Research Items

Relational Learning in Chimpanzees. Using the multiple-choice method, R. M. Yerkes (*Compar. Psychol. Monographs*, **10**, No. 1; 1934) has studied in full detail the efforts of four young chimpanzees to solve a number of relational problems, such as choosing the right hand one of any set of compartments. He found that solution came by sudden discovery of the essential relation in about 50 per cent of the cases, and was fully retained in the control settings. Their ability to apply the correct solution to the control situations is markedly higher than that of other mammals, exclusive of other anthropoids and man, and their behaviour "obviously presages those expressions of human curiosity and originality which we call invention and discovery". The affective condition of the apes is of the greatest importance in relation to success or non-success. There is a general discussion of different types of 'learning'.

Possible Recovery of Trumpeter Swan. Few naturalists in Europe can have realised that during the last few years the magnificent trumpeter swan has been about that lower limit of numbers which generally heralds extinction. Probably the trumpeter swans in Yellowstone Park make up the majority of those now in existence, and of these there were in 1931 only 20 adult birds and 15 cygnets (Science Service, Washington, D.C.). The migrations of the species are limited in extent, and the fact that the Yellowstone individuals do not go beyond the protected area during the winter gives them a greater chance of survival. But even in the Park they have many enemies to contend with—coyote, otter, horned owl, golden and bald eagles—so that in a nest which has been under observation since 1925, not until 1933 did the pair successfully raise young at all. At present, the numbers appear to be at least holding their own; in 1932, there were 58 adults and 12 cygnets, and in 1933, 49 swans and 17 cygnets, against the 1931 total of 35; but until the increase is very much more marked it cannot be said that the trumpeter has escaped the danger of extinction.

Insect Enemies of White Flies in Asia. Mr. C. P. Clausen, of the U.S. Department of Agriculture, has published a paper on the insect enemies of Aleyrodidæ or 'white flies' in tropical Asia (*Philippine J. Sci.*, **53**, No. 3, March 1934). During a lengthy tour of the Eastern Orient, the author was able to accumulate a number of observations on this subject. Various species of the host 'white flies' are of economic importance, and a record of their natural enemies is of value in the event of projects, based on biological control, being contemplated. Up to the present, two species noted in tropical Asia have been effectively controlled by parasite introductions, namely, *Aleurocanthus woglumi* in Cuba and tropical America, and *A. spiniferus* in Japan. It is this genus which is perhaps the dominant one in tropical Asia. In number of species and general effectiveness, *Prospaltella* is the dominant genus of parasites in the region concerned and every species of *Aleurocanthus* shows attack by one or more species of *Prospaltella*. Second in importance, the parasite genus *Eretmocerus* requires mention, and, in general behaviour, its various species appear to be well adapted for purposes of attempting biological control. Of hyperparasites, the only species which were reared all belonged to the genus *Ablerus* which attacks indiscriminately all of the primary parasites of *Aleurocanthus*. Of predators, Coccinellid beetles were observed from time to time, but they seldom exercised an influence comparable to that of internal parasites. Larvæ of Drosophilid flies and of lacewings (Chrysopidæ) were also observed as predators, the latter group of insects often being the dominant one in this respect. An occasional predator was also observed in the larva of the Pyralid moth *Cryptoblabes gnidiella*. The paper is accompanied by a list of all the known enemies of Aleyrodidæ in the region concerned.

Pruning of the Tea Plant. In England, the main consideration of the grower in connexion with the practice of pruning has to be its effect upon flower and fruit production, but in the case of the tea plant the aim has usually to be to force a large number of buds into vigorous vegetative growth from which a crop of young leafy shoots may be gathered. Naturally this treatment means a great reduction in the carbohydrate reserves in the plant, and the result is often a very serious 'die-back' of the branch system of the bush. Mr. F. R. Tubbs, plant physiologist of the Tea Research Institute of Ceylon, describes in the annual report of the Institute for the year 1933 the results to date of the trial of a method of cutting back the bushes in which six main outer branches (the 'lungs') are left until about a month before the time of tipping, when they also are cut back to just above a bud. Such vigorous leafy shoots are thus able to contribute to the carbohydrate reserves of the bush before they are removed, and the result has been a considerable increase in the yield of shoots suitable for tipping and a reduction in 'die-back'. This last point is very important, as the withering snags are often places where disease organisms first obtain access. This preliminary report upon the experiments of the Institute is much in favour of the new practice which is termed 'rim lung' pruning. In Great Britain, snag production in the apple has recently been studied from the point of view of anatomy and development by Miss M. E. Wray (*Proc. Leeds Phil. Soc.*, **2**, part 12, May 1934).

British Rust Fungi. Mr. W. B. Grove and his colleague, Mr. C. G. C. Chesters, have recently published the results of some investigations on British rust fungi (*Trans. Brit. Mycol. Soc.*, **18**, Part 4, 265–275, April 1934: "Notes on British Uredinales, including one new to the British Isles"). *Uromyces sparsus*, the new British species, has been found on plants of sea spurrey (*Spergularia marina*), uredospores, teleutospores and æcidia being now known. *U. scirpi* produces teleutosori on *Scirpus maritimus* and æcidia on *Oenanthe crocata* (water dropwort), *Glaux maritima* (sea milk-wort) and possibly other plants. *U. acetosi*, *U. striatus*, *Puccinia Luzulæ-maximæ*, *P. cirsii-lanceolati*, *Melampsora euphorbiæ-dulcis* and *M. symphyti* are also described. The account is a useful addition to Mr. Grove's book, "British Rust Fungi", bringing several of the descriptions up to date.

Translocation of Nitrogen. Further information regarding the transport of nitrogenous materials in the cotton plant is given by T. G. Mason and E. Phillis

in No. 6 of the *Memoirs of the Cotton Research Station, Trinidad* (reprinted from *Ann. Bot.*, **58**, 315–333; 1934). Curtailment of nitrogen supply to the roots of the plant in the vegetative condition limits the growth of the apical region, and the young tissues absorb nitrogen at the expense of the mature leaves lower down. The stem tissues continue to gain nitrogen from the mature leaves, and the normal negative gradient in the stem persists, even during pronounced nitrogen deficiency in the apical tissues. As the plant passes from the vegetative to the reproductive condition the developing bolls withdraw nitrogen from the bark, which results eventually in reversal of the negative gradient. This suggests a gradient of storage, rather than structural nitrogen. Concentrations in the bark depend apparently on the age of the tissue, a greater proportion of storage nitrogen being found in the older lower parts than in the younger upper ones. Variation of the nitrogen supply to the roots, from conditions of deficiency to excess, produces no significant change in the direction of the bark gradients, which remain negative throughout. It is concluded that nitrogen continues to be stored in the bark even in conditions of nitrogen starvation. The non-withdrawal of calcium from the vegetative parts of the plant during bolling confirms the suggestion previously made that calcium is not normally mobile in the phloem. The facts seem to support the view that nitrogen travels by a diffusion process in the sieve tubes down a gradient of mobile nitrogen, but against a gradient of organic storage nitrogen.

The Cambrian of Shropshire. The Cambrian rocks of the neighbourhood of Rushton, Shropshire, described by Drs. E. S. Cobbold and R. W. Pocock (*Phil. Trans. Roy. Soc.*, B, **223**, 305; 1934) occupy a wedge-shaped area between the Wrekin fault on the east and the Church Stretton fault on the west. Structurally, the area consists of the broken core of an anticline in Charlton Hill, pitching southward, and the broken syncline of Rushton, also pitching southward. Lower, Middle and Upper Cambrian deposits are represented, and correspond closely with those of the well-known Comley area situated about 12 miles to the south-east, and almost all the faunal horizons found at Comley are represented at Rushton. A correlation table (pl. 39) shows the relation of the faunal horizons of Shropshire to those in the Cambrian deposits of other parts of the world. The main part of the paper, by Dr. Cobbold, deals with the palæontology of the deposits, with descriptions of several new species; the groups represented are Annelids, Brachiopods, Hyolithids, Trilobites, Conchostraca, with one Gasteropod and possibly a Polyzoon.

Annual Perturbation in the Range of Tide. R. H. Cockran (*Proc. Roy. Soc.*, A, May) discusses an annual perturbation in the range of tide, obtained originally from observations at Liverpool but apparently existing all over the world and consistent from year to year. The method of analysis consists in comparing the semi-diurnal component of the observed tides calculated by Doodson's method with the semi-diurnal component of the 'synthesised tide' obtained from the harmonic constituents. The existence of the perturbation was further studied by independent analysis of hourly heights and of high and low waters. The cause of the perturbation is not established. In polar waters, the change of boundary conditions due to ice may account for an annual perturbation; in narrow channels, the perturbation may arise from the superposition of an annual variation in the non-tidal current. These explanations are inadequate for the open ocean.

The Inter-electrode Capacitance of Valves. The introduction of the screen-grid valve has considerably increased the stability of the radio-frequency amplifier and the level of possible amplification. This improvement is attributable to the minuteness of the coupling between the input and output stages containing screen-grid valves, and is associated with the small value of grid-to-anode capacitance in such valves. Previous methods of measuring this small capacitance have required special apparatus and in particular a micrometer condenser. These limitations have been avoided in two methods developed at the National Physical Laboratory, and described recently by Mr. T. I. Jones in a paper entitled "The Measurement of the Grid-Anode Capacitance of Screen-Grid Valves" (*J. Inst. Elec. Eng.*, June). In the first method, the working value of the capacitance is deduced from measurements of the change in the input capacitance of the valve upon reducing the anode load from a known value to zero. It is necessary to know the amplification factor of the stage, and this is measured independently. The second method measures the grid-anode capacitance with the filament cold. The result is obtained in terms of the ratio of the readings of two voltmeters and the settings of a variable air condenser covering a range of capacitance over which it can be calibrated directly. Full details of the two methods and the results of typical measurements are given in the paper.

Dipole Moments of Substituted Mesitylenes. Some measurements of the dipole moments of halogen and nitro-substituted mesitylenes (F. Brown, J. M. A. de Bruyne and P. Gross, *J. Amer. Chem. Soc.*, June) are of interest in connexion with the theory of mutual interactions by induction of the substituent groups in a molecule proposed by Smallwood and Herzfeld in 1930 and tested in other cases. In mesitylene the inherent moments due to the three methyl groups symmetrically placed in the ring cancel one another, and the results thus allow of a study of the interactions between the methyl groups and the other substituents which is reasonably free from complication. The moments of the F, Cl, Br, I and NO_2 compounds are 1·36, 1·55, 1·52, 1·42 and 3·65, all in benzene (the last being 3·63 in CCl_4). The calculated values are 1·42, 1·60, 1·58, 1·43 and 3·99, in good agreement except in the case of the compound containing the nitro-group, which also shows anomalies in other compounds. The agreement in the case of the iodine compound is particularly interesting, since the iodine atom, with its large size and deformability, might be expected to be considerably affected by the close proximity of two methyl groups in ortho-positions.

The Imperial Standard Yard. In the paragraph on page 147 of NATURE of July 28, on the Imperial Standard Yard, the following words should have been added at the end, "in air at 62° F.", as the conditions for which Dr. Tutton's number of Cd_r wave-lengths in the yard, 1,420,209·8, was obtained. Messrs. Sears and Barrell give for air at 15° and 20° C. the numbers 1,420,210·81 and 1,420,204·02. They do not give the number for the official temperature 62° F. (16·66° C.), but by interpolation it would be 1,420,208·6, which is only 1·2 wave-lengths different from Dr. Tutton's value.