

Research Items.

MADI RAINSTONES.—Mr. F. H. Rogers contributes to *Man* for May some valuable notes on rainstones in three areas in East Africa—Meturu, near Dufile, on the Nile, Metuli and Laropi, also near Dufile. In Meturu there are two sets of these stones; one, of four stones, is said to have been brought from the Bari country by Moyi when flying from a jealous brother—the present chief is sixth in succession from Moyi. As there was a good deal of rain when Moyi arrived, he gave out that it was on account of these stones. The second set of stones consists of ten, which have been found from time to time during the reign of the present chief. They also are much venerated. On account of their special shape and smoothness they are considered to have been moulded by God. The stones are kept in a pot and nominally are in charge of the chief, but as they may be handled safely only by boys and old men, he usually deposes some one else to guard them and carry out the rain-making ceremonies. At present the guardian is the chief's mother. If the government has found it necessary to appoint a reigning chief from another family, the custody of the stones still remains in the hereditary rain-making family. When the rains fail, a meeting is called under the *rudu* or sacred tree, a bull is killed and eaten, and a general request for the rain-making ceremony is put forward, when the custodian is instructed accordingly. The custodian then kills a black sheep and anoints a young member of the family, who is under instruction, on the forehead, chest, back of the hands, and dorsum of the feet, with fat from the kidneys. He is then sent to fetch water from the River Areze, with which the stones are carefully washed, first separately, then in the pot. They and the pot are then smeared with fat and put away after the remainder of the water has been poured on them. The boy then goes to sleep for the night, lying prone on his face to ensure an equal distribution of rain over the whole country.

THE PHYSIQUE OF FILIPINOS.—In the *Philippine Journal of Science* for March, Juan C. Nañagas and Leon C. Santiago have analysed measurements of 713 university students, of whom 564 are male and 149 female. These measurements were not made by the authors themselves, and though both sets present certain deficiencies, those of the female students are in particular especially defective, and can scarcely, for the most part, be regarded as significant for the authors' purpose. The coefficient of variation in each group of measurement is such that the groups cannot be regarded as homogeneous. This is as might be expected, as the regional distribution of the students is wide and there is considerable blood intermixture, ranging from Filipinos of pure Malay type to those of near or distant Chinese and Spanish lineage, as well as hybrids of the various constituent elements of the population. The measurements here analysed are stature, weight with the derivative indication of build, and vital capacity, chest circumference, and the derivative index of constitution or robustness. The figures for the Filipinos are compared with university students of Great Britain and the United States where these are available, and the military measurements of Europeans, United States, and Mongolians—North and South China—Korea, and Japan; also Siamese civilians. In stature the Filipinos correspond with the South Chinese group, the measurements being Filipinos 163.3, South China 163.1, but in all the other measurements they show a surprising deficiency, both proportionate and absolute. The authors regard this as an indication

of serious underdevelopment and malnutrition among the students, and, as they may be regarded as a select class, of a still more serious condition among the average of the inhabitants. The figures relating to the female students, notwithstanding their defects, point even more emphatically in the same direction.

BIOLOGICAL STUDIES AT THE TORTUGAS.—An interesting summary of the work carried out at the Tortugas Laboratory during the summer of 1926 is contained in Year Book No. 25, 1925-26, of the Carnegie Institution of Washington. Investigations were conducted by eleven workers, Dr. W. H. Longley acting as administrative officer for the season. Floristic studies, both on algae and diatoms, were carried out, and the fauna, especially in the case of fish and amphipods, was further investigated. Dr. Paul Bartsch continued breeding experiments on cerions, while a series of interesting experimental studies were carried out by other workers. These included experiments on the electrical conductivity in the alga, *Valonia*; on the behaviour of trematode larvæ; on the organisation of echinoderm eggs; and on regeneration in the starfish, *Linckia*. Working with the micro-manipulation apparatus designed by himself, Dr. C. V. Taylor, together with D. H. Tennent and D. M. Whitaker, found, as a result of work on the eggs of *Lytechinus variegatus*, that, in opposition to Boveri's classic observations, there is no localisation of micromere-forming material nor any evidence that this substance has been differentiated before fertilisation. They found evidence, however, of the differentiation of ectoderm-forming substance over the entire surface of the egg even before fertilisation, the endoderm substance being excluded from the superficial layers of the egg. J. M. Valentine's work on regeneration in *Linckia* revealed a number of interesting points, notably that, though autotomised arms in this genus can regenerate an entire animal, this did not occur after isolated arms had been cut off, also that the latent period before the beginning of regeneration, where an arm only was concerned, was about a third of that necessary when a part of the disc was involved. Where arms were amputated at various levels the buds which developed nearest the disc grew most quickly.

A PARASITE OF THE GREENHOUSE WHITE-FLY.—In the *Bulletin of Entomological Research*, vol. 17, Part 3, March 1927, Mr. E. R. Speyer, of the Cheshunt Research Station, gives an account of the life-history of a small chalcid, *Encarsia formosa*, which parasitises the common greenhouse white-fly. It appears that an individual female *Encarsia* may lay its eggs in the pupæ of fifty or more of its host. The parasitic larvæ that emerge from these eggs destroy the white-fly pupæ: the skins of the latter become black, and this feature distinguishes the parasitised pupæ from normal white scales and pupæ. The parasite thrives best at high temperatures and is probably a tropical insect possibly imported into Great Britain from India. It is noteworthy that fumigation with hydrocyanic acid gas as practised commercially for the control of the white-fly is stated to leave the parasites unaffected. Whether this insect can be utilised as an auxiliary method of controlling the white-fly it would be premature to decide, as the author mentions, for example, that it is uncertain how it passes the winter, if indeed it is able to do so in Great Britain, without artificial heat. The species is parthenogenetic, males are scarce, and have so far only been found under conditions that were

preceded by low temperatures in September and October. In a glasshouse that was specially heated over the same periods, no males could be found. It appears probable, as in some other chalcids, that males play an insignificant rôle in the economy of the species and that habitual parthenogenesis prevails. This latter feature is an advantage from the economic point of view, in that pairing has not been arranged for and the insect evidently reproduces freely and would require comparatively little attention.

THE COTTON PLANT.—M. A. Bailey and T. Trought, of the Egyptian Ministry of Agriculture, working along the analytical lines first introduced by Dr. W. Lawrence Balls, have made some considerable contribution to our knowledge of the development of the cotton plant (Technical and Scientific Series Bulletin, No. 60, Ministry of Agriculture of Egypt). They adduce evidence to show that the normal period of development of a flower bud of cotton in Egypt is not less than 42 days, and the period required for boll development about 52 days. The development of the sympodial flowering branch is traced from an early stage, and it is shown that the four succeeding internodes are laid down before the first internode has reached its final length. The existence of regular flowering intervals in Egyptian cotton plants is demonstrated, and the intervals are shown to be of a similar order to those found by Harlan in the case of Sea Island cotton. Balls has directed attention to the fact that the daily flowering curves for a group of plants exhibit marked fluctuations from day to day, and further, that the curves for two different crops of cotton grown apart often exhibit a marked concordance in their fluctuations, to explain which he suggests some fluctuating environmental factor with a wide range of influence, e.g. day and night temperatures obtaining at commencement of flower-bud development. The present authors are unable to confirm this suggestion, and data are given to show that the minimum temperatures which occur when the bud primordia are being differentiated have no effect on the length of the interval between the flowers which open about 42 days later. They conclude from their evidence that flower-bud shedding is not only the principal factor affecting the fluctuations of average flowering curves, but also one of the most important factors affecting the yield of cotton in Egypt at the present time. A further paper on the nature and effect of bud shedding is promised.

CHROMOSOMES OF PIGEONS.—A study of the chromosomes of the pigeon, by Mr. Kan Oguma (*Jour. Coll. Agric. Hokkaido Imp. Univ.*, Sapporo, Japan, vol. 16, part 6), yields some interesting results. In counting the chromosomes from seven embryos belonging to four clutches of eggs, four embryos had 61 chromosomes and three 62, including in each case six very minute pairs. The unpaired or X-chromosome is a large one. In the spermatogonia of adult males, 62 chromosomes were counted, including two (XX) of the maximum size. These numbers are much higher than those found in early studies of the pigeon, in which the chromosomes were lumped through insufficient fixation. Also there is no evidence of a double reduction division, as reported by Guyer. These chromosome conditions indicate that the female is the heterozygous sex, which is in harmony with the genetic evidence for birds. It has long been held that each clutch of eggs in the pigeon produces one male and one female, but in 50 clutches examined both eggs were of the same sex as often as they were of different sexes. Contrary to the description of the chromosomes of fowls by Hance, no fragmentation of chromosomes

is found in the pigeon. Similarities between the chromosome groups of birds and reptiles (lizards) have been pointed out, each having both macro- and micro-chromosomes; but birds have also some chromosomes of intermediate size.

SUGAR BEET.—The fourth Rothamsted Conference (London: Ernest Benn, Ltd., 1927) deals with the culture and manuring of sugar beet. Some account of continental practice is given, which though of great value to the English farmer, must be thoroughly tested under local conditions before it can be used to full advantage. The yield of beets in England is at present unsatisfactory though the quality is good, but under existing terms of contract the total yield is of greater importance provided both conditions cannot be realised simultaneously. The methods of cultivation of the crop require much further experimental work. The question of manurial treatment is less urgent, though the latter has yet to be correlated with the varied conditions of soil and climate in Britain. The suitability of climatic conditions for growing sugar beet in England seems indisputable, and points to the possibility of success for the industry.

WOOD PULP FROM POPLAR.—Science Service has issued an illustrated popular account of recent experiments in crossing poplar trees to produce a rapidly growing hybrid tree for the production of wood pulp. Poplar gives a higher quality of paper than spruce, and the rapid depletion of forests for the production of wood pulp has led to this attempt to regenerate forests at a more rapid rate. Hybrid vigour is a well-known fact, observed by Darwin. Although the cause remains somewhat obscure, certain hybrid walnuts have long been known to grow at a rapid rate, and the best of these hybrid poplars are said to be capable of growing to a diameter of 18 inches in 18 years and yielding 100 cords of wood to the acre. There will be plenty of need for them, as the United States consumed a total of 5,565,831 tons of wood pulp in 1925. Once produced, the hybrids can readily be multiplied by cuttings, since they root as readily as willows. This is probably the first attempt to increase wood production by breeding methods, and it may lead to large results.

NEW SPECIES OF MOLLUSCA IN THE UNITED STATES NATIONAL MUSEUM.—The veteran Dr. Dall (now, alas, deceased), in continuation of similar work on the same lines, publishes some diagnoses of undescribed new species of mollusca in the collection of the United States National Museum. The shells dealt with belong to the Scaphopoda, Gastropoda, and Polyplacophora. Unfortunately the descriptions are not accompanied by figures, which would have added to the value of the paper.

EARTHQUAKES AND THE TILTING OF THE GROUND.—For some years before the Japanese earthquake of 1923, mareograph records revealed a continuous depression of the coast of Sagami Bay. This was succeeded by a period of repose, and then came the great earthquake and with it a marked elevation of the coast (*NATURE*, vol. 119, p. 254). Led by these observations, Mr. M. Ishimoto erected a pair of horizontal pendulums of the Zöllner type in a cellar of the Imperial University of Tokyo in order to determine if any tilting occurred before or after earthquakes. He has recently published a preliminary paper on the observations made last summer (*Bulletin of the Earthquake Research Institute*, Tokyo, vol. 2, 1927, pp. 1-12). The principal change of inclination

is diurnal, and closely follows the change of air-temperature. When distant earthquakes occur, the instrument shows no change of inclination. But after some near earthquakes the record shows a slight change, either of elevation or depression, in the direction of the epicentres. One observation may prove of considerable interest. On Aug. 3 a strong earthquake occurred with its epicentre in Tokyo Bay and 33 miles south of Tokyo. Two weeks before, there was an anomaly in the N.-S. component independent of the diurnal variation. Just before the earthquake, the pendulum indicated no change. After it, the record was lost owing to the fracture of the suspending quartz-fibres.

INTERFERENCE OF RADIO-WAVES.—In the *Zeitschrift für Hochfrequenztechnik* of December last, E. Quäck discusses the interference which is produced when using high-frequency radio-waves, by the waves which have travelled one way round the earth with those that have travelled the other way. In the short-wave radio messages sent last October between America and Berlin, the signals recorded on the tape were often mutilated in such a way as to suggest an interference of this kind. The Telefunken Company investigated the phenomena and proved conclusively that the waves did travel round the world in opposite directions. Assuming that the velocity of the waves is the same as that of light— 3×10^{10} cm. per second—the difference between the lengths of the paths of the two waves comes out to about 28,800 kilometres, the time lag being 0.096 of a second. In another experiment a signal transmitted from Nauen on a wave-length of 15 metres was received at the neighbouring town of Geltow. The first signal came directly over a few kilometres; the second was given by the waves which had travelled round the world. The time lag between them showed that if the waves had travelled with the velocity of light at a height of 182 kilometres above the earth's surface, the time difference between the arrivals of the signal would have been the same. It is curious that this so-called 'echo' effect has only been observed when using wave-lengths lying between 15 metres and 22 metres. Further investigation of this phenomenon may throw light on the method of the propagation of the waves through the upper atmosphere.

PIEZO-ELECTRICITY OF QUARTZ.—A new investigation by L. H. Dawson of the piezo-electric properties of crystalline quartz has brought to light a number of fresh facts (*Physical Review*, 29, p. 532; 1927). When a parallelepiped cut with an electric axis normal to a large face was explored, it was found that the local charges developed varied from point to point both in magnitude and sign, but the irregularities were of a permanent nature, surviving, for example, temporary transition to the β modification. The accepted Curie constant is only an average value when large areas are employed. The curved surface of a cylinder the end of which was parallel to the plane of the electric axes showed three positive areas and three negative areas, spaced symmetrically, providing a way of finding the electric axes when only the optic axis was known. When the temperature was varied, the piezo-electric effect passed through a maximum at 60° C., and the cooling curves showed a lag. All the crystals were cut under exceptionally good conditions, and appeared free from flaws when examined optically. The results seem to be consistent with the idea that large crystals are not perfectly formed, for which there is independent evidence from X-ray analysis, but the author considers that it will be difficult to account for them completely with the

present knowledge of the molecular structure of quartz.

COMPUTING MACHINES.—Computing machines of various kinds have become part of the normal equipment of most scientific departments and large business firms. It is of especial interest, therefore, to examine the relative merits of these machines. In a lecture delivered under the auspices of the Office Machinery Users' Association on Feb. 15, Dr. L. J. Comrie performs this useful function. According to him the ideal machine should perform all the operations with equal facility (adding or listing machines merely, are deficient in this respect), and the result should be visible immediately on completion of the operation. The keyboard should be uniform to touch for all numbers, and should not allow two keys to lock simultaneously. Moreover, it should not be necessary to reverse a special lever for subtraction, or, as in the case of most arithmometers, should the carriage require to be lifted at any stage; there should be tens transmission throughout the multiplier and product registers, and it should have a sight dial. A number of other important points are dealt with and the various machines are classified according to whether or not they possess these characteristics. In the case of the hand-operated barrel-type machine, Dr. Comrie holds that the Nova Brunsviga stands out above the others, but with the electrically operated machine the case is not so clear. Dr. Comrie evidently in his merit classification has in mind the use of such a machine in a department where every second saved in the computation is of importance. While this is so in large insurance offices, and even in statistical and mathematical laboratories, the ordinary scientific worker is not so pressed usually that he requires to consider a minute or so gained on a long calculation. Where the machine is to undergo strenuous operation of the type contemplated, the life of the machine, wear and tear and elastic fatigue become important considerations. These factors do not appear to have been dealt with by the lecturer.

FLAME MOVEMENT.—Among the large amount of work carried out by the Safety in Mines Research Board, one of the most important subjects is the study of the propagation of flame in closed vessels. Paper No. 32, published by H.M. Stationery Office (1s. net), by O. C. de C. Ellis, contains a summary of the principal methods used in the study of flame movement. Although the earlier methods enabled the speed of the flame to be measured, it was not until the method of snapshot photography had been devised that a close determination of the mode of propagation could be made. This method is fully described in the paper, and is illustrated by means of a number of excellent plates.

ANALYSIS OF COAL.—We have received a copy of the report on the methods of analysis of coal which has been prepared by the Fuel Research Division of the Department of Scientific and Industrial Research. The methods which this report (London: H.M. Stationery Office, 1927. 9d. net) describes have been adopted by the Research Department for the purpose of its work on coal, and it is hoped that they will be adopted generally by analysts throughout Great Britain so that all results of coal research may be strictly comparable. The paper contains detailed information with regard to the analysis, and the determination of the caking index and the calorific value of a given sample of coal. Two methods of carbonisation assay are described, and an example illustrating the form in which an analysis should be reported is included.