea of Mr. Kilbourn, or any other man, that Washington should have an "International Industrial Exhibition," borders a trifle upon the absurd.

ARTIFICIAL STONE.

We have heretofore expressed the opinion that nothing whatever can take the place of good stone for building purposes. Nothing else is so durable and nothing else is capable of producing such architectural effects. The only drawback to its more general use is the expense attending cutting it into the required forms.

As the constituents of building stones are easily ascertained and well known to chemists, it is somewhat remarkable that long before this the art of making artificial stone has not been brought to perfection. Yet, if we may judge from the great and increasing variety of processes, patented and otherwise, which now press their claims upon public notice, the time is ripe for the introduction of any process which can demonstrate practically its capacity to fulfill the requirements of the case.

These requirements are not numerous, yet they have been hard to attain, as the history of the failures which have marked the course of invention in this field, sufficiently shows. The Ransome process, successful in England, has not proved so in America yet, though it cannot be said to have had a fair trial here.

We doubt, however, that it will ever compete with cheaper American processes, by which some excellent and cheap building stones are produced.

We have for the last two years availed ourselves of every opportunity afforded us to examine and test specimens of artificial stone, and have met with many kinds which have very little merit. Some however are really good stones, and as such must in our opinion come largely into use.

We notice in the *Art Review Advertiser*, a new journal published in Chicago, that a stone has been introduced there called the Frear Artificial Stone, which is described as fully equaling brown stone both in appearance and endurance. A very handsome residence has been erected on one of the fashionable avenues of that city of this stone, the sidewalk and fence being also of the same material.

The nature of the process is not detailed, in fact it is generally thought advisable by manufacturers of artificial stone to give as little publicity to their processes as possible, in order to prevent infringements.

We have latterly had our attention called to a kind of artificial stone---an advertisement of which will be found in another column—manufactured by Mr. Herman A. Gunther, of Eighty-sixth street, between Third and Fourth avenues, in this city, which we find to be a very excellent stone. In fact we have not met with anything which in our opinion is superior to it in solidity or beauty of surface. It chips with the chisel almost as hard as blue lime stone, and is almost as dense.

We have been shown specimens of this stone which have been laid into sidewalks, and made into a continuous surface of great strength and beauty. Our experiments with it lead us to believe that it will sustain a crushing weight of 150 tuns to the square foot, and the action of water hardens rather than softens it.

It has the great advantage that it may be laid up in continuous walls, leaving no cracks or crevices; a property which has given it considerable request for breweries, malt houses, linings for water tanks, and cellars into which water flows. It may also be molded while in the plastic state into any desired ornamental form, thus saving the expense of cutting. Any desirable shade of color may also be given it except, we believe, pure white.

The material sets very quickly and the stone can be made very cheaply. We believe the Frear stone and other kinds of artificial stone will find it somewhat difficult to give better results than those secured by Mr. Gunther, who is the assignee of the patent which covers the process. We have said thus much as a matter of simple justice to what we deem a meritorious invention, and would advise those interested to examine the stone in question, at the works above mentioned.

THE YACHT RACES.

Last year the American yacht *Sappho* was badly beaten in England by the British yacht *Cambria*. The owners then came to an agreement for additional races this year, the *Sappho* people being very confident that their boat was the fastest sailor, and attributing their defeat to breakage of spars. Three races have been arranged for the present year between the above yachts, the first of which took place on the 10th May, when the *Sappho* came off victorious, greatly to the delight of the Americans. The race was from Cowes, for a distance of 60 miles to windward, up the English Channel. The *Sappho* soon beat the *Cambria* out of sight, so the latter gave up the contest, admitted defeat, and returned to port without having sailed to the stake boat. Two races yet remain to be sailed—one "sixty miles dead to windward and back," and the other a triangular course of sixty miles, twenty miles on each bounding side of the equilateral triangle. The *N. Y. Herald* thus describes the rival vessels:

THE CAMBRIA.

The *Cambria*, schooner, 248 tuns, New York Yacht Club measurement, and probably the fleetest of the British yachts, was launched in May, 1868. She is a fine type of the deep and narrow English model, and in external appearance bears a resemblance to the stiffness and stability of a Cunard steamer. It can hardly be said that the *Cambria* is as graceful and charming in her *pose* upon the water as the majority of American schooners, and this is simply because the English are willing to sacrifice anything to secure the full embodiment of their ideas as to speed. Her dimensions are—

	Feet.
Length (from stempost to sternpost)	108
Beam	21
Depth of hold	11
Draft of water	12
Mainmast (hounds to deck)	61
Foremast	56·6
Main boom	61
Main gaff	33·9
Fore gaff	25
Bowsprit (outboard stem)	35
Maintopsail	35·6
Foretopsail	32·3
Maintopsail yard	32
Foretopsail yard	29

She is a keel schooner, substantially built of oak, with teak topsides. Her interior fittings are remarkably beautiful, rich, and in good taste, and the wainscoting is finished in polished oak. On the principle upon which she was built the *Cambria* is a most perfect triumph, and no one need doubt that she is the finest schooner in Great Britain. All of the delicate niceties employed by English yachtsmen in ballasting, sparring, and canvasing, have been tested by Mr. Ashbury, who, with a spirit which does credit to the most fascinating of all pastimes, has done much to develop yachting among his own countrymen to its present high status.

The *Cambria* has twenty-one tuns of ballast smelted and run into her timbers, and she has also four tuns of lead bolted to her keel. Under sail she spreads a vast area of canvas, and works in the wind with the ease and facility of a weather vane. It is by her qualities of being sharp and quick in stays, of being close to the wind, of making good time in light airs that yachtmen claim that she is one of the fastest schooners in the world. By the wind—that is, close-hauled—she has gaff topsails bent to the ordinary spars; but in sailing free she has much longer and lighter and more flexible yards aloft, and the sail of lighter canvas, of course, clubs out a considerable distance. Her bowsprit is a very peculiar spar, and with the jibboom and flying jibboom is all in one stick and rigs in and out at the option of the sailing master. Of course it is ugly in appearance, but the nautical advantages claimed for it are many and doubtless well founded.

The *Cambria* has had a brilliant and eventful history. She has been the victor in many contests, and her bold and gallant owner and commander has sailed her in most all the seas that wash European shores, and has but recently returned from his cruise up the Mediterranean. She first won fame upon June 2, 1868, when she came in first, with the *Egeria* and *Fleur de Lis* as competitors; but in this contest she failed to win the prize because she had to give time allowance. She also figured with evidences of the finest qualities on the 17th of June, 1868; on the 30th of June, 1868; on the 6th of August, 1868; and on the 11th of August, 1868.

On the 26th of August, 1869, she beat the *Sappho*, her competitor yesterday, and in the same race, three fast English yachts—the *Aline*, *Oimara*, and *Condor*.

After these victories alterations were made in the *Cambria* to make her more sea-worthy. She was padded forward, her masts were bored, and the weight of her keel was diminished. Besides, on the occasions named, the *Cambria* has won golden laurels, especially upon beating to windward, in a trial of this quality with an English cutter (corresponding to our American sloop), in which she was again the victor. This is her *forte*. During the present season the *Cambria* has been given more ballast, her bulwarks have been raised forward and her scuppers have been much enlarged. She is now, according to the dispatches in her best trim, and she will have every American and English eye bearing upon her during the season of 1870.

THE SAPPHO.

All will remember the keel schooner *Sappho*, 274 tuns New York Yacht Club measurement, owned by that thorough yachtman Mr. William Douglas. She is one of the finest, ablest, and fastest of all American or English yachts. Her dimensions are:

	Feet.
Length of keel	113
Length on water line	123·3
Length on deck	125
Length over all	154·8
Beam	27
Depth of hold	11
Foremast	91·20
Mainmast	89·6
Maintopmast	54
Foretopmast	50
Main boom	76
Main gaff	40
Fore gaff	36
Head booms (outward)	30

The *Sappho* draws twelve feet of water aft and seven forward, carries a squaresail, a staysail, two gaff-topsails, and five lower sails, and has great buoyancy and stability by form, both of which comes from a good model and sixty-five tuns of ballast, stowed with fine judgment.

In her model, as can be seen from her comparative beam and hold, respectively 27 and 11 feet, she carries out the American idea of construction. Her bows are very long and fine and her lines forward are nearly straight. She has very little concavity. One peculiarity forward is her bowsprit, which is built in her, thus securing one-third more strength than by the usual plan, with one-third less weight. A very severe test of this improvement has shown it to be of great value, and as an experiment it is very successful.

Coming aft an examination of her lines reveals the excessive swell in her bilge lately increased by Mr. Douglas by "hipping"—that is, by planking on the original framework and augmenting her width below the water line. These alterations took place between the fore and main mast and certainly give the *Sappho* more buoyancy under the large cloud of canvas which she spreads in all weathers; but it is doubtful if she has gained in speed—at least this is the impression of her former owners. Perhaps it might be well to say she has little to gain in this particular.

From the fattest part of the bilge the schooner's sides hollow with considerable concavity, and terminate in a rocker keel, 36 inches deep. She has a very fine and light stern, peculiar to herself, and is quite hollow aft. Her stern is all dead wood and drags no water, leaving a narrow wake. She stands up well, is remarkably quick in stays, is well sparred, and nearly as strong as crystallized rock: built of oak, locust, and hackmatack; finished on the interior with a hard wood cabin, and in every respect a graceful and elegant craft. She has few superiors or equals.

The amount of sail she spreads is incredible, and in light airs there is not a square inch of area within the limits of the stays through which the sky is visible.

Death of Franklin Peale.

Franklin Peale, Esq., whose decease occurred May 5th, in Philadelphia, was a highly esteemed citizen, and extensively known through the public positions he formerly held, and his connection with various scientific, musical, literary, and charitable societies. For a number of years past he has been President of the Pennsylvania Institution for the Blind. Mr. Peale was the son of Charles Wilson Peale, himself an eminent Philadelphian, and the founder of the widely known "Peale's Museum." He was an associate of his father in the organization, and subsequently was engaged in the mainte