Death of a Notable Elephant.

Bijou, the great pet elephant who has for two years been on exhibition in the World's Museum on Washing Street, Boston, and previously was a resident of the Central Park menagerie in New York, is dead. This animal is the oldest and had been in captivity longer than any elephant ever on exhibition. Bijou has been in this country for sixty years, and while he is known to be seventy-five years old, the probabilities are that he was born nearly a hundred years ago. Recently he had suffered greatly from old age, and his efforts to stand up and receive cakes and candies from visitors at the museum, as he used to, were painful in the extreme. In the last two weeks his massive legs refused to support the weight of his huge body, and his attempts to respond to the call of his old trainer were very affecting. He would try to raise himself on his knees, and then reaching his trunk toward his keeper, the huge beast would settle back and moan.

The old elephant had also lost his appetite and was growing thin. He found it hard to sleep, and lay awake nights groaning and in such evident pain that it was decided to kill him. A box of chocolate drops saturated with a powerful poison was given Bijou after the museum closed on the night of June 19, and in forty-five minutes the beast twined his trunk affectionately around his keeper and died. Bijou's body will be buried in an underground air tight vat until decomposition is complete. This will require some nine months, after which the bones will be separated, bleached, and then prepared, and in another month the skeleton will be placed on exhibition at the World's Museum.

Bijou was an African elephant. Sixty years ago he came to this country, since which time he had traveled with nearly every circus on the road. Twenty times, it is said, his ownership changed hands, and with each stranded show poor Bijou would get a new master. When a youngster he was owned by a London tavern keeper, who exhibited him with a pair of immense gorillas in his tavern, and from there he drifted across the Continent. When but an infant, Prince Albert of England rode him and made him a pet, but his after life was not so pleasant.

In 1840 he visited Germany with a prominent showman, and tramped back and forth throughout the world until 1873 and 1874, when he was an attraction in the Great Eastern Circus. Then O. P. Older, a well known circus man, purchased him, and later Bob Frier, an equestrian with Barnum's circus, broke him to tricks.

Bijou then went to California, and at last drifted back to New York. On the way home, in crossing a bridge Bijou refused, after trying the planking, to make the passage. His keepers, it is claimed, goaded him on. He took a few more steps and plunged through the rotten boards, spraining his ankle, and since then he has never been himself.

While in the Central Park menagerie in New York, the agent of the World's Museum bought him. That was two years ago, and until within three weeks Bijou was never off his feet, even to lie down. He was considered one of the best trick elephants in the country. He played five tunes on the harp, played the harmonica, stood on his head, and did the housekeeping business for the circus with all the intelligence of his nature. During his sickness he has been fed largely on fruit, and a day's allowance included two dozen oranges, twelve loaves of bread, one hundred and fifty pounds of hay, half a bushel of grain, and a bucket of shorts.

Bijou was valued at $3,000, and was probably better known throughout this country than any elephant ever on exhibition.—*New York World.*

Test for Animal and Vegetable Fibers.

A new method has been enunciated by Hans Molisch, in *Dingler's Polytechnisches Journal* (No. 261,135), for distinguishing between animal and vegetable fibers, depending on two new sugar reactions. α-naphthol and thymol give characteristic reactions with cane and grape sugar, which are more delicate than the tests of Trommer and Fehling in common use. The method of procedure is as follows: 5 cub. cm. of the sugar solution are mixed with one or two drops of a 20 per cent solution of α-naphthol in alcohol, and then concentrated sulphuric acid is added in large excess. A deep violet coloration is produced, which gives rise to a bluish violet precipitate on dilution with water. Thymol similarly gives a red brown precipitate. Glucosides and carbo-hydrates, after treatment with sulphuric acid, will also respond to these tests, so that the cellulose in the cell walls of plants may be detected by its use. As animal fibers do not contain any sugar or carbo-hydrates which are capable of giving this color reaction, they can be readily distinguished from plant fibers.

Satisfactory results have been obtained with linen, cotton, hemp, jute, China grass, straw, and many other substances of vegetable origin; while wool, hair, etc., give no reaction. With silk, however, a transient color is produced, especially if the boiling has been continued for some time. When wool is to be tested, it is necessary that it should be first well cleansed, as "wool lice," a feature of vegetable origin, gives the color reaction. Also, many fabrics made from animal fibers are finished with gum or mucilage, which must be removed before the test is applied. Any coloring matter present, according to the author, does not prevent the reaction from being seen.

A NEW STYLE OF THERMOMETER.

In the SCIENTIFIC AMERICAN for December 5, 1885, we published an interesting letter from Dr. Warren, of Boston, Mass., in which he described at considerable length the disadvantages of the common thermometer and the urgent need there was of a new form of instrument, especially for medical purposes. Since that date there has been brought into market a new and ingenious form of thermometer, Immisch's avitreous thermometer, which seems to answer many, if not all, the requirements. We give an engraving of its exterior

appearance and size, the cut being the same size as the article itself. The interior mechanism consists of a small tube, bent in circular form, having one of its ends fixed to a support, the other end free to move, but connected by a fine spring with a shaft carrying the indicating or dial pointer. The tube is filled with a highly expansible liquid. Any variation of temperature causes the tube either to curl or expand, as the case may be, and thus moves the pointer. There is a stop catch, by which the pointer may be held or locked to show its indication as long as desired.

The instrument is waterproof and durable, very sensitive to slight changes of temperature, and very accurate. This fact is established by the guarantee of the Kew Observatory, which accompanies each instrument. Altogether, this is a scientific and desirable form of thermometer, which every medical man especially should be provided with. Messrs. Sardy, Coles & Co., 96 Maiden Lane, New York, supply the instruments and give further information.

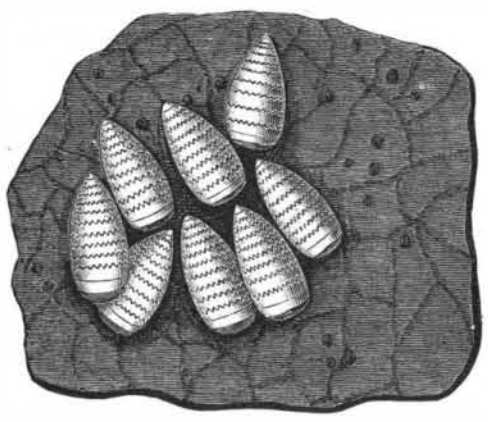
LARVÆ OF BOT FLY IN HORSE'S STOMACH.

BY JAMES F. M'DOUGALL.

I have lately had sent to me, by the son of one of our most eminent breeders, a portion of a horse's stomach, containing a great number of large maggots (the larval form of the horse bot fly) adhering in thick clusters to the lining of the stomach. The gentleman in forwarding specimen writes me that the number of maggots in the entire stomach would have filled a peck measure. I am strongly of opinion that these maggots are much more prevalent in horses' stomachs than has hitherto been made plain.

I have spoken to a number of veterinary surgeons with large country practices, and they inform me it is quite a common thing with horses that have died between January and June to find these maggots in large numbers in the stomach, especially if the animals were at pasture the previous summer or autumn.

The maggots are produced from eggs laid by the horse bot fly (*Gastrophilus equi*). The female deposits her eggs upon those places which are most easily reached by the animal's tongue, as, for instance, the



HORSE BOT FLY MAGGOTS ON LINING OF STOMACH.

shoulders, the legs, the inside of the knees, etc. The effect of the moisture and heat of the tongue seems to be such that licking the places where the eggs have been deposited liberates the minute maggots contained in the eggs, which adhere sufficiently to the tongue to be carried from thence with the food into the stomach. On reaching the stomach they immediately attach themselves to the lining by means of two small hooks with which their mouths are furnished. Here they remain till the following spring, feeding upon the mucus secreted by the mucous membrane. When full grown, they are about an inch in length. When the maggots are fully developed from the larvæ, they are removed from the stomach during ordinary evacuations. —*The Farmers' Gazette, Dublin, Ireland.*

Many Items of Interest.

At a recent meeting of the Polytechnic Society of Berlin, says the *Journal of the Telegraph*, the question was asked, What studies are best to fit one to be an electrical engineer? Herr Frischen, one of Siemens and Halske's experts, replied that much practical experience was required. After graduating from school, a rigid course in an advanced technical school should be taken, followed by an apprenticeship in a factory. He remarked that at present the title of electrician is used too freely, and that the claim of some to it is that they have nailed up a few wires.

A lens which magnifies, and yet is perfectly flat on both sides, is a scientific novelty. It is made at Jena, by the manufacturer of Professor Abbe's new optical glass. The lens consists of a single disk, whose density varies so that its refractive power decreases regularly from the surface inward.

To purify water in glass vessels and aquariums, it is recommended to add to every 100 grammes of water 4 drops of a solution of 1 gramme of salicylic acid in 300 grammes of water. The *Norsk Fiskeritidende*, published at Bergen, Norway, says that thereby the water may be kept fresh for three months without being renewed.

An observer down South says an alligator's throat is an animated sewer. Everything which lodges in his open mouth goes down. He is a lazy dog, and instead of hunting for something to eat, he lets his victuals hunt for him. That is, he lies with his great mouth open, apparently dead, like the 'possum. Soon a bug crawls into it, then a fly, then several gnats, and a colony of mosquitoes. The alligator doesn't close his mouth yet. He is waiting for a whole drove of things. He does his eating by wholesale. A little later a lizard will cool himself under the shade of the upper jaw. Then a few frogs will hop up to catch the mosquitoes. Then more mosquitoes and gnats will light on the frogs. Finally a whole village of insects and reptiles settle down for an afternoon picnic. Then all at once there is an earthquake. The big jaw falls, the alligator blinks one eye, gulps down the entire menagerie, and opens his great front door again for more visitors.

The application of soda ash or any other scale resolvent to a dirty boiler, the editor of the *Locomotive* says, should be followed by a thorough cleaning shortly afterward to remove any scale which may be detached or loosened, or injury to the boiler may result. The idea obtains in some cases that it is only necessary to put the solvent into the boiler and let it work, no further attention being necessary. This is a great mistake. If a solvent does any good, its action is either to loosen scale so that it becomes detached in flakes, or it dissolves it so that it remains in the water, either in a finely divided state or in solution. In the first case, the accumulation of a mass of scale on the bottom of the shell is more than likely to result in burning the plates. The only thing to do is to open the boiler and remove it mechanically.

In the second case the result will depend more or less upon the nature of the scale and the amount and character of impurities that find their way into the boiler. If the scale is cut by the action of the solvent into a fine powder, and grease gets into the boiler, as it will in all cases where an engine exhausts into an open heater for the purpose of heating the feed, trouble is sure to result. Burned plates may always be expected under these circumstances. The only thing to do is to blow off all the water in the boiler, thoroughly clean it out, and begin again, omitting the grease.

Gold will only melt at a comparatively high temperature, as we all know, but what is not generally known, the *Jewelers' Journal* says, is that if two per cent of silica be added to the gold, it can be melted over the flame of a common candle.

From the same source the reader may learn that a pretty alloy, said to resemble gold exactly, can be made with 16 parts copper, 1 of zinc, and 7 of platinum. The copper and platinum are covered first with borax and then with powdered charcoal and melted, then the zinc added, and the alloy thus produced is exceedingly malleable, and can be drawn into the finest wire, while it never tarnishes.

Food Adulterations.

The examinations as to tea, coffee, and sugar conducted by Edward G. Love, Ph.D., for the New York *World*, resulted as follows:

A review of the 300 reports discloses that of the samples of tea, 88 were not adulterated and 12 were adulterated, mostly with "lie tea" and foreign leaves; that of the samples of ground coffee, 72 were unadulterated and 28 were adulterated, mostly with chicory and peas; that of the sugar samples, 98 were pure and only 2 adulterated with starch glucose. In all, there were, of the 300 samples, 258 good and 42 more or less bad. As to the weights of the samples, those of 270 were correct and 30 were light.

Resin in Soaps and Fats.

According to the authors, the methods of Sutherland, Gottlieb, and Heiner do not give quantitatively useful results. They recommend a modification of Gladding's process. From 1 to 2 grms. soap are dissolved with heat in 80 per cent alcohol, the solution, if acid, is neutralized with ammonia, mixed with excess of a 10 per cent alcoholic solution of calcium nitrate, and filtered when cold. The filtrate passes through at first turbid, and must be repeatedly poured back. The precipitate is washed several times with 80 per cent alcohol, mixed in a roomy flask with an excess of silver nitrate solution, and diluted with three volumes of water. After some shaking, the precipitate (if a sufficiency of silver solution has been used) collects on the surface, and the solution is nearly clear. It is filtered, and the precipitate is washed with cold water until the washings no longer give a precipitate with hydrochloric acid. The washed precipitate is dried at 70° to 80°, and washed with ether into the same flask in which was the silver precipitate, and which must have been dried internally in the mean time.

After some time the ethereal solution is filtered through a dry filter into a graduated 100 c. c. cylinder, and the undissolved portion is washed with ether until the filtrate makes up 90 c. c. The ether which flows through last must be colorless. If 90 c. c. do not suffice, a larger graduated cylinder of about 250 c. c. may be used. The solution is then mixed with about 10 c. c. of dilute hydrochloric acid, well shaken for a long time. The cylinder is then filled with ether or hydrochloric acid up to the mark and shaken again. If the operation has been well managed, the precipitate of silver chloride settles quickly, and the ethereal solution of the resin is quite pure and transparent. The volume is read off, from 50 to 60 c. c. are taken with a pipette, the ether is distilled off, the residue dried at 100°, and the resin weighed. From the weight we must deduct 1·6 mg. for every 10 c. c. of the ethereal solution, on account of oleic acid which has been dissolved.—*A. Grittner and J. Szilasi, Chemiker Zeitung.*

A Steam Engine of 1809.

Retained in perfect running order in the United States Steamboat Inspector's office at Louisville, Ky., says the Louisville *Courier Journal*, is an oscillating engine constructed in 1809 by Daniel French. It is only of model size, and is probably the first engine of the kind ever constructed. Its description is simple. Having its piston rod attached directly to the crank pin, as the crank revolves, the cylinder oscillates upon trunnions, one on each side of it, through which the steam enters and leaves the steam chest. The valves are within the steam chest, oscillating with the cylinder. It is perhaps as satisfactory an engine of this class as has ever been built, for it is well known that the mechanism actuating the valves in oscillating steam engines has seldom proved perfectly satisfactory in its operation.

The inventor, whose son carried on a shipyard for years at Jeffersonville and was well known to many of the older citizens of the city, was contemporaneous with Robert Fulton, who built a steamboat on the Seine in 1803 with Chancellor Livingston, and who, in 1806, with Livingston, had a boat built on the Hudson, in which he placed machinery claimed to have been made by Boulton & Watt in England.

Daniel French had litigation with Fulton about this steamboat, claiming that the latter had appropriated his invention, but Fulton was backed by Livingston's influence and capital; and, though the case was before the courts for many years in one form and another, French was finally defeated. Although the oscillating engine on exhibition in the steamboat inspector's office was not built till 1809, it was by no means the first attempt French had made to invent an engine applicable for steam navigation. He had been known as an inventor for a quarter of a century before, and his numerous inventions of different kinds had given him an extensive and esteemed reputation. Those who knew him were wont to say that he was half a century ahead of the time in which he lived.

It is not improbable that Fulton was familiar with French's experiments with steam. It is an historical fact that in connection with his profession as an engineer he had passed years in the scientific experiments the result of which forever identified his name with steamboat navigation. It is not to be doubted, therefore, that he was acquainted with the efforts of every experimenter of the power of steam in this direction, from the time that Blanco de Garay is supposed to have actually applied steam to the propulsion of a ship at Barcelona, in the year 1543, up to the time when, in 1763, William Henry, of Chester County, Pennsylvania, tried his model steamboat on the Conestoga river. Fulton witnessed that experiment, and it is a matter of record that he was familiar with the work of the numerous contemporary inventors in America, and had visited England, where he found others at work on the same problem. But with this invention, as with all others, though the claimants may be numerous, the credit attaches to the one most successful in bringing it before the public.

Roburite, the New Explosive.

A most important and interesting series of experiments was lately carried out at the School of Military Engineering, Chatham, England, under the superintendence of Major Sale, R.E., and in presence of Lieutenant-General Sir John Stokes, K.C.B., R.E., Admiral Colomb, Major Cundill, R.A., Her Majesty's Inspector of Explosives, and a large gathering of other officers and gentlemen.

The new German explosive, roburite, belongs to what is known as the Sprengel class or type, being a mixture of two substances, neither of which separately possesses explosive properties. In this case both components are solid, and the resulting mixture has a sandy, granular appearance, somewhat resembling the commonest yellow sugar. Roburite is the invention of Dr. Carl Roth, an eminent German chemist and analyst, who claims for it the following advantages over other explosives:

1. That the two components are perfectly harmless and inert separately, so that they can be stored and transported without any restriction whatever.

2. That even when mixed or ground up together in an ordinary coffee, cement, or flour mill, the mixture is perfectly safe to handle and use, as neither percussion, friction, nor the application of an ignited or heated body will cause it to explode. This can only be effected by using a detonator charged with fulminate of mercury.

3. That, when detonated, roburite produces neither spark nor flame, and will not, therefore, ignite firedamp nor coal dust in mines. Dr. Roth states that this point was decided by the trials of the Imperial German Commission upon Accidents in Mines, and that, in consequence, this explosive is now being introduced into the coal mining regions of Germany, as affording absolute safety to the men employed.

4. The amount of noxious gases produced by its explosion is so infinitesimal, that for this reason alone it is superior to other exlosives in common use for longitudinal and deep mining work. The report from a mine in Westphalia, with shafts about 1,500 ft. deep, states with reference to roburite: "The men are not inconvenienced by the gases, and experience no difficulty whatever in breathing the moment after a shot has been fired, and they resume their labor at once."

5. Roburite is not subject to deterioration through climatic variations of temperature. It should be kept dry, but if it becomes damp, its strength can be safely restored by drying.

The object of the trials was to test roburite in comparison with gun cotton, dynamite, and blasting gelatine. The programme of the experiments actually carried out was as follows:

A. *Safety Tests.*—After being ground through a small hand mill, the substance was struck direct and glancing blows with heavy hammers upon iron plates, without any result. Flame was then applied to a portion of it by means of a short length of Bickford fuse, but without igniting the mass. Thrusting a red hot iron from a portable forge into the roburite caused only slow combustion and crepitation locally, which ceased when the iron was withdrawn. When a quantity was put on the forge fire, it merely burnt away like an ordinary combustible. Dr. Roth wished to fire a powder charge in contact with the roburite, but it was considered that the above named tests were more severe.

B. *Test on Mild Steel Plates*, 2 ft. 6 in. by 2 ft. 6 in., and of various thickness.—These plates were supplied by the Patent Shaft and Axletree Company, Limited, and were laid flat in shallow trenches, a hollow being left underneath the central portion of each plate; heavy timber balks were stacked around each square trench, with the object of showing the comparative dispersive force of each explosive.

I. Three pounds each of dynamite and roburite were placed on the center of plates 2 in. thick, some sandy loam being piled loosely on top. The results of detonation were that the dynamite produced a dent in center of plate 1¾ in. deep; the indentation produced by the roburite was about 1½ in. deep, but the bulge appeared to have a wider area than in the former case.

II. Five pounds each of roburite and gun cotton were then exploded upon the same plates, with the result that in the former case the plate was smashed into four tolerably equal pieces, while the gun cotton made a breach through the center of the plate somewhat resembling that which would be caused by the penetration of a large projectile. The diameter of the hole was roughly 12 in., with five radial fissures almost reaching the edges, the longest 15 in., the plate being at the same time bent into the shape of a pack saddle. This would seem to have been a remarkably tough piece of metal. The timber balks were scattered in all directions.

III. Eight pounds each of dynamite and roburite were then detonated upon plates 3 in. thick. The dynamite caused an indentation 2¼ in. in maximum depth, while the roburite gave a bulge 3 in. deep in the center, and of a larger area, reaching apparently almost to the corners of the plate.

IV. This series of tests was concluded by exploding 12 lb. each of roburite and gun cotton on plates 4 in. thick, rather more loam being heaped on top of each. The roburite caused a wide indentation 1⅞ in. deep in center, while the tremendous local force of the gun cotton was exemplified in a striking manner. In addition to an indentation 3½ in. in greatest depth, a small crack appeared to extend right through the plate, this crack corresponding with one edge of the lowest slab of gun cotton, the rectangular shape of which could be clearly seen indented on the steel plate, the depth being ¼ in. at the crack and ⅛ in. along the other edges of the slab. There is a circular hole drilled in the slab of wet gun cotton to receive a small cylindrical disk of dry gun cotton, as a primer, and the position of this disk was marked by a circular hollow in the steel plate ½ in. deep in center.

C. *Blasting or Mining Test in Brickwork.*—Three holes, each 1¼ in. in diameter and 18 in. in horizontal depth, were drilled in the solid brickwork of the counterscarp wall, and were respectively charged with 2 oz. of gun cotton, blasting gelatine, and roburite. The holes were then tamped with loam in the ordinary manner, and fired by means of short lengths of Bickford fuse. The gun cotton produced no apparent effect upon the brickwork, but Major Sale was of opinion that the hole must have been open or very weak at the back. The blasting gelatine produced violent local action, displacing the brick through which the hole had been bored and the four adjacent to it. There was a slight bulge in the wall, the cracks extending radially from 10 in. to 12 in. The roburite exhibited a more widespread rending action upon the wall, the radius of disturbance being 15 in. or more, and the bulge being also greater. Rather larger charges of each explosive would have afforded a more satisfactory comparison.

D. *Ground Mines.*—Ten pounds each of gun cotton, blasting gelatine, and roburite were loaded into holes in the bottom of the ditch 4 ft. deep by 8 in. in diameter, filled up with sand, and slightly tamped. The explosion of these charges cast up tremendous fountains of loam and sand, and resulted in the following craters: Gun cotton, 10 ft. 6 in. wide by 1 ft. 8½ in. deep; gelatine, 14 ft. 6 in. wide by 3 ft. 7 in. deep; roburite, 12 ft. 3 in. wide by 2 ft. 9 in. deep. The explosion of the gun cotton mine appeared to cause great local action, but it will be seen that the area and depth of its crater was considerably less than that caused by the roburite, which again must yield the palm, in this instance, to the blasting gelatine. It is, however, to be remarked that these mines had been placed much too close to one another, so that their craters crossed; this would give whichever charge was the last to explode a certain advantage.

In summing up the results of the foregoing experiments, we must bear in mind the great difficulty—we had almost said the impossibility—of obtaining any absolute standard of comparison of the relative strengths of two or more explosives. Each will seem to prove itself superior for certain purposes. Judged, however, by any standard of comparison, it appears that the new explosive has acquitted itself very well, and—especially when we consider its absolute safety—must have a great future before it. Roburite has shown itself to be in some respects more powerful than dynamite, to which it is likely to prove a serious rival in the industrial field, although the latter has the proverbial advantage of strong possession of the ground. An important element in the struggle for ascendency will be the price at which roburite can be supplied, as compared with dynamite, and this will be, we understand, strongly in favor of the new substance.

As regards the military application of explosives, there is nothing in the results of these trials to disturb the firm conviction of our government that gun cotton is the best adapted for torpedo charges, submarine mining, and hasty demolitions of all kinds. Its superiority in local force to dynamite, when employed without any confinement, is once more strikingly demonstrated, to say nothing of the far greater safety of wet cotton, and its applicability for use under water with no other confinement than that of a net to keep the slabs together. But although quite outside the scope of recent experiments, the great power and perfect safety of roburite seem eminently to fit it for use as a bursting charge for shells, into which its granular form would allow it to be conveniently loaded. Much stronger than any picric powder, and doubtless better able to withstand the concussion of the discharge of the gun, an extended series of trials would be necessary to determine the best mode of so employing it.—*Engineering.*

Coppered Tin.

Mr. P. H. Laufmann, Pittsburg, is manufacturing copper-plated sheet steel, which indicates a new use for that metal. The sheet is made of decarbonized steel, and is manufactured at the Apollo Sheet Iron Mills. After being rolled to the proper thickness, it is electroplated with copper on both sides and tinned on one side, and in this condition, it is stated by the manufacturers, it is a better article for many purposes than solid sheet copper.