with its 80,000 volts, and supply it by secondary 200-volt dynamos or 100-volt dynamos, through proper distributing wires, to the houses and factories and shops where it is to be used for electric lighting, and sewing machines, and lathes, and lifts, or whatever other mechanism wants driving power. Now the thing is to be done much more economically, I hope, and certainly with much greater simplicity and regularity, by keeping a Faure battery of 40,000 cells always being charged direct from the electric main, and applying a methodical system of removing sets of 50, and placing them on the town-supply circuits, while other sets of 50 are being regularly introduced into the great battery that is being charged, so as to keep its number always within 50 of the proper number, which would be about 40,000 if the potential at the emitting end of the main is 80,000 volts.

ON THE ARRESTATION OF INFUSORIAL LIFE.*

By Prof. Tyndall.

Three years ago I brought with me to the Alps a number of flasks charged with animal and vegetable infusions. The flasks had been boiled from three to five minutes in London, and hermetically sealed during ebullition. Two years ago I had sent to me to Switzerland a batch of similar flasks containing other infusions. On my arrival here this year 120 of these flasks lay upon the shelves in my little library. Though eminently putrescible the animal and vegetable juices had remained as sweet and clear as when they were prepared in London. Still an expert taking up one of the flasks containing an infusion of beef or mutton would infallibly pronounce it to be charged with organisms. He would find it more or less turbid throughout, with massive flocculi moving heavily in the liquid. Exposure of the flask for a minute or two to lukewarm water would cause both turbitity and flocculi to disappear, and render the infusion as clear as the purest distilled water. The turbidity and flocculi are simply due to the coagulation of the liquid to a jelly. This fact is some guarantee for the strength of the infusions. I took advantage of the clear weather this year to investigate the action of solar light on the development of life in these infusions, being prompted thereto by the interesting observations brought before the Royal Society by Dr. Downs and Mr. Blunt, in 1877. The sealed ends of the flasks being broken off, they were infected in part by the water of an adjacent brook, and in part by an infusion well charged with organisms. Hung up in rows upon a board, half the flasks of each row were securely shaded from the sun, the other half being exposed to the light. In some cases, moreover, flasks were placed in a darkened room within the house, while their companions were exposed in the sunshine outside. The clear result of these experiments, of which a considerable number were made, is that by some constituent or constuents of the solar radiation an influence is exercised inimical to the development of the lowest infusoria. Twenty-four hours usually sufficed to cause the shaded flasks to pass from clearness to turbidity, while thrice this time left the exposed ones without sensible damage to their transparency. This result is not due to mere differences of temperature between the infusions. On many occasions the temperature of the exposed flasks was far more favorable to the development of life than that of the shaded ones. The energy which in the cases here referred to prevented putrefaction was energy in the radiant form. In no case have I found the flasks sterilized by insolation, for on removing the exposed ones from the open air to a warm kitchen they infallibly changed from cleaness to turbidity. Four and twenty hours were in most cases sufficient to produce this change. Life is, therefore, prevented from developing itself in the infusions as long as they are exposed to the solar light, and the paralysis thus produced enables them to pass through the night time without alteration. It is, however, a suspension, not a destruction, of the germinal power, for, as before stated, when placed in a warm room life was invariably developed. Had I had the requisite materials I should like to have determined by means of colored media, or otherwise, the particular constituents of the solar radiation which are concerned in this result. The rays, moreover, which thus interfere with life must be absorbed by the liquid or by its germinal matter. It would therefore be interesting to ascertain whether, after transmission through a layer of any infusion, the radiation still possessed the power of arresting the development of life in the same infusion. It would also be interesting to examine how far insolation may be employed in the preservation of meat from putrefaction. I would not be understood to say that it is impossible to sterilize an infusion by insolation, but merely to indicate that I have thus far noticed no case of the kind.

* British Association, 1881.

PLANTÉ'S RHEOSTATIC MACHINE.*

Translated from the French by the Marchioness Clara Lanza.

Ruhmkorff's electric induction machine has proved in the most satisfactory manner that by the intermediary of inductive action, we can transform voltaic electricity into electricity of high tension. M. Bichat has likewise shown that by the same means, currents of high tension can be changed to currents of quantity, analogous to voltaic currents. M. Planté, with his secondary piles, has rendered this demonstration still more emphatic, and as his experiments demanded a greater tension than he was able to produce with his batteries, he undertook the manufacture of an apparatus by which he could obtain veritable discharges of static electricity, capable of forming at will, long thread-like sparks, or short, thick ones. In this way he was induced to make the battery of which we are about to speak, and which he calls the *rheostatic machine.*

Although this apparatus (fig. 1) was presented to the Academy of Sciences and exhibited to most of the physicians who witnessed M. Planté's fine experiments, it is as yet, but little known. Why this should be the case we are at a loss to understand, for it is one of the most perfect machines that can be employed in experiments of static electricity. Had the apparatus borne a foreign name, we are confident it would have attracted considerable attention long ago. It is much to be regretted that we are so constituted in France, that whatever is invented by an unknown man, a *savant* who does not rejoice in an established position or who is not a member of some scientific coterie originating from a celebrated school, is looked upon entirely as a matter of subordinate interest. "It is only an amateur's work," we hear on all sides for awhile and then the subject is dropped forever. In England it is quite different. Amateurs such as Grove, Gassiot, Warren, Delarue, Spottiswoode, Lords, Ross, Lindsay, Raleigh, Elphinstone and many others, find their efforts are appreciated as they deserve to be, and no one ever thinks of inquiring whether they are *savants* patented by the government or not.

M. Planté therefore, not being among the last-mentioned, was forced to meet with indifference which he forcibly overcame later by the fine work he performed with his accumulators. He was not so successful, unfortunately, with his rheostatic machine, and for this reason we shall dwell a little upon the important results it has afforded us.

M. Planté's machine consists of a series of condensers with mica plates, parallel one with the other and capable of being charged and discharged in a manner similar to his secondary batteries without any other alimentary electric source than these latter.

The various pieces composing the apparatus must be

* *La Lumière Electrique*, August 6th, 1881.