I will present a few observations on the subject :

No. of experiment.	Date of manufacture.	Date of observation.	Condition of sample with $HNaSO_3$.	Condition of sample without $HNaSO_3$.
1.	9.12	9.20	Hardened	Liquor on top
2.	9.11	9.20	"	"
3.	9.19	9.20	Heavy cloud of crystals	No cloud
		9.23	Solid	"
4.	9.23	10.4	"	Little syrup
5.	9.23	10.4	"	Considerable syrup
6.	9.23	10.4	"	Little syrup
7.	9.22	10.4	Little syrup	Great deal of syrup
8.	9.22	10.4	Solid	Little syrup
9.	9.22	10.4	"	Moist
10.	9.22	10.4	"	Very little syrup
11.	9.22	10.4	Plenty syrup	$\frac{2}{3}$ syrup
12.	9.21	10.4	Solid	$\frac{3}{4}$ "
13.	9.21	10.4	"	Mushy
14.	9.21	10.4	"	Little syrup
15.	9.21	10.4	"	$\frac{3}{4}$ syrup
16.	6.21	10.4	$\frac{2}{3}$ syrup	$\frac{3}{4}$ "
17.	9.20	10.4	Very little syrup	$\frac{1}{4}$ "
18.	9.20	10.4	$\frac{1}{7}$ syrup	$\frac{6}{7}$ "
19.	9.20	10.4	Solid	$\frac{3}{4}$ "
20.	9.20	10.4	$\frac{2}{3}$ syrup	$\frac{7}{8}$ "
21.	9.20	10.4	Little syrup	$\frac{1}{2}$ "
22.	9.19	10.4	$\frac{1}{4}$ syrup	$\frac{1}{4}$ "
23.	9.19	10.4	Solid	$\frac{3}{4}$ "
24.	9.19	10.4	Solid and dry	$\frac{2}{3}$ "
25.	9.19	10.4	$\frac{7}{8}$ solid	$\frac{1}{2}$ "
26.	9.19	10.4	$\frac{2}{3}$ solid	$\frac{2}{3}$ "

The bisulphite bleaches grape-sugar solutions readily, and its effect on the sugar at the end of fourteen days and after six months is very marked.

Added to the "washer batch" (the batch first dropped from vacuum pan after boiling out with muriatic acid) the effect is pronounced.

TOPEKA, KAN., January 8, 1895.

THE FURFUROL-YIELDING CONSTITUENTS OF PLANTS.

By C. F. Cross, E. J. Bevan, and C. Beadle.

Received February 13, 1894.

THE chemistry of the formation of the permanent tissue of plants may be approached from various points of view. From the incidents of our working connection with the subject of cellulose we have, from time to time, dealt with the anterior problem of its elaboration from the point of view of the hexosan complexes which are grouped under this term. De Chalmot, Stone, and others who have followed the pioneering work of Tollens, have been more especially confronted with the relation of the pentoses to plant structure and their life history, and have contributed a very valuable series of investigations now resulting in convincing proofs of important points hitherto of doubtful interpretation.

In the convergence of these two lines of investigation an issue has arisen, and a fundamental problem has become a subject of controversy chiefly between de Chalmot and ourselves.

We have maintained the position:

(1) That the furfurol-yielding constituents of plant tissues are not to be regarded as necessarily and exclusively pentoses or pentosans, since there are oxyderivatives of the hexoses, themselves also C_6 compounds, characterized by the same reactions.

(2) That having regard to the chemistry and physiology of assimilation and cell-respiration in plants, it was probable that the celluloses common with other hexosans would be modified by oxidations of various kinds, these oxidations being probably attended by further combination of the products of oxidation with the parent complex, *i. e.*, with the unchanged residues of the complex.

(3) That, therefore, we may expect to find in the celluloses, furfurol-yielding groups, *not* pentoses.

Upon the subsidiary question as to whether the actual formation of furfurol is not always preceded by a change to a pentose configuration with elimination of the fully oxidized C. position, we expressed no opinion. It is, in fact, altogether irrelevant to the point at issue, which is simply that of the molecules as occurring in the plant tissue.

The controversy has proceeded by stages in the following publications, which we cite in order of time.[1]

The purpose of this communication is to point out, as briefly

[1] Cross, Bevan, and Beadle, *Ber d. chem. Ges.*, 26, 3520; 27, 1061; De Chalmot, 27, 1489, 2722.

as possible, that de Chalmot, in his latest communication,[1] closes the controversy in a manner satisfactory to ourselves, although appearing still to join issue with us. It is very necessary to quote two paragraphs from the paper:

(1) p. 589. "*Are there pentosans in plants which are formed from seeds which germinate in darkness?* It has become necessary to answer this question since Cross, Bevan, and Beadle, in a recent article, assert that the furfurol-yielding compounds in the sprouts, which are developed from barley in darkness, are so-called oxycelluloses and are not pentosans."

(2) p. 610. "I wish now to put forward the following hypothesis: Pentose molecules are formed in complex molecules of hexosans (celluloses and hemi-celluloses), in which a part or all of the aldehyde groups have been bound by condensation and are thereby preserved from further oxidation."

This is precisely all that we have contended for. The second paragraph is the answer, from our point of view, to the question contained in the first.

We are dealing, in fact, with an oxycellulose series and the only remaining point at issue between us is this: We are of the opinion that the series is represented in the living tissues. De Chalmot holds that the pentoses are, as it were, explosively formed; the fully oxidized C. group preferring rather a summary exit than the alternative of combining with the basic or alcoholic groups of unaltered hexose or hexosan molecules. This view is, we think, at variance with the perspective of metabolism generally, and certainly contrary to what we know of the chemistry of the oxycelluloses, their very gradual formation under oxidizing treatment, and the intimate union contracted between the oxidized groups and unaltered molecules of the parent cellulose.

Since the final solution of the problem of the constitution of these "natural oxycelluloses" must take the form of quantitative resolution into molecules of simpler, if not the simplest form, it need not be further discussed *a priori*.

We are engaged in a study of their systematic dissection and the results will be communicated in due course.

[1] Am. Chem. J., 16, 589-611.

Of course, it will be understood that these criticisms in no sense lessen the value of the contributions of de Chalmot, and his fellow specialists in the subject of the pentosans, to the general problems of assimilation and metabolism. Any error which may have been made is one only of interpretation. The too free use of "pentose" and "pentosan" as the equivalent of "furfurol-yielding constituents" will prove, we think, to have temporarily obscured some important points in the physiology of the elaboration of plant tissues, but there being now a substantial agreement in the main issue it may well be left to time and experimental investigations to "materialize" this further chapter in the life of the plant cell.

4 NEW COURT, LONDON, W. C.,
January 30, 1895.

THE SEPARATION OF SOLID AND LIQUID FATTY ACIDS.

BY E. TWITCHELL.

Received January 25, 1895.

THE fatty acids insoluble in water, which constitute the greater part of most natural fats, are probably always found as a mixture of two groups, one composed of saturated, the other of unsaturated compounds, the former belonging to the acetic series and the latter to the acrylic and other series containing still less hydrogen. In most fats of commercial importance, such as tallow, lard, cottonseed-oil, and some other vegetable oils, the first named group is represented by only two members, stearic and palmitic acids, which are solid at ordinary temperatures, while the last contains the liquid oleic and linolic acids.

An accurate separation of these groups ought to be the first step in the analysis of any fat, as without it other quantitative reactions, such as the amount of iodine absorbed or alkali combined by the fatty acids, would lead to no very definite conclusions regarding the actual composition of the mixture.

Although a number of analytical methods have been proposed to obtain this separation, their accuracy has not been without question, while in my work I have, at different times, attempted to separate solid from liquid fatty acids and entirely failed to obtain satisfactory results. It therefore seemed to me very