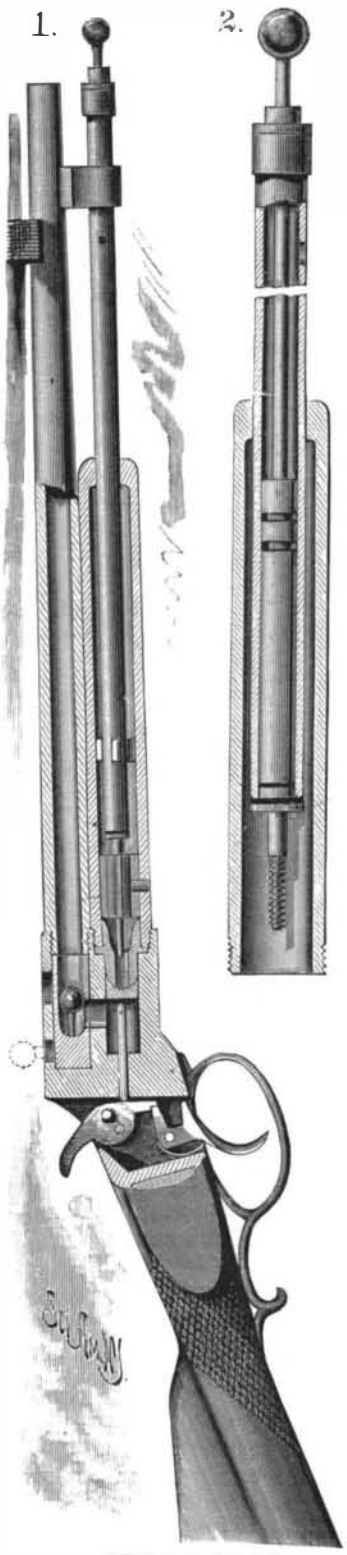
NEW AIR GUN.

The engraving shows a very simple and effective air gun recently patented by Mr. A. G. Hyde, of this city. It is constructed so that the air may be compressed to a high pressure, and its entire volume released at each shot.



NOVEL AIR GUN.

In a cavity in the breech of the barrel, there is a tube of the same caliber as the barrel, closed at its rear end, and provided with a pin for preventing the backward movement of the ball. This tube is provided with a handle by which it may be turned, and which projects through a slot in the breech. There are two holes in the tube, one for receiving the ball, which is dropped in through an opening in the top of the barrel, and the other for communicating with the air chamber, located below the barrel. The holes in the tube are arranged relatively to each other, so that when one is open the other will be closed.

The air chamber contains a valve which is pressed against a packing at the end of the air reservoir, and is held in place by a dog, which, in turn, is retained by the trigger. The air-condensing pump projects into the air reservoir, and is provided with a single valve at its inner end, which prevents the air from re-entering the barrel after having been compressed. The air enters the compressing pump through a small aperture near its outer end. No valve is placed here, as communication between the external air and the space below the piston is shut off after the latter has moved inward a short distance. The piston rod of the air compressor is provided with a ball handle at the outer end.

The arrangement of the barrel and air reservoir may be clearly seen in Fig. 2.

When it is desired to use the gun it is only necessary to move the pump piston out and in a few times, when sufficient air will be compressed to project the ball with great force.

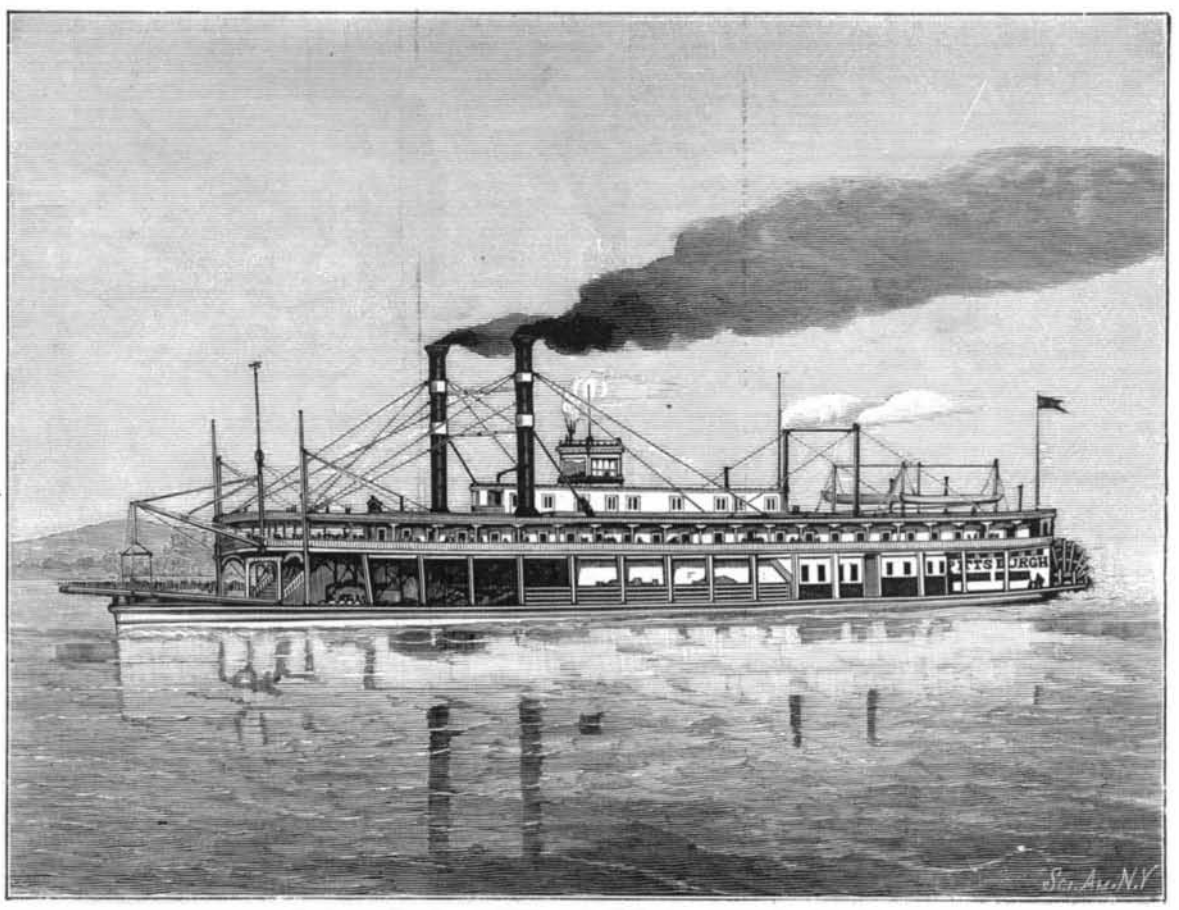
THE STEAMER PITTSBURG.

The light draught stern-wheel steamer, now the predominant type used on the Ohio and Mississippi rivers and their tributaries, is peculiar in many respects to the West. In former years the stern-wheeler was considered, on account of slowness, unfit for the river traffic, but the rapid strides in its perfection which have been made on the Ohio in recent years have placed it almost beside its rival side-wheeler in point of speed. The exterior appearance of these boats is strikingly graceful, the long unbroken lines from stem to stern, together with their very slight sheer, giving them great beauty. The boilers are located on the main deck, about one third the boat's length from the bow. The wheel is never housed, but remains open. The engine room aft occupies but a small space, and the remainder of the deck room is devoted to freight. The cabin is on the upper deck, and on all of the boats in the passenger carrying trades is complete and elegant in every respect. The officers' cabin occupies the hurricane deck. The saloon extends nearly the entire length of the boat, and on many steamers is palatial in its appointments.

The desideratum, of course, in all steam vessels is economy of power. In Western steamboats the very extreme of light draught is necessary. The hulls must be flat bottomed, and built as lightly as practicable with the requisite strength for large cargo carrying. The machinery must be as light as can be made, and for this reason the simple, high pressure, horizontal, lever engine has been found to meet the requirements better than any other. The long return-flue boilers, which, on all boats of late build, are made of steel of the highest tensile strength, are better adapted for several reasons to these boats on account of mud, etc. Besides, their shape distributes their weight over a larger area. There is no doubt that, for the weight of machinery used, the improved boats of the Ohio and Mississippi rivers develop a greater power and speed than any other class of steam vessels.

Among the remarkable specimens of the stern-wheeler on the Ohio may be mentioned the Pittsburg, build at Cincinnati in 1879. Her hull measures 252 feet in length, 39 feet beam, 6 feet hold. She has three steel boilers, 70,000 lb. tensile strength, 47 inches diameter, 28 feet long, 6 flues. Engines, 21 inches diameter, 7 feet stroke, working a wheel 21 feet diameter, 28 feet face. With fuel on board and steam up this boat draws only 24 inches water, and will carry 1,000 tons. She is one of the fastest steamers on the river. The large Golden City, plying between Cincinnati and New Orleans, is 276 feet long, 40 feet beam, 7 feet hold, and carries 1,600 tons. The steamer Buckeye State, of the Upper Ohio, is 240 feet long, and can carry a large cargo on 4 feet water.

These boats are complete with all the modern appliances of steam stages, capstans, windlasses, headlights, etc. The electric light has been applied with great success to several steamers during this year.



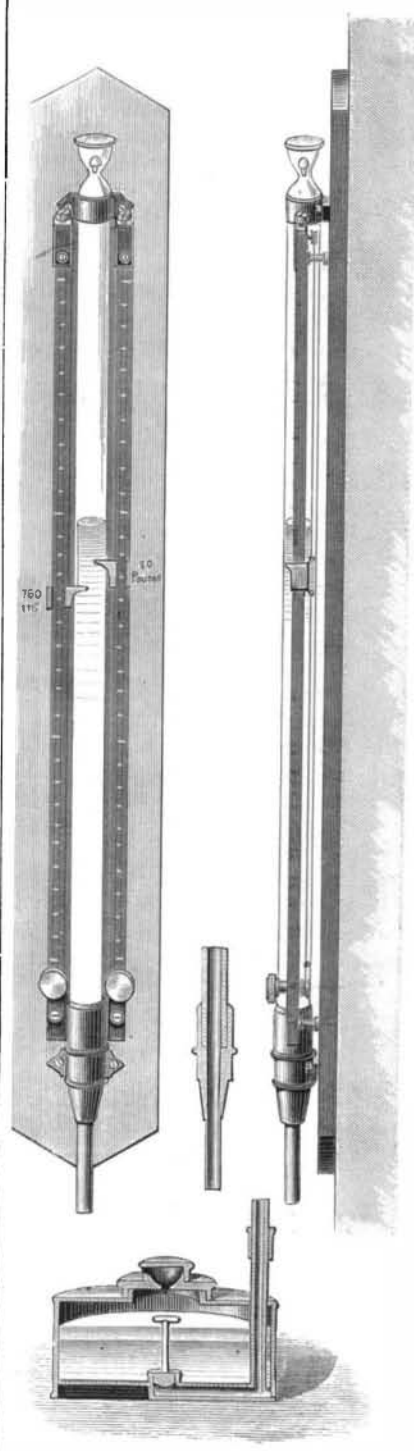
THE LIGHT DRAUGHT STEAMER PITTSBURG.

They Had all Had It!

A health officer writes to a Canadian medical journal as follows: "Inspected a house in the country at the request of the attending physician, as the general health of the family had been bad for a long time, they having suffered from a class of complaints that would indicate bad drainage, etc. Found under the floor a wooden drain with rotten cover, and soil saturated with sewage; trap on water-closet non-effective; water-closet foul; situation very bad; ventilation so arranged as to poison the room above it, a sleeping apartment occupied hy a young man suffering for a long time from general ill health. No trap on kitchen sink; water supply, cistern connected directly with the sewer without traps in the overflow pipe. On my reporting the latter fact to the family, and expressing my surprise that they had not all had typhoid fever, they exclaimed in chorus, 'Oh, we have all had it!'"

THE GLYCERINE BAROMETER.

The marked influence of the variations in the pressure of the atmosphere upon the disengagement of carbureted gases in coal mines, has led the English engineers to devise a new barometer that will not only indicate the most minute variation of atmospheric pressure, but will indicate it so plainly that miners and others not experienced in making barometric observations can readily detect the variations.



THE GLYCERINE BAROMETER AT THE KEW OBSERVATORY.

Among the instruments of this class one of the most interesting is the large water barometer constructed for the Royal Society by Prof. Daniell, in 1830, which, however, was not a success, as the effects of the pressure were annulled by the effect of the temperature upon the vapor found in the Torricellian vacuum.

Mr. B. Jordan, a member of the office of the English mining archives, has spent several years in studying the different liquids that might possibly be applicable in constructing an accurate and highly sensitive barometer, and finally found that glycerine produced the best results. A glycerine barometer constructed by Mr. Jordan, 1870, is still in use. The glycerine, which is very pure, is manufactured by Price & Co., and has a specific gravity of 1·26, and on account of its high point of ebullition the vapors have no perceptible tension at the ordinary temperature, and it will only congeal at a very low temperature. The height of a column of glycerine is 26 feet 9 inches, and a variation of 1-16th of an inch of mercury corresponds to a variation of about 1 inch in the column of glycerine. As glycerine is very apt to absorb the moisture of the air, it is covered with a thin layer of prepared thickened petroleum in the cistern of the barometer. Mr. Jordan has constructed barometers for the South Kensington and Jermyn Street Museums; both have given perfect satisfaction, and to show the scientific value of the instrument the Royal Society has built one at the Kew Observatory.

This instrument is shown in the annexed engraving, and consists of a cylindrical cistern of tinned copper, about six inches high and ten inches in diameter, provided with a screw cover or cap, having a small opening leading into a recess containing cotton to act as filter and keep out the dust. The large barometric tube is made of

ordinary gas pipe, about three quarters of an inch in diameter, and is rigidly attached to the cylindrical cistern or cup. The upper end of this tube fits into a piece of bronze, into which a glass tube, three quarters of an inch in diameter and about four feet high, is securely cemented. This tube terminates in a cup inclosing a rubber packing. Graduated scales provided with indicators are placed at each side of the glass tube, the one on the left side indicating the inches and tenths of inches, and the right-hand scale shows the equivalent measure of a corresponding column of mercury. The scales are attached to an oaken plank, which is fastened to the wall of one of the upper stories of the observatory, and the large tube passes down to a room situated twenty-six feet nine inches lower. The glycerine in the barometer is colored with aniline red. Before putting the glycerine in the tube it is boiled at a temperature of about 180° to expel the air and to make it purer. The air is exhausted from the barometric tube by means of an air pump. Regular observations are made with the instrument at the Kew Observatory under the surveillance of Mr. Whipple, who considers the apparatus to be a scientific instrument of the greatest precision.

TAGUAN FLYING SQUIRREL.

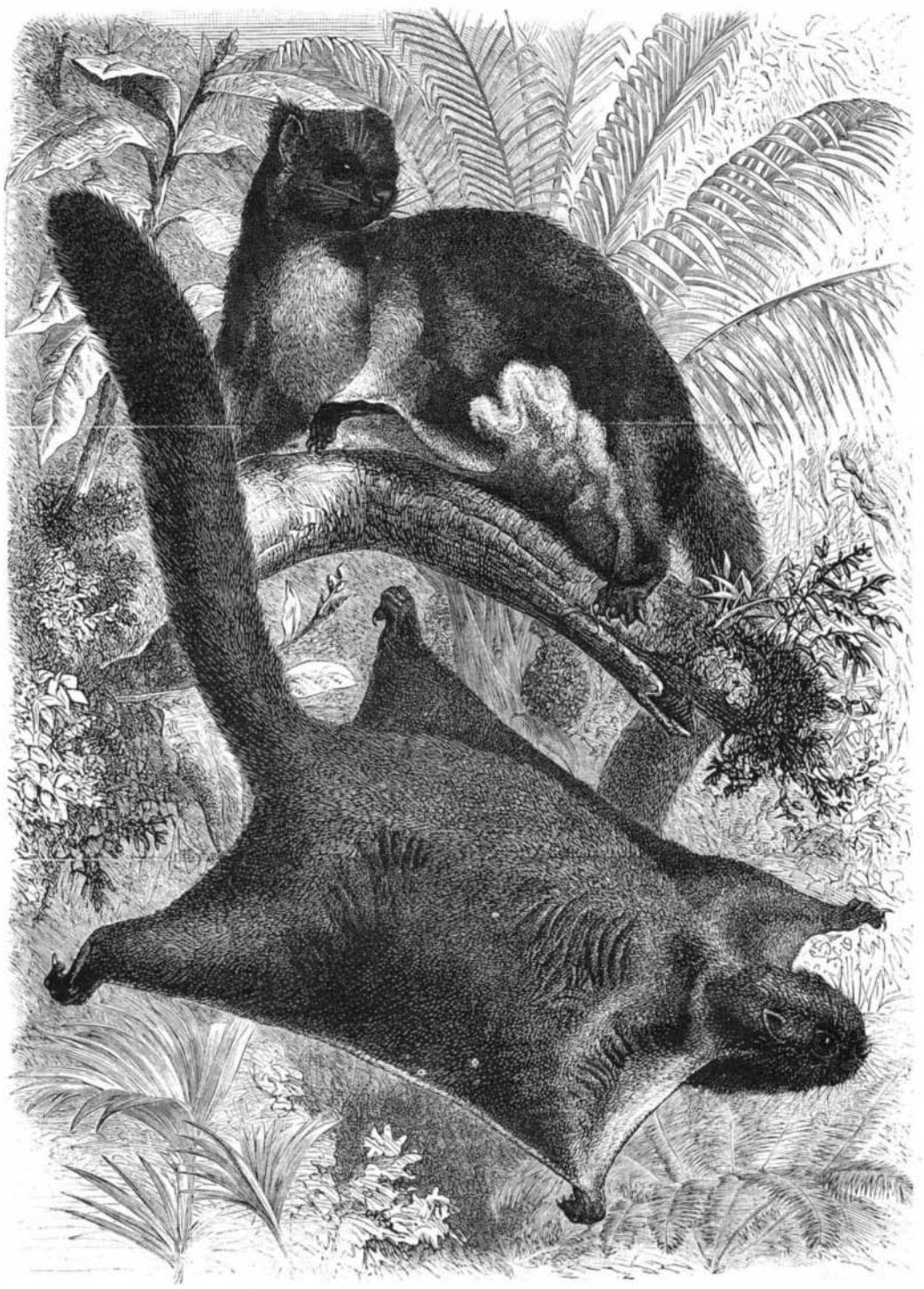
The beautiful and active group of animals of which the English squirrel is so familiar an example, are found in almost every portion of the globe, and, with one or two exceptions, live almost exclusively among the branches of trees. In order to enable them to maintain a firm clasp upon the branches and bark, they are furnished with long, finger-like toes upon the fore-feet, which are armed with sharp curved claws.

In the flying squirrels, of which the taguan is a good example, the skin of the flanks is modified in a method similar to that which has already been noticed in the petaurists of Australia and the colugo of Java.

This skin is so largely developed, that when the animal is sitting at its ease, its paws but just appear from under the soft folds of the delicate and fur-clad membrane.

When the creature intends to make one of its marvelous leaps, it stretches all its four limbs to their fullest extent, and is upborne through the air on the parachute-like expansion which extends along its sides. This animal is a native of India, where it is tolerably common.

It is rather a large species, as its total length is nearly three feet, the tail occupying about one foot eight inches, measured to the extremity of the long hairs with which it is so thickly clothed. The general color of this animal is a clear chestnut, deepening into brown on the back, and becoming more ruddy on the sides. The little pointed ears are covered with short and soft fur of a delicate brown, and the tail is heavily clad with bushy hairs, grayish black on the basal portions of that member, and sooty-black toward the extremity. The parachute membrane is delicately thin, scarcely thicker than ordinary writing paper, when it is stretched to its utmost, and is covered with hair on both its surfaces, the fur of the upper side being chestnut, and that of the lower surface nearly white. A stripe of grayish-black hairs marks the edge of the membrane, and the entire abdomen of the animal, together with the throat and the breast, is covered with beautiful silvery grayish-white fur.



TAGUAN FLYING SQUIRREL.—*Pteromys Petaurista.*

Sharks in New York Bay.

A remarkable school of sharks was recently met with between the Narrows and Bay Ridge shore, in the lower part of New York Harbor. According to the story of Captain Alec Robertson, a well known fisherman of Fort Hamilton, there were thousands of them. His attention was first attracted to a dark spot in the water, moving toward the Long Island shore, and expanding rapidly. On sailing for the spot he suddenly discovered that it was a school of sharks, which snapped angrily at the boat's sides, and lashed the water into a foam. One fish, larger than the rest, leaped toward the stern and crushed the back strip and rudder between its jaws. It appeared to be fully ten feet in length. The water seemed alive with black fins, which darted in all directions. George Morris and John Haffey, the companions of Robertson, rushed to the forward part of the boat. Morris had been sitting on the stern seat, and narrowly escaped the bite of the infuriated fish. Robertson tore up one of the seats, with which the little craft was fitted, and used it effectively on the hard black snouts of more than one of the sharks. The breeze filled the sails and carried the boat steadily through the danger. Not until Bay Cliff was reached did the boat get clear of its pursuers.

Palm Fossils in Colorado.

Mr. E. Johnson, the expressman, brought into the *Gazette* office recently some very interesting fossils, which he had just discovered. In speaking of his discovery he said: "A year ago my son reported that he had found upon the bluffs northeast of the town a petrified fish tail, but embedded in too large a rock for him to carry. He has often urged me to go with him and get it. I finally went, and to my astonishment found that he had discovered a very fine impression of a palm leaf, and I soon found three other perfectly printed leaves of the same variety. The leaves were of enormous size, the ribs diverging from the base just like palm fans, but upon a very much larger scale. The estimated size of one leaf, calculated from reliable data furnished by the ratio of divergence, is found to be eight feet long by six feet wide." Mr. Johnson also found several sections of palm tree trunks, one of which he brought to the *Gazette* office, together with the impressions of the leaves.—*Colorado Springs Gazette.*

A North Carolina Industry.

During recent years the collection of medicinal and other plants has become a large and profitable industry in North Carolina. The trade centers at Statesville, where an enterprising firm have established one of the largest botanical depots in the world. Their stock comprises 1,700 varieties of roots, herbs, barks, seeds, flowers, and mosses, and all sorts of plants for herbariums, some of them peculiar to the flora of the State, and others found more abundantly there than elsewhere. The quantities now on hand vary from 50 to 35,000 pounds of each kind. They pay the collectors either in cash or goods, and last year they disposed in this way of $400,000 worth of merchandise. Their warehouses have 270,000 square feet of flooring, which will give an idea of their capacity for storage of the products they are collecting from all quarters. Their shipment last year, as given in the Raleigh *News*, amounted to 1,800,000 pounds. The collectors are largely Cherokees.

New Polarizing Prism.

M. Crova commends, for photometric purposes, in the *Journal de Physique*, M. Prazmowski's polarizer, which is a Nicol, with faces normal to the axis of a prism, the two halves of which are joined with linseed oil. It requires large pieces of spar, and the joining is long and difficult, but there are several advantages. Thus the layer of oil (unlike Canada balsam) causes hardly any loss of light; its index, 1·485, being nearly equal to the extraordinary index of spar, the polarized field is limited on one side, as in Nicol's, where the total reflection of the ordinary ray commences, by a red band; but the second limit, corresponding to total reflection of the extraordinary ray, is thrown out of the field of vision; the angular value of the polarized field is thus increased. The increase of field, the angular separation of the only colored band, and the direction of its bases, normal to the axis, are qualities to be appreciated in certain cases.

Spread of Disease by Earthworms.

Recent researches by M. Pasteur appear to throw considerable light on the origin of anthrax, or splenic fever, and allied diseases, which attack cattle, sheep, etc. When an animal dies of anthrax it is not uncommonly buried on the spot. The conditions of putrefaction prove fatal to the small parasitic organism, or *bacteridium*, which is abundant in the blood at death. The gas given off causes it to break up into dead and harmless granulations. But before this can occur not a little of the blood and humors of the body have escaped into the ground about the carcass, and here the parasite is in an aerated medium favorable to the formation of germs. These corpuscular germs M. Pasteur has found in the soil, in a state of latent life, months and years after the carcass was buried; and by inoculation of guinea pigs with them, has produced anthrax and death. Now, it is specially notable that such germs have been met with in the earth at the surface above the place of burial, as well as near the body. The question arises: How came they there? And it would appear that earthworms are the agents of conveyance. In the small earth cylinders, of fine particles, which these creatures bring to the surface and deposit after the dews of morning or after rain, one finds, besides a host of other germs, the germs of anthrax. (The same process was proved also by direct experiment; worms kept in ground with which *bacteridium* spores had been mixed were killed after a few days, and many of the spores were found in the earth cylinders in their intestines.) The dust of this earth, after the cylinders have been disaggregated by rain, gets blown about on the neighboring plants, and the animals eating these thus receive the germs into their system. It is suggested that possibly other disease germs, not less harmless to worms, but ready to cause disease in the proper animals, may be in like manner conveyed to the surface in cemeteries. This would furnish a fresh argument for cremation. The practical inference as to anthrax is, that animals which have died of this should not be buried in fields devoted to crops or pasturage, but (wherever possible) in sandy, calcareous ground, poor and dry—unsuitable, in a word, for worms.

To Moisten the Air in Cotton Mills.

A device for moistening the air in cotton mills is suggested by Mr. L. E. Bicknell, of West Cummington, Mass., in a communication dated July 1. It consists of a line of steam pipes running under the rows of looms, with perforations under each loom. The pipes should be laid in grooves in the floor to prevent tripping, and should be laid upon asbestos paper to prevent the overheating of the floor. Under each loom the steam pipe should carry a perforated slide or sleeve, with holes corresponding with those in the pipe, by means of which the jets of steam could be regulated. The rising steam would act directly upon the extended warp above, and afterward by diffusion would secure that humidity of atmosphere essential to the satisfactory working of cotton mills.