

trolled them; and as for the assertion that the rioters were composed of mechanics, we utterly deny it. Our mechanics as a body, are notoriously intelligent, thinking men; and because a few laborers from the foundries turned out, or were forced to, by the most turbulent, the whole mob has been characterized as a popular outbreak of workingmen. Men who sweep our streets and dig dirt are not mechanics; and it is a libel on the most industrious class of our citizens to say that they formed any considerable portion of the lawless crowd. The real source from which the rioters were encouraged and recruited, was, and is, the mobs of young men who stand about street corners; without any special means of support they are yet dressed in the extreme mode, talk loudly, insult women, and are an unmitigated nuisance. Why they are permitted to thus congregate is a mystery to all well-disposed persons.

The mob who raged uncontrolled during the memorable week past, have had their counterpart in days bygone in large cities abroad; and the fiendish spirit which animated them has been as savagely exhibited in the past as it was but recently. Atrocities of the most appalling kind, wholesale plunder, and indiscriminate destruction, are necessarily the results of mob rule. Let not the lesson be lost upon the authorities here and elsewhere. Mercy to the riotously disposed, is but an encouragement to them to continue their misdeeds; and the only alternative is to meet force with force, and violence by an unrelenting exercise of the full power of the law. Even yet we are told that the riot is not quelled, but has only subsided; and that upon any attempt to carry out the conscription, all the scenes of the last outbreak will be renewed. These threats will not, we trust, deter the authorities from executing the law to the letter. The thunder mutters in the distance, long after the storm has passed; so the turbulent threaten after their power to injure has left them. Watchfulness and determination are yet imperatively necessary; and if these are exercised we have no fear that any renewed lawlessness will again disgrace our city.

#### EXPERIMENTS WITH BOILING WATER.

Some very remarkable observations on the ebullition of water were made several years ago by Professor Donny of Ghent. An account of these was published, and attracted general attention; especially as it was then stated, for the first time, we believe, that water deprived of atmospheric air exploded at a comparatively low temperature. The attention of Mr. W. R. Grove, F. R. S., having been directed to the subject, he has made a large number of experiments with boiling water, of which he lately gave an account before the Chemical Society of London. He placed a flask containing hot water under the receiver of an air-pump, and arranged in connection therewith a platinum wire, which could be heated to a tolerably constant temperature beneath the surface of the water, by a galvanic battery. When the air was exhausted, ebullition occurred at intervals of about a minute, upon which a burst of vapor would almost eject the contents of the flask. On this action increasing, the water would again become perfectly tranquil, and remain so for a minute, when another tumultuous ebullition would occur, to be succeeded by a period of rest; and the same phenomena would be repeated at such regular intervals, that the apparatus might almost serve as an indicator of time. If a thermometer were placed in the flask, it would be found that the temperature alternately rose and fell some few degrees. Indeed it could not be asserted that the boiling point of water was constant, for it depended upon the amount of air in solution; and Mr. Grove believed that no one had yet succeeded in observing the boiling point of absolutely pure water.

As a proof of the difficulty experienced in entirely expelling the air (or dissolved gas) from water, he cited the following experiment:—A long glass tube closed at one extremity, was bent in the middle to nearly a right angle; the closed limb was then half filled with water, from which, by long boiling, the air was supposed to have been expelled; the remaining space in the tube was then completely filled with olive oil, and the open extremity was dipped into a small basin of the same. Heat was then ap-

plied to the tube until the water boiled, and this temperature was maintained for a considerable time. Each bubble of steam which left the surface of the water passed through the column of oil, becoming smaller and smaller during its ascent; but it never condensed without leaving a microscopic bubble of gas, which at length accumulated to such an extent that it could be examined. It was found to consist of pure nitrogen; and he had never succeeded in expelling the whole of this gas from the water. The evaporation of nineteen-twentieths of the water did not secure the remainder from being mixed with nitrogen. On boiling ordinary water, air containing a slightly increased proportion of oxygen was first driven off, the oxygen gradually diminishing until pure nitrogen was expelled. The avidity with which such water again absorbs air is remarkable. In the expressive words of Mr. Grove, "it sucks it up again almost as a sponge takes up water." By a slight modification in the apparatus, the experiment was repeated with mercury, instead of oil, in contact with the boiling water. It furnished a similar result.

A number of facts regarding the solubility of gas in water were finally enumerated. The general conclusion drawn from the experiments, was to the effect that water had a very powerful affinity for the gases of the atmosphere; that the oxygen could be eliminated by several processes, but the nitrogen resisted all attempts to expel it from solution; so much so that it might be doubted whether chemically pure water (i. e., a compound of the two elements, oxygen and hydrogen, only), had ever been prepared; and further, that ebullition (as applied to water), under all circumstances, consisted merely in the production and disengagement of bubbles of aqueous vapor, formed upon a nucleus of permanent gas. The question, therefore, was raised as to whether nitrogen is so absolutely inert a body as had formerly been supposed?

#### ANTIQUITY OF MAN.

The period of man's habitation on this globe, is a question which has lately attracted much attention, and caused great discussion among scientific men, and in the community generally. Not many years since, the opinion was very commonly entertained, based upon Scriptural chronology, that man first appeared upon the earth about six thousand years ago. The sculptured monuments of primeval civilization, as well as the history of all past ages, seem to supply evidence that man is but a creature of yesterday—a comparatively recent dweller on this sphere. Quite lately, however, some curious and interesting relics of pre-historic races have been discovered, which are received by many men of science as furnishing proof of a much higher antiquity than has been usually ascribed to the human race. It is in respect to these relics that the controversy is now raised. We give a *résumé* of the argument—first presenting the subject as it has been understood geologically.

The various strata which compose the crust of the earth appear to have been formed at different periods of time, under different conditions, and of different materials. In one class of rocks, certain fossils are found; in other strata placed above these, different fossils are discovered; and so the paleontological remains continue to vary in the different strata, from the elder to the more recent formations. Geologists do not pretend to tell the exact ages of these successive stratifications; but it is generally believed that great epochs of time—hundreds of thousands of years at least—were necessary to their formation. The ancient seas, lagoons, and swamps, swarmed with strange creatures—mollusca and reptiles—and the dry land occupied for ages by numerous races of animals which in time became extinct, to be replaced by new and higher creations. Fossils of the elephant and rhinoceros have been exhumed from the chalk beds of London, and the clay beds of New York, among which no human remains were found. And thus the general testimony of geology has been regarded as favoring the view which recognizes man as a comparatively modern denizen of the globe; and that his advent occurred only some six thousand years ago. The later discoveries which militate against this theory respecting which some of our religious periodicals have declaimed with greater zeal

than knowledge, are of a peculiar character. To these we will direct attention in scientific order; leaving the facts to make their own proper impression.

The diluvium, or drift, of geologists, consists of deposits of clay, sand, gravel, boulders, &c., extending over a great portion of the earth's surface—from the Polar regions to about 38° latitude, north and south. At one time these were supposed to have resulted from the Noachian deluge. The formation of these diluvial deposits is believed to have preceded the extinction of the *mastodon giganteus*—the bones of which have been found exhumed from bogs on the surface of the drift, in New York and New Jersey. The diluvial deposit containing these remains has been identified on both sides of the Niagara Valley; where it could only have been deposited—according to Sir Charles Lyell—before the chasm was made in the river. By his calculations, the drift period cannot approach to within 30,000 years of the time commonly assigned for the introduction of man upon the earth.

The facts seemingly opposed to such a view are as follows:—A few years since, M. Boucher de Perthes—a French investigator—while examining the gravel-beds of the Somme, France, which have been considered as belonging to the diluvian period—found a number of rude flint hatchets, and spear and arrow-heads. The publication of an account of his discoveries led to similar searches in England, and other parts of Europe; when many relics of the same character were found, mixed, in some cases, with bones of the northern elephant and other animals, which were supposed to have become extinct before man appeared on the globe. Here was apparent evidence, at least 30,000 years prior to the historic period! But some doubt still hovered over this testimony to the great antiquity of our race, no human remains having been observed with the old flint instruments. Such remains, however, have at last "turned up," M. Perthes having discovered a human jaw in the supposed diluvium near Abbeville, France.

The news of this discovery caused intense excitement among the *savans* of Paris and London: and four deputies from the latter city, viz: Mr. Prestwich, Mr. Busk, and Drs. Falconer and Carpenter went over to Paris on the 9th of last month, for the purpose of holding an inquest on this ancient relic of humanity, in conjunction with five members of the Institute of France. When first examined, it was in the condition in which it was when obtained from the gravel-bed, and was considered to be the jaw of an old man of low stature, of a type similar to the Laplander. After a photograph of it had been taken, it was washed, and sawn through the middle. The walls of the bone, and the single tooth remaining, looked so fresh that some doubt was cast upon the genuineness of the discovery. On the suggestion of the president, the commission proceeded to Abbeville, for their own satisfaction, and examined the deposit where the jaw was found. Old flint hatchets and other instruments were there exhumed before the wondering eyes of the members, many of whom were thus convinced of the reliability of the statements made by M. Perthes. But even this was not received by all the assembled *savans* as conclusive proof of the great antiquity of mankind: a different effect was produced. In a published note on the subject, Dr. Falconer says of this venerable memento of the past:—"The character which it presents, taken in connection with the conditions under which it lay, are not consistent with the said jaw being of very great antiquity." When the subject was brought before the French Academy of Science, M. Elie de Beaumont—one of the commissioners—went further than Dr. Falconer, and stated that in his opinion the gravel deposit where it was found did not belong to the diluvian age at all, but was of a more modern date; and that he did not believe in the existence of man contemporaneously with the extinct elephant and rhinoceros of the diluvian era.

This is the position in which, viewed scientifically, the question of the antiquity of the human family now stands. But whatever the result of such investigations may be, it is a singular fact that no human remains of the ante-diluvians spoken of in Scripture have yet been discovered. This circumstance should lead investigators to pause, and not be too hasty in

attributing such an age as 80,000 years to the relics of our race, whether discovered in the diluvial deposits of France or any other part of the world. We have examined drawings of the old flint arrow-heads of the pre-historic European races, and find that they correspond in similitude to the flint arrow-heads of the living aborigines of the American continent—particularly those inhabiting the regions in the Straits of Magellan.

#### SOME FACTS CONCERNING REPTILES.

Of old, when the waters that covered the earth had subsided, there were, according to tradition and the limited discoveries of geologists, left stranded amid the ooze and mud certain monsters or reptiles which were hideous and repulsive in form. These are said to have been *chelonians* or those belonging to the tortoise family; *saurians* or lizards and *ophidians* or serpents. Reptiles do not undergo any change of nature and are always air-breathers, although cold-blooded; they have neither mammae nor breasts for suckling their young, nor yet hair or feathers. By the two former peculiarities they are distinguished from fishes and batrachians, and by the two latter from mammals or those which do not suckle their young, and from birds. Reptiles breathe air by lungs, like birds and mammals, but the pulmonary circulation is incomplete, only a part of the blood being sent to the lungs; while from the ventricles of the heart a mixed arterial and venous blood is sent to the other organs. The number of species of reptiles is set down at 2,000, or less than that of mammals or birds; most of them are terrestrial, but some, it is said, can sustain themselves in the air. Some reptiles live habitually in the water, swimming by means of flattened fins (as the turtles) or by a thin tail, as in crocodiles; others dwell in subterranean burrows.

Every degree of speed is found among reptiles, and while some are fitted for running over dry sand, others are better adapted to climbing trees or ascending smooth surfaces. The means of defense with which nature has provided reptiles are many, and, although their appearance is sufficient to terrify most animals, yet they are furnished with other safeguards, which render an attack upon them, to say the least, unpleasant. The crocodile and turtle are sufficiently protected against ordinary assaults; the agility of the lizard serves him well, for he darts into his hole at the expense, possibly, of his tail, which is soon reproduced. The great boas can prevail over every foe but man, and the poisonous fangs of other serpents and the bristling spines of the horned lizard are amply sufficient to guard them from the attacks of predaceous and other ill-disposed members of the animal kingdom. Reptiles are very useful to man in various ways; some fulfill the law of their being by catching insects, while still others serve as food, or supply material useful in the arts. The muscles of reptiles are red, though paler than in mammals and birds; they preserve their irritability for a long time after death. Tortoises have been known to live eighteen days after their brains have been removed. Life seems in a marked degree independent of the brain, as they vegetate rather than live; and being comparatively insensible to pain, they grow slowly, live long, and are very tenacious of life. The sense of touch is dull, whether exercised by the skin, toes, lips, tongue or tail; taste must also be dull, as the food of reptiles is swallowed without mastication. Reptiles eat and drink comparatively little, and are able to go a long time without food; most of them are oviparous, their eggs being hatched by the heat of the sun. The young when born are able to provide for themselves, and are generally indifferent to the mother, who has neither the joys nor the sorrows of maternity.

#### THE REACTION.

As was natural under the circumstances, immediately upon the restoration of law and order in this city, benevolent citizens, pitying the abject condition to which the colored population had been reduced, set about raising a fund to relieve their immediate wants, and to see those who were unable to help themselves properly provided for. All classes of our citizens have vied with each other in this act of charity, and men of all political creed,

(among them Hon. Thurlow Weed who generously gave \$500), have nobly responded to the call made upon their generosity. Eminent merchants of this city have made speeches, voted money, and adopted resolutions promising relief and protection to the colored people, who stand in sore need of it. To this material aid, may be added the offers of assistance made by the first lawyers in New York to the outraged and despoiled negroes. The city and county are as liable for damages inflicted on the colored people of this metropolis, as they are for all other losses suffered by our citizens during the late riot, which amount in the aggregate to \$447,100. It is the intention of the lawyers aforesaid to prosecute the claims of any colored person who may desire it, without delay, and without charge. The Produce Exchange have also taken prompt and creditable action in the matter. The sums now subscribed already amount to many thousands of dollars, and there is no question but that the money will be judiciously applied. This energetic and philanthropic action of the merchants and business men of the city, goes very far to redeem the stain cast upon our good name by the infamous acts of the rioters, and the miserable politicians who were concerned in the late demonstration. They will now see, and let them learn a lesson from it if they can, that the majority of the citizens of this metropolis, so far from siding with them in their acts of rapine and murder, instinctively loathe them, and hasten to relieve the sufferings of their poor victims by all the means in their power. The wildest savage that ever existed in Abyssinia would scorn to descend to the depths of depravity exhibited in this city during the late riot towards a helpless people, whose only offence was that their faces were not so white as those of the black-hearted assassins who attacked and murdered so many in our public thoroughfares. The relief extended toward the colored population has also been bestowed upon the families of those policemen and soldiers who died in the performance of their duty. To the bravery of these men we unquestionably owe our present security; and we are glad to learn that nearly \$20,000 have been collected for this most worthy object. The daily press is full of accounts of the courage and efficiency of the Metropolitan Police force; and the high state of discipline which distinguishes it, with the appearance of the men, individually and as a body, amply bear out the encomiums lavished upon them.

#### INTERNATIONAL COMPETITION OF STEAM FIRE ENGINES.

A series of important trials with steam fire engines took place at the Crystal Palace, near London, on the first three days of the present month. The engines were divided into classes, consisting of machines not exceeding 60 cwt. (6,720 lb) in weight, and over 30 cwt.; and smaller engines not exceeding 30 cwt. (3,360 lb) in weight. The premiums consisted of £250, and £100 for the first and second best engines of each class. The conduct of the competition and awarding of the prizes, were under the management of a number of noblemen and gentlemen, the Duke of Sutherland being chairman; and some of the ablest engineers and practical mechanics in England were on the committee, among whom we notice Messrs. Fairbairn, Nasmyth, Maudsley, Crompton, McConnel, and Appold.

The contest was open to the steam fire engines of all nations. Six English, and three American, engines were entered. Shand, Mason, & Co., entered one of each class; as also did Messrs. Merryweather & Sons. Easton, Amos, & Son, entered a large engine; and W. Roberts, one of 37 cwt., which had to compete with the large ones, though about one-third lighter. The American engines were the "Victoria" (large class), and the "Alexandra" (small class), built by the Amoskeag Manufacturing Company, at Manchester, N. H.; and the "Manhattan" (large class), built at New York—belonging to Messrs. Lee & Larned. This fire engine unfortunately met with an accident, from being overturned on the day prior to the trials, by which it was partially disabled, and was unable to compete on fair terms with its antagonists.

Two of the principal objects to be ascertained by the trials were—the quantity of water discharged in a given time—and the distance it could be thrown

by each engine. A set of targets and tanks were prepared for the purpose. These targets consisted of canvas hoods having openings six feet in diameter, with a conduit attached to each, through which the water was conducted into a gaged tank standing below, and from which the quantity delivered within the opening of the target could be read by means of a graduated index. The committee were also to take into consideration the general efficiency of the engines: such as rapidity in raising the steam; the quantity of water delivered in a given time; also the simplicity and apparent durability of the mechanism.

On the first day, five engines of the first class competed; making two trials, and elevating the water into a tank 80 feet in height, through 60 feet of hose. They were to commence when the steam was raised to 100 lb pressure. Shand, Mason, & Co.'s and Merryweather's, were the most successful in filling the tanks in the shortest space of time after the fires were kindled. The "Alexandra" was the American machine which competed on this occasion. Easton, Amos, & Son's engine did well on the first trial; but the former was injured and it was withdrawn. Three engines of the second class competed, in ten trials, on the first day, viz: one of Messrs. Shand, Mason, & Co.'s, one of Merryweather's, and the "Victoria"—American. The engine of the first company filled the tank first on both occasions.

At the second day's trial the ordeal was that each engine should work for two hours without stopping, drawing its supply of water 18 feet, and forcing it through 500 feet of hose, laid up a steep incline to the top of the water cascades of the Crystal Palace. It is stated that the "Victoria" was unable to accomplish this achievement; and that Messrs. Shand & Mason's, and Merryweather's went through with the trial.

On the third day, the engines competed in throwing vertical streams. The "Victoria," it is stated, was not in proper order, and only threw a stream to a height of between 60 and 100 feet; while Shand's engine threw a steady stream to an elevation of 190, Merryweather's 170, and Roberts' 140 feet. A great victory is claimed by the English papers for the English engines; but the committee had not reported nor the prizes been awarded when the steamer which brought this news of the trial left Liverpool. In all probability, their report will modify the florid account given by the London Times.

#### RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list:—

*Gold and Silver Amalgamator and Pulverizer.*—The object of this invention is to obtain a device of simple construction, which will cause a thorough incorporation of the quicksilver with the pulp containing the metal, so as to insure a perfect amalgamation of the former with the latter. To this end the invention consists in the employment of a pan provided with a bottom, having on its inner or upper surface a series of curved plates, so shaped and disposed as to form curved grooves which extend from its center to its periphery, and using in connection with the bottom, thus provided with plates, a rotary muller having similar plates on its under or face side, but placed in a reverse position; said muller also being provided at its edge with spiral flanges and hung upon its shaft by an universal joint. There are also attached to the inner side of the pan, spiral flanges, similar to those on the edge of the muller, but having a reverse position thereto. The invention also consists in the employment of curved plates which are placed in the pan just above the muller, and arranged in such a manner as to be capable of being adjusted higher or lower. By means of the rotary muller and the bottom of the pan, the pulp is made to pass in a continuous current, or flow over the top and underneath the muller so as to insure a perfect or thorough amalgamation of the metal contained in the ore with the quicksilver, while the curved plates are designed to prevent the pulp or ore being thrown out from the pan by the centrifugal force generated by the rotation of the muller. Zenas Wheeler, of San Francisco, Cal., is the inventor of this improvement.