said that centuries ago gifts were given for the promotion of objects equivalent to those which modern universities hold in view, which, considering the pecuniary resources of those who gave them, should put our most open-handed modern millionaires to shame. England has been remiss of late in perceiving and promoting those interests that hinge on scientific and medical research. In this direction Germany has stolen a march upon us, for the various Governments in that Empire have unstintedly provided their universities with fully-equipped research laboratories, organised and conducted by professorial directors. A university is something more than a medical school, a workshop of research, or a home of science. It must have loftier aims than material advancement or commercial prosperity. It must provide for culture in its widest sense, afford intellectual guidance, encourage individuality, take cognisance of the theoretical problems that arise in the progress of civilisation, be a storehouse of knowledge, and a gymnasium for the exercise of all the powers of the mind; and to be truly a university it must be an organism, and not a mere conglomeration of parts. The one great objection to the multiplication of universities is that they may tend to become local seminaries, somewhat parochial in spirit, and fed exclusively from one district, for it would be a misfortune to a boy to pass from a secondary school to a university in the next street, where he would meet as his fellow-students only his old schoolfellows, and where, however amply fed with knowledge, he would still be surrounded by the same traditions and associations and shop amongst which he had been brought up. A provincial university is a contradiction in terms. What is wanted is a group of territorial universities, each with distinctive features of its own, specially adapting it to its environment, but all affording the most liberal instruction, the finest culture, the best intellectual discipline of the day, and collectively meeting the higher educational needs of the whole country.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 28.—"Regeneration of Nerves." By Dr. F. W. **Mott**, F.R.S., Prof. W. D. **Halliburton**, F.R.S., and Arthur **Edmunds**.

Five sets of experiments are recorded as a contribution to the discussion as to whether the regeneration of nerve-fibres is autogenetic or not. The experimental methods approach the subject in different ways, and in no case was any evidence forthcoming of auto-regeneration.

The facts recorded, taken in conjunction with those published by such observers as Cajal and Langley and Anderson, form, on the other hand, strong pieces of evidence in favour of the Wallerian doctrine that new nerve-fibres are growths from the central ends of divided nerve trunks. The experimental facts recorded by those who, like Bethe and Kennedy, hold the opposite view, are susceptible of easy explanation, mainly on the lines emphasised by Langley and Anderson, of accidental and unnoticed connection of the peripheral segments with the central nervous system by means of other nerves cut through in the operation. If such connection is effectually prevented, real regeneration of structure and restoration of function never occur.

Moreover, the regenerated fibres always degenerate in a peripheral direction, and in a peripheral direction only, when the link that binds them to the central nervous system is again severed. Perhaps the most striking of the facts brought out in the present paper is in reference to the development of the medullary sheath; this appendage of the axis cylinder appears earliest at situations near the point where the ends of a nerve have been joined together, and reaches the distal portions later.

What takes place in the peripheral segment of a divided nerve is a multiplication, elongation, and union into long chains of the neurilemmal cells. The same change is even more vigorous at the central termination of the cut nerve; and the view of the phagocytic and nutritive function attributed to this sheath has been supported independently by some striking observations of Graham Kerr which are referred to. At the central end this nutritive function is effective, and provides for the nourishment of the actively lengthening axis cylinders. At the peripheral end, unless the axons reach it, it is ineffective in so far as any real new formation of nerve-fibres is concerned. If, however, the axons reach the peripheral segment, the work of the neurilemmal cells has not been useless, for they provide the supporting and nutritive elements necessary for their continued and successful growth. The neurilemmal activity appears to be essential, for without it, as in the central nervous system, regeneration does not take place.

According to Graham Kerr, the formation of neuro-fibrillæ may possibly take place in the protoplasmic residue of the degenerated axis cylinder; according to Marinesco, this property is assigned to the neurilemmal elements themselves, a proposition which is extremely improbable, seeing that these elements are mesoblastic. In either case these two observers consider that the neuro-fibrillæ, however formed, are ineffective until they are activated by union with those of the central axons. The present observations do not entirely exclude this view, but, on the other hand, they lend it no support. The facts are readily explicable, however, on the theory that the nerve-fibres are growths from the central ends of divided nerves.

"The Ionisation produced by Hot Platinum in Different Gases." By Prof. O. W. **Richardson**. Communicated by Prof. J. J. Thomson, F.R.S.

The present paper forms an account of an experimental investigation of the steady positive ionisation produced by hot bodies, platinum being assumed to be typical.

The following are the chief results:—

The positive ionisation, *i.e.* the number of positive ions produced by 1 sq. cm. of platinum surface per second, possesses a minimum value, which depends on temperature and pressure, in most gases. The positive ionisation in oxygen at a low pressure (less than 1 mm.) is much greater than in the other gases tried. In oxygen at low pressures, and temperatures below 1000° C., the ionisation varies as the square root of the pressure; at higher temperatures and low pressures it varies nearly directly as the pressure; whilst at higher pressures at all temperatures the variation with pressure is slower, so that at pressures approaching atmospheric the ionisation becomes practically independent of the pressure.

The variation with pressure in air is similar to that in oxygen. In nitrogen and hydrogen the ionisation appeared to increase more rapidly with the pressure at high pressures than in oxygen. In very pure helium at low pressures there was a positive ionisation which was a function of the pressure.

The experiments on ionisation by collisions indicate that the positive ions liberated by hot platinum in oxygen are of the same order of magnitude as those set free by the collisions.

The positive leak in oxygen always oscillated around a certain value under specified conditions. It was, therefore, never steady, so the minimum values were taken. This variability was much less marked in the other gases.

The minimum value of the positive ionisation was found to remain practically constant with a wire heated during three months at various times (for 150 hours altogether) in oxygen at 900°–1000° C. Moreover, four different wires of different dimensions after continued heating in oxygen gave nearly the same value for the ionisation at the same temperatures and pressures.

The positive ionisation in air at constant temperature is smaller than that which would be obtained if the nitrogen were withdrawn, so as to leave only oxygen at a low pressure. The nitrogen, therefore, exerts an inhibiting effect on the oxygen.

The minimum value of the positive ionisation at a definite pressure in all gases appears to be connected with the temperature by the relation first deduced by the author for the negative ionisation. This relation may be written $i=A\theta^{\frac{1}{2}}e^{-Q/2\theta}$, where i is the ionisation, θ is the absolute temperature, and A and Q are constants. The value of the constant Q, which is a measure of the energy associated with the liberation of an ion, is in most cases smaller for the positive than for the negative ionisation.

These results refer to wires which have been heated in a vacuum, and subsequently in the gas considered, for a long time. New wires exhibit peculiar properties, especially in regard to their behaviour under different electromotive forces. Old wires also exhibit hysteretic effects with change of pressure.

The view is developed that the positive ionisation is caused by the gas adsorbed by the metal and the consequence examined of supposing the ionisation to be proportional to the amount of the adsorbed gas present. In the case of oxygen, by making the assumption that the rate of increase of the amount of the adsorbed gas is proportional jointly to the concentration of the external dissociated oxygen and to the area of "unoccupied" platinum surface, whilst the rate of breaking up is proportional to the amount present, a formula is obtained which agrees with the experimental results. This formula is that the ionisation $i=\mathrm{A}p/(\mathrm{B}+p)$, where $p=(k\mathrm{P}+\frac{1}{4}k^2)^{\frac{1}{2}}-\frac{1}{2}k$, P being the external pressure and k the dissociation constant of oxygen; A, B, and k are constants depending on the temperature, and are of the general form $a\theta^{\frac{1}{2}}e^{-b/\theta}$. Thus this view accounts for both the temperature and pressure variation.

The positive ionisation from the outer surface of a hot platinum tube in air is increased when hydrogen is allowed to diffuse through from inside the apparatus. The increase in the ionisation is proportional at constant temperature to the quantity of hydrogen escaping from the surface in unit time.

The negative ionisation from hot platinum in air is unaltered when hydrogen is allowed to diffuse out through the platinum.

These results show that neither the negative nor the positive ionisations usually observed with hot platinum heated in air or oxygen are due to residual traces of absorbed hydrogen.

A wire which has been heated in hydrogen furnishes a negative ionisation which is very big compared with that from a wire heated in oxygen at the same temperature. If the hydrogen is at a pressure of the order of 1 mm. the negative ionisation can be rapidly reduced to a much smaller value by applying a high negative potential to the wire. The wire subsequently recovers its ionising power if the potential is reduced again. Under these conditions the ionisation varies in an interesting way with the time. The reduction in the ionising power of the wire appears to be caused by the bombardment of the surface by positive ions produced by collisions.

When a platinum wire, which has previously been allowed to absorb hydrogen, is heated for a long time in a good vacuum so as to expel the gas, its ionising power does not appear to be reduced. The ionisation apparently is not a definite function of the quantity of gas absorbed by the wire.

PARIS.

Academy of Sciences, September 24.—M. A. Chauveau in the chair.—The colour and spectra of solar prominences: M. **Ricco.** Direct observation of the eastern group of protuberances during the total eclipse of 1905 showed that the colour was different in different parts, and especially at the edges, the latter showing a play of colours. The body of the protuberance was purple-red, the outside was violet-blue, the summit was pure violet, nearly white, and exceedingly brilliant. Two photographs of the spectrum were taken, enlarged reproductions of which are given.—The application of M. E. Borel's method of summation to generalised trigonometrical series: A. **Buhl.**—The amplification of sounds: M. **Dussaud.** The vibrations from any source of sound are received on a membrane, and this, either directly, or through a solid, acts on a jet of compressed air. The sound is in this way faithfully reproduced by the jet of air, the amount of amplification depending only on the power of the motor used in the compression.—The recent scientific cruise of the *Otaria*: Teisserenc **de Bort.**

NEW SOUTH WALES.

Linnean Society, August 1.—Prof. T. P. Anderson Stuart, president, in the chair.—The Australian Melaleucas and their essential oils, part i.: R. T. **Baker** and H. G. **Smith.** In this series of papers on the Melaleucas and their essential oils, of which this is the first, it is the authors' intention to follow out this research on the same lines as those adopted in the work on Eucalypts and their essential oils. Bulk material was employed in obtaining the results given in the paper. The Melaleucas are commonly known as "tea trees," and are distributed throughout the whole continent of Australia, and so are familiar plants in the bush. Two species form the subject of this paper, viz. *M. thymifolia*, Sm., and *M. linariifolia*, Sm.—*Vitis opaca*, F.v.M., and its enlarged rootstock: R. T. **Baker** and H. G. **Smith.** The occurrence of these enlarged rootstocks, weighing from 20 lb. to 25 lb., in the Australian species of Vitis, has been recorded by Baron Mueller, Thozet, Roth, and others, but no chemical investigation of their composition appears to have been made. Such an investigation forms the basis of this paper. From the results a close affinity between the carbohydrates of this "tuber" and those belonging to the true gums is shown, and the alteration products are more in the direction of the sugars than the starches.—Investigation of the disease in cattle known as "rickets," or "wobbles," and examination of the poisonous principle of the Zamia palm (*Macrozamia Fraseri*): E. A. **Mann** and T. I. **Wallas.** The authors for some time have been carrying on investigations on the above subject, as the result of which they have come to the conclusion that the effects upon cattle induced by eating the *Macrozamia Fraseri* are caused by the presence in the plant of acid potassium oxalate (salts of sorrel). This is a confirmation of the results of an analysis made by a Mr. Norrie prior to 1876, and reported to the Royal Society of New South Wales by Dr. F. Milford (Journal of the Society, vol. x., p. 295).

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