RESEARCH ITEMS

Rock Art in North Africa

M. RAYMOND VAUFREY has now added to his previous reports on the results of his researches on the rock art sites of southern Oran and their bearing on the origin, affinities and chronology of the north African neolithic, further details of the sites, comparative studies, and full illustration (*Arch. de l'Instit. de Pal. Humaine*, Mém. 20 ; 1939). On four groups of sites, in the mountains of Figuig, Ksour, Géryville and Jebel Amour, the association of a stone industry with these rock-engravings of animal and human figures, an association previously undetected, made it possible to assign this art to a neolithic with Capsian traditions, which is shown to extend to northern Oran and beyond, linking up with the neolithic of the Sahara and a neolithic pluvial period, to which a date is assigned ranging from the middle of the sixth to the middle of the second millennium before our era. In order to test the application of this dating to the North African neolithic with Capsian tradition and the associated rock art of Oran, the comparison, obvious on both geographical and cultural grounds, is made with proto-historic and pre-dynastic Egypt. Here it is found that certain cultural elements in the North African neolithic are to be assigned to the various cultural stages or 'civilizations' now distinguished—Tasian, Badarian, Amratian, Gerzean —dating from at most 6000 B.C. to about 2000 B.C. But whereas these cultural elements or traits appear at various stages in Egypt according to the 'civilization' to which they belong, in North Africa they appear together—a fact which is explicable only on the ground that the North African is 'colonial' in character in relation to Egypt. A possible affinity of certain rock engravings showing a chariot with galloping horses fixes the latest dating at the opening of the Eighteenth Dynasty, 1580 B.C. As regards its racial character, the culture in Oran is linked with the race of Mechta el-Arbi, which has been shown to have Cro-Magnon affinities.

Tardenois Site in Western Scotland

MICROLITHIC sites in Scotland have been discovered chiefly towards the east coast, while the well-known exception of Shewalton Moor, near Irvine, is probably to be assigned to well into the Bronze Age. A newly discovered site at Ballantrae, Ayrshire, described by the Rev. W. Edgar (*Trans. Glasgow Archæol. Soc.*, N.S., 9, 3 ; 1939) has so far yielded only the earlier types of microliths and may, therefore, be assigned to the Middle Tardenoisian. The site is situated on the 50-ft. beach extending from Laggan Burn to Lownan Point over a distance of about a mile and a half, with an average breadth of about one quarter of a mile. Two streams intersect the area, which with the Laggan Burn supply an abundance of water. The area is fertile and mostly under the plough. Up to the present, only surface finds have been made, nor has the area been examined where not turned by the plough. So far no evidence of pit-dwellings or occupation floors, or traces of charcoal have been found, though concentrations of implements suggest the activities of craftsmen at localized centres, in two or three instances supported by an abundance of cores. The implements collected include blades in comparatively large numbers, generally of the small battered-back type. The triangular is not frequent, but some crescent-like forms have been found ; also micro-burins in numbers, the majority of the usual type ; scrapers in large numbers and in different varieties ; notched flakes not uncommon ; gravers, though rarely, two being 'accommodation pieces' ; and cores in abundance, mostly pyramidal.

Origin of the Grasping Movement in Man

PROF. DAVENPORT HOOKER, reporting on research work towards which financial support has been given from the Penrose Fund of the American Philosophical Society (Year-Book, Amer. Phil. Soc., Philadelphia, 1938), states that observations on the development of the grasping reflex in human fœtuses prove the independence of its two phases, finger closure and gripping, as they develop sequentially. Finger closure appears at about 11 weeks of menstrual age as a quick, though only partial, flexion of the fingers, in which the thumb is not involved. Though the thumb may become feebly mobile so early as 12 weeks in response to tactile stimulation of the palm it plays no part in the grasp by 25 weeks—the terminal age of the present observations. Finger closure becomes progressively more complete. At and after 16 weeks, tactile stimulation of the palm usually evokes complete closure. Gripping has first been observed at about the eighteenth week. It continues feeble for the remainder of the age-span studied. Further study may modify the age-levels at which these characteristic responses appear. Up to the present 42 individuals have been studied in a period of six years, the age-span covering from 7 to 25 weeks. It is the second largest series ever studied and the only one documented by objective records, the fourteenth week being exceptionally well covered. An atlas covering fœtal activity from its initiation, about the eighth week, through the 14 weeks stage has been prepared.

Robin Redbreast Pigment in Fowls

MARY E. RAWLES (*J. Gen.*, 38, 517–431 ; 1939) grafted small pieces of skin from the head of a 90–96-hour-old embryo robin on to the right wing bud of a 73-hour-old White Leghorn. On hatching, the hosts showed areas of down coloured cinnamon brown on part or all of the right wing. In one case this was later replaced by juvenile contour feathers of a colour typical of the robin. After moulting, the feathers were host coloured. The barbules were of the structure of the White Leghorn. Hence the robin-coloured feathers arose from the host's feather germs and were coloured by melanophores which migrated from the grafted tissue into the epidermal 'collar' of the host's feather germs.

Hybridization and Tumour Formation in Mice

C. C. LITTLE (*Proc. Nat. Acad. Sci.*, 25, 452–455 ; 1939) has shown that the first generation hybrid between females of the C57 race of *Mus musculus*

and males of *M. bactrianus* showed a larger incidence (45·5 per cent) of tumours as compared with that of the parents 14·4 per cent and 3·8 per cent respectively. The parental strains are different in the amount and type of tumour present, but the hybrids have an incidence much greater than the addition of the tumour-tendencies of the parents. Also, multiple tumours in one individual occur in 11·57 per cent of the F_1 and in not more than 1·14 per cent in one parental strain. Internal physiological 'unbalance' increased by hybridization is given as the most reasonable cause for the results.

Vascular Anatomy of the Apple

THE developmental anatomy of two different varieties of apple has been studied by Mary Mac-Arthur and R. H. Wetmore (*J. Pom. and Hort. Sci.*, 17, 218; 1939). The varieties McIntosh and Wagener were chosen, as having the same chromosome number (34), a similar growth period, and distinct shape differences. The McIntosh apple is uniform in shape with very faint angulation and with the stamens basal to medium in the distal depression. The Wagener is unequal-sided, definitely angulated, and with stamens attached higher up. The outline of the primary vascular bundles in the former case is circular, and in the latter lobed, corresponding with the respective shapes of the two fruits. In McIntosh, the ventral lobes of the carpels never unite. The locules are thus never completely separated from the central cavity, leaving the core 'open'. In Wagener, the ventral lobes of a carpel are joined, no opening connects the locule with the central cavity, and the core is thus 'closed'. The ovules of Wagener are arranged longitudinally with one ovule in each half of a locule. In McIntosh they are horizontal and stretch across both halves of the locule or occupy the central cavity. This irregularity in McIntosh is associated with irregularity in the separation and direction of the ovular traces. The authors have examined in detail the anatomy and development of the floral parts, and in particular their ontogeny in relation to the nature of the fleshy part of the fruit. They conclude that this is essentially a fleshy calyx tube or 'floral cup', that is, the consolidated bases of the calyx, corolla and stamens.

Control of Club-root

CLUB-ROOT (*Plasmodiophora Brassicæ*) is normally controlled by correction of soil acidity and adequate crop rotation. Where applications of lime are undesirable or ineffective, as may occur with some horticultural crops, mercuric chloride has been successfully used on a small scale. Chlorinated nitrobenzenes have been tried by Margaret J. Smieton (*J. Pom. and Hort. Sci.*, 17, 195; 1939) as an alternative lacking the objectionable properties of mercury compounds. Seed box experiments on white mustard with mercuric chloride, pentachlornitrobenzene and trichlordinitrobenzene showed that the latter compared favourably with mercuric chloride. The same substance applied at 1·5–3 oz. per sq. yard gave variable control of the disease on cabbages, sprouts and broccoli in outdoor seed beds. Mercuric chloride was, however, most effective. The trichlordinitrobenzene reduced the stand of seedlings when applied in greater amount than 1½ oz. per sq. yard. Substantial control of the disease, though not always equal to that given by mercuric chloride, was obtained by the addition of a small quantity of trichlordinitrobenzene to the dibble hole at the time of transplanting. Pentachlornitrobenzene was less effective except in cases of mild attack, but was less phytocidal than the other substances. All the substances tested were liable to check the growth of the plants. With trichlordinitrobenzene the check was greater when lime was used as a diluent than when chalk or talc was used.

Exchange between Nitrogen Isotopes on Metal Surfaces

FOUR years ago Taylor and Jungers (*J. Amer. Chem. Soc.*, 57, 660; 1935) concluded that both in the synthesis and decomposition of ammonia on an iron surface the rate-determining step was $N_{2(gas)} \rightleftharpoons 2N_{adsorbed}$. The correctness of this view has now been investigated by observing the velocity with which the isotopic exchange reaction $^{28}N_2 + {}^{30}N_2 = 2^{29}N_2$ occurs on iron and on tungsten surfaces from room temperature to 725° and 900° respectively. The exchange reaction is immeasurably slow below 450°, and even above this temperature is very slow in comparison with the exchange reaction of molecular hydrogen isotopes at the surfaces of hydrogenation catalysts. Reaction is, however, accelerated by the presence of hydrogen. To explain the slowness of the reaction two alternative mechanisms are put forward involving either (a) the rupture of valency bonds of adsorbed molecular nitrogen, or (b) if the nitrogen is adsorbed as atoms, migration of these atoms over the surface. On either hypothesis the acceleration by hydrogen is readily understood due to formation of imido or amido groups which, in (a), would lessen residual valency forces of adsorbed molecular nitrogen and, in (b), would diminish the Fe-N forces inhibiting migration. The high activation energy of approximately 50 kgm.-cal. indicates that the adsorption of nitrogen on synthetic ammonia catalysts is true activated adsorption.

Activity Coefficients of Strong Electrolytes

IT is well known that the formula of Debye and Hückel for the activity coefficient of an electrolyte holds only at high dilutions, and for moderate concentrations an empirical term involving the first power of the concentration must be added to obtain satisfactory results. P. van Rysselberghe and S. Eisenberg (*J. Amer. Chem. Soc.*, 61, 3030; 1939) have investigated the consequence of assuming a van der Waals' force of repulsion between ions, and as this is related to the mean distance of closest approach between a positive and a negative ion, which is already contained in the Debye and Hückel equation, the result is a one-parameter formula. A term proportional to the volume concentration and to the cube of the distance of closest approach, and another term proportional to the square of the volume concentration and to the sixth power of the distance of closest approach, are added to the Debye and Hückel expression for the logarithm of the activity coefficient. It is shown that precise determinations of the distance of closest approach can be made only at high concentrations, when the activity coefficients become sufficiently sensitive functions of this parameter. Activity coefficients in 0·001 and 0·01 molar solutions are calculated for several electrolytes, and in eight cases out of fifteen comparison with experimental values is possible and shows very promising agreement. The mean ionic diameters are calculated by the method of least squares.