

one based on the possibility of a poison being formed, and one suggesting a direct or 'bullet' action, which may be due to the direct action of the quantum of radiation energy, to the production of an ion-pair or to the passage of an electron track through the sensitive part of a cell. Consideration of wave-length effects should ultimately show which is the true explanation.

Dealing with the two theories as to the mechanism, Prof. Crowther pointed out several objections to the poison theory: the objection that the amount of poison was small (100 r. producing a concentration of the order of 1 poison molecule in 10^8 normal molecules) was not considered valid, but other evidence concerning temperature effects, variations of effects with dosage rates and times seemed to point against the theory. Further, the known survival and mortality curves could only be considered consistent with the poison theory on the basis of certain unlikely

assumptions. On the other hand, the 'bullet theory' rationally explained most of the observed facts, including the insensitiveness of the reactions to temperature variations. In due course it might be hoped that the mechanism would be understood, and at present Prof. Crowther thought that possibly the root cause of radio-biological action might be found in the variations of the electric charges on colloidal particles when irradiated.

The Research Section of the Exhibition contained exhibits from fourteen individuals and institutions, illustrating research in technical, biological and physical problems, and included examples of early apparatus and radiographs. In the Industrial Exhibition was shown a commercial X-ray tube for operation at 1,000 kilovolts. In this tube the electrons are excited in three stages, each of 400 kilovolts, and the tube may be operated either with one pole earthed or in the balanced arrangement.

Nicotinic Acid and the Pellagra-Preventing Vitamin

IN an address to the Birmingham University Biochemical Society, on December 9, Dr. Leslie Harris, of the Cambridge Nutritional Laboratory, referred to the findings in some current work on the chemical nature of the pellagra-preventing factor.

Dr. Harris said that the suggestion of a connexion between nicotinic acid and 'vitamin B' is not a new one. About twenty-four years ago, Funk in England and Suzuki in Japan succeeded in isolating nicotinic acid from active 'anti-neuritic' concentrates, and it was once supposed that nicotinic acid might in some way be related to vitamin B₁. But later investigations proved conclusively that pure nicotinic acid itself had no anti-neuritic action, and there the matter was left for some years, although the possible physiological importance of nicotinic acid was emphasized by the discovery of Euler that the acid amide of nicotinic acid is a component of cozymase. Recently, however, it has been found that nicotinic acid or its amide has a growth-promoting action for certain micro-organisms (Knight, Mueller, Holiday), and for pigeons or rats kept on various diets deficient in some portion of the B₂ complex (Funk and Funk; Frost and Elvehjem). Special importance attached to the statement of Elvehjem and his co-workers that nicotinic acid or its amide was curative of 'blacktongue' in dogs; and work has now been done to link these new results with observations made at the Cambridge Nutritional Laboratory a year or so back. Here experiments by Birch, György and Harris showed that what had hitherto been called 'vitamin B₂' consisted in reality of three distinct factors, namely, lactofavin, vitamin B₆ (the 'rat dermatitis factor') and the pellagra-preventing (P.P.) factor proper. The latter appeared to be identical with the 'anti-blacktongue' factor for dogs. More recently, Harris confirmed these results as to the tripartite nature of the 'vitamin B₂' complex and showed furthermore that monkeys also developed a disease ('monkey pellagra') analogous with human pellagra when restricted to a diet deficient in the P.P. factor but containing the other known constituents of the B₂ complex.

A trial of nicotinic acid on monkeys which were developing symptoms of nutritive failure on a diet deficient in the P.P. factor has now indicated that this substance has in fact a curative action: further work is needed, however, to ascertain whether nicotinic acid is the *sole* deficiency in such a diet. Nevertheless, these results and the findings of other workers seemed sufficiently encouraging to warrant a trial on human beings suffering from pellagra.

Through the collaboration of Dr. A. Hassan of the Faculty of Medicine, Cairo, tests under controlled conditions have been made on pellagrins in Egypt. In preliminary trials, two cases of spontaneously occurring pellagra at the Khanka Asylum and three at Abuzaabal Prison were examined, together with three controls. All variables, such as the composition of the basal diet, the amount of work done daily, and the extent of exposure to sunlight were kept unaltered for all subjects. Nicotinic acid given by mouth up to a maximum level of $\frac{1}{2}$ gm. daily was found to hasten the subsidence of the erythema in all the cases. At the asylum, the general condition of the pellagrins was likewise improved, but at the prison the beneficial effect seemed largely limited to the specific action on the erythematous lesions. It may safely be concluded therefore that the nicotinic acid duly rectified a deficiency in these pellagra-producing diets. The results make it seem likely that the prison diets were deficient in some additional factor, and in fact the asylum diet did contain more meat, more greens, was better prepared and included some wheaten bread—the bread at the prison consisting of one quarter of maize. The possibility has therefore still to be borne in mind that nicotinic acid is not the *sole* major deficiency in some pellagra-producing diets—in other words, that pellagra as sometimes seen may be accompanied by more than one dietary error. Apart from this, it seems probable that nicotinic acid (or amide) is the less active form, or 'precursor' of a more active variation of the P.P. vitamin, which can be formed from it within the animal body.