titled, "The Determination of Nitric Nitrogen in Soils," in which several of the older methods for determining this elusive radical received extended and probably deserved criticism.

Among those receiving its full share was the aluminum reduction method proposed by the writer a little over two years ago. The title of the article proclaiming this method was, "The Aluminum Reduction Method as applied to the Determination of Nitrates in 'Alkali' Soils." It was at that time put forward by the writer, not as the best possible method that the future might develop for this purpose, but as one which, in the presence of the soluble chlorides, sulfates and carbonates abounding in the "alkali" soils of the arid west, would give far more reliable results than the phenol disulfonic acid method of Gill then commonly used in soil work. Comparisons with this latter method are given. Another reason for developing the method in question was to accurately determine nitrates in nitrification cultures in soils containing one or more of the "alkali" salts. Occasionally large amounts of nitrates are here encountered, and, as was shown, when more than twenty or twenty-five milligrams of nitrogen as nitrate are present, the colorimetric method previously mentioned is of questionable value even in the absence of "alkali."

Briefly, the criticism of the method as made by Allen is that very high amounts of soluble humus and organic matter cause incomplete reduction, the results running low.

As all soil scientists know, the "alkali" soils of California and other arid sections are *very low* in soluble organic matter commonly termed humus.[1] They vary from almost nothing to, in some few cases, 3 per cent. The average for the surface soils of California is 1.28 per cent. It was for these soils, and not for those high-humus soils of the middle west, that the aluminum reduction method was originally intended. It was satisfactorily tried out with varying amounts of the "alkali" salts singly and combined, also with soluble organic matter in the forms of glucose and soluble humus, in amounts far in excess of that ever leached from "alkali" soils with distilled water.

The writer admits that some of the statements made for the accuracy of his method were possibly too broad and far-reaching, but they were made more especially with reference to its application to "alkali" soils, as the title should suggest. The method, as proposed, has been successfully used by others in arid sections, and the author still recommends it for use under such conditions.

In conclusion the writer wishes to state that he will be the first to welcome any method for determining nitrates in soils which combines accurate and reliable results with a minimum of time expended.

Note.—Since the above was written (July last) an article entitled "The Determination of Nitrates in Soil," by R. S. Potter and R. S. Snyder[2] has appeared in which the aluminum reduction method, proposed by the writer and criticized by Allen, is shown to be far superior to the colorimetric methods even where the high humus soils of Iowa were used.

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[1] See "Humus and Humus-nitrogen in California Soil Columns," University of California Publication in Agricultural Science, Vol. 1, pp. 173–274, by R. H. Loughridge.

A SIMPLE METHOD FOR THE ELIMINATION OF PROTOZOA FROM MIXED CULTURES OF BACTERIA

Protozoa, particularly various flagellates and ciliates, often hamper the study of the higher bacteria in mixed cultures.

Such cultures may be readily and effectively freed from these undesired animals by centrifugalization. By this means protozoa are quickly thrown to the bottom of the tube, while the bacteria for the most part remain in suspension. If subcultures are then inoculated from the supernatant fluid they will be found entirely freed from protozoa.

Doubtless this "fractional" centrifugali-

[2] *Jour. Ind. and Eng. Chem.*, Vol. 7, No. 10, p. 863.

zation has been previously practised by other workers, but as I have never seen mention made of it, I bring it to the attention of bacteriologists.

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SCIENTIFIC BOOKS

Cancer, Its Cause and Treatment. By L. DUNCAN BULKLEY, M.D. New York, Paul B. Hoeber, 1915.

Various writers, especially Williams in his book on the natural history of cancer, have attributed great significance to the mode of life, especially to the diet as a factor in the origin of cancer. He pointed out that cancer is much less frequent among races which are vegetarian. Dr. Bulkley defends in his lectures a similar thesis: cancer (both carcinoma and sarcoma) is due to errors in the mode of living, not only to an overindulgence in a meat diet, leading to the production of nitrogenous poisons which are not properly eliminated, but also to the consumption of tea, coffee and alcohol. In consequence the saliva becomes acid, increased putrefaction takes place in the large intestines, the glands with internal secretion do not functionate well, the kidneys cease to secrete sufficiently, and the body fluids which bathe the cells become abnormal (especially too acid), thus stimulating certain embryologically aberrant cells to cancerous growth. Other factors, like traumatism play only a secondary part. In support of his views the author cites statistical data which show that frequency of cancer is greatest where so-called civilization has farthest advanced, that the increase in cancer which is observed everywhere is real and caused by a corresponding increase in false living; that experimentally it has been shown that the growth of (transplanted) cancer in animals can be influenced through certain diets; that clinically, cancer has been cured by the author in a considerable number of cases by instituting an appropriate mode of living aided by the use of drugs stimulating elimination of waste products and certain other procedures.

It is impossible to enter into a detailed critical analysis of this position. We must, however, point out that throughout the author's argumentation no sharp distinction is made between fact and hypothesis. Facts opposed to his thesis are ignored or minimized in their importance. We may mention a few objections which might be raised: We do not know at the present time how much the mode of living, external conditions and hereditary factors influence the distribution of cancer among different people. We know that constant irritation of certain kinds may produce cancer in a large percentage of persons, provided the irritation is active over a sufficiently long period of time. We have shown that on the same mouse farm in Granby, under the same vegetarian diet, certain strains of mice are almost exempt from cancer, while in other strains, as a result of hereditary peculiarities, the large majority of all females become affected by cancer of the breast. It is now known that the presence of embryologically displaced cell nests is not necessary for the development of cancer.

There occur in addition to the main arguments not infrequently statements which are open to criticism. To cite a few: "The cells themselves must be influenced ultimately by that mysterious force which we will call life, which ends with its extinction from the body as a whole and which is ultimately related to nerve action." The thyroid is said to be of great importance in governing the calcium metabolism. The same principles are said to hold good for the treatment of skin diseases and for cancer in general, because both concern aberrations in the behavior of epithelial cells; but internal organs like pancreas and liver, although they are of epithelial character, nevertheless do differ in their behavior from the skin. Postoperative recurrences of cancer are, according to the author, due to a transformation of formerly healthy cells into cancer cells as a result of faulty metabolism and not, as is almost generally assumed, to the incomplete removal of the original cancer.

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