

Research Items.

THE CHRONOLOGY OF CENTRAL AMERICA.—Mr. R. C. E. Long in *Man* for January examines the bearings of the historical evidence upon the correlations of Mayan and Christian chronology put forward by Dr. Morley and Mr. Bowditch respectively. The argument turns upon whether it can be shown that Nahua influence existed in Chichen Itza before its overthrow by Hunnac Ceel, governor of Mayapan, or whether the Nahua buildings in the city—some of the greatest in Yucatan—were erected after that event, as Morley holds. A date deciphered by Morley on a ball-court—a typical Nahua structure—at Uxmal proves the existence of the Nahua in Yucatan before the date to which Bowditch assigned the fall of Chichen Itza. If, then, it can be shown that Nahua influence in Chichen Itza also precedes the fall, that in the light of the Uxmal date would afford strong support to the Bowditch dating; but if it can be shown to be later than that event, it supports the Morley correlation. It seems unlikely that the buildings at Chichen Itza which show Nahua influence would have been erected in a period of great wars, such as this is known to have been, when, as Morley thinks, the city had been handed over to Mexican mercenaries. A conclusive piece of evidence, however, is a passage in the Chilan Balam of Chumayel which states that Hunnac Ceel had himself once been thrown into the Cenote of Sacrifice at Chichen Itza, and that, as he had survived the requisite time, he had been taken out and worshipped. This custom of throwing victims into the Cenote was purely a Nahua practice and was introduced into Chichen Itza only after the establishment of Nahua rule. It follows, therefore, that as the custom must have been observed before the overthrow of Chichen Itza by Hunnac Ceel and not after, the date of the ball-court at Uxmal would fall into line with and support the date suggested by the Bowditch correlation.

MAGIC AND MEDICINE.—An illustrated guide to the collections dealing with medical history in the United States National Museum, Washington, has been compiled by Mr. Charles Whitehead, Assistant Curator of the Division of Medicine, and published as Article 15 of Vol. 65 of the Museum's Proceedings. These collections, which since 1916 have formed part of a larger section of the Department of Art and Industry covering the history of pharmacy, public hygiene and sanitation, are classified under magic medicine, psychic medicine, and pharmacological medicine, the last named including Egyptian, Greek, and Roman medicine, while the first covers the healing art of primitive, savage, and half-civilised man as well as the numerous survivals of primitive medicine among civilised peoples. It is naturally the most fully represented. Among the amulets or charms is a specimen illustrating the voodoo of the negroes of the United States and West Indies, which consists of a chicken feather, some human hair, a drop of blood on a rag, and a pine sliver. This is worn on the neck as a preventive of voodoo against the wearer. A number of "madstones," which, when applied to a dogbite, avert madness, have proved their efficacy in the hands of their former owners. For one, a highly polished seed of *Gymnocladus dioica*, the Kentucky coffee tree, 1000 dollars was asked, and a ball of matted hair, such as is occasionally found in the stomach of domesticated cattle and other ruminants, was said to have been used successfully in two cases. One exhibit is a section of a tree from Norfolk, Va., which had been tapped, human (negro) hair inserted, and the hole plugged and sealed with clay. Four inches of new growth formed over the plug, so that

the hair must have been inserted fifty years before it was found. The operation was doubtless performed either to relieve headache, or to cause headache in the original possessor of the hair.

THE BRITISH RACES OF *ARICIA MEDON*, ESPER.—*Aricia medon* occurs in the British Isles in two distinct races, the type *medon* and the variety *artaxerxes*. The type occurs in England and Wales and the variety in Scotland and Ireland, but their areas of distribution overlap in the N.E. of England. Dr. J. W. H. Harrison and Mr. W. Carter (Trans. Nat. Hist. Soc. Northumberland, Durham, and Newcastle-upon-Tyne, N.S., vol. vi. pt. 1) have discussed the origin of these two races. They reject both the possibility of origin from an original mixed population in N.E. England, and an explanation based on orthogenetic mutations. They conclude that the variety originated in a contingent of the type isolated during the glacial period, under the long-continued influence of the refrigerating conditions that obtained at that time, and they cite the experimental results of refrigeration on other species of Lepidoptera in support of their theory. They find, moreover, that in the overlapping areas of their distribution the inheritance follows Mendelian lines.

MERISTEM GROWTH IN WOUNDED POTATOES.—G. A. C. Herklots has a paper in the *New Phytologist* (vol. 23, No. 5, December 1924) in which the cork meristem formed upon cut potato tubers under suitable conditions is used as a means of investigating certain views recently put forward (NATURE, August 16, 1924, p. 258, "Mechanism of Cell Growth") as to the influence of the external hydron concentration upon the activity of meristematic protoplasm. Experimenting with the cut surface in contact with buffered solutions or jellies, he finds that an alkaline reaction at the cut surface favours rapid suberisation, but delays or (if beyond P_{H8}) entirely prevents meristem formation, whilst an acid reaction at the cut surface, whilst delaying the process of suberisation, facilitates meristem formation.

A CINCHONA INSECT PEST.—In the report for 1923-24 of the Government cinchona plantations and factory in Bengal, attention is directed to the ravages of *Helopeltis*. On the plantations both at Mungpoo and Munsong, this pest is on the increase and the attacks have reached and maintained a severity that renders hand-picking ineffectual. The trouble is greater at lower than at higher elevations, and in certain parts of the plantations the growth of the plants is completely suspended for several months of the year. Coppicing as a preventative is beneficial in so far as the affected portions are removed entire, but the disease reappears when the fresh shoots sprout. There seems to be no satisfactory method of dealing with this insect pest. A season that is unfavourable to its development is more beneficial than all the counter measures that have been devised up to the present. In spite of these difficulties and somewhat adverse weather conditions, the plantations did well during the year under review.

ASIATIC SUCCINEIDÆ.—One of the most difficult of the families of the non-marine mollusca to deal with satisfactorily is the Succineidæ. The shells present so few salient characters, whilst far too little is known of their anatomy. All the more credit, therefore, to Mr. H. Srinivasa Rao, of the Zoological Survey of India, for the excellent little monograph he has just furnished of the Asiatic Succineidæ in the Indian Museum (Rec. Indian Mus. xxvi.). The author has

brought together all the facts he was able concerning the anatomy and habits of the members of the family as represented in the Indian Museum, and has principally utilised the jaw and radula for the purposes of distinguishing the various species. The Indian Succineidæ comprise four distinct genera: Succinea itself, which is amphibious, and three terrestrial genera—Indosuccinea, which is new, Lithotis, and Camptonyx. The type of the new genus is *Succinea semiserica* Gould, and the author has further created a few new species and varieties. There are good, clear text figures of the jaws and radula teeth and a very good photo-plate of the shells of the more important species.

RATOONED QUEENSLAND COTTON.—A short note by Mr. Frederick Summers in the Journal of the Textile Institute for December has considerable general interest. When growing wild, the cotton plant is always a perennial, but under cultivation, either because of drought or winter conditions in the resting season, or more usually because of the way in which the pests and diseases of the crop accumulate in the second and succeeding years, it is the rule in Egypt and the West Indies to remove the old stumps after the first year's crop of fruit has been gathered (NATURE, May 31, 1924, p. 800). In S. America, and also in Africa under native cultivation, the plants are often cut down hard at the end of the growing season, and then allowed to produce fresh shoots in the following season, in other words, treated as from time immemorial bush and woody fruits have been treated in Great Britain. In the case of cotton, this process is known as ratooning, and there has been much discussion, on inadequate data, as to whether the ratooned crop, whatever its quantity, is of similar quality with the first year's yield. Fruit growers would naturally tend to assume that quality would be maintained, and one can understand that when new areas come under cultivation for cotton, the pest problem being still little developed, the planters have a natural tendency to follow the practice of ratooning. Queensland growers have done this, although in 1923 for a short period the process was made illegal, as the result of inquiries by the Queensland Ministry of Agriculture as to the esteem in which ratoon cotton is held in Great Britain. This ban has again been removed, and Mr. Summers now reports a careful test of the quality of ratooned fibre as against the normal crop, and it is interesting to see that this examination tells heavily against the ratooned product. This conclusion is of great scientific interest and contrasts strongly with our experience of many perennial plants when brought into cultivation. Mr. Summers emphasises the fact that generalisation must not be based upon these Queensland samples alone, but they certainly raise the problem in a very definite form, and both its scientific interest and commercial importance should mean that further opportunities will be taken of comparing authentic samples of ratoon and normal cottons.

THE JAPANESE EARTHQUAKE OF 1923.—The investigation of the disastrous earthquake which devastated Tokyo in September 1923 is still proceeding, but some preliminary reports have already appeared. In the *Geographical Journal* for January, Dr. C. Davison has an article bringing together the information on the subject at present available, in which he discusses, among other aspects of the earthquake, its origin. The epicentral tract of the earthquake was of unusual size and may have covered so much as 2000 square miles, including the whole of Sagami Bay. Its area may even have been 4700 square miles. The cause, at least in part, is to be sought in the movements which produced remarkable

changes in the floor of Sagami Bay. These changes were very considerable, and although no fault scarp has been discovered on the floor of the bay, a vast block or series of blocks seem to have subsided. A remarkable feature of this subsidence is that the movements on the floor of the bay have affected very slightly the surrounding coasts. The greatest elevation of the sea-bed was more than a hundred times that on land, and the greatest depression of the sea-bed was more than 1600 times that on land. Moreover, the centres of elevation and depression are very close to one another. There is also evidence that the movements on the sea floor were not confined to the time of the earthquake but continued in the same directions for so long as five months, and even now may not be at an end.

MAGNETIC SURVEY WORK IN THE UNITED STATES.—The results of magnetic observations made by the United States Coast and Geodetic Survey in 1923 are published as No. 268 of the survey publications. Five magnetic observatories continued in operation throughout the year, namely, Cheltenham, Md.; Sitka, Alaska; Honolulu, Hawaii; Vieques Island, P.R.; and Tucson, Arizona. Their records have furnished the data for reducing to monthly means the values of declination obtained from field observations. The magnetic survey of Florida was completed and a survey of North Carolina was made. Declination observations were made at a large number of stations along the southern and south-eastern shores of Alaska in connexion with the triangulation. Tables are given of the year's observations at various stations, and the report concludes with descriptions of the stations sufficiently detailed to enable them to be located even if the marking on the ground should be destroyed.

ROTATORY DISPERSION.—The thesis on "The Chemical Significance of Optical Dispersion," on which Dr. Harold Hunter was recently awarded the degree of D.Sc. (Lond.), has been printed and published (London: Battersea Polytechnic, Battersea Park Road, S.W.11; price 7s. 6d.). The thesis is a critical account of the recent position of a question which has formed the subject of considerable discussion both pre- and post-War. It presents in a convenient and accessible form the author's own personal contribution to that discussion and his comments on the views of other workers in the same field. There are very few points in the thesis which call for criticism, the principal one being perhaps the statement (p. 89) that "the rotatory dispersion equation of Drude" "suffers from the defect" that "it does not take into account the degradation of the light energy in the phenomenon of absorption," since this "defect" does not exist in Drude's original equation, but only in the simplified equation which alone is quoted by Dr. Hunter. On the other hand, a partial transposition into italic type is justified as a tribute of admiration for the neat statement (p. 49) that "One of the consequences of improvements in chemical technique is that the *dynamic isomerism of to-day becomes the static isomerism of to-morrow.*"

THE CONDENSATION AND RE-EVAPORATION OF ACTIVE HYDROGEN.—In an interesting paper (*Zeitschrift für Elektrochemie*, Nr. 21/22, pp. 504-508, 1924) Fritz Paneth discusses the properties of active hydrogen and describes experiments carried out in association with K. Peters. The monatomic form (H_1), produced at low pressures by glowing wires and electric discharges, is readily adsorbed and is condensed on the walls of glass vessels cooled by liquid air, the activity disappearing on re-evaporation. At high pressures another modification is produced,

usually regarded as tri-atomic hydrogen (H_3), in conformity with the observations of J. J. Thomson and Aston on positive rays. H_3 is less strongly adsorbed than H_1 and can pass through glass wool. It is generally recognised by the production of hydrogen sulphide, when it is passed at a very low temperature over powdered sulphur. Wendt and Landauer have described an investigation in which they appear to have been successful in producing not only condensation but also re-evaporation of H_3 without change of form, and, considering the substance analogous to ozone, they suggest for it the name "hyzone." Two new methods are now described in detail for the production and study of this active modification of hydrogen. In the first, hydrogen is passed over a glowing Nernst filament, and in the second, through a heated capillary tube of palladium. The results are believed to prove that active hydrogen so produced may be condensed and re-evaporated without loss of activity, and further, that its constitution must be H_3 and not H_1 . Experiments are to be continued with the view of producing the active modification in greater quantities.

THE ISOTOPES OF MERCURY.—An interesting suggestion is made by Dr. F. Stumpf in the *Zeitschrift für Physik* of December 12. He directs attention to the facts that Aston has found the atomic weights 204, 202, 200, and 197 for the isotopes of mercury, and that the last number is almost identical with the atomic weight of gold. Although among the radioactive elements there are cases where different elements have the same atomic weight, this is not true for the other, non-radioactive, elements; and the author considers that it is possible that the 197 isotope was really gold and not mercury. Apparently the intensity of the 197 line was not very different from that of the others, so that it can scarcely have been due to gold existing originally as an impurity in the mercury. It is suggested that gold may have been produced from the mercury in the experiment in a similar manner to that in which Miethe claims to have caused this transformation. It might be possible to obtain evidence of this by receiving the positive rays on a plain sheet of glass or of quartz, instead of on a photographic plate; with a long exposure the glass might be coloured red with colloidal gold at the point in question. In Miethe's experiment parts of the discharge bulb were coloured red.

PROTECTIVE COLLOIDS.—A paper on colloidal protection, read by J. Alexander before the American Section of the Society of Chemical Industry last May, is published in *Chemistry and Industry* (Review) for December 19, 1924. The technical use of protective colloids has been known since antiquity. Thus the Chinese used glue in the manufacture of ink to deflocculate the lamp-black, and the ancient Egyptians used gum (probably acacia) for the same purpose. The protective action was recognised by Meyer and Lottermoser (1897). A protector may be defined as a substance which opposes the aggregation of molecules or particles into larger groups; according to Bechold, the protective action is consequent upon the adsorption of a layer of the protector at the interface between the dispersed and the dispersing phase. This layer is exceedingly thin, since it does not diminish the Brownian motion of the particles, and there is no ultramicroscopic evidence of its existence. Brief descriptions and applications are given of plural, auto- and cumulative protection.

PYROPHORIC ALLOYS.—The production and properties of pyrophoric alloys are described by Dr. N. F. Budgen in the *Chemical Trade Journal* for December 26, 1924. The "flint" of the popular

type of gas-lighter was introduced by Auer von Welsbach in an interesting manner. The incandescent mantle which Welsbach introduced in 1886 contains 99 per cent. of thoria and 1 per cent. of ceria, and the large demand for thoria which it created led to the working up of the monazite sands found in different parts of the world. These sands contain about 5-10 per cent. thoria and 50-60 per cent. ceria and other rare earths, so that large quantities of rare earths, minus the thoria, accumulated at the mantle works. It was while trying to find a use for this "waste" that Welsbach discovered that alloys of iron and the cerium metals throw off sparks when rubbed with a file. The first step in the production of pyrophoric alloys is the preparation of "misch metal," which is an alloy of 40-50 per cent. cerium, 20-40 per cent. lanthanum, 1 per cent. yttrium, and small amounts of neodymium, samarium, gadolinium, etc. This alloy is then fused and mixed with an appropriate metal (*e.g.* iron, zinc, aluminium) in the molten state under a protective layer of salt or fluorspar. The best pyrophoric alloy is probably "aermet," made by alloying up to 60 per cent. of iron with misch metal.

PHYSICAL ASPECTS OF CHEMICAL COMBINATION.—A paper on "Chemical Combination as a Dynamic Problem" by Prof. Born, of Göttingen, read at Innsbruck meeting of the German Scientific and Medical Association on September 26, 1924, is printed in *Die Naturwissenschaften* of December 26. The paper deals with the calculation of physical and chemical constants from data as to the electric charges and distances of the components of various aggregates. Thus the "lattice energies" of crystals of the rock-salt type can be calculated and give results which show a very close agreement with the observed values. In other cases, including the molecules of salt-vapours, the ions appear to be deformable, as indicated, for example, by the different refractive power of Cl' in HCl and in $NaCl$. A table is, however, given of the energy of formation of salt-vapours, in comparison with the lattice energy minus the heat of sublimation. The calculation of the natural free-periods of ions such as CO_3 , NO_3 , ClO_3 , SO_4 , etc., which are constant in all compounds of these ions both in solution and in solid crystals, from the charges and distances of the atoms, is also referred to.

THE PROGRESS OF DEVELOPMENT OF A PHOTOGRAPHIC PLATE.—This matter has been investigated by Mr. L. F. Davidson, of the Imperial Dry Plate Company (*Journal of the Royal Photographic Society*, January 1925), by watching the actual process of development under the microscope, using a high-power objective, and by taking photomicrographs at various stages. The developer was coloured so that its movement was obvious. When the developer reaches a grain, there is a definite time interval before visible action begins, and this "induction period" varies according to the developer used and according to the nature of the grain, but appears to be unaffected by grain size. Development starts at points or "centres" which enlarge and join until the whole grain is blackened. Except in the case of certain slow emulsions, the shape of the grain is changed by its development. If by reason of this change of shape it comes into contact with another grain, this second grain appears to be rendered developable. The developed grain may present an area that is smaller or very much larger than the original silver haloid grain, this alteration in area varying from 0.8 to 104 per cent. in an extended series of experiments. It was sought, though apparently not very successfully, to find some relationship between the increase in size and the character of the plate.