

sufficient to enable him to recollect his normal feelings. Thus he leads two independent lives.

The direct consequence of Dr. Beard's theory is that it tends to reduce all such delusions as clairvoyance, spiritualism, etc., to one common basis of scientific hypothesis; but the indirect consequence seems to us to be fraught with much graver interest to society. The only deduction to be drawn is that there is more evidence of the irresponsibility of humanity, further proof of another state when man may be but an automaton. Last week we brought forward competent medical evidence to prove that a drunken man is as irresponsible as a lunatic. Here again is expert testimony to the effect that, under a host of other conditions, a person may become unaware of his own acts. If fear and excitement are powerful exciting causes for trance, and the person in the trance or near the trance state receives erroneous impressions, wherein is the value of evidences by eye-witnesses of crimes committed under circumstances of great fear or excitement? Testimony as to sudden accidents might be similarly viewed with doubt; yet on the other hand, if we admit irresponsibility in the entranced person, how are we to guard ourselves against deception? for, as Dr. Beard says, "nothing is easier to counterfeit, after slight practice, than the early physical symptoms of trance." We cannot but agree with our author in the view that the day for the examination of this subject by the average individual has gone by, and that the only reliable informant is the medical expert. We do not send committees of lawyers and clergymen to examine peculiarities in construction of buildings; how much less logical is it to ask them to comprehend the hidden phenomena of brain construction? We need something more than a report of what trustworthy men think they see; and that something is the testimony of experts who look to causes and not to mere visible effects.

THE BANIAN TREE.

Of the remarkable phases of vegetable growth, that of the banian tree is certainly the most astonishing. We have more than one running plant, which, like the wild strawberry, spreads around a central stem by dipping into earth its distant branches, and thus establishing subsidiary centers; and in the mangrove of our southern shores we may see a tree, of considerable height, dropping from elevated limbs a number of whip-like roots which penetrate the ground, often through a foot or more of water; then, reversing their circulation, they become true stems, capable of maintaining themselves when separated from the parent stock. But, even with these illustrations before us, it is hard to realize the appearance and life conditions of a wide-spreading communal forest, the connected outgrowth of a single tree.

The anomalous physiology of a mangrove or banian root stem we have never seen described. How is it that its character is so completely reversed? At first its growth is downward, by a true root-like increase of cell structure at its free end. It remains perfectly cylindrical throughout, without the slightest variation in diameter, until it branches in the ground. Up to this point its circulation is downward from the parent stem; but now all is changed. It ceases to be a root, and becomes a stem, growing and supplying its branches with sap like a tree trunk of ordinary growth.

The banian adds another strange peculiarity, namely, that it rarely sprouts from the ground, the crown of a palm being usually its starting place. The banian seed is dropped by some bird into the frond, or upper cluster of leaves of the palm, and, sprouting there takes root within the palm: this commonly when the palm is in its infancy. The palm grows upward, an unbranching column. The banian spreads outward and begins to send its root stalks downward from its branches; not diverted twigs, but special growths, true aerial roots. With this exception, Milton only describes without exaggeration, when he writes of this tree as

"Branching so broad along that in the ground
The bending twigs take root, and daughters grow
About the mother tree, a pillared shade
High over-arched, with echoing walks between."

Meantime the palm is pushing upward, embraced by the descending banian shoots, which become so interlaced in course of time that the trunk of the palm is wholly concealed. At this stage appearance flatly contradicts reality; the palm seems to be growing from the heart of the banian, as though a date seed had taken root in the banian top. Possibly the curious Hindoo custom of marrying trees of different species had its origin in, or was suggested by, these natural unions.

The banian (*Ficus Indica*) is one of the great natural family the *urticaceae*, to which our familiar stinging nettle also belongs. It bears a small red fig or berry, which in times of famine has afforded food for thousands. An instance of the vast extent of country which may be covered by a single tree banian grove is furnished by the island of Nerbudda, which is entirely covered by one tree. A considerable portion of the island and the grove growing upon it has been washed away by river floods during recent years; but enough remains to make one of the noblest groves in the world. The natives boast that it once afforded shelter for a troop of 10,000 horses. Another extensive banian forest—all parts of one tree—occurs in the district of Beerbhoom, in Bengal. It covers "an immense extent of country," and overshadows more than four hundred temples.

The bride of the banian, in the ceremony above alluded to, usually the sacred *peepal*, or *be-tree* (*Ficus religiosa*). It is one of the latter that inspires such widespread reverence among Thibetian and other Buddhists, from the circumstance

that its leaves bear well marked characters in their sacred language. That these characters are not the work of the priests who have charge of the tree seems to be well established. A couple of French missionaries who were permitted to examine the tree report their inability to discover the least sign of art in these mysterious—and to the Buddhists miraculous—markings. "We examined," they write, "everything with the closest attention, in order to detect some trace of trickery, but we could discern nothing of the sort; and the perspiration absolutely trickled down our faces under the influence of the sensations which this most amazing spectacle created."

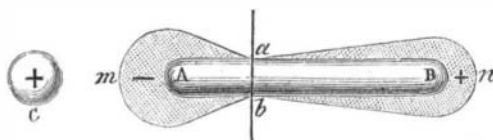
The mental attitude of these perspiring missionaries, when brought face to face with an alleged miracle that bore no evidence of trickery, is instructive. That the markings could be natural seems not to have occurred to them. Dr. Hooker, from his familiarity with Nature in India, was able to explain the miracle offhand with the single word "insects!"

VOLPICELLI'S NEW THEORY OF ELECTRO-STATIC INDUCTION.

An insulated conductor charged with either kind of electricity acts on bodies in a natural state placed near it in a manner analogous to that of the action of a magnet on soft iron, that is, it decomposes the neutral fluid, attracting the opposite and repelling the like kind of electricity. The action thus exerted is said to take place by influence or induction. The usual apparatus for demonstrating this hypothesis is a brass cylinder placed on an insulated support and provided at its extremities, or at various points along its length, with pith balls suspended by linen threads. If this arrangement be placed near an insulated conductor charged with either kind of electricity, the natural fluid of the cylinder is supposed to be decomposed, and free electricity is developed at each end, when both pith balls there located will diverge. The electricity of opposite character to that of the conductor goes to the end of the cylinder nearest that conductor, while electricity of the same kind as the conductor seeks the further extremity. There is a point on the cylinder where no divergence of the pith balls occurs, and this is termed the neutral point.

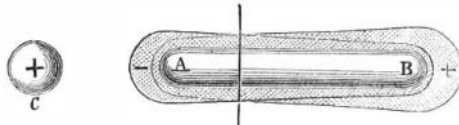
This hypothesis was, some thirty years ago, attacked by Melloni, who asserted that the imaginary electric fluid was not separated into its positive and negative components, but that both of the latter existed all over the cylinder, although, in point of quantity, there was more negative fluid on the end nearest the positive conductor and more positive fluid on the opposite extremity. The difference between Melloni's theory and that first noted will be clear from the annexed engravings. If the inducing source, *c*, Fig. 1, is positively electri-

Fig. 1.



fied, all the negative fluid of the cylinder, *AB*, according to the old hypothesis, goes to *amb*, and all the positive fluid to *anb*, *ab* being the neutral point. Melloni's idea is exemplified in Fig. 2, where both kinds of electricity exist in some degree over the entire cylinder. Melloni had scarcely more than reached a definite conclusion on this subject when

Fig. 2.



he died; but his work was taken up by M. Volpicelli, who for some twenty years has pursued the necessary investigations, and has recently announced conclusions confirming those of his original enunciator.

M. Volpicelli's apparatus consists of a large glass tube, 70 inches long, terminated by metallic armatures, and contain-

Fig. 3.

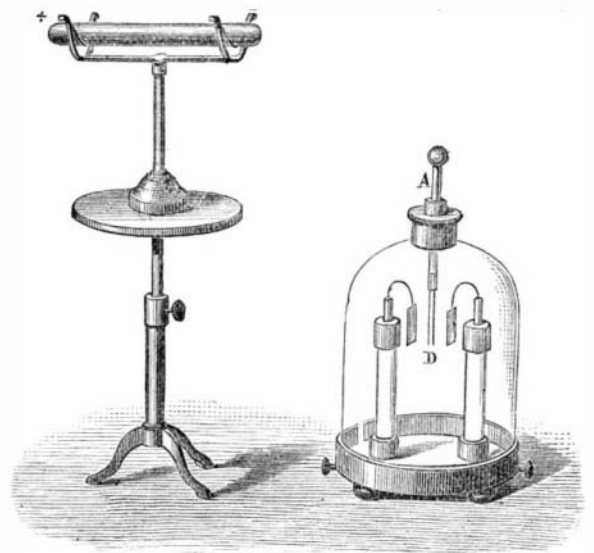


ing a dry pile composed of 24,000 disks closely packed together and covered with a layer of copper on one face and of peroxide of manganese on the other (Fig. 3). This bat-

tery works uniformly for several months, and is a constant source of electricity. The body on which the induced electricity is developed is an ordinary glass cylinder, perfectly isolated by threads of raw silk, by which it is suspended in the crotches of a support (Fig. 4). The electricity rendered free by induction is taken on the cylinder by means of a little proof plane, which merits a special description; for the success of the experiments is largely dependent upon the excellence of the instruments used and the care with which all possible causes of error are avoided. The plane is composed of two small disks of copper, 0.35 inch in diameter, separated by a thin layer of insulating varnish. One of these disks is in communication with the soil by means of a metallic rod which is held in the hand. The other disk is fixed to a metallic rod terminating in an ivory ball, which slides freely in an opening situated in the middle of the first disk and in an eyelet carried by an annexed arm. In order to use the device, the two disks are brought into contact, and the movable disk is placed on the cylinder. The free electricity on the surface of the latter condenses on the disk, and may be transported to a distance, as, for example, upon the exterior armature of an electroscope, situated far enough away from the dry pile not to be influenced by it. M. Volpicelli also uses a proof plane consisting simply of a pin head. A portion of the end of the pin is cut off, and the rest inserted in a knob of sealing wax at the end of a metal handle. A Böhnenberger electroscope, containing improvements devised by M. Volpicelli, is also used. The two plates, towards which the gold leaves, *D*, are attracted when the exterior armature, *A*, is electrified, are supported by two glass columns containing dry pills analogous to those of the large inducing cylinder (Fig. 5). This electroscope has

Fig. 4.

Fig. 5.



great sensibility. It might be termed a kind of electrical microscope.

In order to make the experiments, the insulated cylinder is properly placed in view by the electric source. It becomes electrified by induction. The free electricity on the cylinder is collected by the proof plane; and with the charge plane the electroscope is touched. The following phenomena then appear:

1. The free electricity found on the portion of the cylinder nearest the electric source is of the same character as that of the latter. This is diametrically opposite, of course, to the assertion of the old theory. The experiment may be repeated five or six times successively.
2. If the cylinder be placed in communication with the soil, so that the free electricity is allowed to escape, and the experiment with the proof plane be again tried, no sign of electricity is manifest.
3. If the cylinder be moved away from the electric source, so that the influence of the latter is diminished, and the proof plane be applied, the electroscope to which the latter is touched indicates an electricity of opposite character to that of the inducing body.

M. Volpicelli sums up the result of his investigations as follows: "Upon an insulated conductor submitted to the influence of an electrified body, electricity of opposite name possesses no potential. It is found in greatest quantity at the end of the conductor nearest the electrified body, and diminishes towards the opposite end. Electricity of the same name as that of the electrified body is found at all points on the insulated conductor, the end nearest the electrified source not excepted. It increases as it approaches the other extremity, and is always free." We extract our engravings from *La Nature*.

A New Projectile.

Mr. W. H. Lewis, a Welsh gentleman, of Hafod, near Swansea, has invented a new engine of warfare, which will be likely to attract considerable attention. It consists of a cannon, so arranged as to discharge a sharp sword-blade crosswise in the direction of the enemy, the knife or cutter being so poised in its career through the air as to cover the whole space in a longitudinal direction described by the blade itself. An 8-inch ball would carry a sword 14 feet in length 600 yards, literally mowing down every human obstacle in its path.