

Research Items

Early Settlers in Virginia

IN the course of the recent meeting of the American Association for the Advancement of Science, at Richmond, Va., during December 27-31, R. Bennett Dean presented a study of early settlements of various nationals in the Colony. Of the French the first to land came with the Governor, Lord De la Warr, in 1610. They planted vines and mulberry groves and were responsible for the establishment of the silk industry. In succeeding years of the seventeenth century, great numbers of Huguenots followed, especially from Saintonge, Languedoc and the Gironde; but the greatest single movement took place about 1700, when on one occasion four boats with about eight hundred passengers sailed from London. After the revocation of the edict of Nantes in 1685 more than 1,000 settled at Mannakin on the upper James. By 1800 the French had spread to nearly every community in Virginia. The highest percentage is now in Powhatan county. Four Germans were in the first boat to arrive at Jamestown. By 1623 there were at least 109 German, Swiss and Dutch, chiefly, artisan, settlers in Virginia. Two thousand immigrants from the Rhenish Palatinate in 1707 were the ancestors of the settlers in the Valley of Virginia. Between 1690 and 1716, the persecution of the Protestants in Germany brought settlers to the forks of the Potomac. Some afterwards moved into the Shenandoah valley. These now are the areas with the highest percentage of Germans. One of the earliest settlements of the Scots was in 1649, when 320 Royalists arrived. In 1732 Scots, largely from Pennsylvania, entered the Valley, founding Presbyterianism in the United States. More numerous and more active than the Germans, they spread over and outside the State, and were an effective buffer against the Indians along the Alleghanies, enabling the colonists to consolidate their gains. In the earlier period of its history, Richmond was entirely occupied by Scots.

Mbali of Southern Angola

THE designation 'Mbali', according to the interpretation given by the people themselves, means 'civilized black'. These people may be defined, according to the Rev. P. E. C. Estermann (*Africa*, 12, 1; 1939), as descendants of former slaves, who through employment on plantations, have assimilated a large number of the cultural elements of their old masters, and at the present day readily take to earning their livelihood among the Whites as domestics and artisans. The language of this people, originally of a mixed origin, is Kimbundu, mingled plentifully with Bantuized Portuguese terms. Their material culture has almost completely given way to elements which have been imported from Europe; but in mentality and in beliefs they are still predominantly Bantu. This appears especially clearly in their behaviour in relation to sickness and death. Belief in the incidence of sickness as due to the action of sorcerers is general. The medicine man is as much diviner as healer. The Mbali resort to them no less readily than do other natives, though the ritual employed differs in details, more especially in

the introduction of certain Christian features. The healing ceremonial culminates in a sacrifice of a victim which is killed by the patient after the onset of 'possession'. As the victim falls, the patient throws himself upon it and drinks the warm blood. In burial ceremonial, before the body is committed to the grave, the widespread Bantu rite of interrogation of the dead is performed. Two men raise the shroud, while a third asks the deceased who has been responsible for his death, slaying him by sorcery. If the sorcerer is present, this will be indicated by the movement of the shroud. If the person indicated is a man of courage or position, the accusation may be ignored. If, however, it should be a person of inferior standing, it may be that to avoid the consequent unpleasantness he will have to leave the country. Mourning lasts a fortnight and is brought to a close by a feast held at night, in which dances are accompanied by obscene songs.

Double Monsters

PROF. TAKU KOMAI and his colleagues have issued a series of four papers (*Mem. Coll. Sci. Kyoto Imper. Univ.*, B, 19, 155-253; 1938) dealing with the various types of twins and double monsters which occur in fishes, reptiles, birds and mammals. The literature is reviewed, and several new instances are given. The problem of situs inversus viscerum is recounted in some detail for fish embryos, and Komai comes to the conclusion that this curious derangement is associated with a disturbance of the normal developmental process and is due to a general, rather than a local, cause. There would appear to be a physiological gradient passing from the left to the right side of a fish embryo; and the derangement of this gradient brings about the situs inversus viscerum. Cranio-pagus, a rare form of duplicity in snakes, is described for *Hemibungarus japonicus*. The numerous types of katadidymi in chicks and ducklings are surveyed and tabulated in detail. Five specimens of mammalian double monsters are recorded. The many illustrations add to the usefulness of these papers.

Hæmoglobin Production in Anæmia

P. F. Hahn and G. H. Whipple (*J. Exp. Med.*, 69, 315; 1939) find that a low protein intake causes limited hæmoglobin production in anæmic dogs. The dog on a limited protein intake was unable to produce the usual amount of globin and therefore of hæmoglobin even in the presence of a large amount of iron. The same result was obtained whether the iron was given by mouth or intravenously, the dog, made anæmic by withdrawal of blood, being unable to produce the expected new hæmoglobin related to the iron intake when the protein intake was kept at low levels. The dogs could be kept in perfect health and weight equilibrium during these long periods of limited diet intake and anæmia. Under the stress of protein limitation, the proteins of salmon muscle, banana and carrot were well utilized, and only 7-8 gm. of these food proteins were required to produce 1 gm. of new hæmoglobin. These experiments clearly showed that the iron content of liver was not wholly responsible for its potency in anæmia due to hæmorrhage.

Reptiles and Amphibians of the Sahara

WE think of the Sahara as a region in which vegetation and, along with it, animal population are reduced to a minimum, yet in his two missions of exploration (1929-32 and 1934-35) H. Lhote contrived to capture alive 35 specimens of snakes, 115 lizards and 76 amphibians. His journeys traversed the Sahara from north to south, but they also touched the Sudan, and that to some extent accounts for the numbers of his specimens. With F. Angel he now describes the collections as representing the following numbers of species and subspecies: one crocodile and one chelonian, 25 lizards, 17 snakes, 8 frogs and toads (*Bull. Com. d'Etud. Hist. Sci. Afrique Océ. Française*, 21, 345; 1938). Several of the species are described as new to science. Perhaps the most interesting part of an ecological region of great diversity is the area Tanzeouft and Ténére, the most desert of all the Sahara, forming a belt from Atlantic to Red Sea, which is an impassable barrier to all small species. Here the fauna is reduced to small forms able to subsist upon the sparse and scattered tufts of vegetation. The oases also constitute regions of ecological interest, for these isles of man-planted vegetation, lost in a vast sea of sand, form the only areas which can preserve the amphibians still persisting in the Sahara.

Evolution and Relationships of Elasmobranchs

J. A. MOY-THOMAS has recently reviewed the considerable amount of modern work on early fossil fishes and put forward his views regarding the evolution and relationships of the elasmobranchs (*Biol. Rev.*, Jan. 1939). Elasmobranchii has been used as synonymous with Chondrichthyes and not in the sense that it is used by some authors, who include in it a number of other early groups which the author, with justification, considers to be not closely related. The group arose in the Upper Devonian, and *Cladoselache* represents an approximation to the ancestral form. They early differentiated into two lines separable, *inter alia*, by their tooth structure, the Selachii and the Brachyodonti; the former having been derived from the Cladoselachii and including the living elasmobranchs, sharks, skates, rays, etc. The origin of the latter is not so clear, and their living representatives are the Holocephali. Reasons are given for regarding the Acanthodii, Arthodira and other placoderms as not closely related to the elasmobranchs. They are a diverse group, with a number of characters in common, and are at a lower grade of evolution than the elasmobranchs.

Effect of Euployploidy on Chloroplasts

EUPOLYPLIIDY in plants induces certain heritable changes such as increase in amount of nucleolar substance, increase in size of nucleus, amount of cytoplasm, volume of cells, etc. The size of the plants themselves is also affected; but the relation between euploid chromosome alteration and size varies, since some euploid plants are larger whereas others are smaller. The effect of euployploidy on the size of the chloroplasts has recently been studied by D. Kostoff and A. Orlov, working on *Nicotiana* and *Solanum* (*Ann. Bot.*, New Series, 2, No. 8, 883; 1938). From the data obtained, it is clear that chloroplasts do not increase with an increase in the chromosome number. In fact, there is a tendency to smaller size than in the diploids or in the parental species. In only one case (*N. rustica* × *paniculata*) was the average diameter of the chloroplasts of the amphidiploid larger than the average diameter of

those of the parent species. Since tetraploids are usually deeper green in colour, the colour difference is probably due to a larger number of chloroplasts in the cell.

Seeding from Severed Shoots

A DISCOVERY of importance to the farmer and gardener is the fact that once the flowers are open some of the common weeds can ripen their seeds on the severed shoot just as well as on the growing plant. N. T. Gill has carried out investigations into this question (*Ann. App. Biol.*, 25), and an account of his results is also given in the *Gardener's Chronicle* (No. 2716, 105). The most dangerous weeds in this respect are ragwort and sow thistle, for seed from cut shoots of these species showed as good viability as when allowed to ripen completely on the parent plant. Cut shoots of groundsel, on the other hand, gave only 35 per cent germination compared with 90 per cent from ripened seed. Other weed seeds such as dandelion, cat's-ear, creeping thistle, curled dock and stinging nettle can only germinate if the seeds are fully developed, but the inconspicuous nature of the flowers in some of these plants makes it unwise to assume that it is safe to leave cut portions on the ground. The stage of maturity may also exert an influence on the length of dormancy of the seed. In the case of shepherd's purse, mature seeds can germinate in the autumn or spring, but half-ripe seeds wait until the spring. Corn speedwell and chickweed showed the same behaviour. *Datura stramonium*, on the other hand, behaved quite differently, for ripe seeds either germinated at once or lost their viability after four weeks, whereas immature seeds retained their germinative capacity for a year or more.

Frost Damage to Fruit Trees

THE serious reductions in crop suffered by fruit growers in recent years have led the Ministry of Agriculture to institute an inquiry into the effect of meteorological factors on the distribution of frost damage. Preliminary results obtained by C. E. Cornford have recently appeared (*J. Pom. and Hort. Sci.*, 16, 291; 1939). A study of micro-climate in relation to topography has brought out several interesting facts which may be of importance in attempts to combat frost injury. On certain clear nights when a calm exists in valleys, the occurrence of a light and relatively warm 'hill-top wind' has been demonstrated. This is able to influence the force and direction of a local katabatic wind on a neighbouring slope, producing a calm belt or 'neutral zone' across the slope, or a movement of air along the contours, according as the wind blows directly or obliquely on the slope. Such a calm belt may be a suitable site for orchard heaters. It was shown that on most radiation nights the air temperature over undulating country varied with altitude, the highest places being the warmest. The temperature, however, measured at a height of 3 ft. above the ground, was equally affected by the nature of the vegetation. The lowest minimum temperatures occurred over grassland, whilst the air above bare soil and that in woods with a complete leaf canopy was relatively warm, often 6° F. above that over grassland. Only exposed grass was able to produce relatively cold air above it on a radiation night, grass under trees in a leafy apple orchard causing no reduction. It is suggested that risk of frost damage in an orchard in the blossoming period may be reduced by reducing the amount of long grass exposed to the sky.

Anomalous Dispersion of Rayleigh Waves

THIS is the subject of a second paper on "Anomalous Dispersion of Elastic Waves" by K. Sezawa and K. Kanai (*Bulletin Earthquake Research Institute, Tokyo Imperial University*, 14, Part 4, November 1938). The densities and elastic constants of the surface layer and the subjacent material are symbolized, and the velocity equation of dispersive Rayleigh waves is determined in terms of these. Six cases of μ'/μ ranging from 1 to 0.4 are then assumed and the consequences investigated. It is found that when the stratification approximates to Wiechert's condition ($\varphi'/\varphi = \mu'/\mu = \lambda'/\lambda$), the velocity of Rayleigh waves for an intermediate value of L/H is considerably higher than that of the usual Rayleigh waves. In this particular instance there is a second dispersion curve that passes through the point corresponding to the velocity of Stonely waves. As the stratification approaches the usual type, the dispersion curve tends to assume the normal dispersion type. When density increases with depth more rapidly than elasticity, as may often occur in the earth, the dispersion curve becomes quite anomalous, and beyond a certain critical condition there should exist a range of L/H within which no surface waves of permanent type can exist.

Deep-Focus Earthquakes in Central Asia

S. P. LEE has made a study of four of these shocks occurring between 1933 and 1935, using data obtained from seismograms (*Seis. Bull., Chiufeng, China, Seismic Station*, 3, Nos. 2 and 3; 1935 [received 1938]). The shocks were chosen by their characteristics as enumerated by Scrase and chiefly by their lack of notable l and m phases. The method of investigation was first to find the epicentre by assuming the travel time (T) of the P wave to be connected with the epicentral distance (Δ) by the formula $T = A + B\Delta + C(\Delta/10)^3$ and fitting in the constants A , B and C by the method of least squares, afterwards applying the Geiger method to correct the approximately determined epicentre. The depth of focus was then determined by four methods: (1) from first principles, (2) by the Brunner chart, (3) by Scrase's method, (4) by the time interval between $PKKS$ and P' . The results for the four shocks obtained by the author were as follows: (1) Epicentre φ 35° 29', λ 70° 05', T_0 1933 Jan. 9d. 2h. 1m. 38s.; depth of focus, 0.045 of earth's radius. (2) Epicentre φ 36.1°, λ 70.7°, T_0 1935 Feb. 3d. 2h. 10m. 42s., depth of focus 0.023 of earth's radius. (3) Epicentre φ 36.4°, λ 70.8°, T_0 1935 April 3d. 11h. 11m. 56s., depth of focus 0.031 of earth's radius. (4) Epicentre φ 38.1°, λ 70.9°, T_0 1935 Oct. 11d. 4h. 20m. 31s., depth of focus 0.047 of earth's radius. The author notes that the epicentres are all near φ 36°, λ 70°, near the inflexion of the Hindu Kush, and proposes to investigate the method of origin further.

Crystal Structure of Ammonium Cadmium Chloride

IN crystalline cadmium chloride $CdCl_2$, there are octahedral $CdCl_6$ groups condensed into layers, each chlorine atom being adjacent to three cadmium atoms. Tetrahedral co-ordination is shown by cadmium with cyanide groups in $K_2Cd(CN)_6$ and with sulphur, selenium and tellurium atoms in the sphalerite and wurtzite type crystals CdS , $CdSe$ and $CdTe$, and might occur with chlorine also. There are hence two types of structures which might well occur for the complexes $(CdCl_3)_2$, the first involving

octahedra with shared corners, as in the cubic crystal $KMgF_3$, and the second involving rings or chains of tetrahedra as in the metasilicates. H. Brasseur and L. Pauling (*J. Amer. Chem. Soc.*, 60, 2886; 1938) have determined completely the structure of the orthorhombic crystal NH_4CdCl_3 and find it to be based on octahedral configuration about the cadmium atoms. The $CdCl_6$ complexes occur in the crystal in infinite polymers in the form of double rutile strings of $CdCl_6$ octahedra parallel to the c -axis. These complexes are held together by the ammonium ions, each of which has nine chlorine atoms co-ordinated about it. Interatomic distances in the crystal are found to be closely related to those in $CdCl_2$ and NH_4Cl .

Large Cosmic Ray Showers

P. Auger, R. Maze, P. Ehrenfest and A. Fréon (*J. de Phys.*, 10, 39; 1939) have investigated very large showers of particles produced in the atmosphere by the cosmic rays. They find that Geiger counters separated by quite large distances (up to 75 m.) show occasional coincident discharges. The frequency of these extensive showers increases with altitude at much the same rate as the ordinary showers produced in heavy metals. It was concluded from the counter experiments that the density of particles in a shower was of the order of 50 per sq. metre, and a very similar result was obtained by the use of an expansion chamber released by the coincidences (cf. Jánossy and Lovell, *NATURE*, 142, 716; 1938). A great part of each shower consists of electrons, as shown by absorption and by the cascade multiplication of the particles in a lead plate. The authors consider that there are some penetrating particles present, though it seems possible that their absorption curves are not incompatible with a shower containing only electrons of fairly high energy. There seem to be some protons produced by nuclear interaction. The showers observed are probably part of large cascades produced by the multiplication in the atmosphere of an incident electron of very high energy. Assuming that this is so, the initial energy must be of the order $10^{13} - 10^{14}$ electron volts. It may be remarked that this is much larger than the energy which could be obtained by the complete annihilation of the heaviest atoms.

An Improved Liquid-Filled Prism

F. J. HARGREAVES has recently described his hollow liquid-filled prism of about 3½ in. effective aperture, the glass plates constituting the refracting sides of the prism being joined at their edges to the cell by goldbeaters' skin (*Mon. Not. Roy. Astro Soc.*, 99, 2; 1938). The object of this flexible connexion is to prevent stresses in the plates, each of which presses against external stops and is held there by the pressure of the dispersing liquid within the cell. A difficulty arose in supporting the weight of the glass plates, more especially as it is necessary to invert the prism to empty it. To prevent too much tension on the goldbeaters' skin supplementary support was provided by the use of slings made of phosphor-bronze wire. Another prism is under the process of construction on the same principle but with minor modifications in detail. The author sees no reason why much larger prisms should not be made on similar lines, though there is the difficulty of constructing large disks that are thin and homogeneous. Hargreaves thinks that this difficulty can easily be overcome.