tion—apparently by diminishing the resistance of the liquid. If, too, we increase the quantity of the dissolved metallic salt, we get more than a proportional increase of deposited metal. Thus, in an experiment made with the different strengths of nitrate of silver on the table, the following results were obtained in ten minutes, all the circumstances being the same except the strength of the solution: 1 per cent solution dissolved ·025 grammes copper; 2 per cent dissolved ·078 grammes, and 4 per cent dissolved ·224 grammes.

In fact, it had been found that, in solutions not exceeding 5 per cent, twice the amount of nitrate of silver dissolved in water gave three times the amount of chemical action; and this was true with other metals also in weak solution. It is likely that this is not the precise expression of a physical law, but it agrees at least very closely with the results of experiment.

The power arising from this action of two metals on a binary liquid may be carried to a distance and produce similar decompositions there. This is ordinary electrolysis. Metals have been crystallized from their solutions in this way, and Mr. Braham has made excellent preparations of crystalline silver, gold, copper, tin, platinum, etc., by using poles of the same metal as is intended to be deposited upon them. The forms thus obtained are precisely analogous to those produced by the simple immersion of one metal into the soluble salt of another, and illustrate still further the essential unity of the force that originates the two classes of phenomena.

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

A Plea for the Classics.

To the Editor of the Scientific American:

In your issue, dated May 25, I noticed, in an article entitled "How to Conduct Scientific Investigations," this sentence: "Not only are physics and mechanics more pleasant studies than Latin, and chemistry more interesting than Greek grammar, but we assert that a man may make more money, by applying a mere superficial knowledge of these sciences, than by a much more profound knowledge of the dead languages." From the above, one would draw the conclusion that money making was the chief end of man. If that be so, perhaps the writer is correct. But man was born for a higher purpose than the simple attainment of wealth. I maintain that every man who comes into the world was put here to make humanity better for his being in it, and not only for his own aggrandizement; and he who fails in this, fails to do his duty. Society demands some benefit from all, in order that it may advance. And fine literature will cause this advancement. I challenge any man to bring forth writings on any scientific subject whatever, chemistry or botany, natural history or mineralogy, and in them will be found derivations from the dead languages. Ask any eminent lawyer what advantage he has gained from the study of Latin and Greek; the universal answer will be "almost every thing." Look at his law books, and you will find nearly every alternate word to have derivation in the ancient languages Although I do not wish to depreciate Mr. Bryant's translation of Homer, yet I assert that no one can fully appreciate the work until he has read the original Greek. A man may have the most "profound knowledge" of any science, and yet it would be almost impossible for him to deliver a lecture on that subject and not make some stupendous grammatical mistakes, provided he is ignorant of the classics, thereby making himself the laughing stock of the community. Not long since, a case came under my personal observation, in which a young man who never had looked into an English grammar, yet had a tolerable knowledge of the classics, was placed in an examination on that subject (English grammar), with several who knew nothing of Latin or Greek, but had always studied English; the consequence was that the one understanding Latin passed better than three fourths of the rest. This only goes to prove how utterly dependent our own language is on the classics. When a boy or girl is striving to obtain an education, he or she should not only study what will be of practical utility, but what will prepare the learner for the battle of life. The study of these languages gives the brain a thorough drill that can be obtained in no other manner; it compels the mind to think, and think correctly; to rely on its judgment, not on its memory; whereas mathematics and natural sciences give exercise only to the latter, which, too often, is fickle. Step into the Senate chamber of the United States, count the noses, and you will find that a majority of the members are classical scholars and college bred men. From the foregoing remarks, no reasonable man can fail to see that, while the sciences have their uses, they are still dependent upon language for their elucidation. And granting that more money may be made by their immediate use, nevertheless the classics lend influence to the "pen," which rules the world, and which, as all men know, is more "powerful than the sword." In conclusion, allow me to quote the memorable passage of Cicero: "*Idem ego contendo, cum ad naturam eximiam atque illustrem accessit ratio quædam conformatio doctrinæ, tum illud nescio quid præclaram ac singulare solere existere.*"* G. L. F.

Testing Turbines.

To the Editor of the Scientific American:

As a well written communication by Mr. A. M. Swain, in the SCIENTIFIC AMERICAN of June 1st, on the subject of turbine wheels, pointedly alludes to a short article of mine, on page 228 of the current volume, and somewhat misconstrues me, I beg to say a few words in reply, not defensive, for my impression is that such are not needed, nor controversial, for I have not the time even if you had the space.

The inference seems to have been formed that the test of which I spoke was made in raising water. I did not intend to say this. I suppose in every test, if its commercial aspect is to rule, the water discharged, time, and the net result, are the elements of calculation. In this case, the head was 110 feet, the water discharged by the hydraulic engine—not a ram—about 42 per cent of what the turbine used for the same work in raising a weight. If there is a more simple method, a more accurate one than this, I would like to know it. In Mr. Swain's communication, overshot wheels are instanced. I propose to follow them up as proof. If an ordinary over shot receives pressure earlier than at 45° away from a vertical line through its shaft, it discharges it enough earlier, than at the corresponding angle below the shaft, to render it next to certain that the full weight of the water utilized cannot be greater than what is due to the capacity of the buckets between these points. This quantity would be represented by the 90° remaining between them, or 50 per cent of the weight of water the buckets would contain if the whole diameter of the wheel were effective. How then could 70° of the discharge be raised to its head, even if taken from the tail-race? And much less could it be done if taken from a mine.

There is, doubtless, some "inaccuracy" about the process. A parallel holds good as between an overshot wheel, using about 90° of its circumference, and a hydraulic engine. In each, if the instrument is withheld from movement, the power is retained; but with a turbine, a forcible total stop page only checks the flow, and power is lost. If in the most approved turbines, 8 per cent of water under pressure is intentionally freed, is it not done to give the best effect to the balance? And if so, does it not go to show that my use of the word "speculation" was not loosely taken?

This loss by a turbine, I hold to be a fair representation of the disparity between the two systems; but it is very much understated in the 8 per cent; and the 12 per cent is demanded as a reasonable allowance for other things. Wherever allowances are asked, that have not been, perhaps cannot be, proved to be precisely right, I must still call them speculation. Only the weight of the water can be used as power, and a turbine does not use the whole. I cannot say that 86 per cent of the power of water upon an overshot wheel has not been utilized, but I am incredulous for the reasons stated, even though the buckets were made to trip, after a vertical passage the distance of the diameter of the wheel. Your correspondent, in speaking of the test I suggested, to wit, that of forcing back to its head as much water as the power would raise, has apparently overlooked the allowance I proposed for every necessary mechanical obstacle. This allowance need not complicate the process; the difference between the quantity discharged and that replaced would measure the exhaustion of power; then if the "necessary obstacles" were or could be measured, and added to the replacement effect, raising it to its original condition in the reservoir, my case would be lost. I have no arguments against turbine wheels; they are excellent devices and are doing immense service; but I only do not believe that they have ever used the percentage of power claimed. R. H. A.

Baltimore, Md.

The Cherokee Tribe of Indians---A Subject Interesting to Antiquarians.

To the Editor of the Scientific American:

If I am correct in memory, it was near twenty years ago when I met with Henry E. Colton in Macon county, North Carolina, and his business seemed to be an inquiry after the ancient relics, as well as traditional history, of the former inhabitants of the country, to wit, the Cherokee tribe of Indians. Mr. Colton directed one enquiry to myself: "What could have been the intentions of the Cherokee Indians in building so many large earth mounds that were met with in the low grounds of these mountain valleys?" My reply was that "the Cherokee tribe of Indians disclaimed all knowledge of the origin of those earth mounds, as well as the purposes for which they were built; and, furthermore, that I had evidence, satisfactory to myself, that these mountain valleys had once been inhabited by some race of people antecedent to their occupancy by the Cherokee Indians; and that this fact I inferred from the wide diversity in form, material and quality of their pottery, as well as their edged or cutting utensils, but more particularly as regarded their mode of sepulture, which, in all races, is permanently fixed; and in pursuance of this subject, I related to Mr. Colton the following incident: After the Cherokee Indians abandoned the country in the year 1821, I, in a spirit of romance, became a small farmer in a wild and picturesque valley in the country the Cherokees had left; and while plowing, in a low ground or bottom fields, in passing over a certain spot the plow produced a rumbling hollow sound, and this led to digging—rather scraping away the earth—in quest of the cause; at the depth of fourteen inches I met with charcoal, and then a clay slab that had been so highly indurated by burning that it had the hardness of a brick. An effort was made to take this slab up entire, as it was but seven feet in length and four in width; but this we failed to do, as it broke in turning it over. But what was our astonishment to find, on the reverse or under side, the complete cast of a human body, not a vestige of which was to be found! From all the appearances, the opinions I formed at that time (and these opinions have not changed) were that at some remote point in the world's human history, some peculiar race of people inhabited this country, whose mode of sepulture was to place the body of their dead in a shallow grave in a nude state and on its back, with the limbs extended at full length, cover it with soft clay mortar, pile wood upon it and consume the body with fire. Furthermore, the problem was suggested: May it not be that this race, so far back in the history of man, were the mound builders? In my farming, I found but two other of these burnt clay sepulchres. All of these facts I narrated to Mr. Colton, and about thirty years after their discovery, and after the abrasion of time and the wear of the plow share in farming my lands had reduced these casts in the clay slabs to fragments.

For the first time after the delivery of the above narrative to Mr. Colton, I met with him at a Cherokee Indian ball play, and this was in the year 1860; and he addressed me, as I then thought, somewhat rudely, in these words: "Mr. McDowell, some years ago you described to me some peculiar Indian sepulchres you had found in your fields—have you, since then, discovered any more of these?" My reply was "I have not." He rejoined: "The reason why I now name this subject is this: I published your narration, and archæologists and antiquarians give no credit to your story, because, they say, it is contradictive of all the modes of sepulture yet discovered among the various tribes of Indians on this continent, and it is due to your reputation as a man of truth to find and exhibit one other of these sepulchres." I was wilted by Mr. Colton's words and manner, because, not knowing for why, I felt as though I were half a villain. I made him, I fear, an unmannerly reply that was more practical than pious, and have not seen Mr. Henry E. Colton since, nor have I searched for another sepulchre for the purpose of redeeming my lost reputation as a man of truth.

And yet a kind Providence has saved me, from going down to my grave disgraced, in this way: The 16th day of this month was the recurrence of my seventy-seventh birthday, and a team of oxen were pulling a deep running plow through my field, when the point of the plow struck upon the side of one of these burnt clay sepulchres and rent from it a small portion of an arm. I had the plowing stopped, and the locality marked, and it shall remain intact until some scientific individual arrives who can superintend the delicate process of raising the sepulchral slab without injury to the cast of the human figure impressed upon it. I have intrusted the procurement of the proper man to direct this delicate operation to Colonel C. W. Jenks of St. Louis, now superintending, for the American Corundum Company, the working of the Cullasajah corundum mines in this county.

Franklin, Macon county, N. C. SILAS MCDOWELL.

P. S. Since the 25th inst., when Colonel Jenks and myself conversed publicly on the above subject, eleven of these sepulchres have been reported to me, found in different localities. S. McD.

Do Snakes Charm Birds?

To the Editor of the Scientific American:

In taking a morning stroll by a board fence, I discovered a cat bird fluttering along on the edge of the top board, which was about one inch in thickness; and walking closely up to it, say within four or five feet, I discovered a black snake, about four or five feet long, lying well balanced on the edge of the top board. Neither the bird nor his snakeship seemed at all disturbed at my proximity; but the former, crying and with hanging wings, would advance and retreat, each time seeming to approach nearer to the glistening eyes of its charmer. My sympathy was at once aroused for the bird, and fearing that in its next advance it would be taken captive, I took off my hat and held it on the fence about two or three feet from the snake's head "to break the charm;" but to my surprise, as before, here came the bird towards the hat; it flew over it and lit on the fence near to the serpent's tail. I then armed myself with a cudgel about two feet long, and stepped back about a rod from the parties to observe strategic movements. The bird continued the same movements at the tail which it had done at the head, advancing and retreating, drawing nearer each time, until finally it lit on the tail, then off on the fence, still fluttering, chirping and crying. His snakeship did not seem to fancy an attack in the rear, and slowly lowered about one foot of the tail end, and let it hang down the side of the board. The bird, encouraged by this move, again and again lit on the back part of the body toward the tail and once struck it with its bill. The snake not being able to turn its head back and keep its balance on so narrow a base, it retreated from the bird, coming towards me (it seems that I was not worth its notice), moving slowly along until it reached the post, passing it far enough for the middle of its body to rest on the post. I began to think that it had given up the chase; but not so, for, with all the wisdom of the serpent and the calculations of a civil engineer, he turned his head, doubling himself until his head was within about six inches of the end of the tail, head slightly elevated, and seemed to say: "Now, birdie, come on." Sure enough, it came, fluttering and crying as before. I advanced to within about three feet of the snake, stick in hand, ready for the "clash of arms." The bird approached so near before retreating, I feared to let it advance another time, and immediately made battle in its behalf, and so slew the "sarpint." A darkey, witnessing the conflict, took the snake, saying: "I will hang him up wid his belly to de clouds to make de rain come." And now I cannot tell whether or not a snake can charm a bird; can you? H. L. EADES.

South Union, Ky.

The Nebular Hypothesis.

To the Editor of the Scientific American:

Your comments on the "Nebular Hypothesis," page 345, current volume SCIENTIFIC AMERICAN, are very interesting, but I differ from you. I am confident that the equatorial zone cooled first and that the mighty force of that shrinking belt was resisted by no other force. The central mass was

*Similarly, I assert that when reason adds, to an exceptional and enlightened nature, some system of education, the celebrity and distinction that there may lie in is unknown.—*Eds.*]

too light and powerless; we cannot rotate an infiated bladder and burst it by the weight of air contained therein, as the air would escape through the pores of the bladder, but we can burst it by the weight of the bladder itself.

If any portion of the nebulæ was left behind, it was the lighter portion, which, owing to that irresistible shrink, spiralled to either pole and like smoke from a pipe streamed on the solar orbit. True, the action of gravitation would be greatest at the poles, but the spiral would reduce it to a minimum, as in a jack screw. Nebulous rings could have formed in no other manner; spheres could have been formed by shrinking belts. TIRE.

Paris Green and Potato Bugs.

To the Editor of the Scientific American:

Much has been said, and a great deal written, concerning the use of Paris green for the destruction of the potato bug. Many advise the use of it dry, mixed with flour. Last year, I tried another way, which I think is safer and cheaper; and it proved very effectual. As it may be a benefit to many, I give it as follows:

Take one large table spoonful of Paris green and mix it with ten table spoonfuls of flour. These must be mixed very thoroughly, till the mass is of one shade ofc olor throughout. Take of this mixture, two table spoonfuls, and put it into a gallon of water. Stir this till it is all well mixed through the water, and stir it occasionally to keep it from settling,—for if it is not kept stirred, it will settle. Put the water thus prepared into a sprinkler, and apply when the plants are dry and the larvæ are at work. In a very few minutes, the larvæ will have gone to "that bourne whence no traveler returns."

The liquid applied this way, twice or three times during the season, will be sufficient to protect the plants. Used in this way, while it will destroy the insects, there is no danger of its hurting the plants; nor does sufficient go into the ground to do any harm. X. PERRY MENTOR.

Sans Souci, Ohio.

THE NEW STATE CAPITOL AT ALBANY, N. Y.

After three years labor, and at a cost of two millions of dollars, one third of the new capitol at Albany, the design for which we illustrated on page 242 of Vol. XXIII., may be considered complete. The foundations are laid, and the water table, and four feet of the first story walls, is in position.

The structure covers about three acres of ground, its width being three hundred feet, and its depth, four hundred. The cellar is excavated 26 feet and its floor is covered with a solid bed of concrete four feet in thickness. On this rest the piers of massive brickwork which, surmounted by groined arches, bear the weight of the structure. Long vaulted passages are thus formed which, intersecting each other, traverse the entire cellar, some leading to apartments in the corners of the building, others to the large hall in its center. The last mentioned division of the cellar is designed for an engine room, and is to contain four large furnaces and two engines, to be used for warming and ventilating the edifice. The ceiling of this apartment is, like those of the passages, formed of groined arches. These are 20 feet high, their spans varying from 11 to 20 feet, and are considered the finest specimens of masonry of their kind ever constructed.

The foundation of the main tower is the heaviest piece of solid stone work in the building. It is pyramidal in shape, its base being 150 feet, and its top, 80 feet square. It is sunk six feet below the surface of the cellar, and its extreme strength is necessitated by the immense superincumbent weight of tower which will be constructed entirely of stone and iron, and will reach a hight fifty feet above that of the dome of the Capitol at Washington.

The exterior foundation walls are 20 feet thick; their lower courses are built of a species of blue limestone of great hardness, obtained in Essex county in this State. The upper portions, which are more liable to be affected by frost, are constructed of Saratoga granite, and the lintels, of a very coarse granite from Fall River. The water table is built entirely of Dix Island granite, the company supplying that stone having had a contract to employ it exclusively in that part of the structure. On the completion of the water table and the consequent expiration of the Dix Island Company's contract, new proposals were invited from other quarries to supply the stone for the rest of the building. Sixteen competitors entered, and, in the end, the work was awarded to a company in Yarmouth, N. H., who agreed to furnish the stone at 75 cents per cubic foot delivered at Albany. It seems, however, and the fact will account for the delay in the progress of the work which the daily press have lately made the subject of unfavorable comment, that the Yarmouth Company failed to carry out their contract, sending only some eighteen or twenty carloads of stone around by land at considerable expense. The Keene quarry, of Keene, N. H., offering to supply their stone at 85 cents per cubic foot, the commissioners have agreed to take the balance of the material from that source.

Of these three varieties of granite—the Dix Island, the Yarmouth, and the Keene—the Dix Island is much the coarsest in texture; the Yarmouth and Keene stones resemble each other very closely, both being white, fine, and hard. The Keene, however, is found to be slightly the most brittle under the cutting tool.

The stone is quarried in enormous blocks, some weighing as much as thirty tuns. They are so cut as to make all the angles of the building solid, or, in other words, there is no angle on the outside of the building where two stones meet and form a joint. The manipulation of these ponderous masses was, of course, at first a matter of no slight difficulty, but lately a form of derrick has been devised by which they can be raised or transported from place to place with the utmost facility. The apparatus consists of a heavy platform mounted on trucks and resting on a track, the rails of which are some sixteen feet apart. On this platform is a ponderous crane, secured by strong wooden stays. To the crane, heavy tackles are attached, the falls leading to a hoisting apparatus worked by a five horse power engine, situated on the rear end of the platform. This engine, being geared to the wheels of the latter, supplies the motive power; so that a stone can be lifted by the crane and the whole machine moved bodily to any desired point.

Seven hundred men are now at work upon the building, the majority being engaged in cutting the stone, which is supplied in the rough, into the required forms. Two large sheds serve as workshops, movable derricks running on tracks transporting the stones to any required locality. The work is systematized with the greatest care. Each man is required to work his stone through from beginning to end. The stone is numbered and the work measured, so that it can readily be seen whether the full day's work has been properly performed or not. The hands are paid by the hour. They struck some time since on account of some workmen from another State being put to work with them, and at the same time demanded $4.50 for eight hours work. A short time had elapsed, however, before the union in this city informed them that it could support them no longer, and consequently they compromised at 45 cents per hour, and signed an agreement to find no more fault either in their wages or in the fact of non-union men being put to work with them. When the present excitement commenced, a committee endeavored by threats and other means to induce another strike, but on the wages being raised to 50 cents per hour, the men declared themselves satisfied and refused to resort to any further coercive measures.

A Monster Cannon.

The Russian government has lately constructed and tested an immense smooth bore cast iron cannon, made after the method of the American Rodman guns. The *Engineer* says that the weight of this weapon in a finished state is 44 $\frac{2}{6}\frac{2}{2}$ tuns. The weight of the projectile to be employed—a cast iron spherical one—is 900 lbs. In trying the gun, in all 313 rounds were fired, the normal charge of prismatic gunpowder being about 117 lb. The experiments of firing were conducted on the river Rama, the high bank across the stream serving as a butt, which was at a distance of about 1,400 yards of the gun. The weapon was placed under an iron plated covering of a peculiar construction. On the discharge of the piece, the concussion of the air was so great that in the village of Matoriloro, situated at a distance of one third of a mile, the chimney stacks fell in when the wind was blowing in that direction. The sound itself, although loud, was not deafening, and persons standing even under the iron plated covering were able to support both the noise and concussion of the air. The iron gun carriage weighs 6$\frac{1}{2}\frac{1}{2}$ tuns. The breech of the gun is elevated and depressed by means of a screw ratchet key. For facilitating the running forward of the gun, a system of cog wheels is introduced, and for the diminution of the recoil and the hoisting of the charge and projectiles, special appliances are provided. The moving of this enormous mass of iron can be effected easily by three men.

After the introduction into the military art of rifled cannon, the conviction became established of their unconditional superiority over the smooth bores. As regards guns of small caliber, this opinion may very likely be correct; but with respect to naval guns of the largest calibers, it would be difficult to give the preference either to the one or the other system. Without going into particulars of the merits or demerits of the one or the other description of weapon, we will point to one important difference in the effect of the spherical projectiles of the smooth bores and the oblong ones of the rifled guns; the latter will hit an iron plated target at a greater distance than the former, and, so to say, pierce it through; on the other hand, the former will produce a far greater amount of concussion, shaking loose the rivets of the plates and bolts of the target, and bounding on the plates and cracking them. Besides the difference in the destructive action of these weapons, there is an enormous difference in the cost of production. Thus, for instance, according to a statement of Mr. Grasshof, the price of a 20in. smooth bore gun will be, when produced in quantities, about $8000, whereas an 11 in. steel rifled piece corresponding to the same could not be produced under $30,000.

New Fishing Smack.

A marine novelty worthy of attention was lately exhibited in Glasgow. It was a model of a welled fishing craft, 4ft. long, with 19 in. beam, clinker built and neatly finished The exhibitor was Mr. Dempster, of Kinghorn, who is well known for his advocacy of deep sea fishing, and who proposes to convert ordinary open decked fishing smacks into well decked boats, by laying a well caulked deck or flooring from stem to stern, at a hight of 2½ft. from the keelson, the space beneath this deck forming the well, which is filled with sea water from several small circular holes in the bottom of the boat. At a hight of 5ft. or 6ft. above the well deck there is another deck, which rises to within a foot of the gunwale, and which, being water tight and comfortable, is adapted for the quarters of the crew. Mr. Dempster has proved the advantages of this style of fishing craft by actual results in practice; and he claims for his system the advantage that, no matter what seas the boat may ship, it is impossible for it to be swamped, as the water immediately makes its way out at the bottom.

New Theory of Atmospheric Electricity.

A correspondent, Mr. G. Wright, of Rock Falls, writes as follows:

"The earth is surrounded by an electrical atmosphere which is subject to the law of gravitation, and is consequently more dense near the surface of the earth, and more rare in the higher regions. All the phenomena of electricity are due to the disturbance of this electrical atmosphere, in connection with the resistance of different substances to the passage of the electric fluid. When any substance has more electricity than another substance near it, it is in a positive or charged condition; when it has less, it is in a negative condition, and the attraction which negative substances exhibit for the positive is only the tendency to restore the equilibrium.

If a bladder be filled with air near the surface of the earth, and then elevated to a considerable distance, the confined air will burst the bladder and escape, because the atmosphere which surrounds it in these higher regions is of less density. So if a metallic ball, having the electrical condition natural to the surface of the earth, be suddenly elevated, its natural electricity becomes a charge, which may be drawn off by a spark. This fact can be demonstrated, on a still day when the air is free from moisture. Now, what better evidence do we want to prove that the earth is surrounded by an electrical atmosphere, more dense near the surface of the earth, and that the charge on the ball which was elevated is due to the lesser density of the electrical atmosphere which there surrounds it? When we add to this the chain of evidence which results from the explanation, of electricity in the clouds, the causes of *aurora polaris,* the daily variation of the magnetic needle, and every other electrical phenomenon, on this hypothesis, the proof is as positive that the earth is surrounded with an electrical atmosphere as that it is surrounded with an aerial one. I have spent several years in experiments and observations to demonstrate the truth of this hypothesis, and upon it to establish a theory that shall be applicable to all electrical experiments and phenomena, and am astonished at the facility with which all questions pertaining to this subject can be solved."

Refractory Clays.

Bischoff finds that the analysis of a clay gives a distinct indication as to its power of resisting extreme heats. The temperatures were measured by keeping the clay at a white heat till wires of iron or platinum were fused. The value of a refractory clay is found by the proportion of the alumina to the fusible matter, and again by that of the alumina to the silica. The more alumina a clay contains in proportion to the fusible matter (iron, alkalies, etc.,) the more refractory is it. Silica, on the contrary, augments its fusibility. Of two clays containing alumina and fusible matter in the same proportions, that which contains least silica is most refractory. Save in certain determinate cases, the clays containing alumina, silica, and fusible matter in equal proportions have an equal power of resisting fire. If we give to clays the general formula—$m\,Al^2O^3 + n\,Si\,O^2 + RO$, the degree of resistance to fire is measured by $\frac{m}{n}$. The higher the value of this fraction, the more refractory the clay.

PUT UP YOUR JAM WHILE HOT.—It is said that ordinary jam—fruit and sugar which have been boiled together for some time—keeps better if the pots into which it is poured are tied up while hot. If the paper can act as a strainer, in the same way as cotton wool, it must be as people suppose. If one pot of jam be allowed to cool before it is tied down, little germs will fall upon it from the air, and they will retain their vitality, because they fall upon a cool substance; they will be shut in by the paper, and will soon fall to work decomposing the fruit. If another pot, perfectly similar, be filled with a boiling hot mixture, and immediately covered over, though, of course, some of the outside air must be shut in, any germs which are floating in it will be scalded, and in all probability destroyed, so that no decomposition can take place.

HYDROFLUORIC ACID.—Mr. A. P. S. Stuart remarks that every one who has prepared hydrofluoric acid knows that sulphuric acid and fluor spar form an exceedingly hard rock-like compound, and that it is very difficult to remove this from a platinum retort. This inconvenience may be avoided by mixing with the fluor spar about an equal weight of gypsum and the proper quantity of sulphuric acid. After the hydrofluoric acid has been expelled by heat, the mass in the retort is found to be of a pasty nature, and is easily removed by water.

FATHER CLEVELAND.—Charles Cleveland, a respected clergyman of Boston, Mass., widely known for his useful and faithful labors, died recently in that city, at the remarkable age of one hundred years—less sixteen days. He retained his faculties up to the moment of his death, and continued in the exercise of his peculiar ministrations as city missionary until within a few weeks. After attaining his majority, he spent forty years in mercantile pursuits. His work for the past forty years has been remarkable. He devoted his whole time to ministering to the poor, and his labors were highly appreciated.

STRETCHING OF CHAINS.—Professor Trowbridge, of Yale College, has stated that at the Novelty works, N. Y., he once made a chain one thousand feet long, to be used for pulling a load of ten tuns up an incline five hundred feet long and one hundred feet high. In one year he took out, little by little, sixteen feet of slack caused by stretching. The chain got stretched out in time, though, and then did not alter.