DR. LE PLONGEON'S LATEST AND MOST IMPORTANT DISCOVERIES AMONG THE RUINED CITIES OF YUCATAN.

(*Continued from page* 263.)

The mural paintings upon the walls of the inner room of the Mausoleum of Chaacmol are separated into tableaus divided by horizontal lines. Each figure is about nine inches high, and as we have many reasons for supposing thatthese people were about our own size, perhaps a little bigger, we may say that the artist allowed one and a half inches for each foot. The outlines are bold, decided, and graceful, but the tints are flat, and the perspective was evidently not understood by those artists, except in a very limited manner. Nevertheless, as these are the only actual mural paintings that we have found during a ten years' study in the ruined cities of ancient Yucatan, we consider them of remarkable interest and value, being the last remnants of the art of painting (mural) among the Mayas. Religious ceremonies, battles, and domestic scenes, as well as grand processions, are depicted on that wall—a fading gem of antique art.

In 1875 Dr. Le Plongeon made tracings on transparent paper of the best preserved tableaus, and from these tracings a facsimile of those portions of the wall was made and lent to the Metropolitan Museum of Art, Central Park, N. Y., where they are now on exhibition. At the time we made these tracings (1875) one part of the precious wall was covered with the dirt of centuries; for, alas! these palaces are now the abodes of bats and swallows, that build their nests in small, square holes on the sides of the roofed arch —holes that supported the ends of wooden beams of choicest wood, polished, and sometimes carved. We had not then with us the means of cleaning those paintings, but now (1884) came prepared to cleanse and copy all that could possibly be saved. To our grief, we at once saw that some one had tried to clean the wall by *scratching* off the dirt. In answer to our exclamations of disgust, some of the soldiers that escorted us in our expedition said: "Oh, yes! that gentleman who came two years ago did it; he scraped it with a machete, and said: 'Look at this ugly little old woman!'" We said: "What! did M. Charnay do that?" "No, it was M. the *Consul Americano*, who accompanied M. Charnay." We left the wall as we found it; it was no longer in a condition to be copied.

The jambs of the door of this funereal chamber, and the square pillars that are against them, forming, as it were, a triple jamb, are covered all over, on every side, with warriors dressed and armed. The work is perfect, and painted in bright colors. The figures are nearly life-size, and Dr. Le Plongeon has made moulds of all, they being important to show the various types, dresses, insignia, and weapons. The faces, whether sculptured or painted, are in profile, not because the Maya artists did not know how to make a full face, for the sculptures in the round prove to the contrary, but because they preferred it; just as they did the triangular arch to the round, which they knew well enough how to make, for on the very wall just mentioned domed buildings are painted. I must also say that the aborigines are generally better looking side face than full face, and they must have been well aware of the fact; even though the beautiful Maya women, say the historians, did not use a looking glass to see what position best suited their face; only the men indulged in that vanity.

The most interesting remains of the art of sculpture among the Maya are the *sapote* beams that form the lintel of the funereal chamber. Unhappily, the carving of that lintel has been much defaced by individuals who have hacked it with machetes. What remains shows how exquisitely those Mayas could carve wood in most intricate designs.

Dr. Le Plongeon has made moulds of the lintel, as much for the historical teaching it conveys as because it is the last specimen of wood carving among the ancient Mayas. On examining the closeness and depth of the lines, we find it hard to believe that the artist had no finer tools than those of obsidian or silex; the intaglios are nearly three-fourths of an inch deep, and *sapote* is very hard wood. In making the mould of these carvings Dr. Le Plongeon discovered that the surface of the wood was covered with a thick coating of a yellowish gummy substance, that when rubbed with a wet brush yielded a thick, froth-like soap, which led us to suppose that the substance, whatever it may be, was used by the artist to preserve the wood from insects and protect it from atmospheric influence.

Plate 1.—SCULPTURED STONE WORK.

In the year 1875, when we unearthed the statue called Chaacmol, now in the museum at the capital of Mexico, Dr. Le Plongeon discovered a monument that he considered of great importance, and, returning here, he decided to examine the interior. He succeeded in measuring the original dimensions, though it was reduced to little more than a shapeless pile of stones, with broken stairs on one side, and covered with bush. The structure was square, its four sides faced the cardinal points, and on each were thirteen stairs, three meters eighty centimeters wide, that led to the top platform, exactly four meters above the ground, and sixteen meters square. In the center was a large stone slab, on which formerly was a statue of a man about double life-size, in a reclining posture, like the statue Chaacmol.

The fragments of this gigantic statue are scattered at the base of the mound, only the lower limbs being entire, which show us the position it had. On the sides of the monument, in the spaces between the stairs, there were finely sculptured stones.

Only a few are now in place, and Dr. Le Plongeon has made photos and moulds of them. The largest is one meter twenty-five centimeters high, and one meter thirty-five centimeters wide. It is a human face within the distended jaws of a snake, and on the sides of the face are Egyptian letters that give the name Cay Canchi. [Plate 1.]

On the north side of the mound, in a part where there was neither sculpture, stones, nor stairs, we set our men to open a trench one and a half meters wide, to reach the center of the mound, the interior of which consisted of unhewn stones, piled one over another, and mortar that seemed to have been poured among them. As the work proceeded, the sides had to be propped with a strong palisade made of tree trunks cut from the surrounding bush, to prevent the loose stones from falling on the laborers. [Plate 2.]

Plate 2.—HOW THE EXCAVATIONS WERE MADE.

Oxalic Acid.

Oxalic acid we obtain mostly from wood sorrel and the sorrel tree, but it is contained in many other substances. It is manufactured in large quantities from heated sawdust in connection with hydrate of potassium, etc. Oxalic acid is in colorless and odorless crystals, with a strong sour taste. It is soluble very slowly in eight parts of cold water to one part of oxalic acid, but is easily soluble in hot water. It is very poisonous, and many cases of poisoning have already occurred in lithographic establishments by mistake when regular or common salt should have been used. It is a sure remedy, when not too late, to give the person who has swallowed oxalic acid large draughts of water mixed with white chalk.

Oxalic acid is used for preparing stones for engraving, and is greatly preferable before etching with nitric acid when machine ruling is to be applied on an engraving. It only requires a little more weight on the diamond, as the oxalic acid produces a layer on the surface of the stone, which the diamond has to cut through; otherwise, all lines would not have the necessary strength and would look broken; but when the diamond has cut through the layer, the lines will print sharper and more distinctly than in the etching with nitric acid. It also prevents scratches on the stone from taking ink. Oxalic acid is also used for keeping the edges of the stone clean in the steam press. A solution of ten parts of dissolved gum arabic, one part of oxalic acid, and one part of phosphoric acid is the best preparation for stopping out lights and correcting errors on engraving stones. This acid is not effervescent, and does not spread out as nitric or muriatic acid does. It is also the best acid to take off any dirt or scratches from old engravings; but very great care must be taken that no work is touched that is to remain on the stone, for where the oxalic acid is once applied the ink will not easily take hold again. Therefore it shows what is a good remedy for one thing is a very dangerous thing for another.—*Lithographer.*

An Enormous Puff Ball.

My friend, Prof. R. E. Call, has handed me a photograph of a puff ball, the largest on record. The fungus was found by him in Herkimer County, N. Y., in 1877, and as it was impossible to preserve it, careful measurements were made, and photographs of it were taken. It was irregularly oval in outline, and much flattened, instead of approaching the spherical form, as is common in the large puff balls. Its largest diameter was five feet and four inches, its smallest four feet and six inches, while its height was but nine and a half inches. In reference to it Professor Call described it as "much larger than the largest wash tub we had at home."

The specimen undoubtedly belonged to the species known as the giant puff ball (*Lycoperdon giganteum*), and it was by far the largest of any of which I have been able to find measurements.—*C. E. Bessey, Amer. Naturalist.*

DYNAMITE THROWN FROM CANNON BY POWDER.

On the 22d of April a trial was made in the vicinity of New York of firing dynamite from a 12 pound Rodman gun with a charge of powder. The system employed by the inventor, Mr. F. H. Snyder, to whom we are indebted for the following particulars, consists in the insertion of a buffer combination between the powder and the dynamite, so that the buffer will take up the shock without exploding the dynamite.

The trials were made in the presence of a number of spectators, and following, as they do, so closely upon the trials of the pneumatic dynamite gun, have excited great interest, particularly on account of the simple manner in which the problem has been met.

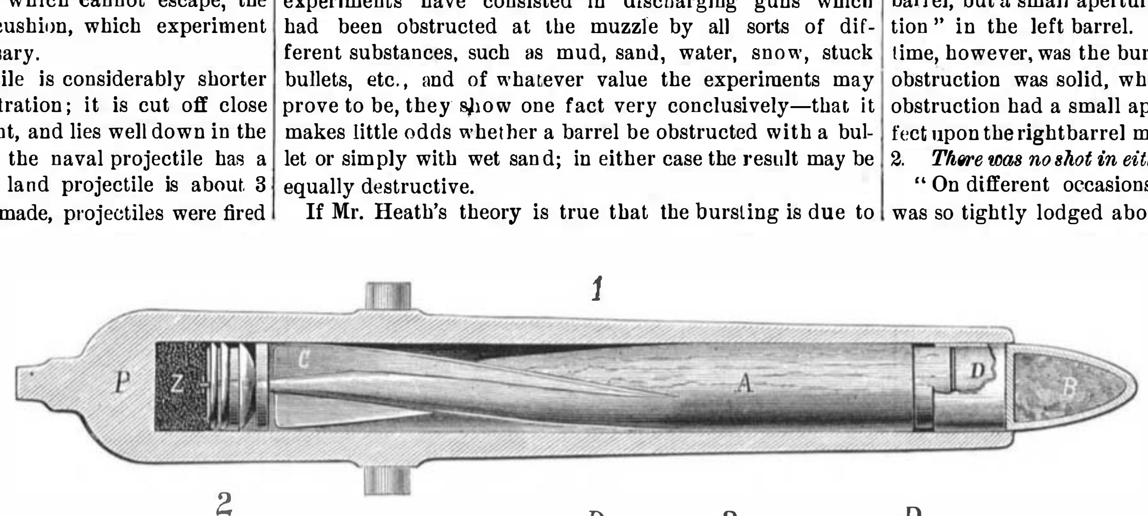
By referring to the accompanying illustrations, it will be seen that no extra appliances whatever are required as regards the gun. The dynamite can be loaded in ordinary guns, such as exist at the present day, and is fired in the usual manner with powder. The great advantages of such a system are obvious, since it conforms in every respect with the practice of firing solid shot, and is equally applicable to naval and land operations. In our illustration Fig. 1 represents an ordinary gun with the naval projectile in position. The latter consists essentially of the dynamite compartment, B, and the wooden shank, A, provided with wings, C, to guide it when it strikes the water.

In addition to this, and constituting the principal features of the invention, are the means provided for reducing the shock when the gun is fired. These consist, in the first place, of the sabot shown in Fig. 2. This is built up in three sections of wood or *papier mache*, W and S, between which are located leather washers with overlapping sides, L. In front of the third section, W, is placed a convex disk of copper, F, which bears against the former at its outer edge, the copper in turn butting against a plug, X. The whole is bolted together, all the disks, however, fitting loosely on the bolt. This arrangement acts both as a gas check and as a buffer, the washers, L L, performing the first office, and the copper disk the latter. This will be understood by stating that the copper disc is of smaller diameter than the bore of the gun; thus, when the latter is fired the shock is taken up by the disk, which becomes flattened out, thereby overcoming the inertia of the projectile gently.

There is, however, still another provision made to reduce the shock of a sudden discharge, which consists in placing a cushion between the end of the shank, A, and the dynamite chamber, B. The latter is formed into a hollow cylinder at its rear end, passing over the shank, A, like a sleeve. Into this hollow cylinder there is placed the buffer, D, shown enlarged in Fig. 3. This is made of India rubber, and has a series of holes, E, running longitudinally nearly through, a cap fitting over the end to close the holes. When the projectile is in position the end of the shank lies against the bottom of the India rubber buffer, and the cap of the latter in its turn against the dynamite compartment, the shank, A, being recessed a short distance behind the sleeve so as to allow free motion. When the gun is fired the shock is partly taken up, not only by the rubber, but also by the air which is confined in the holes, E, and which cannot escape, the device making a very efficient cushion, which experiment has shown to be all that is necessary.

For land purposes the projectile is considerably shorter than the one shown in the illustration; it is cut off close behind the dynamite compartment, and lies well down in the gun. Thus, for an 8 inch gun the naval projectile has a length of about 9 feet, while the land projectile is about 3 feet. In the experiments lately made, projectiles were fired from a Rodman 12 pounder, 4·62 inch bore, in which quick burning "FF sporting powder" was used, and which threw a charge of 5 pounds of dynamite three-quarters of a mile; the dynamite buried itself several feet in soft mud without exploding. Subsequently, when firing a naval projectile, the latter ricocheted a long distance before sinking, thus proving itself capable of striking a ship at the water line with certainty

Another important point observed is the fact that the recoil of the gun is greatly diminished by the interposition of the cushions, which property will commend itself particularly in naval guns.



DYNAMITE CARTRIDGE THROWN FROM CANNON BY POWDER.

As yet no official tests have been made of the system, but the United States Government has invited the inventor to make a trial of it, which will take place at Sandy Hook as soon as arrangements can be made.

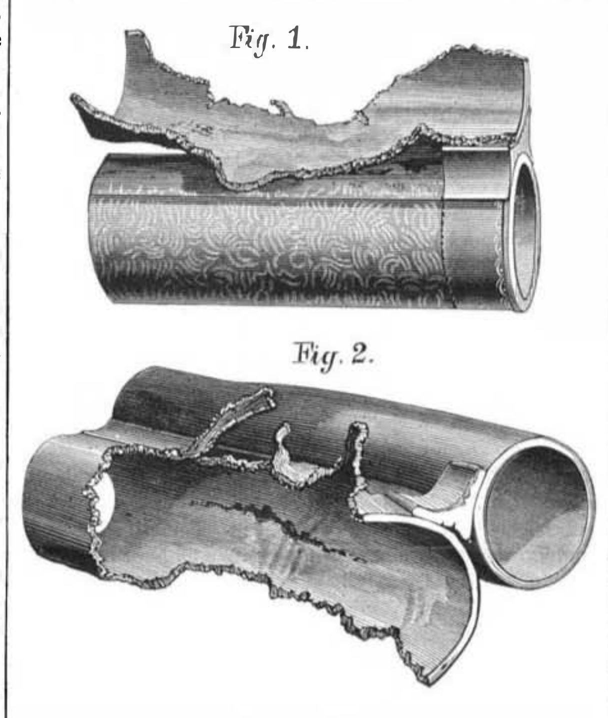
The simplicity of the system must commend itself, requiring no change in the cannon, and entailing but a small cost in the other appliances used. As a weapon of destruction in warfare, dynamite is as yet an almost unknown force, but if a charge can in this way be thrown five miles many old ideas will have to be discarded.

THE BURSTING OF GUN BARRELS.

We give below some extracts from a letter of Mr. Munn Davis, of Nebraska, who writes us upon the subject of the bursting of gun barrels, and criticises some articles which have been published upon this subject in some of the sporting papers and in *Harper's Weekly* by Mr. W. McK. Heath,


THE BURSTING OF GUN BARRELS.

of Philadelphia. Mr. Heath has been making some experiments, and he has spent many words in describing them. But the point which is of most interest, and which would render his experiments of any value, he seems carefully to have avoided, namely, the cause of the bursting of gun barrels. He passes over the subject with a single sweep of the pen, and says that it is the jamming of the projectile against some obstruction in the muzzle of the barrel. This may be all very true, but it scarcely explains anything, and least of all the real action which takes place



THE BURSTING OF GUN BARRELS.

in the barrel before and during the explosion. Mr. Heath's experiments have consisted in discharging guns which had been obstructed at the muzzle by all sorts of different substances, such as mud, sand, water, snow, stuck bullets, etc., and of whatever value the experiments may prove to be, they show one fact very conclusively—that it makes little odds whether a barrel be obstructed with a bullet or simply with wet sand; in either case the result may be equally destructive.

If Mr. Heath's theory is true that the bursting is due to simple jamming of the projectile against the obstruction, we do not see how he explains what has become of the air which filled the space between the projectile and the obstruction before the discharge, nor how he accounts for that total wreck of firearms which we so often hear of. Mr. Davis, in his communication, has elucidated this point, we think, in an experience which he relates, and in which case the bursting must have been due, not to the jamming of the bullet against the obstruction, for this does not seem to have occurred, but to the almost instantaneous compression of the air in the barrel between the cartridge and obstruction. He says:

"During the summer of 1871 I saw in Topeka, Kansas, among a lot of government arms that were being overhauled and cleaned, a "needle gun" which had been burst by a "stuck" ball about four inches from the muzzle. The upper part of the barrel had been blown up and back, the rupture commencing at the rear end of the "stuck" ball; the end of the broken section had struck the barrel itself at a point immediately in front of the back sight, and with such force as to dent it about one-sixteenth of an inch in depth, and had then glanced off to the right side and continued its course downward some three or four inches below the lower line of the stock. The "stuck" ball was still in the gun, and showed *no signs* of having been struck by the projectile, except that in one place it was slightly battered over the jagged edge of the ruptured barrel. If it was not the compressed *air* which caused this break, what force was it which could split the barrel from the rear end of the "obstruction" to the point of indenture, just in front of the back sight, a distance of about fifteen inches? The accompanying sketch shows the appearance of the gun at the time." Fig. 1.

"I also send a fragment, 2½ inches long, taken from the muzzle of a Piper breech-loading shotgun, the right barrel of which burst from a mud obstruction at the muzzle. The barrels are Damascus steel, and have a patent appliance at breech and muzzle, by which they are said to be "re-enforced." It is evident in this case that the shot struck the "obstruction," and then "wedged" to such an extent as to cause the rupture, as you will readily perceive the black line of lead still sticking to the barrel."

"In most breech-loading shotguns the diameter of the shell chamber is perceptibly larger than that of the remainder of the barrel, and it is customary to use a No. 8 wad in loading a 10 gauge brass shell. This gives what is commonly called a "force" wad, *i. e.*, a wad which will fit tightly the entire length of the barrel; and, to a common thinker, it seems as though the wad over the shot would be sufficient to remove the "obstruction," provided it was not jammed into the barrels so tight as to prevent the escape of air. Some think the break is caused by the shot jamming against the "obstruction," and indeed this seems to be the case with the Piper gun."

"A few days since I took occasion to test the matter, with the following results: Procuring an old muzzle-loading shotgun (No. 14 gauge), I loaded each barrel with four drachms of Hazard gunpowder (FG) and two No. 12 Ely Bros.' pink edged wads. In the right barrel two of the same kind and size wads were placed about two inches below the muzzle, and in the left barrel I put one wad down about the same distance from the muzzle, and on top of it some *mud*, crowding it against one side of the barrel so as to leave clear about half the space. The gun was then discharged, and the "obstructions" in both barrels were blown clear without injury to either barrel. The piece was loaded again in the same manner as before, and mud put in the muzzle of each barrel, but a small aperture was made through the "obstruction" in the left barrel. The result of the discharge this time, however, was the bursting of the right barrel, where the obstruction was solid, while the left barrel, in which the obstruction had a small aperture, remained intact. The effect upon the right barrel may be seen in the illustration, Fig. 2. *There was no shot in either barrel.*"

"On different occasions I have fired a rifle when the ball was so tightly lodged about ten or twelve inches from the muzzle that it was impossible to move it with the rammer, and I did on one occasion fire a *ramrod* from a shotgun when the wad had "turned," and thus wedged it in the barrel so that it could not be moved, but have never had a gun burst in my hands yet."

A 30 inch barrel probably has over 24 inches of air space between the charge and the obstruction.

The sudden compression of this air not only wedges the obstruction tighter, which prevents the escape of the air, but will generate an immense pressure, by compression, liberation of latent heat of compression, and the escape of the products of combustion by windage, of from three to four thousand pounds per square inch, before the charge could reach the obstruction.

This great pressure is made up from say 60 or more volumes of air instantly compressed into one volume, which will give about 450 pounds. The heat liberated by this amount of compression is theoretically over 5,000° Fah., which will add a thousand pounds more to the pressure. This is upon the supposition that there is no windage or leakage of the products of combustion of the charge past the bullet or wad, which however is not to be admitted.

The windage during the first few inches of the movement