

The Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park Row (Park Building), New York.

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TERMS—Three Dollars per annum—One Dollar in advance, for four months.
Single copies of the paper are on sale at the office of publication, and at all periodical stores in the United States and Canada.
Hampson Low, Son & Co., the American Bookbinders, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.
See Prospectus on last page. No traveling agents employed.

VOL. IX, NO. 5...[NEW SERIES].....Nineteenth Year.

NEW YORK, SATURDAY, AUGUST 1, 1863.

BIG GUNS—WHY THEY FAIL.

We publish on another page a communication from "A Rifleman," in which he indulges in a free criticism upon the folly of attempting the use of Admiral Dahlgren's gun in the reduction of rebel strongholds. There is considerable force in his arguments, and they ought to arrest the attention of the Navy Department. We were assured by a friend of ours who witnessed the reduction of Fort Pulaski, near Savannah, that the rifled guns of Parrott, and James's shells, were far more effective than anything else in compelling the surrender of that stronghold. So terrible was their effect, that an opening was made in the fort large enough to admit the entrance of a storming force, had it been necessary. We are also assured from other sources, that the brave and accomplished General Gilmore, now commanding the siege of Charleston, has declared that he could have taken Fort Pulaski with two of those rifled guns, at one-tenth the cost which attended the attack; and if permitted to arm the iron-clads—or even part of them—with those guns, and shells, he could take Sumter, or any other fort in possession of the rebels. We are also informed that Mr. Parrott offered to furnish, gratuitously, four of his very largest rifled guns (300-pounders); and that another party offered to furnish the James's shell on the same terms, upon condition that two of the *Monitors* should be armed with them for the fight; but that the offer was declined, because Dahlgren insisted on firing his own gun instead.

We do not undertake to vouch for the full truth of these statements; but their truth or falsity can be easily ascertained. We have no idea that the Government intends to neglect the use of the most powerful means at its command to put down rebellion; but we are inclined to think that our amiable Secretary of the Navy is sometimes blinded to the real merits of powerful ordnance, which has not the sanction of those whose axes are continually upon the public grindstone. Admiral Dahlgren, for instance, has long been chief of ordnance of the Navy Department. He is an able and accomplished man; and we hope he may succeed in his attack upon Charleston; but we fear that his prejudices are very closely bound up in Dahlgren's naval gun. It is the offspring of his own brain, and he very naturally cherishes it; but it does appear to us that the Secretary of the Navy might at least have the independence to accept the offer of Mr. Parrott, and allow one or two *Monitor* vessels to have something besides the Dahlgren gun. Let the experiment be fairly tried; and if Dahlgren's gun proves to be the best, its use will be continued; if not, the supporters of the Government have a right to expect that its further use will be dispensed with.

EXPANSIVE WORKING OF STEAM IN MARINE ENGINES.

In ocean steam navigation, the expenditure involved is much greater, proportionally, as the length of the voyage is increased. This is due, not only to the greater length of time necessarily occupied, and the greater quantity of materials consumed: but also to the space required for the materials to operate the vessel, which might otherwise be occupied

by available paying cargo. Thus the coal required for a ten days' voyage, is double the quantity needed for a five day's trip; and as all the fuel must be carried by the vessel, it occupies double space, and necessitates the consumption of more power to carry it. The reduction of the quantity of coal usually consumed in ocean voyages, is a problem to which the attention of almost every inventive mind should be directed; for notwithstanding the numerous improvements which have been made in steam engineering, not a tithe of the heat-force of the fuel under combustion has yet been economized, and transformed into the mechanical power required for propelling vessels. There is, therefore, a large and inviting field presented to inventors, in this direction, for developing improvements. An article upon this subject from the *Engineer* (London), affords evidence of the interest taken in it by European engineers.

SIMPLE LOCOMOTIVE ENGINES.

While visiting one of our large engineering establishments lately, the superintendent pointed to a pile resembling a hay stack, covered with sail cloth, and with a humorous twinkle of the eye, said, "a big thing there." Lifting one end of the cover, he told us to take a look, which we did; but such a combination never before met our gaze. It was a steam-engine on wheels; and was provided with cog-wheels, sectors, bell-cranks, levers, and mechanical devices innumerable, packed as closely together as the works in a watch. Some men are "Jack of all trades; master of none;" and there are some machines designed to do an indescribable number of things, which are good for no one thing. This machine was one of those wonderful contrivances. It was intended to act as a common road engine, steam-plow, saw-mill, and several other things. But it was so complicated in arrangement as to be considered totally worthless for practical purposes; from the frequent leakages and disorder to which it was liable, and the difficulty of managing it properly. Simplicity of mechanism, is one of the great aims of thoroughly practical, common-sense engineers; and, above all other machines in the world, simplicity is most essential to a locomotive engine, either for rail or road. It is quite different from an engine that has a fixed position in a boat, or in a building; being subject to so many concussions and vicissitudes in moving itself. It should be constructed of as few parts as possible; in order to secure simplicity, lightness, and strength. The locomotives called "dummy engines," have been constructed to obviate a most senseless objection, which has been made to simple, common, high-pressure locomotives. The dummy is a condensing engine, which in addition to all the parts of a common locomotive, is provided with a condenser, extra pump, and other devices, involving extra weight, and complex mechanism; simply to make dumb the usual noise of the exhaust in the smoke pipe, while the engine is passing through streets. Every locomotive engineer knows that condensing engines are totally unfit for general railway purposes. Depending upon condensing engines, we never would have had our splendid railway system. The public in town and country should know that the common, simple, high-pressure locomotive, is safer than horses or *dummies*, and is more easily controlled; and that the prejudice against its use upon railways is worthy of the ignorance of the "dark ages."

THE VALUE OF RESEARCH.

Aside from the natural phenomena of the globe, most of the material operations upon it depend on skilled labor, and the intelligent co-operation of the human hand and brain. To-day, the chemist unfolds the secret of some subtle compound, or wondrous dye; to-morrow, the mechanic in his workshop combines anew the wheel, the pulley, and the axle, and from them produces a new and valuable machine. So also with the weaver. He intertwines in his fabric aspirations, hopes, and desires, which seem to tinge the bright pattern he elaborates. These artisans, members of separate and distinct callings, did not obtain their elementary knowledge and skill by intuition: they acquired it by close, untiring study, and continuous research.

At this very moment the earth teems with wealth,

undiscovered, and unknown, only waiting to be brought to light by the industry and perseverance of man. Nature has, locked up in her laboratory, vast stores of riches, which generations yet unborn shall delve and dig for. In one way or another, the natural forces of the globe are continually developing new features useful and ornamental to man. Quite recently have been discovered the beautiful aniline dyes, rivalling those of Tyre in their richness. But lately the Franklinite ore has been discovered,—a metal which bids fair to inaugurate a new era in iron castings. In brief, either new substances, or else ingenious combinations of old ones, are continually brought to public notice.

It is very true that a lucky thought may sometimes occur to anyone, which put in practice, produces a rich reward to the fortunate possessor. In like manner, an idler strolling in the mountains, may stumble on, and pick up a diamond. But, in general, neither fortunes nor diamonds are to be had in this way; and the only sure guide to their possession is through diligent study, and careful attention to a single subject. How often in the history of invention and discovery do we hear of the struggles of an inventor before his ideas are perfected; but how certain and gratifying the reward, when the invention is of unmistakable utility. A man who has a talent for invention is the owner of a mine of wealth if he only works it properly; and he is just as truly a public benefactor in his way as Franklin or Fulton. Even he who invents the deadliest gun, or makes the most impenetrable iron-clad ship, is also humanitarian in principle. The destruction of those engaged in it, tends largely to limit the prosecution of war, and confine its ravages. Men will learn the art of war no longer just so soon as they invent guns or defenses of a kind that preclude the possibility of success to either side. When this occurs, and not till then, shall the races of the earth cease to harass and annoy each other. Inventors, whoever you are, and whatever the product of your ingenuity may be, turn into the Patent Office what you have patiently elaborated; and avail yourselves of its facilities for furthering your interests: thus at the outset making assurance doubly sure, so that no vexatious delay or failure may occur through your submitting an imperfect, or badly constructed model. Your reward is as sure to follow, as the reaper is certain to gather in the product of the seed he has sown, when harvest time comes round.

RIOTS AND MOB LAW.

The recent scandalous exhibitions of mob law which have disgraced the city are now over. The fires of passion are not quenched however, but smoulder. Within the confines of a great city is gathered every conceivable degree of moral worth and worthlessness. Restraint being removed, law being overborne, riot ensues as a natural consequence. The inference is plain; had the same prompt action ensued in this city which was adopted in Boston and other places upon the first appearance of the outbreak, families would not now mourn, property would not have been sacrificed, and the integrity and majesty of the law would have been unassailed. The same spirit reigns to-day that existed two weeks ago, and were the authorities, either actually, or by confession or implication unable to stem the tide of ruin, similar scenes would be re-enacted. The riot was evidently planned before-hand, and carried out upon some basis of co-operation; not effectually, as of course it could not be. In proof of this statement we can cite personal knowledge of inflammatory telegrams dispatched from this city to the towns adjoining, which were pre-eminently calculated to cause trouble, and incite resistance to the lawfully constituted authorities. The panic which reigned here supreme for the first three days, extended also to the rural districts; but was promptly met by the energy of the authorities. It could as easily have been disposed of among us, had not incompetency, or something worse, left the city undefended.

Of the political character ascribed to the mob we say nothing, because words are worse than useless on that head. If there was any deep-seated determination on the part of the rioters to deter the Government from carrying out the conscription, the futility of such a course is fully apparent now. We do not believe, however,—that any such animus con-

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 *resumé* 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