round the North Pole also, but less perfectly, and consequently the North Polar barometric depression, though decided, is much less than the South Polar. The reason of this difference I believe to be, that the North Polar cyclone is broken up by local air-currents due to the unequal heating of land and sea—a cause which scarcely exists in the South Polar regions, where almost all is sea or snow-covered land. JOSEPH JOHN MURPHY

"Towering" of Birds

IN connection with Mr. Romanes' valuable letter on this subject, the following note may be interesting. Rooks, I am informed, are sometimes killed by means of a paper cone containing birdlime, which is placed in a locality where these birds congregate. The rook inserts his bill and head into the cone; after a little time he rises vertically into the air and then falls dead. My informant—a traveller and sportsman of much experience—considered the upward motion to be due to the obstruction of sight, but the fact, I doubt not, will bear the same explanation as the towering in the case of a wounded grouse.

ARTHUR SUTHERLAND

IF it is of any importance to the question I may state that I have seen the following birds "tower:"—common snipe, field-fare, wood-pigeon, pheasant, partridge, common Australian duck (*Anas superciliosa*), large Australian white cockatoo, Australian Nankeen night heron, and Australian piping crow. I have shot many thousands of Australian duck, and towering has occurred among them pretty frequently. In one case, the notes of which I have, the duck began to rise almost immediately, and rose to a great height. I was indoctrinated in the cerebral injury hypothesis, but I soon found that this was untenable, for I made a habit of plucking and examining the heads of all towering birds which I could recover, and there were some among them with no wound whatever on the head. One such instance would have been sufficient to dispose of the hypothesis; but I was unable to substitute another for it. The explanation given by Mr. Romanes meets the conditions as far as they have come under my observations. A. N.

THE SOCIETY OF TELEGRAPH ENGINEERS

THE Annual General Meeting of this Society was held at The Institution of Civil Engineers, 25, Great George Street, Westminster, on the evening of Wednesday, the 13th instant.

The Report submitted by the President and Council showed that during the past year the number of Foreign Members, Members, and Associates had gone on increasing until the total of all classes now exceeded 800. Many valuable papers, it was stated, have been sent in, or promised, for discussion during the current session, almost every available evening being already taken up. The result of the ballot for the President, Vice-Presidents, and Council for the ensuing year, was announced, Prof. Abel, F.R.S., being elected President.

A *Conversazione* was held at Willis's Rooms on the evening of Monday the 19th inst., when about 600 were present. Amongst these were to be found almost all the prominent members of the telegraphic profession, as well as most of the representatives of the leading cable companies and men whose names are known in connection with electrical or telegraphic engineering. A magnificent display of apparatus had been got together, including everything in the shape of a novelty which had been introduced in connection with this branch of science during the past year. Many interesting experiments were shown, and for the more especial gratification of the non-scientific portion of the assembly, Mr. Apps and Mr. Browning of the Strand exhibited respectively their attractive vacuum tubes and microscopical objects.

Prominent amongst the features of the evening were the experiments designed and personally exhibited by Mr. Robert Sabine. These may be divided into three classes—(1) Showing the circulation of mercury under the influence of oxidation and deoxidation; (2) Measuring time to the infinitesimal portion of a second; (3) Showing the potential at various points and the speed of waves of electricity through submarine cables. Full descriptions of these experiments—now publicly shown for the first time—have been contributed by Mr. Sabine to the recent numbers of the *Philosophical Magazine*. It was on the first-named that Sir Charles Wheatstone was engaged at the time of his death in Paris, and, based upon the results which he obtained, he had constructed a form of mercury "relay" constituting one of the most delicate portions of receiving telegraphic apparatus that could possibly be devised. The duration of impact, when an anvil is smartly struck with a hammer, was measured by means of the arrangement in connection with the second series of experiments. A condenser is charged from a potential of one volt, and then discharged through a Thomson's reflecting galvanometer, the deflection on the scale being noted. The condenser is again charged; a hammer in connection with one side of it is then brought on to the anvil which is in connection with the other side; during the moment of impact partial discharge takes place, the amount of current escaping being known when that which remains is next measured through the galvanometer. All the factors being thus known, the question of the time during which the hammer and anvil were in contact becomes a matter of simple mathematical calculation. The third series, owing to the difficulty of obtaining a sufficient length of Muirhead's artificial cable, was scarcely so successful as the other two, but yet sufficient was done to show the principle involved.

Prof. Dewar's electrometer, by means of which the electromotive force of the most minute fraction of any galvanic cell may be measured, and which is based upon the oxidation and deoxidation of mercury, was also shown.

Amongst the apparatus Sir William Thomson's new form of marine compass proved to be a centre of attraction. The adjusting "spider"—the most recent addition—was absent, but yet enough was exhibited to show that the mariner might to a great extent now render himself independent of solar observations. Eight small magnetic needles are employed, and the friction of the various parts is reduced to a minimum. Two soft iron balls are placed, one on each side of the compass, and adjusting rods are employed in addition to them. The liquid gyrostat, already described in NATURE, was also amongst Sir William Thompson's collection.

Hanging around the walls of the room were carefully executed diagrams, showing what are perhaps the most valuable observations of earth-currents that have ever been made. They were exhibited and are now presented to the Society by Mr. H. Saunders, of the Eastern Telegraph Company. Availing himself of a broken cable between Suez and Aden, Mr. Saunders succeeded in obtaining simultaneous observations at both stations, and saw that they are graphically represented; the coincidence between the two is striking to a degree. It is to be hoped that so interesting a record as this may be brought prominently forward in the form of a paper, and so elicit a discussion upon a subject which, although occupying the attention of many, still remains one of the most obscure problems in connection with electrical science. Closely allied to these were the specimens of the movements of the declination and horizontal magnetic force and of the earth-currents as observed at Greenwich and sent up specially for the evening by the Astronomer-Royal. They comprised the observations for a calm and a disturbed day, and served to show very clearly the correspondence which exists between magnetic and galvanic disturbances.

A form of grapnel designed by Mr. Andrew Jamieson, assistant to Mr. Saunders, did not fail to attract considerable attention. The toes, instead of being rigid, are hinged on to a spring which yields under a pressure of two tons, and thus serves to release the toes from any rocks or foreign matter with which it may be brought into contact, whilst a hold is still retained of the cable.

A telephone—showing clearly the principle of the apparatus—was exhibited by the Messrs. Wray, and musical notes were accurately transmitted by means of it through about 120 feet of wire. The battery employed for the purpose was the thermopile, designed by themselves, which was also shown. Although at first sight very similar to the well-known form of Clamond, the thermopile of Messrs. Wray has several modifications which are undoubted improvements. The extreme brittleness so fatal to many of Clamond's bars is here got rid of by the introduction, for a distance of about two inches, into the alloy, of a tongue which really is only a continuation of the sheet-iron. At first sight one would be inclined to think that this would tend to lower the electro-motive force of the couple, but the reverse is stated to be the case. The asbestos rings are replaced by a framework composed of circular plates of earthenware supported on three tie rods which serve to give stability to the structure and remove from each ring of bars the superincumbent weight of all the others over it. But perhaps the main improvement effected is the method of heating the bars; instead of allowing the flamers to impinge directly on their ends, or admitting the products of combustion near them, an earthenware cylinder forms the centre of the pile. Around it and abutting hard upon it the bars are placed, and from a perforated chimney within the gas issues, and burning in blue jets, speedily raises the cylinder to a red heat, which is transmitted through to the ends of the bars.

THE PHYLLOXERA AND INSECTICIDES

SOME time ago we published in our columns a short account of the results of the investigations of various scientific men in France into the nature of the Phylloxera—that terrible scourge which is committing such widespread ravages among the French vineyards. Latterly we have received some reports communicated to the French Academy of Sciences dealing with the attempts which have been made during the last three or four years to arrest the mischief done by the insect, and ultimately to destroy it altogether, by means of some potent drug. It is obvious that the remedy to be employed must possess two qualities at starting, viz., it must destroy the insect and it must not damage to any great extent the vine. But, further, it is not sufficient that when put in close contact with the roots of a plant—as in a pot—it should prove fatal to the insect, it is necessary, if the remedy is to be of real practical value, that it should reach and destroy the Phylloxera on all the parts attacked by it in vines which are planted out in the open air. This is a real difficulty to overcome, as the remedy, be it in the form of solution or of vapour, cannot easily permeate the soil, sometimes clayey, sometimes sandy, on which the vine is growing, so as to reach and act upon the smaller root branches whose nutrition the Phylloxera diverts into itself.

M. Mouillefert, a professor at the School of Agriculture at Grignon, was the gentleman delegated by the Academy of Sciences to make the necessary experiments for the purpose of determining what agent was the most practically applicable to the destruction of the Phylloxera, and the account of the numerous substances employed by him with varying results fills no less than 200 pages of a memoir presented to the Academy of Sciences. It is not our intention here to do more than give a brief *résumé* of the results at which he arrived.

He divides the substances used by him into seven groups, the first of which was composed of manures of various kinds, such as guano, superphosphates, farmmuck, &c.; the second of neutral substances, as water, soot, and sand; the third of alkalies, as ammonia and soda; the fourth of saline products, amongst which were the sulphates of iron, copper, zinc, potassium, and ammonia, alum, and sea-salt; the fifth of vegetable essences and products, as decoctions of hemp, datura, absinthe, valerian and tobacco; the sixth of empyreumatic products; and the seventh of sulphur compounds. It was only with some of the substances contained in this last group that really satisfactory results were obtained, and it is to M. Dumas, the permanent secretary of the French Academy of Sciences, that the credit is due for suggesting the employment of the alkaline sulpho-carbonates of potassium and sodium and those of barium and calcium. All the other classes of remedies mentioned above were either without effect on the Phylloxera, or, in destroying it, also destroyed or damaged the vine.

The sulpho-carbonates, which were carefully studied by the great Swedish chemist Berzelius, are obtained by combining the alkaline mono-sulphides with the bi-sulphide of carbon, are either liquid or solid, and emit a powerful odour of sulphuretted hydrogen and bi-sulphide of carbon.

The alkaline sulpho-carb onates in the solid state are of a beautiful reddish yellow colour and deliquescent, but are not easily obtainable in that condition; the sulpho-carbonate of barium can be easily procured, however, in a solid state, and presents the appearance of a yellow powder, but little soluble in water. The sulpho-carbonates decompose under the influence of carbonic acid, forming a carbonate, and evolving sulphuretted hydrogen and bi-sulphide of carbon. These two latter substances are gradually liberated and, as they have a very powerful effect on the Phylloxera, one can understand that the sulpho-carbonate, placed in the ground, may prove, by its slow decomposition, a powerful insecticide. In the case of the sulpho-carbonate of potassium, over and above its toxic effect, it has a direct invigorating influence upon the vine, as the carbonate of potassium is an excellent manure.

The employment of the sulpho-carbonates as a means for the destruction of the Phylloxera was suggested to M. Dumas by the clearly-recognised need that there was of some substance that would evaporate less quickly than the bi-sulphide of carbon; he saw that it was desirable to apply the insecticides in some combination which would fix them and only allow them to evaporate gradually, so that their action might continue long enough in any one place to infect with their vapours all the surrounding soil.

But the task of eradicating the Phylloxera has by no means been accomplished by the mere discovery of the value for the purpose of these substances; there is the further difficulty of applying them to the vine in cultivation. One thing seems very certain, that in order to render the sulpho-carbonates practically efficacious in killing the insect, it is necessary to use water as the vehicle by which they may be brought to all the underground parts of the plant, and that the best time of year for their application is the winter or early spring, when the earth is still moist and the quantity of water necessary to be brought on to the ground by artificial means is consequently less. Mixed with lime in the proportion of 2 to 1, these sulpho-carbonates give a powder which can be spread over the ground before the heavy rains, that is, between October and March, and which will probably prove itself very efficacious.

The conclusion at which M. Mouillefert arrives at the end of his report is that the efficacy of the sulpho-carbonates is proved, and all that is necessary is to bring to perfection their employment in agriculture, which can only be accomplished by the intelligence and practical knowledge of the vine-grower who is well able to discover the economic processes of culture which are conducive to their successful application.

He ends by saying that "Science has accomplished its mission, and it remains for Agriculture to fulfil its part" in the eradication of the Phylloxera from the vineyards of France.