THE PROPAGATION OF NERVE EXCITEMENTS.

Physiologists differ widely on the question as to whether moter and sensory nerves are identical or different in their formation and capabilities: in other words, whether a sensory nerve may conduct excitations having for their result a bodily movement, or *vice versa*. It is not even definitely known whether an excitation of a nerve near the middle of the latter propagates itself simultaneously in both directions, centripetal and centrifugal. In order to obtain some *data* on this interesting subject, M. Paul Bert has recently made some curious experiments, an account of which, with the accompanying illustrations, we find in *La Nature*.

If at any point of its length, says M. Bert, a sensory nerve be pricked, the pain experienced indicates quite clearly that the excitation is propagated in centripetal direction. We have no similar certain knowledge that centrifugal propagation occurs, for the simple reason that at the terminal extremity of the nerve there is no perceptive nervous apparatus. Now if we can succeed in placing that extremity in connection with a perceptive center—that is to say, with the brain—then, if we find sensation, it must follow that centrifugal propagation takes place.

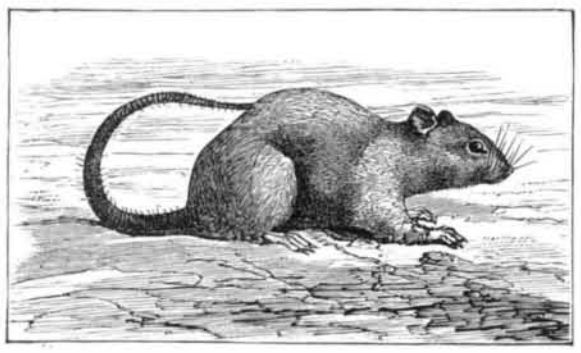


FIG. 1.—M. BERT'S EXPERIMENTS ON THE NERVES.

A rat was the subject of the experiment thus indicated. The skin was removed from the end of the tail of the animal for a distance of nearly an inch; and an orifice being made above the spine, the exposed end of the tail was inserted in the cellular subcutaneous tissue. A few sutures sufficed to keep the parts in place, and eventually complete adherence was obtained.

At the end of eight months the tail was cut at about the middle; so that the animal had two tails apparently—one growing out of the back, the other in natural position. Immediately after the section, the dorsal portion was manifestly sensitive; as, when it was pinched, the rat squealed, and attempted to escape. It was therefore evident that, in this fragment of the tail, excitation of the sensory nerves was propagated from the large to the smaller end—that is to say, in inverse direction to the supposed normal course. What had occurred?

The sensitive nerves, says M. Bert, which extended to the end of the tail, wounded by the removal of the skin, united with the nerves of the dorsal region, which had likewise been cut in making the necessary orifice. After a sufficient period, the nervous cicatrix became capable of passing vibrations. Then, when the end of the dorsal tail was pinched, the vibration traveled in the excited caudal nerve, traversed the cicatrix, and followed the dorso-cutaneous nerve to the spinal marrow, which conducted it to the brain, which organ translated the vibration into a sensation of pain. This will be clearly understood from Fig. 2, in which M E is the spinal marrow, and N C one of the nerve filaments passing to the end of the tail, the extremity of which was exposed. G is its ganglion, N one of the nervous filaments in the back exposed when the orifice was made, C the nervous cicatrix formed when the nerves united, S the point of section of the tail, and *a b* arrows indicating the two directions in which the excitations which determine sensibility are propagated.

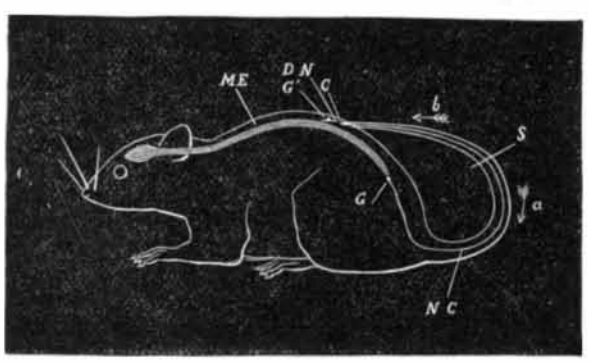


FIG. 2.—M. BERT'S EXPERIMENTS ON THE NERVES.

On the second day after the section was effected, the sensibility of the dorsal tail diminished and finally disappeared altogether. Examination with the microscope showed that the nerves of this portion had undergone the usual alterations of nerves separated from their trophic centers, and that this had taken place in part under the skin as well as that outside, although the appendage had grown to the animal and seemed healthy and vigorous. The nerves in the true tail were, on the contrary, perfectly free from degeneration.

M. Bert's conclusions are that an excitation in a sensory is propagated simultaneously both centripetally and centrifugally; and he thinks the same holds true for motor nerves. It is also very probable that, as Vulpian has shown, nerves are simple conductors, which are differentiated only by their mode of working, which depends upon the apparatus existing at their air extremities: namely, nervous motor cellule and muscular fiber for motor nerves, receptive nervous cellule and impressionable termination for sensory nerves.

Clothes Pins.

The Newark *Advertiser* says: Insignificant as the common wooden clothes pin is itself, its manufacture forms no mean part in American industries, and the numerous factories in New England and other States furnish employment to thousands of people. There are several large clothes pin manufactories in Pennsylvania and Ohio, and one in the vicinity of Saratoga, N. Y., each of which is capable of turning out a thousand boxes, or 72,000 pins, per week. There are several small factories scattered throughout Massachusetts, New Hampshire and Vermont, and all are run by water power. As a rule, those engaged in the manufacture of clothes pins are Quakers. Beech, white birch, and poplar are the woods used in making the article, the birch and poplar being considered the best. The machinery employed is very simple. The wood is first sawed into logs four feet in length, and then cut into small square sticks by means of a cutting machine. Each stick, after being rounded in a lathe, is passed into another machine which throws out a number of perfectly formed pins at one cut and with great rapidity. The pins are then thrown into a large revolving cylinder and smoothed by friction with each other. New York and Boston are the principal markets for this ware, and hence they are shipped in large quantities to the West, and to England and Australia. Over 100,000 boxes of pins are annually sent to England, and a corresponding number to Melbourne, Sydney, New Zealand, and the Sandwich Islands. Owing to the depression in business, during the past two years prices have fallen off 25 per cent, and some of the manufacturers in New England have ceased operations because they could buy cheaper from the West than they could manufacture themselves, besides saving the expense of packing and transportation. The price depends entirely upon the finish and number in a box.

An Observatory on Etna.

Professor Tacchini sends us a note read before the Genoese Academy on September 22, 1876, entitled, "On the Convenience and Utility of Erecting an Astronomico-Meteorological Station on Mount Etna," in which, after describing his experiences during a brief ascent on September 15 and 16, he expresses his views with regard to the establishment and most desirable fitting of an observatory on the mountain, to be mainly devoted to spectroscopic and meteorological observations.

Professor Tacchini ascended on the morning of September 15 from Catania to the station occupied by a party of the English and American expeditions on the occasion of the total solar eclipse of December, 1870, and found there a diminution of temperature of 73·8° Fah. He had taken with him a Dollond telescope of 3¾ inches aperture, a spectroscope of strong dispersion by Tauber, a small spectroscope of Janssen, an aneroid barometer, thermometers, and a polariscope. At 10h. 30m. A.M., on the 16th, a few detached clouds only being present, he remarked that the blue of the sky was much deeper than at Palermo or Catania. The solar light had a special character, it seemed whiter and more tranquil, as though due to artificial illumination by magnetism. Viewing the sun rapidly with the naked eye, it was seen as a black disk surrounded by an aureola of limited extent, projected on the blue ground of the sky. On interposing an opaque body before the disk the aureola was seen better, but always limited, and the pure blue sky terminated the same, which extended to rather more than half the solar radius; with the naked eye it was difficult to judge if the aureola was of equal breadth all round the disk, and the only thing well marked was the difference from the view obtained at the level of the sea; while the sky is ordinarily whitish about the sun, on Etna it remained blue, and the aureola acquired a better defined contour. With a helioscope the aureola was much better seen, and its border appeared irregular, and as though it were rather more extended at four points, which, at noon, corresponded to the extremities of the vertical and horizontal diameters of the disk. At 3 P.M., after interruptions from clouds (which in passing rapidly at short intervals produced a striking effect by the formation of a stupendous series of colored rings round the sun, containing all the gradations of color in the spectrum, a phenomenon new to Professor Tacchini), the Tauber spectroscope was applied to the telescope for examination of the solar spectrum, and the observer expresses his surprise at the fine definition of the lines and the extraordinary distinctness of the whole; the chromosphere was bright.

In the evening, at 10h., the spectacle of the starlit sky was novel and enchanting. Sirius appeared to rival Venus, the finer constellations acquired an altogether special aspect, and the appearance of the *Via Lactea* was astounding. The image of the planet Saturn was admirable, and the peculiarities of the ring and belt were seen to much greater advantage than at Palermo, shortly before leaving. Venus afforded remarkable proof of the rare quality of the sky of Etna. The planet shown with a powerful light, which cast shadows during the ascent of the mountain; it scintillated frequently like a star. The telescope showed, on the northern part of the phase, an oblong space, less illuminated than the rest of the disk, which Professor Tacchini says was "sicuramente una macchia del pianeta."

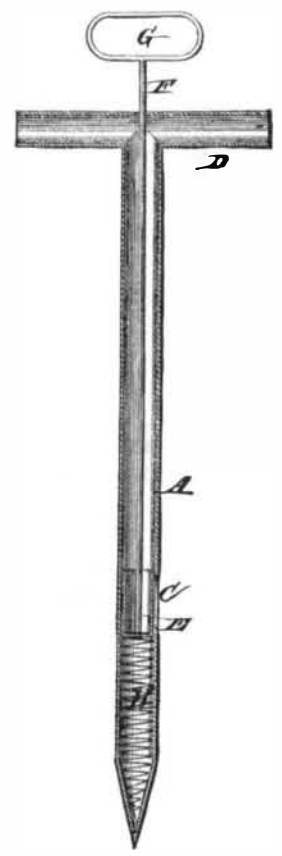
Spectroscopic observations were renewed on the following morning, when the sun had attained an altitude of 10°. The chromosphere was magnificent; the inversion of the magnesium and of 1,474 was immediately evident, which was not seen at Palermo with the same telescope.

With regard to the proposed observatory, which Professor Tacchini is desirous should be an accomplished fact before the meeting of the scientific bodies at Rome in September next, he proposes that it should be erected at the *Casina degl' Inglesi*, and should be named after Bellini, and that it should belong to the University of Catania. He suggests that it ought to be provided with a refractor of first-rate quality and of at least about 6·3 inches aperture; and he advises that, while the meteorological instruments, which should be adapted to the requirements of the day, as indicated by the London Congress, would remain constantly at the Bellini Observatory, a duplicate mounting might be provided for the refractor at some spot within the University of Catania, with its proper dome, the other being fixed on Etna: so that, while from June to the end of September astronomical observations could be carried on upon the mountain, during the winter they might be made at Catania, where the sky is a very good one; the astronomer would thus have only the object glass with its tube to transport to and fro. Professor Tacchini further suggests that accommodation for visitors should be provided, with the view to increasing their numbers, and that a certain payment should be made by them, to go towards the maintenance of the Observatory and its custodian.

We wish every success to the scheme thus energetically brought before the Italian authorities by Professor Tacchini, and have no hesitation in predicting important gains to Science from its adoption.—*Nature*.

IMPROVED GRAIN SAMPLER.

We illustrate herewith a simple device for sampling grain in bags or in bulk. A is a pointed tube, which is provided with an aperture, C, in one side. A tubular handle, D, is attached, and a valve, E, is provided for closing the aperture. A rod, F, is centrally attached to the valve, E, and runs through the handle, D, and is provided with a handle, G. A coil spring, H, is placed in the tube, A, between the coned end and the valve, E, for closing the said valve. When a sample from the interior of a body of grain is required, the tube, A, is forced into the grain as far as may be desired, when the valve, E, is pushed back, opening the aperture, C, allowing the grain to run into and partially fill the tube, A. The rod, F, being released, the spring, H, returns the valve to its normal position. The instrument is removed from the bulk of the grain, and the contained sample is poured through either arm of the tubular handle. The conical end permits the insertion of the tube in bags by displacing the meshes of the material of the bag as the tube is forced in.



Patented through the Scientific American Patent Agency December 5, 1876, by Mr. J. F. Gent, of Columbus, Ind.

A Salmon's Endurance.

Land and Water relates the following, concerning a remarkable battle lasting for sixteen hours, between a plucky sportsman and an obdurate salmon, before the latter was conquered: "On Friday, at four P. M., Mr. A. Crawshay hooked a fish below Haughton Castle, but did not land him till Saturday morning, the 24th inst., at eight A. M. Immediately after being hooked, the fish went down the river, taking out upwards of 100 yards of line. The water being strong and the fish determined, it was impossible to get him back. A wood by the water side made it equally impossible for Mr. Crawshay to follow his fish, and so things remained until a boat was brought at daylight next morning from some distance, by which means the wood was passed, and the fish at last landed on a gravel bed, in the presence of many spectators, some of whom had passed the night with the angler. The fish was a splendid male, forty inches long, and twenty-two inches girth; weight, 25½ lbs."

Portland Cement.

Mr. I. J. Mann, assistant engineer, Port and Docks Office, Dublin, has made experiments upon the qualities of Portland cement, which prove that coarsely ground cement when used neat (without sand) is stronger than finely ground cement; but when used with sand, as in concrete and mortar, it was found that cement containing only twenty-five per cent of coarse cement particles had but half the strength of mortar mixed with fine cement, the cement used being in each case four weeks old. On the other hand, extremely fine sand diminished the strength of the mortar to less than one half of that which was mixed with coarse sand.