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Iodine and goiter in Utah and use of the Cottrell precipitator in iodine analysis.

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In reviewing the iodine determinations of drinking water from the State of Utah made in this laboratory (some of these determinations being made by J. C. Hathaway, H. H. Vanderslins, Clarence Dahl) it was found there was not a very close relationship between iodine and freedom from goiter. In some cases a number of determinations were made on the same water supply and the iodine content was found to vary at different times.

In the case of the water supply of Stanford University a chemist who had worked on these iodine determinations actually collected and evaporated the water and yet it varied considerably during different months.

Since the enlargement of the thyroid is the result of iodine deficiency during several years, even though the child has not changed its residence during this period, the immediate iodine content of the water supply would not be expected to bear a very close relation to the size of the thyroid. If, however, a large number of cases are taken it is always found that where there is a low average iodine content of the water there is higher average incidence of goiter among school children as shown in the following table:

TABLE I.

Iodine in parts per billion	City	County	Per cent goiter in schools
.01	Ogden	Weber	53.
	Parowan	Iron	69.1
	Vernal	Uintah	40.8
	Nephi	Juab	64.3
	Kamas	Summit	46.4
	Park City		42.2
.16	Salt Lake City	Salt Lake	41.6
.18	Alpine		57.
.33	Syracuse	Davis	23.1
	Millcreek	Salt Lake	42.5
.36	Oak City	Millard	82.2
.4	Logan City	Cache	40.5
	Ft. Duchesne	Ninta	71.7
			Average 52
.5	Murray	Salt Lake	34.4
	W. Warren		7.1
.6	Brigham City	Boxelder	29.0
	Santaquin		45.
	Butler School	Salt Lake	67.3
.7	Farmington	Davis	54.5
	Huntsville	Weber	41.1
.6	Kaysville	Davis	49.1
.9	Mt. Pleasant	Sampete	58.6
	Levan	Juab	73.4
2.16	Lakeview		6.
2.5	Goshen		15.
9.5	Milford	Beaver	23.
			Average 39

In this table there are twenty-six towns. Thirteen with low iodine show an average of 52 per cent goiter in the schools. The thirteen with high iodine show an average of 39 per cent goiter in the schools. One town, Huntsville, in Weber County, with 41.1 per cent goiter in the school, showed on one analysis high iodine (7.07), and in another analysis low iodine (0.22). It was included in the table, and yet its inclusion in either the high or the low would not materially affect the average. At Kaysville one analysis showed 0.06 iodine and a later one 1.6. Both of these would be in the high group. The figure for Alpine is for Alpine Canyon, Grove Creek having 0.43 I_2. In order to get a closer correlation it is necessary to determine the iodine in the foodstuffs since usually the pupil gets more iodine from foodstuffs than water and the foodstuffs are not always grown on the water-shed from which the water comes.

In the determination of iodine in foodstuffs it is necessary to completely burn the organic matter and it is difficult to collect all

of the iodine from the smoke. The smoke may be passed through a number of wash bottles and not catch all the solid particles. The method of passing it between a hot and cold tube is somewhat cumbersome. The Cottrell precipitator described by Harold C. Webber[1] was found to be effective provided that the smoke did not pass through it too rapidly. The apparatus was simplified in that the beaker was dispensed with, the side arms put on at right angles and a platinum wire was fastened in the center of the precipitated tube by passing it through rubber stoppers at the two ends of the tube and attaching it to one of the secondary binding posts of the Ford spark coil. A split brass tube was clamped around the outside of the lead glass precipitating tube and attached to the other secondary terminal of the coil (the common or ground terminal). In burning a pound or more of foodstuff it is necessary to have a battery of these precipitators or make the tube much longer. The smoke sticks to the platinum wires and they are withdrawn and coiled around a silica rod and burned in a small combustion tube to free the iodine.

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Composition of rats on low magnesium diet.

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Three rats were fed on diets of purified casein, glucose (cerelose) and cod liver oil, with a salt mixture of NaCl, $CaCO_3$, K_2HPO_4 and $Fe_2(SO_4)_3$. Analysis of the ash of samples of these diets showed that they contained 1.2 mg. magnesium per 100 gm. of diet. The rats were kept on the diets 20, 20 and 100 days respectively. The ash of the rats contained 23, 14 and 31 mg. magnesium, or 0.030, 0.029 and 0.026 per cent of their respective body weights. The corresponding control rats contained 24, 15 and 36 mg., which was .039, .043 and .037 per cent

[1] Webber, H. C., *J. Ind. and Eng. Chem.*, 1924, xvi, 1241.