

Research Items

Dental Caries in the Punjab, Northern India

A RECENT diet and health survey of the Kangra District, Punjab, Northern India, carried out by the Public Health Department and Dr. D. Curjel Wilson, has shown a high incidence of rickets and osteomalacia, and definite vitamin D, calcium, and phosphorus deficiencies in the diet of the population. Fifty children with rickets were examined clinically and dentally by G. F. Taylor and C. D. Marshall Day (*Brit. Med. J.*, May 6, 1939). A radiological examination of ten subjects showed that four had no caries, and in the remaining six, fourteen cavities only were found—an average of 1·4 cavities per head. In 96 temporary and 135 permanent teeth, two cavities were in the temporary, and twelve in the permanent teeth. The children came from a hill district and live in primitive conditions, the diet consisting mainly of carbohydrates, with relatively small proportions of protein and fats. Meat and fruit are almost entirely absent; and very small quantities of milk and vegetables are consumed. Sugar is rarely eaten. Two meals a day only are taken, of rice and chapattis made from home-ground flour. Rickets and osteomalacia are common. It is concluded that vitamin D deficiency alone does not cause either dental caries or hypoplasia of the teeth. The low incidence of dental caries and the excellent teeth and jaw formation are characteristic of the peasant of the Punjab, and have not been seen equalled by the authors in either Great Britain or America. An investigation of the teeth of 800 school children of the middle class in Lahore, having a diet more in keeping with European standards, including soft carbohydrates and sugar, showed an average of 6 cavities per head. The evidence appears to lend support to the 'detergent' theory of Sim Wallace, which postulates that the physical nature and cleansing action of the diet is more important than other factors in the promotion of dental caries.

Parthenogenesis in Vertebrates

A RECENT issue of the valuable series of monographs "Actualités Scientifiques et Industrielles", No. 651 (Hermann et Cie., Paris) falls into the group dealing with "Biologie et Reproduction" and has been written by the editor of the group, Jean Rostand. Parthenogenesis in invertebrate animals is well known and a usual method of multiplication in not a few species; but it is less often recognized that natural parthenogenesis of a limited kind occurs among fishes and batrachians, is in varying degrees a regular occurrence in the unfertilized ova of birds, and has long been known in mammals, both in ovarian and free ova. The phenomenon is generally confined to a rudimentary segmentation, limited in extent and, as in birds, proceeding more slowly than the segmentation which follows fertilization, although conforming with it in its general lines. The discovery of natural parthenogenesis led to the development of artificial parthenogenesis and this, particularly amongst batrachians, has led to a long series of experiments in which a wide variety of physical and chemical activators has been studied. The 62 pages of "La Parthénogénèse des Vertébrés" give a succinct account of present knowledge of both natural and

artificial parthenogenesis, and point to gaps which future investigation might profitably endeavour to close. For example, no success has attended attempts to prolong the natural parthenogenesis which is normal in ova of domestic fowls, nor has anything been done here to test artificial activators. Amongst reptiles no positive evidences have yet been discovered of parthenogenesis, natural or artificial.

Cactus-feeding Moths of the Family Phyticidæ

A SMALL Argentine moth (*Cactoblastis cactorum*) of the above family has largely saved a great area in Australia from being converted into desert owing to the spread of prickly pear. Plants of this kind are common over the United States, Mexico and South America, where they are kept more or less under control by various insects and by competition with other plants. Nearly half a century ago a few prickly pear plants were introduced into Australia from North America and were intended solely for gardeners. The continent had no indigenous cacti and these few examples proved to be the progenitors of millions which ran wild. The invasion is now a matter of common knowledge, and by 1925 more than sixty million acres in Queensland were rendered useless by prickly pear. After almost every possible method of control had been considered or exploited, salvation came in the form of the inconspicuous small moth *Cactoblastis*, the larval activities of which eventually reduced the prickly pear to a state of real control, and fifteen million acres are now available for settlement and cultivation which had previously become completely useless. Various Lepidoptera have larvae which feed upon cacti, and many of them belong to the family Phyticidæ. These have recently been classified by Carl Heinrich, senior entomologist of the U.S. Bureau of Entomology and Plant Quarantine (*Proc. Nat. Mus.*, 86, 331–413; 1939). This information is now available for Australian and other entomologists. So far as is known, it is only the species *C. cactorum* that is really effective as a controlling agent under Australian conditions. The other species caused but little effect on the plant, mainly, perhaps, because their larvae feed scattered in an individual fashion, whereas those of *C. cactorum* feed in companies and may amount to many thousands on a single plant. Altogether there are no fewer than eighteen genera, including nearly fifty species of Phyticidæ, the larvae of which are known to feed on prickly pear.

Fungal Rotting of *Sequoia* Timber

THE Californian redwood tree, *Sequoia gigantea*, does not appear to be a common host for parasitic organisms, but J. A. Macdonald has recently described a fungus which has rotted the wood of young trees growing in Scotland (*Ann. App. Biol.*, 24, No. 1, 83–86, Feb. 1939). Cultural and microscopical characters show that the species concerned is *Coniophora puteana*. Several species of *Coniophora* have been described as secondary parasites; but it seems clear in the present investigation that the organism is acting as a primary pathogen. The fungus can attack blocks of healthy *Sequoia* wood, and can also infect lime, maple, horse-chestnut, hornbeam, alder, oak, elm, beech, willow and birch.

Properties of Virus

Hideo Moriyama and Shunkichi Ôhashi have recently published a review of their own and other modern researches upon the physico-chemical nature of viruses (*J. Shanghai Sci. Inst.*, Sect. 4, 4, 63, Feb. 1939). They describe a general method for the isolation of virus protein, and show that the activities of ultra-microscopic organisms are inseparable from such material. With regard to virus production in the host, it is stated that "viruses can be considered as a coagulant of protoplasm-proteid, in which some chemical change is produced by the physico-chemical influence of the virus". The problem is complicated by the fact that other minute particles of protein are known, which have no virus activity, and the paper under review considers the minute physical and chemical differences between these two similar states of protein. Immunity to virus attack is considered, and also the fascinating problems as to how viruses arise, and whether they can have separate multiplication away from living host cells. Animal viruses provide almost all the data, though plant viruses are occasionally mentioned to demonstrate similarity to their related zoological parasites. A plea is also made for a new subject of "virology", and, indeed, the paper forms an excellent summary for teaching purposes.

Virulence of Bacteriophage

MANY different kinds of virus which attack animals and plants show considerable range of virulence. It would be reasonable to suppose that the same character would be observed for bacteriophage, a virus disease of bacteria, and there have been several investigations of this problem. Hideo Moriyama and Shunkichi Ôhashi (*J. Shanghai Sci. Inst.*, Sect. 4, 4, 51-61, January 1939) have recently worked with a phage of *Bacillus coli*, and they find no confirmation of the statements made by earlier workers that the size of a phage plaque upon an agar plate culture of the bacteria is inversely proportional to the size of the phage particle producing it. The size of plaque is considered to be governed solely by the velocity of multiplication of the phage. Thus strains of phage which produce large plaques are more virulent than those which can only make small ones under similar conditions. The differing virulence of various strains tends to be perpetuated in subsequent culture. Lowering of virulence can, however, be induced by incubating phage with bacteria in media containing neither calcium nor magnesium salts, or in media containing citrate or oxalate radicals, and this induced change appears to be of a permanent nature.

Changes in Level of Land

THE relative vertical movement of land and sea is generally so slow a process that its detection by measurement rather than by inference is difficult. There is a considerable amount of evidence of such changes on the coasts of Europe in recent geological times. The only method, however, of detecting movement in progress is to keep a careful record of sea-level by one or more autographic and continuously acting tide gauges. H. L. P. Jolly has discussed this problem in a paper on "Supposed Land Subsidence in the South of England" (*Geographical J.*, May 1939). The Ordnance Survey tide gauges erected at Dunbar in 1913, Newlyn in 1915, and

Felixstowe in 1917 provide some data. Precautions are taken to rule out any purely local subsidence or a settling of the structure carrying the gauge. The Dunbar record shows no aggregate change of mean sea-level over twenty-three years, but those at Newlyn and Felixstowe show a rise of sea-level during twenty-five and twelve years respectively. The Felixstowe record was interrupted in 1929. Mr. Jolly discusses at length the nature and value of the evidence, and notes that a gauge was established last year at King's Lynn and that another is projected on a site in the north of Scotland. The question of relative vertical movement between one part of the land surface and another will be settled when it becomes possible to carry out a new geodetic levelling of Great Britain. Comparisons between the first levelling in 1840-60 and the second in 1912-21 are vitiated by inaccuracies in the older works.

The International Temperature Scale

THE International Conference in 1927 defined the International Temperature Scale so as to conform as closely as possible with the thermodynamic scale according to measurements then available, and regarded it as capable of improvement as more accurate ones were obtained. Since that time, more accurate methods of measurement have been devised and Dr. H. T. Wensel, of the U.S. Bureau of Standards, has examined the results and has made suggestions for securing greater accuracy in the definition (*J. Res. Bur. Stand.*, April). Below 660° C. the scale was defined by the standard resistance thermometer, from 660° C. to 1,063° C. (the gold point) by the standard thermocouple and then up to about 5,000° C. by the Wien radiation formula. Dr. Wensel suggests that 630.5° C., the freezing point of antimony, should be substituted for 660° C., and that the Planck formula $I = c_1/\lambda^5 (e^{c_2/\lambda T} - 1)$ should be substituted for the Wien above 1,063° C. He considers that the most accurate values of the constants are $c_1 = 3.732 \times 10^{-5}$, $c_2 = 1.436$, $\lambda_m T = 2,892 \times 10^{-4}$ and σ of Stefan's expression for the total radiation = 5.70×10^{-5} , all in c.g.s. units. More accurate values of a number of auxiliary constants than were available in 1927 are also given.

Parabolic Orbit of a Comet by a Graphical Method

T. CLOSE has developed a method of finding how a preliminary orbit of a comet can be determined graphically to an accuracy of about 1' (*J. Brit. Astro. Assoc.*, 49, 6; April 1939). The method is similar to that described by G. F. Chambers in "A Handbook of Descriptive and Practical Astronomy", but contains numerous simplifications. It has also certain features in common with M. Davidson's method by means of a model in which three dimensional measurements are possible (see *Mon. Not. Roy. Astro. Soc.*, 90, 5; March 1930). Close has taken Finsler's Comet as an illustration, and has obtained an orbit very close to that which was computed for an interval of 10 days. It is necessary to use a fairly large scale to be certain of four-figure accuracy. Of course parallax and light-time corrections are superfluous in the method, and those who are skilful as draughtsmen will find it possible to obtain a preliminary orbit, assuming parabolic motion, without a great mathematical equipment. The method is not suitable for finding the orbit of a minor planet.