The Planet Mars.

The planet Mars is enveloped, exactly in the same manner as its next door neighbor, the earth, in a dense screen of mists and cloud; and it is only at the favorable moments when these clouds are rent asunder, that the actual surface of the planet can be seen. When the cloud curtains are most close-drawn the hue of the planet is greenish-white; when the curtains are flung open the planet wears a ruddy light. The planet's body is red, like the red sandstone of the earth. The drapery of clouds is of the same tinge as the clouds of the earth when seen hanging in masses under reflected illumination.

Under these circumstances, the only way in which anything like an idea can be formed of what the appearance of the planet would be if the drapery of cloud was entirely removed, is to fit together piecemeal the several passing glimpses that are caught of different parts of its surface at favorable times. The best views are so fleeting and capricious that the observer has to watch continually for hours to catch, it may perhaps be, but a momentary glimpse, which then has to be quickly fixed in the mind in order that it may be accurately transferred into the form of an endering record. And this task can only be worked at, it will be remembered, when the planet is in opposition; that is, when it is on the same side of the sun as the earth, and therefore in its nearest approach to the observer—a circumstance which recurs after intervals of 780 days. The observations of Beer and Madler were made with a fine telescope of Fraunhofer's construction, which enlarged the apparent dimensions of the planet from 22 seconds to 110 minutes of arc, and which made its disk seem nearly four times as broad as the moon. Instruments of this class, until very recently, have been very costly affairs. But through the great ingenuity and skill of Mr. With, instruments of a high order of merit and power can be now supplied at something like one fourth the cost of those of an earlier time. Mr. With's telescopes are reflecting instruments in which the mirror is made of silvered glass, glass being much more easily worked into perfect form than the old speculum metal, and silver afforded a far more brilliant surface than the mixture of copper and tin.

Photography is as yet unable to cope with work such as the delineation of the appearances on Mars, because the actinic power of the largely magnified image of the planet is very low, and because the complex movements of the planet and the earth both render prolonged exposures with any exactness of definition impracticable. Mr. Browning has nevertheless shown that there is something which photography can do in regard to this planet, although it cannot make the planet sit for its portrait. It can enable any pair of human eyes to contemplate the picture of the planet exactly as it would be seen if at some favorable instant it could be caught entirely stripped of its veil of cloud. It can bring all the thousand-and-one results of patient and prolonged study and watching together into one glance. Such are, in fact, the stereograms of Mars which Mr. Browning has prepared.

It now only remains to draw attention to the leading features which are developed in these interesting delineations of Mars. Certain spectroscopic observations made by Mr. Huggins leave no reasonable ground to doubt that the red color of Mars is due to the physical character of the actual substance of those portions of the planet's surface. The ruddy hue is at all times less strongly marked towards the border of the visible disk of the planet, where it is more masked in consequence of the reflected light having to pass through deeper tracks of the planet's atmosphere than in more central regions. It is also very much more intense at some returns of the planet into the favorable position of opposition than it is at others. Thus, for instance, the planet was much more distinctly red in the year 1868 than it was in 1864. This seems to indicate that clouds are more prevalent in the platetary atmosphere at some times than at others. The greenish or bluish-gray patches have just such a character of light as would be reflected from large oceans of water. The red and gray patches of Mars are, therefore, now accepted as indicating a very high degree of probability that these are actually continents and seas, which are contemplated, by chance glimpses, upon the planet's surface.

The actual amount of solar light and heat which Mars receives from the great central luminary is less than one-half the amount which is conferred upon the earth; in more exact numbers the proportion is $\frac{43}{100}$.

From some careful investigations made by the philosopher Zollner, it appears that Mars appropriates for his own intrinsic use something more than seven-tenths (or more exactly ·7328 parts) of the solar energy which it receives, and reflects into space nearly three-tenths (or more exactly ·2672 parts).

With lessened solar force less vapor is raised into the atmosphere, and less rain is precipitated upon the land. There are, therefore, less vigorous traces of the changes that are worked by the wearing away of high land under the action of running water. Something also of the difference of sculpturing and contour are most probably due to the fact that a globe, having only one-seventh part the volume of the earth, would pass from the primeval incandescent and plastic condition into the hardened and rigid form much more rapidly, and therefore would not have the wrinklings and foldings of its contracted crust arranged in exactly the same way as the wrinklings and foldings of the crust of the larger earth.—*Prof. Mann.—British Journal of Photography.*

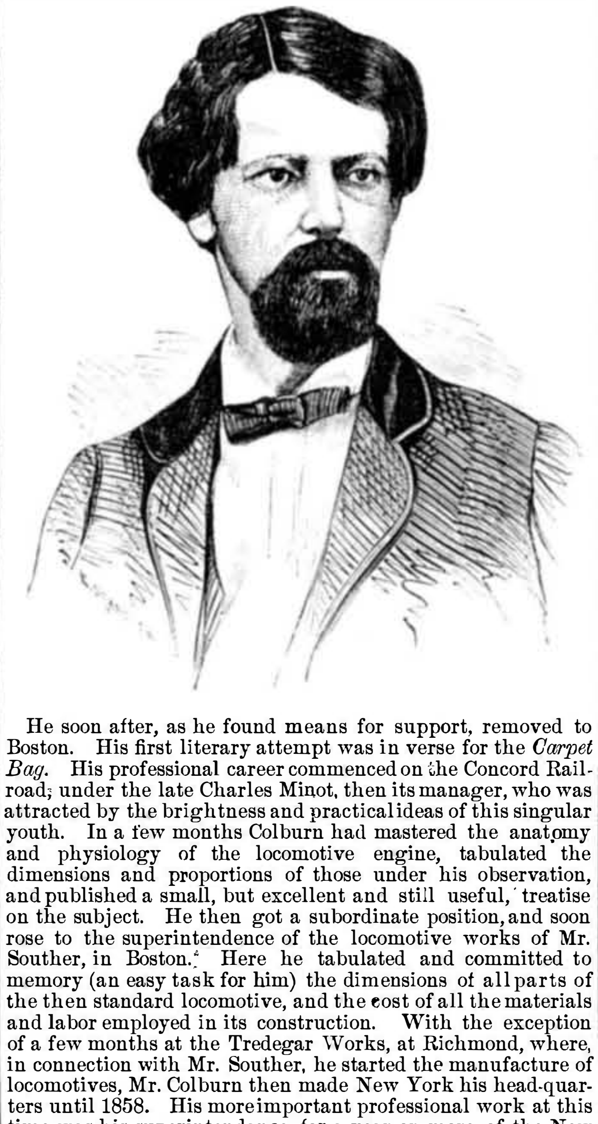
PALE LACKER FOR TIN PLATE.—Best alcohol, 8 oz.; turmeric, 4 drs.; hay saffron, 2 scr.; dragons'-blood, 4 scr.; red sanders, 1 scr.; shellac, 1 oz.; gum sandarach, 2 drs.; gum mastic, 2 drs.; Canada balsam, 2 drs.; when dissolved, add spirits of turpentine, 80 drops.

OBITUARY--ZERAH COLBURN, ENGINEER, AND LEADING WRITER OF ENGINEERING PAPERS.

We have had specially prepared for this paper a portrait of the late Zerah Colburn, which we publish with the accompanying obituary notice from the pen of his former associate, Mr. A. L. Holley, as published in the New York *Times*, of May 2d.

The name of Zerah Colburn is known to the engineers of all countries where professional literature exists, and his writings are perhaps more various in scope and more vigorous in practical treatment than those of any other member of his profession. In his death engineering sustains an irreparable loss.

Mr. Colburn was born in Saratoga, N. Y., in 1832, and was named after his uncle, the celebrated mathematician. His father died soon after, and his mother, very poor and infirm, removed to New Hampshire, where, during his boyhood, young Colburn earned his living on a farm. His early means and opportunities for acquiring an education were limited to a few months' attendance at a district school, a short clerkship in a factory, and such books as he could find in a remote country village. But his industry and his wonderful memory more than made up to him then, and throughout his life, his want of early advantages. From an odd volume of the old *Penny Magazine* he gained a knowledge of the world and an inspiration to see and figure in it, which all educational appliances fail to give the average boy of the period. At the earliest possible moment, young Colburn left the wilds of New Hampshire and struck out for civilization, and he kept moving till he finally settled down in its midst—in London. His first sight of a city, and, what was a greater thing to him, a locomotive, was at Concord. The strong but hitherto undeveloped mechanical talent in him at that sight asserted its proper place, and the locomotive was ever after his chief study, and the subject of his best conclusions and ablest writings.



He soon after, as he found means for support, removed to Boston. His first literary attempt was in verse for the *Carpet Bag*. His professional career commenced on the Concord Railroad; under the late Charles Minot, then its manager, who was attracted by the brightness and practical ideas of this singular youth. In a few months Colburn had mastered the anatomy and physiology of the locomotive engine, tabulated the dimensions and proportions of those under his observation, and published a small, but excellent and still useful, treatise on the subject. He then got a subordinate position, and soon rose to the superintendence of the locomotive works of Mr. Souther, in Boston. Here he tabulated and committed to memory (an easy task for him) the dimensions of all parts of the then standard locomotive, and the cost of all the materials and labor employed in its construction. With the exception of a few months at the Tredegar Works, at Richmond, where, in connection with Mr. Souther, he started the manufacture of locomotives, Mr. Colburn then made New York his head-quarters until 1858. His more important professional work at this time was his superintendance, for a year or more, of the New Jersey locomotive Works at Paterson, during which engagement he made some improvements, still standard, in the machinery of freight engines.

Although eminently fitted for the management of practical construction, Mr. Colburn early found that the literature of engineering was his true calling. He therefore joined the *Railroad Journal* of this city, in which professional readers, soon recognizing the hand of a master, began to look for a new era in technical journalism. And they were not disappointed. In 1854, Mr. Colburn started, in New York, the *Railroad Advocate*, a weekly, devoted especially to the machinery of railroads, and addressed chiefly to the master mechanics, and the more intelligent operatives. The next year he enlarged the *Advocate*, which soon reached a large circulation and great popularity, not only among railway mechanics, but among the profession at large. It is worthy of mention, as illustrating Mr. Colburn's extraordinary power of memory, that he kept no books for many months, but simply remembered when every subscription and advertisement fell due, and made no mistakes.

In the summer of 1855 Mr. Colburn thought he saw, in his large and favorable acquaintance with railroad men, the way to a fortune in the business of railroad supplies. He therefore sold the *Advocate* to Mr. A. L. Holley, then draftsman of the New York Locomotive Works, bought land warrants with the money, journeyed to Iowa and located his lands, and then returned to New York—but with another scheme. The frontier life had temporarily charmed him, and he got together an engine and machinery to set up a steam saw mill in the far West. But before his plans were completed, literature and civilization had resumed he mastery, and he fell to writing for the *Advocate*, because he could not help writing, and to arranging his supply business. The first thing—and the last—that he undertook in this direction was Ames' tires, and with his knowledge, industry, shrewdness, and his advantages with the professional press, he kept the hammers at Falls Village busy day and night building up an immense business, which, unfortunately, the character of the tires did not maintain.

But Colburn was not made for a merchant. He pined for larger professional observation and knowledge, and for a wider field. As suddenly as he went into trade he left it, and sailed for Europe. During a three months' stay or rather rush among the machine and iron works of England and France, whereof the story is recorded in the *Advocate*, and is of permanent value, he had become again and finally wedded to literature. Returning to New York, he connected himself again with the *Advocate*, which was then enlarged and entitled the *American Engineer*.

In the autumn of 1857, Messrs. Colburn and Holley were commissioned by several leading railroad presidents to visit Europe to report on the railway system and machinery abroad, and in view of the financial troubles of 1857, they were advised to stop, at least temporarily, the publication of their paper.

Permanent-way and coal-burning locomotives were found to be the most important subjects of the period, and in 1858 their report on these subjects, largely illustrated by engravings, was published and generally circulated among American railway managers.

Mr. Colburn's thorough and, to American readers, entirely new and startling analysis of the cost and economy of British railways, was the foundation of many of the reforms that have since, although slowly, become standard here, especially in the matter of improved road-bed and superstructure. The success of this book was such that its authors determined to continue their researches, and in the fall of 1858, Mr. Colburn again visited London. Here he commenced writing for the *Engineer*, then the leading professional journal, and soon became its editor. Under his vigorous management it largely increased in circulation and influence.

Mr. Colburn at this time wrote a supplement on the American Practice for a new edition of Mr. D. K. Clark's work on the "Locomotive Engine." After several years' hard work in London, Mr. Colburn resolved to start another engineering paper in America. He came out in the *Great Eastern*, on her first passage in 1860, and soon selected Philadelphia, the principal seat of mechanical engineering in this country, as the birthplace of his own *Engineer*. It was an excellent paper, and the few numbers published will have permanent value, but the time was not ripe, in America, for a publication of this kind, and Colburn, although he had learned to labor, had never learned to wait. In a moment of despondency he dropped his new enterprise, sailed for England, and again became the editor of the London *Engineer*. At this time he familiarized himself with the French language and professional literature. He also wrote several pamphlets on boiler explosions, heat, etc., the originality of which attracted great attention, and he commenced his great work on the locomotive engine.

In 1866, Mr. Colburn started in London the publication of *Engineering*, which is in all countries accounted the ablest and best serial publication on that subject, and he dissolved his connection with it only a few weeks before his death.

During his residence in London, Mr. Colburn was employed as consulting engineer on many important constructions, and prepared many valuable papers in addition to his editorial labors. The more noted of these were his papers before the Institution of Civil Engineers (of which he was a member) on "Iron Bridges" and on "American Locomotives and Rolling Stock," both of which received medals.

Mr. Colburn wrote vigorously, originally, and with understanding on all the leading subjects embraced under the head of engineering. On the locomotive, the steam engine and boiler at large, steam navigation, bridges, railway works, and mechanical engineering in general, he was a first-rate authority.

The saddest part of Mr. Colburn's story remains to be told. Overwork was at least a powerful agency in his early fall, and this, together with his natural impulsiveness and his habitual irregularity in relaxation, as well as in work, drove him, within a few months, into partial insanity. He came to this country a fortnight since, avoided all his old friends, strayed away to a country town in Massachusetts, and there died by his own hand.

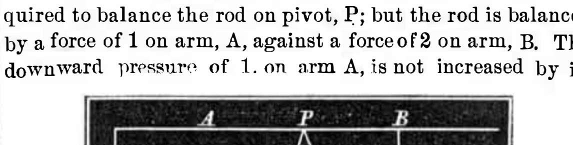
Zerah Colburn was a man whom the profession could ill afford to lose. His thoroughly practical education in the workshop, his extended observation of engineering works, his intimate acquaintance with professional literature, his remarkable quickness of comprehension, his more remarkable memory, and his mechanical talent and inborn engineering ideas, combined to give him a distinction that no engineer in the world will deny him—the best general writer in his profession.

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

A Simple Question.

MESSRS. EDITORS:—It is reasonable, *a priori*, to assume that equal downward forces on the arms, A and B, are required to balance the rod on pivot, P; but the rod is balanced by a force of 1 on arm, A, against a force of 2 on arm, B. The downward pressure of 1, on arm A, is not increased by its



greater distance from the pivot, P, than force, 2, on arm, B, for the joint pressures on the pivot is only 1 + 2 = 3.

There is a law in nature, whereby the greater motion of a small force is made equal to the less motion of a greater force. But here there is no motion. How, then, does ar A, with half the force, equal arm, B?

Until a better explanation is given, we may suppose the greater force on arm, B, does, or rather would preponderate if the inseparable and simultaneous creation of motion infinitely small, did not arrest it, as with the parallel case of action and reaction. T. W. B.

Pittsburgh, Pa.

Scraping Slide Valves.

MESSRS. EDITORS:—I notice in a recent number an article on "Scraped Surfaces." From thirteen years' experience, I find that for all kinds of slide valves and such like, a really good scraped-up face is a most decided benefit. But it is a lamentable fact that few workmen know how to scrape properly. I have always found that the scraper works best after a smooth file; everything should be finished with the smooth file previous to the scraper being used. I have seen many workmen leave too much to be done by the scraper. Now that is a gross mistake; every article ought to be fitted as well as possible before being touched by a scraper; otherwise a bad job is almost certain to be the result. The scraper should always be used obliquely to the file marks, never across at any rate. Nothing makes a better scraper for wrought and cast iron than a taper saw file, and for brass a flat scraper must be used if good work is wanted; say about 1 in. broad and $\frac{3}{32}$ in. thick. A saw file scraper is too keen for brass. In all railway shops in Scotland, scraping is much used and with the best results. We always scraped slide valves, motion bars and blocks, and axle boxes. It is certainly a very unworkmanlike way of turning out a slide valve,and leaving it to work itself tight. It is tantamount to saying it can't be made tight. Most of the first class marine engine builders in Great Britain scrape valves, etc. I know Penn, of Greenwich, tried last year to do away with the scraper on a pair of large valves; on the trial trip the valves got cut up awfully; so scraping is there considered a necessity.

Brooklyn, N. Y. WM. P. COWAN.

Steam on Common Roads.

MESSRS. EDITORS:—Quite a number of years ago I first saw a steam carriage in Brattleborough, Vt.; it was about the size and build of a common 1-horse wagon; its two cylinders were placed horizontally beneath the seat, and were connected by the usual pistons, cross-heads, and connecting rods, to a crank shaft, with a crank upon each end, and at right angles with each other; power being communicated from this shaft to the driving axle by a "chain belt."

The boiler consisted of a series of tubes bent U form, the lower branches of them serving for the grate and the upper branches for the crown of the fireplace, their ends terminating in two parallel horizontal cylinders, the fuel door being between them, the uppermost of the two cylinders being surmounted by a third of larger size for steam room; the tubes and their two connected cylinders being filled with water and cased with sheet iron.

This carriage worked quite lively on level ground and around a circle of from ten feet to twenty feet radius; but I noticed that the fire and the condition of the water in the boilers were matters of considerable care and solicitude with the operator, the fuel being wood, and the boiler containing but little water, the pressure varied greatly and constantly; now flowing freely from the safety valve and the carriage running vigorously, and then barely steam enough to move. There were both power and speed enough while steam was up. I was deeply interested in the novel exhibition, and expected to see, long ere this, steam vehicles in as common use as any other; and I have often wondered that the people should be so tardy in their appreciation of this mode of locomotion.

To be sure the association of boiler bursting has a terror for the inexperienced, but this will always vanish in proportion to the increase of intelligence upon the subject.

During leisure intervals in mechanical operations—especially while engaged in putting up railway engines—I have often busied myself in considering the best methods of applying the power of steam to common road use, both for heavy and light work.

The steam carriage enterprise was prosecuted quite vigorously in England some years ago, and the minutes of evidence taken in the investigation of the subject in the House of Lords are extremely interesting. It is well known that the result of this investigation amounted to almost a prohibition of the working of steam carriages on any of the populous and paying routes; the tolls imposed being so heavy that the proprietors of steam carriages are forced to abandon the enterprise to the "slow coach," podanger policy. Improvement must necessarily be slow while the paths of progress are thus beset with such adverse legislation.

F. G. WOODWARD.

Collisions on Railways.

MESSRS. EDITORS:—Within the last few months I have noticed that, on railroads, where each train is designated by a number, and all trains are moved by telegraph, that several wild trains, standing on side tracks, have been mistaken for regular trains, and, as a natural consequence, in each case a collision, more or less serious, has been the consequence.

Could that not be remedied by superintendents of roads having the number of each train painted on a movable board attached to either side of the cape of the engines drawing the train. For engines regular trains a revolving tablet could be used, on which could be painted the numbers of both the trains (North and South or East and West) sufficiently large and prominent to be read by the engineer of any train passing another while it was standing on a side track?

For night trains, lamps, with numbers on them, could be substituted for placards.

On all wild or construction trains, the word "Wild," or "Construction," or "Irregular" could be used.

R. E. PLEASANTS.

Louisiana, Mo.

Buzzing Up.

MESSRS. EDITORS:—I am glad to see the "buzzing up" process brought to notice in the SCIENTIFIC AMERICAN, *vide* page 252 "Explanation Wanted," C. H. Ladomus. Sure enough it is wanted. Fifty years ago the operation was to me a pastime, perfectly bewitching, and unaccountable as now. It is not (?) animal magnetism; I know as much about that as anybody—which is very little. What is it? C. H. L. is, I think, needlessly particular. A lies on his back, on the floor, ground, or an open lounge. B and C (two are as good as four) place their forefingers under the shoulders and hips of A. They breathe in concert by finger signal from A. At the exhalation B and C lift, but they don't lift; the least effort or grunt breaks the spell, and you must begin anew. Thus A is breathed up, the breath lasting, if you are adroit, till you raise him as high as you can reach, when you must catch him to prevent a fall. The head should be the highest and then he will come down on his feet. He will feel that the gravitation is out of him; B and C lift only the clothing. He feels—have you ever dreamed of flying? That is it exactly.

No need of a close or still room, Mr. L. It can be done out of doors, in a gale as well as in a closet. When you get the knack of it—and it has once cost me three hours to teach a class—any two boys of 12 or 15 years can toss up a Daniel Lambert like a feather. I do not know that any science can come out of it, but as an amusement, it is the richest thing I ever knew. Thousands of your readers understand it, but they have need to be touched up a little in order to enjoy it.

Princeton, Wis. W. M. R.

About Making Tea.

[From Good Health, for May.]

Potatoes, no doubt, are an important addition to roast beef, and the man who first planted them ought to have a statue raised to him. Some people may look with awe upon the rock near Salcombe, in Devonshire, where Sir Walter Raleigh smoked his first pipe in England. Indispensable as the potato, sweetly soothing as is the tobacco plant, more thirst-quenching than *lachrymæ Christi*, or Bordeaux, invigorating as, but less soporific than beer, tea "cheers, but not inebriates," and seems to unite in itself the virtues of other modern luxuries, without sharing in their demerits. Tea in China, however, is not the same as tea in America. The Chinaman would as soon think of putting milk or sugar into his tea as we should think of flavoring champagne with salt. He is also far more particular about his cups and saucers than we are. He would laugh at many of our thick clumsy cups, called "china" by courtesy. His cup must be of a certain shape, ornamented with colors, which are always beautiful, and harmoniously arranged. He delights, most of all, in the delicate and transparent paper-china, that feels as light as a wafer, and is instantly heated through. The invariably stout and sedentary person, with useless feet, who sits all day, and sometimes all night, making tea for him, puts a few dry leaves into his cup, then pours the boiling water over them, claps a thin little saucer-lid upon the cup, to keep the steam in and draw the tea; and presently the tea is poured into that same little saucer-lid, and drank by John Chinaman, much in the style of our washerwomen. In Russia they make tea in tumblers, and flavor it with lemon and sugar. Some people add rum and drink it cold. In France if you call for tea, you will get a thin boiling fluid, which flows almost colorless from the tea-pot, and tastes something like warm water flavored with dandelions. Of course we mean to imply that our method of making tea is the only sound and proper one. We are not sure that we might not borrow the saucer-lid from the Celestials, but we must insist upon plenty of milk and sugar. At all events, in a free country we may fairly claim the liberty of the subject in this direction; but, alas! how few people know how to make tea! only middle-aged bachelors ever attain supreme excellence in this art, and perhaps a few gifted ladies who have been carefully instructed by them. How many of those unconscious damsels, who carelessly shovel in an indefinite number of spoonfuls, and drench the same with an indefinite quantity of half boiling water, realize the difficulties of the task they have so lightly undertaken! They confidently put their tea-pot on the stove, as they say "to draw," as if, forsooth, tepid water would ever draw the hidden treasure out of leaves that have, perhaps, been placed in a tea-pot only half warmed. Others pour you out three thimblefuls as strong as brandy, and then fill up your cup with pure water, and hand you this flavorless mixture, with the request that you will add milk and sugar according to your taste, as if any possible additions could make the wretched stuff drinkable. Some pour your tea into a cold cup, and deluge it with milk. Others merely tinge the fluid, already pale with weakness, thinking that the tea will look darker without much milk. Some give you a good first cup, and let the drained tea-pot stand till you call for a second; then they have the effrontery to fill it up under your very nose, and offer to pour you out any quantity of hot water, which they expect you to drink gravely, with milk and sugar, and call it tea. Others put in soda, and stir the tea-leaves with a spoon—some boil your tea! in fact, there is no end to the dreadful delusions practiced by women on themselves and their victims under the name of tea-making. Doubtless, there are certain rules which may be laid down, such as—see that the water boils; warm your tea-pot and cups well through; fill the tea-pot at least half or three-quarters full, or your tea will be cold, the water will not be hot enough to draw, or it will draw a little strong essence, which you will presently have to drown, and consequently spoil, with boiling water. Keep the tea as much as possible of an even quality. Let the second and third cups be at least as strong as the first. Dr. Johnson was a great connoisseur in tea, and used not unfrequently to take twelve cups. But such were Mrs. Thrale's experience and skill, that we do not hear of his ever being disappointed. But no rules will insure good tea-making. *Poeta nascitur non fit*, and it may be said similarly, you are born a tea-maker, but you cannot become one.

However, to be a good tea-maker is one thing, and to avoid being a very bad one is another; and we are certain, if ladies could be made to realize the importance of this delightful art, and if they only knew what excellent judges most men are of tea, we should soon have what is sadly wanted throughout the country—a great reform in tea-making.

The First Artificial Fire.

Dr. Collas, in *Cosmos*, expresses doubt that the primitive races made fire by simply rubbing together two pieces of wood against each other. He claims that "the friction of two pieces of wood against each other is not sufficient to excite fire, and after what I have seen, I doubt very much if the strength of man is equal to such a task, even if it were possible. It is then not impossible, when we seek from the habits of men still in the uncivilized state, to learn the habits of pre-historic man, assisted by the utensils or relics which time has spared, to arrive at very definite conclusions concerning them.

"The savage, in making his fire is, according to the Sanscrit etymology, a veritable *Prometheus*, for he *hollows by rubbing* in order to *steal away* the fire. Without the groove which he wears he could not make fire. His method is to take two dry pieces of wood unequal in size and hardness. In the larger and softer he plows the groove. The other he bluntly points like a pencil. The larger being firmly supported against a tree or a large rock, the smaller is pushed backward and forward at an angle, in such a way that a groove is formed, making at the same time a mass of fine shavings, or rather a sort of powder which he gathers up at the extremity of the groove opposite to him. The powder soon blackens and smokes, then takes fire, but the *powder only*, and not the piece of wood. Sometimes sailors have attempted the same thing, and have succeeded in blackening the powder and causing it to smoke, but I have never known one to inflame it. Our attempts have been successful in increasing the depth of the groove, but so far as heat was concerned, beyond blackening the powder, we have produced only that which induces perspiration.

"If now we take into consideration the rôle of the powder, the amount of unskilled labor which I have seen lost in *rubbing* pieces of wood with which, without great effort the young Kanack could procure fire, we are led to think that it would be difficult to make a fire with a piece of wood revolving like a drill. With equally good reason we shall conclude that the rocks (*pierres*) found near pre-historic dwellings served another purpose than that of making a fire, and that the piece of granite from Lake Fimon was a household utensil probably analogous to those which the inhabitants of India now possess, and which they use for bruising many substances used as food, whether by pounding them, or by crushing them under a stone roller."

English Steam Plows in Louisiana.

A writer in the *New Orleans Times* gives an account of a visit to a plantation known as the Magnolia Sugar Estate one of the largest in the country. Among other interesting things he witnessed the operation of some English steam plows. We cull a few paragraphs from his description:

"This new implement of agriculture consists of two ten-tun portable engines, resembling the old locomotive that many of our readers probably have noticed at the lake end of the Pontchartrain dept. Beneath each locomotive is a revolving steam drum, on which passes the steel corrugated wire rope that draws to and fro the cultivator, to which are attached some ten steel tipped plow blades. The cultivator is an iron frame, with a seat at each end, and mounted on two iron wheels. On top of the cultivator sits a colored boy, who by means of a simple tiller directs the progress of the plow. The locomotive engines are situated directly opposite to each other, about two acres in distance. By means of the steam drum and the rope the cultivator traverses the field back and forward much faster than a man can walk, and turning up the soil to a depth of eighteen to twenty-two inches in a more effectual manner than could be done by the old system; a harrow some eight feet in length is used over the same field, and is propelled with great ease by the same motive power.

"Mr. Lawrence, the proprietor of the estate, has four of these plows in operation, which easily turn over twenty-four acres a day, at a cost, including fuel and labor, of some three dollars per acre, which is quite a saving over the method heretofore pursued. There is no apparent intricate machinery about the work; the whole seems to work as smoothly as an ordinary standing grist-mill; the locomotive trails over the road quite easily, propelled by steam. Mr. Lawrence, last fall, took off a crop of over six hundred hogsheads of sugar, the entire plowing having been performed by the steam apparatus. The plow, locomotive, etc., were constructed by a firm in Leeds, England, and cost, exclusive of freight, etc., some £1600. The first one imported to this country is now in New Jersey; one subsequently was sent to Illinois, which has lately been sent to this State, and is now in operation at the Concession Plantation, in the parish of Plaquemine, where it is said to give great satisfaction."

Preservation of Stones.

Dr. Robert, in the Paris *Les Mondes*, maintains that the use of the black oxide of copper, and its salts, will effectually prevent change in stone. He shows that the decay of granite, marble, limestones, sandstones, and all natural building stones, is the combined effect of various causes, and that among these is a very minute lichen, the *Lepra antiquitatis*, which is one of the worst enemies of stone, and its action is to such an extent that, for instance, the beautiful marble sculptures of the well-known *Parc de Versailles* will, unless proper measures be taken for staying the process of decay, be unsightly and ugly masses of dirt, and quite irretrievably lost, as works of art, within the next fifty years. The author, taking as instances such buildings at Paris as the Bourbon Palace, the *Palais du Corps Legislatif*, the Mazarin Palace (*l' Institut*), the Mint, and others, points out that dust, spider's webs, and the action of rain, combined with the minute lichen above alluded to, hasten the decay of stone, especially of those parts where any sculpture or ornamental carving promotes the deposition of dirt and dust. Various places and instances are cited, of the application of oxide of copper and its salts, which places are open to inspection, and the length of time which has elapsed since such application, seems to warrant the conclusion that these compounds act as preservatives of stone. In reference to granite, the author states that this stone is also, according to the experience of Egyptian engineers, far more readily affected by a moist climate than one would be led to believe. The obelisk of Luxor, brought from Upper Egypt to Paris, has become blanched and full of small cracks, during the forty years it has stood on the Place de la Concorde; although forty centuries had not perceptibly affected it, as long as it was in Egypt. Granite, in a moist climate, becomes the seat of a minute cryptogamic plant, which greatly aids its destruction, and it is, moreover, a well-known fact, that the disintegration of this stone, which is composed of three separate minerals (quartz, mica, and feldspar), depends very greatly upon the thorough and intimate mixture, as well as the chemical composition of these three ingredients, each of which, in a separate state, more easily withstands the influence of the weather.

Thames Mud Butter.

A paragraph was recently published in the London journals about the adulteration of butter, in that city, from a product of the Thames mud. At the time of that publication, there was some doubt in our minds as to whether the report had foundation in reality, or whether it was one of those sensational newspaper reports which our British Cousins seem to relish, as well as their Yankee relations. Morgan's *Trade Journal* now reasserts the statement, and gives the following particulars:

"An analytical chemist has extracted from a portion of Thames mud, taken from the river at Battersea, a pure white fat. At this stage it lacks both taste and smell, but properly manipulated, it makes a very popular article of food—whether traceable to the refuse of manufactories and of ships or other sources it is impossible to say. That there is, however, no doubt about the fact is proved by the circumstance that about a week ago a small proprietor on the bank of our noble stream, thunderstruck by the apparent extravagance of an offer for his wharf, learned that it was a very favorable situation for a butter factory. Now, the faster this secret oozes out of its discoverer's brain into the receptive organs of other impostors, the faster, of course, will the mud which it utilizes be made to ooze out of its native bed into pats of London butter, which, if the truth as to its origin were fully told, would be stamped with a likeness, not merely of a cow, but of Father Thames. Unfortunately, knowledge of adulteration is not a step toward its suppression. We must grin and bear it, although we are quite awake to the fact, that our milk is sluiced with water, our stout colored "a fine brown" with liquorice, and our butter likely enough to be enriched with the fertilizing properties of mud. What are we to do, when one proverb warns us that every one eats a peck of dirt before he dies, and another, never to quarrel with our bread and butter, not even when the latter is mud pie with a vengeance—of the earth, earthly indeed?"

The Oxygen Light.

According to the *Opinion Nationale*, Paris, the new *Prefet de la Seine* has definitively authorized the Tessie du Motay Company to lay their underground communications in the city of Paris for illuminating with oxygen gas.

A system of pipes will connect the oxygen works of Pantin with the boulevards, and in a few months all the inhabitants residing between the "new Opera" and the Passage Jouffroy, will thus be enabled to benefit from the immense advantages offered by this new light over the old gas.

Already oxyhidric lanterns have been placed at the entrance of the bazar European, near the Passage Jouffroy, and project a light of the purest white and the most dazzling brilliancy, near which the old gas pales and appears to shine with the most singular yellow color.

The journal referred to congratulates M. le Prefet de la Seine for having ratified a measure in accordance with the general wishes and interests of the people, and which appears to it to be the indispensable corollary of the great improvements undertaken within a few years in Paris.

Medical Properties of Eggs.

The white of an egg has proved of late the most efficacious remedy for burns. Seven or eight successive applications of this substance soothes pain, and effectually excludes the burn from the air. This simple remedy seems preferable to collodion, or even cotton. Extraordinary stories are told of the healing properties of a new oil which is easily made from the yolk of hens' eggs. The eggs are first boiled hard, and the yolks are then removed, crushed, and placed over a fire, where they are carefully stirred until the whole substance is just on the point of catching fire, when the oil separates and may be poured off. One yolk will yield nearly two teaspoonfuls of oil. It is in general use among the colonists of South Russia a means of curing cuts, bruises, and scratches.

TO CLEAN MARBLE.—Take two parts of common soda, one part of pumice-stone, and one part of finely powdered chalk; sift it through a fine sieve, and mix it with water; then rub it well all over the marble, and the stains will be removed, then wash the marble over with soap and water, and it will be as clean as it was at first.

The Osmogene Process.

The inventor of the Osmogene process, for purifying molasses, M. Dubrunfaut, has lately reviewed in the columns of the *Journal des Fabricants*, the progress which his invention has made, and the extent to which it is adopted in the French sugar manufacture. We are not aware that the process has been introduced into this country in a single instance, indeed, it is chiefly valuable for operating on beet-sugar molasses, on account of the soluble salts, which are the chief impurities of this sirup, and which the Osmogene process is so efficient in removing.

M. Dubrunfaut first made public his adaptation of the principle of dialysis in a work presented to the Academy of Sciences, in November, 1855, in which he announced that he had succeeded in applying the power of Osmose to the separation of certain mixtures.

Dutrochet appears to have been the first to study the peculiar behavior (called Osmose) of saline solutions when separated from water, etc., by a diaphragm of a membraneous nature. He was followed with greater accuracy of results by Vierordt, Professor Jolly, and by the closer researches of Graham. The term Osmose, derived from a Greek word signifying impulsion, comprises the two terms endosmose (diffusion through inwards) and exosmose (diffusion through outwards). The first experiment in connection with it was performed by suspending a closed bladder holding a saline solution in a vessel nearly full of water. The salts passed through the bladder into the water at a certain speed, and the water entered into the bladder at a certain speed, but the velocity of diffusion was not alike in each. The more rapid flow from the thinner to the thicker fluid was called endosmose, and the opposite slower current exosmose. It is this principle of dialysis, or diffusion, which M. Dubrunfaut successfully adapted to the purification of beet molasses and the extraction of sugar contained therein. These molasses are a mixture of sugar and different salts, chiefly nitrate of potash and chloride of potassium, which retard and in certain cases prevent the crystallization of the sugars which are present with them. If, then, the proportion of salts in the molasses can be diminished by whatever cause, the molasses will furnish a further quantity of crystallizable sugar.

This result M. Dubrunfaut obtained by placing in the endosmometer of Dutrochet molasses of the usual density in the presence of water, and then causing two currents to flow; a strong one forces the water against the molasses, the other, more feeble, forces the molasses against the water, a diaphragm separating the two. The effect is such that the molasses parts with the greater part of its salts to the water, but with little or none of its sugar, so that the molasses remaining contains much less salts and nearly the same proportion of saccharine, which, by the usual operations of the refinery, may be separated in the form of crystallizable sugar.

Such is the principle of this mode of treatment of molasses and other saccharine liquids, and to the apparatus for carrying it out M. Dubrunfaut has given the name of an "Osmogene."

In an osmogene there are two distinct reservoirs separated by a permeable partition. One of these receptacles contains the molasses or sirup, the other is filled with water; the medium separating the two liquids is of parchment paper.

Each receptacle consists of a casing, the top, bottom, and ends of which are of rather thick wood, while the sides are furnished with parchment paper; each casing is about 3 feet in length, 2 feet in breadth, and ⅜ of an inch in thickness. Four bars of wood divide the interior of the casing lengthwise into five compartments, which communicate with each other by an opening in each bar. On each side of the casing is fixed a leaf of parchment paper, kept in place by slendor strings. Thus, when the molasses is allowed to enter at the lower part of the casing, it rises in a serpentine manner through the five compartments to the top of the casing whence it may flow out.

A second casing, exactly similar for the water, is joined to the first in such manner that one leaf of parchment paper serves to separate the two cases. This pair constitutes what may be called a set or couple of osmogenes, but as one couple would allow of the treatment of only a small quantity of molasses, a number of these double casings are united, say 25 for water and 25 for molasses, which work simultaneously. The result is, of course, according to the number of cases employed, and it is the union of these cases which is called an osmogene. It is only requisite for success that all the cases of molasses and all the cases of water should fill and empty themselves simultaneously, as if only a single couple were being operated with; to effect this, the molasses enters at the bottom of one end of the series of cases, and a tube communicates with each, the water entering by the top filling simultaneously every water casing and flowing out at the bottom.

There is thus maintained a constant efflux of molasses and water in the osmogene, the two liquids being all the time kept separate during their course by the membrane of parchment paper.

Dr. Charles A. Lee on Water as an Element of Organic Life.

Water is another factor of organic life. Without water no chemical or vital change can take place in the living body. Water enters into the composition of all organic beings. A large number of animals have their existence determined by water. A man weighing 150 lbs. contains 111 lbs. of water in his tissues. The oxygen that vitalizes his tissues is conveyed by water. The starch, the fat, the albumen, so necessary to the existence of animals, are all digested, absorbed, and conveyed to the tissues by water. These substances through whose chemical change life is possible, are decomposed in the presence of water, and the products of this decomposition are carried off by the agency of water. All the higher animals drink water for this very purpose; and the adult human being, on an average, in one form or another, takes from 70 to 80 ounces of water daily. Water is the most potent of chemical agents; its solvent power is equal to that of the mineral acids, and it associates itself in nature with a vast variety of compounds with which it comes in contact in the external world. It dissolves both organic and inorganic matters, hence it may become so contaminated as to be unfitted for the purposes of life. From the inorganic world, it may take up the salts of lime, iron, lead, copper, arsenic, and other compounds in such quantities that, when taken into the human body, it is not only unfit for healthy life, but it may become the source of immediate disease or death. Like the air, it may become the medium of introducing those definite organic poisons, which, kindling similar poisons in the living system, are at once the source of disease to others, and the death of the individual suffering from their action. Hence, among hygenic inquiries, none, perhaps, are more interesting and important than those relating to the quality of the water we drink; and not only this, but as connected with washing, cooking, and manufacturing purposes.

Modifications in the Construction of the Nest of the Swallow.

In the tenth number of the *Comptes Rendus* for the present year, is a paper by M. Pouchet, on the modifications of the nests constructed by the common swallow, in which he remarks that it is evident the mode of life of certain animals, far from being persistent and invariable, undergoes modifications under different terrestrial conditions, and that, in many instances, their habits are different from what they were in former ages. Spallanzani indeed remarks in one of his remarkable memoirs on the swallow, that the shape and structure of the nests of birds are interesting features in their history, and that each species constructs its habitation on a plan peculiar to itself, which never changes, and is continued from one generation to another. And this opinion is shared by many naturalists; observations, however, when sufficiently close and attentively made, show that it is erroneous. We do not indeed see any modifications of those of their habits which are associated with their biology, so that the arboreal species seek to form for themselves a subterranean nest, or rear their young ones in dwellings adherent to the coigns of our houses, but it nevertheless is ascertained that in a succession of years, each learns to improve the construction of his residence. Certain birds work up only the products of our own handiwork, and would necessarily employ natural substances if these were deficient. Thus, as may be seen in the museum of Rouen, the Loriot of Europe sometimes forms its nest with thread ends under the branches of trees, which cannot possibly be the natural method. For several centuries the common swallow has disported itself in our crowded cities, and with its friendly masonry attached itself to our houses. The chimney swallow, still more familiar and audacious, often builds in the smoky shafts of our domiciles, or even in the noisiest factories, undisturbed by the din or the fires or the movement around them. Such habits must form a strong contrast with those of their predecessors in times long gone by. When we ourselves wandered untutored savages in the prehistoric times, or when still later we constructed lacustrine towns, or megalithic monuments, the habits of the birds can scarcely have been identical with those of today, for such human edifices afforded little security or shade. They must then have built amongst rocks. Nearly the same remarks apply to the storks, which have not remained stationary, but have preferred to their less commodious dwellings those offered to them by man. These changes in the industry or the manners of birds are perhaps even more rapid than we might at first sight suppose; and M. Pouchet's observations have demonstrated to him that notable improvements have been adopted by swallows in their modification during the first half of the present century. Having directed a number to be collected for the purpose of having drawings made from them, M. Pouchet was astonished to find that they did not resemble those he had collected some forty years ago, and which were still preserved in the museum of Rouen. The present generation of swallows have notably improved on the architecture of their forefathers, amongst those still building in the arches and against the pillars of the churches. Some, however, still adhere to the old methods, or such nests may possibly have been old ones which have undergone reconstruction. In the streets, on the other hand, all the nests appeared to be constructed on the new method. And now for the differences observed. The old nests show, and all ancient writers as Vieillot, Montbrillard, Rennie, Deglaun, etc., describe the nest of the house-swallow as globular, or as forming a segment of spheroid with a very small rounded opening, scarcely permitting the ingress and egress of the couple that inhabit it. The new nests, on the contrary, have the form of the quarter of a hollow semi-oval with very elongated poles, and the three sectional surfaces of which adhere to the walls of edifices throughout their whole extent, with the exception of the upper one, where the orifice of the nest is situated; and this is no longer a round hole, but a very long transverse fissure formed below by an excavation of the border of the section, and above by the wall of the building to which the nest is attached. This opening has a length of nine or ten centimeters and a hight of two centims. M. Pouchet considers this new form affords more room for the inmates and especially for the young which are not so crowded, whilst they can put out their heads for a mouthful of fresh air, and their presence does not interfere with the entrance and exit of the parents. Lastly, the new form protects the inhabitants of the nest better than the old one, from rain, cold, and foreign enemies.

Improved Cherry Stoner.

On page 289, Vol. XVIII., of the SCIENTIFIC AMERICAN, we published an engraving of a neat and ingenious device for removing the pits from cherries, plums, and the like, and also the seeds from raisins, cranberries, etc. Since that time the machine has been greatly improved, and a very different form given to it, although the principle of removing the pits by punching, is retained.

The improved form of the machine, which we illustrate in connection with the present article, was patented by George Geer, of Galesburg, Ill., the inventor of the former machine.

It is screwed to the table by a hand screw, A. An upright, B, supports the body of the machine. The fruit is held in the left hand as shown in the engraving, and rolls down along a gutter, C, and enters the small cups in the periphery of the annular wheel, D.

E is a double crank from which a link, F, imparts vertical, reciprocating motion to the cross bar, G, and also to the recurved punching bar, H. Each time the cross bar, G, rises, a stud, I, engages with one of the cups on the annular wheel, D, turning it along one-eighth of a revolution, and bringing another cup directly under the point of the punching bar, H, carrying with it the fruit which has fallen into it from the gutter, C. Each of the cups has a hole through the bottom large enough to permit the passage of the pit; and when the punching bar descends by the rotation of the crank, it pierces the fruit and forces the pit through the bottom of the cup, into the chute, J, whence it falls into a dish placed to receive it.

The point of the punching bar is branched into four short sharp prongs, so that it cannot slip to one side of the pit; and a plate, K, prevents the fruit from rising with the punching bar.

Thus the pits may be removed almost as fast as a child can turn the crank, and the operation is so rapid that the juice does not escape, and the fruit retains its natural shape and appearance.

This ingenious and useful invention is manufactured by Geer, Stewart & Brother, Galesburg, Ill., to whom all communications should be addressed.

GEER'S IMPROVED CHERRY STONER.

Improved Screw-Driver.

In an article published on page 393, Vol. XVIII., of the SCIENTIFIC AMERICAN, discussing the reason why a long screw-driver will put in a screw easier than a short one, we showed that the fact was attributable solely to increased leverage. The device which forms the subject of the present article, and of which an engraving is given, secures increased leverage at the will of the workman without increased length, and will for many kinds of light work also take the place of the bit-stock or brace for drilling, boring, etc.

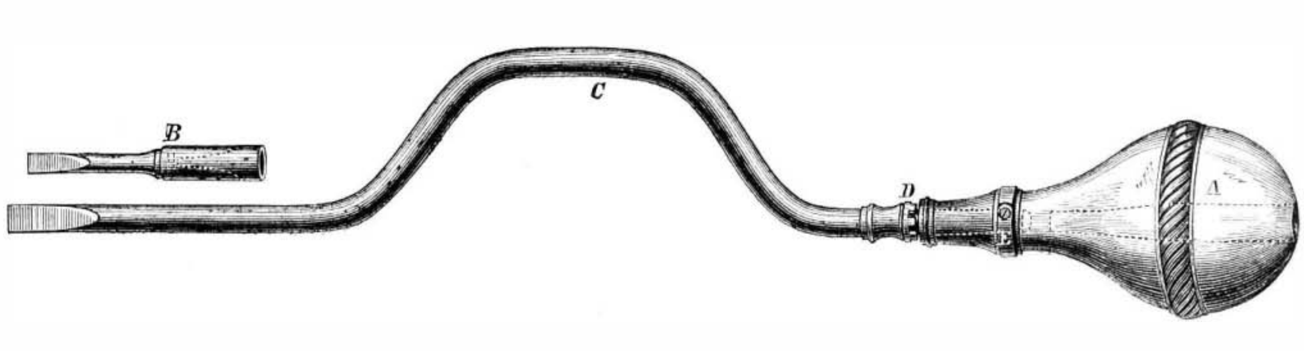
In the engraving, A represents a wood handle, having a recess to receive and retain, when not in use, a second and smaller point, B. This recess is indicated by the dotted line. This supplementary point has a sleeve, indicated by a dotted line, which slips over the point of the larger screw-driver.

The shank, C, of the larger screw-driver is bent in the form shown. At D is a clutch, one portion of which is formed on the shank, and its counterpart on the handle, and underneath the ferrule.

The extremity of the shank, C, in the interior of the handle, has a turned groove, into which the point of the screw, E, enters, and holding the handle so that the two portions of the clutch cannot engage with each other, permits the shank, C, to be revolved like an ordinary bit-stock.

When it is desired to use the tool with one hand, the screw, E, may be turned out a little distance, when its point no longer enters the groove. and the counterparts of the clutch at D, engage with each other. The shank will then turn with the handle, and may be used precisely like the ordinary screw-driver, except that when it is necessary to use the power of both hands in driving home a large screw, an increased leverage is gained by the curvature of the shank.

It will also be obvious that bits properly formed may be placed on the end of the large screw-driver in the same manner as the supplementary point, B, above described, when the instrument will take the place of the ordinary bit-stock.



DRUMMOND'S IMPROVED SCREW-DRIVER.

Various styles of handles may be employed which will suggest themselves to manufacturers. It can be made of wood or metal, and constructed to carry a "kit" of small bits if desired. The inventor would like to communicate with manufacturers in regard to the making or introduction of the device. Address David Drummond, patentee, McGregor, Iowa.

Who Named the Pacific Ocean?

It was Ferdinand de Magelhaens, or "Magellan," as he is usually called, who named the Pacific ocean. Balboa discovered it, from the Isthmus of Darien, several years before, but did not give it the name. Magellan was a native of Portugal, but had been several years in the service of Spain, when he formed the design of going westward from Spain to the East Indies. He started with five ships, in 1519; reached South America in safety, but had to quell a mutiny among his rascally crew before proceeding further. Then, continuing his voyage, he passed through the remarkable strait which bears his name, thus saving hundreds of miles of navigation around Cape Horn, where it is said, "Forever and ever the wildest winds of heaven seem let loose to vex the ocean into madness." Then finding the waters so much more placid than the Atlantic, he named the ocean Pacific. He reached the Ladrone islands, and thence the Philippine islands, where he was killed in a quarrel among the natives. His ship was conducted by Cano, one of his officers, onward to Spain, being the first that had circumnavigated the globe. The voyage occupied three years and one month.

Cellars.

There ought to be no cellars under any dwelling, because they are always more or less damp and musty; and are the receptacle of every variety of substances subject to decay, decomposition, and the promotion of unhealthful gases and odors; not one cellar in a thousand, either in town or country, is clean or dry; and as any housekeeper may verify in ten miuutes. Cellars are usually cluttered up with old barrels, boxes, casks, bottles, cast-off boots, shoes, hats; with bones, ashes, and various remnants of wilted and rotting potatoes, turnips, apples, and other varieties of fruits and vegetables; it is the gases, the emanations, arising from these things, which cause the worst forms of typhoid and other malignant fevers. It is a benevolent arrangement of the wise and good Ruler of us all that pestiferous gases are lighter than the common air, and rise with great rapidity in warm weather to the regions of the clouds, where they can injure no one, and are either purified or resolved into their elementary conditions. Thus the disease-engendering atmosphere of the cellar, rises upwards, penetrates the crevices of the flooring, and would escape from the building, but is confined to the parlors and chambers, especially on the highest floors. This is particularly the case in New York City where the only entrance to the cellar is within the building; hence, every time the cellar door is opened, a crowd of foul emanations rush upward to impregnate the air of every apartment in the house. Very many of the ceilings of cellars are not even plastered; when really they ought not only to be plastered, but the eight or ten inches between the floors and the plastering, should be filled with charcoal or ashes. We have seen water closets under the stores in Broadway, which, for conditions of filthiness, are an utter disgrace to civilization. From considerations above named, the cellar should be the cleanest apartment in every dwelling; and in this moving time of the beautiful May, when perhaps half the dwellings change occupants, it is peculiarly convenient, when a cellar has been emptied by the movers out, for those moving in, to have the cellar most completely emptied of every thing not fast attached to the building; let every avenue of grating, door, and window be left open day and night for at least a week; the floor, walls, and ceilings or joists should be swept several times; the walls and ceilings whitewashed with two or three coats; the floor well washed and then rinsed with water, and unslacked lime or powdered charcoal should be liberally scattered wherever there is any appearance of dampness, so as to absorb all odors arising from moist and dark places. In a large district in a city the cholera appeared in only one house, traced to a pile of kitchen offal in a dark corner of the cellar.—*Hall's Health Tracts.*

Bosquillon on the Secrets of Longevity.

"To chew well and to walk well," said Bosquillon, "are the greatest secrets of longevity that I know of." One of the most pernicious habits that can be acquired is that of eating fast. The loss of teeth is not necessarily conducive to a short life, if the imperfection in chewing is remedied by a more careful and slower process. Simplicity in diet is another great point. Two, or at the most, three dishes ought to suffice, but monotony should be avoided. There should be variety in simplicity. It is also of importance to preserve a certain degree of regularity in repasts. The number of repasts may vary with age and constitution; but three repasts, a light breakfast, a good dinner in the middle of the day, and a light supper, are admitted more favorable to health than late dinners, which leave the stomach unoccupied for a long interval, and overloaded at night. It is further of importance that the mind should be at ease during meals. That which is pleasant promotes digestion; everything that is the reverse is obnoxious. Plutarch declared laughter to be the best sauce. Exercise should precede alimentation, not follow it.

WELDING IRON TO COPPER.—It is said that the Pennsylvania Railroad Company have just concluded a series of experiments on a new process recently discovered by Mr. Beazel, a Pennsylvanian, which welds copper and all grades of steel and iron together at one heat so that they cannot be separated, even when upset and beaten down under a steam hammer. After subjecting it to every test at their shops at West Philadelphia for the last two months, the company have purchased the right to use it in their workshops.

TO BRONZE GUN BARRELS.—Dilute nitric acid with water, and rub the gun barrels with it; lay them by for a few days then rub them with oil, and polish them with bees' wax.