

RESEARCH ITEMS

Bacteria of the Throat and Nose

AN account of the micro-organisms, the normal bacterial flora, found in the nose and throat of persons living in London and south-east England, some of whom were repeatedly examined over a period of seven years, is given in a report by Drs. Edith Straker, Bradford Hill and R. Lovell, published by the Ministry of Health (Reps. on Pub. Health and Med. Subjects, No. 90. H.M. Stationery Office. 2s. net). The inquiry, which lasted from 1930 until 1937, included repeated swabbings of volunteers from among the staff of the London School of Hygiene and Tropical Medicine, and of boarders in a boys' public school. Swabbings were also occasionally taken from inmates of the Royal Hospital School, Greenwich, of an orphan home, and from members of the clerical staff of the Ministry. The work shows that of any large group of adults living in an urban community between 20 and 40 per cent will usually at any one time be carrying a pneumococcus in the nasopharynx, between 5 and 15 per cent a hæmolytic streptococcus, between 40 and 80 per cent the so-called influenza bacillus, and between 5 and 20 per cent the meningococcus of cerebro-spinal fever. The pneumococcus and the meningococcus were less frequent in women than in men. The pneumococcus was found more frequently in cold damp weather than during hot dry periods, while the reverse association tends to occur with the hæmolytic streptococcus. The last-named organism shows a sharp rise in prevalence in boys' boarding schools in association with outbreaks of tonsillitis. Neither the pneumococcus nor the influenza bacillus shows any close association with the fluctuations in mortality attributed to influenza. Observations made on persons suffering from colds tell strongly against the view that the acute infectious cold is caused by any of the bacteria studied. Dr. Rosher contributes a section on the frequency of the influenza bacillus in the trachea of unselected cases without respiratory disease coming to post-mortem examination; this organism was found in 27 per cent of such cases.

Markings on Fossil Bones

ONE of the side-lines of investigation which invariably leads to interesting and sometimes to important indications of the make-up of a prehistoric fauna is the study of the markings upon bones. Bones may be fractured or marked by contemporary human beings, by animals and by various kinds of weathering and chemical action; and as a rule careful scrutiny reveals not only the agency, but in the case of animal markings perhaps even the species concerned. Not much attempt has been made to systematize the distinctive characters of markings as a guide to other workers, but in an excellent paper, copiously illustrated, Pei Wen-Chung discusses his experience with bones from a series of sites in China ranging from Pliocene to historic times ("Le rôle des animaux et des causes naturelles dans la cassure des os", *Paléont. Sinica*, N.S., D., No. 7, 1938). He describes the characteristic appearance of markings caused by the gnawing of rodents of different kinds and by carnivores, the striations due to the scratchings of carnivore claws, vermiculations

which are sometimes puzzling, and the indications of chemical action or the effect of water. Not the least useful section of his paper deals with examples of markings which, although due to other agents, might well be mistaken for human artefacts. Such errors of interpretation may easily be made by workers not familiar with the variety of markings which may be made by animal or physical agency.

Barnacle Communities

F. HIRO, in a survey on the barnacle communities at the Madarai Pier in Korôru Island, Palao (Palao Tropical Biol. Stat. Stud., No. 4), deals with the distribution and orientation of four species of *Tetraclita* and one of *Chthamalus* on vertical concrete piers. The various species show a clearly marked vertical zonation, *Chthamalus* occupying the highest zone, and extending to high-water mark. Where channels are cut under the pier, the *Chthamalus* show a marked tendency to avoid the parts where light and currents are strongest, while the *Tetraclita* species do not show this effect. Finally, in the centre of these cuts where light is weak, most barnacles are orientated at right angles to the current so that they can, by twisting the body through 90°, feed readily in a current coming from either direction, while those near the ends of the cuts tend to be orientated towards the light.

Bacterial Synthesis of an Eye Colour

THE diffusible substances v^+ and cn^+ , which are essential for pigment formation in eyes of *Drosophila* individuals dominant for these genes, can be formed by recessive vbw insects cultured on starvation diet. E. L. Tatum (*Proc. Nat. Acad. Sci.*, 25, 486-497; 1939) now also finds that under suitable conditions certain bacteria synthesize a substance which has the activity of v^+ . All the present evidence indicates that the product from bacteria is identical with v^+ . An unidentified *Bacillus* species in the presence of tryptophano, can produce this substance, which is soluble in water and ethyl alcohol but insoluble in acetone and chloroform. Like v^+ , this substance is transformed into Cn^+ when introduced into vbw flies.

Polyploidy in the Salamander

G. FANKHAUSER (*J. Hered.*, 30, 377-388; 1939) finds that the somatic chromosome number of *Eurycea bislineata* is 28. Of 134 larvae examined, 13 were triploid with 42 chromosomes and 2 were tetraploid. The larger cells and pigment pattern allow the polyploid larvae to be tentatively identified. The tetraploids were weaker and retarded in growth. Among 311 individuals of *Triturus* five were found to be triploid.

Fluorination of Phosphorus Halides

THE fluorination of phosphoryl trichloride and phosphorus tribromide has been studied by H. S. Booth, S. G. Frary, and F. B. Dutton (*J. Amer. Chem. Soc.*, 61, 2934, 2937; 1939). The phosphorus compounds were treated with antimony trifluoride, with bromine or antimony pentachloride as catalysts, or in the case of phosphorus tribromide with dry

calcium fluoride. In this way the new compounds dibromomonofluorophosphine PBr_2F and monobromodifluorophosphine PF_2Br were obtained from phosphorus tribromide. PBr_2F is a colourless liquid (b.p. 78.4° , f.p. -115.0°), PF_2Br a gas (b.p. -16.1° , f.p. -135.8°), both hydrolysed by atmospheric moisture, decomposing slowly into PF_3 and PBr_3 at -78° , reacting with mercury with liberation of phosphorus, and combining with bromine to form, probably, PBr_3 and PF_2Br_2 . From the fluorination of phosphoryl trichloride by the same methods, gaseous PF_3 (b.p. -39.8°) and phosphoryl difluoromonochloride POF_2Cl (b.p. 3.1° , f.p. -96.4°), and liquid phosphoryl monofluorodichloride PFCl_2 (b.p. 52.9° , f.p. -80.1°) were obtained. All these substances are colourless and do not attack glass when dry.

Mercuric Halide Complex Ions

WHEN HgCl_2 , HgBr_2 and HgI_2 are dissolved in solutions of the corresponding alkali metal halides, it is known that complex anions are formed. These have been represented as HgCl_3^- , HgBr_3^- , HgI_3^- , whilst evidence has been submitted for the existence of HgBr_4^{2-} and HgI_4^{2-} . A. B. Garrett (*J. Amer. Chem. Soc.*, 61, 2744; 1939) has determined the solubilities of mercuric bromide and iodide in the corresponding potassium halide solutions. The solubility of mercuric bromide in pure water at 25° was found to be 0.0170 mol./1000 gm. water. The solubilities of mercuric bromide can be accounted for on the assumption that the only complex ion formed is HgBr_3^- . In the case of mercuric iodide, however, an additional reaction is probably present, namely the formation of HgI_4^{2-} in appreciable amount. The amount of HgCl_3^- is negligible; but the solubility of mercuric chloride in low concentrations of chloride solutions is anomalous. This is accounted for on the basis of polymerization of mercuric chloride to the order of 10 per cent. The free energies of formation of the complex ions from mercury halide and halide ions are given in gm. cal. at 25° as: HgCl_3^- -1700; HgBr_3^- -365; HgI_3^- +430; HgI_4^{2-} -2100.

Structure of Potassium Molybdocyanide Dihydrate

THE substance potassium molybdocyanide dihydrate $\text{K}_2\text{Mo}(\text{CN})_8 \cdot 2\text{H}_2\text{O}$ is one of the more familiar examples of compounds containing eight atoms or radicals bound to a central atom. The configuration of the MX_8 group has not previously been established with certainty in any single case, although the cube and the square Archimedean antiprism have been regarded as geometrically plausible. J. L. Hoard and H. H. Nordsieck (*J. Amer. Chem. Soc.*, 61, 2853; 1939) have shown by X-rays that the $\text{Mo}(\text{CN})_8$ polyhedron is a duodecahedron with eight vertices and triangular faces. It can be described as the figure outlined by the vertices of two interpenetrating bisphenoids orientated in the same way as the positive and negative tetrahedra of a cube. Although required by the space group to possess only a plane of symmetry, the complex ion in the crystal approximates to the symmetry of one of the point groups.

Raman Spectrum of Gaseous Methylamine

THE literature on Raman effect contains very few researches on gases or vapours because of the difficulty of procuring good spectra at comparatively low pressures and with relatively short exposures.

It is, therefore, extremely interesting to find that a new technique has been developed by Kirby-Smith and Bonner (*J. Chem. Phys.*, 7, 880; 1939) which, by using a light source of high intensity, a large scattering volume, and a spectrograph camera with a large aperture, gives satisfactory spectra of gases at a pressure of approximately three atmospheres after an exposure of from three to six hours. Data for gaseous methylamine are given and compared with those of Kohlrausch (*Monatsh. Chemie*, 68, 349; 1936) for the liquid. The most noticeable difference between the spectra is in the position of the N-H valency vibrations near 3400 cm^{-1} ; in the liquid they are at 3312 and 3372 cm^{-1} , whereas the gas shows them at 3360 and 3470 cm^{-1} . These large differences are attributed to the formation of hydrogen bonds between neighbouring NH_2 groups in the liquid. For C-H vibrations, on the other hand, the largest difference between gas and liquid is 12 cm^{-1} . Whereas all methyl compounds should possess only two vibrations characteristic of C-H bond stretching, methyl halides exhibit three, and gaseous methylamine is found to have four. Their origin is given as a double Fermi resonance (*Z. Physik.*, 71, 250; 1931) between a fundamental near 2840 cm^{-1} and two infra-red bands at 1460 and 1426 cm^{-1} . The appearance in gaseous methylamine of a hitherto unrecorded displacement of 781 cm^{-1} is explained as due to an N-H bending vibration, on the grounds that such a vibration in the liquid would be sensitive to hydrogen bonding and association.

Determination of Stellar Diameters by Interferometer

A PAPER was formerly published (*Mon. Not. Roy. Astro. Soc.*, 99, 141) by Fürth, Sitte and Appel, which proposed a modification of Michelson's stellar interferometer that would enable it to be used even when there were strong air perturbations. Two independent papers have now appeared (*Mon. Not. Roy. Astro. Soc.*, 99, 9; October 1939) by P. Lacroute and J. A. Carroll, both of which criticize the efficiency of the apparatus. Lacroute shows that in the modified form suggested, even if fixed fringes are formed, that is, fringes insensible to movements of the Michelson fringes, they would be utterly useless for the determination of stellar diameters. He shows, however, that they are not insensible to movements of the Michelson fringes, and offers a tentative explanation of the reason why the authors of the original paper thought they observed stability, though he admits that the explanation may be conjecture, because some of the experimental details could easily be missed by anyone reading the description. Carroll shows that they drew an incomplete analogy between a ruled grating illuminated by plane waves and the Michelson fringe system, because the displacement of the Michelson fringes, in the focal plane of the observing telescope, does not correspond to a simple translatory motion of a grating, but to a translation and also a rotation, about an axis parallel to the rulings, of the incident light. For this reason the secondary system must move through the same number of fringes as the primary Michelson system. He also tested the secondary fringes to see if they were less liable to disturbances than the Michelson fringes, and found that the claim could not be substantiated. It appears from the criticism of Lacroute and Carroll that the apparatus for the elimination of strong air perturbation effects is of no use for that purpose.