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.

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.

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."

THE smallest known race is that of the bushman of South ern 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.