

Boston Water and Lead Pipes.

The Commissioners appointed to report upon the best material to convey the water of Lake Cochituate into the private houses of Boston, have reported in favour of lead pipe. They have gathered up a mass of evidence to prove its perfect safety in the conducting of water, and some strong testimony against it, but on the whole they recommend lead pipe for being the cheapest, and that it is perfectly safe to use for domestic purposes.

As this has been long a vexed question, the report is of more than common interest. They referred the subject principally to Prof. Horsford of Harvard University.

The grounds on which lead is preferred for the composition of small distribution pipes are, that the metal is cheap; it is easily formed into pipes, of any convenient size or length; flexible and easily adapted to all situations, in which it is desirable to place it; it is of sufficient strength to bear the pressure of an ordinary head of water, and if made of a suitable thickness, and provided with proper guards against the effects of a sudden check of the current, it is capable of resisting the extraordinary shock thus produced. It moreover preserves the water in a state of purity, and is itself durable, unless dissolved by the action of substances foreign to the source from which the city is to be supplied. Pipes of this material may be laid in a much shorter space of time, and at less cost, than those of cast iron.

Attempts have been made to discover the nature and source of the mixtures which impart to water the power of acting more energetically upon lead. It is observed that nitrates possess this power, and that they are frequently found in well water. The observations of Professor Horsford led him to the conclusion that the unequal proportion of these salts constitutes the chief distinction between different waters, in their relation to lead. These salts are often, if not uniformly found in the water of wells and springs so situated as to be replenished by the filtration of water through a soil enriched from the stable or by the wash from collections of animal substances, of any description. A small solution of saltpetre, or of a nitrate of any description, in water, is found to impart to it the property of dissolving lead, and thereby forming the nitrate of lead. This substance renders the water undoubtedly deleterious and dangerous to the health of those who drink it or use it in the preparation of their food. This explanation, which seems to be fully confirmed by ample experiments, accounts sufficiently for the fact, that the water of wells situated as are a large portion of those in towns, and cities, and of springs situated in the midst of richly cultivated fields, or in the vicinity of animal deposits of any description, may produce the chemical effect here described upon the leaden pipes used to conduct it, while the waters of rivers and lakes, not particularly exposed to contact with substances of that nature, will be destitute of any such power.

Of the harmlessness of the New York and Philadelphia waters, and others of a similar class, we have abundant testimony, of which we cite, by way of sample, the following statements. In regard to the New York water works, which have for several years supplied many thousands of families, Dr. Griscom in a letter to Dr. Webster, dated Dec. 14, 1847, and appended to the report of the consulting Physicians, says, "nothing but lead pipes is now used in this city for the conveyance of water into, and within the residences of the citizens."

The water works of the city of Philadelphia have been in successful operation more than twenty five years, and they have afforded a wide field of experience, which has been of great value to directors of other similar works.

The water of the London water works is distributed from the houses in leaden pipes, and is usually preserved for use in tanks lined with lead, and without complaint of any injurious effects from the metal. On this subject, Professor Graham of the London University, an eminent chemist, in reply to an inquiry by Professor Horsford, says, "The point upon which you desire information is one which

has been settled here by long experience. It is, that lead alone is used to conduct the water from the street main into the houses, or for service pipes. No evil is experienced in London, either from these pipes, or the leaden cisterns. Yet, as the latter are filled in general only twice a week the water must remain in them for several days."

Dr. McNaughton, of Albany, N. Y. where leaden pipes are partially used for the distribution of water, states that his own family have, for a period of sixteen years, freely used, for all purposes, water introduced to his house, a distance of at least one hundred and seventy-five feet, through a leaden pipe, and they have never had, in that time, a case of lead or other colic. He has known no case of lead poisoning from the use of the Albany Water Works, and he has been informed, on inquiry of some of the oldest physicians of the city, that they know of no such case.

OPPOSITE PROOFS.

On the other hand, a great number of cases might be cited, and many of them been made known to the public, in which the water of wells and springs either conveyed through leaden pipes, or received into cisterns lined with lead, has not only rapidly dissolved the lead, but has proved seriously detrimental to the health of persons who have habitually used it with their food. Repeated cases of both these descriptions have occurred, from the use of the water of certain wells in Boston, and in Worcester, Dedham, Cambridge, and other places. It is not possible to prove in reference to all these cases, what ingredient the waters contain capable of producing the effect, which is not contained in the water of rivers and lakes. The water of two wells in Cambridge, situated near each other,—(those of Rev. Dr. Walker and Mr. Buckingham,) drawn through leaden pipes, were subjected to experiment by Professor Horsford. In the former, a trace of lead was discovered, and in the latter none. The use of the water of the former had also proved injurious to the health of the family. On subsequent inquiry, it was ascertained that the well of Dr. Walker was shallow, and was supplied from springs near the surface of the earth, and above the clay substratum. The well of Mr. Buckingham, after a discovery that the surface springs were insufficient, had been sunk deeper, and the water at the time of the experiment was drawn from a depth below the clay, which is impervious to rain water.

Dr. Chilton, a most practical chemist of this city stated that he had been called on to analyse water taken from leaden pipes, in a house in the city which had been closed for some time previous, several persons having been made seriously ill from drinking the same water, and that he had detected the presence of lead in it. He was also of opinion that the effect of lead from drinking Croton water under such circumstances is of frequent occurrence, but not recognized as such by the physicians.

The question then seems to be settled that river water at least exerts no deleterious influence upon lead pipes for domestic purposes.

Investigation of Science.

Few people are aware of the extreme difficulty of the art of simple observation. That art consists not only in the ability to perceive the phenomena of nature through uncolored eyes, but also of the talent to describe them in unobstructed and transparent words. To observe properly in the very simplest of the physical sciences requires a long and severe training. No one knows this so feelingly as the great discoverer. Faraday once said that he always doubts his own observations. Mitscherlich, on one occasion, remarked to a man of science of his acquaintance that it takes fourteen years to discover and establish a single new fact in chemistry. An enthusiastic student one day betook himself to Baron Cuvier with the exhibition of a new organ, we think, it was a muscle, which he supposed himself to have discovered in the body of some living creature or other; but the experienced and sagacious naturalist kindly bade the young man return to him with the same discovery in six months. The baron would not even listen to

the student's demonstration nor examine his dissection, till the eager and youthful discoverer had hung over the object of inquiry for half-a-year; and yet that object was a mere thing of the senses! In a word, the records of physical science are full of instances in which genuine researchers, men formed by nature and trained by toil for the life of observation, have misstated the least complicated phenomena. Nor would the intelligent public not be amused, as well as astonished, if they only knew how very few of the noisy host of professing men of science, in even this matter-of-fact country, ever discover a single new fact; ever describe with irreversible fidelity a new phenomenon of any significance; ever add one true word to the written science of the world.

If, however, it be one of the hardest of problems to make observations with unbiased simplicity, and useful accuracy on inorganic nature, the difficulty is greatly enhanced when there are superadded the phenomena of vitality to those of chemical affinity, mechanical cohesion and celestial gravitation, as is the case in the science of physiology.—Mechanics is the science which was first brought to something like perfection; and the reason is obvious, for the phenomena with which it is conversant are not only the nearest to the senses of the observer, but they are the least complicated ones in creation. Then followed astronomy in the process of time; and then chemistry, the phenomena of which are still more complicated than those of the science of stars: and it is clear to every thoughtful and competent mind that physiology is now awaiting the consummation of chemistry. When the vast complexity of the science of physiology is considered with thoughtfulness, and when it is remembered that chemistry is still so far from perfection that the chemist cannot construct a particle of sugar, or any other organic substance, although he knows the exact quantities of charcoal and water of which it is composed, the reader will not be astonished to find that M. Comte, the amplest yet the most severe representative of positive science that European influences have yet produced, speaks of the former department of knowledge as hardly set within the bounds of positive science.—He characterizes it as just emerging into that sphere.

Theory of Vision.

At a late meeting of the British Association for the advancement of Science, a paper was read by Sir David Brewster, entitled "An Examination of Berkeley's Theory of Vision." Sir David endeavored to overthrow the established theory that the idea of distance is obtained merely by experience, and that all objects appear to the uneducated eye, as on the same plain. He mentioned several facts connected with pinocular vision to show that there is a line of distance impressed naturally on the retina; and all the instances to the contrary, derived from the observation of those who had received sight for the first time, Sir David considered unsatisfactory, inasmuch as the eyes of such persons were not in a natural state immediately after having undergone the operation of couching. Experience proved that children had ideas of distance, for they did not attempt to reach the sun and the moon, and as regards animals, this fact was more striking, for the duckling, on coming out of its shell, ran to the distant water, and did not try to get into it as if it were within reach. He also mentioned some curious facts in connection with vision, which he thought militated directly against the Berkleyan theory. When for example, a person takes hold of a cane-bottomed chair, and directs the axes of his eyes through the pattern to some point on the floor, the pattern of the woven cane is seen in a position where it is not, and by no effort of the mind can it be seen where it really is. The same illusion occurs when the eyes are directed steadily to the paper of a room, when the pattern is regularly placed in vertical stripes. Dr. Whewell defended the Berkleyan theory, contending that the facts stated by Sir David confirmed instead of overthrowing the theory. With reference to the vision of animals, he said, that could not be adduced against the

Berkleyan theory, as it was an exhibition merely of instinct, of the nature of which we know nothing. It might as well be said that children do not walk by experience and practice because some animals run about from the moment of their birth. Dr. Whewell maintained that experience showed that children have little or no idea of distance, for if they do not try to catch the sun or the moon, they frequently attempt to take hold of the flame of a distant candle.

Starch a Cure for Scurvey.

Dr. J. Porter in an interesting article in the American Journal of Medical Science adduces much proof in favor of starch being an excellent anti-scorbutant. He says "Experience has long shown that a diet consisting solely of potatoes is capable of affording nourishment, and of preserving the body in perfect health." Certain nations, it is well known, subsist almost entirely on rice, arrow root, and similar kinds of vegetable food. These are all of the starch class; and it may be that therein, as well as the potato, resides their chief value. These articles—rice, arrow root, sage, tapioca and starch—may be made into excellent puddings with lemon juice and spices, and make a luxurious article of diet at sea. Arrow root may be purchased in any quantity in the islands of the Pacific and elsewhere and often as low as two or three cents the pound.

Conversing a few days since, with one of our oldest shipmasters in the whaling fleet, I mentioned to him the theory in relation to starch, as being the chief ingredient in the potato. His crew had suffered most severely from scurvy in his last voyage. I inquired if he had any arrow root on board. "No," was his reply, "for I was disappointed in obtaining it at the island, as it is my custom to do for puddings, &c." On my informing him that arrow root was almost entirely a form of starch, after some reflection, he said:—"I cannot but think that there is truth in the theory you have named, for, on looking back, I find that during those voyages when I took most arrow root on board, I had the least scurvy. Besides," he added, "I was perfectly well during this last voyage, while all were sick around me, and two men died; and I know not what to attribute it to, unless it be to a practice which I have followed for years, of having, while at sea, a bowl of arrow root gruel at my breakfast."

There is much truth in the above view. Starch is excellent for the purposes set forth applied both outwardly and as an article of diet—this we know from the testimony of individuals who have used it. The information is important to many.

Cause of Waves.

The friction of the wind combines with the tide in agitating the surface of the ocean, and, according to the theory of undulations, each produces its effect independently of the other. Wind, however, not only raises waves, but causes a transfer of superficial water also. Attraction between the particles of air and water, as well as the pressure of the atmosphere, brings its lower stratum into adhesive contact with the surface of the sea. If the motion of the wind be parallel to the surface, there will still be friction, but the water will be smooth as a mirror; but if it be inclined, in however small a degree, a ripple will appear. The friction raises a minute wave, whose elevation protects the water beyond it from the wind, which consequently impinges on the surface at a small angle: thus, each in pulse combining with the other produces an undulation which continually advances.

Pride.

I never saw pride in a noble nature, nor humility in an unworthy mind. Of all the trees, I observe that God hath chosen the vine, a low plant, that creeps upon the helpless wall: of all beasts, the soft and patient lamb: of all birds, the mild and gentle dove. When God appeared to Moses, it was not in the lofty cedar, nor the sturdy oak, nor the spreading plane; but in a bush—a humble, slender, abject bush; as if he would by these elections check the conceited arrogance of man. Nothing procureth love like humility; Nothing hate, like pride.