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OF

The Connecticut Agricultural Experiment Station

NEW HAVEN, CONN.

ON

FOOD PRODUCTS AND DRUGS, 1918

BEING

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BEING THE

Twenty-Third Report

ON

Food Products

AND

Eleventh Report on Drug Products

By E. M. BAILEY

CONNECTICUT AGRICULTURAL EXPERIMENT STATION

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FOODS.

DRUGS.

Since December, 1917, the department has been deprived of the service of Mr. Street, who entered the U. S. N. A. as a nutrition officer, and since August, 1918, of the service of Mr. Morison also, for a similar reason. The writer takes this opportunity to acknowledge the whole-hearted co-operation of the remaining members of the laboratory staff, Messrs. Shepard, D'Esopo and Edmund, and of Mr. Morison until his departure, in carrying on the work of the department.

I. FOODS.

Tea.

Origin. A Japanese legendary account of the origin of tea, is, according to Kaempfer,[1] as follows: "A priest who came from India into China in A.D. 519, having succumbed to sleep when he had wished to watch and pray, in a movement of anger cut off his two eyelids, which were changed into a shrub, the tea tree, whose leaves are eminently calculated to prevent sleep." Knowledge of tea, however, dates back much earlier than A.D. 519. It is mentioned as early as 2,700, B.C., and there is no doubt that its cultivation and use in China are of very ancient date. It is now cultivated in other countries of the Orient, notably India, Ceylon and Java, and in South America.

Definition. Tea is the leaves and leaf buds of different species of *Thea*, prepared by the usual trade processes of fermentation, drying and firing; meets the provisions of the Act of Congress approved March 2, 1897, and the regulations made in conformity therewith;[2] conforms in variety and place of production to the name it bears; and contains not less than four (4) nor more than seven (7) per cent. of ash.[3]

Botanical Character of Leaf. The characters of genuine tea leaf are sufficiently pronounced to make an examination of tea for foreign leaves not particularly difficult. The following are the characteristics of tea leaf as given by Leach.[4] The tea leaf is oval or lanceolate, 5 to 8 cm. long and 2 to 3 cm. wide. It is

[1] DeCandolle, Origin of Cultivated Plants.

[2] Treasury Department Circular No. 16, February 6, 1905.

[3] Definition, U. S. Department of Agriculture, Office of the Secretary, Circular No. 19.

[4] Food Inspection and Analysis, p. 286.

short-stemmed, somewhat thick and fleshy, attenuated at the bottom and usually pointed at the top. At a distance of a third to a quarter up from the base, the smooth or wavy margin of the leaf develops hooked-shaped serrations which continue to the tip. The veins extend outward from the midrib, nearly parallel with one another but before reaching the margin bend upward to join the one next above to form a loop.

Quality and Classification. The general quality of tea depends chiefly upon the age of the leaf, the time of picking and the method of preparation.

The youngest leaves are tenderest and most juicy and constitute the choicest product. Several pickings of leaves are made during a season, as many as 25 are said to be made in India, but leaves of pickings later than the second become tougher and less desirable in point of quality.

In case of Chinese teas, the significance of the name refers to the position of the leaf on the branch. Thus *flowery pekoe* is composed of the newest leaf on the tip of the branch. This class of tea is seldom found outside the country of its production. The next leaves in descending order on the branch constitute *orange pekoe*, *pekoe*, *souchong 1st* and *2d*, and *congou*. The seventh leaf, if there be one and it is used, is termed *Bohea*. Teas are also designated by the name of the district of their production.

The difference between black and green teas is not one of variety but of method of preparation. Black teas are fermented before drying. This process destroys the chlorophyll, to which the color of green tea is due, and partially decomposes tannin as shown by Kozai's[1] analyses. Green teas are dried while still fresh and unfermented. Tea infusions are prized for their peculiar aroma, flavor and stimulating effects, to which essential oil, tannin and thein chiefly contribute. Thein is the alkaloid of tea and is identical with the caffein of coffee.

Production. In 1860 by far the greatest amount of tea imported by the United States came from China. The quantity coming from Japan has increased enormously since that time, advancing from 35,000 lbs. in 1860 to more than 37,000,000 lbs. in 1896, in which year it equalled the amount coming from China. In 1917 the United States imported 126,794,997 lbs. of tea, valued at $25,763,075, of which 41% came from Japan, 25% from the British

[1] Imperial College of Tokyo, Japan, Bull. 7.

East Indies, 15% from China, and the remainder from the United Kingdom, Canada and other countries.[1]

Legislation. The quality of teas imported into the country was safe-guarded in 1883 by an Act of Congress, which act was repealed and replaced by a broader act entitled "An Act to prevent the importation of impure and unwholesome tea," approved March 2, 1897. Under this law the Secretary of the Treasury is charged with the enforcement of the provisions of the Act. He is required to appoint each year a board of seven experts who shall prepare and submit to him standard samples of tea. Upon the recommendation of this board he shall fix and establish uniform standards of purity, quality and fitness for consumption of all kinds of teas imported into the United States. Duplicate samples of such standards are deposited at the Custom Houses of New York, Chicago and San Francisco and such other places as he may determine. These serve as a basis of comparison and judgment for teas of their respective classes.

By an amendment to Sec. 1 of this Act, approved May 16, 1908, the importation of low grade tea is permitted "for the sole purpose of manufacturing theine, caffeine or other chemical products whereby the identity and character of the original material is entirely destroyed or changed."

Regulations made by authority of the Act provide for the comparison of suspected or other teas with the standards, according to the usage and custom of the tea trade. Teas are judged for quality, for impurity, including coloring or facing, and for quality of infused leaf. An excess of woody stems (floaters) over the amount shown by its respective standard is basis for the rejection of any tea. The presence of artificial coloring or facing is not of itself sufficient ground for rejection, but only when such coloring or facing occurs in amounts to exceed that of the respective standard. For this comparison the Read test, as amended, Treas. Dept., May 16, 1918, is recognized as official.

Teas comparing unfavorably with the standards as regards the points above mentioned, should be further submitted to chemical analyses in comparison with the standards.

Inspections in this State. An examination of teas found in the Connecticut market, made in this laboratory in 1898, showed

[1] Tea and Coffee Trade Journal, April, 1918.

practically no adulteration or inferiority. Foreign leaves were found in one sample and many green teas were "faced," but this, as shown above, does not of itself constitute adulteration under the tea Act. No inspection of tea has been made since that date, but this satisfactory condition of the market has apparently continued, as indicated by our inspection this year.

INSPECTION OF 1918.

Number of Samples examined. In connection with the examination of 44 samples of market teas, more complete analyses of the 12 U. S. Government Standard Teas for 1918-1919 were made.[1] The laboratory was in possession of 8 teas which were the U. S. Government Standard for 1905-1906, the same having been kept in the original unbroken package since that year. These also were analyzed.

EXPERIMENTAL WORK.

Methods. The analytical methods used were the revised methods as given in the Jour. A. O. A. C. Vol. II, No. 3, p. 335 et seq. A slightly modified procedure was followed for the estimation of *water extract* and particular attention was given to the determination of *caffein* (theine) in a number of standard teas.

Hot water extract. The amount of water extractives to be obtained from tea will obviously depend chiefly upon the proportion of water used and the length of time of boiling. Lesser variations will be introduced by the methods of filtering and the use of tarred papers and weighing bottles.

The tentative method for determining water extract is as follows:

To 2 grams of the original sample in a 500cc Erlenmeyer flask, add 200cc of hot water and boil over a low flame for an hour. The flask should be closed with a rubber stopper through which passes a glass tube 18 inches long, for a condenser. The loss from evaporation should be replaced from time to time by the addition of hot water. Filter through a tared filter and wash the residue until the filtrate measures 500cc, stirring the contents of the filter throughout the process to facilitate the filtering. Dry

[1] Through the courtesy of Mr. Geo. F. Mitchell, Supervising Tea Examiner, and of the Collector of the Port of New York, the laboratory was furnished with a set of the U. S. Standard Teas for 1918-1919. Other courtesies by Mr. Mitchell are furthermore gratefully acknowledged.

the filter paper and residue in the funnel in the steam oven until the excess of water is removed, transfer paper and contents to a tared weighing bottle and dry to constant weight at 100° C.

This procedure was found to be extremely slow and tedious, due to the clogging of the filter and consequent slow filtration. It was suggested[1] that an adaptation of the procedure now used in this laboratory for the determination of crude fiber be tried.

This procedure as adopted is as follows:

To 2 grams of the original (unground) sample in a 500 cc Erlenmeyer flask add 200 cc of hot water and boil for an hour, having the flask fitted with a glass tube condenser. Replace water lost by evaporation if necessary. Fill the flask with cold water and allow suspended material to settle. Draw off the supernatant liquid, filtering same through a linen filter. (An inverted thistle tube or other suitable tube, over the orifice of which is tied a piece of fine linen introduced into the Erlenmeyer and connected with suction serves the purpose satisfactorily). The residue in the flask is then thrown upon a tared filter, allowed to drain and washed three times with water. Dry out in the funnel until excess of water is removed, finally transferring filter and contents to a tared weighing bottle and drying to constant weight at 100° C.

The per cent. of insoluble leaf, plus the per cent. of moisture in the sample, subtracted from 100 per cent., gives the per cent. of hot water extract.

The essential conditions of the tentative method are not materially changed but the slow filtration is avoided.

The comparison is shown in the following tabulation:

TABLE I. HOT WATER EXTRACT IN TEA.

No.	Tentative Method %.	Modified Method %.	Difference by Modified Method %.
10517	38.12	38.09	—0.03
10518	35.04	35.15	+0.11
10519	29.56	29.05	—0.51
10520	32.13	32.63	+0.50
10521	35.36	35.49	+0.13
10522	36.13	36.75	+0.62
10523	33.02	33.27	+0.25
10524	35.08	35.60	+0.52

The results obtained by the modified procedure are generally higher than those by the tentative method, but the differences are within the limits of reasonable toleration of error for a determination of this kind; *viz.*, 1 per cent.

[1] By C. E. Shepard.

It is interesting to note that the present tentative method was suggested by Doolittle and Woodruff[1] who used for their investigations, as we have in ours, the standard teas of 1905–6. The amounts of extract obtained by them run from 6 to 9 per cent. higher than the figures given in Table I above, which is due to the fact that they undoubtedly used the ground sample, while we have used the unground tea.

Caffein. In 1890 G. L. Spencer[2] used a method for the determination of caffein in tea which was essentially the Stahlschmidt procedure. He adopted it for its simplicity and accuracy. The Stahlschmidt method as modified by J. M. Bartlett[3] in 1915 is the present tentative method for caffein.

Comparative studies with this method and one due to Fendler and Stuber[4] have been made on a number of standard teas.

The method of Fendler and Stuber is as follows:

Pulverize the tea to pass without residue through a 0.5 mm. sieve.

Treat a 10 gram sample with 10 grams of 10% ammonium hydroxide and 200 grams of chloroform in a glass-stoppered bottle and shake continuously for one-half hour. Pour the entire contents of the bottle on a 12½ mm. folded filter, covering with a watch-glass. Weigh 150 grams of the filtrate into a flask (250 cc) and evaporate on a steam bath, removing the last chloroform with a blast of air. Digest the residue with 80 cc of hot water for ten minutes on the steam bath, with frequent shaking, and let cool. Treat the solution with 20 cc of 1% potassium permanganate and let stand one-quarter hour at room temperature. Add 2 cc of 3% hydrogen peroxide (containing 1 cc glacial acetic acid in 100 cc). If the liquid is still red or reddish, add hydrogen peroxide, 1 cc at a time, until the excess of potassium permanganate is destroyed. Place the flask on the steam bath for one-quarter hour, adding hydrogen peroxide in ½ cc portions until the liquid becomes no lighter in color. Cool and filter into a separatory funnel, washing with cold water. Extract four times with 25 cc of chloroform. Evaporate the chloroform extract from a weighed flask with the aid of an air blast and dry at 100° C. Weigh the residue as caffein and calculate to 7.5 grams of tea. Test the purity of the residue by determining nitrogen and multiplying by the factor 3.464.

Six of the standard teas of 1918–19 were used in these trials. The results are given in Table II.

[1] Proceedings A. O. A. C., 1906. Bureau Chem. Bull. 105, p. 48.
[2] Bureau of Chem. Bull. 13, Part VII., 1890.
[3] Jour. A. O. A. C. **3.** 1, p. 22., 1917.
[4] Zeit. Nahr.-u. Genussm., **28,** 9, 1914.

TABLE II. DETERMINING CAFFEIN IN TEA.

Station No.	Name and Standard No.	Modified Stahlschmidt Method. Gravimetric.	Modified Stahlschmidt Method. From N.	Fendler and Stuber Method. Gravimetric.	Fendler and Stuber Method. From N.
		%	%	%	%
11205	Formosa Oolong, 1.....	2.20	2.03	2.16	2.12
11206	Fouchow Oolong, 2....	2.54	2.44	2.57	2.54
11207	Congou, 3.....	1.97	1.89	1.97	1.93
11211	Pan Fired Japan, 7.....	2.00	1.94	2.07	2.00
11214	Scented Orange Pekoe, 10	2.71	2.63	2.82	2.73
11216	Canton Oolong, 12.....	3.10	2.96	3.27	3.20

The results indicate a slightly higher degree of purity in the caffein obtained by the Fendler and Stuber method. The figures by this method are also seen to be uniformly higher although the differences do not exceed 0.1 per cent. except in one instance, which may be due to a greater experimental error in that case.

Comparative studies of these two methods in the case of coffee[1] showed generally but not uniformly lower results by the Fendler and Stuber method.

The difficulties attending the weighing of volatile solvents at midsummer temperatures, such as obtained when our work was done, tend to errors in the plus direction. We prefer the Stahlschmidt method for its simpler manipulation and greater uniformity of results under varied conditions.

It is interesting to refer again to results obtained by Doolittle and Woodruff[2] on U. S. Standard Tea No. 4 of the 1905-6 standards, using the Stahlschmidt method. They report duplicate results of 2.38 and 2.28 per cent. thein. Our own gravimetric result on this sample is 2.34 per cent. The moisture content of their sample was 9.26 and of ours at this time 7.78 per cent., so that on a water-free basis the results are practically identical.

Proportion of caffein and tannin removed from tea by household methods of infusion. The value of tea as a beverage depends obviously upon the ingredients of the leaf which are removed by the method of infusion. The constituents of tea have not been sufficiently studied to enable us to interpret the physiological effects of the beverage in terms of definite chemical ingredients. Generally the stimulating quality is attributed to caffein, and the peculiar shades of taste and aroma to the tannin and essential oils, the latter being present, however, in exceedingly small amounts.

[1] H. A. Lepper, A. O. A. C. Referee on Coffee, 1917.

[2] Loc. citu. p. 49.

We have made a series of determinations to show how much of the caffein and tannin is removed by a process of infusion which is probably generally typical and which is recommended by an expert on India teas.[1]

The method is as follows:

One heaping teaspoonful of tea is taken for each cup of water. Bring the water to boiling, add the tea and remove from the flame at once to stop boiling. Allow to steep for 4 minutes and strain.

For analytical purposes this method was reduced to more definite proportions. It was found by trial that a heaping teaspoonful of tea weighed about 4 grams. A cup full of water is taken to be a half pint or 240 cc. After straining, the tea solution was cooled and made up to a volume of 250 cc. Aliquot portions were taken for determination of solids, caffein and tannin.

Solids obtained by evaporating an aliquot of the tea infusion were found to be lower than when obtained by difference, as directed in the methods for hot water extract. It was found by a series of trials that this difference averaged close to 10 per cent. The figures for extract in the accompanying table have, therefore, been increased by 1/10 to make them more strictly comparable with the extract as obtained by the regular laboratory methods.

The results of this experiment are shown in Table III as compared with the total amounts of the several constituents obtained by regular methods of analysis.

TABLE III. PERCENTAGE AMOUNTS OF EXTRACT, CAFFEIN AND TANNIN OBTAINED FROM TEA BY A HOUSEHOLD METHOD OF INFUSION.

No.	Extract. Total	Extract. Household Method.	Extract. Percent. of total.	Caffein. Total.	Caffein. Household Method.	Caffein. Percent. of total.	Tannin. Total.	Tannin. Household Method.	Tannin. Percent. of total.
11205	35.80	19.32	54.0	2.03	1.80	88.7	7.95	4.37	55.0
11206	36.38	19.18	52.7	2.44	2.08	85.2	9.78	4.28	43.8
11207	30.01	13.84	46.1	1.89	1.64	86.8	4.02	1.48	36.8
11208	33.65	20.57	61.1	2.77	2.32	83.8	6.83	3.67	53.7
11209	33.25	17.69	53.2	1.73	1.52	87.9	5.76	2.79	48.4
11210	32.00	12.91	40.3	1.54	1:42	92.2	5.85	3.05	52.1
11211	34.82	21.56	61.9	1.94	1.81	93.3	8.21	5.07	61.8
11212	32.91	18.77	57.0	2.01	1.93	96.0	7.51	4.10	54.6
11213	42.12	28.64	68.0	1.94	1.87	96.4	7.60	6.59	86.7
11214	38.90	23.32	60.0	2.63	2.32	88.2	10.75	5.33	49.6
11215	37.59	20.17	53.7	2.81	2.44	86.8	10.92	4.28	39.2
11216	36.69	19.36	52.8	2.96	2.77	93.6	10.48	4.28	40.8

[1] See Kinney & Cooley. Foods and Household Management.

It should be noted that **11213** is tea dust, which explains the higher percentage of total water extract and also the higher proportions of extract, caffein and tannin removed by the household method. From the data, excluding **11213,** it appears that from 84 to 96 per cent. of the caffein in the tea leaf finds its way into the tea-cup by the ordinary method of household preparation. Also it appears that only 37 to 62 per cent. of the tannin, and 40 to 62 per cent. of the total extractive matter are removed. In other words, the percentage removal of tannin nearly equals the removal of total extractives. This is in substantial agreement with results obtained by Kenrick[1] by a 10 minute infusion process.

Proportion of stems. Besson[2] in an examination of Chinese, Ceylon, Java and Indian teas found percentages of stalks as follows:

Chinese green	0.4 to 5.3
Chinese Foochow	4.1 to 17.5
Chinese Hankow	8.6 to 17.1
Ceylon	5.8 to 43.4
Indian	11.5 to 37.4
Java	4.4 to 29.9

He found very little relation between the amount of stalk and the quality of the teas, as judged by the test of taste and by the price.

Deuss,[3] following Besson's method, found from 7.3 to 9.3 per cent. stalk in Japanese teas and from 3.6 to 28.3 per cent. in Java teas. He suggests that it is justifiable to fix standards for the amount of stalk in teas, but thinks it should not be so low as the Swiss standard; *viz.*, 22 per cent.

The separation of stems and leaves is a mechanical process carried out as follows:

> Boil 5 grams of the original tea with 200 cc of water for 15 minutes, decant the aqueous extract and bring the insoluble material into a suitable dish with 50 cc of fresh water. Pick out the stems with forceps, dry at 100° and weigh. The botanical character of the leaf can well be observed during the operation of separating the stems.

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[1] Canada Inland Rev. Dept. Bull. 24, 1891.

[2] A. A. Besson. Chem. Zeit., **35,** 813-815; 830-832, 1911. (Through Analyst, **36,** 454, 1911.)

[3] J. J. B. Deuss. Chem. Weekblad, **13,** 66-71, 1916. (Through Analyst, **41,** 78, 1916.)

There is some question as to what should properly be included in the term "stems;" whether it should include all stems or bits of stems to which no portion of leaf blade is attached, or whether it should refer to the more distinctly woody fragments and floaters. The latter, obviously, are the elements which would, in excess, noticeably affect the substance and quality of the product. We have followed the former plan, although it is open to the criticism that it includes elements which were parts of leaves and have been broken therefrom in the process of manufacture.

The results, tabulated in detail in Table IV, show that the per cent. of stems ranges from 2.58 to 15.20, omitting the sample of tea dust in which the amount of stems was only 0.14 per cent. No consistent relation is shown between the amount of stems and the amounts of such other constituents as hot water extract, nitrogenous material, fiber, caffein and tannin, except that sample **11210** having 15.20 per cent. of stems, had the lowest nitrogen content in the series and the highest fiber content. This sample was noted to have a larger proportion of woody stems than any other in the series.

ANALYSES OF U. S. STANDARD TEAS.

The complete analyses of eight of the U. S. Standard teas of 1905–6 and a complete set of the standard teas of 1918–19 are given in Table IV.

The official definition of tea includes only one numerical standard; *viz.*, not less than four (4) nor more than seven (7) per cent. of ash.

The standard teas examined fall within these limits, except in the case of **10522,** which contained 7.43 per cent., 4.11 being insoluble in water, of which a relatively high amount, 0.82 per cent., was insoluble also in acid. Nos. **10524** and **11213** also contained high proportions of ash insoluble in acid, the total ash, however, not exceeding the maximum of 7 per cent.

As regards the relation between the water-soluble and water-insoluble ash, the former exceeds the latter in eleven out of twenty samples. In no sample did the water-soluble ash equal 4 per cent. In fourteen samples it exceeded 3 per cent., and of the remaining six only one was less than 2.5 per cent.

TABLE IV—ANALYSES OF

Station No.	Name of Tea and Standard No.	Stems.
	1905–1906.	%
10517	Formosa Oolong, 1	.....
10518	Foochow Oolong, 2	.....
10519	North China Congou, 3	.....
10520	South China Congou, 4	.....
10521	India, 5	11.20
10522	Ping Suey, 6	2.24
10523	Country Green, 7	1.19
10524	Pan Fired Japan, 8	3.30
	1918–1919.	
11205	Formosa Oolong, 1	4.60
11206	Foochow Oolong, 2	4.71
11207	Congou, 3	8.87
11208	Ceylon, 4	13.61
11209	Gunpowder Green, 5	2.58
11210	Young Hyson Green, 6	15.20
11211	Pan Fired Japan, 7	3.71
11212	Basket Fired Japan, 8	4.44
11213	Japan Dust, 9	0.14
11214	Scented Orange Pekoe, 10	7.67
11215	Scented Canton, 11	6.51
11216	Canton Oolong, 12	3.60

* cc $\frac{N}{10}$ alkalai per gram of tea.

Total nitrogen ranges from 2.95 to 4.22 per cent. By far the greater part of this nitrogenous material remains to be identified.

Substances soluble in ethyl ether are lower than the average of published analyses which we have seen. These results were obtained by a sixteen-hour continuous extraction of the material previously dried in hydrogen.

While there is no standard for hot water extract, teas yielding less than 30 per cent. thereof are generally regarded as inferior. The extract in all the standard teas of 1918-19 exceeded 30 per cent.; in six it exceeded 35 per cent.; in only one, Japan Dust, did it exceed 40 per cent.

The analyses of the two series of teas is interesting, first for the comparison between crops of widely separated years and, second, as showing that practically no change, as revealed by analysis, takes place in tea properly stored during a period of

U. S. STANDARD TEAS.

Station No.	Moisture.	ASH								Total Nitrogen.	Crude Fiber.	Ether Extract.	Hot Water Extract.	Caffein.		Tannin.
		Total.	Sol. in Water.	Insol. in Water.	Insol. in Acid.	Alkalinity of Sol.	Alkalinity of Insol.	P_2O_5 Soluble.	P_2O_5 Insoluble.					Gravimetric.	From Nitrogen.	
	%	%	%	%	%	*	*	%	%	%	%	%	%	%	%	%
10517	7.12	6.16	3.32	2.84	0.56	2.6	3.5	0.29	0.41	3.75	11.37	1.17	38.12	2.36	2.22	9.07
10518	7.43	6.21	3.09	3.12	0.60	3.2	3.9	0.17	0.46	3.12	13.09	1.79	35.04	2.22	2.06	8.54
10519	8.79	5.77	3.21	2.56	0.29	3.0	4.1	0.23	0.43	3.60	11.55	1.44	29.56	2.36	2.32	6.08
10520	7.78	5.85	3.32	2.53	0.32	3.2	3.6	0.17	0.38	3.39	12.68	0.96	32.13	2.34	2.20	6.34
10521	7.20	5.96	3.76	2.20	0.02	3.0	5.2	0.23	0.52	4.04	10.82	2.11	35.36	3.55	3.27	7.57
10522	7.12	7.43	3.32	4.11	0.82	3.3	3.9	0.51	0.46	3.33	11.85	1.95	36.13	1.79	1.73	6.87
10523	7.12	5.78	3.35	2.43	0.09	3.7	4.7	0.20	0.49	3.27	13.53	1.92	33.02	1.94	1.85	7.05
10524	6.73	6.94	3.21	3.73	0.85	3.4	4.3	0.24	0.46	3.59	13.04	1.84	35.08	1.87	1.78	7.22
11205	7.07	6.40	2.99	3.41	0.32	2.8	3.9	0.14	0.37	3.30	13.91	2.32	35.80	2.20	2.03	7.95
11206	8.53	5.57	2.99	2.58	0.12	3.1	3.5	0.18	0.36	3.22	13.96	2.96	36.38	2.54	2.44	9.78
11207	5.21	6.15	2.75	3.40	0.72	2.8	4.0	0.14	0.38	3.04	14.47	2.19	30.01	1.97	1.89	4.02
11208	7.80	6.23	3.28	2.95	0.35	3.5	4.0	0.12	0.52	3.68	13.08	1.51	33.65	2.96	2.77	6.83
11209	7.79	6.73	3.31	3.42	0.53	3.5	4.1	0.05	0.48	3.18	14.30	4.44	33.25	1.86	1.73	5.76
11210	8.17	6.51	2.16	3.35	0.51	3.8	4.1	0.11	0.45	2.95	17.28	3.33	32.00	1.68	1.54	5.85
11211	6.88	5.70	2.80	2.90	0.47	3.2	4.0	0.14	0.48	3.39	15.37	4.22	34.82	2.00	1.94	8.21
11212	7.52	5.74	3.08	2.66	0.18	3.8	4.3	0.01	0.50	3.39	15.87	4.70	32.91	2.07	2.01	7.51
11213	7.78	6.73	3.19	3.54	0.96	3.8	4.0	0.19	0.45	3.47	13.25	4.14	42.12	2.09	1.94	7.60
11214	7.58	5.77	3.19	2.58	0.18	3.5	3.8	0.44	0.41	4.04	13.36	2.05	38.90	2.71	2.63	10.75
11215	6.56	5.99	3.42	2.57	0.30	3.7	3.6	0.30	0.40	4.22	11.83	2.43	37.59	2.93	2.81	10.92
11216	7.12	5.19	2.94	2.25	0.20	3.3	3.6	0.26	0.31	3.78	13.17	2.01	36.69	3.10	2.96	10.48

twelve years. The lower ether extract in the older teas is not readily explained. Slow volatilization of the essential oils affords a partial explanation.

INSPECTION AND ANALYSIS OF MARKET TEAS.

Forty-four samples of market teas, mostly of cheaper grades, have been examined.

The results of the examination are shown in Table V.

It is seen that the limitations of the standard as regards ash are met with but one exception, and in that case the maximum is exceeded by only 0.05 per cent.

Hot water extract exceeds 40 per cent. in seven cases and exceeds 35 per cent. in forty-three cases of the total of forty-four.

Ether extract is lower in black tea than in green tea, as would be expected from the fact that chlorophyll, which comprises a

TABLE V. ANALYSES OF MARKET TEAS.

Number.	Brand.	Price Per lb.	Moisture.	Ash.	Total Nitrogen.	Ether Extract.	Fiber.	Hot Water Extract.
		cents.	%	%	%	%	%	%
9962	Black	60	7.52	5.73	3.48	2.53	11.62	36.72
9961	"	45	5.64	5.85	3.91	1.91	10.82	39.11
9946	"	40	5.56	6.30	3.57	2.35	11.74	38.06
9947	"	50	5.35	6.08	3.57	2.68	12.60	38.32
9948	"	55	5.42	6.04	3.81	1.40	11.09	40.76
9949	"	39	4.07	7.05	3.50	2.07	13.01	39.63
9950	"	50	5.61	5.93	3.26	2.39	12.82	37.46
9951	"	60	5.61	6.66	3.76	2.51	13.47	34.73
9952	"	50	6.24	6.00	3.61	1.40	11.75	40.13
9953	"	35	4.51	6.41	3.57	2.25	12.04	35.63
9954	"	40	4.49	6.38	3.53	2.21	13.36	38.56
9955	"	40	4.73	6.25	3.81	2.59	11.87	35.30
9956	"	55	4.61	6.25	3.78	1.96	11.38	41.08
9957	"	50	4.23	6.28	3.56	1.93	12.31	39.19
9958	"	33	5.40	6.44	3.49	2.55	12.42	36.79
9959	"	55	5.79	5.37	3.70	1.46	12.05	34.14
9960	"	45	5.99	5.98	4.11	1.08	9.97	39.54
9968	Black, Ceylon	80	6.51	5.52	4.04	1.27	10.62	37.42
9965	Green	40	6.50	5.73	3.56	3.06	13.19	35.14
9971	"	35	4.70	6.00	3.78	3.59	13.39	35.73
9972	"	60	4.61	5.60	3.66	3.55	13.68	37.48
9973	"	35	5.03	5.83	3.40	4.22	14.41	37.34
9974	"	33	4.69	5.65	3.69	3.57	13.91	37.20
9975	"	50	5.85	5.50	3.64	3.82	12.72	36.22
9978	"	35	5.00	5.75	4.09	3.23	13.64	39.00
9979	"	45	4.70	5.61	4.38	2.71	11.25	40.47
9980	"	50	5.72	5.55	3.52	4.31	14.06	36.07
9981	"	35	4.83	5.80	3.42	3.90	15.37	35.09
9982	"	45	3.91	5.88	4.26	2.65	11.42	40.18
9983	"	45	4.80	6.62	3.94	3.85	10.48	39.15
9984	"	39	4.80	6.46	3.94	2.50	10.27	38.32
9985	"	45	5.18	5.50	4.20	2.90	12.02	38.20
9986	"	50	3.88	5.71	4.29	2.81	11.84	41.32
9987	"	45	5.61	6.48	3.26	2.92	13.94	43.99
9988	"	40	5.08	5.75	3.50	3.29	14.90	36.97
9989	"	50	4.97	5.22	3.92	2.60	11.97	38.63
9977	Green, Gunpowder	50	5.13	6.23	3.72	2.79	10.10	39.37
9964	Mixed	75	6.97	5.94	3.72	1.99	11.58	36.73
9966	"	60	5.89	5.99	3.44	3.18	12.10	38.78
9967	"	60	6.54	6.18	3.88	1.20	11.12	37.44
9969	"	70	6.49	5.41	3.98	1.29	9.48	39.97
9970	"	70	7.58	5.19	3.25	1.35	10.64	36.25
9963	Orange Pekoe	80	5.95	5.61	3.99	1.49	11.20	37.77
9976	Uncolored Japan	50	6.30	5.55	4.09	2.56	12.81	38.42

large portion of such extract, is largely destroyed in the process by which black tea is made.

No foreign leaves were detected in any of the samples.

As regards conformity to standard, quality and genuineness of leaf, this inspection reveals a very satisfactory condition of the tea market.

FATS AND OILS.

Some of the work done with this class of foods has already been reported.[1] Subsequent work includes an inspection of olive oil, and further analyses and inspections of butter, oleomargarine, nutmargarine and cooking fats. The greater part of the newer work is upon samples submitted by the Dairy and Food Commissioner.

OLIVE OIL.

Six inspections of olive oil, made by this Station between the years 1897 and 1909, both inclusive, showed a general improvement as regards adulteration, indicated by the following tabulation:[2]

TABLE VI.—SUMMARY OF INSPECTIONS OF OLIVE OIL.

	Year.	Not found adulterated.	Adulterated.	Per cent. adulterated.
From Grocers	1897	37	23	38.3
	1900	45	28	38.4
	1905	19	0	0.0
	1906	25	0	0.0
	1907	7	0	0.0
	1909	44	0	0.0
From Druggists	1897	13	5	27.8
	1900	17	13	43.4
	1905	21	9	30.0
	1906	55	11	16.7
	1907	65	11	14.5

Owing to unusual trade conditions during the past year, many dealers have resorted to mixing less expensive oils, like cottonseed and corn oils, with olive oil, neglecting to legalize such a mixture by proper labelling and neglecting also to reduce the price proportionally.

[1] Conn. Agr. Exp. Station Bull. 201, Jan., 1918.
[2] Conn. Agr. Exp. Station Report, 1909–10, p. 214.

Ninety-eight samples were examined. Of these, three were either sold for mixtures or legally labeled to declare the presence of foreign oil. Twenty-five were sold for olive oil but contained cottonseed oil. Two were sold for olive oil but were largely corn oil. Of the adulterated samples containing cottonseed oil one was marked Pompeian Brand, but it was admitted at the trial of the dealer that the oil was bought in bulk and retailed, in this case, in a refilled can. Another sample, although the presence of cottonseed oil was declared, was not labelled in accordance with the Rules and Regulations provided in such cases.

All violations of the law were investigated by the Dairy and Food Commissioner, who, upon affidavits of this laboratory, held twenty-seven hearings which were followed by twenty-three prosecutions.

The results of this inspection are given in Table VII.

Three samples were sent in by individuals. **11143** was adulterated with cottonseed oil. **10785** appeared to be genuine olive oil but contained a sediment and had a musty odor. **11258,** *Sierra Madre* brand, a California oil packed for Goldberg, Bowen & Co., San Francisco, was found to be pure. It had an iodine number of 87.2 and a refractive index of 1.4710 at 15.5° C.

COOKING FATS.

Analyses of a number of cooking fats have been reported in an earlier bulletin.[1] To this list the analysis of Sawtay has been added. This product, like Kuxit, shows the chemical and physical constants of cocoanut fat.

The sample of Mazola examined gave a Reichert-Meissel number of 0.86. Subsequent samples examined gave lower results, none exceeding 0.15. Referring to the literature on the volatile fatty acids of corn oil, Volte and Gibson[2] obtained Reichert numbers of 4.2 to 4.3 which would be closely equivalent to Reichert-Meissel numbers of 8.4 to 8.6. Spüller obtained a Reichert figure of 0.33 (R–M 0.66) and Hopkins[3] obtained a Reichert-Meissel number of 0. Hopkins and Coburn[4] have reported Reichert-

[1] Conn. Agr. Exp. Station Bull. 201, Jan., 1918.
[2] J. Am. Chem. Soc., **22,** 461, 1900.
[3] J. Am. Chem. Soc., **20,** 956, 1898,
[4] Oil Chemists' Handbook, 1900, p. 38

TABLE VII. INSPECTION OF OLIVE OIL.

Number	Brand.	Dealer.	Price per gal.	Refractive test Index @ 15.5.	Halphen test for cottonseed oil.	Baudouin test for sesame oil.	Nitric Acid test for corn oil.
	Not Found Adulterated	ANSONIA:					
13474	Rivera. Packed in Malaga, Spain	Geo. Gardello	$3.20	1.4705	negative	negative	negative
13475	Pericles	G. A. Kledaras	4.80	1.4705	negative	negative	negative
13465	Rome Superfine	Mariania Romano	5.20	1.4708	negative	negative	negative
		BRIDGEPORT:					
13497	Romanza. Misura Esatta	Joseph M. Calcaterra	4.00	1.4708	negative	negative	negative
13485	Domino Extra. Virgin Imported, International, Chicago	L. Maimiero	4.40	1.4706	negative	negative	negative
13489	Gloria. Gloria Olive Oil Co	Joe Minarda	5.00	1.4703	negative	negative	negative
13499	Red Lion. T. C. Dolea Co., Porta Maurizio, Italy	Fuse & Perachio	5.40	1.4705	negative	negative	negative
13484	Romanzo. The Romanilli Co., Genoa, Italy	J. E. Roberts	5.00	1.4706	negative	negative	negative
13116	In bulk	Antonio Russo		1.4706	orange*	negative	negative
13490	Gloria. Gloria Olive Oil Co	J. Simonelli	5.00	1.4703	negative	negative	negative
13470	Mariani, M. B. Imported San Remo, Italia	Sam Vindigni	4.40	1.4705	negative	negative	negative
13498	Phoenix	Tony Vontsos	5.00	1.4708	negative	negative	negative
		DANBURY:					
13493	Beaumarchand. Nice	W. D. Baldwin	5.40	1.4705	negative	negative	negative
13494	Soprafino, Marca Roma	D. Gillotti	4.00	1.4705	negative	negative	negative
13492	Purity Superfine. Packed in Italy	Gigliotti Bros	5.00	1.4703	negative	negative	negative
		FAIRFIELD:					
13496	Italy Pure. Philip Berio & Co., Lucca, Tuscany	D. Mercurio	5.60	1.4702	negative	negative	negative

* Suspicious, but passed.

TABLE VII. INSPECTION OF OLIVE OIL—*Continued.*

Number.	Brand.	Dealer.	Price per gal.	Refractive test Index @ 15.5	Halphen test for cottonseed oil.	Baudouin test for sesame oil.	Nitric Acid test for corn oil.
	Not Found Adulterated—Continued.						
		HARTFORD:					
13122	Elysee Palace, Virgin	V. Bonelli		1.4704	negative	negative	negative
13121	Passo	V. Bonelli & Son		1.4704	negative	negative	negative
13454	Gloria Virgini. Gloria Olive Oil Co., Italy	Louis Both	$4.00	1.4705	negative	negative	negative
13836	In bulk	M. J. Cunningham		1.4706	negative	negative	negative
13120	Romanzo	R. Delillo		1.4704	negative	negative	negative
13456	Valca. Cavanna & Co., Importers, Philadelphia, Pa	H. Ladone	5.00	1.4704	negative	negative	negative
13119	Spanish	G. Martello		1.4702	negative	negative	negative
13117	In bulk	Vincenzo Juliano		1.4703	negative	negative	negative
13455	Mariani	B. D. Pasquale	4.00	1.4710	negative	negative	negative
		MERIDEN:					
13491	Virgin Oil. F. Valenti, New York, Importer	D. Dondero	5.00	1.4703	negative	negative	negative
		MIDDLETOWN:					
13702	Romanzo. Misura Esatta	Santo Cannota	5.00	1.4708	negative	negative	negative
13703	Carmelo. Carmelo Co., N. Y., Importers	C. Musalli	4.00	1.4705	negative	negative	negative
		NEW BRITAIN:					
13704	Superfine. F. Butolli, Lucca, Tuscany, Italy	S. Arata	5.00	1.4710	negative	negative	negative
13707	Termini Imerese. Sicilia, Italia	S. D. Cerbo	4.00	1.4707	negative	negative	negative
13705	Poletico	A. Mancini	4.60	1.4710	negative	negative	negative

TABLE VII. INSPECTION OF OLIVE OIL—*Continued.*

Number.	Brand.	Dealer.	Price per gal.	Refractive test Index @ 15.5	Halphen test for cottonseed oil.	Baudouin test for sesame oil.	Nitric Acid test for corn oil.
	Not Found Adulterated—Continued.						
		NEW HAVEN:					
9910†	Partenope. Imported. Puziello, Luccaro & Co., Brooklyn, N. Y.	Cash Grocery	$4.80	1.4712	negative	negative	negative
13463	Anita. United Pure Food Co., Importer	Michael Barbuto	4.00	1.4708	negative	negative	negative
13458	Italia. Filippe Bario, Lucca, Tuscany	G. Barera	4.00	1.4704	negative	negative	negative
13715	White Horse. J. S. Pride, Importer	Co-operative Trentino	5.00	1.4710	negative	negative	negative
13461	Domino. Extra Virgin. Virgine Internationala, Chicago	French-Italian Imp'ting Co	4.00	1.4708	negative	negative	negative
13462	Extra-Lucca. Italy. Packed for R. Martorelli	Marianna Gaetano	4.00	1.4708	negative	negative	negative
13459	E & T. Economon & Theodos, Importers, New York	Antonio Pepe	4.00	1.4710	negative	negative	negative
12973	Olio D'Puro	Real Co		1.4703	negative	negative	negative
14287	Pompeian. The Pompeian Co., Baltimore	John W. Scobie		1.4709	negative	negative	negative
		NEW LONDON:					
13720	Poletico Brand-La Mignore, Mariea Extra	A. Laverone	5.00	1.4707	negative	negative	negative
13721	Gloria. Gloria Olive Oil Co., Importers	A. D. Maggio	5.00	1.4707	negative	negative	negative
		NEW MILFORD:					
13711	Lalance. French oil	Kyoto Tea Co	4.40	1.4704	negative	negative	negative
13710	Carmelo. Carmelo Co., N. Y., Importers	G. B. Schiappacasse	5.00	1.4707	negative	negative	negative
13709	Rome	S. Vivierto	5.40	1.4704	negative	negative	negative

† Sampled by Station Agent.

TABLE VII. INSPECTION OF OLIVE OIL—*Continued.*

Number.	Brand.	Dealer.	Price per gal.	Refractive test Index @ 15.5	Halphen test for cottonseed oil.	Baudouin test for sesame oil.	Nitric Acid test for corn oil.
	Not Found Adulterated—Continued.						
		NOROTON:					
13495	The Lazeran. Nice, Paris & N. Y.	Richard Dugdale	$4.00	1.4702	negative	negative	negative
		NORWICH:					
13719	Soprafino Marca Toredor. Francesco Albano, N. Y.	Frank Ferry	5.00	1.4704	negative	negative	negative
		SEYMOUR:					
13476	Taygete. C. S. Calanopulus	A. Conkos	5.60	1.4700	negative	negative	negative
		SOUTH NORWALK:					
13487	Domico Extra. Internationala, Chicago.	Raffaelo Cocehia	5.00	1.4706	negative	negative	negative
		THOMPSONVILLE:					
13452	Elysee Palace. Elysee Olive Oil Co., New York	Antonio di Agostino	4.28	1.4705	negative	negative	negative
13450	White Horse. J. S. Prides, Importer	Carlo Peris	3.40	1.4708	negative	negative	negative
13451	Luida. Nice (France), Malaga (Spain)	Carlo Peris	3.30	1.4705	negative	negative	negative
		TORRINGTON:					
13479	Prodetti Italiano. W. P. Bernagozzi & Co.	S. Marbarek	4.40	1.4705	negative	negative	negative
		STAMFORD:					
13467	Makris. B. G. Makris, Importer	Arena Brothers	4.00	1.4705	negative	negative	negative
13473	E. & T. Economon & Theodos, Importers, N. Y.	R. Campanile	4.80	1.4707	negative	negative	negative
13466	Spanish. Avanzino Bros., Boston	Cascanna Bros	4.00	1.4708	negative	negative	negative
13468	Carmela. Nouvelles, Nice (France), Malaga (Spain)	G. Epifanio	5.40	1.4707	negative	negative	negative

TABLE VII. INSPECTION OF OLIVE OIL—*Continued.*

Number.	Brand.	Dealer.	Price per gal.	Refractive test Index @ 15.5	Halphen test for cottonseed oil.	Baudouin test for sesame oil.	Nitric Acid test for corn oil.
	Not Found Adulterated—Concluded.						
		WATERBURY:					
13480	Tuscany Supreme. Lucca, Italy, Frank Pepe, Importer	T. Marino	$4.00	1.4704	negative	negative	negative
13481	Stella d'Oro. Italy	Nicola Rosa	4.40	1.4706	negative	negative	negative
13482	Superfine Alba. Packed in Italy	Nicola Rosa	4.40	1.4706	negative	negative	negative
13483	Crisafulli. Lucca, Tuscany, Italy	Nick Scopette	4.80	1.4706	negative	negative	negative
		WESTVILLE:					
13457	Italy. Philip Bario & Co., Lucca, Tuscany	Mary Riccio	4.60	1.4704	negative	negative	negative
		WILLIMANTIC:					
13718	Pasco. Porte Morizio, Italia	Joseph Giraca	5.20	1.4704	negative	negative	negative
13717	Finest Quality Italian Lucca	W. H. Hibbard	4.00	1.4710	negative	negative	negative
		WINDSOR LOCKS:					
13517	Pasco. In bulk	Italian Co-operative Store		1.4705	negative	negative	negative
13518	Pompeian. In bulk	Italian Co-operative Store		1.4705	negative	negative	negative
13519	W. P. Bernagozzi. In bulk	Italian Co-operative Store		1.4705	negative	negative	negative
13520	Carmela. In bulk	Italian Co-operative Store		1.4705	negative	negative	negative
	Containing Cottonseed Oil but Legally Labelled.						
		MIDDLETOWN:					
13701	Termini Imerese. Cottonseed & Olive Oils. C. Battaglia, Sicilia, Italia	Antonio Marino	3.00	1.4746	positive	negative	negative
		NEW HAVEN:					
13722	Olio Finissimo (Cottonseed & Olive oils)	F. Beneventu	2.50	1.4742	positive	negative	negative
13723	Tripolitana. (Cottonseed & Olive oils)	A. Pepe	2.60	1.4739	positive	negative	negative

TABLE VII. INSPECTION OF OLIVE OIL—*Continued.*

Number.	Brand.	Dealer.	Price per gal.	Refractive test Index @ 15.5	Halphen test for cottonseed oil.	Baudouin test for sesame oil.	Nitric Acid test for corn oil.
	Adulterated or Misbranded—Containing Cottonseed Oil.						
		ANSONIA:					
13464	Termini Imerese	G. C. Artiglia	$4.00	1.4712	positive	negative	negative
		BRIDGEPORT:					
13471	Frate del Bosco Lucca. Tuscany, Italy	Thomas Arganis	4.60	1.4737	positive	negative	negative
13488	Extra fine Lucca. Garra & Trusso	Riozzoli & Brualdi	4.20	1.4732	positive	neagtive	negative
13469	Frate del Bosco Lucca Brand. Tuscany, Italy	Quatraella & Panucci	3.40	1.4737	positive	negative	negative
13113	Termini Imerese	Antonio Russo	.....	1.4736	positive	negative	negative
13114	Tripolitania	Antonio Russo	.....	1.4740	positive	negative	negative
13115	Puro D'Oliva, Lucca	Antonio Russo	.....	1.4728	positive	negative	negative
13472	Termini Imerese. Sicily, Italy	Venicia Importing Co	3.00	1.4742	positive	negative	negative
		DERBY:					
13477	Lucca	C. Cavallaro	4.60	1.4722	positive	negative	negative
13478	Purissimo di Bitonto Bari	Carmela Propolo	4.00	1.4724	positive	negative	negative
		HARTFORD:					
12971	Extra No. 1. Packed for Garra & Trusso, N. Y	Benj. Feir	.....	1.4718	positive	negative	negative
13118	In bulk	B. De Pasquale	.....	1.4729	positive	negative	negative
13453	Crisifulli. Imported from Lucca, Tuscany	Frank Tinnerella	5.00	1.4718	positive	negative	negative
		MIDDLETOWN:					
13700	Bitonto-Bari	Concetto Russo	3.20	1.4722	positive	negative	negative

TABLE VII. INSPECTION OF OLIVE OIL—*Concluded.*

Number.	Brand.	Dealer.	Price per gal.	Refractive test Index @ 15.5	Halphen test for cottonseed oil.	Baudouin test for sesame oil.	Nitric Acid test for corn oil.
	Adulterated or Misbranded—Containing Cottonseed Oil—Concluded.						
		NEW BRITAIN:					
13706	Riviera. Cochram & Co., Distributors	C. Banini	$3.00	1.4735	positive	negative	negative
		NEW HAVEN:					
13460	Termini Imerese. Sicilia, Italia	Saggio Caleedonio	5.60	1.4738	positive	negative	negative
13714	Soprafino Italia. Lucca, Tuscany, Italy	Filipe Bros	4.00	1.4739	positive	negative	negative
13982	Pompeian*	P. Lucariello	.....	1.4746	positive	negative	?
9909†	Olio Puro. Lucca, Italy	Grocery, 135 Wooster St	3.80	1.4723	positive	negative	negative
13713	Olio Puro. Lucca, Italy	M. Marenna	4.00	1.4729	positive	negative	negative
13724	Tipo Termini Imerese. Sicilia, Italia	Leucio Rapuano	2.66	1.4742	positive	negative	negative
13716	Tripolitania. Cottonseed & Olive oil	Luigi Amatruda	4.00	1.4742	positive	negative	negative
		NORWALK:					
13486	Olio Puro. Lucca, Italy	James Nicholas	3.60	1.4739	positive	negative	negative
		WATERBURY:					
12972	Termini Imerese	S. Bellachino	.....	1.4751	positive	negative	negative
13515	Unknown	Submitted by Dairy & Food Commissioner	.....	1.4727	positive	negative	negative
	Adulterated or Misbranded—Containing Corn Oil.						
		NEW HAVEN:					
13712	Olio Puro. Lucca, Italy	Joe Guarini	3.00	1.4761	negative	negative	positive
		RIDGEGIELD:					
13708	Extra Fine. Lucca, Italy	Brunetti & Gasperini	2.66	1.4761	negative	negative	positive

* Refilled can. † Sampled by Station Agent.

Meissel numbers of 0.49 to 0.50. A sample of refined corn oil and one of crude corn oil[1] were examined in this laboratory and Reichert-Meissel figures of 1.49 and 2.69 respectively were obtained. Different methods of extracting the oil, differences in degree of refinement and in some cases a confusion of the terms used in expressing results explain the variations noted. It is evident that volatile fatty acids cannot be relied upon to distinguish corn oil from olive and cottonseed oils. The analyses of all the cooking fats examined appear in Table VIII.

TABLE VIII—ANALYSES OF COOKING FATS.

Number.	Brand.	Moisture.	Protein (N x 6.25).	Ash.	Fat.	Free fatty acids as Oleic.	Refractometer reading at 40°C	Reichert-Meissel No.	Halphen test.	Nitric Acid test.
		%	%	%	%	%				
8164	Wesson Oil	0.06	....	....	99.94	0.06	59.5	1.04	red	yellow
8165	Mazola....	0.00	....	....	100.00	0.17	62.5	0.86	yellow	red-brown
8166	Vegetole...	0.02	0.38	0.02	99.58	0.15	59.5	0.45	deep red	red-brown
8167	Cottolene..	0.02	0.31	0.08	99.59	0.10	56.0	0.48	deep red	red-brown
9583	Crisco.....	0.02	0.19	0.05	99.56	0.18	54.7	0.50	yellow	yellow
9584	Kuxit.....	0.31	0.13	0.03	99.53	0.15	37.0	5.03	yellow	yellow
9879	Sawtay....	0.03	0.38	trace	99.59	0.08	35.0	8.02	yellow	.....

BUTTER.

The only numerical standard in the present definition of butter is that it shall contain not less than 82.5 per cent. of milk fat. The question of the revision of butter standards has been under discussion by Federal and State authorities and creamery men for the past year. For information in connection with this matter twelve samples of genuine butter, fairly representative of this product in the state, were taken by the Dairy and Food Commissioner and submitted to us for analysis.

The results appear in Table IX. All samples are seen to exceed 80 per cent. milk fat, and all but two exceed the present standard of 82.5 per cent.

[1] Both furnished by the Corn Products Refining Co., New York.

TABLE IX. ANALYSES OF GENUINE BUTTER.

Number.	Dealer.	Water.	Fat.	Casein.	Salt.	Undetermined.
		%	%	%	%	%
12400	L. F. Turner, Burlington.....	11.78	84.06	1.76	2.40	0.00
12401	Canton Creamery, Canton.....	12.61	85.75	1.35	0.21	0.08
12402	Morton & Dwyer, Manchester....	8.52	88.59	1.60	1.27	0.02
12403	H. C. Tracy, Hartford.....	13.39	84.13	1.36	1.12	0.00
12404	Martin Stauss, Rockville.....	10.61	87.47	1.24	0.68	0.00
12405	Wm. Bemhauer Est., Rockville....	12.63	81.36	1.83	4.05	0.13
12406	Oswald Saenger, Rockville.....	12.35	85.30	1.64	0.71	0.00
12471	R. B. Muller & Co., Hartford.....	12.07	83.99	2.21	1.73	0.00
12472	Boston Branch Grocery, Hartford.	10.57	86.78	1.28	1.36	0.01
12473	Glaser & Englert, Rockville.....	14.79	83.20	1.34	0.64	0.03
12474	Glaser & Englert, Rockville.....	11.64	83.95	1.21	3.06	0.14
12475	H. J. Bingenheimer, Rockville....	15.88	80.93	1.35	1.84	0.00

Fourteen other samples were submitted by the Commissioner for examination as to adulteration or misbranding. Eight were found to be genuine butter, and six were renovated.

One sample was submitted by Mrs. E. B. Sage, North Woodbury. It was found to be genuine butter.

OLEOMARGARINE.

There is no official definition or standard for oleomargarine in this state, except that the Statutes direct that it shall be "free from coloration and from any ingredient intended to cause it to look like butter." For this reason oleomargarine cannot be sold if it contains added artificial color. The use of naturally high colored fats in the manufacture of oleomargarines violates the above restriction in that the product obviously will not be free from coloration. It may be argued, however, that it is free from any ingredient *intended* to cause it to look like butter, which ultimately brings the matter up for a decision in court. It is to be regretted that the law does not provide, either that the product shall be white, or else permit the addition of harmless coloring matter, which privilege is accorded to butter.

Thirteen samples of oleomargarine were submitted by the Dairy and Food Commissioner.

No annatto or coal-tar dyes were found in any of the samples. In all cases where tests were made for carotin, positive results were obtained. Reichert-Meissel numbers determined in these cases indicated from 3 to 20 per cent. of butter in the product. Palmer and Eckles,[1] Gill[2] and others have shown that carotin is a color principle rather widely distributed in plants and in vegetable and animal oils and fats. It is present in butter fat, being derived from grass, and occurs also in palm oil. The detection of carotin, therefore, is without the diagnostic significance it was formerly supposed to have.

Analyses of five samples collected by this station, previously reported, appear in Table X.

NUT MARGARINE.

Nut margarines differ from oleomargarine in that they do not contain the fat of slaughtered animals. They are chiefly composed of cocoanut fat with admixtures of other vegetable fats or oils to give the proper consistency. Peanut or cottonseed oils are used for this purpose. The fats are ripened with milk to which a culture of lactic acid-forming bacteria has been added, in order to impart the flavor of butter. They are quite perishable products and manufacturers do not encourage jobbers to keep large quantities on hand, preferring to have them supplied with fresh material. Benzoate of soda is used as a preservative in some cases, which is legal provided the amount does not exceed 0.1 of one per cent. and is so stated. The color dispensed with nut margarines we have found to be annatto. Analyses of eight of these products, including three brands previously reported, are given in Table X.

CEREAL PRODUCTS, ETC.

SUBSTITUTE FLOURS.

Flours other than wheat flours have been of especial interest to the housewife during the past year. From the standpoint of calorie yield any of the substitutes are the equal of wheat flour, but by reason of its superior baking qualities, due to the gluten it

[1] Jour. Biol. Chem. **17,** 190-249, 1914.

[2] Jour. Ind. & Eng. Chem., **9,** 136, 1917; **10,** 612, 1918.

TABLE X. ANALYSES OF MARGARINES.

Number.	Brand.	Moisture.	Protein (N x 6.25)	Ash.	Fat.	Free Fatty Acids, as Oleic.	Refractometer reading at 40°C.	Reichert-Meissel No.	Halphen test.	Nitric Acid test.
	Nut Margarine.	%	%	%	%	%				
8168	A 1. Downey Farrell Co., Chicago	10.84	1.25	4.51	83.40	0.45	40.0	7.00	deep pink	brown
8169	Cocoanut. Nucoa Butter Co., Soho Park, N. J.	6.53	0.69	1.58	91.20	0.39	37.2	7.50	yellow	brown
8170	Providence Churning Co., Prov., R. I.	11.28	0.75	1.14	86.83	0.47	39.0	6.15	yellow	yellow
9883	Nut-ola. Armour Co.	9.44	2.71	6.06	81.75	0.25	39.0	6.37	yellow	.....
9898	Gem. Swift & Co.	12.64	1.36	2.91	83.09	0.95	40.0	6.69	pink	.....
9911	Benefit. Sweet Nut Butter Co., Boston, Mass.	12.35	1.29	2.08	84.27	1.11	37.0	6.22	yellow	.....
9937	Kingnut. Kellogg Products, Inc., Buffalo	10.12	1.87	3.00	85.01	0.19	38.5	6.50	yellow	.....
9938	Nut Marigold. Marigold Margarine Fact. 5th Dist., N. J.	14.71	1.19	1.51	82.58	1.03	38.0	6.62	yellow	.....
	Oleomargarine.									
8171	Lilly. Swift & Co.	1.67	0.56	0.41	97.36	0.74	52.0	1.50	deep red	red-brown
8172	Premium. Swift & Co.	2.54	0.63	0.60	96.23	0.63	49.2	0.99	red	red-brown
8173	Gilt Edge. John F. Jelke Co	8.52	1.25	1.62	88.61	0.74	49.2	.....	pink	red-brown
8175	Silver Churn. Armour Co.	4.90	0.56	1.44	93.10	0.80	51.0	1.30	deep red	red-brown
9994	Good Luck. John F. Jelke Co.	9.20	1.00	3.08	86.72	0.50	49.3	.....	red	red-brown

contains, wheat has the advantage over the other cereals as a bread grain.

The analyses of sixteen flours derived from cereal grains and from potatoes, are given in Table XI.

BREAKFAST FOODS, HEALTH FOODS, ETC.

Four breakfast foods not hitherto analyzed in this laboratory have been examined.

8174. Whole grain wheat. Prepared ready to eat. Price 10 cents per can of 10 ounces, net weight. Made by the Whole Grain Wheat Co.

9597. Cream of Barley, American Barley Co., Minneapolis, Minn. Price 25 cents per package of 1 lb. 8 ozs.

9598. Cream of Rye. Minneapolis Cereal Co., Minneapolis, Minn. Price 20 cents per package of 1 lb. 2 ozs.

11291. Fancy Hominy Grits. The Quaker Oats Co., Chicago. Price 15 cents per package of 1 lb. 8 ozs.

Analyses are as follows:

No.	8174	9597	9598	11291
	%	%	%	%
Moisture	66.16	9.17	11.47	13.15
Ash	1.54	1.36	1.65	0.48
Protein	6.63	11.06	12.00	7.88
Fiber	1.15	0.59	1.43	0.20
Nitrogen-free extract	23.75	76.21	71.90	77.84
Fat	0.77	1.61	1.55	0.45
Starch	.....	62.38	46.01	70.99
Total sugar, as invert sugar	1.23	.....	.....	.....

Two products of the class of health foods and two miscellaneous preparations were also examined.

9874. Grant's Hygienic Crackers. For constipation, indigestion, dyspepsia and sour stomach. Hygienic Health Food Co., Inc., Berkeley and Oakland, Calif.

9875. Dr. Vons' Health Biscuit. Relieves constipation, strengthens stomach and bowels.

9872. Goodmans Berliner Tea. Matzoths. A. Goodman & Sons, Inc., New York.

TABLE XI. ANALYSES OF SUBSTITUTE FLOURS.

Number.	Name of Flour.	Price per lb.	Moisture	Ash.	Protein.	Crude Fiber.	Nitrogen-free Extract.	Fat.	Starch.
		cents	%	%	%	%	%	%	%
	Barley Flour.								
9914	In bulk	9	11.11	1.75	12.75	0.84	71.13	2.42	55.29
9915	In bulk	9	11.40	1.51	12.38	1.06	71.21	2.44	56.42
9917	In bulk	8	11.60	1.60	11.75	1.35	71.45	2.25	55.29
	Corn Flour.								
9913	In bulk	8	11.22	1.34	9.00	0.85	74.34	3.25	64.74
9919	In bulk	8	12.67	1.01	7.63	0.38	76.16	2.15	68.91
9594 A	In bulk, yellow	.....	12.01	0.68	7.75	0.44	77.47	1.65	70.20
9594 B	In bulk, white	.....	11.76	0.82	9.69	0.51	75.96	1.26	59.63
11238	Maize,* in bulk	10	13.88	0.58	7.81	0.19	76.92	0.62	57.88
	Oat Flour.								
9595	Health Food Co., New York	.....	10.28	1.84	15.06	0.75	65.70	6.37	54.79
	Potato Flour.								
9596	Potatine, Strohmer and Arpe Co., New York	.....	14.90	0.28	0.63	none	84.16	0.03	81.17
9936	Potato starch, Stickney and Poor	12	15.87	0.64	0.63	none	82.84	0.02	81.22
9920	In bulk	18	17.03	0.38	0.25	none	82.32	0.02	79.68
9918	Austin, Nichols & Co., Inc., New York	22	16.19	0.34	0.63	none	82.81	0.03	80.27
	Rice Flour.								
9921	In bulk	14	12.22	0.99	7.38	0.09	78.52	0.80	72.67
9912	In bulk	13	11.64	0.87	7.19	0.19	79.58	0.53	74.92
9916	In bulk	14	11.80	0.52	7.19	0.16	79.83	0.50	74.53

*Flakes.

9871. Home Made Sun Rise Rice Cakes. Made from rice flour, wheat flour, eggs and sugar. The Sun Rise Rice Cake Co., New York.

Analyses of these products are as follows:

No.	**9874**	**9875**	**9872**	**9871**
	%	%	%	%
Moisture	9.16	9.34	9.11	2.51
Ash	3.21	4.05	0.61	0.37
Protein	12.25	9.75	14.19	6.88
Fiber	1.49	4.43	0.28	0.16
Nitrogen-free extract	71.94	66.30	75.50	89.78
Fat	1.95	6.13	0.31	0.30
Starch	52.99	22.78	64.07	36.79
Sugar	.....	.....	.....	39.54

Two samples, **12905,** Rye Meal, and **14154,** White Floured Corn Meal, were submitted by the Dairy and Food Commissioner. The rye meal was found to be genuine, apparently the ground whole rye. The corn meal was adulterated, in that it contained maggots and grain beetles.

Fruit Juices and Carbonated Beverages.

The sugar shortage of the past year has made it difficult for manufacturers of carbonated soft drinks to obtain suitable sweetening agents. The necessity for conserving sugar has suggested the use of the following substitutes for this purpose; *viz.*, corn syrup (glucose), corn sugar (crystalized glucose), maltose syrup, honey and high grade refiners' syrup. Skinner and Sale,[1] after a study of various formulas involving the use of these sweeteners with ordinary sugar, found that none of them could be used to replace all of the sugar, but that one-third to one-half of the amount ordinarily used could be satisfactorily replaced. The keeping qualities of such mixtures, while not so high as when cane sugar is used alone, was found to be satisfactory for limited periods of about six weeks. The relative sweetness of these substitutes as compared with ordinary cane sugar (sucrose), taken to be 100 is, honey 75; corn sugar 45; maltose syrup 30; corn syrup 20.

While there is no restriction on the use of the above named sweetening agents, their presence is required to be stated on the label whenever used.

[1] U. S. Dept. Agr. Bureau Chemistry.

Saccharin is not considered to be a legitimate sweetening material and its use in normal foods is prohibited by the Rules and Regulations of this State. Its use is illegal whether or not its presence is stated on the label.

The use of harmless colors, including ten colors of coal-tar origin, finds especial application in beverages of this class. Declaration of their use upon the label is, however, necessary to make the product legal.

There must also be on the label a declaration of the net contents.

In goods bottled locally we have noted considerable carelessness in the matter of labels. For example, the printed label may bear the name and amount of the product; a legend blown in the bottle may give the name of a different manufacturer and state a different net contents, while the patent cap on the bottle may declare the presence of artificial color and may or may not agree with the other two legends as regards the kind and amount of the product within the container.

The law recognizes but one label and all the required information must be contained thereon.[1] A statement of quantity of contents blown in the bottle is permissible if plain and conspicuous and in conformity in other respects with the regulations.[2]

In our opinion the patent cap on a bottle, easily interchanged, is not the place to look for reliable information regarding the contents of the bottle, and if the statement blown in the bottle conflicts with that of the printed label, the latter should be regarded as the true label.

Eleven fruit juices and thirty-seven carbonated beverages have been examined and the results tabulated in Table XII.

Sugars were determined as reducing sugar calculated as invert sugar, and as cane sugar calculated from the increase in reducing sugar after inverting at 69°C for 10 minutes, using the factor 0.95.

Total solids were obtained by drying to constant weight in vacuum at 70°C.

Of the forty-eight samples examined, forty bore a declaration of net contents which in twenty-eight cases was correct or within a reasonable degree of variation; *viz.*, one ounce for thirty-

[1] Rules and Regulations Relating to the Food and Drug Law, Connecticut, Regulation 16.

[2] Rules and Regulations Relating to the Food and Drug Law, Connecticut. Par. c, p. 49.

TABLE XII. ANALYSES OF FRUIT JUICES AND CARBONATED BEVERAGES.

Number.	Description of Sample.	Price per bottle.	Volume of contents declared.	Volume of contents found.	Sugars. Reducing (as invert).	Sugars. Sucrose.	Total solids.	Saccharin.	Preservative.	Color.
	Grape Juice.	cents.	ozs.	ozs.	%	%	%			
9888	Sunbeam. Austin, Nichols & Co., Inc., New York	19	16.0	.....	15.20	0.29	17.17	none	none	natural
11225	Dover Bay. Cleveland Fruit Juice Co., Cleveland, O.	18	4.0	.....	13.57	0.00	15.98	none	none	natural
9895	Blue Seal. Lewis DeCroff & Son, New York	15	8.0	.....	16.37	1.52	18.93	none	none	natural
9887	Fremont. Fremont Grape Juice Co., Fremont, Ohio	19	16.0	.....	15.05	0.44	17.75	none	none	natural
9930	Fremont. Fremont Grape Juice Co., Fremont, Ohio	10	6.0	6.0	14.34	0.14	15.89	none	none	natural
9894	Red Wing. Puritan Food Products Co., Fredonia, N. Y.	15	4.0	.....	16.62	0.09	20.39	none	none	natural
9880	Red Wing. Puritan Food Products Co., Fredonia, N. Y.	25	16.0	16.0	16.95	0.05	18.45	none	none	natural
9886	Gold Medal. Randall Grape Juice Co., Ripley, N. Y.	10	6.0	6.0	16.86	0.32	18.84	none	none	natural
9881	Epicure. John Sills & Sons, New York	21	16.0	16.0	17.63	0.11	19.06	none	none	natural
	Loganberry Juice.									
9995	Jones Bros. & Co., Portland and Newberg, Oregon	25	16.0	15.3	14.25		14.81	.....	none	natural
9923	Phez.* Pheasant Fruit Juice Co., Salem, Oregon	25	8.0	7.6	26.89	3.98	32.73	none	none	natural

* Add two parts of water before serving.

TABLE XII. ANALYSES OF FRUIT JUICES AND CARBONATED BEVERAGES.—*Continued.*

Number.	Description of Sample.	Price per bottle.	Volume of contents declared.	Volume of contents found.	Sugars. Reducing (as invert).	Sugars. Sucrose.	Total solids.	Saccharin.	Preservative.	Color.
	Carbonated Beverages.	cents.	ozs.	ozs.	%	%	%			
11232	Cream Soda.** West End Bottling Co., Bridgeport	12	24.0	24.0	7.38	0.80	8.27	none	none	caramel[1]
11226	Cream soda. Kenney & Ross, Bridgeport	13	25.0	22.0	5.61	0.29	5.86	present	none	amaranth & veg.[2]
9943	Vani cream. Yolens, Dranoff & Co., New Haven	12	.....	33.0	1.44	1.86	3.64	present	none	none found[1]
9939	Cream soda.† John Clancy, New Haven	13	28.0	28.0	2.26	0.66	3.05	present	none	colorless
9925	Cream soda.** Star Bottling Co., New Haven	15	27.0	27.0	7.98	0.05	8.46	none	none	none found
9891	Cream soda. Shanbrom's Bottl'g Wks., New Haven	12	.....	30.0	2.44	4.28	6.92	none	none	none found[1]
9885	Ginger soda. Bacon Bottl'g. Wks., Hartford	12	.....	25.0	4.68	3.63	8.76	none	none	caramel[1]
9926	Ginger ale. Francis H. Leggett & Co., New York	12	16.0	16.0	8.71	0.19	9.09	none	none	none found
9922	Ginger ale. Clysmic Spring Co., Ellenville, N. Y.	15	15.5	15.7	8.10	1.97	10.28	none	none	none found
11224	Grape smash. Tropical Fruit Juice Co., Chicago	5	6.5	.....	11.69	0.49	12.37	none	none	amaranth[1]
11227	Grape soda. Kenney & Ross, Bridgeport	13	25.0	21.0	6.79	0.15	7.33	present	present[3]	amaranth[1]
11236	Lemon soda. Greater N. Y. Bottl'g. Co., Bridgeport	5	8.0	8.7	4.55	1.05	5.90	present	none	colorless
11231	Lemon soda. Kaplan Bros., Bridgeport	12	24.0	24.0	6.06	3.52	9.50	none	none	colorless

** Artificial. † Compound. [1] Artificial color declared. [2] Artificial color not declared.
[3] 1/10 of 1 per cent. benzoate of soda declared; .03 per cent. found.

TABLE XII. ANALYSES OF FRUIT JUICES AND CARBONATED BEVERAGES.—*Continued.*

Number.	Description of Sample.	Price per bottle.	Volume of contents declared.	Volume of contents found.	Sugars.		Total solids.	Saccharin.	Preservative.	Color.
					Reducing (as invert).	Sucrose.				
	Carbonated Beverages, continued.	cents.	ozs.	ozs.	%	%	%			
11228	Lemon soda. Kenney & Ross, Bridgeport.	13	24.0	21.0	5.95	0.75	6.97	none	none	colorless
9942	Lemon soda. Yolens, Dranoff & Co., New Haven	12	.....	30.0	2.81	0.40	3.20	present	none	none found[1]
9941	Lemon soda. Clancy Bottl'g Wks., New Haven	13	24.0	28.5	4.87	0.24	6.26	none	none	colorless
9884	Lemon soda. The Bacon Bottl'g Wks., Hartford	12	.....	22.7	4.09	4.79	9.45	none	none	colorless[1]
9892	Lemon soda. Shanbrom's Bottl'g Wks., New Haven	12	.....	36.6	3.11	3.10	6.66	none	none	colorless
11237	Orangeade. Greater N. Y. Bottl'g Co., Bridgeport	5	6.0	8.7	5.07	2.51	7.80	none	none	orange I[1]
11233	Orange soda.** West End Bottl'g Co., Bridgeport	12	24.0	24.2	5.84	1.83	7.73	none	none	orange I[1]
11230	Orange soda. Kaplan Bros., Bridgeport	12	24.0	25.0	4.66	2.01	7.02	none	none	orange I[2]
9929	Orange Whistle. Orange Whistle Co., St. Louis	7	6.5	6.5	5.49	4.62	10.32	none	present[5]	unindentified[2, 4]
9933	Orange soda. Bottler unknown	12	.....	28.0	3.96	1.85	5.99	none	none	amar'th, orange I[1]
9931	Orange soda. Star Bottl'g & Supply Co., New Haven	17	28.0	28.3	5.89	1.82	7.87	none	none	orange I[2]
9890	Rexo Cola. The R. G. Lyons Co., New York	5	6.0	6.9	10.60	0.25	10.95	none	none	caramel[1]
11234	Root Beer.** West End Bottl'g Co., Bridgeport	12	24.0	23.0	3.27	5.64	9.35	none	none	caramel[1]

** Artificial, [1] Artificial color declared. [2] Artificial color not declared. [4] Probably orange I.
[5] Less than 1/10 per cent. benzoate of soda declared; .03 per cent. found.

TABLE XII. ANALYSES OF FRUIT JUICES AND CARBONATED BEVERAGES—*Concluded.*

Number.	Description of Sample.	Price per bottle.	Volume of contents declared.	Volume of contents found.	Sugars.		Total solids.	Saccharin.	Preservative.	Color.
					Reducing (as invert).	Sucrose.				
	Carbonated Beverages, concluded.	cents.	ozs.	ozs.	%	%	%			
9944	Root Beer. Yolens, Dranoff & Co., New Haven	12	26.0	25.0	2.17	3.42	5.84	present	none	amaranth[2]
9932	Root Beer. Shanbrom's Bottling Wks., New Haven	12	28.0	27.7	8.18	0.14	8.71	none	none	caramel[2]
9928	Root Beer. Star Bottling & Supply Co., New Haven	15	28.0	28.2	1.32	5.27	7.34	none	none	caramel[2]
9927	Sarsaparilla. Star Bottling & Supply Co., New Haven	15	28.0	27.6	4.00	2.59	6.66	none	none	caramel[2]
9896	Sarsaparilla. Clancy Bottling Wks., New Haven	13	24.0	27.3	2.39	3.85	6.77	suspicious	none	caramel[1]
11235	Strawberry soda, Imitation. Greater N. Y. Bot. Co., Bridgeport	5	8.0	9.2	4.70	1.62	6.44	present	none	amaranth[1]
11229	Strawberry soda. Kaplan Bros., Bridgeport	12	24.0	25.0	5.27	3.10	8.56	none	none	amaranth[2]
9945	Strawberry soda. Yolens Min'l. Bottl'g. Wks., New Haven	12	26.0	26.3	1.01	3.33	4.32	present	none	amaranth[2]
9940	Strawbery soda. Clancy Bottl'g. Wks., New Haven	13	24.0	31.3	4.97	0.52	5.49	none	none	amaranth[1]
9934	Strawberry soda. Shanbrom's Bottl'g. Wks., New Haven	12	.....	32.8	5.39	0.10	5.69	none	none	amaranth[1]
9924	Strawberry soda. Star Bottl'g. Co., Inc., New Haven	15	28.0	26.2	6.61	2.00	8.59	none	none	amaranth[2]

[1] Artificial color declared. [2] Artificial color not declared.

two ounces, and one-half ounce for sixteen ounces above or below. In five cases the variations were deficiencies, and in seven they were overruns.

Saccharin was found in nine samples and one more was suspicious but tests were inconclusive.

No unpermitted colors were identified, but in eleven samples artificial colors were found when their presence was not declared. Four samples carried a declaration of color but none was found, the solutions being in some cases colorless.

No preservative was found except where declared and in those the amounts did not exceed the declarations.

Dried Eggs and Egg Substitutes.

Three samples of genuine dehydrated eggs have been examined, as follows:

No.	9991	9992	10327
	%	%	%
Moisture	4.44	3.68	6.13
Protein	38.13	42.50	39.13
Ash	4.06	4.17	3.83
Fat	44.68	41.72	44.69
Preservative	none	none	none

From these analyses it is seen that the essential food constituents of eggs are protein and fat.

During the past year numerous so-called egg substitutes have appeared on the market. While some of these specify that they are to be used for cooking only, they are, nevertheless, offered for use where eggs are called for in cooking or baking recipes.

Analyses show that these products consist essentially of protein, derived usually from casein or dried skim-milk powder, starch, and baking powder ingredients to supply the necessary leavening power. The chief suggestion of eggs lies in the artificial yellow color which they contain. They do not resemble eggs in substance or quality. They belong more properly to the class of self-raising flours.

Many states have passed stringent regulations with respect to this class of products, forbidding the use of the word egg on the label, except under specified conditions, and prohibiting in most cases the use of any artificial color.

Recently adopted regulations[1] in this State regarding these materials are as follows:

1. "Powdered Egg" or "Egg Powder" is held to mean only powdered, dessicated or dried eggs, exclusive of the shell.

2. "Egg Substitute Powder" is held to mean an article reasonably equivalent in substance and quality to whole egg material.

3. Any article which purports to replace wholly or in part whole egg material, whether for baking or other purposes, is held to be an egg substitute.

4. Egg substitutes are held to be Food Compounds or Imitations and are subject to Regulations already obtaining for such articles. (Regulations, 17, 20 and 21): further providing that (a) they shall bear a distinctive name; (b) the word *egg* shall form neither the whole nor any part of such name, nor shall the label bear any design or device suggesting eggs or egg material unless whole egg material comprises a preponderating part of the article; (c) the use of artificial color in any egg substitute not conforming to Paragraph 2 of this Regulation is held to be an adulteration.

Four products of this class have been examined:

9897. Ecc-O-Gene. Stated to be made from corn and milk products with certified pure food color.

12763. Yelco. Stated to contain powdered milk, rice flour, bicarbonate of soda, cream of tartar, tartaric acid, powdered tumeric and corn starch.

11469. Centenegg. Stated to contain vegetable, cereal and milk products and to contain no egg.

10651. Egg-Nu. Stated to contain the nutriment of eggs artificially colored.

The analyses are as follows:

No.	9897	12763	11469	10651
	%	%	%	%
Moisture	11.44	8.26	11.79	6.20
Ash	2.80	19.67	2.07	9.85
Protein	27.38	4.38	22.19	27.69
Fiber	.....	.....	0.08	trace
Nitrogen-free extract	57.51	65.55	63.77	50.61
Fat	0.87	2.14	0.10	5.65
Starch	49.33	41.62	56.36	23.65
Lecithin P_2O_5	0.01	0.005	.....	0.17
Color	Artif.[2]	Artif.[3]	Natural.	Artif.[4]

[1] Rules and Regulations Relating to the Food and Drug Law, Connecticut, October 1, 1918.

[2] Orange I. [3] Tumeric. [4] Orange I and Tartrazine.

None of these products complies with the new regulations in all respects. Egg-Nu may contain a small amount of egg material judging from the lecithin phosphoric acid content.

Milk.

No systematic inspection of market milk has been made by this station of its own initiative in recent years. The reason for this is that much of such work is done each year indirectly by the examination of samples taken by the Dairy and Food Commissioner, who receives and investigates complaints from local health officers and others regarding milk, and through whom prosecutions for violation of the laws governing the sale of milk are instituted. The percentage of adulteration found in this way cannot be taken as fairly representing the condition of the milk supply in this state, as practically all samples are taken upon complaint or suspicion.

The greater vigilance of health and other officials during the past year in the matter of milk supply is evidenced by the unusually large number of samples which we have been called upon to examine. This attention is abundantly justified. No single article of food is of such vital importance to the consumer as milk. There is no substitute for it, and it is essential that the supply be maintained both as regards quantity and quality.

Fourteen hundred and thirty-nine samples have been submitted to us by the Dairy and Food Commissioner. Of these seven hundred and sixty-four were not found adulterated. Four hundred and six were below the legal state standard. One hundred and seventy-one were diluted with water. Ninety were skimmed. Eight were both watered and skimmed.

In tabular form the results are as follows:

Not found adulterated	764	53.1%
Adulterated by dilution with water	171	11.8
Adulterated by skimming	90	6.3
Adulterated by dilution with water and skimming	8	0.6
Adulterated by reason of being below standard,		
in solids and solids not fat	177	12.3
in fat, solids and solids not fat	229	15.9
	1,439	100.0

It appears that about 12 per cent. of all samples examined were diluted with water. This offense is two-fold in character; the quality of the product is necessarily lowered, and its cleanliness may be seriously jeopardized. No matter how high the grade of milk may be from the standpoint of food ingredients as shown by analysis, if it is unclean it is dangerous. All efforts to free milk from animal dirt and protect it from contamination at the place of production and in transit are completely nullified by the addition of water which may contain the germs of disease.

Six and one-half per cent. of samples were skimmed. The majority of these was obtained from lunch counters where the dipping of milk is practiced. Milk fat rapidly rises to the top of the container where it may be removed, inadvertently perhaps in some cases, through insufficient mixing before portions are served.

Nearly thirty per cent. of the samples were below the required composition as set forth in the state law, which defines that milk of standard quality shall contain not less than eleven and three-quarters per cent. of milk solids, not less than eight and one-half of solids not fat, and not less than three and one-quarter per cent. of milk fats. These numerical standards do not describe a milk of exceptional excellence, but rather one of average or fair quality only. It is difficult to establish a standard for milk, which shall be satisfactory in all respects. The standard in this state corresponds to the Federal standard. White and Judkins[1] have studied the relation between fat and solids not fat in milk from various breeds of cows, and also present data as compiled by other investigators. In their opinion, which is based upon figures obtained, the present standard for solid not fat; *viz.*, 8.5 per cent., is too high. This is in accord with the experience of this laboratory, and it has been our practice in the inspection of milk not to class as adulterated such samples as are deficient in solids not fat alone.

From the data available on this point it is evident that for a given percentage of fat there is a corresponding range in percentage of solids not fat, and that as the fat increases the average of solids not fat increases also. It follows then that for a given fat content the required solids not fat should be correlated thereto. According to data as compiled by Lythgoe, Brown and Ekroth,

[1] Storrs Agr. Exp. Sta. Bull. 94, Jan., 1918.

and White and Judkins, milk of 3.25 per cent. fat will contain on an average 8.3 per cent. solids not fat, the range being from 8.05 to 8.65 per cent. The same data show that a figure of 8.5 per cent. solids not fat is more properly correlated with 3.5 per cent. of fat.

The present standard of 3.25 per cent. of fat should not, in our opinion, be lowered. Milk testing below this figure is more often the result of improper mixing of the product of the herd than of actual fat deficiency. The latter opinion is shared by White and Judkins who show that the mixed milk of a herd comprised by Jerseys, Guernseys, Ayrshires and Holsteins did not fall below 3.88 per cent. in fat at any time during the period of one year, and who doubt if the fat standard should be lowered.

Analyses of two hundred and seventy-two samples of milks adulterated by dilution with water, skimming, or both, are given in Table XIII. Analyses of four hundred and six samples found to be below standard are not tabulated. Of this number two hundred and twenty-nine, or 56 per cent., exceeded 3.25 per cent. of fat but were below standard in solids and solids not fat. One hundred and seventy-seven were below in all respects.

Upon affidavits furnished by this laboratory the Dairy and Food Commissioner has held three hundred and thirty-four hearings on the subject of adulterated milk and has prosecuted one hundred and fifty-three cases.

Forty samples of milk were submitted by individuals for partial or complete analyses. Seven were found to be diluted with water, one was skimmed, nine were below standard, and twenty-three were passed.

Cream.

Eleven samples of cream were submitted for determinations of butterfat. Six of these were sent by the Dairy and Food Commissioner, for the purpose of checking candidates for a state license to test milk and cream.

Food Products Examined for Saccharin.

Four samples of Apple Sauce, two of Cranberry Sauce, one of Strawberry Syrup, fifteen of Apple Pie, thirteen of Prune Pie, and one of Squash Pie were submitted by the Dairy and Food Commissioner, to be examined for saccharin. It was found in

Table XIII. Adulterated Milk.

No.	Dealer.	Solids.	Fat.
	Containing Added Water.		
	Avon.		
12750	F. B. Woodford.	11.21	3.5
12751	F. B. Woodford.	10.69	3.3
	Branford.		
13219	John Tambaini.	9.65	3.0
	Bridgeport.		
13227	Evergreen Dairy	10.80	3.0
13228	Evergreen Dairy	10.59	3.0
14013	Evergreen Dairy	10.49	3.2
14014	Evergreen Dairy	10.62	3.3
14015	Evergreen Dairy	11.03	3.3
14016	Evergreen Dairy	10.60	3.1
14077	Farmers Dairy Co.	10.35	3.0
14078	Farmers Dairy Co.	11.19	3.4
14079	Farmers Dairy Co.	10.80	3.1
14080	Farmers Dairy Co.	11.19	3.4
14081	Farmers Dairy Co.	9.93	2.9
14282	Herbert's Star Dairy.	9.79	3.2
14283	Herbert's Star Dairy.	10.59	3.2
14284	Herbert's Star Dairy.	10.44	3.2
14285	Herbert's Star Dairy.	10.32	3.2
14286	Herbert's Star Dairy.	10.17	3.2
12865	Garden Restaurant.	9.66	2.8
14090	W. P. Hough Rest'nt.	10.79	3.2
12856	Leong Sun Rest'nt.	9.19	2.3
14091	Star Restaurant.	9.78	2.9
10	William Schatz.	9.79	3.0
12296	William Schatz.	10.21	3.1
12297	William Schatz.	11.36	3.6
12299	William Schatz.	9.41	2.9
12858	M. Snow	9.56	3.4
13221	Martin Snow	11.03	3.4
	Brookfield		
14198	Edward Beers.	10.81	3.3
14199	Edward Beers.	10.82	3.2
14200	Edward Beers.	10.29	3.2
14167	C. D. Bristol.	11.40	3.8
14195	Peter Fennell	9.79	2.8
14190	Frederick Gustafson	12.14	4.4
14212	Richard Harris.	8.80	2.6
14185	Paul Kominack	10.02	3.2
14186	A. Kominack	9.90	3.0
14196	Roy Montrose	10.04	3.1
14160	William Pechaski.	11.36	3.7
14181	John Piskura	11.13	3.7
	Containing Added Water—continued.		
	Brookfield—*con't.*		
14187	Steve Piskura.	9.78	3.3
14197	Alex Tubursky.	9.91	3.4
14191	F. Sherwood	10.66	3.3
	Brooklyn.		
13800	J. Molione.	11.05	3.5
13801	J. Molione.	9.97	2.6
13802	J. Molione.	10.70	3.0
13803	J. Molione.	10.23	3.1
13689	Albert Webb.	10.49	3.2
13691	Albert Webb.	11.16	3.4
13692	Albert Webb.	10.66	3.3
13695	Albert Webb.	11.31	3.6
	Cornwall.		
13070	Benj. Cohen	11.21	3.5
13071	Benj. Cohen	10.72	3.2
13072	E. Siminosky	10.60	3.0
	Danbury.		
14235	Martin Repko	11.45	4.0
	Durham.		
13164	G. H. Bailey.	10.25	3.1
13165	G. H. Bailey.	10.48	3.4
13166	G. H. Bailey.	8.83	2.6
	East Hartford.		
12435	M. H. Kearns.	10.60	3.1
12436	M. H. Kearns.	10.98	3.6
	Fairfield.		
14010	Edwin M. Hill	9.95	3.1
	Gaylordsville.		
12517	John Cornwall	11.02	3.4
	Goshen.		
12260	Harrison Ives.	10.33	3.0
12261	Harrison Ives.	11.38	3.9
12262	Harrison Ives.	11.77	4.2
12263	Harrison Ives.	10.67	3.5
	Granby.		
12719	A. B. Phelps.	11.41	3.6
12720	A. B. Phelps.	10.70	3.1
12721	A. B. Phelps.	11.78	4.1

TABLE XIII. ADULTERATED MILK—*Continued.*

No.	Dealer.	Solids.	Fat.
	Containing Added Water—cont'd.		
	GROTON.		
13405	Mrs. Francis Frank..	10.70	3.5
13404	P. Vincent & Co....	11.25	3.7
	GUILFORD.		
14005	Eber Fisher.....	9.76	2.8
14008	Eber Fisher.....	11.47	4.1
14009	Eber Fisher.....	11.48	3.7
	HAWLEYVILLE.		
14251	Mike Melycher.....	11.35	3.7
	MIDDLEFIELD.		
12250	Sidney J. Harvey....	6.44	2.4
12251	Sidney J. Harvey....	7.65	3.0
	MONROE.		
12939	Morris French.....	10.58	3.1
13244	Louis Snow.....	10.21	3.0
13245	Louis Snow.....	10.50	3.1
	MOOSUP		
12967	A. P. Cory.....	9.07	2.6
12968	A. P. Cory.....	8.97	2.6
12969	A. P. Cory.....	9.58	3.0
	NEW BRITAIN.		
12955	Arcade Lunch.....	10.82	3.1
12386	J. Battaglia.....	8.30	2.6
12954	D. Cherniak.....	9.60	3.1
	NEW LONDON.		
13133	Geo. M. Chapin.....	11.26	3.6
12433	V. Fields.....	7.75	2.4
	NEWTOWN.		
14038	Albert M. Boyson...	11.42	3.8
14043	Wm. Leibold.....	10.01	2.8
14048	Adolph Urban.....	11.08	3.5
14049	Adolph Urban.....	11.59	4.2
101	F. A. Young.....	10.91	3.3
	NORTH BRANFORD.		
12626	Isaac Segel.....	10.44	3.2
12627	Isaac Segel.....	10.21	3.4
12628	Isaac Segel.....	9.29	2.7
12629	Isaac Segel.....	10.71	3.2
12630	Isaac Segel.....	9.00	2.8
13267	Benj. Snider.....	10.82	3.6
	Containing Added Water—cont'd.		
	NORTH WINDHAM.		
13848	F. W. Mueller.....	10.00	3.0
13849	F. W. Muller.....	9.65	2.6
13950	F. W. Muller.....	12.31	5.1
13951	F. W. Muller.....	9.78	3.0
	NORWICH.		
12345	Edward Holden.....	11.48	4.0
12346	Edward Holden.....	10.39	3.0
12347	Edward Holden.....	11.21	3.6
12348	Edward Holden.....	10.69	3.4
12349	Edward Holden.....	10.67	3.5
12450	Edward Holden.....	10.14	3.3
	PUTNAM.		
13106	Z. Paquin.....	10.45	3.1
13107	Z. Paquin.....	10.91	3.3
13108	Z. Paquin.....	10.52	3.1
13109	Z. Paquin.....	10.79	3.2
	ROCKY HILL.		
13839	Simon Cinni.....	8.43	2.5
13840	Simon Cinni.....	10.23	3.5
13837	A. & J. Mayerinvitch	11.60	3.7
	ROCKVILLE.		
12326	Henry Martin.....	11.78	4.2
	SHARON.		
12956	Amile Envard.....	11.03	3.3
	SHELTON.		
13170	Alfred Shaw.....	10.43	3.0
	SOUTHBURY.		
106	Henry Johnson.....	10.15	2.6
	SOUTH KENT.		
12519	Mont Darling.....	10.54	3.2
12521	Mont Darling.....	10.62	2.8
	SOUTH MANCHESTER.		
13329	C. Hagnaw.....	9.41	3.3
13330	C. Hagnaw.....	9.39	3.3
13331	C. Hagnaw.....	9.41	3.3
13332	C. Hagnaw.....	9.39	3.3
13333	C. Hagnaw.....	9.45	3.3

TABLE XIII. ADULTERATED MILK—*Continued.*

No.	Dealer.	Solids.	Fat.
	Containing Added Water—cont'd.		
	STAFFORD SPRINGS.		
13447	Steve Dezso.....	11.13	3.6
13449	Steve Dezso.....	11.26	3.5
	STAMFORD.		
13041	Eagle Lunch.....	10.65	3.1
13042	Hartford Lunch.....	10.72	3.2
13048	Quick Lunch.....	10.24	2.8
	STEPNEY.		
13232	Louis Snow.....	10.54	3.3
13260	Louis Snow.....	10.64	3.4
	STORRS.		
12307	A. Kivoitzsky.....	11.56	3.8
	TRUMBULL.		
13250	Wolf Bernstein.....	10.05	2.9
13251	Wolf Bernstein.....	9.71	2.9
13252	Wolf Bernstein.....	9.50	2.7
13253	Wolf Bernstein.....	9.72	3.0
13254	Wolf Bernstein.....	10.22	3.1
13255	Wolf Bernstein.....	10.20	3.1
14082	Bernard Berske.....	9.83	2.3
13235	Geo. Bumbera.....	9.62	2.9
13236	Geo. Bumbera.....	10.08	3.1
13290	Burt Bros.....	7.68	2.5
13291	Burt Bros.....	9.63	3.6
14088	D. M. Fuller.....	11.19	3.4
14068	Paul Goldstein.....	10.37	2.7
14059	A. J. Moore.....	8.82	2.6
14060	A. J. Moore.....	9.27	2.7
13022	Leonard Palueko....	10.67	3.1
13023	Leonard Palueko....	11.52	3.8
13026	Francis Strobel.....	10.20	3.0
14057	Hattie Wells.....	10.00	3.6
14058	Hattie Wells.....	9.66	3.3
	WATERBURY.		
13188	Belmont Lunch.....	10.72	3.2
	WATERFORD.		
13351	D. W. Barnes.....	10.65	3.2
13355	M. T. Beckwith.....	12.37	4.8
13363	Chas. Chapone.....	11.03	3.5
13366	Chas. Chapone.....	10.49	3.2
13381	Mrs. A. W. Wicks...	12.37	4.4
	Containing Added Water—concluded		
	WESTPORT.		
13037	Wagner's Lunch.....	11.93	4.5
	WETHERSFIELD.		
13438	Andrew Olsen.....	10.20	3.2
13439	Andrew Olsen.....	10.51	3.3
13440	Andrew Olsen.....	10.51	3.4
13441	Andrew Olsen.....	9.80	2.7
	NO ADDRESS.		
13650	Steve Dezso.....	11.00	3.6
12448	Andrew Furlong.....	10.99	3.3
13272	Geo. W. McCall.....	11.08	3.6
13092	Theo. Rachele.....	11.10	3.5
	Skimmed Milk.		
	ANSONIA.		
13203	Puritan Lunch.....	11.26	2.5
	BERLIN.		
12805	Salvador Gianfrito...	9.38	1.4
	BRIDGEPORT.		
12870	W. C. Ducharme....	10.42	2.1
12855	Essex Restaurant....	10.07	1.7
12904	(Sent by Board of Health).....	9.91	1.6
	BROOKFIELD.		
14182	John Piskura.....	10.59	2.1
	CORNWALL.		
13073	J. Malasky.....	10.43	2.4
	DERBY.		
13208	Colwell Lunch.....	11.22	2.7
13207	The Y. Lunch.....	9.52	1.7
	DURHAM.		
12252	Morris Walerstein...	10.88	2.1
	GREENWICH.		
13016	Lens Lunch.....	9.39	1.3
13017	Palace Lunch.....	9.11	0.8
13018	Whalen Lunch.....	9.07	1.1
13020	Klump's Restaurant..	10.47	2.1
13019	Koopman Rest'n....	8.90	0.6

TABLE XIII. ADULTERATED MILK—*Continued.*

No.	Dealer.	Solids	Fat.
	Skimmed Milk–cont'd.		
	GROTON.		
13402	Frank Bergman	9.13	1.4
12461	I. E. Crouch	12.66	3.2
	HAMDEN.		
13078	Jacob Zabilowski	10.21	2.4
	HARTFORD.		
12484	Auto Lunch	11.91	3.1
12492	Majestic Lunch	11.74	2.5
12479	Schuman Lunch	11.77	2.4
12485	Hong Kong Rest'nt	10.36	1.5
12487	Wiener Cafe & Res'nt	10.00	1.3
12491	John B. Ryan	11.74	3.0
	HEBRON.		
12443	M. W. Hills	10.95	2.7
	MERIDEN.		
12800	J. S. Billings	10.40	2.1
12394	W. E. Dyer	12.42	3.3
12801	F. M. Raymond	10.37	2.1
	MONROE.		
12938	Chester Terrell	10.20	2.0
	MOOSUP.		
12970	L. C. Parker	10.29	1.7
	NEW BRITAIN.		
12389	Mrs. Walter Lawson	10.86	2.3
12385	Maxwell & Hills	10.26	1.8
12388	John Pethis	10.02	1.6
12392	E. A. Simpson	11.22	2.5
	NEW HAVEN.		
12886	Boston Chop House No. 1	10.99	2.1
12884	Boston Chop House No. 2	10.40	1.3
12888	Home Lunch	10.81	2.3
12880	Olympia Lunch	10.23	2.0
12648	The Rail Lunch	10.90	2.4
12885	Brown's Restaurant	11.17	2.6
	NEW LONDON.		
13373	F. E. G. Douglas	11.25	2.4
13346	New London Candy Kitchen	12.18	3.0
13343	New London Lunch	11.14	2.6
	Skimmed Milk–cont'd.		
	NEW LONDON–*cont'd.*		
13301	Paquette & LeBlanc	9.87	2.2
13302	Paquette & LeBlanc	11.00	2.5
13344	Swanson's Rest'nt	9.87	1.1
13362	Lee Co	10.06	1.7
	NORWALK.		
13008	McCarthy Rest'nt	10.41	1.9
	NORWICH.		
12424	Chamberlain & Co	10.67	2.1
13966	Edward Holden	11.41	2.9
12423	N. Kontanis	11.76	3.0
12428	Miss Isabell Murphy	10.04	1.8
13925	J. G. Potter & Sons	11.20	2.4
12426	Vellis Bros	11.27	2.4
	PUTNAM.		
13907	M. Paquin	11.26	2.8
	ROCKY HILL.		
13838	A. & J. Mayervitch	10.50	2.0
	ROCKVILLE.		
13680	City Lunch	11.80	3.0
	SOUTH COVENRTY.		
12322	C. R. Knight	10.91	2.4
	SOUTH MANCHESTER.		
12314	Thomas Graham	11.21	2.4
12316	Thomas Graham	11.45	2.8
12317	Thomas Graham	12.27	3.0
	SOUTH NORWALK.		
13004	Hartford Lunch	9.87	1.5
13003	Trip's Lunch	10.85	2.5
13002	Middlebrook Rest'nt	10.16	1.9
	STAMFORD.		
13043	Canthas Lunch	10.27	2.1
13040	Royal Lunch	9.44	1.8
13046	Wilt's Restaurant	10.57	2.2
	SUFFIELD.		
12990	W. F. Cronan	10.77	2.2
	THOMPSON.		
12837	H. C. Reynolds	10.87	2.6

TABLE XIII. ADULTERATED MILK—*Concluded.*

No.	Dealer.	Solids	Fat.
	Skimmed Milk–cont'd.		
	TRUMBULL.		
13233	Geo. Hoyt	11.29	2.7
	VERNON.		
12414	Jacob Kahn	13.03	3.4
	WATERBURY.		
13197	John Brois	10.27	2.2
13176	John Crook	9.08	1.0
13184	Famous Lunch	9.97	1.8
13192	Randays Lunch	10.49	2.5
13191	Star Lunch	10.86	2.8
13190	White House Lunch	10.78	2.2
13194	The Why Lunch	10.63	2.4
13175	O. Sampson	10.24	2.3
13181	Kelley's Restaurant	11.29	2.8
	WESTPORT.		
13038	Ackerly Lunch	10.89	2.3
	WEST SUFFIELD.		
01	F. W. Orr	12.06	3.1
	WILLIMANTIC.		
12416	Hyman Israel	10.53	2.0
12415	F. J. Kirtland	11.07	2.3
12420	A. Krug	10.88	2.5
12421	T. F. Shea	10.69	2.0
	WINDSOR LOCKS.		
12992	Harry Brusie	11.42	2.8
	Skimmed Milk–conc'd.		
	NO ADDRESS.		
13633	John Wallin	10.34	2.2
12807	Name not given	11.30	2.6
12812	Name not given	10.20	2.0
	Skimmed and Watered Milk.		
	EAST HAVEN.		
14000	W. A. Bassett	9.92	2.2
	HARTFORD.		
12480	Hartford Lunch	7.87	1.9
	MERIDEN.		
12804	D. B. Allen	9.13	1.9
	NEW HAVEN.		
12878	Busy Bee Restaurant	10.72	2.7
12893	J. Joseph Lunch	8.86	1.6
	SHELTON.		
13212	Bodner's Lunch	9.72	2.2
	SOUTH MANCHESTER.		
12315	Thomas Graham	9.87	2.4
	STAMFORD.		
13049	Jessup Lunch	9.74	2.2

only two samples, Nos. **12328** and **12329**, prune pie and apple pie, respectively, both sold by the Connecticut Pie Baking Co., Hartford.

PORK SAUSAGE.

Twenty-two samples of Pork Sausage were submitted by the Dairy and Food Commissioner to be examined for "fillers." The substances used for this purpose are starchy products such as bread, cracker and biscuit wastes and permit of the absorption of excessive amounts of water and the use of lower grade meat stock. The use of fillers should be declared by proper labelling.

According to Leach[1] 1 per cent. or more of starch may be found in sausage arising from the spices used in seasoning, but in our experience this is rather too high, the starch content in products made without admixture of cereals being generally less than 0.5 per cent.

In only three samples examined was starch found in excess of 1 per cent. They were as follows:

12602. Sold by L. Lowenthal, Stratford Ave., Bridgeport. Contained 4.59 per cent. of starch.

12605. Sold by Stockman & Schiff, E. Main St., Bridgeport. Contained 1.59 per cent. of starch.

12612. Sold by Chicago Market, Main St., Bridgeport. Contained 1 08 per cent. of starch.

Vinegar.

The law requires that cider vinegar shall contain 1.6 per cent. of solids and 4 per cent. acidity.

Seven samples were submitted by the Dairy and Food Commissioner for examination as to identity and conformity to the state standard. Of these, one met the standard requirements, four were below standards in solids or acidity, or both, and two were distilled vinegars.

Ninety-nine samples have been sent to us by individuals. Of this number sixty-one were passed and thirty-eight were found deficient.

Wine.

A sample of Vista del Valle, a California wine of the Moselle type, was sent us by Dr. Potter, Director of the Memorial Laboratory and Clinic, Santa Barbara, Cal.

The analysis was as follows:

Specific gravity at 15.6° 0.9925; alcohol, by volume, 11.25 per cent; total sugars, as invert sugar, 0.06 gram per 100 cc.

This sample is of interest in connection with our previous analyses[2] of various types of wines with reference to their suitability for use in a diabetic diet.

[1] Food Inspection and Analysis, p. 185.

[2] Conn. Agr. Exp. Sta. Report, 1913, pp. 72 and 73.

Non-Alcoholic Beverages.

Three samples of this class of products have been examined.
9990 and **10328,** Pablo; **10329,** Weiss Imitation Beer.
The analyses are as follows:

No.	9990	10328	10329
Specific gravity at 15.6°	1.0207	1.0207	1.0022
Alcohol, by vol.	0.42%	0.36%	4.62%
Solids	5.14	5.10	1.39
Sugars, as dextrose	4.80	4.82	1.03
Preservative	none	none	none

Sample **10329,** if an imitation, is a very faithful reproduction of the original as regards stimulating properties.

Syrups.

Three products of this class have been analyzed.
9876, Karo (blue label) and **9935,** Karo, maple flavor. The Corn Products Refining Co., New York.
9877. Domino Kanelasses. American Sugar Refining Co., New York.
The analyses are as follows:

No.	9876	9935	9877
Density, Baumé	39.9	38.7	40.7
Total solids	77.04%	74.69%	78.43%
Direct reducing sugar,			
as dextrose	32.00	27.81	.....
as invert sugar	.....	.....	42.08
Sucrose	.....	.....	26.60
Total sugars	.....	.....	68.68
Total sugars, as dextrose	71.38	70.00	.....
Ash	0.70	0.38	2.37

Miscellaneous Materials.

Foods, etc.

Miscellaneous foods, sent by private individuals and others and not included in previous classifications, have been examined as follows:

Cherries. **9893.** Liberty Cherries. The Liberty Cherry and Fruit Co., Covington, Ky. Labelled as containing sulphur dioxide and artificial color and flavor.

They were colored with permitted colors, napthol yellow S. and light green S. F. yellowish; contained 86.4 milligrams of sulphur dioxide per kilo, which is not an excessive amount, and had a pronounced mint flavor.

Virocacao. **10593.** The Virocacao Company, Inc., New York. Manufactured on the basis of egg, malt, milk, peptones, phosphates, cocoa, etc.

The analysis of the product is as follows:

Moisture	1.75%
Ash	8.51
Protein (N. 1.64%)	10.25
Fiber	0.65
Nitrogen-free extract	69.70
Fat	9.14
Direct reducing sugar, as dextrose	5.93
Increase after inversion, as sucrose	45.51
Starch	4.42
Total phosphoric acid	4.09
Lecithin phosphoric acid	0.016
Water-insoluble nitrogen	1.06
Coagulable nitrogen	0.15
Tannin-salt precipitable nitrogen	0.26
Resdiual nitrogen	0.17
Total nitrogen	1.64

The amount of lecithin phosphoric acid is too small to be convincing of the presence of an appreciable amount of whole egg; otherwise, the ingredients as stated appear to be substantiated.

Hebe. **9878.** The Hebe Company, Seattle, Wash. "Compound of evaporated skimmed milk and vegetable fat." Stated to contain 6% vegetable fat and 24% total solids. For coffee and cereals, baking and cooking.

Analysis showed the following composition:

Total solids	25.49%
Ash	1.58
Protein	6.38
Lactose	8.79
Fat	8.18
Constants of fat:	
Butyro-refract. at 40°	39.5°
Reichert-Meissel No	6.70

The product is true to its label. The milk fat removed has been replaced by adding cocoanut oil, as the flavor and the constants

of the fat indicate. Cocoanut fat is not an adequate substitute for milk fat as a food for children or invalids, but no such claim is made or implied for this preparation. For the purposes stated on the label it should be satisfactory.

Mammala. **10539.** The Mammala Corporation, 120 Liberty St., New York. Special dry milk for babies, invalids and convalescents. Pure fresh cow's milk modified by removing a part of the cream and adding a suitable portion of milk sugar. Net weight of contents 12½ ozs.

This product has the following composition:[1]

Net weight of contents	12.75 ozs.
Moisture	4.05%
Ash	5.75
Protein	25.78
Lactose	49.90
Fat	14.52
Starch	none
Sucrose	none

On the basis of 12 per cent. solids, this analysis reduces to 3.22 per cent. protein, 1.82 per cent. fat, 6.24 per cent. sugar, and 0.72 per cent. ash. This is the composition of milk with about one-half of the fat removed, reinforced with milk sugar, the other constituents remaining normal.

Krystalak. **11241.** The Dry Milk Co., 15 Park Row, New York. Dry skimmed milk. Contains no added sugar, no preservative and no adulterant of any kind. Contains 30 per cent. casein, 50 per cent. milk sugar and 7 per cent. milk salts. Net weight 1 lb.

Weight found	1 lb.
Moisture	5.05%
Ash	8.37
Protein	35.41
Fat	3.20
Lactose	48.20
Difference (+.23) deducted =	100.00

Lactora. Soluble Dry Milk. **11351.** The Dry Milk Co., Bainbridge, N. Y. Submitted by Miss Bixby, Board of Health, Bridgeport.

[1] See also Conn. Agr. Expt. Sta. Report, 1914, p. 336.

This product is dried skimmed milk, as shown by the following analysis:

Moisture	8.39%
Ash	7.74
Protein	32.47
Fat	2.60
Lactose	48.50
Undetermined	0.30
Total	100.00

Corn Meal. **11084** and **11085.** Eastern Flour and Merchandise Co., New Haven; **11116, 11117, 11118, 11119, 11120** and **11121.** Stoddard Gilbert Co., New Haven. These samples represented car lots of meal to be turned over to the Government for overseas shipment, provided they showed the required composition as regards moisture and fat content.

These ingredients were as follows:

No.	11084	11085	11116	11117	11118	11119	11120	11121
	%	%	%	%	%	%	%	%
Moisture.	12.79	12.25	12.92	13.40	11.95	12.34	13.19	13.25
Fat.....	1.19	3.45	2.40	0.82	4.30	2.89	3.15	2.77

Owing to the danger of spoilage through heating, shippers have found it necessary to insist upon a fixed correlation between moisture and fat, to insure a reasonable margin of safety. Thus the following limitations have been set for this purpose: 11.50 per cent. water, not over 3.00 per cent. fat; 12.00 per cent. water, not over 2.00 per cent. fat; and 13 per cent. water, not over 1.50 per cent. fat.

A sample of meal, **11346**, sent by County Agent B. W. Ellis, Putnam, suspected of being of inferior quality, was found to be below the average as regards protein but not below the minimum in that respect.

Rice Flour. **11362.** Submitted by Crouch and Plasman, Bridgeport, for examination as to genuineness. It showed the analysis of a typical rice flour and the microscope revealed no foreign starch.

Rye Flour. **10537.** Suspected of being other than rye flour. The sample contained 7.94 per cent. of protein, which is too low for a typical rye flour. The starch grains were much too small for rye, and closely resembled buckwheat.

Lye Hominy. **10534.** Stokely Brothers and Co., Newport, Tenn. This is a white corn treated with caustic soda solution to loosen the hull so that it can be removed. The hulled corn is then freed from alkali by repeated washings with water.

The net contents of the can was 1.013 grams, of which 471 grams was liquor and 542 grams was moist (drained) hominy. The analysis of each is as follows:

	Drained Hominy.	Liquor.
Water	77.98%	97.85%
Ash	0.64	0.71
Protein	1.93	0.06
Fiber	0.15	....
Starch	15.27	1.00
Other nitrogen-free extract	3.00	....
Fat	1.03	....
Undetermined	....	0.38
Total	100.00	100.00

The liquor is discarded when preparing the hominy for eating. About one-half of the ash constituents are thereby lost, but no considerable amount of other materials. The reaction of the liquor was very faintly alkaline.

Chicaros. **10542.** Large yellow peas, common in Italy. Submitted by Dr. Julia Teele for an opinion as to their suitability as a diabetic food.

They were analyzed as follows:

Moisture	6.40%
Ash	3.12
Protein	22.31
Fiber	1.50
Fat	5.99
Starch	37.97
Other nitrogen-free extract	22.71

The starch content is too high for a satisfactory diabetic diet.

Almond Chocolate Bars. **10786.** Made by Loeb's Diabetic Food Bakery, New York. The product is substantially the same in composition as was found on previous examination[1] in this laboratory, with the exception that it contained considerably more fat and correspondingly less nitrogen-free extract. There was no indication of added sugar, the sweetening agent being saccharin.

[1] Conn. Agr. Expt. Sta. Food and Drug Report, 1914, p. 246.

Breast Milk. Three samples of breast milk were analyzed as follows:

No.	10953	11353	10620
Solids	12.21%	13.52%	12.49%
Fat	3.83	4.80	3.90
Protein	2.17	8.46	1.16
Sugar	6.21		7.23
Ash		0.26	0.20

Nut Margarine. **10650.** Submitted by the Dairy and Food Commissioner on complaint of a purchaser, who had bought a considerable quantity, a large part of which had become rancid in storage.

No chemical examination was made. All fats tend to decompose and become rancid on long standing. Some are more prone to such change than others. Nut margarines are delicate products of which manufacturers do not encourage jobbers to carry a large stock, but rather to handle small lots to insure freshness of supply. There was no way of determining in this case whether rancidity was due to faulty manufacture or to subsequent improper handling and storage.

Vanilla Extract. **11218.** This was a very turbid preparation, purchased in bulk and contained 0.08 per cent. of coumarin.

Victor Butter Preserver. **11166.** The Victor Packing Co., Rockford, Ill. Submitted by the Dairy and Food Commissioner.

The product consists of about 37.5 per cent. of sugar, 60.0 per cent. of salt, with 1.58 per cent. of saltpetre, 0.44 per cent. potassium chloride and a trace of sulphate. Benzoates, borates and salicylates were absent. The preparation is used as an external preservative and is not objectionable.

Sample **11082,** a white salt thought to be saltpetre and proposed for use in the manufacture of sausage, was submitted by the Board of Health, New Haven.

The salt was found to be sulphate of soda containing much free sulphuric acid and would hardly be a success for the purpose intended.

Water. **10954.** The sample was submitted by R. E. Thompson, Greenwich, and contained a sediment, explanation of which was requested.

It was found to be hydrated oxide of iron due probably to contamination from the piping.

Whiskey. **10606.** Submitted for test of proof. It was found to contain 33.04 per cent. of alcohol which is 66 per cent. proof.

Beer. **11198 A** and **11198 B.** Samples were cloudy in appearance and thought to contain insufficient alcohol. They contained 4.58 and 4.36 per cent., respectively, which is normal alcoholic strength. The cloudiness was due to faulty sterilization.

Cider. **11277.** Sample sent for identification by Dr. Howd, Health Officer, Winsted. It contained 2.22 per cent. solids, 0.50 per cent. acidity and 5.94 per cent. alcohol by volume, with the physical properties of hard cider.

Other miscellaneous samples, eight in number, have been submitted. These included a sample of sulphur for determination of degree of purity; flowers of sulphur for mechanical analysis; linseed oil for degree of purity; aresnate of lead for analysis; two unknown salts for identification; a sample of soap and one of salt.

Silver Springs Salt. **10390.** For Live Stock. Sent by the Dairy and Food Commissioner. It contained 4.01 per cent. moisture; 76.24 per cent. sodium chloride; 17.62 calcium sulphate; a trace of magnesium, and 2.13 per cent. of undetermined substances.

The other samples require no comment.

FOODS SUSPECTED OF CONTAINING INJURIOUS FOREIGN SUBSTANCES.

During the past year the public press has frequently reported instances of suspicious destruction of, or injury to, consignments of food stuffs. This has resulted in a general suspicion of injurious substances in foods of daily consumption which for a time developed into a sort of hysteria.

Ground Glass. Of these injurious substances ground or powdered glass has been chiefly suspected. State and local food administrators, health and police officials, as well as private individuals, have submitted samples of food and confections suspected of containing this substance.

Forty samples have been examined. In thirty-one of these no evidence of glass was found. Silica (or sand), which is widely distributed in foods of vegetable origin, and crystalized sugar were the substances chiefly responsible for the alarm in these cases.

In six samples we detected no glass ourselves, but identified as glass small fragments to which our attention was called, or

which had previously been isolated, by the persons submitting the samples.

In three cases we detected glass as follows:

10812. Cooked meat. Sent by W. J. Rawlings, Chief of Police, New Britain. One fragment of glass weighing about ¼ grain was found, with smaller particles also present.

11086. Partially chewed chiclet. Sent by T. W. Farnam, Food Administrator, New Haven. Contained fine particles of glass.

10852. Canned Corned Beef. Sent by G. A. Shelton, Health Officer of Shelton, through the Dairy and Food Commissioner's Office. No analysis was necessary to detect glass in this sample. Large fragments were found weighing from fractions of a grain to over two grains and present in the proportion of 2.5 ozs. per pound of meat. Report was made to the proper authorities for investigation, the results of which have not come to our attention. This was evidently a case of sabotage.

Coarsely broken or chipped glass, if not detected earlier, would be found after being taken into the mouth, where obviously it might result in laceration of the mouth tissues or injury to the teeth. There is little likelihood of it getting beyond the mouth. The injurious effects of powdered glass are probably overestimated. It is reported to have been used as a remedy among the peasants of Eastern Europe. The ash of all vegetable matter contains substances which are like it in kind and quality, and familiar to us as silica or sand. Moreover particles of silicious material in vegetable ashes often show sharp and jagged edges when viewed under the microscope.

We have been interested in this connection in an opinion by Dr. Thomas Brown[1] whom we quote, not, perhaps as an authority on the physiological effects of ground glass, but because his comment is based upon much sense and some experiment. He says "That ground glass is poyson according unto common conceit I know not how to grant. Not only from the innocency of its ingredients, that is, fine sand, and the ashes of glass-wort of fearn, which, in themselves are harmless and useful; or because, I find it by many commended for the stone; but also from experience,

[1] Pseudodoxia Epidemica. Printed for the assigns of Edward Dod. London, 1669.

as having given unto dogs above a dram thereof, subtilly powdered in butter or paste, without any visible disturbance." Speaking of "Glass grossly or coursely powdered" he says, "that indeed is mortally noxious, and effectually used by some, to destroy Mice and Rats; for by reason of its acuteness and angularity, it commonly excoriates the parts through which it passeth, and solicits them into a continual expulsion. Thereupon, there ensues fearful symptons, not much unlike those which attend the action of poyson."

Poisonous Substances. Twenty-two samples were examined for poisons or suspicious substances.

10886. Cooked meat, submitted by the matron of a boarding school in this state, was found to contain 290 milligrams of copper per kilo. No arsenic was present.

10851. Cooked meat with the water in which it was cooked. The intense purple color of the solution was undoubtedly due to the dye or stain from the U. S. Inspector's stamp on the meat, which had not been removed before the meat was cooked.

10607, 10608, 10619. *Sugar.* This sugar, which was not suspicious in general appearance, dissolved in water with a deep blue color. No one would think of drinking the solution. On close inspection blue particles were seen distributed throughout the sugar. Two coal-tar dyes were isolated, one an unidentified blue and the other probably Orange II. We have no evidence that the color was poisonous, but probably no housewife would use the sugar, even with the certain knowledge that the color was harmless.

The contamination of the sugar may have been intentional, or it may have been accidental as, for example, coming from a container lined with blue paper to which source we once traced "suspicious blue particles" in flour.

This case also was reported to authorities for investigation.

None of the other samples examined require comment.

OTHER MATERIALS SUSPECTED OF CONTAINING POISON.

Eleven samples were submitted for examination.

10661. *Poisoned bait.* Sent by F. H. Plumb, Game Protector, Stafford Springs. Strychnine was present in considerable quantity.

Stomach contents of cow. Sent by J. J. Cavanek, D. V. M., Hartford. Distinct amounts of copper and arsenic were found.

11345. *Chicks thought to have died of arsenical poison.* Submitted by R. D. Martin, M. D. V., Bridgeport. Copper and arsenic were found in the crop, gizzard and liver of the birds, indicating death by Paris green.

11354. *Stomach contents of horse.* Sent by Dr. D. C. DeWolf, Bridgeport. Copper was detected but tests for arsenic were inconclusive.

Two exhibits submitted by State's Attorney Alling, New Haven, involved identification of copper sulphate, magnesium, sulphate and bicarbonate of soda; also the examination of an article of decomposed food in which copper and mercury were identified. Tests for arsenic and alkaloids were negative.

10814. A white powder submitted for identification by Chief Nichols, Police Department of Stratford. It was found to be Epsom salt.

11386. An unknown powder found scattered on the floor of the waiting room and toilet in a station of the New Haven Road. On complaint of passengers the railroad authorities investigated and sent 0.2 gram of the powder to us for examination. It was found to be white pepper.

The other samples require no comment.

II. DRUGS.

The work with this class of products during the past year has included the examination of four medicated wines, twelve proprietary remedies, twenty-four miscellaneous drugs and six samples of toilet preparations.

Medicated Wines.

Four preparations of this class have been examined.

Fairbanks Rock Cordial, Rye Compound. **8144.** P. J. Kennedy & Co., Boston. An excellent remedy for all throat and lung disorders. Analysis on label states 27.64 per cent alcohol, 19.10 per cent. solids, and 0.10 per cent. ash.

We find the composition of this preparation to be as follows:

Contents	13.1 fluid ozs.
Specific gravity at 15.6°	1.0400
Ethyl alcohol, by vol.	29.24%
Methyl alcohol	none
Solids	18.77
Ash	0.03
Direct reducing sugar, as invert	2.96
Increase after inversion, as sucrose	14.92
Polarization, direct at 21°C	+15.20°
invert at 21°C	— 4.62°
Glycerin	trace
Alkaloids	none
Other vegetables extractives	present
Color	natural

Grimault's Cinchona and Iron Wine. **5575.** Stated to contain 15 per cent. alcohol. Net contents 240 grams. For stomach disorders, etc.

The analysis is as follows:

Contents	8.2 fluid ozs.
Specific gravity at 15.6°	1.0653
Ethyl alcohol	14.96%
Methyl alcohol	none
Solids	18.53
Ash	0.41
Direct reducing sugar, as invert	15.25
Increase after inversion, as sucrose	none
Glycerin	0.27
Alkaloids	0.18*
Other vegetable extractives	....
Iron	0.08
Tartaric acid	0.54
Sulphur dioxide, iodides, bromides	none
Color	natural

* Cinchona alkaloids.

Nourry's Wine, iodinated. **8005.** E. Fougera & Co., New York. Stated to contain 12 per cent. alcohol. Contents 300 grams. To be taken before and during the course of meals.

The analysis is as follows:

Contents	10.5 fluid ozs.
Specific gravity at 15.6°	1.0950
Ethyl alcohol	11.20%
Methyl alcohol	none

Solids	25.05%
Ash	0.36
Direct reducing sugar, as invert	17.48
Increase after inversion, as sucrose	0.30
Glycerin	5.96
Alkaloids	trace
Iodine	0.25*
Tannin	0.38
Tartaric acid	0.45
Sulphur dioxide and bromides	none
Color	natural

* Largely or entirely as iodide.

Quina Laroche. **8006.** E. Fougera & Co., New York. Complete extract of the three kinds of cinchona bark, red, yellow and gray. Remedy against difficult digestion, debility, etc. Stated to contain 17 per cent alcohol.

The anlysis is as follows:

Contents	8.3 fluid ozs.
Specific gravity at 15.6°	1.0855
Ethyl alcohol	16.28%
Methyl alcohol	none
Solids	23.85
Ash	0.27
Direct reducing sugar, as invert	21.23
Increase after reduction, as sucrose	0.55
Glycerin	0.53
Alkaloids	0.035*
Tartaric acid	0.23
Sulphur dioxide, iodides and bromides	none
Color	natural

* Cinchona alkaloids. No indication of cocaine.

These products are all closely alike in that they are wines or other alcoholic fluids reinforced with a little medicament in the form of vegetable extractives, but with not enough thereof to destroy the pleasing effect of the sweet hydro-alcoholic base.

Proprietary Remedies.

Twelve products of this class have been examined.

Arbolone. **9908.** The Blackburn Products Co., Dayton, Ohio. Compound for the treatment of obesity. Five-grain tablets. Price 75 cents per box.

Examination and analysis showed the following composition:

There were 54 tablets in the package weighing collectively 31.77 grams. Average weight per tablet 9.05 grains. Ash 31.16 per cent., chiefly calcium carbonate; total sugars, as dextrose, 36.00 per cent; starch, 7.29 per cent.; total organic iodine 0.021 per cent.; loss at 100° 2.37 per cent.; thyroid present.

These tablets are essentially thyroid and starch coated with carbonate of lime and sugar.

Cadomene. **9907.** The Blackburn Products Co., Dayton, Ohio. Tonic compound. Stated to contain in each tablet nux vomica ¼ grain, zinc phosphide 1/20 grain, also calisaya bark, gentian, saw-palmetto, damiana and iron peptonate. Three-grain tablets, Price $1.00.

Examination and analysis showed the following composition:

There were 84 tablets weighing collectively 41.77 grams. Average weight per tablet 7.65 grains. Loss at 100° 1.98 per cent.; mineral matter (ash) 31.34 per cent. (includes 2.48 talc, 14.16 lime, 4.33 iron oxide, 0.44 zinc, 0.15 phosphorus, carbonates present); total sugars 41.64 per cent.; total alkaloids 0.68 per cent.—strychnine, brucine and quinine present; gentian, damiana and peptonate present.

Hypo-Nuclane. **9905.** The Blackburn Products Co., Dayton, Ohio. Carefully compounded of pure drugs and chemicals. For nervous ills, malnutrition and malassimilation, general debility, etc. Especially to increase weight. Sixty 3-grain tablets, $1.20.

Examination and analysis showed the following composition:

60 tablets averaged in weight 5.52 grains per tablet. Loss at 100° 1.23 per cent.; mineral matter (ash) 42.96 per cent. (includes lime 15.12, magnesia 2.85, sodium 3.09, potassium 1.60, iron 2.58; sulphates and carbonates present); phosphates, chlorides, nitrates, bromides and iodides absent; total phosphorus, chiefly as hypophosphites, 6.32 per cent.; total sulphur, chiefly as sulphate, 0.16 per cent.; total nitrogen 0.48 per cent.; total sugar, as dextrose, 26.20 per cent.; total alkaloids, strychnine identified, 0.24 per cent.; biliary products(?); emodin-like substances absent.

The tablets are orange colored, coated with carbonate of lime and sugar, and contain essentially hypophosphites, iron and strychnine with biliary products possibly present.

Fruitatives. **9900.** Fruitatives Limited, Ogdensburg, N. Y. "The laxative and healing properties of fresh ripe fruit—enhanced by special tonics and condensed into tablet or pill form." Stated

to be made from concentrated and intensified fruit juice, a special extract from seeds of nux vomica fruit, and special tonics and antiseptics.

Small packages containing 17 tablets sell for 23 to 25 cents. The 50 cent size package contains 45 tablets.

Examination and analysis showed the following composition:

Loss at 100° 3.78 per cent.; mineral ingredients (ash) 46.18 per cent., chiefly carbonate of lime with magnesia, sodium and potassium present; sugar, as dextrose, 27.28 per cent.; alkaloids 4.95 per cent., including 4.60 per cent. quinine with strychnine and brucine present; aloes and rhubarb present and possibly cascara, ginger and licorice; tests for fruit acids, citric and tartaric acids, were negative.

The medicament in these tablets is chiefly aloes, rhubarb and the alkaloids of cinchona and nux vomica.

Brazilian Balm. **9902.** B. J. Jackson & Co. A remedy for colds, grippe, influenza and a long list of other ailments including consumption and rheumatism. Also an antiseptic and healing agent for external use. Literature with the bottle states, among other things, that it contains no alcohol or narcotics, minerals, purgatives, or poison.

Examination and analysis showed the following composition:

A brown syrupy liquid with a wintergreen odor. Specific gravity at 15.6° 1.2404; alcohol 1.54 per cent.; solids, chiefly glycerin, 88.63 per cent.; ash 0.06 per cent.; tartar emetic 0.26 per cent.; no alkaloids were detected.

Tartar emetic is antimony and potassium tartrate and is a poisonous drug.

Preparations with this name have been the subject of two Notices of Judgment under the Federal Food and Drugs Act. From N. J. No. 4365 it appears that the remedy contains alcohol and tartar emetic, but the latter substance does not appear among the constituents as noted subsequently (N. J. No. 5929), from which it would appear that the formula for the product has been revised.

Linonine. **9904.** Kerr's Flaxseed Emulsion. The Kerr Chemical Co., Danbury, Conn. The formula on the label states the following ingredients: Oils of flaxseed, cassia, eucalyptus and betula; Irish moss and glycerin.

Examination and analysis showed the following composition:

Specific gravity at 15.6° 0.9959; alcohol none; mineral matter (ash) 0.28 per cent.; volatile oils present, cassia and wintergreen detected; fixed oil, identified as linseed, 20.75 per cent.; glycerin 2.31 per cent.; Irish moss present.

Radway's Ready Relief. **7909.** Radway and Co., New York. For external use as a liniment and also for internal use for sour stomach, heartburn, diarrhoea, etc. Stated to contain 27.00 per cent. alcohol. Contents 3½ fluid ozs. Price 50 cents.

Examination and analysis showed the following composition:

Contents 3.2 fl. ozs.; specific gravity a 15.6° 0.9730; alcohol 25.00 per cent.; methyl alcohol none; solids 1.94 per cent.; ash 0.77 per cent. (includes potassium, sodium and carbonates); nitrogen 1.00 per cent. (in ammoniacal form); capsicum, camphor and small amount of soap present; emodin-like substances, glycerin and sugar none; tests for alkaloids inconclusive.

Seng. **9903.** Sultan Drug Co., St. Louis, Mo. A digestive secernent. Indicated in indigestion malassimilation, malnutrition, wasting diseases, etc., in which it is desired to stimulate the secretory glands of the digestive organs. Contains 18 per cent. alcohol.

Examination and analysis showed the following composition:

Specific gravity at 15.6° 1.0188; alcohol 19.90 per cent.; total solids 11.80 per cent.; mineral ingredients (ash) 0.37 per cent., includes traces of lime, potassium, sodium, phosphates and carbonates; total sugar as dextrose 0.90; glycerin 10.41 per cent.; emodin-like substances not found; alkaloids none; aromatic taste resembling ginseng.

This product is essentially an alcoholic solution containing glycerin and sugar, with some aromatic vegetable principle, possibly ginseng.

S. S. S. **7910.** The Swift Specific Co., Atlanta, Ga. Purely vegetable. Said to contain *Chionanthus Virginica* root, prickly ash root, sumac root and sarsaparilla root. Label states 15 per cent. alcohol. Contents 12 fl. ozs. Price $1.00.

Examination and analysis showed the following composition:

Contents 11.8 fl. ozs.; specific gravity at 15.6° 1.0107; alcohol 14.36 per cent.; methyl alcohol none; solids 7.74 per cent.; ash 0.15 per cent.; sugars trace; glycerin 4.41 per cent.; alkaloids trace; tannin and color principles large amount, source undetermined; sarsaparilla present; emodin-like substances, iodides and bromides were not detected.

This product is an alcoholic solution containing glycerin, and vegetable principles of which only sarsaparilla was identified.

Taps. **7948.** Taps Pharmacal Co., New York. Stated to contain cascara, aloes, podophyllum, phenolphthalein and leptandrin.

Examination and analysis showed the following composition:

Thirty-one heart-shaped tablets averaging in weight 4.37 grains each. Loss at 100° 4.36 per cent.; mineral matter (ash) 22.26 per cent.; ash insol. in acid 3.94 per cent.; sugar, as dextrose, 31.20 per cent.; phenolphthalein 2.20 per cent.; cascara, aloes and probably podophyllum present; leptandrin not identified; alkaloids(?).

They are laxative pills coated with sugar and mineral substance and contain phenolphthalein with aloes, cascara and probably other vegetable principles. Presence of alkaloids was not conclusively shown.

Orchard White. **9901.** The Edward Wesley Co., Cincinnati, Ohio. Label states an alcohol content of 11 per cent. It directs to mix the contents of the bottle with lemon juice; to be used as a massage lotion for the complexion. Not intended for curative or medicinal purposes.

Examination and analysis showed the following composition:

A white emulsion with the odor of bitter almonds. Specific gravity at 15.6° 1.0035; alcohol by vol. 12.00 per cent.; solids 3.55 per cent.; mineral constituents (ash) 1.29 per cent.; bismuth, equivalent to bismuth tri-oxide, 0.78 per cent.; boric acid 1.28 per cent.; tragacanth present.

The analysis shows that the preparation is an alcoholic suspension of gum tragacanth, containing boric acid and bismuth. The purchaser adds citric acid in the form of lemon juice.

Bon Opto. **9899.** Valmas Drug Co., Detroit, Mich. Contains, according to formula on the carton, chloretone, zinc sulphate soldim chloride, boric acid and menthol.

The $1.00 size package contained 14 white tablets weighing about 5 grains each.

Examination and analysis showed the following composition:

Boric acid 39.06 per cent.; sodium chloride 39.40 per cent.; zinc and sulphuric acid equivalent to 4.13 per cent. of crystalized zinc sulphate; menthol and chloretone present.

Druggists' Stock Preparations.

SAMPLED BY THE STATION AGENT.

Tartar Emetic. This is antimony and potassium tartrate, $K(SbO)\ C_4\ H_4\ O_6 + \frac{1}{2}\ H_2O$, and is required by the U. S. Pharmacopoeia to be not less than 98.5 per cent. pure. Since the salt loses its water of crystalization upon exposure to air, it should be kept in securely closed containers. Each gram of the salt corresponds to not less than 59.3 cc of tenth-normal iodine solution.

Five samples were examined none of which fell below the U. S. requirements. In four cases results were somewhat too high, due to efflorescence of the salt. All were sold with a "poison" label, with one exception, in which case the mark "for external use only" appeared.

SUBMITTED BY THE DAIRY AND FOOD COMMISSIONER.

Tincture of Iron. This is a hydro-alcoholic solution containing ferric chloride equivalent to not less than 4.48 per cent. of iron, and should contain 63 per cent. of alcohol.

The two samples examined differed from the U. S. P. standard in one or both particulars.

12236. Sold by Alex. C. Prinz, Ideal Pharmacy, 190 Main St., Danbury.

It contained 3.70 per cent. of iron and 70.65 per cent. of alcohol. Variation from alcoholic strength not tolerated. Found deficient in iron.

12237. Sold by M. Soroch, 256 Main Street, Waterbuy.

It contained 3.55 per cent. of iron and 68.55 per cent. of alcohol. Sample passed as to alcoholic strength. Found deficient in iron.

Tinture of Iodine. This is an alcoholic solution of iodine and potassium iodide. The U. S. P. requires that it shall contain in 100 mils not less than 6.5 nor more than 7.5 grams of iodine, and not less than 4.5 nor more than 5.5 grams of potassium iodide. The alcoholic strength should be 83 per cent.

One sample, **12238,** sold by J. A. Notkins & Bro., 198 Congress Ave., New Haven, was examined.

It contained 84.95 per cent alcohol; 6.17 grams of iodine and 4.98 grams of potassium iodide per 100 mils.

Sample was passed with respect to alcoholic strength and content of potassium iodide, but found deficient in iodine.

Spirit of Nitrous Ether. This is an alcoholic solution of ethyl nitrite containing not less than 3.5 per cent. nor more than 4.5 per cent. of ethyl nitrite and should contain 92 per cent. of alcohol.

One sample, **12235**, sold by A. B. Pixley, 14 No. Main St., Wallingford, was found to meet the U. S. P. requirements in both particulars.

Fluid Extract of Nux Vomica. One hundred mils of this preparation are required to yield not less than 2.37 nor more than 2.63 grams of nux vomica alkaloids.

One sample, **12233,** sold by Malinewsky and O'Brien, 487 Main St., New Britain, was found to meet the U. S. P. requirements.

Wine of Colchicum. The National Formulary requires that 100 mils of *Wine of Colchicum corm* shall yield not less than 0.126 nor more than 0.154 gram of colchicine. It requires that *wine of colchicum seed* shall contain in 100 mils not less than 0.036 nor more than 0.044 gram of colchicine.

One sample, **13500,** dispenser not known, was found to contain 0.096 gram colchicine.

Wine of Colchicum Seed. **13516.** Sent by Dr. O. K. Isham, High St., Hartford.

The sample contained 31.50 per cent. of alcohol, and 0.070 gram of colchicine per 100 mils. The alkaloidal strength is practically double the minimum N. F. standard and more than 50 per cent. in excess of the maximum standard.

Soap Liniment. This U. S. P. preparation is a hydro-alcoholic solution of soap, camphor and oil of rosemary. It should contain 66 per cent. of alcohol. There are no standards prescribed for the other ingredients.

One sample, **12234**, sold by Fred S. Sanford, Shelton, was examined and passed.

Bismuth Subnitrate Tablets. One sample, **13501**, dispenser unknown, submitted by the Deputy Commissioner, and labeled to contain 2 grains bismuth subnitrate, was examined and found to be correctly labeled.

Another sample, **12245**, submitted to the Dairy and Food Commissioner by Dr. O. K. Isham, Hartford supposed to contain 2 grains of bismuth subnitrate per tablet, was found to contain none of that drug.

Four samples of tablets, Nos. **10688, 10689, 10690** and **10691,** were submitted. They consisted largely (from 92 to 95 per cent.) of milk sugar with traces of iron, lime, sodium, potassium and aluminum. Tests for alkaloids were negative, except in sample **10688,** where a doubtful test was observed. No mercury or nitroglycerin was found. Conclusive evidence of specific medicaments could not be obtained.

Toilet Preparations.

Under the Act of Legislature forbidding the use of wood alcohol in any preparation intended for internal or external use, six samples have been examined, all submitted by the Dairy and Food Commissioner.

Four were deficient in grain alcohol but none contained wood alcohol. This is an improvement over last year when, of twenty-five samples examined, wood alcohol was found in twelve.

Miscellaneous Preparations Submitted by Individuals.

Morphine Sulphate Tablets. **11280.** Submitted by Dr. Gustavus Eliot, New Haven. They were supposed to contain ¼ grain of morphine sulphate per tablet and were suspected of being deficient.

They were found to contain 0.234 grain per tablet and were satisfactory.

Brilliantine. **10782.** A case of suspected poisoning through the use of a hair dressing was referred to us by the Department of Health, New Haven.

No evidence was found of any substances to which the symptoms described could be attributed.

Liniment. **10636.** Submitted by W. J. Rawlings, Chief of Police, New Britain.

The so-called liniment consisted of at least 90 per cent. of kerosene, with a small amount of turpentine and camphor present.

Turpentine. **10630.** The F. E. Spencer Co., New Haven.

No mineral oil was found. Sample was satisfactory.

Gen-Sen. **11542.** Submitted by the War Bureau, New Haven. A remedy of which free samples were being distributed from house to house.

It consisted essentially of aloes and Epsom salt. No alkaloids were present.

SUMMARY.

MATERIALS.	Sampled by: Station Agent.	Sampled by: Dairy and Food Com'r.	Sampled by: Individuals.	From all sources.	Found adulterated, below standard, or otherwise illegal.
FOODS.					
Breakfast foods, Health foods, etc	8	2	0	10	1
Butter	0	26	1	27	6
Cooking fats	7	0	0	7	0
Cream	0	6	5	11	0
Eggs, dried	3	0	0	3	0
Egg substitutes	3	0	1	4	4
Foods, for saccharin only	0	36	0	36	2
Fruit juices and carbonated beverages	48	0	0	48	29
Milk	0	1439	40	1479	692
Non-alcoholic beverages	3	0	0	3	1
Nut margarine	8	0	0	8	0
Oleomargarine	5	13	0	18	0
Olive oil	2	96	3	101	28
Sausage	0	22	0	22	3
Substitute flours	16	0	0	16	0
Syrups	3	0	0	3	0
Tea	64	0	0	64	0
Vinegar	0	7	99	106	42
Wine	0	0	1	1	0
Miscellaneous	3	2	108	113	–
Total	**173**	**1649**	**258**	**2080**	**808**
DRUGS.					
Druggists' Stock preparations	5	14	0	19	5
Medicated wines	4	0	0	4	–
Proprietary remedies	12	0	0	12	–
Toilet preparations	0	6	0	6	4
Miscellaneous	0	0	5	5	–
Total preparations	**21**	**20**	**5**	**46**	**9**
Total for foods and drugs	**194**	**1669**	**263**	**2126**	**817**

A Correction.

In our Report for 1916, Table XVI, page 250, sample **11553** is accredited to the Harvey Co., Saratoga Springs, N. Y. This was the original information furnished us, but doubt arose later as to its identity and the sample was, therefore, not discussed in the text of the Report, and should not have been included in the tabulation of weight variations.