MONTHLY AVERAGES OF BACTERIAL COUNTS AND B. COLI TESTS IN THE BALTIMORE CITY WATER SUPPLY BEFORE AND AFTER TREATMENT

Month	Grains per gallon Coagulate added	Parts per million available Cladded	Impounding reservoir effluent before addition of hypochlorite				Tunnel effluent 4.9-12.2 hrs. after treatment				First storage reservoir effluent 5-15 days after treatment		Second storage reservoir effluent 8-25 days after treatment	
			Bacteria per cc. 20° C.		B. Coli per cc.		Bacteria per cc. 20° C.		Per cent reduction		Bacteria per cc. 20° C.		Bacteria per cc. 20° C.	
Jan.	0.000	1.00	1,100	1.70	43	95.91	0.0012	99.99	28,000	0.016	26,000	0.0037		
Feb.	0.000	1.00	1,600	2.56	8	99.51	0.0022	99.99	42,000	0.0023	55,000	0.0100		
Mar.	0.000	1.00	14,000	7.21	116	99.17	0.0000	100.00	19,000	0.012	85,000	0.0120		
April	0.000	1.00	1,800	31.4	10	99.46	0.0000	100.00	80,000	0.036	80,000	0.0400		
May	0.000	1.00	9,500	27.1	12	99.88	0.094	99.66	19,000	0.062	7,000	0.0790		
June	0.952	1.00	2,400	39.0	81	96.61	0.33	99.16	100	0.120	525	0.120		
Average			5,100	13.16	45	99.11	0.0712	99.46	31,428	0.0414	41,917	0.0441		
37° C.														
July	1.05	1.25	4,200	2.80	42	99.01	0.0000	100.00	27	0.0020	180	0.0070		
Aug.	0.846	1.50	550	40.0	23	95.71	0.0020	99.99	36	0.019	210	0.0300		
Sept.	0.867	1.50	450	42.6	67	85.08	0.0030	99.99	300	0.251	225	0.178		
Oct.	0.506	1.50	240	26.0	31	87.25	0.0025	99.99	48	0.300	55	0.300		
Nov.	0.610	1.50	875	24.2	33	96.22	0.095	99.61	24	0.083	26	0.096		
Dec.	0.000	1.50	325	7.81	36	88.58	0.064	99.20	35	.0014	30	0.0010		
Average			1,100	23.9	38	91.97	0.0277	99.79	79	0.109	120	0.102		

TYPHOID FEVER IN BALTIMORE, JAN., 1906, TO DEC., 1912, SHOWING DECREASE IN MORBIDITY AND MORTALITY SINCE THE USE OF HYPOCHLORITE

Month	1906		1907		1908		1909		1910		Average 1906-1910		1911		1912	
	Case incidence	Deaths	Case incidence	Deaths	Case incidence	Deaths	Case incidence	Deaths	Case incidence	Deaths	Case incidence	Deaths	Case incidence	Deaths	Case incidence	Deaths
Jan.	31	12	43	12	47	7	39	16	40	7	40	7	55	11	47	9
Feb.	31	6	16	5	26	9	23	3	25	11	24	11	31	3	28	7
Mar.	25	6	37	6	36	3	20	5	30	12	29	6	35	5	33	11
April	67	11	35	17	24	2	22	4	22	4	36	11	44	8	37	10
May	143	12	65	3	40	3	23	5	31	2	60	5	56	7	30	3
June	87	5	41	6	47	3	41	6	46	8	52	4	34	8	57	3
July	105	14	78	22	149	24	107	11	110	7	110	16	89	4	98	15
Aug.	284	34	217	23	339	35	217	20	473	30	306	28	280	22	198	22
Sept.	206	32	469	41	364	29	312	24	398	49	349	35	241	31	212	18
Oct.	125	26	241	47	187	30	138	23	359	42	210	34	170	28	190	12
Nov.	59	15	87	31	99	25	61	10	251	37	111	24	104	19	77	9
Dec.	46	10	91	7	68	10	66	9	106	26	75	14	62	8	76	17
	1209	183	1420	230	1426	180	1069	136	1891	235	1403	193	1201	154	1083	136

and almost entire elimination of the members of the *B. coli* group, the treated water during three months showing none of these organisms at any time in 100 cc.

The reduction in the number of cases of typhoid fever occurring in Baltimore during 1912 is 31 per cent, compared with an average of the number of cases occurring during the years from 1906 to 1910, and 24 per cent, compared with the number of cases occurring during 1911, in the last six months of which the water supply was treated.

We wish to acknowledge indebtedness to Mr. Ezra B. Whitman, Water Engineer, and to Mr. Emory Sudler, Engineer in charge of the improvement of the water supply, for an interest unusual with engineers not directly acquainted with the details of the laboratory work.

WATER DEPARTMENT
CITY OF BALTIMORE

WILD LETTUCE RUBBER¹

By CHARLES P. FOX

We have in the Central United States, two representatives of the *Compositae* which might be regarded

¹ Paper presented at the Annual Meeting of the American Chemical Society, Milwaukee, March, 1913.

as possible rubber producers. These are members of the genus *Lactuca* (Wild Lettuce), one of these species, *L. Canadensis*, being a native while the other, *L. Scariola*, is of European origin. Both are widely distributed and in some sections are very abundant and often regarded as troublesome weeds.

Lactuca Canadensis.—A native biennial plant found growing everywhere across the continent from Oregon to the Carolinas. A vigorous, robust plant, three to twelve feet high; stems stout, hollow, purple; leaves, large, irregularly cut and toothed, dull green; flowers small, numerous, yellow to white; seeds small with usual cottony appendages which aid in its distribution; odor strong, acrid. All portions of the plant, especially the stem, secrete, when bruised, an abundance of thick latex which rapidly coagulates to a yellowish semi-solid. Found in damp situations, growing upon rich soil, especially on newly cleared lands. Known as "Fireweed," "Trumpetweed."

Lactuca Scariola.—A naturalized annual from Europe. Stem three to four feet high, erect, branching, armed with stiff, sharp spines; leaves opposite, oblong, sessile or clasping, armed; flowers, numerous,

small, yellow. The latex, while similar to that of *L. Canadensis*, is not as abundant. *L. Scariola* lacks the strong characteristic odor noticed in its relative. Found abundantly throughout Eastern United States flourishing under the most adverse conditions. Although regarded as an unimportant weed by Darlington in his "American Weeds and Useful Plants," published in 1847, it has spread through the greater part of the pluvial portion of the United States, and is now regarded as one of our most troublesome weeds. It thrives upon soils regardless of their lack of plant food or moisture. This plant is often mistaken for "Sow-thistle" (*Sonchus*), commonly known as "Hungarian Lettuce."

The latexes of these plants contain rubber, a waxy acetone soluble body [resin(?)], and a substance of acid nature soluble in weak alkalies, and of intensely bitter taste.

COMPOSITION OF LACTUCA LATEXES

	<i>Lactuca canadensis</i> Per cent	<i>Lactuca scariola</i> Per cent
Resin(?).....	11.42	12.85
Rubber.....	2.19	1.58

Rubber.—The quality of the rubber obtained from both these species is exceptionally good, being very firm and strong. There seems to be very little difference in quality between the two products. In quantity the latex of the native species is the richer. In preparing these rubbers, it was necessary, on account of the presence of the acid-like substance, to heat the crude acetone precipitate with boiling alcoholic potash or to precipitate directly the benzole rubber solution with this reagent, and then purify the resin extract.

Resin.—The purified acetone extract is a brittle, light brown substance of waxy feel, and slight bitter taste. Soluble in acetone, alcohol, glacial acetic acid and benzole.

Organic Acid(?)—Insoluble in hot water; insoluble in acetone; soluble in weak alkalies to a fine cherry-red solution. Intensely bitter taste; characteristic plant odor.

Lactuca Canadensis contains, according to Maisch,¹ a bitter principle which has been pronounced equal to *lactucarium* of German origin. *Lactucarium* is a recognized drug of the pharmacopoeia, classified as a *sedative* and *diuretic*, and known as "lettuce opium" on account of its medicinal action which is due to *lactucin* or *lactucic acid*.

Lactucarium is an imported drug originating in Scotland, Rhenish Prussia, and France. In Scotland its production is an industry. The combined production of *lactucarium* and *rubber* may be a possible industry for the North Temperate Zone

AKRON, OHIO

A COMPARATIVE STUDY OF THE COMPOSITION OF HOPS GROWN IN DIFFERENT PARTS OF THE WORLD²

By H. V. TARTAR AND B. PILKINGTON

In the markets, hops grown in different parts of the world sell for different prices. In this country

¹ A. J. P., 1869, p. 145.

² Paper presented at the Annual Meeting of the American Chemical Society, Milwaukee, March, 1913.

New York hops usually sell at a higher figure than Pacific Coast hops. In the autumn of 1911, while Oregon hops were selling for 40 to 45 cents a pound, New York hops sold for 55 cents a pound and the Saaz hops imported from Europe sold for more than \$1.00 a pound.

Upon observing such a condition as this, one is naturally led to ask: Why all this difference in price? Is the composition of hops from one locality so widely different from those of another locality as to make them have so much greater value for brewing purposes? Does the climatic conditions of different countries so vastly affect the actual value of hops?

The writers tried putting such questions as these to men who had been long engaged in hop growing and buying. In response, various and often very conflicting answers were received. The answers obtained from different brewers were quite as much at variance. In fact, out of all the answers received to our questions, there were not two that exactly agreed. The data obtained would not permit of any definite conclusion, except that people of long experience in the commercial valuation of hops were widely at variance, and no doubt, in many instances, governed by prejudice.

Consequently, in the autumn of 1911, a chemical study of hops from various localities was begun, the object of the study being to ascertain what differences there are in the composition of hops grown in different parts of the world. The samples of Oregon were selected by chemists from this laboratory and were representative. Doctor Alfred C. Chapman, a British chemist who has carried on extensive hop investigations, selected the English samples. We are indebted to Mr. Paul Weidner, Sr., an experienced and reliable hop dealer of Detroit, Michigan, for the samples of Washington (state) hops and also the two samples of Saaz hops. Mr. E. Clemens Horst, who grows hops extensively in the state of California, secured the samples of Californians. At the suggestion of the Director of the New York Agricultural Experiment Station (at Geneva, N. Y.), Mr. E. J. Conger, of Waterville, New York, was employed to select the samples from that state. Doctor A. J. Lehedler, of the Pabst Brewing Company, at Milwaukee, selected the samples of Wisconsin. All the samples were as representative as could be secured in this way from the different localities from which they were chosen.

The samples were taken soon after the hop harvest and were analyzed within a few weeks after reaching the laboratory. Meanwhile, they were carefully stored in a cold, dry room to prevent any marked changes in composition from taking place.

Because of the nature of the literature on the chemical composition of the hop, it may be well to state, by way of explanation, that investigators are agreed that the principal constituents of the hop cone are: a volatile oil, a hard resin commonly designated as the "gamma" resin, two soft bitter resins designated as the "alpha" and "beta" resins, a wax, and a tannin. The constituents designated as resins are not true resins,