where many persons are acquainted with the little conical sand pits made by the doodle-bugs but very few persons have actually seen the doodle-bug.

Fifty years ago my black mammy tried to tell me how to see the doodle-bug. A certain incantation was necessary. I am not certain whether this arose from voodooism or some other worship, but if one took a stick and stirred the sand at the bottom of the pit and repeated the words,

Doodle-bug, doodle-bug,
Come out of your hole,

the doodle-bug was supposed to appear.

After trying this with and without the incantation for fifty years, I have concluded that the doodle-bug is deaf or else the spirits that control his destiny are deaf, and it is the stick that pokes the doodle-bug out when it is properly applied to his tail. This is due to the fact that the doodle-bug always burrows in the sand backwards. If the presence of a stick behind prevents this backward motion, he may be successfully pried out of the sand, in which case he feigns death for a short time and may be rather closely observed.

According to some persons, the law-makers are not fighting over the question as to whether one may study the doodle-bug but whether one may study his cousins and his ants as well as his uncles and his aunts. The question is whether the doodle-bug's cousins are legitimate or illegitimate.

One of the foremost American scientists, William Morton Wheeler, has written a book, called "Demons of the Dust," in which he has very beautifully described the doodle-bug and his cousins. In fact, he has quite a number of cousins in all continents of the world, and they are often as different in their habits as two different races of mankind. Unfortunately, doodle-bugs are not very plentiful in cold climates. One of the most intelligent queens of Sweden studied at least the cousins of the doodle-bug, but she had them shipped from further south.

It is too bad that the law-makers have not studied doodle-bugs. Such a study would give them a more philosophical view of life. Thus it might entail considerable emotion to discuss the question of whether the different races of mankind were cousins or the monkey's distant relatives, but one can have a more objective view-point in discussing the cousins of the doodle-bug.

In fact, I believe the doodle-bug himself has a more philosophical view of life than has mankind, since he can often sit for months motionless and just think. Perhaps one might say he is less afflicted with vanity than is the human race. He does not need to claim divine ancestry in order to puff up his pride. Clad in a humble coat of sand, dwelling in a house of sand, he claims a long line of doodle-bugs in his family tree. His doodle-bug ancestors go back millions of years, their tombs being imperishable rocks. These tombs need no inscriptions, since the mummified doodle-bugs are so perfectly preserved. They are dated by the geological strata. The doodle-bug's cousins also claim an ancient lineage. These family trees are all preserved in the rocks. In such a day of strife and differences of opinion, it is comforting to take over a doodle-bug philosophy.

On holidays I sometimes wander over dry sandy areas and even old battlefields, looking for doodle-bugs, who are still making their conical pits in the dry sand under the shelter of some projecting object. Wars over the same field have not disturbed them in their philosophy. Neither have the law-makers impaired their eternal hope that some day a wandering ant will fall into the pit and thus keep alive the race of doodle-bugs.

J. F. McCLENDON

INSTITUTE OF BIOLOGY,
TOHOKU IMPERIAL UNIVERSITY
SENDAI, JAPAN

THE RELATION OF DETERIORATION OF ORANGE JUICE TO ITS IODINE REDUCING VALUE

IN the course of investigations on the nature of deterioration of orange juice during storage it was found that direct titration of the juice with standard iodine solution gave a good indication of the extent of browning and of the general deterioration in quality. The iodine titration decreased from 20 to 25 cc 0.01 N I_2 per 50 cc of pasteurized or benzoated juice to less than 2 cc during storage. The decrease in the iodine titration was found to be a good indication of degree of discoloration. Darkening, which normally occurred during storage at room temperature in the presence of oxygen or air, was not perceptible until the iodine titration was low. The greater the darkening, the lower was the iodine titration. The iodine reducing substances present in fresh orange juice were not appreciably changed by the manner of extracting the juice, the amount of suspended pulp, by deaeration for several hours with air or oxygen or by heating. The maturity of Valencia and Navel oranges did not materially affect the initial iodine value, although for Navel oranges it was, in some cases, appreciably higher than that of Valencia juice. In view of the fact that Szent-Györgyi[1] has shown that this reducing factor present in orange juice and other peroxidase containing plants is largely hexuronic acid and that G. C. King and W. A. Waugh[2] have shown that a pure crystalline

[1] *Biochem. J.*, 22: 1387, 1928.
[2] SCIENCE, 75: 357–358, 1932.

vitamin C preparation is identical in chemical and physical properties with hexuronic acid, the iodine titration of orange juice may serve as an indication of the probable vitamin C potency of preserved orange juice. Further investigations on the effect of maturity, variety and treatment on the iodine value of orange juice and other citrus juices are under way and will be reported shortly. A comparison of the formal titration, which has been found by A. Neithammer[3] to give a good indication of the nature of lemon juice, and the iodine titration is also now being studied to determine the probable mechanism of the reactions involved.

M. A. JOSLYN
G. L. MARSH

FRUIT PRODUCTS LABORATORY,
UNIVERSITY OF CALIFORNIA

PROPERTIES OF STARCH FROM TROPICAL AND TEMPERATE CLIMATES

IN a recent article[1] mistakes occur in the description of the temperature of gelatinization of starches produced by plant families of temperate habitats. The text (page 190) gives this "gelatinization temperature as from 50° to 90° C.," and to have "higher gelatinization temperatures than starch from tropical plant families." It is also stated "that the high temperature of gelatinization of temperate starch corresponds to the higher melting points of hydrocarbons, acids, alcohols, esters and saponins of temperate climates." These three errors are repeated in the summary of the paper on page 192.

The chart on page 189 of the article shows the gelatinization temperatures of starches examined from temperate plant families to extend from 50° to 65° C. This is correct according to the evidence presented by Reichert and McNair, to which references are cited in the paper. As a consequence starches from the examined plant families of temperate habitats have *lower* gelatinization temperatures than starches examined from tropical plant families. Likewise, the *low* temperature of gelatinization of the temperate starches examined *does not* correspond to the higher melting points of hydrocarbons, acids, alcohols, esters and saponins of temperate climates.

It is not to be concluded that all temperate starches necessarily have lower gelatinization temperatures than all tropical starches, nor is it to be concluded that all tropical starches of necessity have higher gelatinization temperatures than all temperate starches. The observation is confined at present to the average values of those starches analyzed by Reichert.

It is of interest to note that both temperate starches and temperate glycerides have higher iodine values than tropical, and that the low gelatinization temperatures of starches coincide with the low melting points of temperate glycerides.

JAMES B. MCNAIR

CHICAGO, ILLINOIS

WATER SOLUBLE MAGNESIUM IN SOILS

SINCE April, 1923, the writer has studied a so-called phosphorus deficiency in highly calcareous soils classified as belonging to the Bearden series as mapped in Cass County, North Dakota. Although many areas of these Bearden soils have the most desirable physical characteristics of any of the soils of the Red River Valley and are admirably adapted to general farm crops, alfalfa yields are not considered satisfactory. Since February, 1928, the writer suspected the presence of water soluble magnesium salts as a factor in this apparent lack of fertility.

A note by Ruigh (*J. A. C. S.*, 51–1456, 1929) suggested a method for the determination of water soluble magnesium in soils. It is briefly: 5 cc of a 1 to 5 water extract of soil is made slightly acid with dilute hydrochloric acid. One drop of a dilute solution of p-nitrobenzeneazoresorcinol is added. When this mixture is made alkaline with sodium hydroxide, a sky-blue lake is formed. Yields of alfalfa and sweet clover grown on soils, which develop this lake from a 1 to 5 water extract, have been markedly increased by the application of superphosphate. The writer is continuing the development of this test as an indicator of water soluble and exchangeable magnesium in highly calcareous soils. The method is simple, rapid and sensitive.

JAMES E. CHAPMAN

NORTH DAKOTA EXPERIMENT STATION,
FARGO

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A NEW MULTIPLE-UNIT ELECTRODIALYSIS APPARATUS

DURING the last decade the principle of electrodialysis has found extensive application in the various fields of science. Intensive studies have been made to develop technique and apparatus which will broaden the usefulness of the process and insure greater reliability for the results secured.

[3] *Z. Untersuch. Lebensm.*, 59: 420, 1930.

[1] James B. McNair, "Some Properties of Plant Substances in Relation to Climate of Habitat—Volatile Oils, Saponins, Cyanogenetic Glucosides and Carbohydrates," *American J. of Botany*, xix, pp. 168–193, 1932.