
CONNECTICUT
AGRICULTURAL EXPERIMENT STATION.

NEW HAVEN, CONN.

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EXAMINATION OF FOOD PRODUCTS SOLD IN
CONNECTICUT.

The following report to the Governor of Connecticut, which according to statute is to form a part of the Annual Report of this Station, is issued as a Bulletin in order to place it promptly before those who are concerned.

The Bulletins of this Station are mailed free to citizens of Connecticut and to others who apply for them, until the editions are exhausted.

REPORT ON FOOD PRODUCTS.

To his Excellency, O. Vincent Coffin, Governor of Connecticut :

As required by statute, I herewith submit the first Report of this Station upon Adulterated Food Products.

Very respectfully yours,

S. W. JOHNSON, *Director.*

The Conn. Agricultural Experiment Station,
New Haven, July 15th, 1896.

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REPORT ON FOOD PRODUCTS.

The General Assembly of this State, at the January Session, 1895, passed an act regulating the manufacture and sale of food products; which was approved June 26th, 1895, and went into effect on August 1st of that year.

The text of the law is as follows:—

CHAPTER CCXXXV.

PUBLIC ACTS, JANUARY SESSION, 1895.

An Act regulating the Manufacture and Sale of Food Products.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Manufacture or sale of misbranded or adulterated food.

SECTION 1. It shall be unlawful for any person, persons, or corporation within this state to manufacture for sale, offer, or expose for sale, have in his or their possession for sale, or to sell, any article of food which is adulterated or misbranded within the meaning of this act.

Term food defined. Term misbranded defined.

SEC. 2. The term food, as used in this act, shall include every article used for food or drink by man, horses, or cattle. The term misbranded, as used in this act, shall include every article of food and every article which enters into the composition of food, the package or label of which shall bear any statement purporting to name any ingredient or substance as not being contained in such article, which statement shall be untrue in any particular; or any statement purporting to name the substance or substances of which such article is made, which statement shall not give fully the names of all substances contained in such article in any measurable quantity.

When an article shall be deemed to be adulterated.

SEC. 3. For the purposes of this act, an article shall be deemed adulterated:

First, if any substance or substances be mixed or packed with it so as to reduce or lower or injuriously affect its quality or strength;

Second, if any inferior substance or substances be substituted wholly or in part for the article;

Third, if any valuable constituent of the article has been wholly or in part abstracted;

Fourth, if it be an imitation of or sold under the name of another article;

Fifth, if it is colored, coated, polished, or powdered whereby damage is concealed, or if it is made to appear better or of greater value than it is;

Sixth, if it contains poisonous ingredients which may render such article injurious to the health of a party consuming it, or if it contain any antiseptic or preservative not evident and not known to the purchaser or consumer;

Seventh, if it consists, in whole or in part, of a diseased, filthy, decomposed, or putrid substance, either animal or vegetable, unfit for food, whether manufactured or not, or if it is in any part the product of a diseased animal, or of any animal that has died otherwise than by slaughter;

Provided, that an article of food product shall not be deemed adulterated or misbranded within the meaning of this act in the following cases:

(a) In the case of mixtures or compounds which may be new or from time to time hereafter known as articles of food under their own distinctive names, and not included in definition fourth of this section;

(b) In the case of articles labeled, branded, or tagged, so as plainly or correctly to show that they are mixtures, compounds, combinations, or blends;

(c) When any matter or ingredient is added to a food because the same is required for the protection or preparation thereof as an article of commerce in a fit state for carriage or consumption and not fraudulently to increase the bulk, weight, or measure of the food or to conceal the inferior quality thereof;

(d) When a food is unavoidably mixed with some extraneous matter in the process of collection or preparation.

SEC. 4. The Connecticut Agricultural Experiment Station shall make analyses of food products on sale in Connecticut suspected of being adulterated, at such times and places and to such extent as it may determine, and may appoint such agent or agents as it deems necessary; who shall have free access, at all reasonable hours, for the purpose of examining, into any place wherein it is suspected any article of food adulterated with any deleterious or foreign ingredient or ingredients exists, and such agent or agents upon tendering the market price of said article may take from any person, firm, or corporation samples of any article suspected of

Connecticut Agricultural Experiment Station to make analyses.

being adulterated as aforesaid, and the said station may adopt or fix standards of purity, quality, or strength when such standards are not specified or fixed by statute.

Notice to prosecuting officers.

SEC. 5. Whenever said station shall find by its analysis that adulterated food products have been on sale in the state, it shall forthwith transmit the facts so found to a grand juror or prosecuting attorney of the town in which said adulterated food product was found.

Report.

SEC. 6. The said station shall make an annual report to the governor upon adulterated food products, in addition to the reports required by law, which shall not exceed one hundred and fifty pages, and said report may be included in the report which said station is already authorized by law to make, and such annual reports shall be submitted to the general assembly at its regular session.

Appropriation.

SEC. 7. To carry out the provisions of this act, the additional sum of twenty-five hundred dollars is hereby annually appropriated to said Connecticut Agricultural Experiment Station, which sum shall be paid in equal quarterly installments to the treasurer of the board of control of said station, upon the order of the comptroller, who is hereby directed to draw his order for the same.

Penalty.

SEC. 8. Any person who, either by himself, his agent, or attorney, with the intent that the same may be sold as unadulterated, adulterates any food products for man, or horses, or cattle, or knowing that the same has been adulterated, offers for sale or sells the same as unadulterated, or without disclosing or informing the purchaser that the same has been adulterated, shall be fined not more than five hundred dollars, or imprisoned not more than one year.

Action not to be maintained on illegal sale.

SEC. 9. No action shall be maintained in any court in this state on account of any sale or other contract made in violation of this act.

SEC. 10. All acts and parts of acts inconsistent herewith are hereby repealed.

Approved, June 26th, 1895.

The fourth, fifth and sixth sections of this act lay certain duties upon this Station as follows:

1st. To make analyses of food products suspected of being adulterated.

2d. Whenever it shall find by its analysis that adulterated food products have been on sale, it shall forthwith transmit the facts so found to a prosecuting officer in the town where the adulterated food product was found.

3d. The Station shall make an annual report.

The law also provides that the Station may adopt or fix standards of purity, quality, or strength, when such standards are not specified or fixed by statute.

All articles used as food or drink by men, horses or cattle are included under the provisions of the law and are subject to the inspection and investigation of the Station. It is obvious that because of this wide scope of the law, and also because of the limited appropriation made for the work, it is quite impossible that the whole field should be covered in any one year.

That due diligence has been shown in examining food products during the twelve months covered by this report is shown by the work described on the following pages.

Authorized agents of this Station have visited forty cities and villages of Connecticut for the purpose of purchasing articles of food liable to adulteration.

These places are distributed as follows:

Litchfield County.....	3 places.
Hartford ".....	9 "
Tolland ".....	1 "
Windham ".....	5 "
New London ".....	5 "
Middlesex ".....	1 "
New Haven ".....	10 "
Fairfield ".....	6 "
	<hr style="width: 10%; margin-left: 0;"/>
	40 "

There have thus been secured 934 samples of food products of the following kinds:

Maple Syrup.....	72 samples.
Maple Sugar.....	7 "
Syrup.....	4 "
Cane Sugar.....	16 "

Comb Honey	12 samples.
Strained Honey	48 "
Lard and Lard substitutes	162 "
Pepper	114 "
Mustard	74 "
Cream of Tartar	103 "
Cereal Foods	9 "
Coffee	124 "
Milk	105 "
Cheese	72 "
Miscellaneous	25 "
	347 "

In collecting these samples no effort has been made to select places in which it might be supposed that adulterated goods would be most abundant, but it was rather sought to get as many different brands of each article as was possible. To this end the agents purchased from "fancy" groceries, as well as from the cheaper places which supply the poorer part of the population.

The State having already specially provided for the inspection of butter, molasses and vinegar by a dairy commissioner and his deputy, inspection of these three food products by the Station is uncalled for.

It should be said, however, that all samples drawn by the dairy commissioner or his deputy are referred by them to this Station for examination and report.

The examination of the samples bought by Station agents has been entirely done by Messrs. Winton, Ogden and Mitchell, as will be seen from their papers on the following pages.

In every case where certain proof of adulteration was found, the facts, as required by the law, have been forthwith transmitted to a grand juror or other prosecuting officer of the town or borough where the adulterated food products were sold.

The duties of this Station end here. In order to prosecute successfully it is necessary for the State not only to prove the sale of adulterated food products, but also to prove that the seller knew that the articles sold were adulterated.

MAPLE SYRUP AND MAPLE SUGAR.

By A. W. OGDEN.

Maple syrup, obtained by evaporating the sap of the sugar maple, contains essentially the same sugars that exist in sugar made from sugar cane and beet root, but it is specially prized for its peculiar flavor. This flavor is said to be more or less successfully imitated, and, according to popular belief, it is quite possible to prepare, from the ordinary white or brown sugar of the stores, a syrup or a sugar which cannot be certainly distinguished from genuine maple syrup or maple sugar.

It is probable that genuine maple syrup or sugar may be melted with water and a large proportion of ordinary sugar to make a mixture which has enough maple flavor to be in demand and to be extensively sold as maple sugar or maple syrup.

In Table I, page 9, are given analyses of 61 samples of "maple syrup," bought by Station agents in 22 different cities and towns of this State.

Of most of these it is impossible to say whether or not they are genuine and unadulterated.

But the last eight samples in the table of analyses are certainly adulterated and consist wholly or in part of glucose syrup. The five samples which immediately precede in the table those marked adulterated, and which are numbered 5094, 5093, 5461, 5397 and 5043 contain some substance which has a strong right-handed polarization and is not "inverted" by the action of acids. Such a substance is not known in pure maple syrup or sugar, but a mixture of syrup with a moderate quantity of glucose would give the polarization observed in these samples.

METHOD OF TESTING SUGARS AND SYRUPS.

Sugar, syrup and honey are tested generally by the polariscope, other tests being made in special cases.

In our work one-half the normal quantity for polariscopic test* was dissolved in water and clarified when necessary with 1^{cc} each of alum cream and basic lead acetate solution. After making up the volume to 100^{cc} and filtering, the solution was polarized in a 200^{mm} tube. 50^{cc} of the solution were treated with 5^{cc} of strong hydrochloric acid, heated at 68° to 70° C. for ten minutes and polarized a second time, after inversion.

The results in the table are calculated in all cases to the normal quantity.

* 13.024 grams.

EXPLANATIONS OF THE TABLE OF ANALYSES.

The last column in Table I gives the per cent. of cane sugar deduced from the polarizations. This ranges in the "maple syrups" from 47 per cent. in No. 5371 to 66 per cent. in No. 5460. Most of the samples contain 60 per cent. or over. The other 30 per cent. is in some cases mostly and in all largely water, but besides cane sugar and water there are larger or smaller amounts of "invert sugar" (a mixture of "glucose" and "fructose" sugars), which always results when cane sugar solutions containing acids (juice or sap) are heated and boiled as in open pan sugar-making. A properly prepared solution of pure dry cane sugar polarizes +100 degrees. After heating with hydrochloric acid the cane sugar is changed to "invert sugar," which polarizes -36½° at a temperature of 15° C. In most cane sugars and in syrups containing cane sugar only, the same relation holds so that such a syrup, giving direct polarization of +50°, would polarize -18.25° after inversion and would accordingly contain 50 per cent. of cane sugar.

But sugars or syrups that already contain invert sugar, show in consequence a less direct + polarization and a greater - polarization than those which contain a like amount of cane sugar without invert sugar. Thus in the sample of maple syrup first in Table I the 56 per cent. of cane sugar corresponds to +56° of direct polarization and about -19.3° after inversion. The difference—2.9 degrees—represents the polarizing effect of invert sugar, with small quantities possibly of other optically active substances.

Assuming, however, that cane and invert sugar are the only optically active present, the amount of invert sugar is 1.44 per cent.

Table II, page 12, gives the analyses of seven samples of "Maple Sugar."

Whether these were made entirely from maple juice or are imitations of maple sugar cannot, in the present state of knowledge, be certainly determined by chemical examination.

They contain 10 to 15 per cent. of moisture.

TABLE I.—MAPLE SYRUPS.

Station No.	Label on Package.	Manufacturer, Producer, or Wholesaler.	Dealer.	Cost per Package.	Polarization.			Per cent. Cane Sugar.
					Direct.	After Inversion.	Temperature. C.	
5488	Pure Maple Syrup	Hildreth Bros. & Segelken, N. Y.	A. J. Finney, 202 Main St., Stamford	\$0.22	+53.1	-22.2	19.0	56.0
5298	Leonard's Pure Vermont Maple Syrup	D. C. Leonard & Son, Wilmington, Vt.	Newton & Robertson, Hartford	.35	+56.7	-20.0	24.6	58.3
5096	Maple Syrup	C. L. Houghton & Co., Northampton, Mass.	Grocery, S. W. corner Wallace & Walnut Sts., New Haven	.25	+57.5	-17.5	27.8	57.7
5384	Golden Crown, Pure Sap Maple Syrup	Clark, Chapin & Bushnell, N. Y.	W. H. Bronson, 234 Main St., Ansonia	.25	+58.8	-20.2	21.3	59.3
5380	Golden Crown, Pure Sap Maple Syrup	The Vermont Maple Sugar Ex., Brattleboro, Vt.	R. D. Baldwin, Bridge St., Winsted	.25	+58.8	-20.5	21.3	59.4
5302	The Vt. Maple Sugar Ex. & Co. Guarantees This Maple Syrup Strictly Pure	E. Frank Steele & Co., Springfield, Mass.	H. J. Case & Co., Hartford	.35	+58.8	-21.6	24.0	60.8
5301	Warranted Strictly Pure Maple Syrup	Welch Bros. Maple Co., Burlington, Vt.	Earnest Glaeser, Rockville Waterbury Grocery Co., 163 Bank St., Waterbury	.25	+59.2	-19.6	25.0	59.7
5383	Maple Sap Syrup. Put up and Guar. by	Not known	Fitch A. Hoyt, Stamford, Conn.	.25	+59.5	-20.7	22.2	60.3
5497	Irving's Vermont Maple Syrup	David H. Geer & Son, Boston, Mass.	T. W. Potter, New London, Conn.	.22	+59.6	-21.9	18.8	60.6
5042	None	D. Trubee & Co., Bridgeport, Conn.	Grocery, 234 E. Main St., Bridgeport	1.00*	+59.6	-21.5	21.6	60.8
5369	Pure Maple Syrup. Put up by	Not known	E. L. Sullivan, 436 E. Main St., Bridgeport	.12	+59.6	-20.6	21.8	60.2
5376	Pure Vermont Maple Syrup	Clark, Chapin & Bushnell, N. Y.	Gilbert & Thompson, New Haven	.25	+60.0	-20.2	22.5	60.4
5092	Hazen's Vt. Maple Syrup, Warranted Pure	The Vt. Maple Sugar Ex., Brattleboro, Vt.	L. D. Chidsey, New Haven	.45	+60.6	-20.1	26.0	61.6
5422	None	Said to be Thompson, Northampton	N. W. Heater, Waterbury, Conn.	.75 can	+60.3	-20.4	25.0	61.3
5381	Famous Vt. Maple Syrup. Strictly Pure	Leslie, Dunham & Co., Pittsfield, Mass.	H. I. Palmer, Norwich, Conn.	.20	+61.1	-20.2	22.3	61.4
5309	Pure Maple Syrup		D. S. Cooper Co., 470 State St., New Haven	.75†	+61.5	-21.8	23.4	62.9
5097	None		N. Y. Cash Grocery, Norwalk, Conn.	.25	+61.7	-20.0	26.3	62.4
5499	Hampshire County Maple Syrup			.20	+62.0	-22.0	18.3	62.3

*7 Gallon. † One-half gallon.

TABLE I.—MAPLE SYRUPS—Continued.

Station No.	Label on Package.	Manufacturer, Producer, or Wholesale.	Dealer.	Cost per Package.	Polarization.		Per cent. Sucrose of Cane Sugar.
					Direct.	After Inversion.	
5312	Climax Pure Maple Syrup	C. T. & J. C. Joslyn, Waitsfield, Vt., and Malden, Mass.	J. P. Holloway, Norwich, Conn.	\$0.30	+62.0	-20.9	23.4
5303	Maple Sap Syrup. Put up and Guaranteed by	Green Mountain Maple Assn.	W. W. Walker, Hartford.	.24	+62.5	-21.0	24.7
5426	Maple Syrup	The Crystal Conserve Co., N. Y.	Logan Bros, Main St., Bridgeport	.10	+62.6	-21.3	21.9
5313	Vermont Maple Syrup. Warranted 1st Quality	J. H. Barker & Co., Rutland, Vt.	Welcome A. Smith, Norwich	.35	+62.6	-21.7	23.7
5385	Warranted Strictly Pure Vt. Maple Syrup	Hildreth Bros. & Segeiken, 28 & 30 W. Broadway, N. Y.	The Clarke & Stevens Grocery, Shelton.	.25	+62.8	-20.8	22.2
5387	Vermont Maple Syrup	F. H. Leggett & Co., N. Y., Prop.	A. H. Armington, Danielson	.35	+62.8	-20.7	22.8
5296	The Crystal Conserve Co. Maple Syrup	Thompson & Cromack, Northampton.	Berry & Bailey, 946 Grand Ave., New Haven.	.18	+62.8	-21.1	22.0
5098	Strictly Pure. Made in Wyndham Co., Vt.	D. M. Welch & Son, New Haven, Conn.		.25	+63.0	-19.5	27.5
5044	Pure Vt. Maple Syrup. Put up expressly for	F. H. Pratt, Tolland, Mass.	D. M. Welch & Son, New Haven	.22	+63.0	-20.0	26.8
5386	None	The Crystal Conserve Co., N. Y.	J. C. O'Brien, Main St., Ansonia	.40	+63.0	-21.0	23.1
5379	Maple Syrup	J. C. Worth, Norwich	McGraw & Baldwin, Danbury	.25	+63.1	-21.0	21.3
5311	None	R. N. Fitzgerald, 142 State St., Hartford	Wheeler Bros., Norwich	.30	+63.2	-22.2	23.5
5465	None	Not known	P. W. Hiller, New Britain	.15	+63.3	-21.2	22.9
5299	Mascot Brand, Pure Maple Syrup	W. J. Lamb, W. Somerville, Mass.	Purinton & Reade, Willimantic.	.35	+63.4	-21.2	24.8
5095	Superb Pure Maple Syrup	W. J. Lamb, W. Somerville, Mass.	Coe & Field, New Haven, Conn.	.25	+63.4	-20.7	26.6
5500	None	Not known	Betts & Farrington, Norwalk, Conn.	.10	+63.5	-22.0	19.0
5395	None	W. J. Lamb, W. Somerville, Mass.	W. H. Brown, Moosup	.25	+63.7	-20.6	21.5
5300	Pure Maple Syrup. Orange Co., Vt.	W. J. Lamb, W. Somerville, Mass.	Ransom Bros., Rockville	.30	+64.1	-20.9	24.8
5374	Pure Maple Syrup. Enosbury, Vt.	D. H. Geer & Son, Boston, Mass.	Store at 47 White St., Danbury	.15	+64.2	-21.5	22.5
5462	Warranted Strictly Pure Maple Syrup. Put up for.	F. M. Hotchkiss, Meriden, Conn.	N. P. Lamontague, Meriden	.25	+64.3	-21.9	22.6
5372	Vermont Maple Syrup	Stoddard, Kimberly & Co., N. H.	Gustav. E. Friedrich, So. Norwalk	.30	+64.4	-21.6	22.0
5046	Warranted Pure Vt. Maple Syrup	Austin, Nichols & Co., N. Y.	H. S. Dailey, 97 Whalley Ave., N. H.	.35	+64.6	-20.7	27.4
5375	Green Mountain Maple Syrup. Pure and Deliculous		Doran's Cash Grocery, Danbury	.25	+64.6	-22.2	22.5

TABLE I.—MAPLE SYRUPS—Continued.

Station No.	Label on Package.	Manufacturer, Producer, or Wholesale.	Dealer.	Cost per Package.	Polarization.		Per cent. Sucrose of Cane Sugar.
					Direct.	After Inversion.	
5463	Thompson's Absolutely Pure Maple Syrup	J. E. Thompson	Sovereigns' Trading Co., N. Britain	\$0.25	+64.7	-19.6	23.3
5404	Warranted Strictly Pure Maple Syrup	G. W. Moseley & Son, Hartford	Lee Bros. & Co., New Britain, Conn.	.30	+64.8	-21.0	21.9
5045	Pure Maple Syrup. Woodstock, Vt.	F. J. Adams & Co., Boston, Mass.	P. Jente & Bro., Broadway, N. H.	.23	+65.1	-21.1	25.6
5447	Warranted Strictly Pure Maple Syrup	G. W. Moseley & Son, Hartford, Conn.	Hill Grocery, 552 Asylum St., Hartford	.28	+65.2	-23.3	18.9
5460	Home Brand, Warranted Strictly Pure Vermont Maple Syrup	Bryan, Minor & Reed, New Haven	E. F. Buller, Meriden	.25	+66.4	-22.3	19.2
5371	Vermont Maple Syrup	J. H. Green, 150 Flushing Ave., Brooklyn, N. Y.	Conn. Am. Tea Co., 856 Main St., Bridgeport, Conn.	.10	+41.2	-21.2	22.5
5377	None	Unknown	Grocery, 87 White St., Danbury	.30	+49.6	-20.6	22.7
5094	Pure Maple Syrup	H. D. Gloyd, Charlestown, Mass.	J. H. Dore, 763 Grand Ave., N. H.	.23	+61.1	-11.7	25.6
5093	Thompson's Absolutely Pure Maple Syrup	J. E. Thompson	C. E. Hart & Co., 350 State St., St. N. Y.	.30	+71.0	-8.7	26.0
5461	Pure Vermont Maple Syrup	James Butler, 406 Greenwiche St., N. Y.	Russell Bros, Meriden	.10	+69.6	-5.0	19.2
5397	Mayflower Brand Pure Maple Syrup	R. N. Fitzgerald, Hartford, Conn.	Perkins & Bliss, Willimantic	.30	+74.3	-5.9	23.8
5043	Pure Vermont Maple Syrup	<i>Adulterated "Maple Syrup," Consisting of or Containing</i>	Johnson & Bro., 411 State St., N. H.	.35	+72.1	-0.2	25.3
5316	The Champion Brand Pure Maple Syrup	C. A. Reed, Medford, Mass.	James M. Young, Preston	.25	+80.0	+18.9	22.0
5370	Vermont Maple Syrup	J. H. Green & Sons, Brooklyn, N. Y.	Store cor. E. Main and Clarence Sts., Bridgeport.	.10	+85.0	+37.6	22.1
5388	Pure Maple Syrup for Family Use.	Silas F. Jones, Hancock, Vt.	J. Burkhardt & Co., Shelton	.25	+93.7	+48.3	22.5
5394	Said to be	W. J. Lamb, W. Somerville, Mass.	Quinnebaug Store, Danielson	.25	+95.0	+58.7	23.1
5498	Pure Maple Syrup	Fournier & Schiller Co., Rochester, Vt.	Finney & Benedict, Norwalk	.25	+96.4	+37.7	20.3
5279	Pure Maple Syrup for Family Use	Hudson Mfg Co., 61 Hudson St., N. Y.	H. Dion, Willimantic	1.00*	+97.4	+61.2	24.0
5446	Hudson Brand Maple Syrup	259 Greenwich St., N. Y.	C. F. Cleaveland, Windsor Locks	.25	+100.0	+45.6	19.0
5373	Thompson's Maple Syrup		Chas. Starr, New Milford, Conn.	.25	+105.0	+50.9	21.5

* Gallon.

TABLE II.—MAPLE SUGARS.

Station No.	Label.	Producer or Wholesaler.	Dealer.	Cost per Package.	Polarization.			Sucrose, or Cane Sugar.
					Direct.	After Inversion.	Temperature, C.	
5100	None	Not known.	D. S. Cooper Co., 470 State St., New Haven.	\$0.12	+84.1	-28.8	25.0	85.9
5308	None	W. J. Lamb, W. Somerville, Mass.	Brainard & Bartlett, Putnam.	.15	+85.8	-27.3	22.9	85.3
5099	Genuine Vt. Maple Sugar	C. T. & J. C. Joslyn, Malden, Mass.	Coc & Field, 422 State St., New Haven	.15	+86.1	-27.6	27.2	87.2
5304	None	W. J. Lamb, W. Somerville, Mass.	Ransom Bros., Rockville	.15	+87.5	-27.5	26.0	87.8
5382	None	Hildreth Bros. & Seigelken, N. Y.	The Clark & Stevens Store, Shelton	.18	+87.7	-28.3	21.9	87.2
5389	Gem Pure Vt. Maple Sugar	Clark, Chapin & Bushnell, N. Y.	W. H. Bronson, 234 Main St., Ansonia	.15	+88.0	-28.3	22.5	87.6
5317	None	W. J. Lamb, W. Somerville, Mass.	H. D. Rallton, 45 Broadway, Norwich	.20	+88.4	-29.3	22.0	88.5

SUGARS.

By A. W. OGDEN.

Three samples of granulated sugar, ten of powdered sugar and three of brown sugar, have been examined, with the results given in Table III.

Powdered sugar is sometimes suspected by purchasers of being adulterated with flour or terra alba because of a real or imagined lack of sweetness, but no evidence of adulteration has been found in any of the samples here examined.

The powdered and granulated sugars contain from 98 to 99.5 per cent. of pure sugar; the brown sugars, like the maple sugars, contain from 10 to 15 per cent. of moisture.

TABLE III.—SUGAR.

No.	By Whom Sold.	Price.	
		Cents per Pound.	Per cent. of Pure Sugar. (Sucrose.)
<i>Granulated Sugar.</i>			
5051	Benjamin Blumenthal, 229 Market St., Hartford	6	99.0
5052	Isaac Lechner, 203 Front St., Hartford	5	99.2
5053	Joseph Malley, 137 Front St., Hartford	5	99.2
<i>Powdered Sugar.</i>			
5057	Davis, 228 Shelton Ave., New Haven	8	98.4
5058	J. Casseriego, Cor. Starr St. and Shelton Ave., New Haven	8	99.4
5059	Voelcker Bros., Cor. Gibbs St. and Shelton Ave., New Haven	8	99.4
5060	I. Strack, Cor. Munson St. and Shelton Ave., New Haven	8	99.0
5061	A. C. Tillman, 7 Shelton Ave., New Haven	8	99.0
5062	A. A. Eissele, Cor. Henry St. and Dixwell Ave., New Haven	8	99.4
5063	C. Kipp, 292 Dixwell Ave., New Haven	8	99.4
5064	C. Richards, 181 Dixwell Ave., New Haven	10	98.8
5065	J. T. Pohlman, 140 Dixwell Ave., New Haven	—	99.2
5066	P. Jente & Bro., Broadway, New Haven	7	98.8
<i>Brown Sugar.</i>			
5055	Joseph Malley, 137 Front St., Hartford	5	84.8
5055	Benjamin Blumenthal, 229 Market St., Hartford	5	89.2
5056	Isaac Lechner, 203 Front St., Hartford	5	84.8

"SYRUP."

Table IV gives analyses of four articles bearing this name. Nos. 5502, 5378 and 5278 are glucose syrups; No. 5501 is apparently a cane sugar syrup.

As no distinct claim is made regarding either of these articles they cannot be considered adulterated.

TABLE IV.—“SYRUPS.”

Station No.	Name of Brand.	Manufacturer or Wholesaler.	Retail Dealer.	Cost per Package.	Direct Polarization.	Polarization after Inversion.	Temperature.
5501	Sold for Sugar Syrup	S. Comstock, Jr., 72 N. Main St., South Norwalk.....	\$.03 $\frac{1}{2}$ pt.	+ 36.5	- 13.2	22.3
5502	Queen Syrup	G. Boyd & Sons, 8th and Cantrell Sts., Phila.....	D. S. Davenport, S. Norwalk.	.25	+ 97.5	+ 68.2	22.0
5378	Queen Syrup	G. Boyd & Sons.....	P. D. Vroom, 5 Keeler Street, Danbury.....	.30	+ 113.8	+ 93.6	23.8
5278	Sold for Sugar Syrup	Halpin & Green, N. Y.....	W. W. Walker, Hartford.....	.50 gall.	+ 129.4	+ 114.1	24.5

HONEY.

By A. W. OGDEN.

Honey consists of the nectar of flowers elaborated by the bee and laid down in the cells of the honey comb.

This is in substance the definition given in the dictionaries and recognized by writers on food products and food adulterations.

It is a not uncommon practice to feed bees, when flowers are scarce, with sugar in some form to carry them along till they can get a full supply of nectar from flowers. But in order to lessen the work of the hive and so to increase production, cane sugar is sometimes fed abundantly and continuously when it is not at all essential to the bees.

This cane sugar, more or less converted by the bees into invert sugar, is laid down in the comb; but according to the definition given above, is not, strictly speaking, true honey.

Thus it happens, as in sample 5050 in Table V, p. 16, that "honey" bought in a comb which has not been removed from the frame into which it was built by the bees, and therefore, where direct adulteration by a dealer is in the nature of things impossible, may yet contain a large percentage amount of cane sugar. It was most probably taken by the bees from their artificial food and was laid down within the cells without conversion into invert sugar.

The buyer of honey, *in the comb*, therefore is not sure of getting honey made wholly from the nectar of flowers.

Invert sugar and glucose syrup are common adulterants of the "strained honey" of the shops and a dead bee or a fragment of comb floating on the surface is no sure sign that the liquid beneath is not glucose syrup with some coloring and flavoring matter.

Forty-eight samples of strained honey and twelve samples of comb honey have been bought by agents of the Station in nineteen cities and villages, and the results of their examination are given in the following table.

HONEY IN THE COMB.

Table V contains 12 samples of this class. Of these we consider the first six, numbers 5610, 5611, 5049, 5105, 5486 and 5490, to be genuine.

TABLE V.—COMB HONEYS.

Station No.	Label.	Producer or Wholesaler.	Dealer.	Price per Package.	Polarization.			
					Direct.		After Inversion.	
					Degrees.	Temper. C.	Degrees.	Temper. C.
5610	None.*	C. H. Chittenden, Killingworth, Conn.	A. B. Stevens, 61 Broadway, N. H.	\$0.18	0.6	24.9	6.6	24.5
5611	" †	" " " " " "	" " " " " "	.18	4.7	25.0	10.1	25.0
5049	"	Austin, Nichols & Co., Hudson St., N. Y.	Johnson & Bro., 411 State St., New Haven.	.15	7.3	21.5	14.1	24.7
5105	"	Said to come from Westville, Conn.	E. E. Nichols, 378 State St., New Haven.	.25	6.2	21.5	9.2	24.7
5486	"	Not known.	Geo. A. Ferris, 184 Main St., Norwalk	.18	6.7	23.8	10.3	22.5
5490	"	" " " " " "	Betts & Farrington, Wall St., " "	.20	9.7	23.3	15.4	20.2
5104	Possibly from bees fed with Sugar. None on box.	On crate, J. E. Hetherington, Cherry Valley, N. Y.	Coe & Field, 422 State St., N. Haven	.20	12.3	23.6	15.4	26.0
5367	"	Not known	Wilcox & Adams, Winsted, Conn.	.18	11.8	23.6	14.2	24.9
5366	From the apiary of Ward Lamkin, Ledyard, N. Y.	Ward Lamkin, Ledyard, N. Y.	E. L. Sullivan, 436 E. Main St., Bridgeport, Conn.	.18	16.4	23.4	18.0	24.4
5365	None on box.	From the apiary of F. Greiner, Naples, N. Y.	Foot Bros., W. Main St., Waterbury.	.18	16.6	23.0	17.8	24.3
5368	"	Not known.	D. M. Welch & Son., New Haven.	.10	19.5	23.4	20.5	24.0
5050	Containing Cane Sugar. New England No. 7 apiary	H. D. Davis & Co., So. Newbury, Vt.	Johnson & Bro., 411 State St., New Haven	.15	18.5	25.2	9.0	24.0

* From sumach, tulip and basswood.

† From sumach, and possibly some basswood.

The next five, numbers 5104, 5367, 5366, 5365, 5368, may represent "honeys" from bees fed more or less with sugar.

No. 5050 is probably from bees which had been abundantly fed with cane sugar in some form. It contains 20.8 per cent. of cane sugar.

The per cents. of ash in the four samples, Nos. 5049, 5105, 5104 and 5050, were .24, .26, .46, and .03 respectively.

STRAINED HONEYS.

Table VI contains the tests of 48 samples of this class. Seven of them, as indicated in the table, are probably genuine. Thirty-four are suspected of representing honey from bees fed on sugar or of being adulterated with invert sugar.

Two others contain considerably larger amounts of cane sugar, which either came from the sugar on which the bees were fed or was added to the honey as an adulterant.

The last five in the table, Nos. 5360, 5270, 5273, 5314, 5352, are unquestionably adulterated with glucose syrup.

Samples numbered 5359, 5354 and 5363 contain 14.6, 20.3, and 23.1 per cent. of cane sugar respectively.

The per cents. of ash in samples numbered 5101, 5048, 5103, 5102, and 5091 are .20, .02, .09, .36, and .09 respectively.

A considerable number of samples of "honey" were in packages identical in form and size and bearing labels of the same size, form and wording, but the contents of these packages were nevertheless quite unlike in quality.

These are included in Table VII. The first column gives the numbers of the samples, with brackets enclosing those which were contained in packages of one kind; the second column gives the label, common to the packages, while the following columns give the results of the examination.

Thus it is seen that there were two samples, 5360 and 5425, both in packages (bottles) of the same shape and size and both bearing the label, "Pure California Honey, put up expressly for family or medical use." The label bore the picture of a busy bee-hive. One of these bottles contained glucose syrup (5360), and the other (5425) invert sugar or possibly honey made from bees fed with cane sugar.

There were five samples, 5352, 5467, 5492, 5494, and 5047, put up in glass "tumblers" of precisely the same size and shape,

TABLE VI.—STRAINED HONEYS.

Station No.	Label.	Manufacturer or Producer.	Dealer.	Price per package.	Polarization.			
					Direct.	After Inversion.	Direct.	After Inversion.
				Degrees.	Temperature, C.	Degrees.	Temperature, C.	
5276	Probably Pure.			\$0.50	1.0	23.8	5.1	24.8
5485	Pure Extracted Honey	Helen Johnson, Middle Haddam, Ct.	Hills & Co., Hartford, Conn.	.25	3.6	22.8	8.4	24.0
5449	Pure Honey	Wm. T. Gregory, Norwalk, Conn.	Finney & Benedict, Norwalk, Conn.					
	Choice Honey	C. A. Stanton, Newington, Conn.	J. A. Pilgard, 138 Front St., Hartford, Conn.	.25	5.1	23.8	11.0	22.3
5467	Pure Honey	Not known	Rudolph Bros., Meriden, Conn.	.20	7.9	23.3	11.2	22.0
5310	Choice Extracted Honey. Strictly Pure	E. C. Hazard & Co., New York	H. I. Palmer, Norwich, Conn.	.20	5.6	23.2	16.5	24.0
5423	Pure Orange Blossom Honey. Eagle Brand	Not known	Doran's Cash Grocery, 150 Main St., Danbury, Conn.	.20	6.8	25.1	15.6	22.4
5352	None	Sold for native honey	M. H. Tilley, Derby, Conn.	.18	7.2	23.8	14.0	24.2
5355	None	<i>Possibly from bees fed with sugar, or the honey adulterated with invert sugar.</i>						
5361	None	Not known	J. B. Sullivan, E. Main St., Bridgeport	.20	10.1	23.3	14.1	24.7
5364	Pure California Honey	Said to be Lamb	L. F. & A. M. Guillole, Bank St., Waterbury	.20	10.3	23.4	14.7	24.2
5424	Choice Extracted Honey. Strictly Pure	D. H. Geer & Son, Andrew Sq., Boston	J. B. Vallee, 21 Grand St., Waterbury	.25	11.0	22.7	16.2	23.6
5420	1 Pound Pure Honey	E. C. Hazard & Co., New York	Waterbury Grocery Co., 163 Bank St., Waterbury	.35	11.8	25.1	14.5	22.5
5495	None	Not known	W. S. Chappell, 148 Slate St., New London	.25	12.0	24.7	17.3	22.5
5492	Pure Honey	Said to be native from New Canaan	T. Leeds, Stamford, Conn.	.18	12.4	22.6	17.2	18.5
		Said to be native	D. S. Davenport, N. Main St., South Norwalk	.18	12.7	23.7	16.9	21.2

TABLE VI.—STRAINED HONEYS—Continued.

Station No.	Label.	Manufacturer or Producer.	Dealer.	Price per package.	Polarization.			
					Direct.	After Inversion.	Direct.	After Inversion.
				Degrees.	Temperature, C.	Degrees.	Temperature, C.	
5448	1 Pound Pure Honey	Said to be Phelps	C. F. Cleaveland, Windsor Locks	\$0.25	13.2	22.5	16.1	18.4
5351	None	Said to be W. J. Lamb	M. S. Burgess, Derby Junction	.25	13.4	23.3	16.5	25.0
5315	Pure Honeysuckle Honey	W. J. Lamb	H. D. Rallion, Norwich	.25	13.7	22.0	16.1	24.4
5356	None	Said to be farmer's honey	McGraw & Baldwin, Danbury	.20	13.9	22.8	16.5	26.2
5421	None	Said to be Cal. honey. From Am. Grocery Co., New York						
5277	Pure Extracted White Clover Honey	H. A. Whittlesey, Newington, Conn.	T. W. Potter, 72 State St., N. London	.25	14.3	23.5	19.1	22.9
5496	None	Said to be native from New Canaan	Newton & Robertson, Hartford	.25	14.4	24.0	17.4	24.5
5494	Pure Honey	Not known	W. & E. Osterbanks, Norwalk	.30	14.6	22.0	19.3	19.6
5353	None	Said to be native from farmers.	Addison Brown, Wall St., Norwalk	.20	14.9	23.7	17.5	22.9
5357	Strained Honey	Francis H. Leggett & Co., New York	Chas. Starr, New Milford	.15	15.1	23.3	17.6	25.4
5491	None	Not known	Logan Bros., Bridgeport	.25	16.2	22.3	19.4	25.0
5101	Pure White Clover Honey	W. J. Lamb	G. W. Raymond, Norwalk	.15	16.6	22.9	19.9	20.8
5275	Pure Strained Honey	The Crystal Conserve Co., New York	S. S. Adams, 412 State St., New Haven	.15	16.8	25.7	19.1	26.5
5358	None	Said to come from Leggett	Hills & Co., Hartford	.25	17.3	23.5	20.5	24.6
5274	None. Sold for Orange Blossom	Hildrath Bros. & Segelken, New York	Barnum & Reed, 301 Main St., Danbury	.25	17.4	22.6	18.7	24.6
5048	Pure Clover Bell Honey	D. M. Welch & Son	W. W. Walker, Hartford	.15	17.6	24.5	18.9	24.6
5047	Pure Honey	Not known	D. M. Welch & Son, Congress Ave., New Haven	.10	18.1	25.5	21.3	24.1
5103	Pure White Cal. Honey	F. P. Adams & Co., Boston, Mass.	F. H. Kearney, Cor. Hill and Congress Ave., New Haven	.15	18.2	22.7	19.6	23.7
5272	Pure Honeysuckle Honey	W. J. Lamb	F. A. Basserman, 621 Grand Ave., New Haven	.25	18.4	21.9	20.2	24.4
			F. Farrenkopf, Rockville, Conn.	.20	18.4	24.0	20.5	24.7

TABLE VI.—STRAINED HONEYS—Continued.

Station No.	Label.	Manufacturer or Producer.	Dealer.	Price per package.	Polarization.			
					Direct.		After Inversion.	
					Degrees.	Temper. C.	Degrees.	Temper. C.
5489	Orange Blossom Honey, &c.	Leslie, Dunham & Co., Brooklyn, N. Y.	A. J. Finney, 202 Main St., Stamford	\$0.25	-18.5	23.1	-23.1	22.2
5466	Choice Honey	C. A. Stanton, Newington.	Sov. Trading Co., 282 Main St., New Britain	.18	-18.8	21.4	-21.5	22.2
5493	Pure Orange Blossom Honey. Eagle Brand	Not known	W. R. Bates, Norwalk, Conn.	.18	-19.0	22.8	-22.1	20.7
5271	None	Said to be Lamb	Ransom Bros., Rockville, Conn.	.20	-19.6	24.2	-19.8	24.7
5102	Pure Extracted Honey.	H. D. Gloyd, Boston, Mass.	Daniel Dore, 577 Grand Ave., New Haven	.15	-20.4	23.0	-22.7	25.6
5425	Pure California Honey	Not known	Not known	.18	-20.8	24.8	-25.1	21.7
5021	Orange Blossom Honey, &c.	Leslie, Dunham & Co., Brooklyn, N. Y.	Gilbert & Thompson, New Haven	.30	-21.2	22.3	-24.0	26.1
5359	Pure Orange Blossom Honey. Eagle Brand	Not known	Village Store Co., E. Main St., Bridgeport	.18	+ 1.2	24.5	- 18.2	23.6
5354	Pure Clover Honey	Contains Cane Sugar.						
5364	Pure Clover Honey	Vermont Maple Syrup Co., Bridgeport	D. Hallett, 470 E. Main St., Bridgeport	.20	+ 24.2	23.3	- 14.5	23.7
5363	Durkee's Choice Extracted Clover Honey.	J. W. Durkee & Co., New York	E. F. Platt, 37 E. Main St., Waterbury	.10	+ 15.0	23.2	- 15.6	23.0
5360	Pure California Honey (&c.)	Not known	M. Blanchette, S. Main St., Waterbury	.20	+ 30.2	23.5	+ 27.2	24.0
5270	Pure Strained California Honey	Hildreth Bros. & Segelken, New York	E. Ghesser, Rockville	.20	+ 38.4	23.3	+ 35.6	24.0
5273	Choice Clover Honey	Chas. Israel & Bro., New York	H. J. Case & Co., Hartford	.20	+ 43.2	24.7	+ 38.2	24.4
5314	Choice Golden Rod Honey (&c.)	Wm. Thompson, Wayne Co., N. Y.	W. A. Smith, Norwich	.25	+ 53.5	23.7	+ 50.5	23.8
5352	Pure Honey	Not known	79 White St., Danbury	.18	+ 58.8	23.6	+ 56.4	24.0

each bearing a label showy with flowers, with the highly idealized picture of a bee in the center, over the picture of a hive, and the words, "Pure Honey." "Trademark."

No two samples were alike in composition. One was probably pure honey, another was certainly glucose syrup, the three others were perhaps honey, but of doubtful purity.

TABLE VII.—SAMPLES OF HONEY PUT UP IN SIMILAR PACKAGES.

No.	Label of Packages.	Polarization.			
		Direct.		After Inversion.	
		Degrees.	Temper. C.	Degrees.	Temper. C.
5420	1 Pound Pure Honey. (Blown in bottle.)	-12.0	24.7	-17.3	22.5
5448		-13.2	22.5	-16.1	18.4
5359	Pure Orange Blossom Honey. Eagle Brand	+ 1.2	24.5	-18.2	23.6
5423		- 6.8	25.1	-15.6	22.4
5493		-19.0	22.8	-22.1	20.7
5360	Pure California Honey. Put up expressly for family or medical use	+ 30.2	23.5	+ 27.2	24.0
5425		-20.8	24.8	-25.1	21.7
5272	Lamb's Pure Honeysuckle Honey.	-18.4	24.0	-20.5	24.7
5315		-13.7	22.0	-16.1	24.4
5352	Pure Honey	+ 58.8	23.6	+ 56.4	24.0
5467		- 7.9	23.3	-11.2	22.0
5492		-12.7	23.7	-16.9	21.2
5494		-14.9	23.7	-17.6	22.9
5047		-18.2	22.7	-19.6	23.7
5310	Choice Extracted Honey. E. C. Hazard & Co.	- 5.6	23.2	-16.5	24.0
5424		-11.8	25.1	-14.5	22.5
5449	C. A. Stanton. Choice Honey, Newington, Conn.	- 5.1	23.8	-11.0	22.3
5466		-18.8	21.4	-21.5	22.2
5091	Orange Blossom Honey. Leslie, Dunham & Co., Brooklyn, N. Y.	-21.2	22.3	-24.0	26.1
5489		-18.5	23.1	-23.1	22.2

EXAMINATION OF LARD.

BY A. L. WINTON.

PURE LARD.

Pure lard is the fat of swine, separated from the animal tissue by the process of "rendering." It should contain less than one per cent of water and foreign matters.

The choicest lards are made from the whole "leaf," or from the residue, after rendering the leaf at low temperatures and expressing the "neutral lard" which is used in the manufacture of oleomargarine. A good quality of lard is also made from back-fat and leaf rendered together. Fat from the head and intestines goes to make cheaper grades.

Lards may be either kettle or steam-rendered; the kettle process being usually employed for the choicer fat parts of the animal, while head and intestinal fat furnish the so-called "steam lard." Steam lard, however, is sometimes made from the leaf, and on the other hand other parts than the leaf are often kettle-rendered. Kettle-rendered lard usually has a fragrant cooked odor and a slight color, while steam lard often has a strong animal odor.

ADULTERATIONS OF LARD.

Bell (1881) stated that water is the only adulterant which came under his notice in England. Dietzsch (1883) cited water as the chief adulterant, but added that "American refined lard" is a mixture of hog fat, oleomargarine, stearin and beef tallow.

The celebrated case of McGeoch, Everingham & Co. vs. Fowler Bros., which was tried before the Chicago Board of Trade in 1883, developed the facts that the mixing of cotton seed oil, beef stearin, etc., with lard at that time was practiced in Chicago. The chief, and at present, apparently the only adulterants of lard in common use, are other cheaper fats, of which cotton seed oil and "stearin"* are the ones mostly used; the former especially

* By rendering at a low temperature, and subsequently straining and pressing, beef fat is separated into two parts; "oil," which finds use in the manufacture of oleomargarine or imitation butter, and "stearin," the more solid fat used in making lard substitutes or imitations.

because of its cheapness, the latter in order to give solid consistence to the mixture.

The misleading term "refined lard," which, until 1889, was used to designate imitations, composed largely of cotton seed oil and beef stearin, has since been abandoned, and such mixtures are now branded as "lard compounds."

N. K. Fairbank & Co. and Swift & Co. have gone a step further and manufacture, under the names of cottolene and cotosuet, mixtures of cotton seed oil and beef fat, which are not sold as imitations of lard, but as substitutes, under copyrighted trade names.

Neither of the materials used as lard adulterants are considered to be at all injurious to health. But the mixture of cotton seed oil and stearin is cheaper than pure lard, and by many people is considered inferior for culinary operations.

METHODS OF DETECTING LARD ADULTERATIONS.

The most complete work on the subject of lard adulteration was published by Wiley as Part IV, Bulletin 13, of the U. S. Department of Agriculture, Division of Chemistry. In this are described in detail the processes used in the manufacture of lard and lard adulterants, the properties of these fats, the methods of identification, and the results of the examination of numerous samples of pure and adulterated lards, cotton seed oil, various stearins, etc.

Of the numerous methods which have been proposed for the detection of foreign fats, three have been selected as best suited for our purpose.

1.—Bechi's silver test as modified by Dudley is described in detail by Wesson, in a recent article on lard adulteration (*Jour. Amer. Chem. Soc.* xvii, 724). The author, whose experience in this kind of work has been very extensive, states that this is the best single test for cotton seed oil we have. In doubtful cases the lard should be treated with nitric acid, as recommended by Wesson.

2.—Hübl's Iodine absorption number: I have followed in all essentials Hübl's directions as given in Bulletin 13, Part IV, of the Division of Chemistry, U. S. Dept. of Agriculture, p. 462.

For weighing the fat, however, I have used, as recommended by Wesson, flat-bottomed glass cylinders, 10 mm. in diameter and 20 mm. high.

These weigh less than 2 grams and do not change weight perceptibly from one weighing to another.

Five to seven c.c. of the melted fat (according as the iodine number is high or low), are measured into a weighed cylinder from a delicate pipette. After cooling, the cylinder and fat are weighed and introduced into the glass-stoppered vial in which the subsequent operations are performed.

3.—Belfield's microscopic test modified by Gladding: The details of this process were kindly furnished by Mr. T. S. Gladding, and have since been published by him, *Jour. Am. Chem. Soc.* xviii, p. 189.

EXAMINATION OF LARD FROM THE CONNECTICUT MARKET.

One hundred and sixty-two samples have been collected by agents of the Station, in twenty-one cities and villages of Connecticut, between the third of October and twenty-third of November, 1895.

These samples fall into three classes :

- 1st.—Pure lard.
- 2d.—Lard substitutes, "compound lards," cottolene, cotosuet, etc., sold under their trade names, but not as pure lard.
- 3d.—Adulterated lard, or imitations sold as lard.

Some samples were evidently duplicates of well known brands, already examined, and were not tested.

Pure Lard.—In Table VIII are given the results of examination of sixty-four samples of this class.

The first six samples are stated to have been rendered by the butchers from whom they were purchased. The nine samples which follow them were probably all kettle-rendered. Of the remainder a considerable number were undoubtedly steam lards. The prices paid for these pure lards ranged from nine to fourteen cents per pound. The average price was 11.4 cents.

Bechi's test, applied directly, usually gave with these pure lards no color at all or only a slight color. In a few samples, probably steam lards, a decided purple color was obtained, but after purification of the fat by nitric acid as described by Wesson, Bechi's test produced only a slight coloration.

The highest iodine number is 68.3, the lowest 54.5. The lower numbers were found in the kettle-rendered samples. Microscopic examination in each case revealed the presence of the lard stearin in crystals, and in no case were the characteristic beef stearin forms present.

Lard Compounds and Lard Substitutes.—In Table IX are described eleven samples of this kind, sold for what they really were : that is, not pure lard, but fat mixtures resembling lard, and having the same culinary use. They are not adulterated goods, in accordance with provisions *a* and *b*, Section 3, of the Connecticut Pure Food Law of 1895. The prices of these lard substitutes and compounds ranged from 8 to 10 cents per pound.

All of these samples, when tested with Bechi's reagent, formed a mirror of reduced silver and became discolored, acquiring in some cases a dark brown, in others a purple black tint. Previous purification of the lard samples did not change the result.

The lowest iodine number found in any case was 81.5, the highest 92.6. Armour's lard compound, which was formerly so mixed as to have about the same

TABLE VIII.—PURE LARD.

Station No.	Brand.	Dealer.	Price per Pound In Cents.	Chemical Examination.		Microscopic Examination.
				Bechi Test.	Iodine Number	
5294	Butcher's Lard	J. R. Allen, 122 W. Main St., Norwich	10	Colorless.	65.6	Lard Stearin.
5295	"	Elijah Tracey's Market, Norwich	12	Slight Color.	64.2	"
5318	"	J. Kevin, 62 North St., New Britain	12	Colorless.	56.5	"
5332	"	A. M. Bidwell, 344 Main St., Middletown	12	"	54.5	"
5477	"	White Front Market, 466 East Main St., Bridgeport	12	Slight Color.	66.8	"
5416	"	Menz Market, 5 Pacific St., Stamford	12	Slight Brown.	59.9	"
5306	Pure Lard, Kettle-rendered, White, Perry & Dexter, Worcester, Mass.	W. C. Wade, State St., Hartford	10	"	"	"
5305	Pure Leaf Lard, White, Perry & Dexter, Worcester, Mass.	Brainard & Bartlett, Putnam	10	Colorless.	59.1	"
5346	Pure Kettle-rendered Lard, Meriden Provision Co.	A. L. Allen, Norwich	13	"	60.8	"
5411	Pure Lard, Meriden Provision Co.	West End Cash Market, 453 W. Main St., Waterbury	13	Slight Color.	60.3	"
5409	"	J. Kevin, 62 North St., New Britain	10	Colorless.	64.1	"
5331	"	A. M. Bidwell, 344 Main St., Middletown	12	Slight Brown.	63.9	"
5404	Kettle-rendered Pure Lard, Providence Beef Co.	White Front Market, 466 East Main St., Bridgeport	12	Colorless.	62.3	"
5337	Pure Leaf Lard, F. A. Bartram & Co., Bridgeport	W. S. Chappell, 148 State St., New London	10	"	65.2	"
5119	Pure Lard, Plumb & Winton, Bridgeport	McGraw & Baldwin, White St., Danbury	12	Slight Color.	58.5	"
5284	"	Manufacturer	13 1/2*	Colorless.	65.0	"
5391	"	J. A. Turner, Willimantic	10	"	65.6	"
5009	Choice Leaf Lard, Warranted Strictly Pure, S. E. Merwin & Son, New Haven	Bodo Bros., Moosup	9	"	63.4	"
5008	Choice, Strictly Pure Elm City Lard, S. E. Merwin & Son, New Haven	Manufacturer	14 1/2	"	64.2	"
5020	" Pure " (Red Label), Sperry & Barnes, New Haven	Manufacturer	12 1/2	Light Brown.	66.3	"
5010	" Pure " (Red Label), Sperry & Barnes, New Haven	J. Casseriego, Shelton Ave., New Haven	12	"	67.7	"
		L. D. Chidsey, Church St., New Haven	14 1/2	Colorless.	63.5	"

* In 3 pound pail. † In 5 pound pail.

TABLE VIII.—PURE LARD—Continued.

Station No.	Brand.	Dealer.	Price per Pound in Cents.	Chemical Examination.		Microscopic Examination.
				Becht Test.	Iodine Number	
5341	"Pure" (Red Label), Sperry & Barnes, New Haven	J. M. Bristol & Son, Central Market, Ansonia.	12	Colorless.	59.5	Lard Stearin.
5017	Sperry & Barnes, New Haven	Henry Hahn, 1377 W. Chapel St., New Haven	12	Slight Color.	66.7	"
5339	Steam Refined Lard, Sperry & Barnes, New Haven	E. D. Booth, 200 Main St., Birmingham.	13	Colorless.	63.3	"
5016	Sperry & Barnes, New Haven	Shelton Ave. Cash Store, 228 Shelton Ave., New Haven	12	Slight Color.	66.4	"
5013	Sperry & Barnes, New Haven	P. Jente & Bro., Broadway, New Haven	11	"	64.8	"
5281	Pure Lard, Constock, Providence, R. I.	Bert Thompson, Willimantic	12	Slight Color. §	61.6	"
5113	Pure Leaf Lard, Swift & Co., Chicago	C. E. Hart & Co., 350 State St., New Haven	14	Colorless.	61.6	"
5110	"	Grand Ave. Market, 830 Grand Ave., New Haven	12	Colorless. §	63.8	"
5403	Pure Lard, Warranted, J. B. Mason & Sons, Providence	Joseph Kopp, 297 Bank St., New London	10	Colorless.	65.0	"
5399	Pure Lard, J. B. Mason & Sons, Providence	W. A. Murray, 672 Bank St., New London	10	"	64.0	"
5340	Warranted Pure Lard, The L. C. Bates Co., New Haven	F. McEnerney, 130 Main St., Birmingham	12	Slight Color.	65.8	"
5392	Warranted Pure Lard, The L. C. Bates Co., New Haven	Holden Arnold, Willimantic	10	Colorless.	63.4	"
5327	Warranted Pure Lard, The L. C. Bates Co., New Haven	Smith & Burns, Cor. Liberty and Keeler Sts., Danbury	10	"	62.7	"
5334	Pure Lard, Lee & Hoyt, New Haven	Kinney's, Bank St., New Milford	13	Slight Color.	63.0	"
5286	Pure Lard, G. H. Hammond, Indiana	Purinton & Reade, Willimantic	12	Colorless.	66.4	"
5325	"	Chas. Starr, New Milford	13	"	62.9	"
5473	"	Sam'l Comstock, Jr., 72 N. Main St., S. Norwalk	12	"	66.3	"
5308	Warranted Pure Lard, Robinson Brand, John F. Crocker & Co., Boston	P. M. Leclair, Putnam	10	"	63.6	"
5285	Pure Lard, North Packing & Provision Co., Boston	H. C. Hall, Willimantic	12	"	66.0	"

§ After treatment with nitric acid.

TABLE VIII.—PURE LARD—Continued.

Station No.	Brand.	Dealer.	Price per Pound in Cents.	Chemical Examination.		Microscopic Examination.
				Becht Test.	Iodine Number	
5288	Choice Grocery Lard, Strictly Pure, North Packing & Provision Co., Boston	J. S. Hennessy, Willimantic	10	Colorless.	64.5	Lard Stearin.
5280	Pure Lard, John P. Squire & Co., Boston	Frank Larrabee, Willimantic	12	"	65.4	"
5480	Best Lard, Absolute Purity, Finest Quality, Geo. C. Napheys & Co., Philadelphia	W. & E. Osterbanks, 53 Main St., Norwalk	11 ¹ / ₂	Slight Color. §	66.3	"
5453	Pure Lard, Armour & Co., Chicago	Patrick Costello, 153 Pratt St., Meriden	10	Slight Color.	68.3	"
5109	Pure Leaf Lard, Armour & Co., Chicago	Booth Meat Co., 370 State St., New Haven	12	Colorless.	65.7	"
5019	Pure Lily Leaf Lard, Nelson, Morris & Co., Chicago	Geo. M. Coombs, Whalley Ave., New Haven	12	"	67.7	"
5454	Pure Lard, H. L. Handy, Springfield, Mass.	C. M. Shipple, 141 Turnbull St., Hartford	8	"	65.2	"
5410	"	Boston Branch Grocery, 238 Main St., New Britain	12	"	66.5	"
5287	"	H. Dion, Willimantic	12	"	65.7	"
5324	"	McNamara, 396 E. Main St., Bridgeport	10	"	59.9	"
5488	"	Pannan & Cook, 26 W. Main St., Meriden	10	Colorless. §	63.2	"
5473	"	Firmey & Benedict, 41 Wall St., Norwalk	12	Slight Color.	62.6	"
5457	"	Wm. J. Cashmann, 133 Pratt St., Meriden	10	"	65.5	"
5418	"	I. W. Buckley, Hartford	12	Colorless.	67.3	"
5419	Kettle-rendered Lard	I. C. Duvau, Windsor Locks	12	"	64.2	"
5414	"	H. Jonas, Temple St., Hartford	12	"	64.1	"
5483	"	Geo. A. Ferris, 184 Main St., Stamford	10	Colorless. §	65.5	"
5445	"	John A. Figard, 138 Front St., Hartford	10	Colorless.	61.2	"
5016	"	F. H. Kearney, Cor. Congress Ave., and Hill St., New Haven	10	"	65.8	"
5107	"	Pagter Bros., 800 Grand Ave., New Haven	10	Slight Color.	65.8	"
5114	"	Coe & Field, 422 State St., New Haven	12	"	64.5	"
5320	"	T. R. Hoyt & Co., 7 West St., Danbury	10	Slight Color. §	63.8	"
5320	"	T. Kilmartin, 495 W. Main St., Waterbury	12	Colorless.	63.7	"
5328	"	E. L. Sullivan, 436 E. Main St., Bridgeport	10	"	66.1	"
			10	Slight Color.	66.6	"

§ After treatment with nitric acid.

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iodine number as pure lard, thus making Hübl's iodine absorption test of no value in detecting the presence of cotton seed oil, is now apparently compounded according to another formula.

The presence of beef stearin was readily detected by the microscope in every instance. Cottolene and cotosuet, which are claimed to be made of cotton seed oil and beef suet and to contain no lard, react like "compound lards" with the reagents mentioned.

Lard Compounds and Imitations, sold as Lard.—In Table X are given analyses of forty-three samples of this class. In every case the purchasing agent asked for lard and there was sold to him an imitation or substitute without any statement or hint that it was not pure lard. The prices paid ranged from seven to twelve cents per pound and averaged 9.3 cents.

TABLE IX.—LARD COMPOUNDS AND LARD SUBSTITUTES SOLD UNDER THEIR TRADE NAMES, BUT NOT AS PURE LARD.

Station No.	Brand.	Dealer.	Price per Pound In Cents.	Chemical Examination.		Microscopic Examination.
				Bechl. Test.	Iodine Number	
5117	Refined Lard Compound, N. K. Fairbank & Co.	N. Stein, 811 Grand Ave., New Haven.	10	Dark Brown.	91.5	Beef Stearin.
5108	Lard Compound, Armour & Co.	Booth Meat Co., 370 State St., New Haven.	8	"	85.8	"
5115	Superior Lard Compound, Armour & Co., Kansas City	Peoples' Market, 448 State St., New Haven.	8	"	83.3	"
5012	Lard Compound, Nelson, Morris & Co.	J. C. Kelley, Boulevard Cash Store, New Haven.	8	"	81.5	"
5289	Lard Compound, G. H. Hammond	Holden Arnold, Willimantic.	8	"	91.1	"
5290	Superior Compound Lard, Swift & Co., Chicago.	A. A. Trudeau, Willimantic.	8	"	83.6	"
5291	Royal Lard Compound, Whitford & Bartlett, Providence, R. I.	Bert. Thompson, Willimantic.	8	"	87.1	"
5116	Lard Compound, Stoddard, Kimberly & Co., New Haven	Geo. W. Cooper, junction Grand Ave. and St. John St., New Haven.	10	"	87.6	"
5112	Lard Compound	D. Dore, 577 Grand Ave., New Haven.	10	Purple Black.	84.7	"
5021	Cotosuet, Swift & Co., Chicago.	P. Jente & Bro., Broadway, New Haven.	10*	Dark Brown.	85.5	"
5468	Cottolene, N. K. Fairbank & Co., Chicago	D. M. Welch & Son, Congress Ave., New Haven.	8†	"	92.6	"

* In three pound pails.

TABLE X.—LARD COMPOUNDS SOLD FOR LARD.

Station No.	Dealer.	Price In Cents per Pound	Chemical Examination.		Microscopic Examination.
			Bechi Test.	Iodine Number.	
5408	J. H. Shierman, Main St., Middletown	9	Dark Brown.	91.9	Beef Stearin.
5406	W. J. Trevithick, Rapella Ave., Middletown	9	"	91.2	"
5455	A. D. Cook, 56 Market St., Hartford	10	"	92.3	"
5456	Chas. S. Kelley, 154 Front St., Hartford	10	"	90.5	"
5118	Wallace St., next to R. R. Bridge, New Haven	10	"	91.7	"
5475	Betts & Farrington, Wall St., Norwalk	12	"	93.4	"
5345	251 S. Main St., Waterbury	10	"	91.8	"
5398	Wm. S. O'Brien, 729 Bank St., New London	8	"	95.5	"
5402	S. D. Ameco, 64 Main St., New London	10	"	94.7	"
5401	Geo. F. Barnstorf, 45 Main St., New London	10	"	86.5	"
5349	M. M. Smith, Main St., Winsted	8	"	94.4	"
5336	Mrs. Clancy, 925 Main St., Bridgeport	10	"	89.7	"
5482	Lorenzo Dibble, N. Main St., S. Norwalk	7	"	95.7	"
5407	Sam. Kennedy, 648 N. Main St., New Britain	10	"	87.3	"
5405	Lee Bros. & Co., 500 Main St., New Britain	9	"	92.6	"
5319	Branch York State Butter Co., 844 Bank St., Waterbury	9	"	87.0	"
5321	Frank Pepe, 4 Middle St., Waterbury	10	Purple Black.	88.4	"
5347	843 Bank St., Waterbury	8	Dark Brown.	91.5	"
5344	Ladd's, 96 S. Main St., Waterbury	10	"	94.5	"
5342	John B. Vallee, 21 Grand St., Waterbury	10	Purple Black.	92.9	"
5350	King's Market, Cor. Keeler and Liberty Sts., Danbury	10	Dark Brown.	80.0	"
5338	P. D. Vroom, 5 Keeler St., Danbury	8	Purple Black.	89.4	"

TABLE X.—LARD COMPOUNDS SOLD FOR LARD—Continued.

Station No.	Dealer.	Price In Cents per Pound	Chemical Examination.		Microscopic Examination.
			Bechi Test.	Iodine Number.	
5390	Geo. A. Robertson, 70 State St., Bridgeport	9	Purple Black.	87.6	Beef Stearin.
5333	102 N. Washington Ave., Bridgeport	10	Dark Brown.	88.0	"
5326	J. J. Donovan, Cor. E. Main and Steuben Sts., Bridgeport	9	"	77.1	"
5323	D. Sullivan, 881 Main St., Bridgeport	10	Purple Black.	91.3	"
5322	Centennial American Tea Co., 856 Math St., Bridgeport	10	"	90.5	"
5348	D. Hallett, 470 E. Main St., Bridgeport	10	"	90.5	"
5400	P. T. Gloster & Co., Main St., Winsted	10	Dark Brown.	90.9	"
5111	T. Manning, 407 Bank St., New London	10	"	94.5	"
5011	40 (?) Walnut St., New Haven	10	"	82.4	"
5459	H. C. Dingwall & Co., 68 Congress Ave., New Haven	9	"	90.1	"
5471	Russell Bros., 2 Colony St., Meriden	8	"	92.4	"
5474	New York Cash Grocery, N. Main St., Norwalk	7	"	81.1	"
5412	W. R. Bates, Norwalk	7	"	94.5	"
5415	C. H. Russell, New York Butter and Grocery House, 383 Main St., Hartford	9	"	90.2	"
5417	Joseph Hagartry, 75 Front St., Hartford	10	Purple Black.	91.2	"
5451	H. Bacharach, 13 Park St., Hartford	10	Dark Brown.	96.0	"
5452	Foley's Market, 487 Main St., Hartford	10	"	89.6	"
5413	E. M. Palmer, 124 Albany Ave., Hartford	10	"	89.6	"
5478	John Bonora, Windsor Locks	10	Dark Green.	87.3	"
5484	New York Grocery Co., 206 Main St., Stamford	8	Dark Brown.	94.7	"
5014	A. J. Finney, 202 Main St., Stamford	9	"	96.0	"
	Italian Grocery, cor. Oak and Factory Sts., New Haven	10	"	85.6	"

EXAMINATION OF PEPPER.

BY A. L. WINTON.

A considerable part of the chemical work described in this paper was done by Mr. W. L. Mitchell.

Nature of Pepper.—Both the white and the black pepper of commerce are the fruit of *Piper nigrum*, a climbing perennial plant, indigenous to Malabar and cultivated in various other tropical countries.

The berries or peppercorns grow close to the stems in long spikes, twenty to fifty berries in each spike, and change color as they ripen, from green to red and finally to black.

The black peppercorns of commerce are prepared by picking and drying the unripe spikes as soon as some of the berries begin to turn red. During the drying process the berries shrivel somewhat and turn black.

“White peppercorns” are the ripe berries from which the outer shell has been removed. They are grey in color and have a smooth surface. White pepper is not so pungent as the black kind, but is considered by many to have a finer flavor.

Long pepper, although produced by a plant (*Piper longum*) belonging to the same genus as the true pepper, is very different in its looks and flavor. The small berries are very closely crowded together in elongated clusters often an inch or more in length. It has a spicy taste, but none of the fine flavor of true pepper, to which it is sometimes added as an adulterant. Long pepper is apt to have earth adhering to it.

Cayenne, often called “red pepper,” is the fruit of several species of *Capsicum* quite similar to our garden peppers and is radically different from the kinds of pepper already named. It is also used as an adulterant of black pepper, to restore the “bite,” which has been lost by the addition of tasteless foreign matters.

Pepper is the most important commercially of all the spices and condiments. It is almost entirely imported in the form of peppercorns, which are admitted free of duty.

According to the Report on “Imports for Consumption into the United States, 1894 and 1895,” prepared by the Bureau of Statistics, U. S. Treasury Department, 19,937,422 pounds of whole pepper, having a value (at four cents per pound) of

\$791,853.93, were brought into the United States during the year 1895. A larger quantity of pepper was imported than of any other single spice or condiment, and the money value of the imported pepper was more than one-third of all unground spices taken together.

Assuming that all this pepper is annually consumed in the country and that Connecticut consumes a quantity proportional to the population (one per cent.), nearly 200,000 pounds must be annually used in the State.

The wholesale price of this, unground, would be nearly \$8,000, but the retail price would be \$56,000. This does not take into account the enormous quantities of adulterants, for which the consumer usually pays about the same price as for pure pepper.

The Adulteration of Pepper.—Ground pepper, the form in which most of the pepper is sold to consumers, is perhaps the most extensively adulterated of all food products. The list of things which have been used as adulterants includes bran, hulls and other by-products from wheat, maize, rice, oats, buckwheat and other grains, ground linseed, olive and rape seed cake, shells (often roasted or charred) of cocoanut, almonds and other nuts, sawdust, mustard husks, cayenne, long pepper, pepper shells, terra alba.

In order to get a proper mixture of light and dark particles, it is customary to use two or more adulterants, the one dark, the other light-colored; as for example: Roasted cocoanut shells and wheat middlings; buckwheat hulls and buckwheat middlings.

Cayenne reinforces the pungency which has been reduced by dilution. Mustard husks also give a certain “bite” to the mixture.

Wheat or buckwheat middlings furnish adulterants for white pepper which closely resemble the genuine pepper in appearance.

Pepper shells or dust consists of the hulls removed from white pepper with adherent dirt and often other waste material.

EXAMINATION OF SAMPLES OF PEPPER FROM THE CONNECTICUT MARKET.

One hundred and fourteen samples have been bought by our sampling agents from stock sold in bulk as well as in manufacturers' packages. The results of the examinations appear in the following tables and discussion:

METHODS OF EXAMINATION.

Microscopic Examination.—A portion of the sample was first viewed in water with ordinary illumination, using magnifying powers of 74 and 392 diameters. The character and size of the starch granules were noted and the results supplemented by examination with polarized light and also by viewing portions treated with iodine. The foreign tissues could often be identified without use of clearing agents.

The same portion which had been viewed directly was then treated with potash and again examined.

The crude fiber separated in the course of chemical analysis furnished material in which much of the denser tissues, such as "stone cells," was brought out distinctly and could be easily identified. The presence of charcoal or charred shells was also shown in this material, as it remains black after the treatment with acid and alkali, while the tissue of genuine pepper and of most adulterants, even buckwheat hulls, is of a light brown color. The presence of charred material was confirmed by bleaching tests with nitric acid and chlorate of potash.

Chemical Analysis.—Water, ether extract, fiber and ash, were determined by the methods which are used for the analysis of feeding stuffs. The drying in hydrogen was continued until constant weight was secured, which required about eight hours. The loss represents not only water, but also a part of the volatile oil. The extraction with absolute ether was complete at the end of eight hours. The same weighed portion was used for determination of water, ether extract and fiber.

The ether extract from pure pepper consists of piperine and resin, and the former invariably crystallizes out from the resin on cooling; but when the pepper is adulterated with stuff which contains fat or oil, the latter may completely hide the piperine crystals if it does not prevent their forming in the extract. We regard the absence of crystals in the ether extract as certain evidence of adulteration.

If the fat or oil introduced in the adulterant brings up the weight of ether extract to the amount which is found in pure pepper, a nitrogen determination in the extract from 10 grams of pepper will disclose its real nature.

Pure piperine contains 4.91 per cent. of nitrogen, but the ether extract of pepper consists in part of resin, which lowers the percentage considerably. Thus a sample of pure white pepper gave an ether extract containing 3.25 per cent. nitrogen, and of pure black pepper 2.64 per cent. In adulterated samples the ether extract had less than two per cent. of nitrogen.

Adulterated peppers, as a rule, contain: 1. Either less ether extract, or, 2. less nitrogen in the ether extract, or, 3. more fiber, or, 4. more mineral matter than pure ground pepper. It would be difficult to find adulterants which could be used in any considerable quantity and yet fail to be detected by one or more of these tests.

Pure Black Pepper.—In Table XI are grouped all those samples, fifty-nine in number, in which no foreign substance was detected with the microscope and which within reasonable limits agree in chemical composition with samples of undoubted purity.

It is possible that some of these samples are adulterated with

TABLE XI.—PROBABLY PURE BLACK PEPPER.

Station No.	Brand (taken from label on package in which goods were sold).	Dealer.	Price paid per M pound. Cent.	Microscopic Examination.	Chemical Examination.
55623	<i>Pepperconus ground at Station.</i>			Pepper Starch and Tissue	Water. 10.33 8.30
55631	West Coast Sumatra Black Pepper.			"	Ash. 11.49 4.85 Fiber. 12.07 3.74 Ether Extract. 10.74 7.57
55631	Singapore Black Pepper			"	Water. 11.24 7.66*
55658	<i>Ground Pepper in labeled packages.</i>			"	Water. 10.72 7.02
55671	Absolutely Pure Pepper. D. & L. Shade Co., Boston	Holden Arnold, Willimantic.	10	"	Fiber. 14.30 4.96
55666	Pure Pepper, warranted strictly pure Bennett, Sloan & Co.	Geo. M. Coombs, 195 Whalley ave., New Haven	10	"	Ether Extract. 8.77 6.72
55667	S. I. Specially Imported Ground Shot Pepper. Thurber Whyland Co., New York	C. D. Strickland, South Manchester.	10	"	Water. 10.18 7.26
55669	Pepper. O. H. Blanchard	H. Dillon, Willimantic.	10	"	Ether Extract. 8.69 8.09
55670	Genuine Malabar Black Pepper. Bennett, Simpson & Co., London	Waterbury Grocery Co., 163 Bank street, Waterbury	10	"	Ash. 10.63 7.84
55673	Pure Pepper. Boardman & Sons., Hartford	J. Kerin, 62 North St., New Britain	10	"	Water. 10.13 7.65
55674	Crescent Mills Pure Pepper. John P. Augur, New Haven	Footie & Westwood, West Main street, Waterbury	10	"	Ether Extract. 11.89 8.15
55676	Blue Ribbon Pure Black Pepper. Austin, Nichols & Co., New York	Geo. Farley, Putnam	10	"	Fiber. 10.89 7.11
55677	Pepper. Lincoln, Seyms & Co., Hartford	E. F. Platt, 37 E. Main St., Waterbury	10	"	Water. 9.36 7.30
55681	Ground Black Pepper, warranted pure. Bryan, Miner & Read, New Haven	P. McEnerney, Main St., Birmingham.	10	"	Ether Extract. 11.18 7.81
55683	Pure Black Pepper. Bryan, Miner & Read, New Haven	Holden Arnold, Willimantic	10	"	Fiber. 12.23 7.62
55685	XXX Pepper. E. R. Durkee & Co., New York	Thomas Nolan 250 Pratt St., Meriden	10	"	Water. 11.34 8.33
55686	Red Shield Pepper. Jas. G. Powers & Co., New York	G. A. Ray, Norwich	9	"	Ether Extract. 10.79 8.33
55688	Pure Pepper. Clark, Chapin & Bushnell, New York	R. D. Baldwin, Bridge St., Winsted.	10	"	Ash. 13.23 5.61

* 2.64% nitrogen in ether extract.

TABLE XI.—PROBABLY PURE BLACK PEPPER—Continued.

Station No.	Brand (taken from label on package in which goods were sold).	Dealer.	Price paid per 1/4 pound, cents.	Microscopic Examination.	Chemical Examination.			
					Water.	Ether Extract.	Fiber.	Ash.
5590	Pure Pepper, Adams & Howe, New York	— 79 White St., Danbury	10	Pepper Starch and Tissue	8.30	8.34	14.48	5.93
5591	Pure Black Pepper. W. H. Mansfield & Co., Putnam, Conn.	W. H. Mansfield & Co., Putnam	10	"	11.30	7.95	12.73	4.46
5592	Pure Pepper. Union Spice Co.	Union Pacific Tea Co., 253 Main street, Danbury	10	"	11.04	7.79	12.67	5.74
5593	Pure Pepper. Swain, Earle & Co., Boston	James M. Young, Preston	10	"	11.00	7.32	12.80	4.22
5595	Strictly Pure Pepper. Barnum & Reed, Danbury	Barnum & Reed, 307 Main St., Danbury	12	"	10.26	6.62	13.53	4.68
5596	Strictly Pure Pepper. L. Battey & Son, Moosup	L. Battey & Son, Moosup	8	"	9.69	7.09	13.70	3.94
5597	Strictly Pure Pepper. C. H. Lyon, New London	C. H. Lyon, 42 Coit St., New London	10	"	10.41	6.76	12.23	3.97
5598	Pepper. Grand Union Tea Co., New York	Grand Union Tea Co., 237 Main street, Birmingham	10	"	11.34	8.11	13.63	5.56
5599	Strictly Pure Pepper, Excelsior Mills. A. R. E. Palmier	George M. Spring, 214 Main St., Birmingham	12	"	11.06	8.06	12.60	5.87
5600	Pure Pepper. E. P. Hornick, New York	John P. Murphy, Norwich	10	"	10.19	7.46	12.17	5.62
5616	<i>Ground Pepper sold in bulk.</i>	— 793 Bank St., Waterbury	10	-----	10.48	7.70	12.82	5.75
5618		Corkey & Gannon, 29 Main St., New London	10	-----	10.61	7.91	14.22	5.78
5621	-----	— 152 E. Main St., Bridgeport	10	-----	11.97	8.60	11.83	6.58
5622	-----	Dillon's Cash Grocery Store, 158 Main St., Ansonia	7	-----	10.38	9.09	13.79	5.90
5624	-----	M. Ahern, 160 Pratt St., Meriden	10	-----	11.85	7.57	12.09	4.36
5628	-----	W. H. Brown, Moosup	10	-----	10.18	8.02	11.86	4.45
5629	-----	D. E. Ketcham & Co., 33 Elm St., Danbury	8	-----	11.61	7.34	11.09	4.37
5630	-----	James M. Young, Preston	10	-----	10.84	7.45	13.29	4.21
5632	-----	Fred. H. Lewis, 98 W. Main St., Meriden	8	-----	11.71	7.40	8.57	4.20

TABLE XI.—PROBABLY PURE BLACK PEPPER—Continued.

Station No.	Brand	Dealer.	Price paid per 1/4 pound, cents.	Microscopic Examination.	Chemical Examination.			
					Water.	Ether Extract.	Fiber.	Ash.
5536	<i>Ground Pepper sold in bulk.</i>	McGraw & Baldwin, White St., Danbury	8	-----	11.30	8.51	11.20	5.39
5538		Purinton & Reade, Willimantic	10	-----	11.58	7.25	14.66	6.12
5540		— 102 N. Washington Ave., Bridgeport	10	-----	10.71	7.46	13.81	4.41
5547		Johnson's Cash Grocery, Main street, Winsted	10	-----	10.29	7.76	13.44	5.87
5551		H. C. Hall, Willimantic	10	-----	12.13	8.12	12.50	5.02
5552		Keeney Bros.	8	-----	11.31	7.59	12.70	4.57
5553		W. S. Chappell, 148 State St., New London	10	-----	11.21	8.13	11.52	3.79
5557		G. A. Ray, Norwich	5	-----	9.63	8.64	14.13	6.10
5558		P. M. Leclair, Putnam	10	-----	9.37	7.12	13.85	4.57
5559		D. W. Lawton, Main St., Winsted	12	-----	9.47	7.62	13.83	6.00
5560		James Sullivan, Putnam	10	-----	10.31	7.96	11.37	4.99
5562		The Clark & Stevens Cash Grocery, Howe St., Shelton	8	-----	9.80	7.57	12.84	4.21
5563		Putnam Mfg. Co. Stores, Putnam	10	-----	9.17	8.22	12.89	4.97
5564		T. Kilmartin, 495 W. Main St., Waterbury	9	-----	10.47	8.28	13.70	5.78
5571		M. H. Tilley, Main St., Birmingham	8	-----	9.84	7.40	13.45	4.58
5507	W. A. Murray, 672 Bank St., New London	5	-----	10.51	7.18	13.18	5.20	
5506	Finney & Benedict, 41 Wall St., Norwalk	10	-----	11.23	7.46	12.22	4.99	
5504	Addison Brown, Norwalk	10	-----	10.76	7.30	13.06	4.15	
5567	Betts & Farrington, Norwalk	10	-----	11.02	7.83	12.37	4.77	
5068	Henry S. Dailey, 97 Whalley Ave., New Haven	10	-----	11.08	7.86	11.33	4.45	
5070	F. H. Kearney, cor. Hill St. and Congress Ave., New Haven	8	-----	10.92	7.20	11.42	4.40	
5520	Henry Hahn, 1327 West Chapel St., New Haven	9	-----	10.90	8.00	12.88	4.80	
5549	Jacob Walz, 54 Temple St., Hartford	10	-----	11.22	6.59	15.52	6.42	
	John B. Vallee, 21 Grand St., Waterbury	10	-----	10.23	8.80	12.41	6.30	

pepper shells, but not with appreciable quantities of other foreign matters. Twenty-six of these samples were sold in packages bearing the name and address of the manufacturers, and thirty-three were sold by grocers in bulk.

The lowest per cent. of ether extract found in any sample was 6.62. The highest per cents of fiber and ash were 15.41 and 6.42 per cent. respectively.

Adulterated Black Pepper.—In Table XII are given results of examinations of twenty-nine samples of this kind, seven sold in packages bearing the name of the manufacturer or dealer, and twenty-two sold in bulk.

All of these samples were condemned both by the chemical and microscopic investigation. With the microscope one or more of the following things were found in each sample: cayenne, starch, wheat, buckwheat, cocoanut shells, charred matter, sawdust and chaff.

In noting the character of the adulterants, we name in most cases the seed or the article from which the adulterant was derived. It is not always possible to state positively the particular product used. For example: where wheat starch and wheat tissue were identified, we have given wheat as the adulterant without attempting to say whether wheat middlings, wheat flour or wheat bran was used. The buckwheat products used were in some cases largely the black hulls, in others almost entirely the inner seed envelopes with starchy matter.

Whenever cocoanut shells and charred matter were both detected in the same sample, it is probable that the latter was derived from the former, although it was not always possible to identify the cocoanut "stone cells" in the blackened opaque masses.

Generally it is not possible to determine the exact per cent. of adulteration. In some samples, however, there was no evidence that any real pepper was present and the per cent. of ether extract showed that a number of samples did not contain more than 50 per cent. and in two cases not more than 20 per cent. of pure pepper. This does not disclose the full extent of adulteration, as most of the adulterants yield a considerable amount of ether extract.

In the columns giving the results of the chemical analyses, those figures which are abnormal, that is to say below 6.50% for ether extract, or above 16% for fiber, and 6.50% for ash, are printed in heavy faced type.

TABLE XII.—ADULTERATED BLACK PEPPER.

Station No.	Brand (taken from label on package in which goods were sold).	Dealer.	Price paid per ½ pound. Cents.	Microscopic Examination—Adulterants detected.	Chemical Examination.			
					Water.	Ether Extract.	Fiber.	Ash.
5572	<i>Ground Pepper in labeled packages.</i> First Quality Black Pepper.....	W. K. Spencer, 96 Main St., Middletown.....	8	Farinaceous Matter.....	8.72	4.99	15.97	6.43
5575	Strictly Pure Black Pepper. Stocker & Brill, Newburgh, N. Y.....	— 79 White St., Danbury.....	10	Buckwheat, Wheat, Cocoanut Shells.....	10.54	5.33	19.42	8.63
5578	Pepper. E. B. Worthington, Norwich, Conn.....	A. L. Allen, Norwich.....	10	Buckwheat, Wheat.....	8.50	4.45	24.11	4.42
5584	XX Pepper. The Challenge Mills, New York.....	A. J. Hopkins, Boston Branch, Norwich.....	10	Buckwheat, Cocoanut Shells, Charred matter, Cayenne.....	8.96	5.45	26.63	4.02
5594	Pure pepper. E. S. Kibbe & Co., Hartford.....	S. E. Amidon, Willimantic.....	10	Buckwheat, Wheat, Cocoanut Shells, Charred matter, Cayenne.....	8.70	4.59	18.34	3.93
5601	A. & P. Pepper. Sultana Spice Mills.....	Atlantic and Pacific Tea Co., 269 East Main St., Bridgeport.....	15	Buckwheat, Wheat, Cocoanut Shells, Charred matter.....	9.92	4.94	14.06	3.91
5602	Windmill Brand Black Pepper. London & Johnson, 181 Chambers St., New York.....	Ernest Glaeser, Rockville.....	8	Wheat, Sawdust, Cocoanut Shells, Charred matter.....	9.46	4.16	21.67	7.60
5069	<i>Ground Pepper in bulk.</i>	Keating's Store, cor. Oak and York Sts., New Haven.....	9	Wheat, Cayenne.....	10.49	3.27	13.72	6.71
5106		D. Dore, 377 Grand Ave., New Haven.....	5	Wheat.....	11.00	5.24	16.80	8.19
5450		B. Fowler, 6 High St., Hartford.....	10	Buckwheat, Wheat, Cocoanut Shells, Charred matter, Cayenne.....	8.09	6.32*	22.28	4.17
5487		Geo. A. Ferris, 184 Main St., Norwalk.....	7	Buckwheat, Cayenne.....	9.64	7.90†	15.88	5.54
5503		N. Y. Cash Grocery, 206 Main street, Stamford.....	7	Wheat, Grain Hulls, Cocoanut Shells, Charred matter, Cayenne.....	8.61	3.63	22.67	12.31
5505		N. Y. Grocery Co., 15 N. Main St., S. Norwalk.....	8	Wheat, Grain Hulls, Cocoanut Shells, Charred matter, Cayenne.....	8.01	3.68	23.01	12.18

* 1.35% Nitrogen in Ether Extract.

† 1.88% Nitrogen in Ether Extract.

TABLE XII.—ADULTERATED BLACK PEPPER—Continued.

Station No.	Brand (taken from label on package in which goods were sold).	Dealer.	Price paid per ¼ pound. Cents.	Microscopic Examination—Adulterants detected.	Chemical Examination.			
					Water.	Ether Extract.	Fiber.	Ash.
5514	Ground Pepper in bulk.	F. W. Tracey, Preston	10	Wheat, Grain Hulls, Coconut Shells, Charred matter.	9.55	3.09	17.06	3.71
5517		Kinney's, Bank St., New Milford.	10	Wheat (cracker crumbs), Cayenne.	10.03	4.41	14.69	5.65
5519		Wm. W. Blakeman, Derby Junction.	8	Wheat, Coconut Shells, Charred matter, Cayenne.	9.45	5.12	23.62	4.48
5523		191 East Main St., Bridgeport.	10	Buckwheat, Wheat, Coconut Shells, Charred matter.	9.67	5.24	23.64	3.81
5526		D. Hallett, 470 E. Main St., Bridgeport	8*	Buckwheat Hulls, Cayenne.	10.41	2.09	27.04	7.37
5531		Mrs. J. McGovern, 122 N. Washington Ave., Bridgeport.	8	Buckwheat Hulls, Coconut Shells, Charred matter.	10.96	1.40	27.71	7.81
5534		A. J. Hopkins, Boston Branch, Norwich	8	Buckwheat, Coconut Shells, Charred matter, Cayenne.	8.46	5.51	23.84	6.05
5537		87 White St., Danbury.	10	Wheat (cracker crumbs), Cayenne.	9.98	4.36	11.29	6.13
5541		C. A. Allison, 31 Main St., Middletown	10	Wheat, Grain Hulls, Coconut Shells, Charred matter.	9.60	2.71	15.24	3.95
5544		Joseph Connor & Sons, Norwich	10	Buckwheat, Coconut Shells, Charred matter, Cayenne.	7.74	4.08	27.59	5.35
5546		J. B. Sullivan, cor. E. Main and Steuben Sts., Bridgeport.	10	Buckwheat Hulls, Cayenne.	10.96	1.38	26.42	8.83
5548		Son'l Z. D. Durand, 183 Main street, Birmingham	10	Wheat	10.04	5.74	15.85	6.80
5550		Morris Shoield, 142 Main St., Birmingham	5	Wheat, Coconut Shells, Charred matter, Cayenne.	8.49	5.38	25.01	4.05
5555		Foote Bros., W. Main St., Waterbury.	10	Wheat, Coconut Shells, Charred matter, Cayenne.	8.34	3.52	18.96	4.22
5556		E. A. Fitch, 64 Broadway, Norwich.	10	Wheat, Coconut Shells, Charred matter, Cayenne, Chuffy	9.41	3.05	20.01	3.42
5565*		A. L. Allen, Norwich.	10	Buckwheat, Wheat.	12.01	6.35	7.97	4.56

* 1.35% Nitrogen in Ether Extract.

In eight samples the percentage of all three constituents was beyond the standard limits. The same was true in 14 cases of two constituents and in five cases of one constituent.

Only one sample, No. 5487, was not condemned by any of these three determinations, but the ether extract from this showed no crystals of piperine and contained but 1.88% of nitrogen.

Two samples of buckwheat middlings analyzed at this Station (see Report for 1886, p. 111 and for 1888, p. 152) contained 7.55% and 8.06% respectively, of ether extract. A pepper may have the normal percentage of extract and yet be grossly adulterated with this product. Fortunately we have other means for detecting the admixture with certainty.

Black Pepper Suspected of Adulteration.—In Table XIII are included four samples of this class from packages bearing the name of the manufacturer or dealer, and eight sold in bulk.

No foreign matters were detected in these samples by the microscope, but chemical analysis indicates either the addition of pepper shells, or that the samples were ground from uncleaned peppercorns.

An analysis of a sample of "pepper shells" offered to the "trade" at one and three-quarter cents per pound in 25 ton lots, is given below, together with an analysis of long pepper.

	Station No.	Water.	Ether Extract.	Fiber.	Total Ash.	Sand.
Pepper shells or dust	5630	8.36	6.98	22.88	9.19	2.28
Long pepper, ground at the Station	5634	9.87	7.24	7.38	8.10	.55

TABLE XIII.—BLACK PEPPER SUSPECTED OF ADULTERATION.

Station No.	How sold.	Price per ¼ pound. Cents.	Chemical Examination.				
			Water.	Ether Extract.	Fiber.	Ash. (Total.)	Sand.
5589	In labeled package	10	8.54	8.18	16.63	6.61	1.75
5587	" " "	10	10.73	6.43	17.62	6.67	1.00
5580	" " "	10	11.73	6.77	15.66	7.30	1.43
5579	" " "	8	10.91	7.96	15.17	6.95	1.35
5561	In bulk	8	10.21	8.16	16.97	7.85	1.91
5535	" " "	10	10.51	7.34	18.87	6.90	1.05
5525	" " "	7	10.54	6.96	20.29	6.56	.88
5533	" " "	8	10.48	5.14	20.27	6.83	1.04
5554	" " "	10	10.42	7.43	14.01	6.82	1.70
5543	" " "	10	10.07	7.85	12.32	7.15	1.80
5515	" " "	6	11.32	9.41	14.09	6.56	1.35
5527	" " "	10	10.21	7.59	12.56	7.03	2.10

White Pepper, Pure and Adulterated.—In Table XIV are given analyses of seven samples of white pepper, two of which are adulterated.

To recapitulate: 102 samples of pepper have been examined.

- 64 samples were probably pure pepper.
 - 12 samples were suspected of adulteration.
 - 31 samples were certainly adulterated.
-
- 107

About 66 per cent. of the samples in packages were pure, about 52 per cent. of samples sold in bulk were pure.

TABLE XIV.—WHITE PEPPER, PURE AND ADULTERATED.

Station No.	Brand.	Dealer.	Price paid per 1/2 pound. Cent.	Microscopic Examination.	Chemical Examination.			
					Water.	Ether Extract.	Fiber.	Ash.
5633	<i>Pepper corns ground at the Station.</i> Singapore White Pepper			Pure	11.88	7.07	3.65	.99
5632	Siam White Pepper			Pure	11.73	6.80	4.16	1.69
5766	<i>Ground Pepper in labeled boxes.</i> White Pepper, Absolutely Pure. D. & L. Slade & Co., Boston.			Pure	12.31	*6.58	3.32	1.70
5586	Pure White Pepper. Packed expressly for Hills & Co., Hartford.	Hills & Co., 368 Asylum St., Hartford	10	Pure	10.93	7.45	4.13	1.93
5582	White Pepper. Strictly Pure, Stocker & Brill, Newburgh, N. Y.	— 79 White St., Danbury.	10	Wheat	12.57	3.62	2.27	.68
5545	<i>Ground Pepper in bulk.</i>	Murray & Dorsey, 4 Truman St., New London.	9	Pure	11.90	6.98	3.74	3.14
5542		Waterbury Cheap Grocery, 171 S. Main St., Waterbury	6	Buckwheat, Cayenne	9.40	†7.14	3.64	5.57

* 3.25 per cent. nitrogen in ether extract.

† 0.59 per cent. in other extract.

MUSTARD.

By A. L. WINTON.

A portion of the chemical work described in this paper was done by Mr. W. L. Mitchell.

The genuine mustard of commerce is made chiefly, if not wholly, from the seeds of the black mustard (*Brassica nigra*), and white mustard (*Brassica alba*).

Cabbage, cauliflower, turnip and other well known plants belong to the same genus, *Brassica*, and their seeds are like those of the mustards in form and structure.

Black mustard seed is about as large as dust shot, and varies in color from light brown to black. When rubbed up with water there is formed the volatile oil of mustard, which has a penetrating and highly pungent odor as well as taste.

White mustard seed is several times as large as seed of the black species, has a buff color, and when pulverized and moistened emits no odor of mustard oil, but has a sharp, acrid taste.

The pure ground mustard of commerce consists of the ground seed of one, or of a mixture of both the black and white species, the husks being separated by bolting. Oftentimes a portion of the fatty oil of the seed is extracted, as the pungency is not thereby affected and the mustard meal is said to keep better.

Adulterations of Mustard.—The common adulterants of mustard are make-weights: such as starchy matters (wheat flour, etc.) and plaster or terra alba—and coloring matters: such as turmeric and Martius' yellow.

The use of flour in mustard has been defended on the ground that pure mustard does not keep well and is too pungent for ordinary use.

To color mustard, turmeric is generally used. It is prepared from the root of a plant allied to ginger, and its bright yellow color and spicy taste make it sought after for the purpose.

The use of Martius' yellow is objectionable, as it is distinctly poisonous.

These dyes hide the presence of white adulterants and have a brilliant yellow color. The natural color of pure ground and hulled mustard seeds is, however, a very pale yellow.

EXAMINATION OF SAMPLES OF MUSTARD FROM THE CONNECTICUT MARKET.

Methods.—Ash or mineral matter was determined by direct incineration.

Turmeric was detected by its characteristic color reaction with ammonia. The method given in Allen's Commercial Organic Analysis, Vol. III, Part 1, p. 154, was followed in testing for Martius' yellow.

Starch was detected by microscopic examination.

Pure Uncolored Mustard.—In Table XV are included 15 samples of this kind. These samples were not only free from starchy and mineral adulterants, but contained no coloring matter foreign to the mustard seed. They were without exception of a dull yellow color and contrasted strongly with the vivid yellow of mustards dyed with turmeric or Martius' yellow. The per cent. of ash ranged from 4.20 to 7.82.

Mustard Artificially Colored.—Table XVI includes 24 samples of this class in which no foreign matter, except coloring, was detected. Martius' yellow was present in four samples, turmeric in the remaining 20 samples.

Mustard Adulterated or "Compounded" with Starchy Matter or Gypsum.—There are grouped under this head in Table XVII "mustards," 30 in number, in which either flour or plaster was present in considerable quantity. Three of these, Nos. 5665, 5666 and 5672, were conspicuously labeled mustard on the broader sides of the boxes, and on one of the narrower sides it was stated, in much smaller type and in the words given in the table, that the article is a compound.

Of the 30 samples examined, 26 contained considerable quantities of wheat flour or other starchy matter and four were adulterated with gypsum or terra alba. Twenty-four were colored with turmeric, four with Martius' yellow and two appeared to be colored, although no dye was identified. Eleven were in labeled boxes, the remainder sold in bulk.

The quantity of lime present was determined in the four samples adulterated with gypsum and the equivalent sulphate of lime (anhydrous) ranged from 12.97 to 15.34 per cent., but the actual percentage of adulterant present was probably greater, owing to combined water.

TABLE XV.—PURE UNCOLORED MUSTARD.

Station No.	Brand.	Dealer.	Price paid per $\frac{1}{4}$ pound. Cents.	Ash.
5775	<i>In labeled packages.</i> Oxford Mustard, Absolutely Pure, D. & L. Slade Co., Boston	Lorenzo Dibble, N. Main St., S. Norwalk	10	6.28
5664	<i>In bulk.</i>			
5691	W. S. Chappell, 148 State St., New London	W. S. Chappell, 148 State St., New London	13	4.73
5694	P. T. Gloster & Co., Winsted	P. T. Gloster & Co., Winsted	10	5.94
5074	T. Kilmartin, 495 W. Main St., Waterbury	T. Kilmartin, 495 W. Main St., Waterbury	13	6.51
5639	Keating's Store, Cor. York & Oak Sts., New Haven	Keating's Store, Cor. York & Oak Sts., New Haven	9	5.52
5073	Keoney Bros., Rockville	Keoney Bros., Rockville	10	7.79
5075	Henry Hahn, 1327 W. Chapel St., New Haven	Henry Hahn, 1327 W. Chapel St., New Haven	9	5.57
5640	F. H. Kearney, Cor. Congress Ave. and Hill St., New Haven	F. H. Kearney, Cor. Congress Ave. and Hill St., New Haven	10	7.78
5646	Beckwith & Keefe, 125 Bank St., New London	Beckwith & Keefe, 125 Bank St., New London	10	6.20
5682	J. E. St. John, Bank St., New London	J. E. St. John, Bank St., New London	10	6.63
5681	Village Store Co., East Main St., Bridgeport	Village Store Co., East Main St., Bridgeport	6	5.60
5677	McGraw & Baldwin, White St., Danbury	McGraw & Baldwin, White St., Danbury	12	5.93
5675	James Sullivan, Putnam	James Sullivan, Putnam	10	4.20
5647	P. M. LeClair, Putnam	P. M. LeClair, Putnam	10	6.48
5647	W. H. Brown, Moosup	W. H. Brown, Moosup	10	7.82

TABLE XVI.—MUSTARD ARTIFICIALLY COLORED—OTHERWISE PURE.

Station No.	Brand.	Dealer.	Price paid per $\frac{1}{4}$ pound. Cents.	Ash.	Color.
5645	<i>In labeled packages.</i> Pure Durham Mustard, Howard & Co. Guaranteed absolutely pure	T. W. Pottier, 72 State St., New London	10	6.00	Martius' yellow.
5638	Pure Mustard, Boardman & Sons, Hartford	J. Kerin, 62 North St., New Britain	15	5.89	Turmeric.
5650	Strictly Pure Mustard, L. Battey & Son, Moosup	L. Battey & Son, Moosup	10	6.27	"
5654	Pure Mustard, J. H. Beard, Full Weight	Shelton Cash Store, J. H. Beard, Prop., 476 Howe Ave., Shelton	9	4.73	"
5669	Mansfield's Pure Mustard, W. H. Mansfield & Co., Putnam	Mansfield & Co., Putnam	10	7.11	"
5670	Gauntlett Brand Mustard, E. R. Durkee & Co., New York	G. A. Ray, Norwich	10	5.30	"
5680	Pure Mustard, Union Spice Co.	Union Pacific Tea Co., 263 Main St., Danbury	10	5.60	"
5700	Mustard, O. H. Blanchard, All goods bearing my trade mark strictly pure	Joseph Copland, Cor. North and Clark St., New Britain	10	5.73	"
5643	Pure Mustard, Warranted strictly pure, Bennett, Sloan & Co., New York	Wm. S. O'Brien, New London	10	4.19	"
5652	Mustard, Grand Union Tea Co., New York	Grand Union Tea Co., 237 Main St., Birmingham	10	6.58	"
5653	<i>In bulk.</i>				
5679	Dillon's Cash Grocery Store, 158 Main St., Ansonia	Dillon's Cash Grocery Store, 158 Main St., Ansonia	7	5.42	"
5678	Morris Shield, 142 Main St., Birmingham	Morris Shield, 142 Main St., Birmingham	5	4.98	"
5662	D. W. Lawton, Main St., Winsted	D. W. Lawton, Main St., Winsted	12	6.29	"
5648	Stevens' Cash Grocery, 398 E. Main St., Bridgeport	Stevens' Cash Grocery, 398 E. Main St., Bridgeport	8	5.94	"
5649	Barnum & Reed, 307 Main St., Danbury	Barnum & Reed, 307 Main St., Danbury	12	6.52	"
5656	John P. Murphy, Norwich	John P. Murphy, Norwich	10	5.46	"
5703	F. W. Tracy, Preston	F. W. Tracy, Preston	10	5.76	"
5660	W. N. Arnold, Danielson	W. N. Arnold, Danielson	10	7.15	"
5680	Perkins & Bliss, Willimantic	Perkins & Bliss, Willimantic	10	7.11	"
5690	Sam'l Z. D. Durand, 183 Main St., Birmingham	Sam'l Z. D. Durand, 183 Main St., Birmingham	10	7.44	"
5701	A. D. Cook, 56 Market St., Hartford	A. D. Cook, 56 Market St., Hartford	8	5.85	"
5680	Parinton & Reade, Willimantic	Parinton & Reade, Willimantic	12	6.19	Martius' yellow.
5680	793 Bank St., Waterbury	793 Bank St., Waterbury	10	5.84	"
5701	Boston Branch Grocery, 238 Main St., New Britain	Boston Branch Grocery, 238 Main St., New Britain	10	6.20	"

TABLE XVII.—MUSTARD ADULTERATED OR "COMPOUNDED" WITH STARCHY MATTER OR PLASTER.

Brand.	Dealer.	Price paid per pound.	Ass.	Coloring.	Adulterants detected.
885 A. & P. Mustard, Sultana Spice Mills	Atlantic & Pacific Tea Co., 269 E. Main St., Bridgeport	15	3.96	Turmeric.	Starchy matter.
886 Celebrated English Mustard, Cole & Firth, London	Murray & Dorsey, 4 Truman St., New London.	10	9.14	"	"
892 Crescent Mills Pure Mustard, Warranted Pure, John P. Augur, New Haven.	Foote & Westwood, W. Main St., Waterbury	15	3.98	"	"
851 Mustard, Lincoln, Seyms & Co., Hartford. All goods bearing our signature are strictly pure and warranted.	E. F. Platt, 37 E. Main St., Waterbury	15	20.08*	"	Sulphate of lime or plaster.
893 London Mustard, Warranted extra strong.	Johnson's Cash Grocery, Main St., Winsted.	12	3.32	"	Starchy matter.
883 Selected Mustard.	Kinney's, Bank St., New Milford	10	3.44	"	"
871 Pure Mustard, Alert Mills, New York.	W. H. Cardwell, Norwich.	15	10.62†	"	Lime and starchy matter.
874 Pure Mustard, Packed for Hills & Co., Hartford.	Hills & Co., 368 Asylum St., Hartford.	10	17.68‡	"	Sulphate of lime or plaster.
865 Colman's Mustard, Mfg. in England, warranted to be the finest mustard compound.	Frank Larrabee, Willimantic	15	3.94	?	Starchy matter.
872 Keene's Mustard, London. This is an admixture in which no injurious ingredients are used.	W. H. Cardwell, Norwich	17	3.49	?	"
866 Colburn's A Mustard. The A. Colburn & Co., Philadelphia. The finest compound for table or medicinal use.	A. A. Trudeau, Willimantic	12	4.17	Turmeric.	"
705	F. H. Lewis, 98 W. Main St., Meriden	10	4.06	"	"
702	Jacob Walz, 54 Temple St., Hartford.	10	3.55	"	"
890	Jos. Copland, Cor. North & Clark Sts., New Britain	10	4.18	"	"
898	C. A. Allison, 31 Main St., Middletown	10	4.24	"	"
895	Foote Bros., W. Main St., Waterbury	10	4.93	"	"
889	King & Gay, Main St., Winsted	12	2.20	"	"
887	Wilcox & Adams, Main St., Winsted	10	3.99	"	"
876	W. A. Murray, 672 Bank St., New London	10	2.42	"	"
861	Joseph Connor & Sons, Norwich	10	2.93	"	"
858	E. A. Fitch, 64 Broadway, Norwich	15	3.79	"	"
855	H. W. Steele & Co., Main St., Birmingham	9	3.98	"	"
842	Wm. W. Blakeman, Derby	10	5.75	"	"
873	S. D. Amico & Co., 64 Main St., New London	10	4.61	"	"
864	Morse Mills Store, Putnam	10	4.87	"	"
868	W. S. Cornwall, 173 E. Main St., Bridgeport.	10	4.31	"	"
869	Thos. Walsh, 486 Main St., Middletown	8	4.49	Martins' yellow.	"
696	M. Aborn, 160 Pratt St., Meriden.	10	4.04	"	"
704	J. B. Patterson, 110 Main St., Middletown	10	19.64§	Turmeric.	Sulphate of lime or plaster.
697	Henry S. Dailey, 87 Whalley Ave., New Haven.	10	21.10	"	"

* Of which 6.18 per cent. calcium oxide, equivalent to 15.03 per cent. calcium sulphate.

† Of which 6.10 per cent. calcium oxide, equivalent to 14.83 per cent. calcium sulphate.

‡ Of which 5.34 per cent. calcium oxide, equivalent to 12.37 per cent. calcium sulphate.

§ Of which 6.30 per cent. calcium oxide, equivalent to 15.34 per cent. calcium sulphate.

|| Of which 4.41 per cent. calcium oxide (not as sulphate).

CHEESE.

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CHEESE.

By A. L. WINTON.

Seventy-two samples of cheese have been examined with special reference to the possible presence of oleo-oil, which is said to be extensively used as a "filler." "Filled cheese" is made from an emulsion of oleo-oil and skim-milk.

In none of the samples was the presence of oleo or other foreign fats discovered.

Method of Examination. Volatile fatty acids were determined in the fat obtained from the cheese by grinding with anhydrous copper sulphate and extracting with ether, as directed for the determination of fat in cheese by Short's method.*

If desired, the percentage of fat and the volatile acids in the fat may be determined in one weighed portion, thus ascertaining whether the cheese was made from whole or skim milk, and whether or not it has been "filled." As there is no restriction on the sale of skim milk cheese in Connecticut, the percentage of fat was disregarded.

In order to have sufficient material for two extractions, 20 grams of cheese and 40 grams of anhydrous copper sulphate were ground to a powder. It was found necessary to perform this operation soon after receiving the samples, as cheese open to the air soon dries and becomes hard and horny; and on the other hand, if kept in a closed jar it moulds. The ground mixture of cheese and copper salt, however, keeps indefinitely, and the subsequent processes may be carried out whenever convenient.

The extract (corresponding to 10 grams of cheese) was collected in a tared flask so that after removal of the ether the weight of the extract could be taken. If more than 2.5 grams were obtained, a portion was removed. In the cases of skim milk cheeses the extract weighed less than 2.5 grams, but was sufficient for the determination of volatile fatty acids, being in all cases more than 1 gram.

The Leffmann & Beam modification of the Reichert process was employed,† using half quantities of reagents to correspond with the half quantity of fat taken. The saponification was carried out in the flasks used for the extraction.

The names and addresses of the dealers from whom samples were obtained are given in the following list. The prices paid ranged from 10 to 18 cents per pound.

Ansonia, W. H. Bronson, 234 Main St.; *York State Butter Store*, 176 Main St.

* U. S. Dept. Agr. Div. Chem. Bull. 43, 371.

† Analyst, 1891, XVI, 153.

Birmingham, H. W. Steele & Co., 99 Main St.; D. M. Welch & Co., Main St.

Bridgeport, Geo. A. Robertson, 70 State St.; New York Butter House, 12 Fairfield Ave.

Colchester, W. S. Curtis, Broadway.

Collinsville, N. Bachand.

Danbury, York State Butter House, Main St., Danbury; Butter Store, 43 White St.

Danielson, A. H. Armington, Railroad Sq.; Waldo Bros., Main St.; W. N. Arnold, Main St.

Hartford, W. W. Walker, 269 Main St.; John A. Pilgard, 138 Front St.; M. J. Feeley, 26 Front St.

Manchester, Fitch & Drake.

Meriden, D. C. Huggins & Co., 31 E. Main St.; Russell Bros., N. Y. Butter and Grocery Store; E. O. Chapman, 64 E. Main St.

Middletown, B. Carbo, Rapello Ave.; Gardner, 121 Main St.

Naugatuck, C. N. Todd's Cash and Exchange Store; Dillon's Cash Grocery Store.

New Britain, Boston Branch Grocery, 238 Main St.; Vermont Butter Store, Main St.; Wm. Cowlshan, 420 Main St.

New Haven, John Franklin, 71 Nash St.; M. C. Dingwall, 66 Congress Ave.; McGovern Bros., 1037 State St.; Broadway Butter Store, 153 Broadway; A. Duhan, 1134 State St.; New Haven Butter Store, 116 Congress Ave.; D. M. Welch & Son, Congress Ave.; D. Dore, 579 Grand Ave.; Butter Store, 391 Grand Ave.; C. T. Downes & Son, 1 Broadway.

New London, Thos. W. Gardner, State St.; M. Pick, 6 Main St.; Chappell, 148 State St.; J. E. St. John, Bank St.

Norwalk, The New York Grocery, Main St.; W. R. Bates, Main St.

Norwich, Bailey & Connell, 40 Broadway; C. W. Hill, Franklin St.; Appley & Jordan, 88 W. Main St.; Somers Bros., 224 Main St.

Plainfield, Walter Tillinghast, Main St.; Kingsley's Store.

Putnam, Brainard & Bartlett, 72 Main St.; W. H. Mansfield & Co.

Rockville, L. Young; Union St. Grocery, 30 Union St.

S. Norwalk, Lorenzo Dibble, N. Main St.

Stonington, James Pendleton, Water St.

Thompsonville, Henry King.

Torrington, The Torrington Coöperative Co., 47 Main St.; Philip Aperion, S. Main St.; G. S. Weeks, 184 Main St.

Wallingford, M. N. Brainerd; F. H. Smith; W. Murray.

Warehouse Point, Aaron Smith.

Waterbury, Brownell, Boston Butter House, 147 S. Main St.; Branch of York State Butter Co., 844 Bank St.; L. P. & A. M. Guilfoile, 777 Bank St.

Willimantic, H. C. Hall, 17 Union St.; Bert Thompson, 798 Main St.; Holden Arnold, 999 Main St.

Windsor Locks, Ed. Coogan.

EXAMINATION OF COFFEE.

BY A. L. WINTON.

Coffee is the seed of a small tree whose fleshy fruit is about the size of a small cherry and contains two seeds joined on their flat sides, which when freed from the pulp and the enveloping membrane are the coffee "beans" of commerce.

The money value of coffee annually imported into this country exceeds that of any other single import, except possibly sugar.

During the year ending June 30, 1895, 532,938,473 pounds were imported, having a wholesale value (at a little over 16 cents per pound) of \$87,372,901.61. The imports of ground chicory during the same year amounted to 9,544,186 pounds, and were valued (1.7 cents per pound) at \$158,142. In addition to the above, 463,579 pounds of unground chicory and 2,807,360 pounds of dandelion root and other coffee substitutes came into the country.

ADULTERANTS OF COFFEE.

Among the materials which, either dried or roasted, have been used to mix with and adulterate pure coffee are the following: roots of chicory, dandelion, beets and carrots; wheat, rye, barley and other grains; peas, beans and other leguminous seeds; acorns; figs; imitation coffee, sometimes moulded into artificial beans, sometimes in masses, granules, etc.

EXAMINATION OF SAMPLES PURCHASED IN CONNECTICUT.

One hundred and twenty-four samples collected by the Station agents have been examined. These may be classified as pure and adulterated ground coffee, coffee substitutes and compound coffees. All were in the roasted state.

Methods of Examination.

By careful sorting, the adulterants in whole coffee were readily separated and in some cases the percentage of adulteration was determined. Microscopic examination of the foreign material was necessary in order to positively determine its nature.

Fragments of foreign material may usually be recognized without the aid of a lens and picked out from adulterated coffee after it has been ground to the usual degree of fineness. This preliminary examination is greatly facilitated by separating the finer from the coarser material by means of a sieve.

Another easy method of separation is to shake a portion of the sample with cold water. The particles of coffee for the most part float, whereas the common adulterants sink.

Material of suspicious character, separated by either of the methods just named, was examined microscopically to fully determine its nature.

Fragments which, from their sweet taste and the color imparted to water were believed to be chicory, were usually found under the microscope to have the pitted ducts and other characteristic tissues of chicory. No attempt was made to distinguish between chicory and the other roots which often are used as an adulterant of, or substitute for, chicory. The term "chicory," as used in this paper, refers to what is known in the trade under that name.

In order to identify the various leguminous seeds, the size and form of the palisade and "supporting" cells of the hull were observed either in sections or, more conveniently in my experience, in portions which had been heated on a slide for a short time with dilute potash and gently crushed with a cover glass. By this latter method, after a few preliminary tests to get potash solution of the proper concentration and to heat for the proper length of time, cells of both layers were easily isolated without being seriously altered in size and form. The palisade cells when thus detached rested on their sides, and with proper care many of the "supporting" cells were in the same position so that it could be seen whether they were prismatic (as in the bean) or spool-shaped, as in most other legumes.

It was difficult and sometimes impossible to distinguish fragments of wheat kernels from rye, either by the shape of the fragments, size of starch granules or cell structure, because these characters had been obscured or wholly destroyed by roasting.

It was not always possible to determine the kind of starch present in the imitation coffee, described on page 54, because the granules were often distorted as if they had been heated. The presence of vegetable hairs and fragments of tissue, however, aided identification.

UNGROUND COFFEE.

Although the larger part of the coffee on sale in this State is in the bean, still only a few purchases of the unground coffee were made since in many of the stores visited by the Station's agents the coffee was found on inspection to be of undoubted purity.

Pure unground coffee.—Two samples of genuine coffee beans were purchased in labeled packages as follows:

5987. Union Club Coffee, Lincoln, Seyms & Co., Hartford. Bought of A. Wilson, Norwich, 38 cents per pound.

6006. Winslow, Rand & Watson's Red Label Java and Mocha Coffee. Bought of Carten Tea Co., Bridgeport.

The remainder of the samples of genuine coffee beans were bought of the following dealers, the price ranging from 25 to 38 cents per pound:

The Original India Tea Co., *Bridgeport*. N. Bachand, Chas. McAleer, Frank Perri, *Danbury*. Waldo Bros., *Danielson*. M. J. Feeley, Mrs. Kramer, *Hartford*. Bissell & Brough, *Manchester*. Lane & Peters, *Milford*. Unite L. Frank Tea Co., Frank E. Hull, Store 1152 State St., New England Tea Co., H. Frank & Son, *New Haven*. Thomas & Gumble, Store junction Bank and Truman Sts., Corkey & Gannon, Keefe & Davis, M. Winslow Dart, *New London*. Brainard & Bartlett, *Putnam*. L. Young, *Rockville*. D. S. Davenport, Brown & Wilcox, *S. Norwalk*. Moses Pendleton, *Stonington*. J. F. O'Hear, M. Mitchell, *Thompsonville*. W. Murray, *Wallingford*. Aaron Smith, *Warehouse Point*. The N. Y. and China Tea Co., *Waterbury*. S. E. Amidon, Bert Thompson, *Willimantic*.

Adulterated unground coffee.—Eleven samples were purchased, and the results of their examination are given in Table XVIII. The adulterants detected were chicory, crushed and roasted peas and lumps of "imitation coffee."

By the term imitation coffee we refer to certain masses of brown, starchy material sometimes found in adulterated coffee. These are made chiefly of wheat flour or middlings mixed sometimes with pea hulls or pea meal. This mixture, in form of a paste, is apparently moulded in sticks or cylinders about half an inch in diameter, which after drying can be crushed or ground with the coffee.

Imitation coffee, moulded in form of coffee beans, instead of sticks, has not been found in any samples which we have examined.

In general, the presence of the adulterants which we have encountered in whole coffee would hardly escape the notice of the careful observer, if he had opportunity to glance at the mixture before it was ground, an opportunity which, in the experience of our sampling agents, is not always accorded to him.

GROUND COFFEE.

Pure Ground Coffee.—In Table XIX are given five brands of pure ground coffee which were sold in sealed and labeled packages.

Only two samples of pure ground coffee sold in bulk were found on sale. These were purchased of James Pendleton, Water St., Stonington (34 cts. per pound), and Chappell's Store, 148 State St., New London (38 cts. per pound).

TABLE XVIII.—ADULTERATED WHOLE OR BROKEN COFFEE, SOLD IN BULK.

Station No.	Dealer.	Adulterants Detected.	Price per Pound (Cents)
5973	F. W. Minor, Wallingford.	†Peas, chicory	25
6011	C. T. Downes & Son, 1 Broadway, New Haven.	†Peas, chicory	25
6004	A. Dulan, Cedar Hill Cash Grocery, 1134 State St., New Haven.	26% peas, 19% chicory	25
6009	*M. C. Dingwall, 66 Congress Ave., New Haven.	Chicory, "imitation coffee"	20
6003	John Franklin, 71 Nash St., New Haven.	42% chicory and "imitation coffee"	25
5983	R. A. Nichols, 60 Courtland St., Bridgeport.	†Peas, chicory, "imitation coffee"	25
5997	F. M. Miller, 38 W. Main St., Meriden	23% peas, 45% chicory and "imitation coffee"	25
5994	Geo. W. Gates, Main St., Windsor Locks.	24% peas, 31% chicory and "imitation coffee"	25
5989	†Doran's Cash Grocery, 150 Main St., Danbury.	14% peas, 21% chicory and "imitation coffee"	24
6002	New Haven Provision Co., 398 Grand Ave., New Haven	12% peas, 22% chicory and "imitation coffee"	25
5979	Walter Tillinghast, Plainfield.	† "Imitation coffee"	25

* Coffee sold for Coffee Screenings. † Sold for "crushed Java."
 ‡ Ground by dealer, hence the percentage of adulteration could not be readily determined.

TABLE XIX.—PURE GROUND COFFEE, SOLD IN LABELED PACKAGES.

Station No.	Brand.	Dealer.	Price per Pound, Cents.
5972	Café Royal Coffee, Benedict & Thomas, New York.....	Gilbert & Thompson, New Haven	45
5958	Seal Brand Java and Mocha Coffee, Chase & Sanborn, Boston (powdered).....	James' Cash Grocery, Danielson	38
5959	Seal Brand Java and Mocha Coffee, Chase & Sanborn, Boston (ground)	The Torrington Coöperative Co., 47 Main St., Torrington.....	40
5957	Union Club Coffee, Lincoln, Seyms & Co., Hartford.....	W. D. Mead, Collinsville.....	35
5948	High Life Java and Mocha Coffee, Winslow, Rand & Watson	H. C. Hall, 17 Union St., Willimantic.....	38

Adulterated Ground Coffee.—Fifty-eight out of sixty-four samples sold as "ground coffee" were found to be adulterated.

Of these, five were sold in labeled packages, giving the name of grinder, or wholesaler, without any statement to indicate that they were mixtures of coffee with other materials.

These were the following:—

5964. Sealed package labeled: "The American Java Coffee (W. G. & B.) Company." "Office of the American Java Coffee Co., 233, 235 and 237 Washington St., New York," etc. Bought of Lorenzo Dibble, South Norwalk. Price 22 cents per pound package. A gilt band cup and saucer given away with a pound.

Contains *chicory and peas*.

5965. Sealed package labeled: "Genuine Mocha Coffee, John P. Angur, Crescent Mills, New Haven." Bought of Adam Wagner, Ashmun St., New Haven. Price 25 cents per pound package.

Contains *chicory and peas*.

6050. Sealed package labeled: "Welcome Coffee gives uniform satisfaction. Manufactured only by Bryan, Miner & Read, New Haven, Conn. The buyer of this coffee receives free with each package 1 bar of Welcome soap. One pound fresh ground." Bought of Geo. W. Gates, Windsor Locks. Price 25 cents per package.

Contains *chicory and peas*.

5960. Sealed package labeled: "Boardman & Sons' Celebrated Excelsior Coffee, 304 Asylum St., Hartford." Bought of R. Fowler, Ford St., Hartford. Price 15 cents per pound package.

Contains *chicory, peas and "pellets."*

6015. Labeled on package from which sample was taken and on bag into which it was put: "Old Style Java, S. H. Brownell & Co., 26 to 31 Canal St., Providence, R. I." Bought (for coffee and chicory) of James' Cash Grocery, Danielson. Price 25 cents per pound.

Contains *imitation coffee*.

The detailed descriptions of the other adulterated samples, sold in bulk, fifty-three in number, are given in Table XX.

The foreign materials detected were chicory, roasted peas, wheat and rye, "imitation coffee" (such as has been described on page 54) and an adulterant consisting of pea hulls made into little granules with bran or middlings. These, for convenience, we have designated as "pellets."

COFFEE COMPOUNDS.

Under this head are grouped eleven mixtures which, as regards their composition and appearance, are like the adulterated ground coffees, but since they were sold in packages with statements on the labels (often, however, in very small type and obscurely placed) as to their character, they are separately considered.

6018. "Columbus Coffee, Chris. Columbus Coffee Company, 245 and 249 Washington St., New York. The contents of this package is a mixture or a Compound of Choice Roasted Coffee, Cereals and Chicory, Blended in such proportions as to produce a good beverage." Bought for coffee of Chas. Brenker, Torrington. Price 22 cents per pound package.

Contains *coffee, peas and chicory*.

5963. "Palmer's Compound Dandelion Coffee, Palmer's Dandelion Coffee Company, Norwich." Bought of C. W. Hill, Norwich. Dealer stated it was a compound. Price 20 cents per pound.

Contains *coffee, peas, chicory*, possibly other ingredients.

6051. "Red Star Blended Java. A blend of choicest Padang Java with roasted cereals," etc. Bought for coffee of the Torrington Coöperative Company. Price 25 cents per pound.

Contains *coffee, peas and chicory*.

TABLE XX.—ADULTERATED GROUND COFFEE, SOLD IN BULK.

Station No.	Dealer.	Adulterants detected.	Price per pound, Cents.
5901	C. N. Todd's Cash and Exchange Store, Naugatuck	Chicory, Peas	25
5902	Dillon's Cash Store, Naugatuck	" "	25
5903	Healy's South End Groceries, 622 S. Main St., Waterbury	" "	25
5913	Ransom Bros., 17 Market St., Rockville	" "	24
5920	W. H. Bronson, 234 Main St., Ansonia	" "	25
5923	Ed. Coogan, Windsor Locks	" "	25
5925	M. N. Brainerd, Wallingford	" "	25
5926	Willis L. Pond, Torrington	" "	20
5927	The Union Pacific Tea Co., 204 Main St., Ansonia	" "	25
5928	Samuel Z. D. Dursand, 193 Main St., Birmingham	" "	25
5938	John P. Murphy, W. Main St., Norwich	" "	25
5945	Adam Wagner, Ashmun St., New Haven	" "	25
5951	Grand Union Tea Co., 88 State St., New London	" "	25
5953	Thos. W. Gardner, State St., New London	" "	20
5969	Geo. E. Cleaveland, 200 State St., Bridgeport	" "	25
5974	O. Coledzky, 68 Morgan St., Hartford	" "	25
5947	B. Carbo, Rapallo Ave., Middletown	Chicory, Wheat or Rye	24
5963	New England Tea Co., 442 Main St., Middletown	Chicory, "Imitation Coffee"	25
5907	Branch of York State Butter Co., 844 Bank St., Waterbury	" "	25
5908	L. P. & A. M. Guilfoile, 777 Bank St., Waterbury	" "	25
5910	Logan Bros., 863 Main St., Bridgeport	" "	25
5911	John Driscoll, Cor. Main and High Sts., Bridgeport	" "	25
5924	Henry King, Thompsonville	" "	20
5967	The New York Grocery Co., Main St., Norwalk	" "	25
5931	F. H. Smith, Wallingford	" "	25
5905	Jas. F. Phehan, 41 E. Main St., Waterbury	Chicory, "Pellets"	25
5906	Moore's Cash Grocery, 804 Bank St., Waterbury	" "	25
			28

TABLE XX.—ADULTERATED GROUND COFFEE, SOLD IN BULK.—Continued.

Station No.	Dealer.	Adulterants detected.	Price per pound, Cents.
5914	Village Store Co., Cor. State and Broad Sts., Bridgeport	Chicory, "Pellets"	25
6068	The Great Atlantic and Pacific Tea Co., 29 E. Main St., Waterbury	" "	25
5970	J. McByven, 117 Saltonstall Ave., New Haven	Chicory, Peas, "Imitation Coffee," Pellets	25
5912	Union Street Grocery, 30 Union St., Rockville	" "	25
5921	Grant's Tea and Coffee Store, Cor. State and Main Sts., Meriden	" "	25
5944	McGovern Bros., 1037 State St., New Haven	" "	25
5909	Chas. W. Starr, New Milford	" "	25
5916	The Union Pacific Tea Co., cor. Main and Golden Hill Sts., Bridgeport	Chicory, Peas, "Imitation Coffee," "Pellets," Wheat or Rye	25
5922	James Keevers, Main St., Windsor Locks	Chicory, Peas, "Imitation Coffee"	25
5930	York State Butter Store, 176 Main St., Ansonia	" "	25
5932	Holden Arnold, 999 Main St., Willimantic	" "	25
5935	H. A. Wheaton, Spring St., Danielson*	" "	25
5937	A. H. Arrington, Railroad Square, Danielson	" "	25
5954	Gardner's Store, Elm St., Stonington	" "	28
5929	H. A. Willard, 268 Main St., Ansonia	" "	20
5943	W. G. Graves, 341 Grand Ave., New Haven	Chicory, Peas, Wheat or Rye	25
5946	Daniel Dore, 579 Grand Ave., New Haven	" "	25
5949	S. E. Amidon, 877 Main St., Willimantic	" "	12
5950	Hong Kong Tea Co., 210 Main St., Norwich	" "	25
5917	G. S. Weeks, 184 Main St., Torrington	" "	25
5904	American Tea Co., Wright & Weible, 42 E. Main St., Waterbury	"Pellets," Wheat or Rye	35
5918	B. Moffitt, 373 Main St., New Britain	"Pellets," "Imitation Coffee"	25
5934	Edward Mullan, 25 Main St., Putnam	"Imitation Coffee"	30
5962	Brainard & Bartlett, 72 Main St., Putnam	" "	25
5915	C. A. Wills, 364 Fairfield Ave., Bridgeport	" "	25
5919	Barry's New York Store, 374 Main St., Ansonia	Chicory	25
		" "	25

* Sold for mixture of Java and Mocha screenings.

6007. "Eclipse blended crushed Coffee. In compounding this coffee we have selected goods that will give a much stronger and richer flavor than many of the so called pure coffees. A compound roasted and packed on the day shipped. Eclipse Coffee Co., 61 Hudson Street, New York." Bought for coffee of W. R. Bates, Norwalk. Price 23 cents per pound in a quart fruit jar. It was unground.

It contains 40 per cent. *coffee beans* whole or broken.

20 " *crushed peas*.

40 " *imitation coffee and chicory* (not separated).

6016. "Arabian Ground Coffee, full weight. 130 Franklin St., New York. This package contains ground coffee." The word "compound" was on another part of the package. Bought of T. W. Potter, New London. Price 15 cents per pound.

Contains *coffee, chicory and peas*.

5956. "Old reliable Java Coffee Company, New York." The following statement was printed in small type, "made of pea berry coffee and chicory." Bought of C. H. Bailey, 34 Enterprise St., Colchester. Price 25 cents per pound. A cup and saucer given away with each pound.

Contains *chicory, peas and cereals*.

5971. "Excelsior French Breakfast Coffee Compound. From Dwinell, Wright & Co., Boston, Mass." Bought for coffee of J. E. Sullivan, Putnam. Price 10 cents per pound.

Contains *chicory, peas, cereals*; coffee was not detected.

5961. "Hayward & Co., French Breakfast Coffee Compound. Dwinell, Wright & Co., Boston." This was put up in the same kind of package as No. 5971 with a similar label. Bought of W. W. Walker, 269 Main St., Hartford, for coffee. Price 8 cents per pound.

Contains *chicory, peas, cereals*; coffee was not detected.

6049. "Enterprise Compound Breakfast Coffee, Lincoln, Seyms & Co., Hartford." Bought for coffee of Ed. Coogan, Windsor Locks. Price 25 cents per pound.

Contains *coffee, chicory and peas*.

6080, 6019. "Old Grist Mill Entire Wheat Coffee, Potter & Wrightington, Boston, Mass." A sealed package of this article was sent to this station with the request that it be examined for real coffee, which it was claimed not to contain.

It was stated on the label: "Is a perfect hygienic product of the Entire Wheat Kernel. It is not ground from the coffee berry,

and while possessing all the delicate flavor of Java or Mocha it contains none of their injurious qualities."

Another package of the Old Grist Mill Entire Wheat Coffee was bought by a station agent of N. A. Fullerton, New Haven, for 20 cents, a loaf of entire wheat bread being given away with it. The label was in all respects the same as the first with two exceptions. First, in place of the above quotation the following was substituted:

"Is a perfect hygienic product containing the entire wheat kernel, roasted and ground. It has all the delicate flavor of Java and Mocha; but, unlike these coffees, it does not produce biliousness or irritate the nerves."

Second. The statement was added, "It is in every sense a Pure Health Food."

Both packages contained *some coffee, mixed with wheat and with a considerable quantity of ground peas*.

COFFEE SUBSTITUTES.

The following preparations from roasted cereals, etc., contain no real coffee and no such claim is made for them:

6017. "Ayers Hygienic Substitute for Coffee, M. S. Ayer, Boston." Bought of Sliver's Grocery, Stonington. Price 20 cents per pound.

6014. "New Era Improved Hygienic Coffee, E. C. Rich Co., New York and Boston." Bought of W. W. Walker, Hartford. Price 20 cents per pound.

5966. "Shredded Cereal Coffee, The Cereal Machine Co., Boston." Bought of H. C. Hall, Willimantic. Price 20 cents per pound.

6013. "J. W. Clark's Phosphi Cereal Nervine Coffee, a wholesome and nutritious substitute for the coffee bean, tea and chocolate. Clark & Alden, N. Woburn, Mass." Bought of Boston Branch Grocery, New Britain. 20 cents per pound.

RECAPITULATION.

The 122 samples which have been examined may be classified as follows:

UNGROUND COFFEE.			
	In labeled packages.	In bulk.	Total.
Pure.....	2	31	33
Adulterated.....	0	11	11
GROUND COFFEE.			
Pure.....	5	2	7
Adulterated.....	5	53	58
Coffee Compounds.....	11	0	11
Coffee Substitutes (no real coffee).....	4	0	4
Total.....			124

It appears that most of the unground coffee on sale is pure, although 11 samples were purchased which were found to contain one or more of the following adulterants in quantities ranging from 12 to 42 per cent.: crushed peas, imitation coffee (moulded from starchy materials) and chicory.

89 per cent. of the ground coffee found on sale was grossly adulterated. The adulterants detected were peas, "imitation coffee," "pellets" (pea hulls and starchy matter made into granules) wheat, rye and chicory. Only two samples of pure ground coffee sold in bulk were found on sale.

MILK.

By E. H. JENKINS AND A. L. WINTON.

During the month of May one hundred and five samples of milk were bought by agents of the Station from grocers and a few bakeries in all parts of the city of New Haven.

The analyses of these samples show the general quality of the milk sold by grocers, which is quite likely to be rather poorer than that delivered by milkmen to families.

The per cents. of total solids in these samples were as follows:

Over 13	per cent. solids, 16 samples.
Between 12 and 13	per cent. solids, 51 samples.
Between 11.5 and 12.0	per cent. solids, 19 samples.
Between 11.0 and 11.5	per cent. solids, 12 samples.
Between 10.5 and 11.0	per cent. solids, 6 samples.
Under 10.5	per cent. 1 sample.
Total.....	105

The per cents. of fat found were:

Over 5.0	per cent. fat, 3 samples.
Between 4.5 and 5.0	per cent. fat, 2 samples.
Between 4.0 and 4.5	per cent. fat, 36 samples.
Between 3.5 and 4.0	per cent. fat, 37 samples.
Between 3.0 and 3.5	per cent. fat, 17 samples.
Between 2.5 and 3.0	per cent. fat, 10 samples.
Total.....	105

The following twelve samples judged by the commonly received standards are adulterated:

No.	Dealer.	Specific Gravity.	Solids.	Fat.	Solids not fat.
7728	Mrs. P. E. Davis, 228 Shelton Ave.	29.2*	11.35	3.14	8.21
7749	M. Maremma, 76 Oak St.	30.7	11.03	2.80	8.23
7769	Cor. Washington and Portsea Sts.	20.6	10.00	3.72	6.28
7773	185 Columbus Ave. cor. Liberty St.	28.7	11.39	3.50	7.89
7783	Cor. Lawrence, opposite Forsyth's Dye Works	30.4	11.45	3.20	8.25
7787	Ferry St., cor. Pierpont St.	31.0	10.38	2.29	8.09
7799	398 Grand Ave.	28.4	11.43	3.50	7.83
7800	D. Doré, Grand Ave.	30.5	11.48	3.20	8.28
7817	Stier's Bakery, 127 Congress Ave.	28.5	11.09	3.30	7.79
7821	Mrs. P. E. Davis, 228 Shelton Ave.	30.3	10.92	2.60	8.32
7827	N. Stein, 815 Grand Ave.	29.0	10.55	2.89	7.66
7828	Bakery, cor. State and Olive Sts.	29.5	10.59	2.60	7.99

* Read 1.0292.

Eleven samples beside these, whether adulterated or not, were of such inferior quality as not to be fairly marketable.

Twenty-three samples of milk, therefore, or more than one-fifth of the whole number examined, were either adulterated, or of such inferior quality that their sale might justly be prohibited by statute or city ordinance.

It is a perfectly familiar fact that pure milk from healthy cows has no fixed and constant composition.

Differences of breed, individual differences among cows of one breed, the age of the cows, the feed, and the period of lactation, all affect the chemical composition of the milk in a very marked degree.

The differences in chemical composition of pure milk are, however, very much smaller when comparison is made between the mixed milk of many cows rather than between the milk of individual cows.

Milk which is sold in our cities represents, almost without exception, the mixed milk of a number of cows or of herds.

State and municipal governments, boards of health and associations of official chemists have from time to time adopted "standards" of composition of milk, fixing minimum percentages of solids, fat and solids not fat, or a specific gravity which shall serve to distinguish pure or marketable milk from adulterated or unmarketable milk.

Thus, in the State of New York, a seller is liable to prosecution if the milk has less than 12 per cent. of solids and 3 per cent. of fat.

In Massachusetts, milk must contain 13 per cent. of solids in all months except May and June, and in those months must have at least 12 per cent. of solids.

The standard adopted by the Society of Public Analysts of England is

Solids	11.50
Fat	3.00
Solids, not fat	8.50

The standard which is fair for one country or section or State is not necessarily fair for another.

If the standard is a reasonable one it will sometimes happen that pure, unadulterated milk of very inferior quality will fall below its requirements and thus be condemned as adulterated when it is not.

But the public ought to be protected from genuine milk of a very poor quality as well as from richer milk which has been adulterated.

We believe that in this State milk which is sold at the usual market rates ought to have a specific gravity between 1.029 and 1.033, with not less than 3.5 per cent. of fat and 11.50 per cent. of solids; and if any two of the three fall below the minimum named, the milk should be declared unsalable.

We consider these as the lowest limits which should be recognized in this State and leave the question open for the present whether they are not too low.

It would seem to be wise to forbid the sale, under penalty, of any milk which does not come up to the prescribed quality, leaving the question of wilful adulteration out of the issue.

All of the samples of milk examined were tested for preservatives, but none were found in any of them.

The use of preservatives in milk without notice to the purchaser is clearly forbidden in the sixth provision of section 3 of the pure food law.

CREAM OF TARTAR.
By A. W. OGDEN.

Cream of tartar is made from argol, an incrustation formed during the fermentation of wines, and is brought into commerce as a white crystalline solid or powder having a pleasant, sour taste. It is, chemically considered, acid potassium tartrate, which when chemically pure contains 25.0 per cent. of potash. "It usually contains from 2 to 7 per cent. of calcium tartrate, an amount admissible in samples for medical use, but it sometimes contains from 8 to 18 per cent. of tartrate of calcium."—(U. S. Dispensatory, 15th Ed., 1153.) It is used in cookery to "raise" bread by setting free carbonic acid from the saleratus or "soda" which is mixed with dough. One hundred and three samples bought by the Station agents for cream of tartar have been examined. Thirty-five were in packages bearing the manufacturers', grinder's or packer's name and brand. Of these, seven were adulterated, as will be seen in Table XXI.

The samples bearing the names of the following firms were unadulterated: Austin, Nichols & Co., N. Y., Berry Wisner, Lohman & Co., N. Y., Bugbee and Brownell, Providence, R. I., Clark, Chapin & Bushnell, N. Y., Francis H. Leggett & Co., N. Y., Lincoln, Seyms & Co., Hartford, Ct., James P. Powers & Co., N. Y., James Pyle, N. Y., D. & L. Slade Co., Boston, Mass., Stickney & Poor, Boston, Mass., Thurbur, N. Y. Sixty-eight samples of cream of tartar were bought in bulk from retail grocers in different parts of the State. Twenty-four of these were variously adulterated, some of them containing no cream of tartar at all. Partial analyses of them, with statement of the adulterants, are given in Table XXI. In addition to the adulterants named in the table, all of the samples, with exception of Nos. 537, 539, 557, 665 and 1500, also contained starch.

TABLE XXI.—ADULTERATED CREAM OF TARTAR.

No.	Manufacturer or Wholesaler.	Retailer.	Analysis.						Nature of Adulteration.
			Potash.	Soda.	lime.	Sulphuric Acid.	Phosphoric Acid.	Nitrogen.	
543	Sold in bulk.	H. Glover & Son, Wall St., Norwalk							Acid phosphate of lime.
644	"	Philip Aeperton, 8 Main St., Torrington	.19	3.59	20.37	8.96	38.94	---	"
572	"	M. Blanchette, 263 So. Main St., Waterbury	trace.	2.48	25.06	12.96	33.01	.10	"
1439	"	Appley & Jordan, 88 West Main St., Norwalk	---	2.36	21.84	13.24	32.18	.12	"
574	"	Hedley's South End Groceries, 622 So. Main St., Waterbury	.85	2.10	24.28	21.63	23.74	---	"
1434	"	A. Wilson, 78 Franklin St., Norwalk	trace.	1.84	20.04	23.87	23.67	.44	"
649	"	York State Butter Store, 176 Main St., Ansonia	---	2.91	23.68	30.42	22.20	---	"
700	Coburn & Co. First Quality.	W. G. Graves, 341 Grand Ave., New Haven	1.23	1.50	19.73	26.96	15.94	.52	"
544	Sold in bulk.	H. A. Wheaton, Spring St., Danvers	.32	2.20	29.80	32.05	15.46	---	"
1450	"	J. A. Pillgard, 138 Front St., Hartford	.21	1.30	13.50	12.91	13.75	---	"
622	Challenge Mills, N. Y.	C. H. Reid, 416 Main St., Bridgeport	---	1.55	18.22	14.88	18.45	.09	"
527	"	R. Fowler, Ford St., Hartford	7.33	1.67	7.50	10.34	1.66	---	"
632	Sold in bulk.	Kingsley's Store, Plainfield	15.07	1.15	10.20	8.79	9.56	---	Sulphate and phosphate of lime.
1431	"	E. A. Fitch, Broadway, Norwich	14.87	1.63	10.34	9.14	10.00	---	"
693	"	D. M. Welch & Son, Congress Ave., New Haven	14.20	1.61	12.72	19.43	---	.18	"
659	"	Barry's New York Store, 374 Main St., Ansonia	12.23	1.42	12.60	19.98	---	.20	"
658	"	Gustav E. Friedrich, South Norwalk	10.95	1.25	17.88	24.90	---	---	"
539	"	M. McPhelan, White St., Danbury	9.70	1.33	18.46	27.13	---	.20	"
557	Bennett, Sloan & Co.	J. McIwren, 117 Saltonstall Ave., Fair Haven	6.33	1.69	8.74	21.27	6.56	1.08	Sulphate and phosphate of lime.
1500	"	S. C. Amidon, 877 Main St., Williamantic	4.61	2.37	15.94	13.02	13.78	---	"
1476	Sold in bulk.	Keefe and Davis, 125 Bank St., New London	4.46	1.50	15.38	23.12	12.51	.60	"
1427	"	G. S. Weeks, 184 Main St., Torrington	---	---	---	---	---	---	"
637	Crescent Mills, New Haven.	New Haven Provision Co., 398 Grand Ave., Fair Haven	---	---	---	---	---	---	"
1497	Crescent Mills, New Haven.	Mastin & Co., 79 White St., Danbury	---	1.86	27.42	38.80	---	---	"
548	Sold in bulk.	New York Grocery Co., Main St., Norwalk	---	1.29	26.04	36.34	---	trace.	Plaster.
665	"	Morris Sheffield, Main St., Derby	---	1.48	26.00	30.14	---	.30	"
610	"	Geo. W. Gates, Main St., Windsor Locks	---	1.27	30.94	39.34	---	---	"
611	"	James Keever, Main St., Windsor Locks	---	5.22	31.30	38.63	---	---	"
537	"	A. Malino's Market, Main St., So. Norwalk	.33	1.84	27.74	38.69	9.43	---	Sulphate and phosphate of lime.

CEREAL FOODS.

By A. L. WINTON.

Nine samples have been examined. No corn starch or tissue was found in any of them.

No wheat was found in the oat meals. All appeared to be properly branded and unadulterated.

The brands examined were the following:—

Oat Preparations.

H. O., made by Hornby's Oatmeal Co., New York.

Quaker Rolled White Oats, made by the American Cereal Co., Chicago, Ill.

Street's Perfection Rolled White Oats, and Toasted White Oats, made by S. H. Street & Co., New Haven, Ct.

Wheat Preparations.

Fould's Wheat Germ Meal, made by Fould's Milling Co., Cincinnati.

Wheatlet, made by Franklin Mills Co., Lockport, N. Y.

Eli Pettijohn's Best, made by Eli Pettijohn Cereal Co., Minneapolis.

Pettijohn's Breakfast Gem, C. S. Lanmeister.

Ralston Health Club Breakfast Food, made by Robinson-Danforth Co., St. Louis, Mo.

Street's Perfection Wheatine, made by S. H. Street & Co., New Haven.

Wheatena.

SUMMARY.

As appears in the following table, this report contains the results of examination of 849 articles of food of thirteen different kinds.

With the exception of Martius' yellow, found in minute quantity in certain samples of mustard, no poisonous adulterants have been found.

TABLE XXII.

	Examined.	Pure.	Doubtful.	Adulterated.
Maple Syrup	61	48	5	8
" Sugar	7	7	--	--
Sugar	16	16	--	--
Syrup	4	4	--	--
Strained Honey	48	43	--	--
Comb "	12	12	--	5
Lard	118	75	--	--
Pepper	102	62	8	43
Mustard	69	15	--	32
Cheese	72	72	--	54
Coffee	124	53	--	--
Milk	105	82	11	69
Cream of Tartar	103	73	--	12
Cereal Foods	9	9	--	31
	848	570	24	254

Of the whole number examined

67.2 per cent. were pure.

2.9 " were doubtful.

29.9 " were adulterated within the meaning of the act.

STATE LAWS REGARDING ADULTERATION OF
FOOD AND DRUGS.

The following laws regarding special forms of adulteration of food or drugs are now on the statute books of this State and, with the Pure Food Law already printed on page 2, give a complete view of our legislation on this subject.

The statute regulating the sale of imitation butter created the office of Dairy Commissioner, who is charged with the execution of the laws regarding the sale of butter, molasses and vinegar. Numerous prosecutions have been brought for violation of these laws.

No one is charged with the execution of the laws regarding Adulteration of Milk, Adulteration of Candy, Adulteration of Spirituous and Intoxicating Liquors, and Adulteration of Drugs and Medicines. Boards of Health are *permitted* to act under the statute regarding the Adulteration of Food, but we cannot learn that any action was ever brought under any of these statutes, which do not make it the duty of some official or institution to see to their enforcement.

ADULTERATION OF BUTTER.

[G. S. 1888, Ch. CLVI.]

[Amended by Ch. CXIV, Public Acts, Jan. Sess. 1893, and Ch. XXXII, Public Acts, Sess. 1895.]

SEC. 2614. Any article resembling butter in appearance and not made wholly, salt and coloring excepted, from the milk of cows, shall be imitation butter within the meaning of this chapter. The words "butter," "dairy," or "creamery" shall form neither the whole nor a part of the name of any imitation butter, or appear upon any article, or upon any box, tub, or package containing imitation butter.

SEC. 2615. No person by himself, or his agents, or servants, shall render or manufacture, sell, offer for sale, expose for sale, take orders for the future delivery of, or have in his possession with intent to sell, any article, product or compound made wholly or partly out of any fat, oil or oleaginous substance or compound thereof, not produced from unadulterated milk or

cream from the same, which shall be in imitation of yellow butter produced from pure unadulterated milk or cream of the same; provided that nothing in this act shall be construed to prohibit the manufacture or sale of oleomargarine in a separate and distinct form and in such manner as will advise the consumer of its real character free from coloration or any ingredient that causes it to look like butter. No imitation butter shall be sold or exposed for sale or delivered except under the following conditions: First, the seller shall maintain in plain sight, over or next the main outer entrance of the premises where the selling is done, a sign bearing in plain, black roman letters, not less than two inches wide and four inches long, on a white ground, the words "sold here," preceded by the name of the imitation article. If the selling is done from a wagon, or other vehicle, such vehicle shall conspicuously bear upon its outside, on both sides of said wagon or vehicle, such a sign. If the delivering is done from a wagon or other vehicle, such vehicle shall conspicuously bear, upon its outside, on both sides of said wagon or vehicle, a sign bearing in plain, black, roman letters, not less than two inches wide and four inches long, on a white ground, the words "delivered here," preceded by the name of the imitation article. Second, all imitation butter shall be kept in an enclosing package which shall bear on the outside of its body, and also of its cover, at all times in plain sight of a beholder of the package, in black, roman letters, not less than one inch wide, and two inches long, on a white or light-colored ground, the name of the imitation article.

Third, the seller shall orally inform each buyer at each sale that the article he buys is not butter, and shall give the buyer the name of the imitation article.

Fourth, every person, copartnership, or corporation, selling, or offering for sale, any imitation butter, and every keeper of a hotel boarding-house, or restaurant, temporary or permanent, who shall furnish any guest with any imitation butter, or food containing it, shall within fifteen days after the passage of this act, or within fifteen days after commencing said business, and annually on the first day of May, or within fifteen days thereafter, register in a book kept by the Dairy Commissioner for that purpose, the name and the town, street and number of street of the place of business of said person, copartnership, corporation, keeper of hotel, boarding-house, or restaurant. All signs prescribed in sections

2615, 2616 and 2617 of the General Statutes, shall be provided by the Dairy Commissioner, and all signs required, under provisions of section 2515 of the General Statutes, to be maintained in plain sight, over or next the main outer entrance of the premises where the selling is done, shall be placed in position, under the direction of the Dairy Commissioner or his deputy. All signs so furnished by the Dairy Commissioner shall be paid for by the parties receiving the same, the same to be furnished at the actual cost thereof.

SEC. 2616. No baker or vender of food shall sell or expose for sale any article of food containing imitation butter unless such baker or vender shall maintain the same kind of a sign as hereinbefore first prescribed, in the way and manner prescribed in that connection, except that the word "used" shall be substituted for the word "sold." If the selling be done from a wagon, or other vehicle, such vehicle shall conspicuously bear such a sign.

SEC. 2617. No keeper of a hotel, boarding-house, or restaurant, temporary or permanent, shall furnish any guest with any imitation butter, or food containing it, unless such keeper shall maintain in plain sight of all guests sitting at tables where food is served such a sign or signs as hereinbefore prescribed, except that the word "used" shall be substituted for the word "sold."

SEC. 2618. The Governor shall appoint a citizen of the State as a Dairy Commissioner, who shall hold office for two years from and after the first day of May succeeding his appointment, and until his successor is appointed, unless sooner removed by the Governor for cause; and in case of his death, resignation, or removal, the Governor shall fill the vacancy. It shall be the duty of the Dairy Commissioner to attend to the enforcement of this chapter throughout the State. A room in the Capitol shall be set apart for the Dairy Commissioner. He may appoint and remove a deputy, who may also act as clerk. The Dairy Commissioner and his deputy shall have free access, at all reasonable hours, for the purpose of examining into any suspected violation of this chapter, to all places and premises, apartments of private families keeping no boarders excepted, where the Dairy Commissioner or his deputy suspects imitation butter to be made, sold, or used; and on tender of the market price of good butter for the same may take from any person, firm, or corporation, samples of any articles suspected to be imitation butter. The Dairy Commissioner may have samples suspected to be imitation butter

analyzed at the Connecticut Experiment Station, or by any State chemist, and a sworn or affirmed certificate of the analyst shall be *prima facie* evidence of the ingredients and constituents of the sample analyzed. Any one refusing the Dairy Commissioner, or his deputy, access, in a reasonable manner and at a reasonable time, to premises for said purpose of examination, or refusing to sell samples as hereinbefore provided for, shall incur the penalty hereinafter first provided for violation of this chapter.

The Dairy Commissioner shall make an annual report to the Governor, and such annual reports shall be submitted to the General Assembly at its regular session.

SEC. 2619. Any person violating any of the provisions of sections 2614, 2615 or 2616, and any person except a boarding-house keeper violating section 2617, shall for the first offence be fined not more than one hundred dollars, or imprisoned not more than sixty days, or both; for any subsequent offence said fine and imprisonment shall be doubled. Any boarding-house keeper violating section 2617 shall for the first offence be fined twenty-five dollars, or imprisoned not exceeding thirty days, or both; for any subsequent offence, said fine and imprisonment last mentioned shall be doubled. Evidence of any violation of this chapter, shall be *prima facie* evidence of wilful violation, with knowledge.

ADULTERATION OF MILK.

[G. S. 1888, Ch. CLVIII.]

SEC. 2658. Whoever shall knowingly sell, supply, or bring to be manufactured to any butter or cheese manufactory in this State any milk diluted with water, or adulterated by the addition of any foreign substance, or from which any milk or cream or milk commonly known as strippings has been taken; or whoever shall knowingly bring or supply milk to any butter or cheese manufactory that is tainted or partly sour, shall forfeit not less than twenty-five nor more than one hundred dollars, with costs of suit, for the benefit of the person or persons upon whom such fraud shall be committed.

SEC. 2659. The usual test for quality and the certificate of analysis of the Director of the Connecticut Agricultural Experiment Station shall be deemed *prima facie* proof of adulteration.

SEC. 2660. No person shall sell, offer or expose for sale any milk from which the cream, or any part thereof, has been removed, without distinctly and durably affixing a label, tag, or mark of metal in a conspicuous place upon the outside, and not more than six inches from the top of every can, vessel, or package containing such milk, and such metal label, tag, or mark shall have the words "Skimmed Milk" stamped, printed, or indented thereon in letters not less than one inch in height; and such milk shall only be sold or retailed out of a can, vessel, or package so marked.

SEC. 2661. No person shall sell or offer for sale, or shall have in possession with intent to sell or offer for sale, any impure or adulterated milk.

SEC. 2662. Every person who shall violate any of the provisions of the two preceding sections shall be fined not more than seven dollars, or imprisoned not more than thirty days, or both.

SEC. 2663. A printed notice of this and the five preceding sections shall be conspicuously posted in all public places, creameries or factories where milk is received or sold.

SEC. 2664. Any person who shall knowingly sell, or expose for sale, milk, or any product of milk, from any cow which shall have been adjudged, by the Commissioners upon Diseases of Domestic Animals, affected with tuberculosis, or other blood disease, shall be fined not more than seven dollars, or imprisoned not more than thirty days, or both.

ADULTERATION OF MOLASSES.

[G. S. 1888, Ch. CLVII.]

[Amended by Ch. CCXXXVIII, Public Acts, Jan. Sess., 1889.]

SEC. 2620. It shall be the duty of the Dairy Commissioner to attend to the enforcement of the law against the adulteration of molasses and the sale of adulterated molasses, and for the purpose of examining into suspected violations of such law, he shall, at all reasonable hours, have free access to all places and premises where he suspects that molasses is adulterated or adulterated molasses is sold, and, on tender of the market price of good molasses for the same, he may take from any person, firm or corporation, samples of molasses which he suspects is adulterated;

and he may have samples of molasses suspected to be adulterated analyzed by any State chemist or by the Experiment Station, and a sworn or affirmed certificate of such analyst shall be *prima facie* evidence of the ingredients and constituents of the sample analyzed; and if such analysis shall show that the molasses is adulterated, he shall make complaint to the proper prosecuting officer that the person or persons who adulterated said molasses, or sold or exposed for sale such adulterated molasses, may be prosecuted.

SEC. 2621. Any person refusing the Dairy Commissioner or his deputy access in a reasonable manner and at a reasonable time for said purpose of examination, or refusing to sell samples as hereinbefore provided, shall be fined not more than seven dollars, or imprisoned not more than thirty days, or both.

SEC. 2622. Any person who shall adulterate any molasses, or who shall sell, or offer, or expose for sale, or who shall solicit or receive any order for the sale or delivery within this State, or for delivery without this State for shipment into this State, of any molasses adulterated with salts of tin, terra alba, glucose, dextrose, starch sugar, corn syrup, or other preparation of or from starch, shall be fined not more than five hundred dollars, or imprisoned not more than one year, or both. The delivery of any of the above mentioned preparations upon any order solicited or received within this State, shall be conclusive evidence that the order, upon which such delivery was made, was for such articles, and shall render the person soliciting or receiving such order liable to the penalty above prescribed.

ADULTERATION OF CANDY.

[Chapter CLXXXIII, Acts of Session of 1895.]

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Any person who shall adulterate candy with terra alba, barytes, talc, or any other mineral substance, or with poisonous colors or flavors, or knowingly sell or offer for sale candy so adulterated, shall be punished by a fine of not more than one hundred dollars.

AN ACT TO PREVENT FRAUD IN THE MANUFACTURE AND SALE OF VINEGAR.

[Chap. LX, Acts of Session of 1889, as amended by Chap. CCXXXIV of Acts of same Session.]

Be it enacted by the Senate and House of Representatives in General Assembly convened:

SECTION 1. No person shall make and sell, or make for sale, as cider vinegar, any vinegar not produced wholly from the juice of apples. No person shall add to any vinegar, or to any article sold or to be sold as vinegar, any drug, any hurtful or foreign substance, any coloring matter, or any acid, other than acetic. Any person violating this section of this act shall be fined fifty dollars for a first offense, and for a second or later offense he shall be fined one hundred dollars and imprisoned thirty days.

SEC. 2. No person shall make and sell, or make for sale, any vinegar not having an acetic acidity equivalent to the presence therein of not less than four per centum by weight of absolute acetic acid, and in the case of cider vinegar, not less than two per centum by weight of cider vinegar solids upon full evaporation over boiling water. No maker of vinegar shall sell the same without conspicuously branding, stenciling or painting upon the head of the barrel, cask, keg, or package containing the same, the name of the maker, his residence or place of manufacture, and in the case of cider vinegar, the words "cider vinegar," *provided* that this clause concerning marking shall not apply to retail sales, at the place of manufacture, in quantities of less than five gallons, and in open packages. Any person violating this section of this act shall be fined ten dollars for a first offense, and for a second or later offense fifty dollars.

SEC. 3. No person shall sell, or offer, or expose for sale, or exchange, or solicit, or receive any order for the sale or delivery within this State, or for delivery without this State for shipment into this State: first, any vinegar, as cider vinegar, not wholly produced from the juice of apples; or second, any vinegar, or article sold or to be sold as vinegar, in which has been added any drug, or any hurtful or foreign substance, or any coloring matter, or any acid other than acetic; or third, any vinegar not having an acetic acidity equivalent to the presence therein of not

less than four per centum by weight of absolute acetic acid, and in case of cider vinegar, not less than two per centum by weight of cider vinegar solids upon full evaporation over boiling water; or fourth, any vinegar made in this State and purchased by the person last mentioned of the maker in a barrel, cask, keg or other package not branded, stenciled or painted as required by a previous section of this act. Any person violating this section of this act shall be fined ten dollars for a first offense, and for a second or later offense fifty dollars. The delivery of any of the above mentioned articles upon any order solicited or received within this State shall be conclusive evidence that the order upon which such delivery was made was for such articles, and shall render the person soliciting or receiving such order liable to the penalty above prescribed.

SEC. 4. It shall be the duty of the Dairy Commissioner to attend to the enforcement of this act; and, for the purpose of examining into suspected violations thereof, he shall at all reasonable hours have free access to all places and premises where he suspects that any provision of this act is violated, and on tender of the market price of good vinegar therefor, he may take from any person, firm or corporation, samples of vinegar which he suspects of being made or sold in violation of this act; and he may himself analyze such samples, or have such samples analyzed by any State chemist or by the Experiment Station; and a sworn or affirmed certificate by such analyst shall be *prima facie* evidence of the ingredients and constituents of the sample analyzed; and if such analysis shall show that such sample does not conform to any requirement of this act, and shall give the Dairy Commissioner reasonable ground for belief that any provision of this act has been violated he shall make complaint to the proper prosecuting officer, to the end that the violator may be prosecuted.

SEC. 5. Any person refusing the Dairy Commissioner or his deputy access, in a reasonable manner and at a reasonable time, for said purpose of examination, or refusing to sell samples as hereinbefore provided, shall be fined not more than seven dollars, or imprisoned not more than thirty days, or both. Evidence of any violation of this act shall be *prima facie* evidence of wilful violation with knowledge.

ADULTERATION OF SPIRITUOUS AND INTOXICATING LIQUORS.

[G. S. 1888, Ch. CLXXXVII, Sec. 3100.]

Every person who shall manufacture, sell, or keep for sale, any spirituous or intoxicating liquors, or any liquors made or compounded in imitation thereof, which are adulterated with any deleterious or poisonous substance, shall be fined not more than two hundred and fifty dollars, which fine shall be paid, one-half to him who shall prosecute to effect, and the other half to the town in which such offense is committed.

ADULTERATION OF DRUGS AND MEDICINES.

[G. S. 1888, Ch. CLXXXVIII, Sec. 3129.]

Every person who shall knowingly adulterate or cause any foreign or inert substance to be mixed with any drug, or medicinal substance or preparation recognized by any pharmacopœa or employed in medical or medicinal practice, so as to weaken or destroy its medicinal effect, or shall sell such drug, or compound, knowing it to be so adulterated or mixed, shall be fined not less than ten, nor more than one hundred dollars, and upon conviction, all such adulterated or mixed articles in his possession may be seized upon a warrant issued by the court in which such conviction is had, and destroyed by the officer by whom such seizure shall be made.

ADULTERATION OF FOOD.

[G. S. 1888, Ch. CLVIII.]

SEC. 2648. The boards of health of the several cities, boroughs, and towns, in this State, may from time to time, at their discretion, procure from any dealer in provisions, groceries, medicines, or other articles of consumption, samples of such articles, and cause the same to be analyzed by one of the State chemists, and if on such analysis it shall be found that the article analyzed is adulterated with any deleterious or foreign ingredient or ingredients, other than is represented verbally and in a conspicuous

label by the seller, the chemist making the analysis shall issue his certificate setting forth the kind and quantity, as near as may be, of deleterious and foreign ingredients found in the article analyzed, and the board of health causing such analysis to be made shall cause said certificate to be published in some paper published in the city, borough, or town, or one nearest thereto, where the article analyzed was obtained, for such length of time as they may think proper, and the cost of analysis, together with the cost of the publication of the certificate, shall be paid by the person or firm from whom the article analyzed was obtained; and if such person or firm shall so elect, he or they may annex to said certificate his or their sworn affidavit, setting forth from whom the article analyzed was purchased by him or them.

SEC. 2649. In all cases where an analysis has been made according to the provisions of the preceding section, and the article or articles analyzed shall have been found pure and free from foreign ingredients, the cost of the analysis shall be paid by the city, borough, or town, whose board of health, or any officer thereof, caused such analysis to be made.

SEC. 2650. Every person who shall adulterate any sugar, or who shall knowingly sell, or offer or expose for sale any sugar which has been adulterated with salts of tin, terra alba, glucose, dextrose, starch sugar, corn syrup, or other preparation from starch, shall be fined not more than five hundred dollars, or imprisoned not more than one year.