

Current Literature.

WALLACE, J. S. **The Best Means of Preventing Dental Decay in Man and the Uselessness and Cruelty of the Projected Experiments of the International Dental Federation.** 21 pp. [Numerous refs.] 1934. Geneva: Bureau International Humanitaire Zoophile, 4, Cour St. Pierre and London: 15, St. James' Place, S.W.1. [6d.]

HOPS, W. **Diet as the Cause and Prevention of Dental Caries.** *E. African M.J.* 1934, v. 10, 318-30.

KOEHNE, Martha, BUNTING, R. W., and HADLEY, Faith P. **A Review of Recent Studies of the Cause of Dental Caries.** *J. Amer. Dietetic Ass.* 1934, v. 9, 445-61. [60 refs.]

Of these three articles the first is written as an essay in the competition for prizes offered by the International Humanitarian Bureau of Geneva as a counterblast to that of the International Dental Federation for experiments to show the result of root-canal treatment, having for its object can effective and lasting sterilization of the canals which would not become foci of infection. The author of this essay obtained the second prize.

An historical survey of the literature on the cause and prevention of dental caries occupies a considerable part of the essay and supports the thesis that the best way to avoid experiments on animals as a means of proving the toxic effects of germs in root canals, is to prevent the teeth from being attacked by caries and by so doing to avoid infection of the root canals. He brings a large amount of experience and evidence in favour of his contentions which find further support from the bibliography of sixty-four references.

The second article is more of a résumé of reading done by the author than a record of personal experience, its object apparently, as it was read at a meeting, was to provoke a discussion, which might have proved fruitful had it been recorded. The conclusions are the usual ones advanced by similar communications.

The third article is of a different nature since it gives a reasoned dissection of the various current views by authors who have experimented on most of the diets described. They give results which are contradictory and are not afraid to admit that these are puzzling and up to the present baffle their attempts to furnish an explanation. They are not out to prove any one theory of dental decay and are quite impartial in their judgment of other workers in the same field whose findings are directly opposed to their own. They have found that caries was produced in children whose diets were recognized generally as adequate for normal health and growth. Close observation over a definite period showed that the metabolism of these children was normal, their appetites were healthy, the gains in height and weight were also normal, in short they were normal children.

Recent researches are reviewed, together with reports of personal experiments, and a conclusion is reached in agreement with that of most impartial authorities that the cause of caries depends on no single principle which can be applied universally in prevention ; that there are undoubtedly persons who are immune to this disease, whose teeth are unaffected by any diet unless some serious constitutional disturbance arises to bring about a change in this immunity, the nature of which is at present inexplicable ; there are others who exhibit a susceptibility unaffected by any diet however sufficing in all the necessary requisites and with a low sugar content. The authors admit that the teeth of those who are moderately prone to the disease may be protected by diets low in artificially sweetened foods. The evidence is strongly in support of the finding that *Bact. acidophilus* growing undisturbed in areas of the mouth may be the primary cause of caries, that the kind of food may favour this by the provision of the necessary medium of acid fermentation, and that caries will result irrespective of the nutritional balance of the diet unless the shape of the teeth is unfavourable for the retention or packing of the food and its fermentation.

L. LINDSAY.

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KETTLE, E. H. **Experimental Pneumoconiosis: Infective Silicosis.**
J. Path and Bact. 1934, v. 38, 201-8, 15 figs. (4 coloured) on 6 plates.
 [11 refs.]

This paper, which records the most recent results obtained by Professor Kettle in his experimental study of the pathological effects of silica and of allied dusts, breaks new and important ground. The view most generally held in regard to the pathogenesis of pulmonary silicosis has assumed the primary pathogenic agent to be silica itself, acting alone and unaided on the pulmonary tissue. On this primary silicosis a secondary bacterial infection—in particular tuberculosis—is often grafted, the frequency and severity of this secondary infection constituting the main menace of the disease. That silica does act in this way under experimental conditions, so damaging the tissues as to create foci in which bacteria, and particularly tubercle bacilli, flourish very readily, the author's earlier studies have shown ; but the experiments that he records in this paper suggest that, at least in regard to pulmonary silicosis as it occurs in nature, we may have been putting the cart before the horse. The difficulty of inducing pulmonary fibrosis in experimental animals by inhalation experiments have been emphasized by many workers in this field, and there is general agreement that dusting experiments of this kind must be continued for months or years if any reliance is to be placed on the results. Even if an active dust is introduced in suspension directly into the trachea, a method adopted by the author in earlier studies, months or years may pass before a definite fibrosis develops.

The present series of experiments was undertaken to study the possible effect of a bacterial infection in promoting silicosis. In order to eliminate the progressive lesions induced by bacterial multiplication and invasion the

agent selected for trial was a saline suspension of a B.C.G. strain of tubercle bacillus, killed by autoclaving. Guinea-pigs were injected intracheally with a suspension of dust alone, a suspension of dead tubercle bacilli alone, or with a mixture of the two reagents. They were killed and examined at various intervals thereafter.

The results were very striking. The naked-eye appearances of the lungs into which dust alone had been injected, and of those that had received the mixture of dust and dead tubercle bacilli, did not differ greatly, but profound differences were revealed on histological examination. The introduction of the dust alone was followed by a rapid and pronounced catarrhal reaction, the dust particles being engulfed by single or giant macrophages within a few days. Part of the dust was removed to the regional lymph-glands, but much of it remained in the alveoli for long periods of time without causing definite fibrosis.

A very different result followed the injection of mixtures of dust and dead tubercle bacilli. There was the same phagocytosis of the finer dust particles, and encirclement of larger particles by giant or syncytical macrophages, but there was a much more intense emigration of mononuclear cells, and areas of lung became solid with dust and exudate. In these foci large clumps of bacilli were present. In course of time these diminished in number, in part as the result of lysis, in part by phagocytosis and subsequent removal; but before they disappeared a localized necrosis had usually developed, and the necrotic areas became surrounded with broad zones of fibrous tissue. The resulting nodular lesions, which are figured in a series of plates, resembled very closely those met with in human tuberculo-silicosis. In other areas a coarse reticular fibrosis replaced the nodular lesions, and this condition also has its counterpart in the pathology of the natural disease in man.

The injection of tubercle bacilli alone, or of tubercle bacilli mixed with inert dusts, such as wellingtonite (aluminium oxide), or iron-coated silica, failed to produce any similar lesions.

It would seem that bacteria, or bacterial products, play a very important part in sensitizing the lung tissue to silicosis. "Infective silicosis," would, on this basis, indicate silicosis occurring as the result of a primary infection, rather than a tuberculous or other infection occurring as the result of a primary silicosis. That the silicosis aggravates the infection, there is, of course, no doubt; but it would seem that we must think in terms of two pathogenic agents working together, thus displacing the silica from its major primary rôle. The importance of this new view-point in regard to the industrial side of preventive medicine is sufficiently obvious.

A further point of interest is that the dust used in these experiments was china-clay (kaolin, an aluminium silicate). It has been commonly held that this dust, in common with all other silicates except asbestos and in contradistinction to uncombined silica, is harmless on inhalation. Previous studies by the author, in which kaolin was injected into the subcutaneous

or other tissues, had led him to the view that this dust is, in fact, active and dangerous, a conclusion which the present series of experiments has amply confirmed.

W. W. C. TOPLEY.

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TWORT, C. C., and TWORT, J. M. **On the Prevention of Mineral Oil and Tar Dermatitis and Cancer.** *Lancet.* 1934, February 10, 286-7.

Investigations carried out over several years are summarized. Certain mineral oils are more carcinogenic than others; refined textile lubricating-oil is the most carcinogenic, being more active than the dirty-looking crude material from which it is prepared, while internal-combustion engine lubricating oils are least active. Oils vary according to geographical area of origin; the more fully hydrogenated an oil, the less is its carcinogenic activity. Treatment of oils with sulphuric acid reduces carcinogenic potency; and any process which hydrogenates or saturates oils, such as oxidation-reduction, polymerization, or selective extraction, has the same effect. The refractivity constant of a mineral oil is closely related to its carcinogenic potency; this fact can be used practically when choosing lubricating oils for mule-spinning. Smearing the exposed parts before work and after the evening bath with a mixture of equal parts of anhydrous lanolin and olive oil prevents the occurrence of mineral oil dermatitis and cancer, and also of tar dermatitis and cancer.

E. L. COLLIS.

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ROGERS, Doris G. **An Inquiry into the Diet and Household Expenditure of Unemployed Families.** 13 pp. 1933. December. The Newcastle Dispensary. [6d.]

The family budgets of 33 unemployed families (22 living in slum areas and 11 in New Housing areas), and 3 employed families (living in slum areas) were investigated. Contributory factors such as conditions for food storage, facilities for washing, presence of ovens and incidence of household pests were also enquired into. All the unemployed diets were very deficient in first-class protein. In the slum areas this deficiency amounted to (on the British Medical Association standard) 51 per cent, and in the New Housing area 65 per cent; the employed diets showed a deficiency of 39 per cent. The fat in the unemployed diets was lacking in quantity and quality; in the slum areas the deficiency was 23 per cent and in the New Housing areas, 26 per cent; the employed diets showed a surplus of 10 per cent. There was a deficiency of total calories in the slum unemployed of 20 per cent and in the New Housing areas, 16 per cent; there was no deficiency in the employed. The greater deficiencies in the New Housing areas are the result of higher rentals, despite economies in other essential expenditure, the average rent being 9s. 2½d. (30 per cent of total income) as compared with 5s. 10½d. (18 per cent of total income) in the slum areas. In the slums the cost of food is increased by the necessity for buying daily quantities owing to the lack of storage accommodation. In the New

Housing areas this difficulty does not exist. In the slum families where a larger food income is available the increase is used for food and in general wisely spent. The average weekly food income in the slum areas was 3s. 5½d. per "man" and in the New Housing areas 3s. 1¼d. per "man" as compared with the British Medical Association standard of 5s. to 5s. 10½d. per "man."

H. N. H. GREEN.

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Fox, F. W. **Diet in Relation to Health in South Africa. Biochemical Aspect.** *S. African M.J.* 1934, v. 8, 3-15. [46 refs.]

Maize is the most important agricultural product in South Africa, taking up 40 per cent of the cultivated land. In general it is little inferior to wheat as a source of food. There is less protein and mineral salts, more fat and about the same amount of carbohydrate in "whole" maize flour as compared with "whole" wheaten flour. Recent work shows that the biological value of "whole" wheat protein is about the same as that of "whole" maize protein. Though the maize protein, prolamin (zein), is deficient in lysine and tryptophane the glutelin fraction contains amounts of these acids similar to wheat glutelin.

The chief objection to a large maize diet is the excess of carbohydrate compared with protein. It should be supplemented with protein-rich foods such as milk, meat, fish, ground nuts and beans. A mixture of mealie meal, kafir corn, ground nuts and soya bean, treated so as to prevent deterioration on keeping, is on trial. The prejudice against yellow mealies, in favour of white, which exists in some parts of South Africa, deprives the native of a valuable source of vitamin A. The use of the soya bean and a greater consumption of fish are suggested as possible methods of providing a protein supplement to the maize diet. The mineral intake of the white population is probably very similar to that found elsewhere and the calcium intake must often fall below the optimal level, but the Poor Whites and the Natives (who often live on an exclusive diet of mealies for considerable parts of the year) must often have an extremely low calcium intake. Though this deficiency shows itself in other ways it is a striking fact that rickets, osteoporosis and caries are rare, which can only be due to the abundant supply of vitamin D from solar irradiation. In fact, in some cases, trouble must be looked for in the direction of over-calcification.

A scheme for a suggested nutritional survey in South Africa is given. Amongst the suggested measures are those of soil survey, the improvement of pastures through attention to grasses, the use of fertilizers (particularly with reference to the well-known phosphorus deficiency in the soil), the study of native foods and food customs and the particular deficiencies existing in various areas.

[This article contains many valuable suggestions and collected data as to the composition of South African foods, of direct interest to all health workers in this part of the world.]

H. N. H. GREEN.

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CLUVER, E. H. Diet in Relation to Public Health in South Africa. *S. African M.J.* 1934, v. 8, 19-22.

The danger of dietary deficiencies chiefly arises from economic causes and for the great bulk of the population of South Africa this factor gives rise to the following deficiencies: Protein of high biological value (with excess of carbohydrate, especially of cereal starch), minerals and vitamins. All persons past babyhood should receive 100 grammes of animal protein daily or a larger amount than this of vegetable protein. The dangers from excess protein in the diet are probably slight. Mealie meal is a useful food but when consumed almost exclusively, as it is by practically the whole native population and a very large section of the poorer European population, it is an unmitigated evil. The natives in the gold mines usually arrive in a malnourished and often subscorbatic condition; they leave in six to twelve months in vigorous health although they have worked under bad hygienic conditions. This must be due to the supplementary articles of diet required by Government regulations. These include 8½ ounces of meat, 3 ounces of beans, half of which must be germinated for the production of vitamin C, and 5 ounces of vegetables.

Though there are no rickets, periods of insufficient vitamin D from solar irradiation combined with a large consumption of anti-calcifying cereal must interfere with Ca-P metabolism and lay the foundation for malformed and carious teeth in children. Deficiencies in vitamins A and B₁ are not common in South Africa, but the vitamin B₂ margin is narrow in the mealie-meal eating communities as illustrated by the periodic outbreaks of pellagra in Bantus. Many natives in Zululand and the Transkei are apparently in a sub-pellagic state, readily convertible into overt pellagra by hard work in the sun. Mealie meal contains no vitamin C and scurvy is not uncommon in the Native territories and the disease may become manifest when hard labour is done, as in the mines, when, unless the diet is fortified with germinated beans, vegetables and fruits, and not too strenuous labour is demanded from the raw recruits, scurvy soon appears.

In the territories the diet is unsatisfactory, for only from March to June is the staple native diet, mealie-meal, supplemented by sufficient meat protein and foods containing sufficient vitamins B₂ and C. There is little to be wondered at that the infant mortality and general death-rates are so high. From the economic aspect alone the diet should be improved, for a large proportion of the adult males in the territories are found to be medically unfit for work in the mines. In the poorer sections of the European community the difference in diet from that of the territories is only one of degree.

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