Correspondence.

Electricity vs. Yellow Fever.

To the Editor of the Scientific American:

I have been an observer, since the epidemic of 1853, of certain phenomena for which I am unable to account, not being a scientist; and I will therefore recount my observations for the benefit of others. I have observed that, for some time prior to the breaking out in southern latitudes of the terrible scourge of yellow fever, rains fall, unaccompanied by thunder and lightning. During the prevalence of the epidemic, lightning is scarcely ever seen, no matter how often it may rain. The weather may be cloudy ever so long, yet the rains are not accompanied by the lightning flashes and thunder peals ordinarily common in this latitude (31° N.). When no yellow fever visits this portion of our country, thunder and lightning accompany every rain. There was, about in the middle of September of this year, one peal of thunder heard in this county (Jefferson) and in Stow county, Miss.; and none from then till the evening of October 26 following. We never have a killing frost, that is, one that destroys all the vegetation liable to be killed, till after a rain accompanied by a good deal of lightning. In 1855, in the county of Madison in this State, I remember that, at an examination of a female school in July of that year, there could not be generated a sufficient amount of electricity to perform the simplest experiment with the electrical apparatus. The yellow fever made its appearance shortly thereafter in the town of Canton, and raged terribly.

I have drawn this conclusion from the facts that yellow fever does not prevail when the atmosphere is charged with electricity; and when it does prevail, there is an absence of that subtle fluid. May not scientific men be able to treat yellow fever cases electrically? As to the *modus operandi*, I have nothing to say; but it strikes me as being reasonable that there is some property in electricity antagonistic to yellow fever or the miasm that produces it; and if electricity can and does destroy the germ of that fatal disease in the atmosphere, why may it not do the same in the patient afflicted with the virulent poison?

I make these suggestions hoping that scientific men may give the subject investigation; and if there be anything beyond mere coincidence in the facts as above stated, electrical statistics will be able to verify it, if a call be made upon those whose duty it is in the various localities to note the changes of the weather. OBSERVER.

Fayette, Miss.

Trees as Historians of the Past.

To the Editor of the Scientific American:

It may have taken a French savant years to ascertain what is a matter of common knowledge with wood cutters. I have understood for more than 30 years that a thin ring indicated a cold season, and a thicker one, a corresponding warm season. Another point which I have observed (and which is not mentioned in the Gros article) is this: In trees that are in an open field, or even in the forest where there is no particular protection from the north wind, the rings will be thinner on the north side than on the south side of the same tree. The heart of the tree is very seldom found in the center of the body. I have no doubt that you would find that a tree cut 4 or 5 feet from the ground will give a true record of the general meteorological conditions of each year of its life. I have often sat down by a newly cut stump of a tree, to count the rings, to note the difference of thickness, and to point out the thin rings to those with me, as indicating a cold year.

While speaking of trees, I will mention another fact, which I have not seen in print, but which I got from an old gardener. It is that all trees that are not trained out of natural shape will exhibit a profile in exact correspondence with the fruit. For extremes, take the greening apple and a long slim pear. The leaves, even, have a general resemblance to the fruit. A. M. W.

Bridgeport, Conn.

Snake Poison.

To the Editor of the Scientific American:

With reference to the article published in No. 3 of your current volume, I wish to mention that the poison of the rattle snake (*cobra cascarel*) has been used in this country for about 20 years by several physicians, upon the homœopathic principle, under the scientific name of *crotallus cascarella*, and with very good results, chiefly against neuralgic complaints and against nervous trembling. It is described as a most powerful specific in such cases, and to operate with great rapidity. Th. T.

Pernambuco, Brazil.

Prizes for Scientific Experiments.

The following subjects for prizes to be awarded in 1874 have been proposed by the Batavian Society of Experimental Philosophy:

1. To discover if there exists, in the molecular state of bodies, modifications other than those caused by temperature, which are such as to give for the same body different spectra. The society wishes that this inquiry should bear chiefly on the magnetic condition of bodies.

2. To find out by new experiments if the vapor of water exercises on radiant heat an absorbent effect much more powerful than dry atmospheric air, as Mr. Tyndall maintains; or if there exists no difference in this respect between dry and moist air, as M. Magnus maintains. The society desires that the new experiments which it asks for be conclusive, and enable it to decide between the two opinions.

3. To determine what influence the pressure which is put upon an electrolyte has on electrolysis, and how far in this case is the principle of conservation of energy confirmed. It is wished that this inquiry bear on three liquids at least, to be chosen by the competitor.

4. To determine the resistance of the liquid amalgams of zinc and gold to the galvanic current. Six at least of each of these amalgams, in various proportions, ought to be examined.

5. A prize is proposed for new experiments which will enable a certain decision to be come to on the opinion, advanced by M. Gaugain as probable, namely, that voltaic electricity is propagated by matter, while induced electricity is propagated by ether.

COMPLETION OF THE HOOSAC TUNNEL.

It is with much pleasure that we chronicle the completion of the bore through the Hoosac Mountains, Massachusetts, which work was accomplished on the 27th of November. The back volumes of the SCIENTIFIC AMERICAN contain accounts of the progress of this great work from its incipiency up to its completion, together with engravings of the various kinds of mechanism, that have, from time to time, been employed.

When the Hoosac Tunnel was authorized, no such railway work of equal magnitude had ever been undertaken, and the project seemed almost impracticable, for lack of suitable mechanical means. The method of hand drilling through the mountain rocks, for a distance of five miles, made the job seem almost interminable; and calls were made for the invention of new and special machinery, whereby the work could be expedited. This was in 1858. The ingenuity of the Yankee was not long in responding to the call; and in the course of a few months, the contractors had the satisfaction of setting at work, against the face of the mountain, an enormous machine composed of a great wheel faced with steel cutters, by which they expected, at one operation, to cut a finished tunnel of twenty-five feet diameter in the most rapid manner. But in this they were doomed to disappointment. The machine began its revolutions, and cut its way into the rocks very nicely for a few feet, when it broke down, and gave such evidence of impracticability that it had to be abandoned. The builders lost a large amount of money, and complications followed which practically suspended the work, although, from time to time, up to 1868, some progress was made by hand drilling, and paid for by State funds. Other inventors had in the meantime succeeded in constructing new and improved drilling machinery, of an effective nature, and in 1868 Messrs. W. and & F. Shanly signed a new contract, guaranteeing to complete the tunnel by or before July, 1874. They set vigorously to work, employed the pneumatic drilling machinery, and have now successfully pierced the mountain. Their portion of the work will be finished in advance of the period fixed by their contract.

The work extends from the Hoosic river, at North Adams, Mass., on the west, through the Hoosac Mountain to the Deerfield river on the east; and when completed, will open a new line of railway travel, by easy grades, from Boston and the northerly portions of Massachusetts to the Hudson river.

The tunnel has a length of 25,031 feet. Its dimensions are 24 feet in width and 20 feet in hight above the railroad track when laid, with a central covered drain two feet square. Its form is a rough semicircle, the variation being such as to give greater hight at the sides than could be given by a true semicircle. It has cost, principal and interest, a little more than $12,000,000.

IMPROVEMENTS IN THE VENTILATION OF THE UNITED STATES SENATE CHAMBER.

The Senate chamber is 113 feet in length and 80 feet in width, by 36 feet in depth, which gives 325,440 cubic feet in solid measure. The galleries, coat rooms, and corridor, however, reduce its capacity to 250,000 cubic feet. The proper ventilation for this apartment, where thinking men sit through long sessions and important business is transacted, has been deemed a matter worthy of the most serious consideration. Previous to November, 1870, the Senate hall was ventilated in the ordinary way, and was excessively bad. Persons with weak lungs found it impossible to breathe the poisonous atmosphere for the few hours occupied by the daily sessions, without headache or more serious indisposition. A new system for ventilating this chamber was devised, and has been gradually put into operation by Mr. H. F. Hayden, Chief Engineer of the Senate wing. A description of the old method and the new will perhaps be interesting to builders and designers of public halls.

The apparatus, as first constructed and operated, for heating and ventilating the chamber, worked by drawing in a quantity of external air by means of a fan, and passing it over coils of pipe heated by steam, then forcing it into the chamber through risers and registers in the floor. It was supposed that the impure air would be forced out through the doorways and opening in the ceiling, by the continuous flow of air. No exhausting power was employed to assist in its removal.

The forcing fan for the chamber is 14 feet in diameter, and is moved by an engine of 16 horse power, will deliver 500 cubic feet of air at each revolution, and is capable of being run up to 80 revolutions per minute, which is the maximum velocity for summer ventilation. But owing to defects and contraction of the main air channel and the various avenues for ingress of air, the quantity of fresh air demanded for healthful ventilation could not be supplied without producing powerful currents on the floor. Therefore the speed of the fan had to be reduced accordingly, which gave only about one fourth the quantity of pure air required. The first improvement was the introduction of two large fans in the basement, and an engine of 25 horse power to operate with them for the removal of vitiated air at the ceiling, by exhaustion. The fans referred to are capable of removing 30,000 cubic feet of air per minute, when run at ordinary speed. The vitiated air is drawn through the perforations in the ceiling into the illuminating loft above, then through two descending shafts into the exhaust room, and discharged by the fans into an ascending one leading to the open air. The capacity of the descending shafts is 36 superficial feet Both the descending shafts and the ascending one are of equal capacity. It will, therefore, be seen that, if the supply of pure air had been equal to the amount that could be removed, the entire atmosphere in the chamber would have been changed once every ten minutes. But the pressure of the air in the chamber was reduced on account of an insufficient supply, and the impure air from the surrounding corridors was drawn in through the doorway to make up the deficiency. A new air shaft of ample dimensions has been constructed, leading from the heating chamber in the basement to an air space under the seats in the galleries. The seats and risers of the same have been freely perforated, so that nearly three fourths of the supply will enter without causing injurious currents. This air can be tempered independently of that for the floor, so that, when the chamber is crowded, the temperature can be regulated to any degree desired. Another improvement is in the construction of a vaporizing apparatus in the main air duct, by which the proper amount of moisture can be added to the supply of air, after it has been heated, and the amount of moisture is regulated by hygrometers placed in the chamber. The inlet for fresh air for the hall was located between the wing and the old Capitol. Coal gas and smoke from the flues above were often forced down by counter currents, and carried into the chamber by the supply fan. At the suggestion of the engineer, a resolution was offered in the Senate last winter to extend the inlet from the Senate wing to the Western Park, a distance of 220 feet. An appropriation was made for the proposed improvement, which will be completed before the meeting of Congress. The air for the chamber will then be drawn from the level of the Western Park into a clean passage, coming in contact with nothing that can vitiate its purity until it has performed its functions of ventilation. It has been fully determined, by experiment, that with the present arrangements 30,000 cubic feet of pure and well tempered air can be supplied per minute, and ample provision be made for its diffusion: which is 25 cubic feet per minute for each individual, assuming the number of persons in the chamber to be 1,200. The efforts that have been made within the past three years by the engineer to improve the ventilation of the Senate chamber, have not been based on theory alone, but on well established principles, which experience and observation have rendered necessary.

The improvements here referred to will be readily understood by referring to page 73 of our last volume, where a diagram of the Capitol, in elevation, is given.

THE USES OF NICKEL.

The manufacturers of the alloy known as German silver have recently submitted a petition to the Parliament of the German Empire, praying against the introduction of nickel money into that country. They state that the cost of nickel has increased at the rate of from one to three dollars, and that German silver in a single month has gone up nearly $12 per 220 pounds. In England, the price of the metal in one year and a half has risen from one to four dollars per pound.

Although but a short time has elapsed since nickel has attained any important position in the industrial arts, it is already a fact that the demand is considerably in excess of the supply. The annual production may be roughly estimated in the neighborhood of 600 tuns, of which aggregate English industries alone, it is stated, use fully one half. It is used as money in this country, Belgium and Switzerland; and hence it is argued, with much truth, that if Germany should decide to issue a similar coinage, the necessary drain upon the supply would seriously affect the manufactures in which nickel is employed. It is very probable that abundant uses could be found for quantities far exceeding the amount now produced. In its resistance to tensile strain it is nearly one third superior to iron, a metal which in many respects it has similar features, while it is much less subject to oxidation in air or water. German silver, as is well known, is nothing more than brass to which one sixth or one third part nickel is added, in order to give the alloy the color of silver and at the same time a superior resistance to the action of various chemical agents. The alloy is superior to copper as a basis for silver-plated ware, as, when the deposit of silver wears away, it does not expose a red or yellow metal beneath. German silver has also been lately used as a deposit upon other substances; an employment to which it bids fair to be largely devoted.

The increasing demand for nickel will doubtless stimulate research for new deposits; but until such are discovered, it seems desirable that the metal should not be used for coin. Some idea of its rarity may be obtained by comparing the production as above given with the amounts of other metals. Thus copper, for example, is mined to the extent of 65,000 tuns per year, and the iron production, it is said, reaches the enormous aggregate of 10,000,000 tuns in the same period. Platinum is obtained probably in smaller quantities than any metal in industrial use, only about two tuns being the yearly yield throughout the entire world.