

Research Items.

Chumash Prehistory.—In 1927 and 1928, Mr. Ronald L. Olson spent some weeks excavating in the neighbourhood of Santa Barbara, California, and on Santa Cruz Island. The more important finds are reviewed and comparison between the sites of the two areas made in vol. 28, No. 1, of the *University of California Publications in American Archaeology and Ethnology*. In both cases difficulty was experienced in finding burials that had not previously been rifled by relic hunters. The sites on the area facing the ocean front are of the familiar shell-mound and kitchen midden type, varying in size from an insignificant scattering of a few thousand fragments up to deposits twenty feet thick. On the islands the sites are larger and more abundant. It is probable that they were occupied only seasonally and not all the year round. In all the mounds there is a progressive diminution in number of objects as the bottom of the mound material is approached, especially noticeable in the bottom two feet. This is due mainly to a decrease in shell and bone objects. Differences in pattern and style in the objects are scarcely noticeable. Mortars, pestles, metatés and mullers, flint work, fish hooks, and barbs and ornaments, if present at the various levels, show uniformity throughout. One mainland site, however, showed that there was a change in the prevailing method of grinding when the lower strata were laid down; metaté and muller were used almost exclusively, but later gave way to mortar and pestle. Post-European objects were found on these sites. It is probable that shell heaps yielding metatés and mullers are the oldest. The stratigraphical evidence points to (1) An early mainland period; (2) An intermediate mainland period; (3) A late mainland period. On the islands an early island period equates with the last phase of the early mainland and the beginning of the intermediate. A late island period occurs in which European objects are found. The sites yielded no evidence of oceanic contact though canoes and circular shell fish-hooks were found.

Human 'Missing Links'.—In the Smithsonian Report for 1928, Gerrit S. Muller deals with this topic as illustrated by *Pithecanthropus erectus* and *Eoanthropus dawsoni*. The author commences by giving a general statement of the question at the present time, and points out that there is a considerable divergence of opinion on the subject. The two types are essentially different in that the *Pithecanthropus* remains consisted of an ape-like skullcap, ape-like teeth, and a man-like femur, while *Eoanthropus* furnished a man-like brain case, man-like teeth, but an ape-like lower jaw. He then discusses whether an agreement on the position of the two forms is possible. Instead of giving an answer, he takes each type in detail and gives a full summary of all the published opinions on the various different points in connexion with them. The paper is illustrated by photographs of all the actual remains or casts thereof without any attempts at reconstructions. Perhaps the most valuable part of the paper is a complete bibliography of all the memoirs or articles in which the two forms have been discussed.

Special Skin Affections Due to Common Plants.—It is probably common knowledge that some persons are especially sensitive to a substance contained in the little glandular hairs upon the Japanese primula, and through contact with this plant may develop a painful inflammation of the skin, which may last for months, or even years, unless the cause is rightly diagnosed and appropriate treatment employed. An article by K. Touton, of Wiesbaden, in *Die Naturwissenschaften* for Feb. 7, 1930, enumerates an astonishing number

of less well-known cases of skin affections which have been traced in a similar way to the special sensitivity of the victims to the particular plants. In some cases, of course, prolonged exposure to the causal conditions may be necessary, as in the yellow colour of the skin, due to deposition of carotin, produced by continued indulgence in oranges, or the skin affection in the left hand sometimes occurring in the orangeries amongst the orange pickers. The author concludes his account of a long list of skin troubles caused by various familiar cultivated plants with the suggestion that on another occasion he may direct attention to some forty other plants, with which man comes frequently into contact, which have also been proved to exert a stimulating effect upon the human skin in some cases.

The Basis of Colour Changes in Animals.—Prof. G. H. Parker has published a useful summary of the state of knowledge concerning chromatophores (*Biol. Rev. and Biol. Proc. Cambridge Phil. Soc.*, vol. 5, p. 59; 1930). Active colour changes in animals are conspicuously developed only in the cephalopods, the crustaceans, and the cold-blooded vertebrates, and in each group a distinctive type of chromatophore has arisen. All these animals have well-developed eyes, and it would seem that in all these groups the eye plays a most important part in initiating the colour changes. But it is no direct reaction, for even in highly organised instances the chromatophoral responses partake of the nature of a reflex rather than of a higher nervous response, and must be regarded as indicating a reactive capacity of relatively low order. The colour responses may be excited through the direct stimulation of chromatophores by external influences, through hormones, or through nervous impulses, but the first is the least common of these modes. Although the biological significance of the chromatophore systems in animals is by no means obvious, it seems certain that in many creatures they are utilised in developing protective or aggressive coloration, while in others they play an important part in behaviour during the breeding season, in heat regulation, and in other such subsidiary functions. These views, however, await experimental confirmation.

Rattlesnakes of the Western United States.—Scale counts and comparative measurements made on well over a thousand specimens of rattlesnakes from most of the western States and northern Mexico, have led Laurence M. Klauber to revise the relationships of species and subspecies in that region (*Trans. S. Diego Soc. Nat. Hist.*, vol. 6, No. 3, p. 95; 1930). The general tendency of his investigation is to show that these areas are peopled by a series, seven in number, of subspecies of *Crotalus confluentus*, and that California and Nevada forms hitherto ranked with the tiger rattlesnake (*C. tigris*), also belong to *confluentus* as connecting links. One result of the new ranging of subspecies is that in certain cases two subspecies of the same species have overlapping areas of distribution without showing any intergrading forms. By some, such a condition is supposed to be impossible, but the author does not see why it should not occur, and thinks that overlapping of conspecific forms is most likely to occur in regions, such as that west of the Rockies, relatively contorted both topographically and climatically.

Philippine Camphor.—In the *Philippine Journal of Science*, Vol. 41, No. 2, February 1930, Augustus P. West and H. Taguibao give the result of the examina-

tion of young trees of the laurel camphor, *Cinnamomum camphora*, which have been planted by the Philippine Bureau of Forestry since 1910, with seeds obtained from Japan. In Formosa and Japan the bulk of the crystalline camphor is obtained by a crude process of distillation from the wet wood of old trees, the leaves containing mainly camphor oil. In these young trees in the Philippines, very little camphor was found in the wood, but the leaves yielded 2.7 per cent on the dry weight. The authors point out that some of the trees examined contained practically no crystalline camphor in the leaves, but these trees yielded a lævo-rotatory camphor oil distinct from the camphor oil of commerce, which is dextro-rotatory and occurs along with the crystalline camphor. The authors discuss the possibility of obtaining supplies of camphor from the Philippine trees able to compete with the synthetic product made from the pine tree turpentine, which contains usually about 70 per cent pinene. They point out also that the Philippine pines (*Pinus insularis*) may be a valuable source of this synthetic competitor, as they appear to yield a turpentine rich in pinene.

Hybridisation in the British Flora.—Messrs. E. M. Marsden-Jones and W. B. Turrill, of the staff of the Herbarium, Kew, have a very clear note on this subject in the *Gardeners' Chronicle*, Mar. 15. Their general conclusion, based on taxonomic observation and breeding experiments with common plants of the British flora, is that "hybridization is one, but only one, of the factors of organic evolution". They describe the origin of a tetraploid hybrid, a 'culti-species' which breeds true, by crossing under controlled conditions *Saxifraga rosacea* with *S. granulata*. The same hybrid has been recorded as occurring naturally on the Continent. They compare the behaviour of the two genera *Silene* and *Centaurea*. In *Silene* natural hybridisation, effective in maintaining new forms, seems to occur only within the species, amongst the various forms included in this taxonomic group. The two species *S. maritima* and *S. vulgaris* will cross readily and do hybridise in Nature, but the resultant hybrid forms seem to have no permanence in Nature and are only found in limited regions where the habitats of the two species overlap. In *Centaurea*, on the other hand, in the 'nigra' group, hybridisation between certain taxonomic species is extremely frequent and seems to be responsible for the existence of a large number of these taxonomic units, which are either hybrids, segregates, or the results of back-crosses to one parent. The authors conclude definitely that the chief cause of polymorphism among the British knapweeds is hybridisation and that plants considered as distinct species by a specialist on the genus are hybrids. The distinction between this inter-specific hybridisation in *Centaurea* and the intra-specific hybridisation in *Silene* obviously cannot be over-stressed, as it depends, in part, upon the relative extent to which specific analysis has been applied by the taxonomist within a group of allied forms in two different genera.

A New Ordovician Gastropod.—With great difficulty sufficient material has been obtained by Mr. E. Kirk to justify the description of a new Ordovician gastropod from the Great Basin region of Nevada (*Proc. U.S. Nat. Mus.*, vol. 76, art. 22). *Mitrospira longwelli*, n. gen. et sp., is highly characteristic of a fairly narrow zone in the upper portion of the Pogonip beds. Despite its sinistral aspect, the author gives reasons for considering it to be an extreme hyperstrophic example of a dextral shell allied to *Maclurites*, for one species of that genus in the Pogonip at times shows a slight eversion of the whorls giving a slightly convex outline

to the lower surface. So far, no antecedent form to *Mitrospira* has been met with and the only other known gastropod with which it may be compared is *Palliseria*, Wilson. An interesting feature shown by vertical sections is that the apical whorls were progressively filled with secondary deposits of lime during the life of the animal, very similar to that which occurs in certain species of *Natica*.

The Tango (Japan) Earthquake of Mar. 7, 1927.—Although the Tango earthquake of 1927 has been more closely studied than perhaps any other earthquake, Prof. S. Nakamura has added some interesting facts in a paper recently translated into English (*Science Repts. of the Tôhoku Imp. Univ.*, vol. 18, pp. 419-472; 1929). The two faults along which displacements occurred have been described in these pages (*NATURE*, vol. 122, p. 36). The author visited the Japan Sea coast ten days after the earthquake. The previous sea-level was well marked by lines of living shell-fish and sea-weeds, showing that the coast had been elevated from a point $1\frac{1}{4}$ miles east of the seaward end of the Gomura fault to a point about 7 miles to the west of it. The maximum uplift, of 2 feet, occurred about the middle of this distance. Some idea of the intensity of the shock is given by the maximum acceleration of 4500 mm. per sec. per sec. at Mineyama, a town almost completely destroyed by the earthquake. Many observations on the rotation of objects were made, and it was found that the anti-clockwise rotation prevailed near the Yamada fault and the clockwise rotation near the Gomura fault. The shear along the former fault was clockwise and along the latter anti-clockwise.

Climatic Changes in Central Asia.—The theory of the progressive desiccation of western Central Asia has been supported by Sir Aurel Stein, Prof. E. Huntington and others who have examined the evidence on the spot. It has, however, been rejected by other travellers, including Dr. Sven Hedin and Prof. J. W. Gregory. In a paper in the *Geographical Journal* for April, Lieut.-Col. R. C. F. Schomberg discusses the climatic conditions in the Tarim basin, and comes to the conclusion that changes in aridity and distribution of population have been caused not by climatic changes but by natural deviations in the course of streams. The soft friable nature of the soil lets stream courses change easily. Any slight increase in the volume of a stream may throw it off its course and mean the abandonment to aridity of large areas. Again, a river cutting downwards tends to be impeded and so diverted by its banks caving in. The abandonment of cultivation may be caused not only by a river changing its course, but also by the level of the water falling, as the bed is cut downwards, and becoming too low to be available for convenient irrigation. Col. Schomberg discusses also the value of evidence obtained by the existence of dead tamarisk and other trees which have often been cited as evidence of weather conditions in the past. He finds this evidence somewhat perplexing, since at times a luxuriant growth of new tamarisk occurs side by side with many dead bushes.

Absorption of Sound.—When standing waves are set up in a pipe having a source of sound at one end, and a reflecting diaphragm at the other, the relative amplitudes of the changes of pressure at nodes and antinodes will be determined by the extent to which the energy reaching the diaphragm is thrown back into the pipe. Some measurements of the absorption coefficients of a number of materials by this method are described by A. H. Davis and E. J. Evans in the

April number of the *Proceedings of the Royal Society*. A loud speaker was used as the source of sound, and the standing waves set up in an iron tube 30 cm. in diameter and 250 cm. long, the end of which was closed by a steel disc supporting the test specimen in a wooden ring. The change of pressure through the tube was found by means of a second smaller tube, connected to an external electrical registering system. The materials investigated were mostly those which are fairly good absorbers of sound, and records were obtained of the effects of the thickness of material and method of mounting, as well as of the effect of variation of the frequency of the sound. The important consequences which may accompany a change in the state of a specimen are well illustrated by some results given for a cane fibre board 1.1 cm. thick. For a frequency of 1200 cycles per second it was found that the ratio of the absorbed energy to the incident energy was 0.07; when the board was drilled with 480 holes per square foot, each hole being $5/32$ inch in diameter, this ratio was increased to 0.53.

Jet-Wave Rectifiers.—In a paper read to the British Association at Leeds in 1927, Prof. Jul. Hartmann described a jet-wave rectifier he had invented for converting alternating current into direct current. The alternating current flows along a thin jet of falling mercury which is put into synchronous oscillation with the current. The end of the jet makes connexion alternately with two contact pieces connected with the opposite ends of a transformer winding. The positive pole of the direct current is taken from the middle point of the transformer winding and the negative pole from the nozzle end of the jet. The rectified current in the jet wave can be quite large, as mercury is a conductor. The jet is cut by a tungsten knife placed between the two contact pieces. The commutation is accompanied by a transient arc, and to reduce the energy losses in the arc was one of the main problems in designing the device. The contact pieces are mounted in a chamber kept filled with hydrogen, because, with the possible exception of helium, this gas is the only one which is able to absorb the energy of the spark in the small time available for this to take place. The duration of the spark in atmospheric air is about ten times as long as its duration in hydrogen. Commercial rectifiers having an output of 200 kilowatts at 550 volts have been developed at the municipal power station of Copenhagen. Experiments were tried on a large scale with a jet-wave rectifier working in parallel with rotary converters. Severe short circuits caused practically all the converters to fall out of action, but the jet-wave rectifier continued to act during the short circuit and afterwards. The author, in his paper to the Institution of Electrical Engineers read on Feb. 13, points out that the jet-wave rectifier provides a means for the production of very high direct current voltages at a reasonable cost. He thinks that a 100-kilowatt direct current rectifier can be made from a hundred very simple jet-wave commutators connected in series.

Machine Telegraph Systems.—Telegraphy and telephony are now comparable, as both can bridge the distance between two points on the earth's surface. The valve amplifier with loaded conductors has done this for telephony, and the regenerative repeater, loaded conductors, and the valve have done it for telegraphy. The paper, therefore, on machine telegraph systems which was read to the Institution of Electrical Engineers by H. H. Harrison on Mar. 27 was a timely one. He pointed out that although inland telegraphy, at least in Europe, is in a bad way financially, international telegraphy is remunerative. In

Europe, inland telegraphy is controlled by government departments, but in America, where it is successful, it is conducted by two privately owned companies. The success, however, is mainly due to the fact that America is a land of long distances. This and other economic factors enable the telegraph not only to survive but also to flourish in spite of the growth of its rival. In Europe, a factor in favour of telegraphy is the difference in local times. As we move eastward, an hour has to be added to the time for every 15° of longitude. It is possible to telephone to America during normal business hours between 2 and 5 P.M. Greenwich time. Talking eastwards must proceed in the morning, commencing at 9 A.M., but it cannot be carried out farther east than China. This difference in local time constitutes the only factor operating against world-wide telephony. The sole effect on telegraphy is to cause a change in the direction of the traffic, which flows eastwards and westwards alternately except when the working days overlap. Either wired or radio telegraphy is bound to survive. The most serious problem that remains to be solved is how to make inland telegraphs pay in countries where distances are comparatively short. The principal obstacle is the cost of retransmission at the various stations, and this will probably be solved by making all these operations automatic.

Turbo-Generator at Hell Gate Station, New York.—There are many advantages in using very large turbine generators in central stations, and it is difficult to see what cause will ultimately limit their size. Working steam pressures are also continuing to increase. A pressure of 1200 pounds per square inch a few years ago was considered quite outside the practical working range. Now it is well established and turbine builders are preparing for the coming of pressures up to 3000 pounds per square inch. More than a year ago, a 165,000 kilowatt, two-unit set was installed by Brown Boveri of Baden in the Hell Gate Station, New York. In size it far outstrips all other electrical apparatus. In the *Westinghouse International* for February, a description of this machine is given. It is 91.5 feet long, 40 feet wide, and rises 27.5 feet from the floor. It weighs 1300 tons, and would light a million homes at once or provide excellent illumination for a highway twice round the world. A notable feature is the high speed of the rotor, which makes 1800 revolutions per minute. Per unit generated it is more compact and cheaper than smaller turbines. The necessary ventilation is provided by three vertical type blower fans which are placed below and between the generators. This effects a considerable saving in the floor space. No less than 275,000 cubic feet of air per minute are supplied to keep the electric generators cool when fully loaded. Further details of this turbine are given in the *Brown Boveri Review* for January.

Chemical Effects of X-rays.—Clark and Pickett, in the February number of the *Journal of the American Chemical Society*, describe the action of X-rays on several chemical systems known to undergo photochemical change in ultra-violet light. Most of the changes, if any, were very small. The most sensitive reactions found besides the oxidation of ferrous to ferric salts were a series of aldehyde-ketone condensations. Colloidal lead used in the Blair Bell technique for cancer therapy was studied from the points of view of preparation, stability, coagulation by X-rays, production of secondary X-rays, and catalytic effects in reactions subject to irradiation. The conclusion was reached that the specific chemical effect rather than the action of producing secondary X-rays *in situ* in the tissues is indicated.