glass bottles. Some time later Booth and Kon[6] showed that the power to reduce the reagent could be restored to an extent varying with the length of exposure to light by treating the milk with hydrogen sulfide. The further detailed study by Kon and Watson yielded the following information:

Under the action of light the ascorbic acid of milk undergoes reversible oxidation, most probably to dehydroascorbic acid. Visible light of short wave-length (blue and violet) is mainly responsible for the reaction. Ultra-violet light is also probably active, but yellow and red are almost without effect. The action of light does not take place in the absence of oxygen, and the reversible oxidation follows the laws of a unimolecular reaction. The reversibly oxidized product is biologically active. The product suffers further decomposition spontaneously, without the agency of light, giving a substance which fails to decolorize the indophenol reagent even after treatment with H_2S and is devoid of biological activity. This reaction does not run to completion. Synthetic ascorbic acid added to milk behaves, under the action of light, in the same way as the ascorbic acid originally present.

Pasteurization by the holder method destroys the reversibly oxidized, but does not affect the reduced, form of ascorbic acid in milk. Milk, as secreted by the normal cow, contains only reduced ascorbic acid. The amount of destruction of vitamin C caused by pasteurization in the absence of catalytic metals (copper) depends on the previous exposure of the milk to light.

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FISH IN THE LATAH FORMATION OF IDAHO

THE purpose of this notice is to bring to the attention of vertebrate paleontologists the existence of fish skeletons in the Latah formation.

In May, 1936, Dr. R. L. Lupher conducted a field trip along the Clearwater River for his class in historical geology. The writer was very pleased to accompany the class as a guest. One of the stops was at a road cut, on the north bank of the river, eleven and one half miles east of Lewiston, Idaho, in T. 36 N., R. 4 W., Boise Meridian. This seems to be the collecting locality called Station 4 by Kirkham and Johnson,[1] who found at least twelve species of plants, which were later described by Berry.[2] Here the Latah beds strike N. 85° W. and dip 20° W. They are composed of yellow and porcelaneous white shale with an eight-inch bed of gray volcanic ash passing through the center of the outcrop.

Fragmentary remains of fish were found by several members of the party. Messrs. J. Bone, A. O. Huhn, M. Morsing and J. Storall uncovered three complete skeletons, which they kindly presented to the writer. Since the first discovery the writer has visited the outcrop twice and both times has found fish remains. The skeletons are from four to six inches long and have been determined temporarily as belonging to the genus *Leuciscus*. Accurate determinations, as yet, have not been made. One slab, measuring ten inches by fourteen inches, has yet to be uncovered.

Dr. F. B. Laney[3] has found bone fragments, and Berry[2] has noted occasional scales, spines and bones in the Latah formation; but, so far as the writer is able to ascertain, this is the first discovery of complete and articulated fish skeletons. Although these skeletons are from only one locality in Idaho, the writer is confident, because of the fine grain of the clay-shale and the excellent preservation of plant remains, that more diligent collecting will uncover many such skeletons in the Latah formation of both Idaho and Washington.

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THE PROTECTION OF PLANTS

RECENT experience[1] shows that the effect of poison-sprayers (arsenic, copper, lead, etc.) is found to extend much beyond its immediate objective, namely, the protection of crops against parasitic attacks.

Apart from its inability to discriminate between friend and foe, this treatment represents in its cumulative poisoning action upon the soil a grave danger to future plant life both by (a) its inhibition of growth and (b) the introduction of toxic constituents into plant metabolism. A greater stress upon the augmentation of the plant's natural means of protection, such as sanitation, nutrition and stock selection, might perhaps lessen the recourse to these artificial protective means.

Now from the work of Greenbank[2] on the inhibition of rancidity in fats and oils (with a possible extension to cereals) by maleic acid, and that of Copisarow[3] on (a) the bactericidal and fungicidal properties of maleic acid, (b) the close chemical and physiological resemblance, if not identity, of maleic acid with the natural

6 *Nature*, 134: 536, 1934.

1 V. R. D. Kirkham and M. M. Johnson, *Jour. Geology*, 37: 483–504, 1929.

2 E. W. Berry, *U. S. Geol. Survey Prof. Paper 185*, pp. 97–125, pls. 19–24, 1934.

3 Oral communication.

1 Report of the American Society of Plant Physiologists, Western Section, SCIENCE, 84: 171, 174, 1936.

2 Greenbank, U. S. Pat., 1898, 363, Feb. 21, 1933; SCIENCE, 77: *Suppl.*, page 6, February 24, 1933.

3 Copisarow, *Jour. Pom. Hort. Sci.*, 14: 9, 1936.

inhibitor—"blastokolin"—present in fruit and vegetables[4] and (c) the probable transition of this inhibitor into the natural accelerator (ethylene), a transformation marking the ripening stage in fruit development and expressed chemically by the degradation of maleic acid to ethylene and carbon dioxide—it appears that the substitution of the poison-sprayers by the natural inhibitor may constitute a practical means of assisting the plant's self-protection. As in the case of stored fruit and vegetables spraying with a solution or emulsion of maleic acid in ethereal oil, paraffin, solvent naphtha or some other suitable medium may perhaps be found effective for such plant treatment.

The application of maleic acid may extend not only to bacteria and fungi, but also to insects in the early stages of their metamorphosis. Again the presence of the inhibitor in seeds and its ready diffusion in an aqueous medium[4] suggests the possibility of treating the seeds with maleic acid as an anti-virus measure. It is perceivable that the preferential cultivation of barbless, husk-free, thin-skin, etc., varieties eliminates the hardier types in our crops, as the accelerated elution of the free, or hydrolysis of the combined inhibitor (as in the case of vitamin C[5]) exert a disturbing influence both on the enzymic equilibrium and general metabolism and increases the susceptibility to parasitic attacks.

The controlled use of maleic acid would obviate any appreciable interference with the normal course of metabolism or any ill effect on food values.

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SCIENTIFIC BOOKS

RATIONAL FUNCTIONS

Interpolation and Approximation by Rational Functions in the Complex Domain. By J. L. WALSH. American Mathematical Society Colloquium Publications, Volume XX, 1935.

IN the field of approximation by rational functions in the complex domain the author of this monograph has been among the most active and successful investigators during more than the last half-score of years. His contributions have been widely read, and his authority in the subject is generally recognized. It would be surprising under these circumstances were his book to be found anything but a valuable and significant addition to the mathematical literature. There is no cause for such surprise. Professor Walsh has written here a clear, careful, thorough and scholarly account which will not fail to receive general commendation. The book is a worthy addition to the important series of Colloquium Publications of the American Mathematical Society.

The subjects of interpolation and approximation, if their many aspects and ramifications are included, are too vast by far to admit of detailed treatment in any single volume. The present monograph confines itself, therefore, specifically to sequences of polynomials or general rational functions which are determined in one of the following two ways; *i.e.,* by the fact that they coincide with (interpolate) a given function upon an assigned set of points or by the fact that they lie closest to (approximate) the given function in a certain specific sense. The considerations are made entirely in the complex domain, the given function being usually assumed to be analytic. Topics pertaining immediately to the real variable are given no place here. It will be clear from this that the author has restricted his book to those aspects of the subject which have been centers of his own research. This, of course, is entirely in the tradition of this series of publications.

Of the field considered the book gives a thorough and comprehensive treatment, generally with an ample degree of detail. Many results of the author's which are included here have not heretofore been published. The material, as one would expect, is technical to a high degree and requires, therefore, to be read closely and with care. There is much of it. However, its organization, which could have been no simple problem, has been effectively and skilfully carried out. The work is well documented—the bibliography including some 150 titles.

In point of style and arrangement there is much similarity with that of the author's recent essay, "Approximation by Polynomials in the Complex Domain," Memorial des Sciences Mathematiques, Paris, 1935, wherever that essay and the present monograph deal with the same material. The monograph, however, in distinction from the essay, is a systematic exposition, not an outline, and among other things deals with general rational functions as well as with polynomials.

In brief summary the contents of the twelve chapters of the book may be described somewhat as follows: In the early chapters general function theoretic considerations and the basic theorems on approximation are set forth, and are followed by discussions and theorems on series of interpolating polynomials—Jacobi series—

[4] Kockemann, *Ber. Deut. Bot. Ges.,* 52: 523, 1934; Shuck, SCIENCE, 81: 236, 1935.

[5] Levy, *Nature,* 138: 933, 1936.