## Research Items

**Indians of Virginia.** When English settlers reached Virginia early in the seventeenth century, they found the country from the river falls to the mountains was claimed by tribes of the Monacan confederacy belonging to the Siouan stock, who were at enmity with the Algonquian tribes, some of whom they had displaced not long before and whose villages lined the shores of the James from its mouth to the Monacan borders. The country west of the Blue Ridge was claimed at a later date by the Iroquois, but they do not appear ever to have settled there. The evidence of occupation of Albemarle County, documentary and archæological, has been examined by Mr. David I. Bushnell, Jr. (*Smithsonian Miscellaneous Collect.*, 89, No. 7), who describes a number of stone implements and the sites on which they were found. A large part consist of stone arrow points from hunting-grounds. The marked weathering of some of the implements is contrasted with the unchanged condition of others which have been exposed to identical conditions for two centuries and a half, pointing to the high antiquity of the former. There were evidently two periods of occupation, of which the earlier may be connected with an early culture found elsewhere, as for example, in Connecticut. This culture is there associated with soapstone mines. Such mines also occur in the piedmont of Virginia, but soapstone objects have not been found in the area under consideration. It is suggested, therefore, that the early culture of Albemarle County may be part of an early culture complex which once extended widely over a region ranging from the New England States southward through Virginia to a boundary difficult to define.

**Flight Speed of White Pelicans.** By pacing, with a motor car, a large flock of white pelicans (*Pelecanus erythrorhynchus*) consisting of about 120 individuals, Ronald Case Ross was able to obtain a close approximation to their rate of flight. The distance of pacing was some three and a half miles, in the neighbourhood of Los Angeles, California, and the cruising speed of the flock was 31 $\pm$ 1 miles per hour (*Condor*, 35, 70; 1933).

**Eradication of Bovine Tuberculosis.** The results of a large-scale experiment, promoted by the Medical Research Council, on the eradication of bovine tuberculosis, are reported by Dr. L. Jordan, of the Hannah Dairy Research Institute (Med. Res. Council, Special Rep. Series, No. 184. London: H.M. Stationery Office). An area of about nine square miles, which included 30 farms participating in the experiment, was selected in Ayrshire. The method was to apply the tuberculin test to the herds; reactors were then housed and grazed separately so far as possible from non-reactors, buildings that had contained infected stock were disinfected, and common water supplies were eliminated. Reacting cows were disposed of when practicable, and precautions taken to prevent infection of young stock. Herds were re-tested at six-monthly intervals and necessary adjustments made; throughout, the ordinary farm routine was interfered with as little as possible. At the end of the three-year period of the experiment, of the 30 herds participating, 20 were free from infection (compared with 8 at the beginning), and 8 showed a substantial reduction in the number of reactors.

**Epithecal Scales of Fossil Corals.** Dr. Louis B. Smyth has recently published two short papers on fossil corals ("On *Cleistopora geometrica* (Milne Edwards and Haime)". *Proc. Roy. Irish Acad.*, 41, Sect. B, No. 12. "On Certain Carboniferous Corals with Epithecal Scales." *ibid.* No. 13. September 1933). In the second paper, two new species of coral from the limestone of Tournai, Belgium, are described. Both are small massive forms with a granular upper surface and a wrinkled epitheca; both may bear peculiar scale-like epithecal structures. Because of these the author believes that the two species must be closely related, but owing to the great difference in other respects he assigns them to separate new genera, *Squameophyllum* and *Stratophyllum*. The nature of these scale-like bodies is obscure. They are reminiscent of the foreign fragments cemented upon the shell of the gastropod *Xenophora agglutinans*, and in view of the habit of some sea anemones, it might be suggested that the corals covered themselves with foreign objects in such a way that the bodies near the base of the exosarc sometimes became incorporated in the epitheca. He rejects this, however, as unlikely, since the bodies are so minute and all of one kind. He therefore regards them as a direct product of the coral, perhaps as a reaction to disease, as they are not present on all the specimens and an abnormal form has the most complete clothing of scales. They are not peculiar to one locality. Lindstrom has described epithecal scales in silurian species of coral, *Tryplasma loveni* and *Syringophyllum organum*, in the latter somewhat similar to those from Tournai, in the former more regular and of a different shape, which he regards as being probably homologous with the opercula of such genera as *Goniophyllum* and *Araeopoma*.

**Culture of Tissues of *Ptychodera*.** Included in the report of the Tortugas Laboratory in Year Book No. 31 of the Carnegie Institution of Washington is a report on tissue culture by Dr. L. R. Cary, who has studied the behaviour *in vitro* of tissues of *Ptychodera bahamensis*. Details of the work are given in Publication No. 435 recently issued by the Carnegie Institution. The technique for sterilising the piece of tissue by repeated washing in 10 per cent by volume of hexylresorcinol in sterile sea-water or by ultra-violet irradiation from a mercury vapour lamp is described. A peptic digest of entire *Ptychodera* was used as a nutrient medium in the preparation of all cultures and the growth of bacteria in the culture was minimised by addition of hexylresorcinol, which had no deleterious effect on the tissue. A small fragment of tissue from the dorsal side of the middle region of the body contains ectodermal epithelium, nerve cells, cells from the digestive cæca, muscle cells and connective tissue cells. Particular attention was devoted to the endoderm cells of the digestive cæca, which migrate from the tissue in culture as flask-shaped bodies; other cells to which they are attached move out successively from the mass of tissue so that a chain of ten or more endoderm cells extends outwards. When these endoderm cells divide, their characteristic pigment granules may be passed on entirely to one daughter cell, the other cell having clear protoplasm. When freed in this way from their large granules, the cells exhibit unusual amœboid

activity, and when maintained in culture the activity of these cells remains constantly at a higher level than that shown by related cells in which the granules are retained. Meantime many muscle cells become separated from the tissue; some become greatly elongated and show marked amœboid activity.

Crossing-over with Inversions and Translocations in *Drosophila*. Six dominant mosaic eye-colour allelomorphic mutants from the brown locus in the second chromosome of *Drosophila melanogaster* have been produced by X-rays. They have been investigated by Dr. H. B. Glass (*J. Genetics*, 28, No. 1), who finds that two of them are associated with inversions of particular chromosome segments, the other four with mutual translocations, the chromosome break occurring in every case close to the locus concerned. A dominant mutant from pink eye in chromosome III was also studied, and two dominant mosaic eye colours (called Moire) in the left arm of III, one associated with an inversion and the other with a mutual translocation. By using flies with a series of mutant genes, the nature of the transposition in each case is investigated. The conclusion that after a mutual translocation of chromosome segments the crossing-over is increased in one chromosome and inhibited in the other is confirmed. It is also concluded that crossing-over need not always begin either at the spindle fibre or the distal end of the chromosome, but in certain cases two chromosomes appear to have undergone synapsis in the form of a ring. This introduces new configurations into the possible rearrangements resulting from different forms of crossing-over.

Chromosomes of Cotton and its Relatives. Recent investigations of cotton and its relatives are throwing important light on the origin of the genus *Gossypium* and the relationships of its species, information which is of value in unravelling the genetics of this important economic plant. A study of the somatic and meiotic chromosomes in nine genera of the Malvaceæ, by Dr. J. H. Davie (*J. Genetics*, 28, No. 1), leads to significant results bearing upon the evolution of cotton. Polyploidy on a basis of $n = 7$ is shown to have played a considerable part in the family Malvaceæ, leading to hexaploid species ($2n = 42$) in *Malva*, *Pavonia* and *Kitaibelia*, and hypohexaploidy in *Lavatera olbia* ($2n = 40$), probably through subsequent fusion of two pairs to give one very long pair of chromosomes. *Hibiscus africanus majus* is octoploid ($2n = 56$). In *Gossypium*, the presence of secondary pairing of certain chromosomes in meiosis and the existence of one larger pair leads to the conclusion that the number $n = 13$ has been derived from an ancestral number $n = 7$. The 'diploid' cottons would then be really modified tetraploids. From these the cotton species with $2n = 52$ have probably been derived through amphidiploidy, that is, doubling of the chromosomes in a sterile interspecific hybrid. The recent discovery that certain wild cottons in Lower California have $2n = 26$ chromosomes indicates that this doubling process to give the valuable Sea Island and other cottons probably took place in America, and possibly during cultivation by the Indians. The various 'tetraploid' cottons ($2n = 52$) therefore appear to be really modified octoploids, the different species not necessarily having the same ancestor. It is clear from these and other results that a fuller investigation of the temperate Malvaceæ is likely to throw further light on the origin and genetics of cotton.

Mechanism of Spontaneous Expulsion of *Wistaria* Seeds. In a recent paper, Tirada, Hirata and Utigasaki (*Sci. Pap. Inst. Phys. Chem. Res.*, Tokyo, 440–1, 233–241; 1933) attempt an explanation of the spontaneous expulsion of *Wistaria* seeds. The immediate mechanism is the dehiscence of the leguminous pods, which takes place with some violence and can expel the seeds, each weighing about 0·5 gm., to a distance of more than 11 m. Under dry conditions, the pods split open longitudinally and eject the seeds, while the two halves of the pod coat assume a helical form. Under the condition that the whole of the elastic potential energy of the two halves of the pod coat is converted into the kinetic energy of the seeds ejected, and making other arbitrary and rather doubtful assumptions, the authors calculate the initial velocity of the seeds at the comparatively enormous figure of from 40·7–61·3 m. per sec., which gives a range of from 17·6–22·6 metres. X-ray photographs of the three principal layers of the pod coat are given. In the same volume (*loc. cit.*, p. 242) Hirata gives measurements of the rigidity of various layers of the pod coat, and records an undoubted hysteresis effect in the relation of rigidity to humidity. A complete determination of the effect of desiccation on the flexure of the tissues concerned, which is doubtless a complicated function of the rigidity, and also of the amount and direction of swelling, of the various layers, presents a problem requiring even fuller treatment.

New Genus of the Ascomycetes. Two new fungi have recently been described by Miss E. S. Dowding ("*Gelasinospora*, a new Genus of Pyrenomycetes with Pitted Spores". *Canad. J. Res.*, 9, No. 3, 294–305. Sept. 1933). The fungi produced ascospores with dimple-like pits, and have been included in a new genus, *Gelasinospora*. Both species produce perithecia, and are therefore Pyrenomycetes. *G. tetrasperma* is a coprophilous fungus with four spores in the ascus, as the name implies. The ascospores may be either dwarf, with two nuclei, normal, with four nuclei, or giant, with six nuclei. Normal and giant spores give rise to homothallic mycelia and perithecia, whilst dwarf spores produce mycelia of different sex, which must unite before perithecia can be produced. *G. cerealis* occurs on wheat and oats, and bears eight ascospores, each of which is binucleate and gives rise to a homothallic mycelium.

Die-back of Apple Trees. The fungus *Valsa ambiens* (Pers.) Fr. causes the death of small twigs of apple and other trees. It has been connected with a species of *Cytospora*, and mycologists have recognised the fact that the two names were given to different stages of the same fungus. Mr. Lawrence Ogilvie has studied the disease ("Canker and Die-Back of Apples associated with *Valsa ambiens*". *J. Pomol. and Hort. Sci.*, 11, No. 3, 205–213, Sept. 1933), and finds that wedge-shaped cankers at the base of the tree and on the branches are also a feature of the disease. Inoculation to healthy branches did not induce disease, but the introduction of the fungus to wounds or burned areas resulted in infection. The *Cytospora* stage was identified as *C. ambiens*, Sacc. Damage to trees does not appear to be extensive, and apples show a tendency to recover from the disease.

North-Westerly Winds of Iraq. Knowledge concerning the vertical extent of the north-westerly winds over Iraq in the summer is of importance in the study of the general circulation of the atmosphere during the time when there is an inflow of surface air to southern Asia. It has also a more directly practical importance, for these winds, known locally as the Shamal, prevail over a wide area including the Persian Gulf, and it is of importance to know to what extent aircraft can avoid them by high flying. In Prof. Note No. 64 of the Meteorological Office (London: H.M. Stationery Office) an analysis is made of many soundings with pilot balloons that have been made at Hinaidi (Baghdad) and at Shaibah near Basra. In discussing the results, S. P. Peters points out that monthly normal isobars above sea-level, published by the India Meteorological Department, suggest that from June to September inclusive the gradient for north-westerly winds over Iraq will have practically disappeared when a height of 10,000 ft. has been reached. It is found that out of the occasions in July at Hinaidi when the wind at 1,500 ft. is from between 290° and 360°, with speed 20 miles an hour or more, a backing of the wind to beyond 270° or a veer to beyond 20° may be expected to occur at some height not above 10,000 ft. once in four occasions, and for the Tigris-Euphrates Valley generally from June to September inclusive, at least once in five times. It is believed that the actual frequencies based on more complete and evenly spaced information with which there would be no element of selection, such as is introduced for example by the tendency for the balloon to be lost to view at a comparatively low level on very windy days, may be as high as one occasion in two. An important point is that the wind above the height where the change occurs rarely reverts to the north-westerly direction; in general, the speed at the level of change is much less than at 1,500 ft.

Physical and Chemical Conditions in the Great Barrier Reef Lagoon. The physical and chemical investigations carried out by A. P. Orr in the Great Barrier Reef lagoon (Great Barrier Reef Expedition, 1928–29. Scientific Reports, vol. 2, No. 3: "Physical and Chemical Conditions in the Sea in the Neighbourhood of the Great Barrier Reef". London: British Museum (Natural History), 1933. 5*s*.) throw considerable light on the coral reef problem and are the first to be made in the tropics throughout a complete year. No significant seasonal changes were found in phosphate, nitrate or hydrogen ion concentration, or in percentage oxygen saturation, which was between 90 and 100 per cent for most of the time. It is clear that the frequently expressed opinion that corals on the windward edge of a reef grow more vigorously because of the higher oxygen content of the water is no longer tenable. Conditions are suitable for plant growth throughout the year but the concentration of phosphate (around 5 mgm. phosphorus per cubic metre) and nitrate were never sufficient to allow an outburst comparable with that found in temperate and polar latitudes in spring. During the rainy season, surface salinity fell and the effect of heavy rainfall was very apparent. In the dry season the south-east winds kept the water very well mixed, but at no season did a well developed thermocline form inside the Barrier. Some work was also done outside the Barrier; except for lesser turbidity due to the absence of mud, conditions were similar to those found inside at the same depth. A sharp rise in salinity occurred between 50 metres and 100 metres, agreeing with changes in other conditions and showing this to be the limit of vertical mixing. The biological applications of the results are briefly discussed but are to be elaborated in later reports.

Viscosity of Pitch. One of the most important uses of pitch is in the manufacture of briquettes of powdered coal. The effectiveness of the pitch in covering the coal particle is probably dependent on the viscosity—the property which governs the empirical tests now applied to pitch. The viscosity of typical pitches has been measured by A. B. Manning (Fuel Research Technical Paper No. 39. London: H.M. Stationery Office) using three different methods to cover the range 30°–110°. The results show that all the coal-tar pitches examined behaved as truly viscous liquids. Experiments made with bitumen, that is, petroleum pitch, showed anomalies analogous to those of colloids such as gelatine, rubber, etc. Bitumen appears to have the structure of a gel and this may be responsible for the different behaviour in use.

Atomic Weight of Uranium Lead. A recent determination of the atomic weight of lead from cyrtolite by Baxter and Alter (NATURE, 132, 285, Aug. 19, 1933) gave Pb = 205·94 and of lead from Katanga pitchblende 205·97 – 206·00. Honigschmid, Sachtleben and Baudrexter (*Z. anorg. Chem.*, 214, 104; 1933) have made atomic weight determinations with lead from Morogoro uranium ore, Katanga curite, Katanga pitchblende and ordinary lead. The last, used as a control, gave Pb = 207·21. The values for the specimens of uranium lead were: (1) Morogoro, 206·035; (2) curite, 206·032; (3) soluble extract from Katanga pitchblende, 206·022. The three values are regarded as identical, and the conclusion is drawn that the leads from the three pure African uranium ores have the same isotopic composition and the same atomic weight, 206·03. The Katanga pitchblende was the same material as that used by Baxter, and the discrepancy between the results remains unexplained.

Electric Clocks from Direct Current Mains. In certain parts of England the direct current supply is obtained by means of mercury arc rectifiers from a three-phase time-controlled fifty-cycle system. In this case it is well known that there is a pronounced third harmonic ripple in the D.C. supply. The frequency of this ripple is 150. According to the *Electrical Review* of December 15, a consumer in Devon recently connected a standard synchronous clock designed for 230 volts at 50 cycles across a supply of this kind. He had previously put in a three to one reduction gear so that the seconds hand should rotate one revolution per minute. As the amplitude of the ripple voltage was only about one fourth that for which the clock was designed, a transformer of one to ten ratio was installed between the supply and the clock coil and a condenser was put in series with it to block out the direct current. It was found that the clock worked satisfactorily. Mr. Geoffrey Ghey, of the Royal Naval College, Dartmouth, who brought this interesting application of the ripple to the notice of Messrs. Ferranti, Ltd., has now clocks of this type operating on the direct current mains. The advantage of perfect time-keeping can thus be obtained from what many think is a defect in the mercury arc rectifier.