

(No. 53.)



PARLIAMENT OF TASMANIA.

GOVERNMENT ANALYST:

REPORT FOR 1896.

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Government Laboratories, Hobart, 5th October, 1897.

1. HAVE the honour to forward herewith a statement of substances examined during the year 1896, with notes on the various results obtained.

The samples of tea, although by far the most numerous, have of late years represented but a very small proportion of the work done; while the number of other analyses was nearly twenty per cent. more than in the previous year.

The requirements of the Customs increased almost daily, not only for revenue protection, but also for the public safety, as in the case of explosives and kerosene; the Railway Department sent many waters, &c., while, in connection with agriculture, large numbers of manures, spraying chemicals, and sugar beet were examined.

The development of mining, and the activity of the Council of Agriculture in connection with the Manures Adulteration Act, &c., together with the question of drawbacks on re-exported dutiable goods, all promise further demands for analysis.

The subjoined note on poisons was supplied by request to the journal of the trade most interested in their sale, and is attached as embodying suggestions, which, if adopted, would be practically final in that direction.

I have the honour to be,

Sir,

Your obedient Servant,

W. F. WARD, Government Analyst.

The Honourable the Chief Secretary.

COLOURING OF ΤΗΕ POISONS.

By W. F. WARD, Government Analyst of Tasmania.

THE first duty of the toxicologist is to lessen, by every means in his power, the necessity for his own employment in post mortem searches for poison; in other words, to use his special knowledge and experience, above all, for protection, and so do away with any need for detection. The necessity for action in this direction is shown by cases in various Colonies in which uncoloured or feebly coloured poisons have been, by accident or design, mixed with sugar, flour, or other food—a notable instance being that of the Queensland shearers, poisoned by strychnine. Further, arsenic may not, in some places at least, be sold without full entry and a witness, but it may be obtained in considerable quantity without these safeguards if slightly coloured and sold as a vermin-killer, the pigments used, such as oxide of iron or Prussian blue, being also practically worthless as aids in detection.

Again, cyanide of potassium appears to be sold, without registration or question, to any soi-disant photographer. Much greater protection can be given, and should at once be given, by-

1. Total stoppage of all unregistered sales.

- Increasing the difficulty of intentional poisoning.
 Removing all possible excuse for, or risk of, accidental poisoning.
- 4. Facilitating detection till it amounts to practical certainty.

Improvements 2, 3, 4 would all be fully secured by the compulsory addition to all poisons sold of certain compounds of chromium, such addition to be in one certain large and absolutely invariable

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proportion, both poison and additions to be in uniformly fine powder, and so not separable mechanically; but necessary exceptions, of course, to be provided for. The chromium compounds are the oxide and the tartrate of chromium and potassium, which possess the following advantages:— Oxide of chromium is bright green, and this colour is already very generally associated with poisonous properties; it is insoluble in water, dilute acid, or alkali; is not absorbed if taken internally, and so could be detected, and its amount determined at any time after death, burial, or even cremation, and the amount of poison with which it had been mixed thus estimated, although all trace of the poison itself had disappeared. Further, chromium is not a natural constituent of the body; is not used internally as medicine; and is not in any way likely to be present in articles of food or drink.

The double tartrate of chromium and potassium is soluble, and so would defeat attempts to separate an *uncoloured* poison from a mixture containing both it and the insoluble oxide; it would also be used in soluble preparations and fly-papers. The adoption of these suggestions, mainly due to Mr. A. H. Allen, of Sheffield, would also cut much of the ground from under the feet of the opponents of cremation, and would prevent the occurrence of much unjustifiable suspicion of poisoning or attempt, not only as regards man, but in relation to domestic pets, stock, &c.' This course has now for some years been advised by me as Government Analyst of Tasmania, and that colony may, perhaps, lead the world in this direction, as it has already in another, by adopting the Hare system of voting.

Increased facilities of travel give greater opportunities for obtaining poison without exciting suspicion, and the benefits from the change proposed would be greatly enhanced by concerted action. Would it not be advisable in these days of federal action or anticipation that the various official analysts should meet and confer on this and many other points in their work in which uniformity is most desirable?—*Chemist and Druggist.*

Substance examined.	For the Government.	For Munici- palities.	For Private Individuals.	TOTALS.	See Note
Tea Milk	$\begin{array}{c} 1775\\5\end{array}$		1	1776 27	1 18
Butter Bread Meat	1 		···· . 1		2
SpiritsBeer	24 3	8	····	$3\overline{2}$ 3	23
Vinegar and Acetic Acid Pickles Water	74 25	 1 1	•••	$\begin{array}{c} 74 \\ 1 \\ 26 \end{array}$	33 13
Essences	476	 3	 1	4 11	1 7
Spraying Chemicals and Drugs Amygdaline	33 3	 12 	2	47 3	· 9 3
Phosphorus Kerosene Shale and other Oils	2 35 83	••••		2 35 85	 98
Soil and Manure Beetroot for Sugar	1 35		25 2	26 37	
Coal Fireclay Explosives	1	••••		4 1 93	 1 35
Ores. Sundry	34 30		161 23	195 5 3	 4
TOTALS	2274	50	222	2546	

STATEMENT of Examinations made in the Government Laboratories during the Year 1896.

Note.—The figures in the last column show adulterations or defects detected in the case of articles of Food or Drink, most of the others being cases in which the Customs were enabled to charge higher duty, or in which faulty condition of Explosives was detected.

TEA (1776).

Under the present low standard only one consignment was rejected, but tea of the exceedingly low quality formerly met with is not now imported, in consequence of the risk of condemnation. Most of the very cheap teas are deficient in strength, but, in view of the usual faulty method of infusion, whereby an excessive proportion of taunin is dissolved out, this may be regarded as beneficial rather than otherwise.

M1LK (27).

Thirteen samples were found to be more or less adulterated, and in the worst cases the vendors were prosecuted in Hobart and Launceston, and moderate fines inflicted. Some doubt was suggested as to the fairness of judging milk by a fixed standard, but it was pointed out that the milkman could always appeal to the cows themselves by having analysis made of milk drawn directly from them. In one case where this was done the result showed distinctly that more water had been added to the sample in dispute than was calculated from standard and certified. One sample consisted of two measures of water to three of milk, while another contained only one-third the proportion of cream to be found in a good milk. The yield from a single cow gave a thick deposit, had the unusual high proportion of 17.5 per cent. of total solids, and showed under the microscope an enormous number of cells resembling pus in appearance, but not otherwise. Other tests, made separately of the yields from different quarters of the udder, showed similar cells in every case, and the milk was, of course, quite unfit for human food.

Colostrum or beastings was in one case sold as ordinary milk ; this, the first yield after calving, is a strong natural aperient, and might therefore seriously affect young children.

BUTTER (3).

A sample sold in Hobart, and some butter supplied to the Launceston Hospital, both contained an undue proportion of curd, the decomposition of which had produced the usual objectionable cheesy smell and taste.

SPIRITS (32).

Many of these were "methylated spirits," found on importation to be not sufficiently unfitted for drinking purposes. This was due to the fact that a comparatively pure methyl alcohol had been added instead of commercial wood spirit, which latter is nauseous and highly deleterious, not from the methyl alcohol present, but from the impurities associated with it.

Three spirits sold as whisky were tested for the Inspector of Stills and Beer Duties, and recognised as not being genuine, having been prepared from molasses, and containing much fusel oil. These examinations were made in connection with a charge of illicit distillation, which necessitated giving evidence at Wynyard.

"Chinese wine" and "medicine wine" were found to be import names for varieties of rice spirit.

Of eight hotel samples taken in Hobart, one was adulterated with water, being 38.2 underproof, the legal minimum being 25 under-proof.

BEER (3).

These were temperance drinks tested for alcohol for the Inspector of Beer Duties.

VINEGAR AND ACETIC ACID (74).

The duty ranges from two to nine pence per pint according to strength of acid, which may vary from vinegar with three per cent. up to, practically, pure acid. Acetic acid appears to be largely imported for conversion into vinegar, although it has been ruled by an English Court that "coloured and diluted acetic acid is not vinegar, any more than coloured and diluted spirit is wine." The revenue must lose largely by this, as one gallon of strongest acid paying six shillings duty would make, with colouring, &c., about 34 gallons of saleable vinegar. The duty on vinegar is one shilling per gallon, so that each gallon of this acid may represent a Customs loss of twenty-eight shillings.

Several so-called vinegars, ready coloured and containing 14 to 33 per cent. of acid, were tested; one gallon of these, by simply adding water, would make $4\frac{1}{2}$ to 11 gallons of moderate strength. Another acid, also apparently intended for such dilution, was uncoloured, but was ready flavoured with acetic ether to increase the resemblance to genuine vinegar.

It is evident, therefore, that the present tariff not only strongly encourages the making of factitious, as against the importation of genuine vinegar, but does so at the expense of the revenue.

WATER (26).

Eighteen of these were examined for the General Manager of Railways as to their fitness for use in locomotive boilers, and seven were found to be more or less unfit for that purpose, unless subjected to some previous treatment. The total dissolved solids varied from 3 to 82 grains, and the combined chlorine from 1 to 31 grains per gallon. Experiments and recommendations as to treatment of such waters before use were made, also tests of material to be used. Several samples were examined for the Central and Local Boards of Health; three taken from the Clyde River were very impure; a "mineral water" contained 278 grains of solids per gallon, mainly salts of lime and magnesia, with 131 grains of chlorine; while another, tested for the Council of Agriculture, showed 160 grains of solids as the disturbing influence in the preparation of "Bordeaux Mixture" for fruit-tree spraying.

ESSENCES (4).

One "essence of lemon" contained sixty per cent. of alcohol, the genuine essence of lemon contains none

SUNDRY FOR POISON (11).

Poison was found in seven cases-two human beings, two domestic animals, two samples of poisoned wheat, strychnine and arsenic respectively in each case. An opium preparation, supposed to have caused death, was also tested.

SUNDRY IN CRIMINAL CASES (6).

These were articles of clothing examined for blood stains, &c.

SPRAYING CHEMICALS AND DRUGS (47).

Many of the materials for spraying were tested for the Council of Agriculture.

Sulphate of copper (bluestone) varied between 15 and 99.5 per cent. of pure sulphate; while the arsenic found in Paris green was 39 to 42 per cent.

The usual impurity in sulphate of copper is sulphate of iron; the latter is much cheaper, but is said by some authorities to be the better germicide, to be of much value as a fertilizer and plant

tonic, and to possess other useful properties. Various points other than chemical composition require to be taken into account, as a "Paris Green," suspected of adulteration on account of its slight beneficial action, was found to contain the full proportion of arsenic, but to be in slightly, and, under the microscope, distinctly coarser powder than usual.

Phosphorus said to have lost its efficacy for rabbit poisoning was found to be simply darkened on the surface, owing to its exposure to light.

Dye-stuffs, preservatives, colours, &c. were tested for tariff purposes.

Four powders sold by an unlicensed medical practitioner, and labelled as "Poison," were found to be simply powdered sugar, directed to be used as an eye-remedy.

"AMYGDALINE" (3).

Exception was taken to the importation and use in soap-making of a liquid thus erroneously named, which consists of turpentine and nitro-benzene (artificial oil of bitter almonds).

Nitro-benzene is an "active poison of a peculiarly insidious nature," and it is stated that "bad effects have been produced by the use of soap scented with nitro-benzene."

A substance invoiced as a solid oil and bearing the name of "Domoleum" contained soap, and was slightly scented with nitro-benzene. The fins containing it bore inscriptions stating that "it can be used as a salve for wounds and for the hair," and it was advised that at least a medical opinion should be obtained before permitting such a compound to pass into consumption.

KEROSENE (35).

The improvement in the class of kerosene, noted in former years, was still maintained.

SHALE AND OTHER OILS (85).

These were mostly examined for Customs purposes, as shale oils of low quality, and certain other classes of oil used in local manufactures, such as tanning and brick-making, are admitted free, while others pay the high duty of 1s. 3d. per gallon, which is often more than 100 per cent. ad valorem.

Some difficulty was caused by the vagueness of the tariff as regards "Black Oil unrefined," a term which in other Colonies appears to be applied to unrefined shale oil, whereas it was here interpreted to mean black whale oil.

MANURES (26).

Manures sold as bone-dust varied in composition from 24 to 60 per cent of Phosphate of Lime, and from 2.15 to 5.18 per cent. of Nitrogen, a high Phosphate being usually associated with a comparatively low Nitrogen; and vice versa.

A Guano (not offered for sale) was more than two-thirds sand, and contained less than ten per cent. of Phosphate of Lime.

A "Kelp Ash," contained 1 6 per cent of Potash, while a Nitrate of Potash, valuable also as a Nitrogen Manure, contained less than four per cent. of impurity. These figures fully illustrate the necessity for buying fertilizers by composition, and not by

Two wonderful misstatements were corrected, one that "Bone-dust had spread Codlin Moth, and the germs of other parasitic diseases," the Bone-dust in question having been thoroughly steamed under pressure ; the other, contained in a pamphlet advertising an imported manure, that "Nitrogen

is entirely lost in the ordinary process of manufacturing Bone-dust." Enquiries were made by the Council of Agriculture as to the best methods of combining the pickling and poisoning of seed wheat, but this process was deprecated, not only as liable to destroy the farmer's friends as well as his enemies, but also as tending to the too wide distribution and use of strong poisons. The alternative was suggested of rendering the seed as distasteful as possible by treatment with some such substance as crude Shale Oil, which is very cheap and duty free.

BEETROOT (37).

These were tested free of cost for the Agricultural and Pastoral Society, the absence of the usual appliances for this work greatly increasing the time and trouble required. Prizes had been offered for the best results, and the percentage of sugar varied from 7.2 up to 20.7, and the weights of the six roots tested in each case from $4\frac{3}{4}$ to $25\frac{1}{4}$ lbs.; the most sugar being contained in roots from about 13 ounces to a little over two pounds in weight.

No information was received as to names of varieties grown, but roots with pink skins gave three of the four lowest yields of Sugar. One competitor sent 12 roots,—six white, six pink,—which were tried in two batches.

	Weight.		Sugar per cent.	·
6 White roots	. 19≩ lbs.	N	14.4	
6 Pink roots	. 20 lbs.		. 8.3	

This seems to be mainly, if not entirely, due to difference of seed.

A trial made earlier in the season showed a large root to contain 8.5 per cent, and a small one 14.7 per cent of sugar.

COAL AND CLAY (4).

One Coal gave much gas, and the unusually low proportion of 5 per cent. of ash; another, with 7.4 per cent. of ash and 76 per cent. of fixed carbon, would, if obtainable in quantity, be of special value for steam raising.

A "Fireclay," although more refractory than ordinary clay, was found to be too readily fusible at high temperatures.

ORES (195).

Noteworthy were the following :—An Ore containing 440 ounces of silver (as chloride) per ton; Arsenical Pyrites, with Copper and Bismuth; Fahlore, with 209 ounces of Silver and 25 per cent. of Copper, and Wolfram. with 59 per cent. of Tungstic Acid, and some Silver and Copper.

A Quartz containing more than four ounces Gold per to ton, together with much Arsenical Pyrites, was tested as to its fitness for direct treatment by the Cyanide process, but it was found that about two-fifths of the Gold remained undissolved.

Many ores, as well as various other substances, were tested free of charge.

EXPLOSIVES (93.)

These were mostly Blasting Gelatine, Gelignite, or Dynamite, tested as to fitness for transport, storage, and use. Thirty-five cartridges, taken from three German consignments, and one British, were more or less faulty, very little exudation of nitro-glycerine being met with, but the main weakness was in the "heat test," which requires Nitro-explosives to withstand a given temperature for a certain time without giving off more than a trace of nitrous fumes.

Reshipment or destruction was recommended where faulty conditions were detected. The materials for making Rackarock are Chlorate of Potash and Oil of Mirbane (Nitro-Benzene); these were imported, and some difficulty arose as to their conveyance, but neither ingredient is explosive alone, and the mixture is only made just before use.

SUNDRY (53.)

The Launceston Health Officer forwarded twelve samples of Cream of Tartar and Saltpetré sold by grocers : the Saltpetre was fairly pure, but two of the six Tartars were deficient in strength, although to a much less extent than was stated by common report, apparently started by trade

rivalry. Some Preservatives were examined for the Customs, and in reference to these it seems necessary to repeat the warning that chemical preservatives from decay are almost of necessity hindrances also to digestion; and that the use of such substances as Boric (Boracic) Acid, Salicylic Acid, &c., has, after careful consideration of their effects, been forbidden in several European Countries.

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WILLIAM GRAHAMB, JUN. GOVERNMENT PRINTER, TASMANIA.