of the process used for producing the illusion given by *Stella*.

The Mystery of Dr. Lynn.—In this new illusion, now being presented at the Folies Bergeres, the stage is larger than for Stella. It starts from the floor; and it is nearly in front, at a very slight distance from the spectator, that we observe the bust of a woman cut off at the thighs and resting upon a small swing shelf. This woman is alive. Moreover, under a thrust from the showman the shelf moves laterally. At a certain moment the woman seizes the cords, the exhibitor removes the shelf, and the body is then seen suspended for a few minutes. The showman passes a rod beneath the bust, and around it, and shows that it is completely isolated.

Where is the body? Such is the question that every visitor asks. In Stella and in several analogous tricks shown by English and French prestidigitators, completely isolated, but immovable, busts or heads were shown to the public, and the majority of these illusions was obtained by means of mirrors. Even with these latter it would be possible to move a bust and swing a shelf, but we believe that *The Mystery of Dr. Lynn* is obtained by a much simpler process—by a simple effect of illumination.

All painters know that in a too strongly lighted picture the whites and bright colors stand out at the expense of the half tones and dark colors, and this effect is the more pernicious in proportion as the light is brighter. Hence the complaints that are heard at exhibitions of paintings, where the light never suits the exhibitor. This same effect is seen in two objects placed alongside of each other; if a white object be placed alongside of one of somber color, it will prevent the details of the latter being distinguished as well as if it were alone. The visibility of objects is relative, then, and depends more or less upon the brilliancy of that which surrounds them. A thing that attracts the eye is seen at the expense of what is placed alongside of it.

This difference in visibility, which makes itself seen when the illumination of two objects is the same, will naturally be still greater if the white object is in the full light and the somber one in darkness. Now it is upon this principle that the Doctor Lynn trick appears to be based.

If we take a book bound in black or very dark cloth, and place it outside of the cone of light produced by a lamp shade, we shall be able to see it more or less distinctly; but if in the same direction we place a sheet of white paper so that it shall be well lighted by the lamp, the visibility of the book will be null or nearly so, and we will see it anew if we take away the paper. It is for the same reason that a person who at night holds a lamp having a reflector becomes completely invisible to other people toward whom he turns the light, while he might be seen were the lamp turned in another direction.

Another small experiment will directly explain to us the Doctor Lynn trick. Let us suppose that in the evening a person dressed in black leans upon a table, his head inclined between two lamps provided with reflectors, which latter may be merely white cardboard, or a few sheets of paper; or the lamps may be replaced by two candles, each shaded by an open book. Under such circumstances the spectator seated upon the other side of the table will distinctly perceive the face of the person placed in front of him, the white parts of the costume, the neck, sleeves, and fore portions of the shoulders and arms, which are well lighted. But if there is no reflection from the ceiling or wainscoting, all the rest of the body placed in darkness will be invisible.

Let us suppose that all the precautions are taken to make the experiment successful, just as if it concerned a public exhibition, and we shall be able to have in this way a decapitated talker, a living bust, or to repeat the mystery of Doctor Lynn.

As regards this last named trick, a glance at the explanatory figure (Fig. 3) will show how the illusion may be obtained. The lower part of the bust seen is a dummy, upon which the upper part of the woman's body rests, the remainder of her body being extended nearly horizontally upon an apparatus that is capable of swinging and following the motion of the shelf. All this portion is hidden by opaque black drapery so arranged as not to attract the light to any point.

The bust and shelf receive a very intense light; then immediately behind there is seen intense darkness—an absolutely black background. This latter is rendered still darker by the brilliant cords of the shelf, a metallic chain, a sword suspended beneath it, and a white handkerchief that seems to have been dropped upon the front of the stage by accident. If we add to this, six gas burners with powerful reflectors turned toward the spectators, it will be seen that the latter are, in a manner, dazzled by everything that strikes their eye in the foreground, and that beyond this they see absolutely nothing but a black background.

Such is the explanation that may be given of the mystery of Dr. Lynn—an illusion that rests upon a curious principle in physics.—*G. Kerlus, in La Nature.*

Trade Marks in Japan.

By imperial decree dated June 7, 1884, a trade mark law has been promulgated in Japan, the law going into force on the first of October. Persons who counterfeit registered trade marks and employ them will be punished by imprisonment with hard labor for a term of not less than thirty days and not more than one year, in addition to a fine. A trade mark in Japan runs for 15 years. Nearly all classes of goods manufactured are included under this new act.

Correspondence.

The Smartest Old Man in the Country.

Under this heading we chronicled in our paper of Nov. 1, an account of the walk of seventeen miles by Seth Cook, of Rathboneville, a gentleman 103 years old. The following curious particulars will be read with interest:

To the Editor of the Scientific American:

Allow me to add a little to the history of "The Smartest Old Man in the Country." I was his family physician for twenty-five years, commencing during the year 1847. He had the appearance of quite an old man when I first knew him.

During that time he lived in constant violation of nearly every sanitary law. His constant drink was *pure alcohol*, of which he drank large quantities, buying it by the gallon and keeping it in the house. I think he rarely ever drank at a bar. I often remonstrated with him for drinking it, telling him it would eat up the coats of his stomach. He constantly affirmed it agreed with him and did him *good*. I do not remember that he was ever sick during the time. He kept himself what might be termed *full*, but never saw him drunk. S. MITCHELL, M.D.

Hornellsville, Nov. 1, 1884.

Steam for Extinguishing Fire in Vessels at Sea.

To the Editor of the Scientific American:

In view of the loss by burning at sea of the steamship Maasdam, on the 24th of October last, I suggest the use of steam as an incomparably more effective agent than water in the extinguishment of fire in vessels at sea, or in any confined situation of limited extent. In all vessels driven by steam power, let it be considered a primary necessity that conducting pipes for steam be laid, and so connected with the boilers for generating steam for power, as to make it possible to deliver it at any and every part of the vessel liable to take fire from accidental circumstances, as in the case above referred to; from lightning, not a very infrequent cause; or from the spontaneous combustion of the cargo in remote and practically inaccessible parts of laden vessels.

From the latter cause we quite often hear of the occurrence of fire in the holds of vessels, and particularly those laden with cotton, in which fire has been known, with closed hatches, to smoulder for days and even for weeks before the final catastrophe of its breaking out was reached. In such cases, no amount of water that could be supplied short of sinking the vessel would, with certainty, accomplish the object, because it would inevitably descend to the floor of the vessel and away from the fire. With steam as the active agent, this would be entirely different. The moment it was ascertained in what compartment, or place in a vessel, fire was located, steam could, by the opening of a valve at or near the boilers, be instantly delivered there, through the open ends of pipes, and would with almost absolute certainty reach and extinguish it.

That the supply of steam for the purpose be assured in all stages and localities of a fire, it would be necessary to have main valves for controlling its distribution situated at a convenient place on deck; also, to have one or more small extra boilers, like those for driving steam fire engines, located there, *as reserves*, to be used in connection with the same system of conducting pipes as those above named. It may be added, also, that boilers of this kind could be supplied and used for this purpose on any and all sailing vessels, carrying large and valuable cargoes, thus practically insuring that class of vessels also against destruction by fire. Of course, the use of steam boilers for such purpose would necessitate the employment and presence of one or more men among the officers or crews of sailing vessels qualified to use them.

In such cases the arrangements for distributing steam to every part of a sailing vessel would be the same as in the other.

The advantages in the use of steam for extinguishing fire are that by aid of its pressure in the boilers it can be forced into and through every compartment or subdivision of a vessel, and by many branch pipes, near the extremities, with open ends, into every *crevice*, even, of the cargo. Thus, by its dampening effect on all surfaces with which it would come in contact, the tendency to ignite and burn will be greatly lessened, while its extinguishing power results from the exclusion, by its pressure, of a large part of the air necessary to support it, and by the reduction in the temperature in what remains below the point of combustion, thus ending the danger.

If by the use of arrangements for the purpose, so simple, inexpensive, and efficient, the owners of vessels can secure their comparative safety against fire, why should not passengers, officers, and crews have protection against danger from one of the most remorseless of all destructive agencies known to man? H. A. BUTTOLPH.

Morris Plains, N. J., Nov. 4, 1884.

Sulphuret of Carbon as a Disinfectant.

M. Peligot has presented a "Note" to the *Comptes Rendus* on some newly discovered properties of sulphuret of carbon. Contrary to the teaching of the text-books, sulphuret of carbon is soluble in water, in the proportion of 2 to 3 milligrammes per liter. The compound stops fermentation, and kills microbes. The manipulation of the liquid is perfectly harmless, and it is erroneous to say that work people, employed in factories where it is used, are poisoned in consequence. No such ill effects as are supposed to emanate from this cause have been detected by M. Peligot in workmen continually living in the midst of sulpho-carbonaceous vapors. The respiration of the vapor of sulphuret of carbon occasions, after a few minutes, a state of anæsthesia similar to etherization, which speedily disappears. The aqueous solution has a sweet taste, and produces a sensation of heat in the mouth and stomach. The author thinks that this solution will be useful as a perfect and harmless antiseptic. In cases where the spread of an epidemic through contamination of the water supply is to be feared, he proposes that the supply should be passed through apparatus whereby it may be impregnated with sulphuret of carbon.

Timber and Tools.

It is a fact well known to millmen that it is not always the harder woods, in the ordinary acceptation of the term, that are the most wearing to the saws. Many practical persons marvel at this, and wonder to themselves why a piece of timber showing small crushing, tension, and other strengths, requires more power to work into lumber, and at the same time wears out the saws and cutting tools faster, than other varieties of timber, the strength of which, in most respects, is greater.

According to the *Lumber Trade Journal*, a log of black walnut and one of burr oak of the same size worked into the same sized stuff will show widely different results on both saws and machinery. If we attempt to rive or split these logs, the walnut will work much easier than the oak, and so far as the various strengths are concerned the oak is superior by far, but when worked or cut into tools of any description the walnut presents much greater resistance than the oak, and the same is true as regards many other varieties of hard and soft timber.

If we take a longitudinal section of these comparatively soft timbers which are so hard on cutting edges, we will find the minute pores or interstices filled with minute glistening particles or crystals; and subjected to chemical analysis we will find them composed of silica, one of the very hardest minerals known, while with the hard, easy working woods they will be found nearly or quite absent by both the microscope and analysis. These little particles, so finely divided as to be insusceptible of ordinary touch, are really a better grit than ordinary sand, and are the means of cutting off the fine edge of cutting tools, as saw teeth, plane irons, and the like.

Two plane irons, made of a fine quality of steel, as near alike as it was possible to make by an accurate, skilled mechanic, were each hardened in our laboratory by means of mercury, then finely sharpened, that the edges of each presented precisely the same appearance beneath the magnifier.

These were each inserted in an ordinary plane, and one placed on oak, the other on a piece of walnut, both pieces of wood having been previously dressed. At the rate of one hundred pounds pressure, each iron was crowded forward four inches. On the oak stick, the pressure from the rear indicated 809·5 pounds, while with the walnut the indicator showed a pressure of over one thousand pounds. The irons were both now withdrawn, and first placed beneath the microscope; the one used on the oak presented a general upset appearance, the edge of the iron showing a slight tendency to turn downward, there being sufficient heat generated by the friction to partially draw the temper along the minute edge, which, however, would not extend back sufficient to materially affect the wearing and cutting properties of the iron if in constant use.

The iron used on the piece of walnut showed a scratched, notched appearance all along the minute edge, and by the aid of the most accurate means of measurement at hand, these notches were all of the same depth, but different distances apart, proving conclusively that the particles of grit or crystals which caused them, by being harder than the best mercury hardened steel, were all of the same size, and evenly distributed, as far as regards depth of deposit in the grain of the wood. The small spaces of the iron edge between these notches or scratches were found nearly as the entire edge appeared originally, showing again that the cellular tissue of walnut, outside its mineral deposits, was really softer than that of oak; hence, were it not for these deposits, the timber would cut much easier. Of course, if the iron had been been drawn back, and again shoved through, the notches would have been more apparent and general, increasing each time, and the distance showed until the entire cutting edge had been of itself cut off.

Consulting the laws governing plant or vegetable growth, we are told that all food before becoming fit for assimilation must be reduced to its gaseous state. If this be so, the question arises. How or by what methods of plant growth and assimilation is it possible for silica to appear in its original crystalline state among the tissues of the growing or matured tree, while it is universally known that this variety of wood grows only where this mineral is abundant in some of its modified forms? This, however, is not of great interest to manufacturers just how it gets there, but that it is present is shown conclusively. To get rid of it, even were it possible, would destroy the beauty and general characteristics of walnut, and to overcome its action on tools, rapid motion and softer iron is the best, safest, and most efficacious method.

LUMINOUS key hole trimmings and door knobs are said to be in great favor with the bibulous inclined person, and convenient for others. They are made of glass, and the back is covered with luminous paint, giving forth a light which may be seen considerable of a distance, on the darkest nights.

A Novel Method of Draining.

Recent experiments of Colonel John P. Fort, in southwest Georgia, in pond draining promise a revolution in the malarial sections of the South, which embrace the richest part of the country, and cover millions of acres. The great drawback of Florida, Louisiana, the rice sections of South Carolina and Georgia, has been the fact that white men could not live there on account of brackish drinking water, and malaria, inseparable from floods and swamps. Several years since, Colonel Fort, who owns much property of this description, conceived the idea of sinking artesian wells, holding that when a certain stratum was reached pure water could be obtained in abundance. His efforts were crowned with such success that every town in southern Georgia is sinking artesian wells. The water is perfectly clear, sweet, and pure as the best to be found in the highlands. This success led Colonel Fort to try the experiment of draining stagnant ponds by running them off through subterranean passages that are known to exist at a distance of from seventy to a hundred feet below the surface. Colonel Fort's experiment was made on his hickory level plantation, in Dougherty County, and the pond upon which he experimented is situated about two hundred yards from his pioneer artesian well. The pond covered an area of about two acres, with a depth of ten feet in the center. To drain it thoroughly an outlet must be made in the deepest part. To accomplish this Colonel Fort bound four substantial pieces of timber together, floated them over the center of the pond, and upon this foundation built his raft or pen, which sank as it was added to. When the raft had been built, the foundation resting on the bottom of the pond, the platform was across the top, and on this platform a derrick was set up. To this derrick boring apparatus was attached. At first a pile-driver was used, but when the pipe had been driven down through the bottom of the pond to a depth of thirty feet it rested on solid rock, and then the work of drilling and boring was begun. At a depth of fifty feet below the bottom of the pond the drill struck an opening, and at once the water commenced to sink with a roar through the big pipe, the top of which was only a few inches under water. The drill-pipe was drawn out, and the pond commenced to empty itself as fast as the orifice that the drill had made through the rocks would permit the water to flow. When the water in the pond was level with the top of the pipe a a reamer was attached to the drill-pipe, and sent down to open the way for the big pipe to be sunk deeper. In this way the pipe was sunk until a joint of two sections was almost level with the bottom of the pond, and there it was unjointed. Colonel Fort will have a square pit dug around the pipe, and the pipe will then be driven down to a level with the bottom of this pit. The top of the pipe will be covered with wire to keep trash out, and the pit will be filled with rocks, and thus the drain will be kept open. This strange scene of emptying the pond into subterranean channels has been witnessed by hundreds of people, who see in it the reclamation of the millions of acres of swamp lands in the South. Thus, within two hundred feet of each other were two pipes, that of the artesian well throwing up the purest of drinking-water, and that in the middle of the pond sucking stagnant water into the bowels of the earth, and carrying it away. The experiment cost only $75, while there were gained from it over two thousand tons of compost soil.—*Boston Transcript.*

The Preservation of Buildings.*

BY DR. R. OGDEN DOREMUS.

In every case the architect must kneel at the shrine of chemistry. The chemist has been called upon by the architect to make an ink that will fade after twenty four hours; and on the other hand, an ink that will not become visible till after the lapse of twenty-four or forty-eight hours. The architect finds his work continually crumbling away. Water is the great solvent, especially with the addition of the acids always found in the atmosphere—carbonic, sulphuric, sulphurous, and nitric; besides ammonia, and often ozone. The coal burned in London alone disengages into the atmosphere 300,000 tons of sulphurous acid annually. These agents eat away brick and stone. Also water getting in and freezing is the great disintegrator in this climate. How to check this constant crumbling has been the great desideratum.

He demonstrated the porosity of sandstone by passing a jet of illuminating gas through a solid block of fine grained sandstone coated with about fifty coats of varnish, and covered on its sides with iron plates, leaving only a small area on each side unprotected, to which were applied pipes for the entrance and escape of the gas which was burned after passing through; and of fine Philadelphia brick similarly armed, by blowing through two thicknesses of it with force enough to extinguish the flame of a candle. He stated that gas will pass through stone not only without pressure, but even, as demonstrated by Prof. Chandler, *against* a pressure of ten to twenty atmospheres.

A result of porosity is that buildings after absorbing water effloresce, or become covered with a coating of salts, especially brick buildings laid in mortar made from sea sand. This means the decomposition of the material, besides a very disagreeable appearance. In Philadelphia, after a rain, the houses are generally thus whitened. This efflorescence cannot be prevented by ordinary paint nor oil.

Another dangerous result of porosity is that buildings absorb malaria. Hospitals thus become poisoned with a poison so deadly that he remarked he would sooner give his child the most deadly poison in the laboratory, and trust to the antidote, than expose him to such contagion.

He mentioned many well known buildings that were crumbling away, such as Girard College, the College of New York, Trinity Church, New York. He had dined with Gorringe soon after the obelisk was set up in Central Park, and the subject of the weathering of the obelisk was suggested. Gorringe said that it had stood 4,000 years, and would stand 4,000 years more. But, in fact, the obelisk is crumbling away. He showed several vials full of clippings collected at the foot of it, also specimens of stone found peeled off from inside the new capitol during the visit of the Institute to it in the afternoon.

A simple remedy was suggested, and one which has been extensively applied in St. Louis and to some extent in New York, namely, an application of paraffin mixed with a little creosote. The building is heated by a small furnace, and where there is ornamental work a blowpipe is sometimes required to heat depressions. The paraffin is then applied in a melted condition, and sinks in about a quarter of an inch, giving a beautiful and indestructible glossy finish, and rendering the material absolutely waterproof and air-tight. In reply to a question about fire, he said that a fire would only drive it in a little. It costs on an average about fifty cents a yard, and never needs to be applied a second time, as no chemical agent in the air or in the rain affects it at all. Even caustic potash does not unite with it, of which one has said that "those who invented sulphur for hell did not know caustic potash." If the application is made to marble that has been weatherbeaten, the marble should first be cleaned with steel brushes. Marble thus cleaned, however, unless treated with paraffin, soon becomes covered with a yellow stain, as appears on the building No. 50 Wall Street, New York.

Some of the buildings in New York which have been treated with paraffin are St. Mark's Memorial Church, houses 124–6 South Fifth Avenue; Huyler's, corner Eighteenth Street and Irving Place; and a house No. 18 East Fifty-fifth Street, in a brownstone row. Every house in the row except this has its doorsteps "with verdure clad," and the growth of such mosses is destructive to the building material. The paraffin method is confidently commended by Dr. Doremus as the very best ever used.

* Abstract of a paper read before the American Institute of Architects, at their eighteenth annual meeting, Albany, Oct. 22, 1884.

An Electric Eel Six Feet Long.

A very interesting addition has recently been made, says the *London Daily News*, to the Zoological Gardens in the shape of an electric eel—*Gymnotus electricus.* It is said to be nearly six feet in length, and must therefore be one of the very largest specimens of its kind.

Humboldt, when in the native home of this fish in and about the Rio Colorado, measured some that were 5 feet 5 inches in length; but though the Indians said there were larger, he himself saw none. The captive in Regent's Park is no doubt therefore a very big specimen, and there can be little doubt of its power. Humboldt thought that the Indians of the locality referred to had exaggerated ideas on this subject, but they no doubt had had practical experience, while the illustrious traveler seems to have prudently refrained from testing the matter, except in the case of an eel in a somewhat exhausted condition. He admits that it would be temerity to expose one's self to the first shocks of a large and strongly irritated gymnotus; and though he does not mention any case within his knowledge of any human life being lost by a shock from the fish, the mode of catching them adopted by the Indians seems to render it by no means incredible that, as some have asserted, this fish is capable of killing a man.

The Indians, it seems, are accustomed, when they want to catch gymnoti, to scour the country round for wild horses and mules, which they drive into the ponds where the fish are known to be; and so violent are the discharges of the pent-up lightnings to which these animals are exposed that, though they are not actually killed by electricity, they are so stunned and disabled that usually several of them are drowned. Humboldt once imprudently put both his feet on an electric eel just taken out of the water; and though he does not speak of it as a large one, he says he never experienced from a large Leyden jar a more dreadful discharge than he felt on that occasion. He was affected all day with a violent pain in every joint of his body.

Waste of Oil.

An old machinist, of nearly fifty years' experience, stated in his shop recently that he had run a countershaft, which he pointed out, on five drops daily of oil, the shaft being one and a half inches diameter and having three bearings in hangers. "Yet," he said, "that shaft has never squeaked." The shaft carried pulleys which drove a drilling lathe, a polishing and wood turning lathe, a small screw cutting lathe, and a grindstone. Most of the weight of these pulleys was between the two hangers on which he lavished two drops of oil a day. He kept his shaft level and in line. The belts pulled almost equally. The boxes were Babbitted. The shaft made about three hundred turns.

The experimenter said that he had tested oils as well as quantity. He believed in clear animal oil—whale or lard. He felt assured that good oil was wasted wherever drip pans were used, and he never used them. There is a text here for establishments to sermonize over, where the shaft bearings drip oil and the floors are soaked with it.

Gas from Paraffin Oils.

A paper on this subject was read before the Chemistry Section of the British Association, at their recent Montreal meeting, by Dr. Stevenson Macadam, F.R.S.E., of Edinburgh. In the course of it he said that for the last fourteen years he has devoted much attention to the illuminating values of different qualities of paraffin oils in various lamps, and to the production of permanent illuminating gas from these oils. His earlier experiments were only directed to the employment of paraffin oils as oils; and the results proved the superiority of the paraffin oils over vegetable and animal oils, especially for lighthouse service. His later trials, however, were mainly concerned with the breaking up of the paraffin oils into permanent illuminating gas; and the results formed the basis on which paraffin oil gas has been introduced into the lighthouse service of Great Britain, both for illuminating purposes and as fuel for driving the engines of the fog-horns. The following table shows the results of his investigations on the relative values of the crude, green, and blue oils:

	Crude.	Green.	Blue.
Gas per gallon, in cubic feet	98	102	127
Candle power..........	50	53	54
Light-value of gas per ton of oil, given in pounds of sperm candles,	4494	4741	6044

Successful Employment of Vaccination for Yellow Fever.

Dr. Freire, of Rio Janeiro, in a recent letter to the *Sanitary News*, writes as follows:

In compliance with your request, I will give you an account of the chief points of interest connected with my studies on yellow fever. I can, of course, give you only a very brief summary, and for further information may refer you to my two memoirs—"The Cause, Nature, and Treatment of Yellow Fever" and "The Contagion of Yellow Fever." An extended report on all the theoretical and practical bearings of my researches is now in press, and a copy will be sent to you as soon as issued.

The method of culture which I have followed is Pasteur's. I withdraw blood, or any other organic liquid, from persons sick with yellow fever, or from the bodies of the dead, using the most scrupulous precautions, and introduce these liquids into Pasteur's flasks, previously sterilized, and containing a solution of gelatine or beef "bouillon." In these conditions the microbe develops abundantly, and becomes of itself attenuated by the action of the air, which filters through the tampion or amianthus with which the flask is corked. The purity of these cultures is demonstrated by microscopic examinations, of which you will find a good illustration in my memoir, "Experimental Studies on the Contagion of Yellow Fever."

The microbe appears in the form of little black points, like grains of sand (780 diameters); in the mature form it presents the appearance of round cells with an ash-gray or black rim, containing in their interior yellow and black pigment and some granulations which will be the future spores. These cells burst at a given moment, and pour out their contents, *i. e.*, the spores, the pigments, and a nitrogenous substance composed of ptomaines, which I have isolated not only from vomited matter, but also from the blood itself, and from the urine. The yellow pigment, being very soluble, produces the icteric infiltration of all the tissues by a sort of tinctorial imbibition which may go on even after death; the black pigment, as well as the detritus, resulting from the rupture of the cells being insoluble, is carried into the general circulation, and produces obstructions in the sanguine capillaries, whence the apoplectic symptoms so common in yellow fever and in the urinary tubules, whence the suppression of the urine, a very frequent and terrible symptom in this disease.

I have described this microscopic organism under the name of *Cryptococcus xanthogenicus;* its development resembling that of this genus of algæ.

After having demonstrated the contagious nature of yellow fever by experiments upon barndoor fowls (see my memoir), I made experiments in preventive inoculations, first upon animals and afterward upon men; I did not fear to do this, because a multitude of experiments upon animals had previously convinced me of the perfect safety of inoculation with attenuated cultures.

Up to this date I have vaccinated 450 persons, for the most part foreigners recently arrived. Freedom from yellow fever has been pronounced among those thus vaccinated, for they have passed through a quite severe epidemic, and only six deaths have occurred among the 450 vaccinated persons —that is to say, less than two in a hundred—while more than a thousand deaths have occurred among the non-vaccinated, the mortality of the non-vaccinated sick being about thirty to forty per hundred. Thus, if we take one hundred vaccinated persons, under the most favorable conditions as regards receptivity, we have only two deaths during the entire epidemic; if we take one hundred non-vaccinated sick, we have thirty to forty decedents, which gives a mortality fifteen times greater among the non-vaccinated. Even if the mortality were only ten times or five times less great among the vaccinated, the preventive measure would be worthy of adoption. The protective inoculation for charbon gives an immunity to one-tenth, and that of vaccination for small-pox guarantees an immunity to one-fifth, according to the calculations of Bousquet.

DR. DOMINGOS FREIRE,

Professor in the Faculty of Medicine of Rio Janeiro,

President of the Central Junta of Public Hygiene.