vard Medical School, where it was shown that a young adult may endure complete deprivation of vitamin C for long periods; it required two months before the ascorbic acid of the blood was reduced to zero, 134 days until clinical signs of scurvy were apparent, and more than five months (161 days) before distinct petechiae with retarded healing of an experimental wound were found. In the light of this information the recommendation on page 56 that,

> because of its labile nature . . ., we now believe it a good investment to include some significant source of this vitamin (C) in every meal, and to provide fruit or fruit juice instead of sweets if snacks are to be eaten between meals or before bedtime,

would seem to be very inconsistent and easily misunderstood by the laity.

One gets the impression that fortified oleomargarine is to be considered as an inferior fat to butter since the amount of vitamin A added approaches what may be considered "their share," which is "perhaps half as much as in good butter." The author neglects to explain that the level of 9,000 I.U. of vitamin A declared on the labels of various fortified margarines was set on the basis that this was the average vitamin A content of butters (good and poor). Unfortunately, the buyer has no way of knowing whether he is purchasing superior butter with 18,000 I.U. per pound or poor butter with 2,500 I.U. per pound.

In Chapter VIII on "How the Body Manages its Nutritional Resources" it is considered that one should not speak of bodily processes as mechanisms. Such *"isms"* are likely to become *"wasms,"* as W. M. Clarke earlier suggested was rapidly occurring with some scientific theories.

In Chapter IX on "The Nutritional Characteristics of the Chief Groups of Foods" the author has an interesting historical discussion on the milling of flour and emphasizes the importance of breadstuffs (especially from enriched flour) in our diets whereby as much as 38 per cent. of the calories, 37 per cent. of the protein and 30 per cent. of the phosphorus may be obtained by the expenditure of only 18 per cent. of the average budget for foods.

On the one hand, we are advised that nutritional deficiencies are much higher than is apparent from actuarial statistics due to non-recognition or mislabeling of the cause of death. "Our greatest nutritional handicap in the United States," it is stated, "is not that part of the population which is starving in the historic sense, nor that part which is *recognized* as suffering from specific nutritional deficiency diseases, but the part (probably much larger than those other parts put together) which 'is getting along on poor diets.'" On the other hand, we are later advised that the 1943 freshman class at Yale, although the youngest on record, is the tallest class in the history of that institution.

The last chapter is concerned largely with experimental evidence of the effect of diet on the rate of growth, on reproduction and on longevity. The author's experiments in this field are described in an interesting manner at some length. There is a selected bibliography of approximately 250 titles at the end.

When one has completed the book, there is a feeling that the information gained carries considerable authority.

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AERIAL PHOTOGRAPHS

Aerial Photographs: Their Use and Interpretation. By A. J. EARDLEY. New York and London: Harper and Brothers. 203 + xxiv pp. Fully illustrated. $2.75.

THE aerial photograph is one of the most important implements of the war. It facilitates the construction of new maps and the revision of old ones. It provides the surest means of finding out about the enemy's defenses, the details of his communication systems, his industrial plants, his harbor installations and air fields, his troop, armor, matériel and ship movements. It provides the aerial bombardier with details of his targets and permits him to assess the damage caused by his bombing raids. In addition, the aerial photograph is an important implement of peace. Combined with some control from the ground, aerial photography permits the accurate survey of terrain which may range from a small parcel of real estate to large expanses of territory difficult of access on the ground. Its economic importance is already recognized and will grow rapidly. Vast studies have already been made of silting and soil erosion, of crop distribution and farm acreage, of timber growths, of geological features. Aerial photographs are used in surveys for laying oil pipe lines and power transmission lines, in water control and in many other important fields. In the days of untrammelled automobile traffic, they were even used for studying parking problems.

At the present time many people, both in the services and out, are learning to make or to interpret aerial photographs. A limited number of good texts are available to them for study. The present volume is a very good simple introduction to the subject in general, and an excellent treatise on the special study of geology by aerial photography. It has withstood the test of the classroom and laboratory.

The first third of the book treats of the taking of aerial photographs and their characteristics; there is a good introduction to the use of the stereoscope and plotting contours; and an introduction to making mosaics, including the radial line method of plotting.

The remainder of the book is concerned with the applications to geology, and a final chapter treats of tactical interpretation. It is a pioneering work in the geological field, and it is assumed that the student has had introductory courses in geology and elementary mineralogy and lithology. It should not be assumed, however, that it is only of use to the geologist, for geological structure determines other surface characteristics, and interpretation of the geological features shown in aerial photographs may be of much value for use in other fields. The strict geological interpretation is based on a thorough background of field geology, but a simple knowledge of geological characteristics is of help for general interpretation.

The man versed in the science of photogrammetry will find much lacking in the book. But it is not for him, and the selection of elementary material has been judiciously made and results in a good introduction to the interpretation of aerial photographs. It is to be expected that with the rapid changes going on in aerial photography, some sections, such as that dealing with apparatus, are somewhat out of date, but little is lost as a result. Not enough study has yet been made of infrared and color photography from the air to be able to state definitely that they are of importance, but one feels that some mention of the work already done in these fields should have been made. They show much promise. As in most books on this subject, one of the most important and fundamental aspects is but slightly touched, that is, the characteristics of photographic films and processing desirable for the production of negatives suitable for aerial photographic interpretation. It is far too easy to make a bad photograph—or, rather, we should perhaps say it requires much knowledge and experience to produce the best kind of photograph. Far too few people have that knowledge. It is to be hoped that the next edition of the book under review, which is otherwise very good, will include an authoritative chapter on the desirable photographic materials and their characteristics.

WALTER CLARK

SPECIAL ARTICLES

THE ANTIGENICITY OF PROTEIN ISOLATED FROM BOVINE SERUM AFTER BRIEF TREATMENT WITH ALKALI[1]

IN a recent publication, Lewis[2] states that "beef plasma which had been incubated one hour or longer with 0.5 normal sodium hydroxide and then neutralized was no longer antigenic when tested by gross anaphylaxis or by the more sensitive method using uterine strips from guinea pigs sensitized to native beef plasma." If we interpret this statement correctly, tests for antigenicity were carried out by using native plasma as the sensitizing antigen and alkali-treated protein as the shocking material. Apparently these results were interpreted to indicate a complete loss of antigenicity after treatment of the plasma with alkali. Obviously, however, it can not be decided from these data whether the results obtained were due to a change in antigenic specificity or to a loss of antigenicity. It has been our experience that protein isolated from bovine serum after exposure to 1 N alkali at room temperature for periods as long as 8 hours is still antigenic, although its antigenic specificity usually is altered by the alkaline treatment. Some of the data in support of our conclusions are included in this paper. A more detailed report will be published elsewhere at a later date.

The antigenicity of alkali-treated egg albumin,[3,4,5] horse serum,[6,7,8] zein,[5] edestin,[5] casein[5], and beef serum[8,9] has been studied by several investigators. In general, these studies have indicated that prolonged treatment with alkali will abolish antigenicity. However, Landsteiner and Barron[6] found that the protein isolated from horse serum treated with 1 N sodium hydroxide for 16 hours still gave weak complement fixation and precipitin reactions with homologous antiserum. Johnson and Wormall[7] reported similar results; treatment of horse serum at pH 13 or above for about 24 hours was required to abolish antigenicity.

Studies in these laboratories have indicated that the protein isolated from bovine serum treated with 1 N sodium hydroxide for 27 hours at room temperature apparently is non-antigenic.[9] The tests that have been employed for antigenicity include active anaphylaxis, passive anaphylaxis, complement fixation, and precipitin reactions. However, this material is not suitable for use in human therapy, since it is fatal to guinea pigs when given intravenously in doses of 35 mg per kg or larger. Lewis[2] stated that products prepared

[1] From the Departments of Immunochemistry and Biochemistry, Medical-Research Division, Sharp and Dohme, Inc., Glenolden, Pa.

[2] J. H. Lewis, SCIENCE, 98: 371, 1943.

[3] H. G. Wells, *Jour. Inf. Diseases*, 6: 506, 1909.

[4] C. Ten Broeck, *Jour. Biol. Chem.*, 17: 369, 1914.

[5] R. L. Kahn and A. McNeil, *Jour. Immunol.*, 3: 277, 1918.

[6] K. Landsteiner and C. Barron, *Zeits. Immunität.*, 26: 142, 1917.

[7] L. R. Johnson and A. Wormall, *Biochem. Jour.*, 26: 1202, 1932.

[8] H. A. Davis and A. G. Eaton, *Proc. Soc. Exp. Biol. Med.*, 50: 246, 1942.

[9] L. E. Arnow, L. A. Kazal and R. J. DeFalco, *Jour. Biol. Chem.*, 145: 347, 1942.