

ON THE OCCURRENCE OF TIN IN CANNED FOOD.

BY H. A. WEBER, PH. D.

The following investigation of the condition of foods packed in tin cans was prompted by an alleged case of poisoning, which occurred at Mansfield, Ohio, in April, 1890. A man and woman were reported to the writer as having been made sick by eating pumpkin pie made from canned pumpkin. The attending physician pronounced the case one of lead poisoning. The wholesale dealer from whose stock the canned pumpkin originally came, procured a portion of the same at the house where the poisoning occurred, and sent it to the writer for examination.

The results of the examination as reported in Serial No. 552, below, showed that the canned pumpkin contained an amount of stannous salts equivalent to 6.4 maximum doses and 51.4 minimum doses of stannous chloride per pound. On being notified of this fact, the dealer sent a can of the same brand of pumpkin from his stock. The inner coating of the can was found to be badly eroded, and upon examination, as reported in Serial No. 563, below, one pound of the pumpkin contained tin salts equivalent to 7 maximum and 56 minimum doses of stannous chloride.

The unexpected large amount of tin salts in such an insipid article as canned pumpkin, and the claimed ill effects of the consumption of the same, suggested the advisability of extending the investigation to other canned goods in common use. Accordingly a line of articles was purchased in open market as sold to consumers, no pains being taken to procure old samples. The collection embraced fruits, vegetables, fish and condensed milk. With the exception of the condensed milk, every article examined was contaminated with salts of tin. In most cases the amount

of tin salts present was so large that there can be no doubt of danger to health from the consumption of the food, especially if several kinds are consumed at the same meal.

METHOD.

The method employed in the determination of the tin was simply as follows :

The contents of each can were emptied into a large porcelain dish, and the condition of the inner coating of the can noted. After thoroughly mixing the contents, fifty grams were weighed off and incinerated in a porcelain dish of suitable size. The residue was treated with a large excess of concentrated hydrochloric acid, evaporated to dryness, moistened with hydrochloric acid, water was added, and the mass was filtered and washed, the insoluble matter being all washed upon the filter. After drying the filter with its contents, the whole was again incinerated in a porcelain dish and the residue treated as before. The solution thus obtained was properly diluted and saturated with hydrogen sulphide. After standing about twelve hours in a covered beaker the precipitate was filtered off and the tin weighed as stannic oxide.

RESULTS OF EXAMINATION.

Serial No. 552.—Sample of canned pumpkin, received of F. A. Derthick, April 22, 1890, sent by Albert F. Remy & Co., Mansfield, Ohio. Pie made from it supposed to have made a man and woman sick. The attending physician pronounced the case one of lead poisoning.

| | |
|--------------------------------------|---------|
| Tin dioxide with trace of lead..... | 0.0424% |
| Grains per pound..... | 2.97 |
| Equivalent to stannous chloride..... | 3.74 |
| Minimum doses..... | 51.4 |
| Maximum doses..... | 6.4 |

Serial No. 563.—Sample of canned pumpkin, received of Edward Bethel, June 27, 1890. Labeled : Choice Pie Pumpkin, packed at Salem, Columbiana County, Ohio, by G. B. McNabb, sent by A. F. Remy & Co., Mansfield, Ohio.

| | |
|--------------------------------------|---------|
| Tin dioxide..... | 0.0444% |
| Grains per pound..... | 3.11 |
| Equivalent to stannous chloride..... | 3.91 |
| Minimum doses..... | 56. |
| Maximum doses..... | 7. |

Can eroded.

Serial No. 565.—Sample of canned pumpkin, bought of T. B. Vaure, July 11, 1890. Labeled: Belpre Pumpkin, Golden. George Dana & Sons, Belpre, Ohio.

| | |
|--------------------------------------|---------|
| Tin dioxide..... | 0.0054% |
| Grains per pound..... | 0.38 |
| Equivalent to stannous chloride..... | 0.48 |
| Minimum doses..... | 7.7 |
| Maximum doses..... | 1.0 |

Can eroded.

Serial No. 566.—Sample of canned Hubbard Squash, bought of T. B. Vaure, July 11, 1890. Labeled: Ladd Brand, L. Ladd, Adrian, Michigan.

| | |
|--------------------------------------|--------|
| Tin dioxide..... | 0.026% |
| Grains per pound..... | 1.85 |
| Equivalent to stannous chloride..... | 2.33 |
| Minimum doses..... | 37.00 |
| Maximum doses..... | 4.7 |

Can badly eroded.

Serial No. 567.—Sample of canned tomatoes, bought of T. B. Vaure, July 11, 1890. Labeled: Extra Fine Tomatoes. Blue Label. Curtice Bros. Co., Rochester, N. Y.

| | |
|--------------------------------------|--------|
| Tin dioxide..... | 0.012% |
| Grains per pound..... | 0.84 |
| Equivalent to stannous chloride..... | 1.06 |
| Minimum doses..... | 16.00 |
| Maximum doses..... | 2.00 |

Inner coating eroded.

Serial No. 568.—Sample of canned tomatoes, bought of T. B. Vaure, July 11, 1890. Labeled: Fresh Tomatoes, Curtice Bros Co., Rochester, N. Y.

| | |
|--------------------------------------|--------|
| Tin dioxide..... | 0.014% |
| Grains per pound..... | 0.98 |
| Equivalent to stannous chloride..... | 1.23 |
| Minimum doses..... | 19.00 |
| Maximum doses..... | 2.5 |

Can eroded.

Serial No. 569.—Sample of canned peas, bought of T. B. Vaure, July 11, 1890. Labeled : Petites Pois, P. Emillien, Bordeaux.

| | |
|--------------------------------------|---------|
| Copper oxide..... | 0.0294% |
| Grains per pound..... | 2.06 |
| Equivalent to copper sulphate..... | 3.95 |
| Tin dioxide..... | 0.0068 |
| Grains per pound..... | 0.48 |
| Equivalent to stannous chloride..... | .60 |
| Minimum doses..... | 9.6 |
| Maximum doses..... | 1.2 |

No visible erosion.

Serial No. 570.—Sample of canned mushroom, bought of T. B. Vaure, July 11, 1890. Labeled : Champignons de Choix. Boston fls. Paris.

| | |
|--------------------------------------|--------|
| Tin dioxide..... | 0.020% |
| Grains per pound..... | 1.40 |
| Equivalent to stannous chloride..... | 1.76 |
| Minimum doses..... | 28. |
| Maximum doses..... | 3.5 |

Inner coating highly discolored.

Serial No. 571.—Sample of canned blackberries, bought of T. B. Vaure, July 11, 1890. Labeled : Lawton Blackberries. Cur-tice Bros. Co., Rochester, N. Y.

| | |
|--------------------------------------|---------|
| Tin dioxide..... | 0.0114% |
| Grains per pound..... | 0.80 |
| Equivalent to stannous chloride..... | 1.01 |
| Minimum doses..... | 16. |
| Maximum doses..... | 2. |

Inner coating eroded.

Serial No. 572.—Sample of canned blueberries, bought of T. B. Vaure, July 11, 1890. Labeled: Blueberries. Eagle Brand, packed by A. & R. Loggie, Black Brook, N. B.

| | |
|--------------------------------------|-------|
| Tin dioxide..... | 0.03% |
| Grains per pound..... | 2.10 |
| Equivalent to stannous chloride..... | 2.64 |
| Minimum doses..... | 42.00 |
| Maximum doses..... | 5.3 |

Can badly eroded.

Serial No. 574.—Sample of canned salmon, bought of T. B. Vaure, July 11, 1890. Labeled: Best Fresh Columbia River Salmon, Eagle Canning Co., Astoria Clatsop Co., Oregon.

| | |
|--------------------------------------|---------|
| Tin dioxide..... | 0.0134% |
| Grains per pound..... | 0.94 |
| Equivalent to stannous chloride..... | 1.18 |
| Minimum doses..... | 18.9 |
| Maximum doses..... | 2.3 |

Inner coating eroded.

Serial No. 578.—Sample of canned pears, received of Mr. Edward Bethel, July 29, 1890. Labeled: Bartlett Pears. Solan's Brand, Packed in Solano Co., California.

| | Juice. | Fruit. |
|-------------------------------------|---------|---------|
| Tin dioxide..... | 0.0074% | 0.0074% |
| Grains per pound..... | 0.518 | 0.518 |
| Equivalent to stannous chloride.... | 0.65 | 0.65 |
| Minimum doses..... | 10.4 | 10.4 |
| Maximum doses..... | 1.3 | 1.3 |

Can eroded.

Serial No. 579.—Sample of canned peaches, received of Edward Bethel, July 29, 1890. Labeled: Peaches, Wm. Maxwell, Baltimore, U. S. A.

| | Juice. | Fruit. |
|-------------------------------------|---------|---------|
| Tin dioxide..... | 0.0324% | 0.0414% |
| Grains per pound..... | 2.268 | 2.898 |
| Equivalent to stannous chloride.... | 2.85 | 3.65 |
| Minimum doses..... | 45.6 | 58.4 |
| Maximum doses..... | 5.7 | 7.3 |

Can badly eroded.

Serial No. 580.—Sample of canned blackberries, received of Edward Bethel, July 29, 1890. Labeled: Blackberries, Clipper Brand, Wm. Munson & Sons, Baltimore, Md.

| | |
|--------------------------------------|--------|
| Tin dioxide..... | 0.060% |
| Grains per pound..... | 4.20 |
| Equivalent to stannous chloride..... | 5.28 |
| Minimum doses..... | 84.0 |
| Maximum doses..... | 10.6 |

Can badly eroded.

Serial No. 581.—Sample of canned cherries, received of Edward Bethel, July 29, 1890. Labeled: Red Cherries, Cloverdale Brand, G. C. Mournaw & Co., Cloverdale, Va.

| | |
|--------------------------------------|---------|
| Tin dioxide..... | 0.0414% |
| Grains per pound..... | 2.898 |
| Equivalent to stannous chloride..... | 3.65 |
| Minimum doses..... | 58.4 |
| Maximum doses..... | 7.3 |

Can badly eroded.

Serial No. 582.—Sample of canned pumpkin, received of Edward Bethel, July 29, 1890. Labeled: Royal Pumpkin, Urbana Canning Co., Urbana, Ohio.

| | |
|--------------------------------------|---------|
| Tin dioxide..... | 0.0184% |
| Grains per pound..... | 1.299 |
| Equivalent to stannous chloride..... | 1.62 |
| Minimum doses..... | 25.9 |
| Maximum doses..... | 3.2 |

Can eroded.

Serial No. 583.—Sample of canned baked sweet potatoes, received of Edward Bethel, July 29, 1890. Labeled: Tennessee Baked Sweet Potatoes, Capital Canning Co., Nashville, Tenn.

| | |
|--------------------------------------|---------|
| Tin dioxide..... | 0.0132% |
| Grains per pound..... | 0.92 |
| Equivalent to stannous chloride..... | 1.16 |
| Minimum doses..... | 18.5 |
| Maximum doses..... | 2.3 |

Can eroded.

Serial No. 584.—Sample of canned peas, received of Edward Bethel, July 29, 1890. Labeled : Marrowfat Peas, Parson Bros., Aberdeen, Maryland.

| | |
|--------------------------------------|---------|
| Tin dioxide..... | 0.0044% |
| Grains per pound..... | 0.30 |
| Equivalent to stannous chloride..... | 0.38 |
| Minimum doses..... | 6.2 |
| Maximum doses..... | 0.8 |

Can slightly eroded.

Serial No. 585.—Sample of string beans, received of Edward Bethel, July 29, 1890. Labeled : String Beans. Packed by H. P. Henningway & Co., Baltimore City, Md.

| | |
|--------------------------------------|---------|
| Tin dioxide..... | 0.0154% |
| Grains per pound..... | 1.08 |
| Equivalent to stannous chloride..... | 1.36 |
| Minimum doses..... | 21.7 |
| Maximum doses..... | 2.7 |

Can eroded.

Serial No. 586.—Sample of canned salmon, received of Edward Bethel, July 29, 1890. Labeled : Puget Sound Fresh Salmon, Puget Sound Salmon Co., W. T.

| | |
|--------------------------------------|---------|
| Tin dioxide..... | 0.0044% |
| Grains per pound..... | 0.30 |
| Equivalent to stannous chloride..... | 0.38 |
| Minimum doses..... | 6.20 |
| Maximum doses..... | 0.8 |

Can slightly eroded.

Serial No. 587.—Sample of condensed milk, received of Edward Bethel, July 29, 1890. Labeled : Borden's Condensed Milk. The Gail Borden Eagle Brand, New York Condensed Milk Co., 71 Hudson street, New York :

| | |
|------------------|-------|
| Tin dioxide..... | none. |
|------------------|-------|

No visible erosion.

Serial No. 592.—Sample of canned pineapples, bought of Mr. Brown, Fifth avenue, August 4, 1890. Labeled: Pineapples, First Quality. Packed by Martin Wagner & Co., Baltimore, Md.

| | |
|--------------------------------------|---------|
| Tin dioxide..... | 0.0098% |
| Grains per pound..... | 0.686 |
| Equivalent to stannous chloride..... | 0.864 |
| Minimum doses..... | 13.6 |
| Maximum doses..... | 1.7 |

Can eroded.

Serial No. 593.—Sample of canned pineapples, bought of Mr. Brown, Fifth avenue, August 4, 1890. Labeled: Florida Pine-apple, Oval Brand. Extra Quality. A. Booth Packing Co., Baltimore, Md.

| | |
|--------------------------------------|---------|
| Tin dioxide..... | 0.0158% |
| Grains per pound..... | 1.11 |
| Equivalent to stannous chloride..... | 1.4 |
| Minimum doses..... | 22.4 |
| Maximum doses..... | 2.8 |

Can eroded.

A NEW FORM OF VOLTAMETER.

BY DR. G. C. CALDWELL.

In the recent development of electrolytic analysis it has come to be shown that a more careful adjustment of the strength of the current is essential, and that for much of the work very weak currents, evolving even as little as 0.1 or 0.2 c.c. of oxy-hydrogen gas per minute must be used for the best results; and it is not often, for any practicable determinations, that a current yielding over 10 c.c. per minute is required.