

What the actual limit of the atmosphere may be is not known, but experiment shows that for the lower strata, at any rate, the adiabatic distribution of temperature is not very far from the truth.

If we have two short columns, one of hydrogen and one of air, of the same length, and both at height h , then (putting $H\frac{\gamma}{\gamma-1} = K_a$ for air, K_h hydrogen, and N for the ratio of the densities, ρ_a/ρ_h at sea-level, the density of the air at h is $\rho_a(K_a-h)^{1/\gamma}$, and of the hydrogen $\rho_h(K_h-h)^{1/\gamma}$.

If the balloon carries no weight it will ascend until the densities are equal, which occurs when

$$h = NK_a \left(\frac{N\gamma-1}{N\gamma-1} \right),$$

or, since $N=16$ for air and hydrogen, and $\gamma=1.41$, $N\gamma-1=3.1$, $N\gamma=5.1$, and $K_a=17$ miles,

$$h = \frac{16 \times 17 \times 2.1}{5.0}, \text{ or } 11.5 \text{ miles,}$$

and no hydrogen-filled balloon could ascend higher than this if the temperature was the adiabatic temperature.

The ascents of the balloons with recording instruments, however, lead to the belief that at heights exceeding 6 or 7 miles the temperature is constant, or nearly so, so that the practicable height of ascent may very considerably exceed the 11.5 miles just mentioned.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The General Board of Studies will shortly proceed to the appointment of a Stokes lecturer in mathematics, in succession to Mr. J. H. Jeans, who is resigning the lectureship. The appointment will be from June 24, 1912, to September 29, 1913. The annual stipend is 200*l.* Candidates are requested to send their applications, with a statement as to the branches of mathematics on which they are prepared to lecture, and with testimonials if they think fit, to the vice-chancellor on or before May 22.

DR. A. H. GARDINER, Laycock student of Egyptology at Worcester College, Oxford, has been appointed reader in Egyptology in the University of Manchester.

REUTER reports that the King of Siam has sanctioned a scheme for the establishment of a University of Bangkok. There will be eight faculties, including medicine, law, engineering, agriculture, commerce, pedagogy, and political science.

THE annual conference of the Association of Teachers in Technical Institutions will be held at Whitsuntide in London, at the Polytechnic, Regent Street. A paper will be read by Sir Alfred Keogh, K.C.B., on "The Relations between the Imperial College of Science and Technology and Technical Institutions." There will also be a discussion on the important question of the cooperation of employers in technical education, following a paper on this subject by Mr. E. A. Atkins.

THE Bethnal Green Free Library, one of the pioneer institutions of the free library movement in Great Britain, has now completed thirty-six years of work without endowment or State aid. We are informed that a million readers, borrowers, and students have used the library and attended the classes in connection with it. A plan is now on foot to secure the perpetuity of the work, and a reserve fund of 10,000*l.* has been started, to which the King has contributed.

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Donations may be sent to the treasurer, Mr. F. A. Bevan, 54 Lombard Street, London, E.C.; the bankers, Messrs. Barclay and Co., at the same address; or to the librarian, the Free Library, Bethnal Green, London, E.

IN the House of Commons on May 6, Mr. Runciman said, in reply to a question relating to agricultural education:—"I am carefully considering by what means the various agencies, actual and prospective, for the provision of agricultural education and research and of technical advice in agriculture may most effectively be brought into cooperation. I think it will probably make both for efficiency and for economy if county councils and agricultural colleges will combine for the purpose of joint action in respect of many of their agricultural activities. I am not yet, however, prepared to make a definite statement on the subject, as to which I shall hope, before taking any decision, to learn the opinions of county councils and agricultural colleges."

THE University of Chicago has established a system of retiring allowances for professors or their widows. A fund of 500,000*l.*, says *Science*, taken from the 2,000,000*l.* Rockefeller gift of 1910 has been set aside for this purpose. This pension system will grant to men who have attained the rank of assistant professor or higher, and who have reached the age of sixty-five and have served fifteen years or more in the institution, 40 per cent. of their salary, and an additional 2 per cent. for each year's service over fifteen. The plan also provides that at the age of seventy a man shall be retired unless the board of trustees specially continues his services. The widow of any professor entitled to the retiring allowance shall receive one-half the amount due to him, provided she has been his wife for ten years.

THE University of the Philippines has, we learn from *The Manila Times* of March 7 last, conferred the honorary degree of doctor of science upon Father Jose Algue, director of the official weather bureau of the Government of the Philippine Islands. Dr. Algue, who was born in Manresa, Spain, in 1856, was in 1891 appointed assistant director of the observatory in Georgetown, D.C. In 1894 he became assistant director of the Manila Observatory, conducted by the Jesuit fathers, which in 1901 was made the official bureau. He held this position until the death of its founder, Father Faura, in 1897, when he was appointed director. Father Algue reorganised the meteorological service of the institution and perfected a system whereby the observatory receives daily telegraphic report from over thirty meteorological stations in the islands, ten in Japan, six in Formosa, four on the Chinese coast and three in Indo-China. He is a leading authority on earthquakes, and his observations in the Philippines, where seismographic phenomena are of such frequent occurrence, have been of great service. The University of the Philippines confers but one honorary degree each year, and its scroll at present bears only the names of Dr. Algue and one other honorary doctor.

THE experienced instructor appeals in teaching to as many of the pupil's senses as possible. The eye, for instance, is being more and more pressed into service to assist the ear in its work, and good lectures and school lessons are consistently illustrated by pictures and diagrams. The most recent of these pictorial aids is provided by the kinematograph, and it is satisfactory to learn that manufacturers and dealers are taking active steps to familiarise lecturers and school teachers with the possibilities of kinematography in increasing the value of their work as well as simplifying it. The proprietors of *The Bioscope*,

for example, are organising a series of invitation demonstrations to be given at Cinema House, Oxford Street, London, on Wednesdays, June 5 and 12, and Saturday, June 15, at 11 a.m., to show the educational possibilities of cinematography. The first performance is exclusively for members of the medical profession, and the films shown will be purely technical; the second will be devoted to natural science, and the third to the educational uses of the cinematograph. Short addresses will be delivered by authorities associated with the particular subject of the demonstrations. Tickets may be obtained on application to the office of *The Bioscope*, 85 Shaftesbury Avenue, W.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 2.—Sir Archibald Geikie, K.C.B., president, in the chair.—Dr. Marie C. Stopes: Petrifications of the earliest European angiosperms. The paper gives an account of the anatomy and the geological bearing of three new petrified angiospermic stems. These three fossils are all in the British Museum collections. Their age appears undoubtedly to be Lower Greensand (Aptian), and they are consequently the earliest angiosperms of which the internal anatomy is known. They are also of interest as coming from northern Europe at a time when angiosperms have hitherto been supposed not to have penetrated to that region. The three specimens differ so considerably in their structure that it seems justifiable to place them in three distinct, new genera.—Dr. F. Keeble and Dr. E. F. Armstrong: The distribution of oxydases in the plant and their rôle in the formation of pigment. The methods of investigation in general use do not admit of the determination in detail of the distribution of oxydases in the tissues of plants and animals. Hence the hypothesis that pigments are produced by the action of oxydases in colourless chromogens, though rendered probable by recent researches, cannot be regarded as established. Methods are now described which allow of the macroscopic and microscopic recognition of plant oxydases. By the application of these methods it is shown that in the Chinese primrose (*Primula sinensis*) the distribution of oxydases in the tissues coincides with that of the pigments of the flower and other parts of the plant. Thus, the hypothesis with respect to the rôle of oxydases in pigment-formation receives confirmation. It is proved that *P. sinensis* contains two peroxydases which differ from one another in their chemical reactions and in their localisation. It is proved definitely that dominant white flowers contain a substance which inhibits, but does not destroy, peroxydase. Experiments with recessive white flowers, the genetical behaviour of which indicates that they lack either peroxydase or chromogen, show that they contain peroxydase. Inasmuch as recessive whites contain no inhibitor of oxydase, failure to form pigment is to be attributed to lack of chromogen. The distribution of peroxydases in *P. sinensis* is to be regarded as typical of that in flowering plants generally, and the method appears to be capable of wide application in the study of the distribution of oxydases.—Dr. B. R. G. Russell: The manifestation of active resistance to the growth of implanted cancer. (1) The reaction which is evoked by the implantation of transplantable tumours of the rodent varies widely with different tumour-strains. The reaction has been determined by exercising all the growths in a series of animals on a given day, and then testing the suitability of the animals for the growth of a tumour-strain growing in 90 to 100 per cent. of normal animals. Some strains do not affect

the natural suitability of the animals, others render every animal resistant to re-inoculation, and the remaining strains occupy intermediate positions. (2) The individuality of the animal inoculated may contribute to the development of the resistance, although not to so marked a degree as the tumour parenchyma. (3) Simultaneous inoculation of a tumour-strain which induces no resistance, and a strain which induces resistance, may be followed by marked inhibition of the growth of the former strain. (4) Mice bearing progressively growing tumours can be rendered resistant to re-inoculation, but the tumour first inoculated need not necessarily be affected. (5) Repeated inoculation of tissues, such as mouse embryo-skin, which renders animals resistant to subsequent inoculation, has not been shown to have a constant effect upon the growth of established tumours. (6) The conclusions drawn in (4) and (5) support the view previously expressed that immunity to cancer is directed mainly against the stroma-eliciting properties of the cancer cells.—Dr. Wm. H. Woglom: The nature of the immune reaction to transplanted cancer in the rat. The paper discusses the reactions to tumour grafts displayed by normal rats and by those rendered resistant through preliminary treatment with tumour or embryo skin. The elaboration of a stroma and the provision of blood-vessels observed in normal rats is absent in refractory animals, irrespective of the method of immunisation.—T. Graham Brown and Prof. C. S. Sherrington: The instability of a cortical point. The reflex reactions obtainable from simple spinal preparations, even when elicited from one and the same receptive "locus," are subject to a certain amount of variability. The variability is somewhat greater when preparations which are decerebrate are employed. With loci in the motor region of the cerebral cortex the variability is greater still. The experiments reported in this paper were undertaken to examine the nature and extent of the variability of response observable in the reactions from one and the same locus in the motor cerebral cortex. It is found that the inconstancy of response amounts under certain conditions to an actual reversal of the effect of the cortical point as examined in the muscles of the limb. The factors determining this reversal of cortical effect are examined, and the reversal itself is studied by graphic registration. A prominent factor in the conditions underlying the reversibility of the cortical effect appears to be the quiescence or activity of points of cortex antagonistic in their effect to the particular point under examination.—Dr. J. W. W. Stephens and Dr. H. B. Fantham: The measurement of *Trypanosoma rhodesiense*. The paper contains the results of the measurements of 1000 *Trypanosoma rhodesiense*, 400 of which were measured from different hosts, namely, man, monkey, horse, dog, rabbit, guinea-pig, mouse, while the remaining 600 trypanosomes were measured from rats only. The authors' chief conclusions are:—(1) That in the case of dimorphic trypanosomes, like *T. rhodesiense*, samples of twenty trypanosomes from a particular slide on a particular day are too small, because the average length may vary by as much as 4.7 μ . (2) The day of infection on which the sample is taken is very important, as on one day 10 per cent. of stumpy forms may be found and on another day 95 per cent. The authors therefore recommend taking samples of trypanosomes from each day of infection of the host. (3) As the host from which the sample of trypanosomes is taken is probably also important, the authors suggest using the same animal throughout, e.g. a tame rat.

Geological Society, April 17.—Dr. Aubrey Strahan, F.R.S., president, in the chair.—H. H. Thomas and Prof. O. T. Jones: The pre-Cambrian and Cambrian