Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW, NEW YORK

O. D. MUNN. A. E. BEACH.

TERMS.

One copy, one year $3 00
One copy, six months 1 50
CLUB RATES { Ten copies, one year, each $2 50 . . . $25 00
{ Over ten copies, same rate, each . . . 2 50

VOL. XXVIII., No. 21. [NEW SERIES.] *Twenty eighth Year.*

NEW YORK, SATURDAY, MAY 24, 1873.

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(Illustrated articles are marked with an asterisk.)

MEDICAL PRACTICE IN EARLY TIMES.

History teaches us that, at the dawn of civilization, the two vocations of medical practice 'and spiritual authority were usually combined. This was the case over all the world. Even when Greece, that most advanced nation of antiquity, had reached quite a high standard in art and literature, the priests were also physicians, and the famous temples of Æsculapius were the special resort of patients suffering from severe ailments, who implored the assistance of the gods by the intervention of the priests. It is not known if the latter had a regular tariff of charges; but the gratitude of the patients was often manifested by gifts, and tablets were erected in the temples, giving a full account of the symptoms of the disease and the means of cure. These tablets, of course, soon became very valuable to all who studied the medical art, and in this way these temples became medical colleges, as well as dispensaries, and the incorporation of the ecclesiastical and medical professions was more and more complete.

There was, however, a prevalent notion, which for a long time paralyzed all attempts at the relief of society from epidemics, etc., by sanitary regulations; it was the belief that every ailment was due to the revenge of offended divinity. These ideas prevailed among the best informed of men, and religious acts, such as sacrifices, invocations, pilgrimages, penances, etc., formed the chief part of all medical treatment. We regret to say that, even in our own times, such notions prevail among certain classes, especially among the ignorant, who indulge in prayers and useless penances, but neglect personal, domestic, and municipal cleanliness, and appear to be totally unable to realize the beneficial effects of fresh air and sunlight on all highly organized beings.

It was reserved for the great and good Hippocrates to entirely upset the theological treatment of diseases, and to replace it by a practical and material theory, founded on the most careful and admirable observations concerning the causes, symptoms and general courses of different ailments. This glorious revolution was indeed one of the greatest triumphs of human genius; but it was not accomplished without a struggle, which ended in the complete separation, among civilized nations, of the business of the priest from that of the physician, and it is for this, especially, that the memory of Hippocrates should be honored as a successful reformer and intellectual revolutionist. His works abound with the proofs of his profound study of the medical art; and his descriptions of symptoms have never been surpassed. For instance, his sketch of the physiognomy of the dying is still copied in our works on the practice of medicine, and the characteristic appearance of the patient in that last stage is so inimitably described by the great master that it is still called "the Hippocratic countenance."

While rejecting all the imaginary notions about supernatural influence, in vogue in his time, he attempted to impute all symptoms to their true physical causes, and to substitute the action of Nature for the action of the gods. He did not give himself any concern about the opposition of the priests, to whose interests it was to refer every disease to the anger of some divinity, and who taught that health could only be restored by a reconciliation with the same, by gifts to his temple, sacrifices, etc. Hippocrates was the first to teach that every disease will run its natural course; and his greatness consists chiefly in his masterly conception of pathology, which caused him never to attempt to check or prevent this physical process, but to watch the critical period, and to modify and bring relief at the right moment by assisting in the elimination of what he called the peccant humors, which he considered to be, by poisoning the blood, the cause of almost all ailments. By his fearless war against superstition, he created a beautiful example to all who have succeeded him in his important profession, teaching them not to hesitate to resist ignorance and prejudice, and courageously to encounter the opposition and disapproval of their contemporaries, being sure that the appreciation of a not very remote future will offer a glorious reward for those who are in the advanced guard of progress.

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THE HORSE POWER AND THE POWER OF THE HORSE.

Some of our readers are finding great difficulty in reconciling the definition of horse power, as given by writers on engineering subjects, with their own knowledge of the power of the horse. There are three terms which we must define with precision, before attempting to place the subject before our readers in such a manner as shall give them an accurate notion of the meaning of the term first referred to.

Force is defined to be anything which produces or tends to produce motion, or change of motion, in bodies. The force of gravitation, of electrical and magnetic attraction, of heat repulsion, of steam pressure, and of a compressed spring, are illustrations. It is measured by the weight which will counterpoise it.

Work is force acting through space, and is measured by multiplying the measure of the force by the measure of the space. A force which overcomes a resistance of 5 pounds through a space of 7 feet, does 35 "foot pounds" of "work." A weight of 2 tuns is raised 5 feet, or 60 inches, by the expenditure of 10" foot tuns," or its equivalent, 120 "inch tuns."

Power, as the term is only properly used by engineers, is the amount of work done in any given example, in some known time. Its unit is called the "horse power." Thus, a machine doing 33,000 foot pounds of work in a minute develops one horse power. The same machine, working in the same manner, would do 550 foot pounds of work in each second, or 190,000 foot pounds during each hour that it might be continuously worked. The horse power, therefore, is a rate of work.

A horse cannot usually exert a great power; but the term was first introduced by James Watt, and since its actual value is a matter of no consequence so long as it is well understood what that value is, engineers have not thought it advisable to change it. The actual power of horses varies immensely, being sometimes more than a horse power, and often much less. The average power of a good draft horse is about three quarters of a horse power, but it can only be sustained about eight hours a day. The same horse drawing in a gin or a mill would exert a power which would average for eight hours work a trifle more than a half horse power. An ox is said to have about two thirds the power of a horse, or to be capable of exerting about a half horse power. The ox can pull as heavy a load as the horse, but moves more slowly, and hence does less work in a given time, and rates less horse power.

The mule pulls about one half the load of a strong draft horse, at about the same speed. He may therefore be rated at $\frac{1}{2}$ of $\frac{3}{4}=\frac{3}{8}$ of a horse power. The ass rates at about $\frac{1}{4}$ of the power of the horse, or $\frac{1}{4}$ of $\frac{3}{4}=\frac{3}{16}$ horse power.

On a direct pull, the average lift which a horse can exert in steady work over a single pulley is about 120 pounds. The maximum is probably double this figure. Professor R. H. Thurston, in the paper on "Traction Engines" of which we gave an abstract some months ago, says: "Experiments made by Captain Robert Merry, at the Jackson Iron Mine, Negaunee, Mich., and the observations and experiments of the writer, indicate the maximum direct traction force of a good horse to be about 250 pounds." This weight, raised at the rate of 250 feet per minute or about three miles per hour, would give $250 \times 250 \div 33{,}000 = 1{\cdot}9$, nearly two horse power for the power of such an exceptionally strong animal; but we should not expect any horse to keep up such exertion for more than a very short space of time. The estimates before given were for average work, kept up eight hours a day for days and weeks together.

British engine builders use a term, in giving the size of steam engines, which is known as "nominal horse power," and is much smaller than the actual power of the engine, which is usually known as the "indicated horse power," or the "dynamometrical horse power," according as it is determined by the indicator or the dynamometer. Thus the engines of the British iron clads, Devastation and Thunderer*, if driven at the slow speed and with the low steam used in the time of James Watt, would be of about 800 horse power. They still are said to be of 800 nominal horse power, but the Thunderer, in her recent trial, developed 5,700 indicated horse power. In this country, this unfortunate and confusing application of the term "nominal" horse power is almost unknown, and we indicate the size of an engine by specifying its diameter of cylinder and length of stroke. The engines of the Thunderer, for example, have two cylinders for each of her twin screws, which are 88 inches diameter and 39 inches stroke.

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CHEMICAL HEAT INDICATORS.

A method of exhibiting the temperature of solutions in vessels without the use of the thermometer is suggested by the *British Journal of Photography*. It consists in painting the exterior of the vessel with the double iodide of mercury and copper. Two drachms of iodide of potassium are dissolved in an ounce of water, to which is added a small quantity, drop by drop, of a saturated solution of bichloride of mercury (corrosive sublimate) until the red precipitate ceases to dissolve. A minute quantity of the iodide will then clear the solution. 1½ drams of sulphate of copper dissolved in the least quantity of water are now added, when the desired compound is precipitated. The clear liquid is then poured off and the precipitate dried for use. The double iodide of mercury and copper thus prepared is a rich red crystaline powder, distinct in color from the simple scarlet iodide of mercury.

When paper or other substances are stained with the double salt mentioned, the red color changes to black when heated to 130° F, and the intermediate variations of temperature are indicated by modifications from red to black. The red color returns when the temperature sufficiently falls.

Professor Mayer, of the Stevens Institute, suggested some time ago the use of the iodides of mercury and copper as a paint for car wheel boxes, to indicate the heating of the journals. He also used the salts for illustrating the spread of heat in conducting bodies, and also for the demonstration of the unequal heat-conducting powers of different sections of crystals. It seems quite possible that chemical investigators may be able to discover other salts still more sensitive to heat than those mentioned, and that this method of heat indication may become practically useful for many purposes.

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LEAPING BY MACHINERY.

Among the sensational amusements now going on in this city, the performances of a young feminine gymnast, Lulu by name, at Niblo's Garden, are noticeable. The deliberate attempts at neck-breaking which she nightly undertakes attract immense audiences of ladies and gentlemen, who enjoy the sensation amazingly, and recommend it to their friends as a worthy and thrilling sight.

The astounding feat consists in what appears to be a direct leap, thirty feet high from the stage floor, and the grasping of a pair of bars at that elevation, directly over the heads of the audience. We need hardly say that the flight is assisted by mechanism.

The performer, costumed in stage tights, totally unembarrassed by petticoats, exhibiting all the charms of her well proportioned physique, stands upon a small iron step, which forms the extremity of a lever that projects up through the stage floor. Below the stage and connected with the lever is a weight of 4,000 pounds and a trigger arrangement. At the appointed moment, the gymnast places herself upon the step, assumes the required position, an attendant taps the floor as a signal, the trigger below is moved, and the gymnast shoots up like an arrow through the air to the bars above. It is a dreadful trick, for the least variation in the force of the mechanism, or the most trifling deviation in her course through the air, would drive the gymnast away from the friendly bars and send her headlong upon the iron chairs below. We sometimes narvel at the strange taste of the Spaniards who still find enjoyment in the gory spectacle of the bull fight. But what shall we say of the sensibilities of Americans, whose popular evening entertainments depend for their chief zest upon the antics of a company of half nude ballet dancers coupled with the fearful risking of human life by methods such as we have described?

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LOSS OF THE POLARIS.

Telegraphic despatches bring the news of the probable loss of the United States exploring steamer Polaris and the end and failure of the Arctic exploring expedition. On the 15th of October, 1872, in lat. 77° 35′, a party of the crew, altogether some nineteen souls, left the ship to place some provisions on an ice floe. A severe storm came on, causing the Polaris to part her moorings. The few remaining aboard got her under steam, but were unable to render any assistance to their comrades on the ice, who, to their dismay, saw their vessel disappear among the surrounding fields and bergs. The tide and wind, it seems, fortunately drove the great floe, bearing the survivors, down through Baffin's Bay and Davis' straits until, on the 30th of April last, they were rescued after one hundred and ninety-six days on the ice, by the British steamer Tigress, in lat. 53° 30′ near the coast of Labrador.

Captain Hall died of apoplexy on the 8th of October, 1872, after returning from an expedition on sledges, in which he reached within 7° 44′ of the North Pole. The Polaris, the survivors state, was without boats and leaking badly at the time of her breaking adrift, so that there is but little chance of her present safety. The sufferings of the rescued party are described as terrible, but all were taken off their perilous raft uninjured and in comparatively good health.

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IMPORTANT DECISION IN RESPECT TO ASSIGNMENTS.

We publish, in another column, the text of a recent decision of the United States Circuit Court, District of California, by Judge Sawyer, in which he holds, substantially, that the purchaser of a patented article, obtained from a *bona fide* owner of a territorial patent right, may use and sell such article outside of the territory owned by the seller. Thus, in the case of the Egg-case patent, the Judge held that the purchaser, who bought the patented goods of parties owning the patent for Illinois, had the right to send the goods to California, use and sell them there, notwithstanding the protest of the party who held the patent for California.

If this doctrine is sound, then the selling of patent rights in specified territorial divisions is a farce, and new restrictions become necessary in the assignment, as Judge Sawyer suggests.

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THE DEATH OF LIEBIG.

It was in 1826 that Justus Von Liebig, then only 23 years old, and already Professor of Chemistry of the University of Giessen, Germany, opened there the first chemical laboratory for the use of students in practical chemical operations, and thus soon attracted pupils from nearly all parts of the civilized world. By this, the little university at Giessen soon rose to great eminence as a scientific school, and was, erelong, in advance of all others. The influence which such instruction had on the industrial progress of Germany and of all Europe cannot be over-estimated, and is one of the most

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* *Vide* Science Record, 1873, p. 222.

lasting merits of the great man who so long maintained the lead in this branch of science.

The early education of Liebig was imparted in his native place, Darmstadt, and was of a very ordinary kind. After leaving school, his predilection for chemistry caused his father to place him with a druggist, but soon after he entered (at the age of 16) the university of Bonn, and afterwards went to Erlangen, where he graduated before he was of proper age. Here one of the good acts (too seldom) done by princes was of great benefit to him. The Grand Duke of Hesse paid his expenses for a residence of two years in Paris, where he enjoyed the instruction of such men as Gay-Lussac, Dumas, Pélouse, and Mitscherlich. By an able report on the fulminates, he obtained Humboldt's friendship, and an introduction to his many scientific friends, which at last resulted in his being offered the professorship at Giessen.

Eleven years later, when his name had become known over all the scientific world, he visited the meeting of the British Association in Liverpool, where he read some valuable papers; and he afterwards dedicated his celebrated "Organic Chemistry applied to Agriculture and Physiology" to this same body. This work shed so much light on the processes of nutrition, respiration, waste of system by motion, the theories of disease and of reproduction, etc., that it was at once published in German, French and English, in the three countries respectively.

In 1843, he published his theory of "Motion of the Liquids in the Animal Body;" in 1849, "Researches in the Chemistry of Food"; then his well known "Familiar Letters on Chemistry in relation to Industry, Agriculture, and Physiology," and several other works and reports, to the number of nearly three hundred.

Although at the present day some of his views have been upset by additional information resulting from the always accumulating store of discovered facts, it must be acknowledged that he deserves the credit of having first attempted to bring system into organic chemistry, and above all that he has very greatly simplified the processes employed for organic analysis, which before his time were so complex as to be, in a great many cases, impracticable. He was so universally esteemed that he was invited to fill many chairs of chemistry, which he declined. Among them was that of Heidelberg, which had been filled by Gmelin, then just deceased. In 1845 the Grand Duke of Hesse created him a baron; and the British Royal Society, the French Academy, and nearly all the leading academies of the world elected him to membership, and he earned the Copley Medal, for original investigations. He finally accepted a professorship in the University of Munich, and then became President of the extensive laboratory there. A fund of $5,000 was raised by subscription in Europe in order to give him a testimonial, as a proof of the value set upon his researches; and with it was bought five pieces of plate, one for each of his children.

He died in Munich last April, at the age of 70, after a short illness; and as he to the last filled his useful position, it will be acknowledged that, notwithstanding his advanced age, his death took place too early for science, which cannot afford to be deprived of such glorious apostles, as long as they are able to add to the progress and diffusion of the most useful of all human pursuits.

THE FALLING OF THE DIXON BRIDGE.

A terrible casualty, resulting in the killing of forty-five persons and the wounding of a large number additional, recently happened through the falling of a bridge over Rock River, at Dixon, Illinois. Baptismal ceremonies were being performed in the stream a short distance below the structure, which, from the view it commanded of the scene, became thronged with some one hundred and fifty people, all of whom were gathered upon one side, outside the truss. Suddenly, with a quick crash, the main western stringer of the north span of the bridge snapped, and the fabric, falling, dislodged the stays from the abutments. The shock ran along the whole length like lightning, and span after span was drawn from the piers and sunk sagging to the water's surface till the whole five literally folded up, crushing and heaping upon the mass of human beings precipitated into the rushing flood beneath. Help was speedily at hand, and the reports of the disaster detail heroic efforts, made in extracting the wounded held in the fearful wreck. Many were killed outright by the falling iron, and others were drowned in the river, which at the point is some thirty feet deep. The number of wounded is not definitely stated, and it is believed that twenty-five more bodies are still entangled in the *débris*.

Turning from the heart-rending details of this latest horror, it is of importance that the public should understand the construction and plan of the fabric, to the inefficiency of which the lives of so many have been sacrificed. It was a wagon and foot bridge with five spans of 132 feet each, making it 660 feet long. Its width at the center was thirty feet, and it stood fifty feet above the water. The roadway was twenty feet wide and the foot paths were enclosed with a heavy filagree work of iron. The structure was a double truss, and was erected by L. E. Truesdell & Co., of Chicago, in 1868, and cost $80,000. Both shore spans are broken to pieces, while the three middle ones, resting entirely upon heavy stone piers, remain hanging by the wrought iron members of the main chords from six to eight feet below their proper places. Between the roadway and foot path were 12 foot high partitions of lattice truss work, directly under which was the main chord. This is broken in every case about twelve feet from its bearing on each pier, or where the first truss bolts to it. The truss bars, of wrought iron, were only half inch by one and one eighth inches iron, filling in between the upper and lower chords perhaps every five feet. The metal work throughout the whole fabric was exceptionally frail. The accident is explained by the fact that the northern span was thickly crowded and bore a weight of twenty tuns or more on the extreme westerly side. The weight strained the trusses, and, at the point where the first of the truss lattice bars passed over the 12 foot cast iron pillar and bolted to the lower main chord (some twelve or fourteen feet out on the pier), the cast iron part of the north shore span first broke. In quick succession, and at about the same point in each span and in both the main chords, this snapping of cast iron chords took place. The breaking is described to have sounded like a volley of musketry.

From the information gleaned regarding the superstructure, there is little question but that its theory of construction was wrong and the material poor and clearly inadequate. The principle of the Truesdell patent, upon which it was based, is to lock joint all supports. Each bar has a crook in the center and all are locked together, the joint being covered with a cast iron shoe. It has been the opinion of many engineers that the idea is a total failure. Too much light and cast iron is employed, and the lock joint arrangement so weakens the metal that its full strength cannot be gained.

If this casualty were the first that had happened from the use of this bridge, it might be considered inevitable and unforeseen. But when the facts are on record, not only of the falling of a structure (its counterpart) but of the pronounced opinions of experts that this very fabric was unsafe, the the fault must be plainly attributed to neglect. The first Truesdell bridge fell in Elgin, Illinois, in December, 1868, and was repaired and said to be strengthened by the inventor. Subsequently, on a strolling menagerie passing that way, an elephant, with curious sagacity, tested the fabric and refused to venture his weight upon it. On the 4th of July, 1869, some two or three hundred spectators gathered upon it to witness a race in the river, when a span, some sixty-eight feet in length, fell, carrying down over a hundred people, though fortunately killing but few. It is said that this disaster destroyed, as well it might, all confidence in the bridge, and that Truesdell could get no more contracts, and eventually died bankrupt. Later experience has proved that not a structure of the kind has been built which has not sagged or required extra trussing within a year.

What with the frequent marine disasters, boiler explosions and kindred horrors that have crowded upon us of late, it seems an almost useless task to repeat in the present instance the denunciations of criminal negligence which so often have found place in our columns. Here was a structure which any competent engineer should have been able to perceive at a glance was improperly built and unsafe, even were he not aware of the experience of others with its defects. Yet we are told that a city council examined it and were suspicious of its strength, and still it was allowed to remain. Naturally, the people are indignant, and in the midst of their sorrow call loudly for the exposure and punishment of the guilty parties; but private grief will, doubtless, soon overcome the complaints of those bereaved by the catastrophe, while the general public, shocked by the sensation for a day or two, will relapse into its usual apathy until again awakened by some new calamity, adding further evidence of the cheapness and insecurity of human life.

Death of John Stuart Mill.

We regret to announce the death of John Stuart Mill, a writer and thinker of great celebrity, whose works are known to the civilized world. He was the son of James Mill, the author of a "History of India" and a speculative philosopher of great reputation. It is as a logician of the highest order, whose reasonings led him to sympathize with the cause of freedom in all countries, that John Stuart Mill will be remembered. He died at his country house at Avignon, France, in the 67th year of his age, on the 9th of May.

SCIENTIFIC AND PRACTICAL INFORMATION.

CURARIC POISONS.

M. Rabuteau has discovered that the iodide of methyl-ammonium and the iodide of tetramyl-ammonium act upon animals in exactly the same manner as curare poison, paralyzing muscular movement without blunting the sensibilities, and with the same subtlety and energy. A fraction of a grain of these substances will kill a dog in a very few minutes.

FIRST ASCENT OF COTOPAXI.

Professor James Orton, of Vassar College, N. Y., has published an interesting account of the ascent of the great South American volcano of Cotopaxi, made in 1872 by Dr. Reiss, a German naturalist. The hight of the volcano was found to be 19,660 feet, and the depth of the crater, 1,500 feet. The inner surface of the crater is very steep, and is lined with innumerable fumeroles, which send forth dense masses of hot gas, and also emit deposits of sulphur, gypsum, and chloride of lime.

NEW METHOD OF EXHIBITING THE CARBON POLES.

Mr. S. H. Landy, of Columbia College, New York city, has succeeded in effecting a decided improvement in projecting the carbon poles upon the screen. The old manner of showing them is to place them behind the condenser in the interior of the lantern, and then throw them upon the screen, giving but a faint and confused image. Mr. Landy's method is to place them in front of the condenser (a sufficient distance to avoid injuring the glass, about an inch); and then, by using an ordinary objective, they are thrown upon the screen greatly magnified and clearly defined. The electric current is then established, the carbon poles are drawn apart and we have a magnified arch of about eight inches, making visible to an audience the transfer of the incandescent carbon from the positive to the negative pole. By placing caustic potash upon the positive carbon, the arch is greatly extended; by the use of thallium, silver, or copper, the characteristic color of each element is gorgeously depicted upon the screen, making altogether a most beautiful and instructive experiment.

NEW METHOD OF PREPARING ALUMINUM.

The oxide of aluminum is first prepared by any of the processes now in use, either from kaolin or clay. It is then mixed with wood charcoal in the proportions of 40 parts charcoal to 100 of alumina, and heated to a red heat. While still hot, the mass is placed in retorts heated to dark redness, and chlorine gas is passed over it from a gasometer. The volatile chloride is condensed in the receiver, and afterwards decomposed by the battery; the chlorine which is set free is returned to the gasometer to be used over repeatedly. The electric current, employed by Garneri, was produced by a magneto-electric apparatus.

PREVENTING MOLD ON SOLUTIONS OF GUM.

A new preventive of mold on solutions of gum Arabic, more efficient than sulphate of quinine, is simple sulphuric acid. According to Hirschberg, a few drops of strong sulphuric acid are added to the gum solution, and the precipitated sulphate of lime allowed to settle. Solutions prepared in this way a year and a half ago have neither become moldy nor lost their adhesive power.

AN AIR BATTERY.

Drs. J. H. Gladstone, F. R. S., and Alfred Tribe recently read before the Royal Society a paper on a new air galvanic battery, constructed on the principle that if pieces of copper and silver in contact are immersed in a solution of nitrate of copper in the presence of oxygen, a decomposition of the salt ensues, with the formation of cuprous oxide on the silver and a corresponding solution of the copper, while a galvanic current passes through the liquid from copper to silver. To employ the oxygen of the atmosphere and facilitate its contact with the silver and dissolved salt, the silver plate is placed in a horizontal position just under the surface of the liquid, with the copper plate beneath it, connection being established by a wire as usual. Holes are made in the silver tray to shorten the communication between the air surface and the copper plate, and to facilitate the movements of the salt in solution.

The conclusions determined are briefly as follows: The current gradually diminishes on account of the using up of the dissolved oxygen in the neighborhood of the silver, but is augmented by merely moving the liquid so as to bring fresh parts of the solution against that metal. A similar result is gained by stirring the silver crystals so as to expose new surfaces. If the wire be disconnected for a time, so as to allow the oxygen to diffuse itself from other parts of the solution, and if the connection be again made, the current is found as strong, or nearly so, as before. Oxygen is taken up with the greatest avidity, the solution absorbing even minute quantities from the surrounding gas. Six per cent was found to be the best strength of the copper nitrate solution. As regards the best proportion between the areas of the metallic surfaces, the increase of the copper has little effect, while that of silver, the negative metal, causes an almost proportionate increase in the chemical action. Heat increases the action of the cell greatly, the augmentation being more rapid in the higher than in the lower ranges of temperature, from 68° to 122° F. The internal resistance of the battery is small. As to the electrolytic power of the current, six cells were sufficient to decompose dilute sulphuric acid slowly, and dilute hydrochloric acid pretty quickly, copper electrodes being employed.

The theoretical interest of this battery lies mainly in the fact that it differs essentially from every other galvanic arrangement, inasmuch as the binary compound in solution is incapable of being decomposed either by the positive metal alone or by the two metals in conjunction; it cannot serve, in fact, as the liquid element of the circuit without the presence of another body ready to combine with one of its constituents when set free. The practical interest centers in the fact that the device is an approximation to a constant air battery. By employing chloride of zinc, power may be obtained at a minimum of expense. Such a battery would appear to be specially adapted to cases where the galvanic current has to be frequently broken, as in telegraphy; for at each period of rest, it renews its strength by the absorption or diffusion of more oxygen from the air.

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PROGRESS OF THE HOOSAC TUNNEL IN APRIL, 1873.—Heading from east advanced westward, 163 feet; heading from west, advanced eastward, 136 feet; total penetration during April, 299 feet. Length opened from east end westward, 13,798 feet; length opened from west end eastward, 9,294 feet. Total length opened to May 1st, 23,092 feet. Length of the tunnel, 25,031 feet. Leaving rock to be perforated, 1,939 feet, being 179 feet more than $\frac{1}{3}$ mile.

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I. H. P. says: "The chief defect of mowing scythes is that they are too light at the heel. More than half the scythes I have used have, after a few weeks or months, broken in two at the junction of the blade with the heel. This part of the scythe should be made wider and stronger, as nearly the whole strain comes at this particular point."

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THE smallest known race is that of the bushman of Southern Africa, the largest that of the Patagonian of South America. The mean hight of the bushman is four feet three and a half inches, and that of the Patagonian five feet eight inches.