SCHMIDT-LEITZ and RAUCHALLES[4] report several experiments on the reaction of simple peptids and glucose. They found a rapid reaction at room temperature between the two compounds in alkaline solutions. Various concentrations, such as 1 mol. of glycyl-glycin to 50 mol. of glucose, gave a 37 per cent. combination. Fructose apparently did not react so readily. BORSOOK and WASTENEYS[5] report that there is a reaction between amino acids, peptones, and glucose. At the same time they state that there is no evidence of a synthetic reaction changing the lower fragments into complex derivatives. Neither did they observe the formation of any ammonia, urea, or like compounds. In one experiment they found a decrease in amino nitrogen in slightly acid solution, although the change was not large.

In view of the fact that there is a greater decrease in amino nitrogen than can be accounted for by supposing deaminization, it is well to consider reactions of this type as an explanation of the results reported here. The general equation may be of this type:

$$R \cdot CHO + R'NH_2 = R'N : CHR + H_2O,$$

and can explain the decrease in amino nitrogen without any increase in ammonia. While no direct evidence is advanced to prove that this type of reaction actually occurs, still the knowledge that amino acids and glucose can so react lends some credence to the supposition.

It must be borne in mind that the soluble peptids are probably concerned in the indicated reactions as well as amino acids, since no effort was made to remove them before running the analyses. In fact, evidence has been secured, using pure solutions of glucose and amino acids, indicating that much of the change is due to changes in this polypeptid fraction.—JAMES E. WEBSTER, *Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma.*

CORRELATION OF SPECIFIC HEAT AND PERCENTAGE OF WATER IN APPLE WOOD[1]

(WITH ONE FIGURE)

The use of calorimetry as a means of measuring the water-holding capacity against freezing in colloidal systems originated with THOENES.[2]

[4] WALDSCHMIDT-LEITZ, E., and RAUCHALLES, G. Zur Spezifität der Peptidasen. II. Vergleich der Peptid-zucker-kondensation mit der Wirkungsweise des Erepsins. Ber. deut. chem. Ges. **61**: 645–656. 1928.

[5] BORSOOK, H., and WASTENEYS, H. The interaction of free amino-nitrogen and glucose. Biochem. Jour. **19**: 1128–1137. 1925.

[1] Journal paper no. B55 of the Iowa Agricultural Experiment Station.

[2] THOENES, F. Untersuchungen zur Frage der Wasserbindung in Kolloiden und Tierschen Geweben. Biochem. Zeitschr. **157**: 174–186. 1925.

ROBINSON[3] is responsible for many improvements in the procedure, and at the present time it is probably the most satisfactory method for determining frozen water in fresh tissue.

Briefly the method consists of accurately measuring the change in temperature of a known quantity of water by the addition of the frozen material. The temperature of the frozen sample is read immediately before it is dropped into the water. The ice formed in the tissue greatly increases the heat required to warm the sample, and if the weight of the material is known the free or frozen water may be calculated from the following equation:

$$X = \frac{(T_3 - T_4) - SW(T_2 + T_4)}{80 - \frac{T_2}{2}}$$

In the equation:

X = grams of free water
$(T_3 - T_4)$ = temperature change in water
S = specific heat of material
W = weight of material in gm.
$(T_2 + T_4)$ = total temperature change in sample
T_2 = temperature of sample while frozen
80 = calories of heat per gm. of ice.

The equation given is incomplete, in that corrections are omitted for the influence of the apparatus and room temperature upon the temperature change in the water. A detailed discussion of the method is presented by ROBINSON.[3]

The equation requires the use of the specific heat of the material under experimentation. With a number of samples the additional labor involved in making this determination is no small item, since the specific heat of each sample (determined from its duplicate) should be known for accurate results.

A study of the comparative hardiness of fifteen apple varieties at Iowa State College has shown that this additional determination may be eliminated, and the specific heat calculated directly from the water content of the fresh tissue. Since water has a higher heat capacity than any liquid or solid known, it should be an important factor in a measure of the specific heat of any fresh tissue. Figure 1 indicates that water is the determining factor, and that specific heat is almost perfectly correlated with the percentage of water of the tissue.

The position of the regression line was calculated from 65 observations made on current-season apple shoots taken at intervals throughout the period from May to December, 1931. A positive correlation (between

[3] ROBINSON, WM. Relation of hydrophilic colloids to winter hardiness of insects. Colloid Symposium Monograph 5: 199–218. 1927.

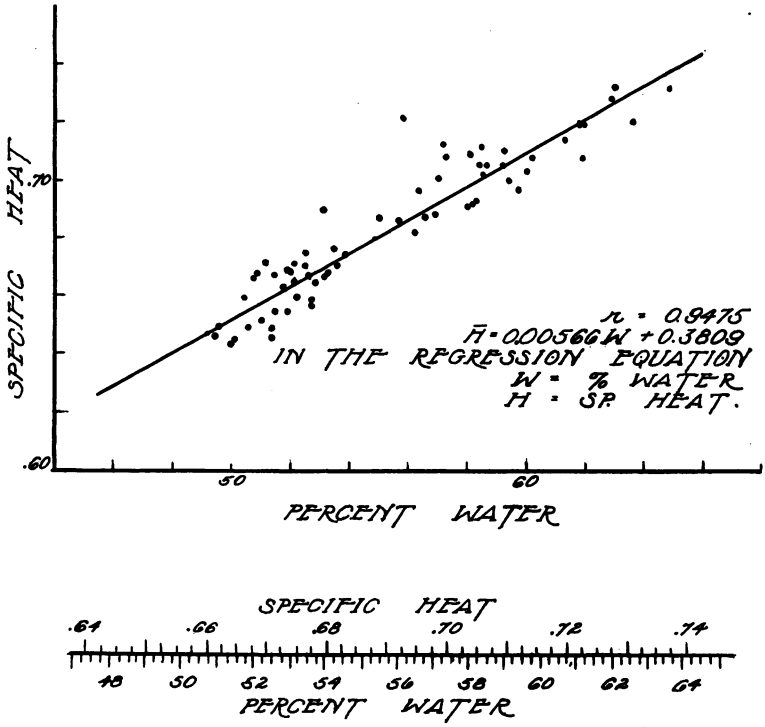

FIG. 1. Relation of specific heat and percentage of water in apple shoots.

specific heat and the percentage of water in the wood) of 0.9475 was obtained in these samples. According to WALLACE and SNEDECOR,[4] a correlation of 0.314 is statistically significant, and the high correlation obtained makes it evident that the specific heat of any sample may be read with more accuracy from the graph than it can be measured from its duplicate. Using the graph, all that is needed to obtain the specific heat of a sample of green apple wood is its percentage of water. In a more convenient form the data may be arranged as shown in the scale below the graph. The value of such an arrangement is obvious when a number of determinations on similar material are to be made.—ARVIL L. STARK, *Iowa Agricultural Experiment Station, Ames, Iowa.*

[4] WALLACE, H. A., and SNEDECOR, G. W. Correlation and machine calculation. Iowa State College Official Pub. 30: no. 4. 1931.