

motor cell in the brain. When  $s$  is stimulated by a slight touch, the stimulus is transmitted up to  $S$ , thence to  $M$ , and down  $m$  to muscles, thus causing reflex contraction. This is increased when a number of slight touches are made over a limited surface, as in tickling, because then  $s$  and  $s'$  are both stimulated, and more motor impulses are produced. But when harder pressure is made on  $s$  the stimulus, instead of being confined to  $S$ , is transmitted to  $S'$  and thence to  $M$ , as well as direct from  $s$  to  $M$ . Thus two impulses are sent to  $M$ , which, starting at the same time from  $s$ , have had a different length to travel round. This different length, we suppose, is just sufficient to allow the impulses to interfere with one another in  $M$  and thus destroy each other's action in regard to motion. When  $s'$  is also irritated at the same time as  $s$ , the same interference is produced by a stimulus passing from  $s'$  to  $S''$ , and then to  $M'$ . But at the same time that the relation of  $S'$   $S''$  to  $M$  and  $M'$  is such as to produce interference and inhibition in regard to motor impulses, the relation to each other is such that the impulses mutually strengthen one another on their way up to the brain, and thus the sensation which we perceive on firm pressure is more definite and better localised.

On this hypothesis each successive layer of sensory and motor cells in the spinal cord may have several different functions: (1) Each cell may exercise its own sensory or motor functions in relation to the sensory or motor nerves connected with it; (2) it may exercise an inhibitory function on the sensory and motor cells above or below it, and also on other sensory or motor cells on the same plane with itself; (3) it may have a stimulating function on other cells above, below, or on the same plane as itself, increasing instead of abolishing their action.

The effect that any sensory or motor cell produces when stimulated is not determined then simply by the *properties* of the cell itself, but by its *relations* to other cells or fibres.

Motion, sensation, inhibition, or stimulation are not positive, but simply relative terms, and stimulating or inhibitory functions may be exercised by the same cell according to the relation which subsists between the wave-lengths of the impulses travelling to or from it, the distance over which they travel, and the rapidity with which they are propagated.

T. LAUDER BRUNTON

(To be continued.)

### NOTES

M. JANSSEN was present at the sitting of the Academy of Sciences on Monday, for the last time before his departure from Paris. He is very busy preparing his apparatus.

BARON NORDENSKJÖLD so very carefully considers every step he takes that we may be sure he has satisfactory reasons for claiming the reward of 25,000 guilders (about 2000*l.*) offered by the Dutch three centuries ago to the discoverer of the North-east Passage. Some surprise is expressed at the Baron's claiming a reward which lapse of time may be considered as having rendered obsolete. At the time it was offered the North-east Passage was regarded as a sea-route of the highest commercial importance, though this idea has been long exploded. Still to some extent Baron Nordenskjöld has shown that the old conception was not without justification, and although the passage is now of no value as a route to China and India, still the Swedish explorer has proved that as a trade-route it may be rendered of considerable value. Moreover as he is so disinterested, ardent, and successful a pioneer of science, we should be glad if the Dutch Government cheerfully admitted the claim. It may be remembered that the much larger reward offered by

our own Government to the discoverer of the North Pole was withdrawn many years ago.

At the last meeting of the Royal Swedish Geographical Society, on the proposal of Baron Nordenskjöld, the greatest honour at the disposal of the Society, the *Vega* gold medal, was conferred on Mr. Stanley. The medal, struck *in memoriam* of the *Vega* expedition "for geographical discovery," has only been twice before conferred—viz. in 1881, on Baron Nordenskjöld, and in 1882, on Capt. Palander.

IN 1880 the Belgian Academy proposed, as a prize-subject, the relations between physical and chemical properties of simple and compound bodies (completion of the knowledge of these by new experiments). The prize (a gold medal valued at 1000 francs) has been awarded to M. De Heen, engineer at Louvain. His memoir is an extension of one previously sent in, which gained high approbation for original work and results, but was thought badly-proportioned, so that the subject was re-proposed. The work is in five sections, dealing successively with specific heats, dilatibility of solids and liquids by heat, changes of state in relation to chemical composition, capillarity, and (here without original researches) molecular volumes, refraction, spectral analysis, and absorbent power of bodies for heat. The ample *résumé* M. Spring gives of this memoir (*Bull. Belg. Acad. No. 12*) indicates matter that must be of much interest and value to the physicist and the chemist.

PERHAPS never in the history of science, the *Lancet* says, has a distinguished career equalled in its length that of M. Chevreul, whose name is best known in this country in connection with his investigations on colour; and it is probably altogether unique for a *savant* to be able, at one of the most distinguished scientific societies in the world, to refer to remarks which he made before the same society more than seventy years previously. A few days ago M. Chevreul made a communication to the Académie des Sciences, and at its close he observed: "Moreover, gentlemen, the observation is not a new one to me. I had the honour to mention it here, at the meeting of the Académie des Sciences, on the 10th of May, 1812!"

THE death is announced of the Silesian botanist, Herr Johann Spatzier, aged seventy-seven; also of Herr Josef Knörlein, the entomologist, at Linz, on February 12, aged seventy-seven.

MOUNT ETNA is very active and ejects red-hot lava. At night the glare is constantly visible. A violent shock occurred on February 15.

WE find in the last number of the *Izvestia* of the Russian Geographical Society a note, by Prof. Lenz, on the cosmical dust collected by M. Marx at the meteorological station of Yeniseik. After having vainly searched for traces of cosmical matter, as he was advised to do by Baron Nordenskjöld, he discovered it finally on October 31, 1881. The wind was blowing in the evening with great force from the west, and during the night it turned into a strong gale, with some snow and rain. When M. Marx measured next morning the amount of water in his pluviometer, he remarked that it had a considerable quantity of suspended matter of a brick-red colour. After careful analysis this matter proved to consist of iron, nickel, and cobalt. Prof. Lenz does not doubt that the red dust found by M. Marx had a cosmical origin, and points out that it was observed on a day very near to the appearance of the November meteors.

AT Monday's meeting of the Paris Academy of Sciences, M. Tresca read a paper full of facts on the experiments tried at the Gare du Nord. Deducting certain work for the mechanical transmission to the generator, the result was 42 per cent. of energy conveyed instead of 35 per cent. with a smaller

velocity, but without deducting this work the alteration was very slight, 33 per cent. instead of 32 per cent.

THE second annual general meeting of the members of the London Sanitary Protection Association was held on Saturday at the rooms of the Society of Arts, under the presidency of Prof. Huxley. From the report of the council, presented to the meeting, it appeared that 368 new members had joined the Association during the year, and there was a total of 533 members. The total number of houses inspected was 362, and in the greater number of these serious errors in the sanitary arrangements of the houses were found and corrected. Twenty-one of them, or 6 per cent., were found to have the drains choked up, and no communication whatever with the sewer; all the foul matter sent down the sinks and soil-pipes simply soaking into the ground under the basement of the houses. In 117 houses, or 32 per cent., the soil-pipes were found to be leaky, allowing sewer-gas, and in many cases liquid sewage, to escape into the house. In 137, or 37 per cent., the overflow pipes from the cisterns were led direct into the drains or soil-pipes, allowing sewer gas to pass up them, and contaminate the water in the cisterns, and in most cases to pass freely into the house. In 263, or nearly three-fourths of the houses inspected, the waste-pipes from baths and sinks were found to be led direct into the drain or soil-pipes, thus allowing the possibility of sewer gas passing up them instead of being led outside the house, and made to discharge over trapped gullies in the open air as they should be. Prof. Huxley moved the adoption of the report, and stated that he had found himself unable longer to act as president of the association, owing to the increasing demands upon his time and energies. He was glad however to say that the Duke of Argyll had consented to succeed him in that post. The second annual meeting of the Sanitary Assurance Association was held at the office, Argyll Place, Regent Street, W., on Thursday. In the absence of Sir Joseph Fayrer, Prof. T. Hayter Lewis, F.R.I.B.A., was elected to preside. The secretary read the report of the council for the year 1882, from which it appeared that the inspection of houses, supervision of work, and issue of certificates had been continued on the plan initiated by the association in 1881. The financial statement showed that considerable progress had been made since the issue of the first report. The increase during 1882 had been nearly double that of 1881.

PART 2 of vol. ii. of "The Encyclopædic Dictionary," published by Messrs. Cassell, extends to the word Destructionist. The present instalment seems quite up to the standard of those already published, though for a work of such extent we think the account of the corona of the sun inadequate. On the other hand, to illustrate the term Darwinism, we have half a column biography of Charles Darwin.

THE last number of the *Izvestia* of the East Siberian Geographical Society, which has just reached us, contains a letter from M. Yurgens, chief of the meteorological station at the mouth of the Lena. When leaving Yakutsk with his companions, Dr. Bunge and M. Eigner, he took with him, besides provisions for eighteen months, a wooden house 42 feet long and 21 feet wide, 40 cwts. of petroleum, two cows with a calf, plenty of hay, bricks, lime, and even moss and clay, as there is no clay in the delta of the Lena. As is unfortunately too often the case with such expeditions, the barometers went out of order, and the observers found great difficulty in filling and boiling them again, so that the new meteorological station at Olekminsk has remained without a barometer. On this subject a correspondent writes: "A new portable barometer would be really an immense benefit for countries like Siberia, but in the meantime would it not be advisable for second-rank meteorological stations to make use of the aneroid? Of course the cor-

rection of each aneroid changes slowly but continuously, so that an uncontrolled aneroid has no value at all; but would it not be possible to control it, say every fortnight, by means of a hypsothermometer—a most reliable instrument if the observer follows the advice of Dr. Wild—and, after having boiled the water, leave the thermometer to cool, and make use only of a second reading, which is made when boiling the water for a second time. The observations of Dr. Wild, repeated by M. Krapotkin at the St. Petersburg Physical Observatory on five hypsothermometers taken from an optician's shop, proved that they were most reliable if the above-mentioned precaution were used. Might it not be useful to repeat these observations on hypsothermometers on a larger scale, in order to ascertain the degree of accuracy that might be expected from these instruments, which highly recommend themselves to travellers, and especially for small meteorological stations, by their portability?"

AN avalanche, or rather a landslide, took place at Gudvangsören, in the remote and narrow Nærö valley, in Norway, at the end of January last. The quantities of earth and stone precipitated into the valley destroyed several farms, and killed two women. Landslips have previously occurred in this valley.

It is remarkable that a disease like leprosy should flourish in Norway. From the returns just published this appears however to be the case, although we are happy to say that the number of afflicted is decreasing. At the end of 1875 there were 2008 patients reported in the country. At the end of 1880 the number had fallen to 1582. The disease is stated to be due to the consumption of food in an unwholesome condition, particularly fish, and also to uncleanness.

ON February 5, at 6.45 p.m., a meteor of unusual size and appearance was observed near Arvika, in Sweden. An observer who happened at the time to be passing a lake—Glasfjorden—states that he first observed the meteor high on the horizon, going from south-east to north-west, when, after about eighteen seconds, it suddenly changed its course to south-east. During its progress to north-west, calculated at eighteen seconds, the meteor made several digressions from its plane, while its size varied from that of an ordinary star to that of the sun, sometimes emitting a white, at others a yellow light, and at times discharging showers of sparks. At the point of changing its direction, when it was so near the surface of the lake that its path was reflected therein, it possessed a distinct tail, and with this adjunct it passed out of the range of sight in a south-easterly direction, after being observed for nearly fifty seconds.

AT Iserlohn (Rhenish Prussia) the fall of a meteorite was observed by several persons on the evening of February 1. Next morning the meteorite was found, having penetrated deeply into the hard-frozen soil of a neighbouring garden. Its weight is 165 grammes, its size that of a goose's egg. The surface is of a glistening black, and the point seems broken off.

A NEW substance, remarkable for its intense sweetness, being much sweeter than cane-sugar, has been lately found by Dr. Fahlberg in the course of some investigations on coal-tar derivatives (*Journ. Frank Inst.*). He designates it *benzoic sulphinide*, or *anhydrosulphamine benzoic acid*.

MR. H. HEATHCOTE STATHAM will give the first of two lectures, at the Royal Institution, on "Music as a Form of Artistic Expression," on Saturday, March 10. The subject of Prof. Tyndall's discourse on Friday evening, March 16, is "Thoughts on Radiation, Theoretical and Practical."

ON February 11, at 9.50 a.m., an earthquake was noticed at Szigeth (Hungary). It lasted four seconds. It was also felt in the Bosnian village of Looskrupa and its neighbourhood.

