Whether bleaching in any given shipment reduces the quality and strength of the flour or conceals damage or inferiority must be decided on the basis of facts in each particular case.

These were the very facts that were decided by the court. This particular phrase, of course, was understood by the bleachers as a general statement which indicated that the whole evidence in regard to concealing damage or inferiority or in reducing the quality and strength of the flour would have to be gone over again, as the authorities simply ignored that these matters were already settled once and all in the decree of the court.

The curse of the corpse-white flour will, of course, die out in time. The people of our country are learning little by little that the whiteness in the flour is inversely proportional to its nutritive value. It has been established by the experiments of the Public Health Service that white flour fed to fowls induced a speedy occurrence of polyneuritis or beriberi which quickly proved fatal. On the other hand, the fowls of same quality and age fed upon the whole grain wheat, or wheat flour made of whole grain, at the end of ninety days, when all the white flour fed fowls were dead, showed no sign of even an approach of beriberi or polyneuritis.

Facts of this kind which have now been established by all investigators will gradually permeate into the conscience of our people and lead to such a demand for wholesome flour that the process of bleaching, if never again attacked by the authorities of the government, will lapse of its own innate prejudicial character. Our bread supply will then be restored to normal, and thus the cheapest source of food for our people be preserved in its natural degree of wholesomeness. It is, of course, a matter of regret that a work of such high character and value as the one in question should so far lose sight of the fundamental principles of nutrition as to convey an impression to the reader that the bleaching of flour is a wholly innocuous and apparently praiseworthy proceeding.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A RAPID METHOD FOR DEMONSTRATING THE EFFECTS OF PLANTS ON A CULTURE SOLUTION

TEACHERS or students of plant physiology may find the method here described useful in demonstrating very easily and graphically within a few hours the changes in concentration of various ions in a solution produced by the growth of plants in the solution. The chief difference between this and the usual methods of growing plants in culture solution consists in the much larger ratio of plants to volume of solution used in this method. With this procedure, it is easily possible to demonstrate to a class of students that plants absorb different ions at very different rates and thereby cause very considerable changes in composition of the culture solution.

The technique is as follows, actual figures from a certain experiment being given. A number of trials with similar procedure at different times have given similar results.

To five grams (about two hundred seeds) of club wheat kernels in a test tube were added 5 cc of water. After two hours the grain was spread on wet filter paper and covered with two sheets of the same paper. The whole was thoroughly wet, placed in a pan and covered with another pan to keep the seed moist. After two days, the roots were about 1 cm long. The sprouted grain was then spread on a piece of mosquito net tied over the mouth of a glass jar 8 cm in diameter and covered with wet filter paper. The jar was kept filled with tap water up to the net. Two days later, the roots had gone down into the water and the young shoots were about 1 cm high. The wet filter paper cover was then removed, leaving the plants exposed to the air. Six days later, the young shoots were 7 to 12 cm high, with roots about the same length. Five days later, the plants were 10 to 15 cm high, growing vigorously. During all the time the plants were kept in a south window at a temperature of 60 to 75° F.

At this time, when the plants were fifteen days old from the time seed was soaked, the net was removed from the top of the jar, the roots of the plants washed in distilled water, and the whole mass of plants was then placed upright in a beaker 6 cm in diameter. Thus the roots were compressed into a small space. Now absorption experiments were begun. On successive days the plants were supplied with dilute solutions of single salts, the volume of solution being just sufficient to keep the roots immersed. If necessary, more water was added in order to maintain sufficient liquid to cover the roots. At the end of the period of absorption, the remaining solution was made up to the original volume with distilled water and tests made for ions remaining. Portions of the original solutions were tested in the same way at the same time. The tests were only very roughly quantitative. The results obtained are set down in the following table. The numbers given represent milligrams of the ions present before and after the absorption period. In some cases, a considerable

CHANGES IN CULTURES SOLUTION CAUSED BY GROWTH OF WHEAT PLANTS

Date 1925	Time	Salt Used	Vol. of soln. c.c.	pH after	Ca		Mg		K		SO_4		PO_4		NO_3		
					Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	
5/25	8–5	KNO_3	50	5.6	0	0.5	.....	.....	12	0	0	0.07	.....	.....	18	+	
5/26	8–5	KCl	50	5.3	0	0.1	.....	.....	12	0	0	0.00	.....	.....	.....	..	Much Cl
5/27	24 hrs.	$Ca(NO_3)_2$	50	7.3	7	1.7	.....	.....	0	0	.....	.....	.....	.....	14	0	
5/28	"	KH_2PO_4	50	4.0	0	0.7	.....	.....	16	0	.....	.....	38	+++	.....	..	
5/29	"	$KHCO_3$	100	5.5	0	0.0	.....	.....	20	0	.....	.....	.....	.....	.....	..	
6/1	3 days	KNO_3	100	6.6	0	Tr.	.....	.....	39	0	.....	.....	.....	.....	62	0	
6/2	24 hrs.	$NaNO_3$	50	7.4	.....	.....	.....	.....	.....	..	.....	.....	.....	.....	18	0	
6/3	"	KNO_3	100	6.7	0	0	.....	.....	20	0	.....	.....	.....	.....	31	0	
6/4	"	$Mg(NO_3)_2$	100	7.2	.....	.....	6	+++	.....	..	.....	.....	.....	.....	31	0	
6/5	"	KCl	100	7.0	0	0	.....	.....	39	+++	.....	.....	.....	.....	.....	..	Much Cl
6/6	"	$(NH_4)_2SO_4$	100	3.0	.....	.....	.....	.....	.....	..	48	+++	.....	.....	.....	..	Before After NH_4 18 +++
6/8	2 days	$Ca(NO_3)_2$	100	6.8	14	++	.....	.....	.....	..	.....	.....	.....	.....	29	0	
6/9	1 day	$MgSO_4$	100	5.8	0	0	8	++	.....	..	32	+++	.....	.....	.....	..	
6/10	"	KH_2PO_4	100	3.5	.....	.....	.....	.....	16	+	.....	.....	38	+++	.....	..	

amount of the ion was indicated by the signs +++, less by ++, and still less by +.

The various ions were detected by means of the following reagents:

For Ca	Ammonium oxalate
" Mg	$Na_2HPO_4 + NH_4OH$
" K	Sodium cobalti nitrite reagent
" SO_4	$BaCl_2$
" PO_4	Acid ammonium molybdate
" NO_3	Diphenylamine, .01% in H_2SO_4
" pH	Phenolsulfonephthalein indicators

By examination of the table, it may be seen that when KNO_3 was used in small amounts, both anion and cation were completely removed from the solutions by the plants in nine hours, the solution remaining nearly neutral. When KCl, KH_2PO_4 or $KHCO_3$ were used, the K was absorbed, but not all the anions. When $Ca(NO_3)_2$ or $NaNO_3$ were supplied, the NO_3 was used up, but most of the cation was left in the solution which became alkaline. When $(NH_4)_2SO_4$ was given, much of both ions remained unabsorbed, but more NH_4^+ than SO_4^{--} had been absorbed, so the solution became acid. Also, when KH_2PO_4 was given, the absorption of K^+ being relatively greater than of $H_2PO_4^-$, the solution became more acid.

For demonstrating these effects to a class, the following procedure is suggested:

Three weeks or more in advance of the day of demonstration, prepare as many jars of plants as are needed for the several tests to be made. Some hours before the class meeting the plants are placed in the various solutions, portions of which are kept unused. At the time of demonstration, the same test is applied to the solutions before and after the plants have been grown in them. If properly managed, the difference between the two solutions before and after the action of the plants may be made easily visible to a good-sized class. The two test tubes, showing the test on the two portions of solution before and after the plants have grown in it, should be exhibited side by side.

For investigational purposes, the same bunch of plants may be used day after day if the roots are well washed in distilled water each time before being placed in a different solution.

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SPECIAL ARTICLES

NOTE ON MAGNETIC DECLINATION

DURING the total eclipse of January 24, 1925, magnetic observations were made at an isolated point near Ithaca, New York. The primary object of the investigation was to record any quick changes in declination of the earth's magnetic field during the time of the eclipse. While the device used could also record the slow gradual changes, it had no advantages in that respect over the vibrating magnet method ordinarily used.

A small bell type magnet, of short period of vibration, was suspended by a quartz fiber in a metal casing and carefully shielded from air currents. By means of a telescope about two meters away, the apparent motion of a cross hair in the telescope was observed as reflected from a small mirror fastened to