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THE CURE OF DIPHTHERIA.

Dr. E. N. Chapman, of Brooklyn, N. Y., has discovered an antidote to the poison of diphtheria, by which the percentage of deaths is reduced to less than one in fifty. Statistics show that the percentage of recoveries in cases treated under the usual practice is about thirteen, or eighty-seven out of a hundred sufferers succumb to the fell disease.

Diphtheria first appeared in this country in 1858. Dr. Chapman, in 1859, lost several cases, and became distrustful of the regular methods. He had been using alcohol in the cure of ship-fever, and he determined, though contrary to all rules, to try it in diphtheria. To his surprise, several of his patients recovered. He then tried quinia, and found it acted well, but not so quickly. At last he settled on a combination of the two, alcohol and quinia, and with these remedies, he claims that diphtheria is more amenable to treatment than many common diseases. In an epidemic, such as diphtheria, all are affected by the morbific agent; but a few only yield to it. Mature, vigorous persons have vitality enough to resist the disease. Children and weakly adults are its usual subjects. Dr. Chapman considers that there is, almost always, super-added a local and direct exciting cause, such as defective exercise, improper diet, dark rooms, damp houses, imperfect ventilation, and poisonous emanations from decomposing filth in privies, cesspools, sewer pipes, etc. To such agencies the strongest constitution will soon succumb. The blood being deteriorated, its crasis is impaired and its vitality lowered; and then the sympathetic nerves, failing to receive due stimulus, waver in their efforts to carry on the animal functions.

"All local treatment," he says, "is worse than useless. It exhausts the nerve force and induces greater injection of the blood vessels, thus favoring the exudation.

"Alcohol neutralizes the diphtheritic poison, sets free the nerves of animal life, subdues the fever and inflammation, destroys the pabulum that sustains the membrane, cuts short the disease, conquers its sequelæ, and shields other members of the family from an attack. Upon the subsidence of the fever, as is usually the case in from twenty-four to thirty-six hours, a purulent secretion begins to loosen the membrane, and soon, thereafter, to detach it in flaky, ragged fragments. This process may take place, and recovery be possible, even when the larynx and trachea are implicated. The membrane is seldom renewed, when this secretion is maintained by a steady use of the remedy. Alcohol is as antagonistic to diphtheria as belladonna to opium, or quinia to malaria. Like any other antidote, it must be given promptly at the outset, or otherwise its potency will be lessened, perhaps lost altogether.

"Alcohol does not act as a stimulant, nor induce any of its ordinary effects. Enough may be given to cause profound intoxication in health, and yet there exists no signs of excitement or odor in the breath."

Quinia is an efficient alloy to alcohol. It energizes the ganglionic nervous system, and thus enables the organism to right itself and resume its function.

Dr. Chapman sustains his position by citing numerous cases in which this treatment was successful. He states that, in his long experience, he only knew of one case where a drunkard had diphtheria. He generally gives the alcohol in the form of whiskey.

THE GEOLOGICAL RELATIONS OF THE ATMOSPHERE.

The gaseous envelope which surrounds our globe plays a very considerable part in the chemical changes ever going on in rock formations, whether actually at the surface—as in what is called the "weathering of rocks"—or in the less apparent, but perhaps more powerful, action carried on below the surface. In a late number of the *Quarterly Journal of Science*, Edward T. Hardman, F.C.S., has a very exhaustive paper on "The Atmosphere Considered in its Geological Relations," from which we extract the following interesting facts:

Perfectly pure water has a very appreciable solvent effect on rocks, which is immensely augmented when it is chemically charged with carbonic acid, oxygen, nitric acid, and other matters derived directly or indirectly from the atmosphere. But while on the one hand the influence of the atmosphere disintegrates and destroys rock masses, on the other it is mighty in building them up. Without the small percentage of carbonic acid contained in the air there could be no vegetation, and there would be none of the coal beds which form such important members of our rock formations. The immense masses of limestone found everywhere, and the coral reef of the present day, must owe their being indirectly to the carbonic acid of former atmospheres. A drop of rain water absorbs a trace of carbonic acid from the atmosphere, falls on a rock containing lime in some form, dissolves the lime as bicarbonate, carries it down to the ocean, and finally gives it up to become part of the skeleton of a coral or mollusc, which in its turn may form a portion of an immense mass of limestone rock.

The bulk of the atmosphere is made up of oxygen and nitrogen, but these do not take so active shares in geological matters as the almost infinitesimal trace of carbonic acid present. The amount ranges from 3 to 10 volumes in 10,000 volumes of air. The principal sources of increase are, volcanic and other subterranean exhalations; respiration of animals; combustion of fuel and vegetable decay.

The series of rock-metamorphisms due to the simple absorption of carbonic acid by a plant is very interesting. The carbon is assimilated by the plant, and it dies and be comes thus a part of a coal bed or lies embedded in sediment of some kind. Decomposition sets in; and if there be a reducible compound near it, chemical changes result. If the strata contains sulphate of iron, it is reduced to sulphide, commonly known as iron pyrites or false gold. The reduction is effected by the carbon of the plant abstracting the oxygen from the sulphate. The resulting carbonic acid either is taken up by percolating water and penetrates farther into the heart of the rock, effecting new changes, or it finds its way to the surface through some crevice, or by aid of a mineral spring, and once more mingles with the the atmosphere, to be perhaps again absorbed by vegetation and pass through a similar round of changes afresh. In many cases the action of the carbonic acid changes a metallic ore from an insoluble to a soluble compound, thus reducing the ancient crystalline rocks. The metals carried away by streams were deposited along their beds, and valuable beds of ore were formed.

The atmosphere in the carboniferous age contained a much larger portion of carbonic acid. This has been gradually absorbed into the earth, until the amount stored in the earth is estimated at 6,620 times as much as there is in the atmosphere, although the latter contains 1,250,000,000,000 tons of carbon. All animal carbon is derived from the atmosphere. Say a tiger dines off a cow, the carbon and nitrogen of her flesh have been obtained from vegetation, which in turn extracted them from the air; so that we have a kind of physiological "House that Jack built," "This is the Tiger that ate the Cow that devoured the Grass that absorbed the Carbon," etc.

Any considerable difference in the volume of carbonic acid must result in diminution of animal life. Very little above the ordinary standard carbonic acid in air becomes a deadly poison to all warm-blooded animals. If diminished vegetable life would languish, graminivorous animals would die of starvation, and finally the carnivora, being obliged to prey upon each other, would of course become extinct. The result would be a completely barren and desolate planet, perhaps in some degree resembling the moon.

Oxygen is the next in importance as a geological agent. Percolating in rocks, dissolved in rain water, it quickly reacts on all oxidizable substances. Carbonates and protosalts are converted to peroxides; sulphides are changed into sulphates, and sometimes alums are formed.

Carbon and oxygen are thus antagonistic in their action on rocks and minerals, and are thus keeping up a circulation between the earth and the air. The carbon always reduces the oxides, and the oxygen replaces the carbonic acid of carbonates with the same inveteracy.

The ammonia existing in the air is absorbed by plants, and by their decomposition forms nitrates. "And now," Mr. Hardman says in conclusion, "it will be seen what an all-powerful agent the atmosphere we breathe is. Without its aid we should know never a stratified formation, and would simply form a ball of truly primitive rock. We should have no coal, no metalliferous deposits, no rivers or seas, and no rain—consequently no denudation by rain and rivers—for the vapor of waters could not ascend into empty space. We should have—but, last and worst of all, there would be no "we." Life would be impossible, and the earth would finally degenerate into a pale-faced moon." That this is probably her mission cannot be denied; and probably before Saturn and Jupiter have cooled down to a habitable temperature, the senescent earth will roll through space—cold, void, and airless.

VENERABLE JOURNALISTS.

In the December issue of *Godey's Lady's Book* appear the valedictories of both the editor and the publisher of that magazine, which with the beginning of the new year is to pass into other hands. Much has been written and said about the exhaustive nature of the journalist's profession, and the general deduction has been made that as a rule literary people are neither long-lived nor are they able to withstand the mental labor incumbent upon them, over any very extended periods of years, comparison being had with members of other callings. No better examples demonstrating the contrary of the commonly accepted opinion could be found than in the careers of Mrs. Sarah Josepha Hale and Mr. L. A. Godey. Mrs. Hale states that she began the editing of the *Ladies' Magazine*, in 1827—fifty years ago—nine years later that periodical was consolidated with the *Lady's Book*, of which Mrs. Hale assumed the editorship, the active duties of which she has subsequently continuously performed. A half century of steady journalistic labor is in itself phenomenal, more so when it be considered that a woman has accomplished the task and it becomes still more remarkable when we are told that it has been done not early, but late in life, Mrs. Hale now having attained the venerable age of 90 years. Certainly no one would imagine that the editor of the sprightly periodical before us, a journal which pre-eminently deals with fashion and art, and is addressed especially to the young, is the same editor who wrote in the same brilliant way and made up the same interesting papers for our grandmothers, but the fact remains that she of late years has been writing for a third generation of readers. The same is true of Mr. Godey, although he is a mere youth as compared with Mrs. Hale, being but seventy three years of age. He began literary work when but fifteen years old, and hence his journalistic life has extended over fifty-eight years, during all but the first ten of which he has uninterruptedly published the *Lady's Book*.

Both of these venerable members of the press—and with the exception of William Cullen Bryant, we can recall none whose years of labor equal theirs—have long since earned the public gratitude for their good works. To Mrs. Hale was largely due the successful completion of Bunker Hill Monument. She is the inventor of Thanksgiving day, for she first suggested the idea of an American national thanksgiving in 1846, and her efforts toward the advancement and education of women have been untiring and fruitful with beneficial results. Both herself and her associate may look back with justifiable pride over the 571 numbers of the *Lady's Book*, which they have prepared, in the consciousness that their labors have tended always toward the promotion of education, culture and refined taste.

WATER SUPPLY FOR NEW YORK CITY.

The last plan submitted to the Special Committee on Water Supply for New York city is by a Brooklyn engineer, who claims a cheaper mode of getting water than by going fifty or sixty miles for it. His plan is the construction of a close canal or conduit, on a low level, of sufficient width and depth, commencing at Harlem river, running through Westchester, following the lowlands and keeping the depth below the well level. This conduit, he states, would always be full of the purest water, supplied from the great underground water basin of Westchester, and would in its course intercept all the springs and streams. Having studied the water supply of Brooklyn he was led to make a proposal to furnish that city with a future supply at a much cheaper rate than could be obtained by building reservoirs, and he thinks the same plan would be applicable to New York, although the soil is very different. The soil of Long Island is of such a nature that it readily absorbs all the rainfall. What streams there are come from springs fed from the higher grounds. The soil of Westchester is different from that of Long Island; it is harder and more compact, and much more of the rainfall runs off the surface; that which is absorbed remains longer in the soil. Hence a long drought would not affect the wells in Westchester as much as those on Long Island. The Brooklyn conduit, which carries the water to the pumping wells, was built as low as possible in order to collect the water from the different springs, yet built above the well level; and by extending it, sufficient elevation to the mile was given to impart the necessary current to send the water to the pumping wells, till now, in seventeen miles, it has risen above the springs and no more water can be obtained without building reservoirs, or adopting the plan he suggests. The conduit for New York was built high in order to get an elevation without pumping, and was carried back forty miles to the high ground of the Croton, passing many streams and getting no advantage from the many valleys in its course, or from the great water shed lying within thirty miles of New York—resources sufficient, if improved, to give an abundant supply for all time.

It is contemplated to build more reservoirs on these high elevations at a cost of $10,000,000, and to build a new conduit between New York and Croton Dam at a cost of $10,000,000 more. In regard to this, he says, to keep building expensive reservoirs on these high elevations is a waste of public money, and will naturally prove a failure as to a future supply, for, as the line is extended, it must keep rising, although already it is above the springs. What water may be obtained in this way is from storm flows, collected during the time of freshets, and retained in their shallow basins, stagnant pools, exposed to the rays of the sun and infected by vegetable decomposition, with no circulation whatever until it is let off into the conduit, thus distributing the seeds of malaria. The best place for reservoirs is where you can get the purest water, and that is at the foot of the hills. Here not only the surface flow is got, but as much more pure spring water, filtered through the upper lands. The expense of pumping will not compare with that of building costly reservoirs on such high elevations; but, even if it did, the sanitary advantages would more than compensate. As the land naturally rises from Harlem river, a conduit could be built on a slight elevation to the mile, of sufficient width and depth to bring to the city as much water as would be needed for all future time. The water in the canal would be spring water and a running stream. The pumping engines could be placed at the Harlem river, and pump directly into the pipes, under pressure, giving the water sufficient force to carry it into the top story of the houses on Murray Hill, leaving the old aqueduct, with its reservoirs, to supply the lower portion of the city.

In brief, the plan is to have one main conduit, commencing at a point west of King's Bridge or east of Central Bridge on the Westchester side of the Harlem river, extending up through Westchester, with lateral branches, running right or left as the nature of the ground may indicate; smaller ones to be built in each of the different valleys, and a cross tunnel made to intercept them all. By this means a large amount of water could be obtained, and the conduit could be extended according to the growth of the city. The main conduit at the commencement would not be less than twelve feet in diameter, or of sufficient capacity to deliver two hundred million gallons daily; it could be diminished as extended. The side walls of the conduit would be of heavy stone laid dry, backed up with small ones, the bottom paved with cobble stone, the top arched with brick laid in cement. The pumping wells and buildings could be erected on the New York side of the Harlem river: the river to be tunnelled with either an iron or a brick tunnel of the same dimensions as the conduit, the top to be twelve feet below low water mark. All the overflow would empty into Harlem river.

An approximate estimate of the cost of such works, with five compound steam pumping engines of the most approved kind, with their boilers, fixtures, and buildings to pump one hundred million gallons of water per day at $9,500,000, exclusive of the right of way, which would not cost much, as the conduit would be mostly underground. Much of the tunnelling could be done without disturbing the surface. The principal and only damage would be the surplus earth left in places. As the conduit would follow the low lands, their drainage would mitigate damages.

THE GREEN CORN CASE.

The celebrated "Green Corn Case," which was argued last September in the Circuit Court at Baltimore, before Judges Bond and Giles, has recently been decided, and the bill for the injunction dismissed. This case was an application by John Winslow Jones for an injunction against Louis McMurray, of Baltimore, for an injunction to prevent him infringing the re-issued patent No. 7,061 (original patent No. 35,274), covering a process of canning green corn, and re-issue No. 7,067 (original patent No. 34,928), for the product of said patented process. The original patents were declared invalid by the Supreme Court of the United States. They were then surrendered and the re-issued patents obtained, which formed the basis of this suit. The complainant avers that the decision of the Supreme Court was given against him because of his "defective specifications," which have been cured by the re issues obtained since the decision referred to. The circuit judges, however, in the present case, have a different opinion of the Supreme Court decision than that entertained by the plaintiff, and state that, "while we are of opinion that the decision of that court is much broader than the complainant admits, and that it goes to the whole invention then and now claimed by Jones in the patents we are here considering, and that it determines that both the process and product now claimed by Jones was the invention of Appert, in France, and Durand, in England, more than sixty years ago, and held that Jones' patents were void for want of novelty, and not merely invalid for want of a proper specification and description of Jones' claims, nevertheless, since the Commissioner of Patents has issued the patents to Jones, we would give him the benefit of them could we discover in what respect they differed from the originals, which the Supreme Court has decided were void. There is no essential difference, however, between the process described in the first patent and the re-issue. The first recites that, after some difficulty found in preserving green corn without drying, the inventor removed the corn from the cob and boiled it, but that by this process the corn, being broken by removal from the cob, dissolved out the juices and made the corn insipid, and then he finally removed the corn from the cob, packed the kernels in cases, hermetically sealed them, and boiled them until the corn was cooked." The Supreme Court, in the case of Sewell *vs.* Jones, says this is not new. Complainant, in his re-issue, states he pursues another plan, whereby he separates and retains the nutritious and edible parts of the corn, boiling them in a liquid of their own juices. No one ever cut green corn from a cob who did not do exactly what this claim describes, and no one under the process described in the patent, which requires the corn to be removed from the cob, could so remove it without breaking the kernels, and when he cooked it in a can, as the patent required, he would find necessarily more or less of the juices with it. The process described in the re-issue is substantially that of the original patent. But if we admit there is something new and patentable in the re-issued patent, which was not in the original, the patent is void, because it is not for the same invention as the original. * * * * It cannot, therefore, be claimed that the re-issued patent contains anything which the original did not, and the original, says the Supreme Court, is void for want of novelty." The patents also described the use of a curved knife to remove the corn from the cob, but this does not appear to add any novelty or patentability to the alleged invention, for the knife differs nothing in principle and little in construction from some styles of spokeshaves or paring knives, and even if the validity of these patents could be admitted on reference to this point, the court could find no evidence that the defendant, McMurray, has infringed them by using the knife of complainant, but, on the contrary, the proof shows that he used a different knife entirely. For these and other objections to the complainant's case, the bill for the injunction was dismissed, with costs. Numerous other suits have been entered by Jones against other parties in New York, Boston, Portland, Chicago, and other parts of the country, which will probably be influenced to a considerable extent by this decision.

HOW TO MAKE HOMES HEALTHY.

Most cases of infectious diseases have, in addition to the common epidemic influence, a direct exciting cause. This will be found, when contagion is excluded, to be poisonous emanations of some kind in the house, or on the premises, or in the drinking water; in cities generally sewer gas. Dr. Chapman, of Brooklyn, to whom we refer in another article, after experiments, has settled on the following plan as a sure relief from sewer gas: The soil pipe running from the cellar passes through the house and opens into the kitchen flue at the top story. The pipe should be four inches in diameter. It will be freely ventilated by the draft of the flue. Into this soil pipe or ventilator, the waterclosets and basins on the different floors empty through traps. The water from the upper closet, running past the opening of the lower closet, would be apt to suck its trap dry, and to prevent this a separate ventilating pipe is run from the traps of the lower closets to a point in the ventilator above the upper closet. In this manner all foul gases at once pass upwards and empty at the top of the house. In several houses where malarial disease had been frequent, since the introduction of this plan the residents have been free from all disease due to blood poisoning.

BREAKAGE OF A STEAMBOAT BEAM.

The Harlem, a passenger steamboat plying between New York and Harlem, recently broke the working beam of her engine. The break took place between the eye of the main link and the main center of the beam. The beam is of the usual American type, having a cast iron skeleton frame bound round with a strap of wrought iron. The fracture of the lower part of this strap shows that a flaw has existed for some time but was not perceptible, being covered by a vertical strap. The fracture of the cast iron skeleton frame and the upper part of the wrought iron strap showed a good quality of iron, the former being of a gray color and close grain, and the latter of a fibrous nature. The rectangular cross section of the strap, where the flaw is, and where the break first commenced, is in size 5 by 3¼ inches. The length of the beam is 15 feet 6 inches by 8 feet wide.

The point of interest is the fracture of the wrought iron strap where the flaw is, and the iron sbows crystallization. As the flaw was concealed from view it becomes a matter of speculation how long it has existed, and whether it resulted from inferioriron or from crystallization gradually taking place as the result of constant vibration. The excellent appearance of the iron in the upper part of the beam strap seems to indicate that the iron when first put round the skeleton was all of good quality, and that a change took place in the lower half or some portion of it.

The experience as to iron undergoing a gradual deterioration under certain circumstances is too universal to be discredited. The multitude of theories put forth to account for it bear witness to the fact, although an explanation of the phenomenon is still required. Mr. Roebling, the late distinguished engineer, assumed that the drawn out fiber of wrought iron is "composed of an aggregate of pure iron threads and leaves, enveloped in cinder. Wrought iron thus becomes brittle under long-continued vibration under tension, because the iron threads and laminæ become loosened in their cinder envelopes."

The Northern Lights.

The Finland observations of northern lights in the years 1846–1855, numbering 1,100, have recently been compared by M. Fritz, in the *Wochenschrift für Astronomie*, with auroral phenomena of the same period in all other regions. This comparison leads to results which are interesting as bearing on the theory of the phenomenon. The table shows that of 2,085 days of the months August to April, on which northern lights were seen, 1,107 days were days of northern light for Finland. On 794 days northern lights were visible simultaneously in America, and mostly also in Europe; on 101 days only in Europe, and on 212 days only in Finland. They were on 958 days visible in Europe and America, and not visible in Finland. The conclusion is thus reached that a large portion of the polar lights have no very great extension, or that the causes producing them must often be of a very local nature, while in another portion of the phenomena the regions of simultaneous appearance are very considerable. The number of those phenomena which are limited to Finland is very small. With the increase of frequency of the phenomena, at the time of maximum, their number observed in Finland and America on the same day increases; while those observed in Finland and only in Europe, or those in Finland only, decrease. These relations correspond to the known law, that with the frequency the intensity and extent of the polar lights also increase.

Yellow Fever Infectious.

Many medical men hold that yellow fever is not infectious. Mr. Jasper Cargill, of Jamaica, W. I., relates, in the *Lancet*, several instances which came under his notice in which there would be no doubt whatever that the disease came from infection. The sufferers were colored people fully acclimatized to the Jamaica climate, so that there was no pobability of the fever having bred in themselves; besides the place of infection was very clearly ascertained.

Lead Explosions.

Many mechanics have had their patience sorely tried when pouring lead around a damp or wet joint, to find it explode, blow out, or scatter from the effects of steam generated by the heat of the lead. The whole trouble may be stopped by putting a piece of resin, the size of the end of a man's thumb into the ladle and allowing it to melt before pouring.

THE famine in India has quadrupled the death rate in the city of Madras. The death rate in July was 1,150 weekly. During the week ending August 17th, 1,051,000 persons were receiving relief in the Madras presidency. In thirteen affected districts the annual death rate in the week was equal to 483 per 1,000, signifying that if this rate continued for a year scarcely more than half the population would survive.

TO COAT iron with emery, give the metal a good coat of oil and white lead; when this gets dry and hard, apply a mixture of glue and emery.