Carolina Clay Eaters.

A short time ago Dr. Frank H. Getchell, of 1432 Spruce Street, Philadelphia, went on a gunning expedition to North Carolina. His quest for game led him into the wild country back of Salisbury, which is inhabited, for the most part, by a miserable race of beings with only just enough energy to eke out a wretched existence. These creatures are nearly all veritable living skeletons, and with few exceptions are addicted to the habit of clay eating.

While shooting wild turkeys and other game in this wild region, Dr. Getchell made an incidental study of this peculiar habit or vice among the inhabitants. It is a mountainous country, and in the spring little rivulets start out from the caps of snow on the mountain, and as the days grow warmer, the little rivulets become torrents, and great washouts are made along the mountain side.

The soil is of a heavy, clayey nature, but there are strata of clay that is heavier than the rest, and when the water rushes down, this clay is formed into little pellets and rolls and accumulates in heaps in the valley. These little pellets and rolls are what the clay eaters devour with as much avidity as a toper swallows a glass of whisky.

"Among the poor people of this section," said Dr. Getchell, "the habit of eating clay is almost universal. Even little toddlers are confirmed in the habit, and the appetite seems to increase with time. While investigating the matter, I entered a cabin occupied by one of these poor families, and saw a little chap tied by the ankle to the leg of a table, on which was placed a big dish of bread and meat and potatoes within easy reach. The child was kicking and crying, and I asked his mother why she had tied him up. She replied that she wanted him to eat some food before he went out to the clay, and he refused to do so. The woman confessed that she ate the clay herself, but explained that the child's health demanded that it eat some substantial food before eating any earth. Almost every one I met in this section was addicted to this habit. They were all very thin, but their flesh seemed to be puffed out. This was particularly noticeable about the eyes, which had a sort of reddish hue.

"All of the clay eaters were excessively lazy and indolent, and all of these conditions combined led me to the conclusion that there must be some sedative or stimulating qualities, or both, in the clay, and I determined to find out whether there was or not. I consequently brought a lot of the clay home with me, and Professor Tiernan and myself made an analysis of the stuff, and discovered that instead of clay eaters the inhabitants of central North Carolina should more properly be called arsenic eaters. All of this clay contains arsenic, but exactly in what proportion we have not yet discovered. Arsenic eating is common in many parts of the world, and is practiced to a greater or less extent throughout the world. It acts as a sedative, and also as a stimulant. The mountaineers of Styria, Austria, are habitual arsenic eaters. They give as their reason for eating it that they are better able to climb the mountains after eating the poison, and their explanation is a perfectly reasonable one, as arsenic acts as a sedative to the heart's action. The habit is also prevalent in the Tyrol and in the Alps.

"It is also said that the peasant girls of Switzerland and parts of Germany and in Scandinavia eat arsenic to give luster to their eyes and color to their cheeks; but this is a matter I have not investigated. It has been shown that arsenic or arsenical fumes are a sure cure for intermittent fever. The inhabitants of a section of Cornwall, England, at one time suffered with this type of fever, but when the copper works were established there the fever disappeared. This was accounted for by the arsenical fumes created in the treatment of copper. As to whether arsenic eating shortens life I am not yet prepared to say, but I intend investigating the matter thoroughly."—*The Clay Worker.*

A New Island.

The government of Batavia has made known to the Admiralty that the commander of the ship Samarang, of the royal navy of the Netherlands, reports the existence of a low, wooded island, which up to the present has never been marked upon any map, and which is situated to the west of Selaroo, one of the Timor Laout Islands.

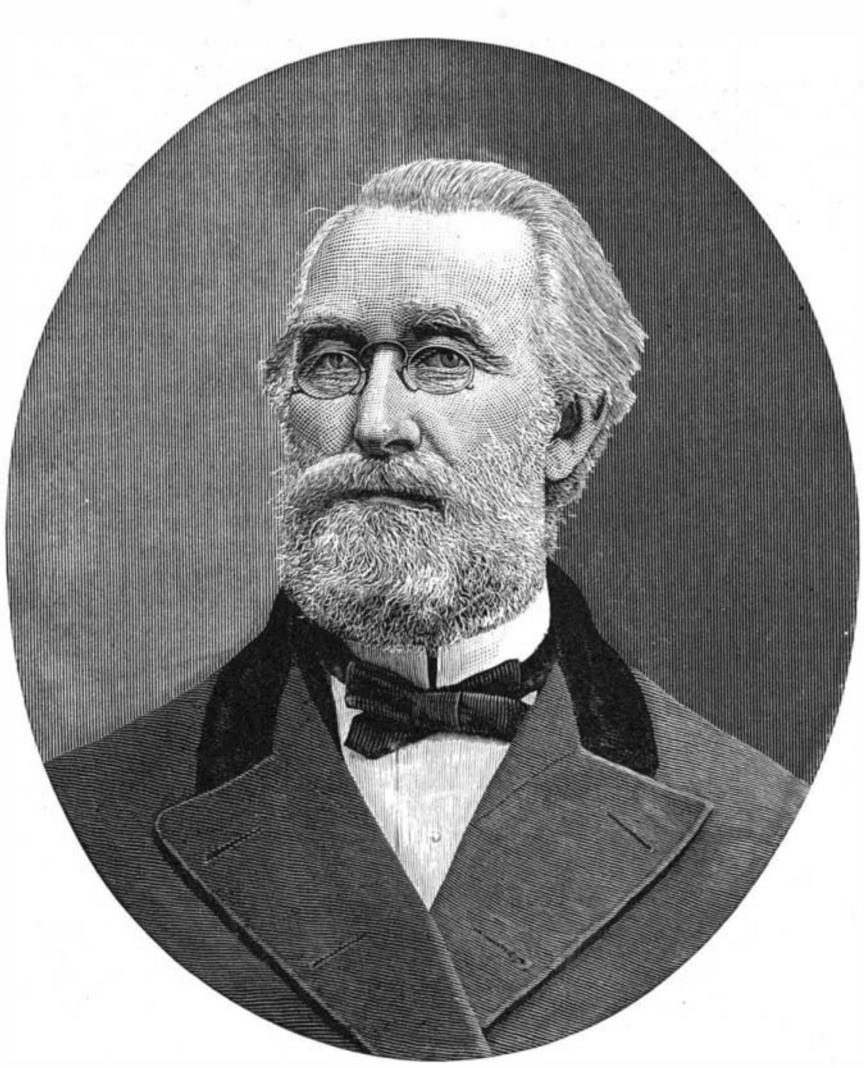
This island appears to be about two miles long from N.N.E. to S.S.W., and nearly two-thirds of a mile wide. Its position, calculated approximately, from the center of the island, is 8° 15' south latitude and 130° 39' east longitude.—*Gazette Geographique.*

THOMAS SILVER.

Among the most serious difficulties which at first attended the use of steam machinery at sea was the excessive straining of the engines for lack of a highly sensitive governor or regulator. By the rolling or pitching of the vessel the wheels or propellers were thrown out of water, and the engines, thus relieved of duty, would instantly start off with terrific speed, shaking the ship from stem to stern, injuring the machinery, and endangering the lives of all on board. Among the vessels disabled and lost at sea from this cause was the steamship San Francisco, in 1854.

The world is indebted to the genius of Thomas Silver for an invention which proved an almost perfect remedy for this trouble. Silver's marine governor soon came into extensive use. Its adoption was ordered on American and British ships, as well as those of other nations.

It was placed on the engines of the steamer Atlantic, of the old Collins line; also on engines at the United States Mint, Philadelphia Arsenal, and on the printing presses of the *Public Ledger*, of Philadelphia, and *Tribune* and *Herald*, of New York, which reported it as "operating more quickly and correctly, even for stationary engines, than the old two-ball governor, which depended upon gravity." Mr. Silver's greatest success with it was in Europe. Admiral Pairs introduced the governor in the French navy in 1855, maintaining "it was just what always had been needed." Vessels on the Continent soon adopted it. John Hamilton and, later, Osborne & Co., engineers on the Clyde, became the manufacturers, realizing large fortunes, though opposition was continual, one house in Glasgow confessing candidly as a reason for not using it that they realized $25,000 yearly by repairing engines on which it was not used.



THOMAS SILVER.

At the Royal Institute, of London, it was resolved that "Mr. Silver had done as much as any man living to facilitate steam navigation, enabling steam vessels to weather all gales without danger of broken shafts, wrecking, and consequent loss of life." Prince Albert said: "Mr. Silver, it is too common sense a thing; engineers *must* use it." The British Admiralty ordered it into general use in 1864, and so did all the naval authorities of the world, excepting that of his own country, the United States.

Thomas Silver, civil engineer and inventor, died in New York, April 12, 1888. He was born June 17, 1813, in Cumberland County, New Jersey, of American parents, belonging to the "Society of Friends." When a boy he developed mechanical ingenuity, and at the age of nine years his little boat, with hidden propeller wheel and other devices, was the wonder of the country village. Models of his many subsequent inventions are at the Patent Office, Washington, Kensington Museum, London, and the Conservatoire des Arts, Paris.

He was a member of the Franklin Institute, of Philadelphia, and of different societies in Europe, and awarded several medals. His latest inventions were a mechanical lamp, and a lamp burner made to dispense with glass chimneys, which is a great economical success. Our portrait is from a photograph by Tourtin, Paris.

Advantages of Good Water Supplies.

All time saved from hard labor is a gain. The convenience in cities and towns is a great advantage. In estimating the returns to be secured from a water supply for a place, consideration must be had for items not appearing on the company's books, but which have a value inestimable in dollars. These are:

First—Promotion of health. Water from a supply system averages much purer than from wells. It is stated that typhoid fever has practically become a country disease. In certain New England counties the lowest average mortality is in districts where there are many cities and towns, most of which have water supplies and sewerage systems. The highest mortality is in sparsely settled towns having no public works of this nature. Without a water supply we can scarcely have any sewerage system. The sprinkling of streets and decrease of repairs on gravel and macadamized roads are worthy items.

Second—By saving property. A supply of water for fire purposes can best be provided in connection with the domestic supply, and the power to prevent a widespread conflagration lies usually in the proper arrangement of the water supply system, where the hydrants should not be located too near large wooden buildings.

Third—By reducing insurance. The insurance companies of New England are always ready to recognize the introduction of water by a very substantial reduction of their rates, generally from twenty to fifty per cent.

Fourth—By encouraging manufactures. Many mills have private fire appliances, but all need external protection, and a reliable water supply and a consideration of its provisions and the consequent insurance rates often determines the location of great manufactories.

President Fanning stated that he had found that, for five years after the water supply was introduced in a certain city, the saving in insurance over the rates that prevailed before had been greater than the cost of the supply during that period. —*F. L. Fuller.*

Garnets on Manhattan Island.

The occurrence of garnets on our island is well known, and their development at places has often attracted the attention of mineralogists. The very large and impressive specimen obtained by Mr. I. I. King, and now in possession of Mr. G. F. Kunz, is perhaps the most famous example of this species from within the limits of our city. Numerous specimens of considerable beauty and fair growth were obtained during the excavations and blastings necessitated by the prosecution of the work of sinking the tracks of the N. Y. Central R.R. below the surface of Fourth Avenue, and the gneissic and schistose beds of the island have afforded this interesting mineral in great numbers, but of imperfect character and usually of small and inferior size.

Recently Mr. Gilman S. Stanton, a young and alert mineralogist, has disclosed the presence among our rocks of a very elegant crystallographic combination of this mineral (trapezohedron truncating edges of the rhombic dodecahedron), which, symmetrically developed and deeply colored, attain sizes varying from a little over an inch to one quarter of an inch in axial diameter, and form very pretty groups. This habit, justly admired by mineralogists, characterizes the Alaskan variety, which these in that respect resemble. They do not, however, possess the hyacinthine hue of the Alaskan examples, and are less translucent. In texture they are minutely fractured. They occur in a vein of coarse granite, are generally implanted in or near the feldspar elements, and when taken out present blurred or dull faces arising from a thin film of ferruginous clay deposited by infiltration. They have been formed in all probability slowly, and have not suffered distortion to any extent from disturbance during their formation, or by vein motion. They belong to the almandite variety of garnets (iron alumina), so far as can be judged, and present red to brown-red internal reflections.

EXTENDED observations at Paris and at Munich indicate that the sanitary condition of a locality depends on the amount of water contained in the ground. The years in which there has been a large quantity of ground water present have invariably been the healthiest, while those in which there has been a smaller quantity have invariably been the unhealthiest.

The Protection of Buildings from Lightning.

The elementary notions about the efficacy of lightning conductors have received, says *Industries*, a rude shock from the investigations of Professor Oliver J. Lodge, which he brought before the Society of Arts in the Mann lectures, delivered on the 10th and 17th of March. The lecturer wisely determined to discard all preconceived notions which are current regarding the nature of lightning strokes, and to start his investigations on a perfectly new experimental basis. In his experiments he did not use the method adopted by Franklin, who, as is well known, flew a kite and obtained electric sparks from the clouds; but he used a Voss induction machine and Leyden jars, by which means the element of danger in the experiments was obviated, while at the same time the phenomena were under better control.

The arrangement of the apparatus may be thus briefly described: The terminals of the Voss machine were connected with the inner coatings of two Leyden jars standing upon the table, while their outer coatings were connected with two metal rods supported on glass stands. The ends of these rods, which terminated in knobs, could be approached more or less, and thus the sparking distance could be varied. The potential on the two outer coatings when the charge is slowly accumulating must evidently be equal; but when a spark occurs at the machine between its electrodes, the distribution of electricity is disturbed, and a second spark may occur between the sparking rods.

If, now, these sparking rods should be joined by a stout copper wire of very low resistance, it would at first sight appear that no spark at all could be obtained, however near the knobs were placed. But, to the surprise of everybody who saw the experiment, the length of spark was scarcely diminished by joining to the knobs the ends of a No. 1 B. W. G. copper wire running round the room.

We have then this extraordinary phenomenon, that although the two rods are in perfect metallic connection, the discharge prefers to take the short path through the air, which must have an enormous resistance, rather than the long path through the copper wire, which has practically no resistance. The explanation, as given by Professor Lodge, is that the self-induction of the copper wire is so great as to almost entirely prevent the passage of a current within the very short time the spark lasts.

A thin iron wire of equal length was then substituted for the copper wire, and although this had a considerably higher resistance, the sparking distance was not materially altered. It was, in fact, slightly less with the i on wire than with the copper wire.

Now, according to preconceived notions, the copper wire should have offered a much easier path for the passage of the current than the iron wire. In fact, when Professor Hughes showed some years ago his classic experiment on self-induction of straight wires, the conclusion was generally drawn from that experiment that lightning conductors should not be made of iron, but always of copper, because a wire of the latter metal has very much less self-induction.

It is well known than an iron wire when traversed by a current becomes circularly magnetized, and thus its coefficient of self-induction is increased as compared with copper, which, being a non-magnetic metal, cannot become so magnetized. But these experiments were made with currents of a period which must be regarded as slow in comparison with the rapidity of a lightning discharge; hence the iron had time to become magnetized, and develop a counter electromotive force. In Professor Lodge's experiments it appears that the time of the discharge is too short to allow the iron wire to become magnetized, and its greater resistance would seem to constitute even an advantage in slightly diminishing the length and violence of the spark. To further elucidate this point, the lecturer inserted a capillary tube of very high resistance (some 100,000 ohms) as a shunt between the sparking knobs, and it was found that the energy of the spark had much diminished.

The influence of self-induction was also shown by a subsequent experiment in which a shunt between the sparking knobs was formed by a strip of tinfoil folded zigzag, with insulation between adjacent layers. Such a conductor has very little self-induction, and accordingly the sparking distance was much smaller than with the straight copper wire.

A tinfoil of equal length, but wound spirally upon a glass tube, was then inserted, and the sparking distance was found to be considerably greater. This was evidently due to the greater self-induction. Now, upon inserting an iron core into the glass tube, it would be expected that the length of the spark would sensibly increase, because the tinfoil and iron core would act as a very powerful induction coil when traversed by alternating currents of moderate period.

Upon trying the experiment, it was, however, found that no increase of sparking distance resulted from the insertion of the iron core, and it was thus made evident that iron at these rapid alternations completely loses its magnetic properties. The great obstruction which even a stout copper wire offers to the passage of a very rapid current was further shown by the experiment of connecting one end of the wire to one terminal of the machine only, and bringing the other end near it within sparking distance.

When a discharge occurs at the machine, a spark is also formed between the ends of this wire loop, showing that the current prefers to flow from the nearer portions of the loop, and leap across the air space rather than flow round the wire.

All these experiments illustrate the well known occurrence of side strokes. If a flash of lightning strikes a lightning rod, it will sometimes run along the conductor for a certain distance, and then, without apparent rhyme or reason, leap across into the building and do considerable damage. The resistance of the conductor may be exceedingly low, and the earth may be very good; yet the discharge, after leaping through a few hundred yards of air into the conductor, does not take the path of least resistance along it to earth, but strikes off.

The explanation, according to Professor Lodge, is that the self-induction of the conductor, quite irrespective of its electrical resistance, is sufficiently great to prevent the passage of the current during the very short time of a flash, and thus forces the discharge laterally outward. He illustrates this by hydraulic analogy. Suppose we have a tube bent into a U-shape and filled with water. If on the surface of the water in one limb is laid a piston, and a gradual pressure is applied, the water will be forced out of the other limb without causing any sensible strain on the tube; but if the piston on the surface of the water be struck a violent blow with a hammer, there is no time for the water to escape, although the tube may be very wide, and in that case the tube is liable to burst.

The side flash from a lightning stroke corresponds to the bursting of the tube, and the evident remedy in the case of the tube is to make it of an elastic material; and in the case of the conductor, to give the system some elasticity of another kind, viz., more electrostatic capacity. This might, for instance, be done by connecting the conductor with one of the coatings of a Leyden jar. Recently Professor Lodge showed that by this means the sparking distance between the knobs could indeed be slightly diminished.

The capacity of jar required for an actual lightning conductor would, however, be far too great to admit of such an arrangement in actual practice, and as a substitute the lecturer suggested that metal roofs and large conducting surfaces about the building should be connected with the conductor, so as to act as condensers. He also recommended to form the conducting system of a large number of thin wires in preference to the employment of a single thick wire.

The lecturer imitated the action of lightning by employing two metal plates fixed horizontally one above the other, but insulated from each other. The lower plate represents the earth, and the upper plate a cloud charged with atmospheric electricity. Into the intervening space are placed conductors terminating in metal knobs or points, and their upper ends can be set at various distances from the upper plate.

Upon charging the upper plate from the machine, a lightning stroke can be produced which will strike either one or the other of the objects placed between the plates, and by this means can be determined the liability which different objects have of being struck. When the charge slowly accumulates on the upper plate, a point is struck sooner than a sphere, even if the point is further from the plate than the sphere; and between two spheres of unequal diameter, a smaller sphere is more liable to be struck, although lower than the larger sphere.

On the other hand, if the charge, instead of slowly accumulating, is suddenly transferred from another body to the upper plate, all objects are equally liable to be struck. Such a sudden transfer of the charge takes place when lightning strikes from an upper to a lower cloud, and in this case Professor Lodge's experiments make it evident that the lightning rod has no protective zone, and that the body of a house may be struck although its lightning rod and conductor may be in an excellent condition.

From Professor Lodge's experiments it would appear that absolute immunity from the danger of lightning is not attainable, but that we may minimize the danger, not by the employment of high lightning rods and a few stout conductors, but by fitting the eaves and roofs of buildings with barbed wire, and connecting the wire in a great number of places with the earth by iron wires of comparatively small section. Professor Lodge recommends ordinary galvanized telegraph wire as preferable to copper wire, partly for electrical reasons and partly because it is not liable to be stolen.

Liquid Blacking.

This blacking is made by digesting in a close vessel at a gentle heat and straining:

Lampblack	1	drachm.
Oil turpentine	4	"
Methyl alcohol	12	ounces.
Shellac	1½	"
White turpentine	5	drachms.
Sandarac	2	"

The Roman Catacombs.

As reported in the *Architect*, London, a lecture was delivered lately in Liverpool, by Professor Stokes, of Dublin, on "The Church and Catacombs of Rome." The professor said that his own idea before he studied the subject was that the city of Rome was built over them, that the catacombs had furnished the building material for the city thus erected, and that the early Christians having discovered those excavations under their houses, made secret entrances into them, so that when any danger threatened them, or when they desired to worship in secret, they just retired into those vast and gloomy recesses.

The catacombs of Rome, however, were of quite a different character. They were not under the city at all—they were all outside, they were excavated in the hills that surrounded the city. Nor were the catacombs the usual places of worship of the early Christians, because they possessed church buildings at a much earlier period than people imagined. There were writings showing that long before the reign of Constantine the Christians erected most magnificent churches. Eusebius told them that "not content with the ancient churches, the Christians erected spacious churches."

The edict of Diocletian ordered the destruction of the churches and the confiscation of lands attached to them, while there were other evidences of the existence of churches at the end of the third century.

The whole extent of the catacombs they knew not as yet, as most probably there were numerous catacombs still to be discovered. Competent authorities estimated the whole length of the catacombs as reaching 350 miles. This might seem an enormous length, but they must remember that the catacombs were excavated on different levels, so that four and even five galleries ran one above the other—in fact, the whole soil for thirty or forty miles around Rome was honeycombed with them. These galleries were narrow, and ranged from 2 to 4 feet in width, and were from 8 to 10 feet in height.

The lecturer next described the pagan burial clubs, and said the early church was built in the form of a catacomb, because it took the name, shape, and constitution of a pagan burial club. It was under the cover of these pagan burial clubs that Christianity seemed to have taken refuge and shelter for the first 200 years of its existence, and through the toleration afforded to those burial clubs the Christian church was enabled to execute the vast operations involved in the formation of the catacombs. They had the testimony of Tertullian that toward the end of the second century Septimus Severus owed a great deal to Christian neutrality in the great civil war which raged at that time. The Christians had grown so numerous that it was almost as important for them to gain their neutrality as it was to gain their active co-operation.

In his subsequent remarks as to the excavation of the catacombs, the lecturer explained the means that the church possessed to carry out such a vast work, and stated that the excavations were the result of the labors of the fossores or diggers, who were reckoned among the inferior clergy.

Deafening Floors.

Various expedients have been used and suggestions given for "deafening" floors, as it is called. We have all heard, says the *Building News*, of mortar mixed with chopped hay or straw—a kind of pugging laid on rough boards, carried by fillets fixed to the sides of joists. This sort of pugging has stood well for centuries, and is found to answer well as a deafening material. Among other substances used are dry lime rubbish, sand, lime, hair, and dry ashes, sawdust, and even cockle shells and cork chippings have been found in the floors of old houses. Any of these materials in layers of 1½ inches to 2 inches will suffice to deaden sound. Recent suggestions have been thrown out in our own journal by correspondents. One of these is to use thick felt laid below the floor boards. A French journal throws out another suggestion attributed to General Loyre, who proposes, instead of loading the floor with plaster, to fill in the space between the boarding and the plastering of ceiling with shavings which have been rendered incombustible by dipping them in a tub of thick whitewash. As it is known that soft substances inclosing air spaces form an excellent non-conducting material to sound, it is thought that the shavings so treated will be found of great service, and it is said they are so incombustible as to add considerably to the fire-resisting properties of the building. Where it is desired to disinfect the space between the floor and ceiling the shavings may be saturated with chloride of zinc, or the latter may be added to the lime wash. The shavings have at least the merit of being light, which some of the materials we have named are not, and if they can be rendered non-combustible—a very essential condition—we do not doubt that this kind of deafening, so cheap and easily procured, will be largely used. Slag wool made in the form of tiles or bricks is a good material to prevent the transmission of sound, and any fibrous material formed into cellular slabs answers the purpose.