Bernard's experimental correctness, but the soundness of his theoretical deductions, have been universally recognised by leading physiologists.

As an author Bernard was not so fertile as most of the scientists of the present day in France. The few works emanating from his pen are regarded as standard even outside the limits of his own country. This is especially true of his "Leçons de Physiologie Expérimentale Appliquée à la Médecine" (1865), a work valuable not only for the exceedingly thorough, systematic, scientific treatment of the subject, but also on account of the numerous indications for the application in medicine and surgery of the results gained by physiological research. His other works are "Leçons sur les Éffets des Substances Toxiques et Médicamenteuses," 1857, "Introduction à l'Étude de la Médecine Expérimentale," 1865, and "Leçons de Pathologie Expérimentale," 1874.

As a lecturer Prof. Bernard was not only peculiarly successful in the professor's chair, but was also distinguished among the *savans* of Paris for his able and lucid presentation of scientific facts to general audiences. He was busily engaged in the fulfilment of his professorial duties when the short sudden disease preceding his death interrupted the courses of lectures, and put an end to a life of rich and varied scientific activity.

As a mark of the universal respect and honour in which he was held, the authorities of the French Republic have decided that his funeral shall be at the expense of the nation. T. H. N.

A PHYSICIAN'S EXPERIMENT

AT a public lecture at Salisbury Hall, Oxford Street, recently, Dr. T. L. Nichols, of Malvern, related particulars of a "Dietetic Experiment" upon himself, which he had made with a view to solving a difficulty as to the quantity of food per diem which would best sustain health. He had always been temperate, his only excess being to be overworked. He rose between five and six, and worked well through the day, but avoided night-work. He seldom knew pain, never took medicine, and had excellent health. He usually ate twice in the twenty-four hours, at nine and five, because, for him, long rest for the stomach was better than shorter intervals. He appeared to sleep better for not eating after four o'clock. Every one should sleep upon, at least a quiet stomach. He had carefully noted the "dry weight" of the food he had taken, oatmeal, &c., he counted as dry weight. The weight of water forming a large portion of all food had not been reckoned, because it did not supply nutrition. Eggs and milk were perfect foods, but were largely composed of water. Milk was the most perfect food, though not the best for adults. He began on November 5, his food being chiefly bread, fruit, milk, and vegetables. During the experiment he had taken no flesh meat, wine, beer, spirits, tea, coffee, or tobacco. With regard to smoking, if it were the good thing people said it was, why not encourage their wives and daughters to smoke? Medical authorities differed as to the quantity of food that should be eaten, and it was a common belief that the more food we ate the greater would be our strength.

The first week, the lecturer stated, he lived on bread, milk, fruit, and vegetables, the total weight being 3lb. 9½oz, costing 3*s.* 1*d.*, *i.e.*, a daily average of 8 3/14oz., costing 5 2/7*d.*; this was slightly below his standard of 6*d.* a day. He felt better, and clearer, and brighter than usual. The second week he studied quality rather than cheapness, his food being Food of Health, milk and fruit. Total weight 4lb. 4½oz., cost 3*s.* 8*d.*, average per diem 9 5/7oz., costing 6 2/7*d.*, and nothing could have been better, physiologically, than the effect of that food upon him. His digestion was simply perfect, and the action of the whole system as good as it could be. He then discontinued milk as unnecessary. For the third week the total amounted to 3 lbs. 2 oz. = 1*s.* 9*d.*, giving an average of 7 1/7 oz. of food costing only 3*d.* per day. Milk was not so cheap for food as Gloster, Dutch, and American cheese; because they had to pay for the water it contained. Doctors recommended 2 or 3 lbs. of food daily to repair the waste of the system; but he asserted that the waste of brain atoms and nerve force could not be measured. The food eaten had to be disposed of at great cost of life and strength, and he believed the wisest plan was to eat the smallest quantity that would properly support the body. The fourth week, his food being similar, weighed 3 lbs. 6 oz., costing 1*s.* 2½*d.*, giving an average of 8 oz. = 2*d.* per day. He considered *8* oz. the *minimum* and *12* oz. the *maximum* quantity of food that should be taken per day. The total weight of his food during the four weeks was 14 lbs. 6 oz., costing 9*s.* 8½*d.*, average per week 3 lbs. 9½ oz.; per day 8½ oz., costing per week 2*s.* 5*d.*, and per day 4 1/7*d.* He then added soups, puddings, eggs, &c., and the fifth week his food weighed 3 lbs. 12½ oz., costing 3*s.* 4*d.*, being at the rate of 8 4/7 oz., a 5 5/7*d.* per day. For the sixth week the figures were 63 oz., at 2*s.* 1*d.*, or 9 oz. at 3 4/7*d.* per day. He had taken the diet without stimulants and had experienced a constant increase of health and strength and power to work, and his weight had remained at about 12 st. 2 lbs., except that at the end of the fourth week there had been a slight decrease which had since been recovered. The experiment had been fairly made upon an average subject and the results were satisfactory. He was convinced that they ought to give rest to the stomach, and that this would cure all cases of dyspepsia. The diet question was at the root of all diseases. Pure blood could only be made from pure food. Proper attention to diet would reduce the rate of infant mortality and remove many diseases. If the drink of a nation were pure and free from stimulating qualities and the food was also pure the result would be pure health.

SOCIAL ELECTRICAL NERVES

OUR modern Mercury since the year 1846, when the first system of electrical highways was laid down from the metropolis to Norwich, Southampton, Crewe, and Exeter, has not been idle. The wonderful development of the laws enunciated by Wheatstone which regulate the transmission of electric currents through solid conductors has resulted in some very remarkable inventions. At the date at which we write, from a crude beginning when with difficulty electric speech could be conveyed to such limited distances as Manchester and Norwich, we are now able to record the transmission of the Queen's speech to the confines of the empire in a few minutes.

Since the first introduction of private and social telegraphy in 1861, when Reuter first proposed to connect the Reporting Gallery of the House of Commons with the editor's room of each of the leading metropolitan newspapers, the electrical wire has become the means of reducing the cost of newspapers and of sending the news almost simultaneously over the country. Before that time the press paid large sums for "special correspondents," and papers were exceedingly jealous of each other's privileges.

Year by year the public have reaped additional advantages. Submarine telegraphy now includes within its grasp New Zealand, Japan, and the western shores of South America. The private wire system of alphabetical telegraphy between offices and works, carried out over the chief centres of the United Kingdom by Holmes in 1861–5, is in still further process of development. The express speed of the Wheatstone automatic system, duplex and quadruplex telegraphy, and the telephone of Bell, with its delicate electrical sound-wave indications, have all passed into practical existence and become the property of the civilised globe. Still, notwithstanding the advances indicated, much remains to be done.

R 2

A recent remarkable advance in the arrangements necessary for utilising the transmitting power of the electric fluid over the metallic nerves of speech we propose to bring briefly under notice.

In every electrical circuit, so far, the limit of usefulness has been restricted to the number of speaking stations or instruments that could effectively be placed in circuit upon the wire, and by the interference and confusion that arises when more than one instrument is used at the same time on such a circuit. To place upon an electrical circuit more than eight or ten instruments has been practically found impossible, the resistance of the instruments themselves being no small element of trouble, while the interference and interruption from multiple speaking has hitherto been found an insuperable difficulty, and one that has greatly tended to clip the wings and usefulness of our modern Mercury. A system that will obviate this trouble and enable any number of instruments to be placed in connection upon the same circuit without the possibility of interference or confusion, opens up a new era in the usefulness of the telegraph as applied to social purposes. It is such a system that will now be described, a system that promises to revolutionise the systems that at present spread over our chief manufacturing cities, and guard the security of property.

A simple illustration will explain the principles of this auto-kinetic system. Let us suppose a tramway to be laid down through the streets and suburbs of any of our large manufacturing centres; the two rails will thread the thoroughfares in every direction, and at each junction, or point of deviation down a bye street or other divergence, a set of points are laid. There is practically no limit to the number of these points that may be placed along the line; they may be one or one thousand. They remain quiescent and of no value as far as the effective running of the car upon the tramway is concerned until the car passes over the special set of points that happen to be required in the transit of the car from its starting-point to its destination. The other nine hundred and ninety-nine sets of points remain ready for use whenever the car has occasion to pass over them, and their presence does not in any way impair the usefulness of the tramway. The one set of points brought into use has been effective in so far that they have enabled the car to reach its destination, and, having been used for a moment, they have again reverted to their original position; while the fact of their being used has in no way affected the utility or efficiency of the remaining points should any be required to pass a car.

Again, suppose two or three cars to be running over various sections of the tramway at the same time, each car could pass over its points on its journey without detriment to the others, although all the cars might be passing points upon the tramway at the same instant of time; the using of these two or three sets of points would not interfere with the remaining 990 odd sets of points which at any moment might also individually be called into requisition. Now the system of electric circuits to be described may be likened to that of the tramway-line, with its accessory junctions and points. A system of two parallel wires is carried through a town. These wires in pairs may be supposed for the purpose of the present explanation to ramify continuously in every direction from a central station up this street and down that, and to embrace within their area the entire commercial and social community. Like the points in the tramway system, so upon the metallic circuit laid down, speaking instruments may be placed at various points and stations along the route, one or 1,000, because in the auto-kinetic system under notice, no instrument is in circuit unless it is, like the points on the tramway-line, being used. A car going over the points makes those points for the time being a portion of the tramway-line. So the circumstance of using the instrument upon the auto-kinetic system makes that instrument for the time being a portion of the electric circuit, and the wires are alone occupied by this transmission.

Should any second or third instrument in other portions of the circuit be brought into requisition at the same interval of time, no interference can take place. As no two cars could run over the same points on the tramway at the same moment, so no two instruments in the system under notice can speak at the same time, but the second or third instrument will automatically succeed the first in the order in which they stand along the line from the central station; just as two or three cars would pass the tram points in the order in which they had been placed upon the line.

The value of this new system of arranging metallic circuits and the instrumental connections, whereby the instrument is only a part of the electrical circuit so long as it is speaking, being thrown off immediately upon the cessation of the speaking current, cannot be estimated or appreciated except by a special reference to its practical development as regards the public and social telegraphy of a large city. This will be fully demonstrated in a subsequent paper by reference to the system of police, fire, and social telegraphs proposed to be shortly carried out for the Corporation of Glasgow, a system at once the most comprehensive and complete that has as yet been devised for affording multiple speaking stations upon the same conducting wires without possibility of interference or confusion.

(*To be continued.*)

OUR ASTRONOMICAL COLUMN

THE STAR LALANDE 19,034.—It is somewhat singular that this star, which was observed by Lalande, on March 21, 1797, and then rated 4½m. should have been so little observed since that year. It is not in Piazzi or Taylor, but it was observed three times by Argelander in the Bonn southern zones, viz., Z. 283, March 6, 1850, when it is called 6m.; in Z. 358, February 16, 1851, where we find it estimated 4m., and again in Z. 400, March 8, 1852, where it is 5m. These circumstances taken together appear to point to considerable variability. The star is in an isolated position on the borders of the constellations Hydra and Antlia. The mean of the Bonn observations gives for its position 1850·0, R.A. 9h. 34m. 26·40s., N.P.D. 112° 54′ 41″·0. Lalande's R.A. is one minute less than Argelander's—yet it looks right in the *Histoire Celeste*. Perhaps one of our meridional observers may find opportunity to revise its position and the star may be further recommended to attention on the score of probable fluctuation of light; though it should be remarked that there are other cases of discordant magnitudes in the Bonn southern zones for stars not yet entered on the list of variables, as in η Canis Majoris for instance, for which in three observations the magnitudes are 5, 3, and 2.

VARIABLE NEBULÆ.—Prof. Winnecke in directing attention to the nebula H. II. 278 as probably affording the first indications of *periodical* variability of a nebula, refers to the one discovered in Taurus on October 11, 1852, by Mr. Hind, as affording the single case where astronomers generally have been agreed as to variation. That nebula was detected on the morning of October 11, in one of the most magnificent skies experienced in the Regent's Park, being caught at once in slow sweeping, with the low power-comet eye-piece of the 7-inch refractor. Towards the end of the year 1876, in a fine sky with the same telescope and eye-piece, not a vestige of it was perceptible, and the same result attended several attempts to discern the nebula in 1874 and 1875. Prof. Winnecke mentions that it is not at present visible in our most powerful telescopes.

MINOR PLANETS.—Observers who are still engaged in the exploration of the region of the ecliptic have given