In half-gallon jars of soil the disease usually appears in Turkish tobacco plants soon after the first evidence of nitrogen deficiency in the lower leaves. Frenched plants may be brought back to normal growth by the addition of a complete nutrient solution or by the addition of nitrogen in the form of calcium, sodium or potassium nitrate, ammonium sulfate, urine and other common sources of nitrogen. Recovery will also result when an excised top of a frenched plant is grafted on a healthy plant or when placed in tap water (containing a trace of nitrate) or in a complete nutrient solution or in a weak solution of nitric acid with an excess of calcium carbonate.

Soil which has produced frenched plants rapidly recovers its ability to produce a normal plant if allowed to stand a short time. The removal of one plant from a jar in which two frenched plants are growing will often result in recovery of the other.

These results and others of a similar nature suggest that frenching is brought about when the rate of carbohydrate metabolism proceeds relatively more rapidly than nitrogen absorption. This results in the production of leaf tissue which, in the absence of sufficient available nitrogen, can not develop chlorophyl and other necessary cell constituents as fast as they are required for the production of a normal green leaf.

The marked similarity between the symptoms of apple[2] and pecan rosette[3] and tobacco frenching suggests that the three diseases have a common cause; namely, a deficiency of available nitrogen. This is further strengthened by the fact that nitrates added to the soil bring about rapid recovery of frenched tobacco plants, while organic matter, especially legumes, plowed under has been found to bring about recovery of affected pecan and apple trees in the course of two or three years.

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KENTUCKY AGRICULTURAL EXPERIMENT STATION

A WIDESPREAD ERROR RELATING TO LOGARITHMS

THE integral part of a logarithm is commonly called characteristic, while the decimal fraction part thereof is known as its mantissa and is the only part of a common logarithm which is found in the usual modern table of logarithms. In view of the fact that students of mathematics frequently meet the word mantissa for the first time when they begin the study of logarithms it may be assumed that some of them are inclined to consult a large dictionary for the purpose of learning something about the origin of this word. If they should happen to look up this term in a recent edition of "Webster's New International Dictionary," or of "The Century Dictionary and Cyclopedia" they would find the statement that the noted British mathematician, H. Briggs, used the term mantissa with its modern mathematical meaning. They would find the same misinformation on consulting the most recent American text-book on the general history of mathematics, for the purpose of obtaining more light as regards the origin of this term.

In view of the fact that this error is so widespread in works which are naturally consulted by many readers with unusual confidence as regards their reliability it may be desirable to note here that as far as is now known the word mantissa was first used as a mathematical term by J. Wallis in the Latin edition of his algebra, 1693. This was more than sixty years after the death of H. Briggs. The word mantissa does not appear in the English edition of this algebra, which was published eight years earlier than the Latin edition and has been said to contain the word in question. J. Wallis used this word with a more general meaning than that noted above, and some very good recent writers, including H. Weber, have followed his example in this respect. Since I have previously directed attention to various errors appearing in F. Cajori's "History of Mathematics," 1919, it gives me pleasure to be able to say here that as regards the term in question his statement on page 152 is essentially correct.

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LITERATURE CITATIONS

MAY I add my bit to the discussion of literature citations from the standpoint of a user. The method of indication of references recommended by *Chemical Abstracts* has a logical sequence of arrangement.

In the case of a typical reference, J. Amer. Chem. Soc. **48**, 34 (1926), the first subject of interest is the journal, which thus refers to certain shelves in the library. This leaves a block containing the volume in heavy type or underlined in typewritten or handwritten notes, the page and the year. The volume, and series if more than one, are outstanding because of their location as the first item or items of the block, and because the volume is in heavy face type.

In general the reference is located by the volume number, in only isolated cases by the year. Only when the volume is located is the page reference of

[2] Morris, O. M., "Apple Rosette," Wash. Agr. Exp. Sta. Bul., 177, 1923.

[3] Skinner, J. J., and J. B. Demaree, "Relation of Soil Conditions and Orchard Management to the Rosette of Pecan Trees," U. S. Dept. of Agr. Dept. Bul., 1378, 1926.

importance. Its relative importance is greater if the volume is bound in two or more books.

Thus this form of reference forms a logical sequence; journal, series, volume number, page reference, lastly year as a check in case of error in the preceding references. Too many references which follow this system in other respects omit the year of publication.

This method of indication places the parts of the reference in their order of importance and use.

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SCIENTIFIC BOOKS

An Introduction to Economic Geography. Volume I. *Natural Environment as Related to Economic Life.* By WELLINGTON JONES and DERWENT S. WHITTLESEY. 375 pp., 366 figures. The University of Chicago Press, Chicago, 1925. $5.00.

"W. D. JONES and D. S. Whittlesey have just produced the best American work on economic geography." Thus has Jean Brunhes, the French geographer, characterized this recent addition to geographic literature. He might have added that it is almost the first presentation in text-book form that is strictly geographic in its contents and method. Most of the other works on economic geography that have appeared have been either physiographies with some emphasis on the influences of physiographic features upon man or descriptions of resources and industries with an attempt to show the relation of those resources and industries to environmental conditions. "An Introduction to Economic Geography" is a presentation of the newer tendencies in the teaching of geography in this country, especially as those tendencies are finding expression in the school of geography of the University of Chicago.

The present work is the first volume of a two-volume treatise. It deals with the natural environment and with some of the more significant relationships to economic life. The second volume, promised for the near future, will deal with the major economic activities and with their relationship to the natural environment. The two volumes are intended for use in introductory geography courses in colleges and in senior high schools.

"An Introduction to Economic Geography" follows none of the orthodox rules of text-book arrangement. There is no systematic treatment either by commodities or by countries. The first volume is divided into three major parts. The first part consists of a series of exercises and question groups covering the outstanding features of the environment. There are exercises on climate, land forms and soil, rocks and minerals, ground and surface waters, the ocean and coasts, and the shape, size and location of land masses. It is the intention of the authors that the student should secure his understanding of the principles of geography through working out the exercises inductively from materials supplied in the remaining two parts of the book.

Part II is text material covering the same range of subjects as the exercises. It includes factual material and explanations of the elements of the physical environment, together with brief descriptions of some vital activities of man as influenced by that element. Accompanying the explanation of the arid and semi-arid climates, there is a description of dry-farming as practiced in the western great plains region and of the life of the nomadic Khirghiz. With the section on land forms, there is an excerpt descriptive of the isolated and backward life of the southern Appalachians. Most of the text material has been prepared by the authors, but a part of it has been adapted for the present use from other sources.

Part III consists of illustrations, 366 in all. They include many maps and graphs, but the great majority are photographs, most of them taken by the senior author. There is an exceptionally good collection of geographic illustrations for the Orient, a result of Professor Jones's two trips to Asia. The folder of world maps is worthy of special notice. It contains excellent maps of world climatic regions, world temperature for January and July, semi-annual rainfall and land forms. The temperature maps show surface temperatures rather than the usually mapped sea level temperatures of so little significance to the geographer.

There are few adverse criticisms to be made of "An Introduction to Economic Geography." The treatment of a subject in each of the three parts of the book tends to weaken the continuity. It would seem preferable, at least, to combine Parts II and III and insert the illustrations throughout the book immediately with the pertinent text material.

The principal criticism is that the explanations of the elements of the environment are not always adequate. Geography, it is true, is not the study of the environment, but it is the study of the relationships that exist between that environment and living organisms. Without an understanding of both the organisms and the environment any understanding of their relationships is impossible. The absence of such necessary background may easily lead to an overemphasis of superficial relationships or to an insistence on relationships that do not exist.

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