(No. 56.)

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PARLIAMENT OF TASMANIA.

# GOVERNMENT ANALYST:

# REPORT FOR 1900.

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(No. 56.)

*Government Laboratories, Hobart, 18th September, 1901.*

SIR,

I HAVE the honour to forward herewith Report on the work of the Laboratories during the year 1900. The pressure during the latter part of the year was so great that the whole of a batch of some 60 samples of foods forwarded by the Hobart Corporation could not be completed until January, although received in October.

The question of using condensed milk for infants has been specially considered. The supply of these appears to be failing to some extent, and it is therefore all the more important to point out all avoidable causes of waste of child life.

I would specially call attention to my notes on "Preservatives" and "Tinned Foods," under the headings "Milk" and "Jam."

I find that as far back as 1885 some explosives were, on my recommendation, condemned and destroyed; since then I have been examiner, and, for most of the time, responsible adviser in these matters, but was not asked to act as Inspector of Explosives and Magazines until recently.

What may be described as the raw materials for adulteration are occasionally met with in the Customs samples. These are reported and recommendation made that, if authority exist for that course, they should not be permitted to enter this State.

Nineteen years' experience of testing under a Tariff has shown me that the chemical questions likely to arise could be much reduced or simplified by comparatively small changes. I may instance those relating to acetic acid, oils, disinfectants, &c., alluded to in my Report. I therefore recommended that the various official analysts, &c., should, so far as they would be referees under it, consider in conference the Federal Tariff: "suggest possible amendments, and agree as to uniform standards, definitions, methods of working." At the same time questions relating to explosives, the valuation of manures, and the restriction of the sale of poisons, could be discussed. Later, a conference on explosives only was suggested from Victoria, and this was strongly supported, but with enlarged scope, as outlined above.

The charge that it is not revenue-producing is usually brought against this department, but on examination this must be greatly modified, as its work is so largely for revenue-producing and other departments, and it is also revenue-protecting in many cases. As a first instance, the Customs formerly paid for the examination of tea at the rate of £100 or more per annum; this work was transferred to the Laboratory, and the cost of an Assistant rendered necessary by this and increased work in other directions has since been borne by the department, the Customs being thus relieved from all further payment in the matter.

I therefore submit that in all fairness this department should have credit, if only on paper, for the assistance given to other departments, and the following amounts may be claimed as representing, on a very moderate estimate, the value of work done in 1893 for them: —

| | £ |
|---|---|
| Customs (including explosives) | 198 |
| Mines | 130 |
| Police and Law | 86 |
| Central Board of Health, Council of Agriculture, &c. | 84 |
| Municipalities | 57 |
| | £555 |

To this may fairly be added at least another £100 as compensation for work done either *gratis* or under the reduced scale of fees fixed by the Government, and this again may be increased considerably by an allowance for information and advice given; so that the balance of cost as against the Laboratory would be reduced to a nominal amount, if not altogether met, for last year,

The above extract is from a former report. So long as the facts are recognised, I do not advocate that the State Departments or municipalities should actually pay for the work done for them, although to take one instance, the Railway Department gets many free analyses, while my official journeys must be paid for. I do claim, however, that some equivalent should be received from the Customs for the very numerous examinations made for revenue purposes, so that my skilled assistants may be paid at a rate at least not below that for junior clerical work in non-professional departments. With at least equal efficiency the Estimates for this year are £195 less than for 1893.

This small department, the function of which is mainly critical, and which has to destroy so many cherished illusions of wealth to come, naturally wins little support, and it has for the past seven or eight years suffered from severe and most exceptional economy; this my proposal would at least to some extent alleviate, and I would therefore press for its full consideration.

I have the honour to be,
Sir,
Your obedient Servant,

W. F. WARD, *Government Analyst.*

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APPENDIX.

*RETURN of Samples received for examination in the Government Laboratories during the year* 1900.

| Substance examined. | From the Government | From Municipalities. | From Private Individuals. | TOTALS. |
|---|---|---|---|---|
| Tea | 96 | 12 | ... | 108 |
| Milk and Cream | 12 | 7 | 2 | 21 |
| Butter | 4 | ... | ... | 4 |
| Cheese | 1 | ... | ... | 1 |
| Meat | 2 | ... | ... | 2 |
| Coffee | ... | 8 | ... | 8 |
| Mustard | ... | 6 | ... | 6 |
| Pepper | ... | 7 | 1 | 8 |
| Lime Juice | ... | 2 | ... | 2 |
| Curry Powder | 1 | ... | ... | 1 |
| Jams | ... | 8 | ... | 8 |
| Honey | 1 | ... | ... | 1 |
| Sauce | 2 | ... | ... | 2 |
| Salt | 2 | ... | ... | 2 |
| Ale and Beer<br>Cider<br>Spirits | 44 | 1 | 8 | 53 |
| Essences | 69 | ... | ... | 69 |
| Glucose and Dextrin, &c. | 2 | ... | 3 | 5 |
| Vinegar and Acetic Acid | 40 | 6 | ... | 46 |
| Fruit in Syrup, &c. | 4 | 1 | 4 | 9 |
| Drugs | 34 | .. | ... | 34 |
| Chemicals, Spraying, &c. | 2 | ... | 1 | 3 |
| Linseed Cake | 1 | ... | ... | 1 |
| Oils and Paint | 40 | ... | ... | 40 |
| Manures | 40 | ... | 22 | 62 |
| Cyanide of Potassium | 1 | ... | ... | 1 |
| Sundry, for poison | 2 | 3 | 5 | 10 |
| Serge | ... | ... | 1 | 1 |
| Water | 33 | 8 | 6 | 47 |
| Boiler composition | 7 | ... | ... | 7 |
| Cement | 3 | ... | ... | 3 |
| Gas Salts | 4 | ... | ... | 4 |
| Counterfeit Coins | 2 | ... | ... | 2 |
| Coal and Shale | 2 | ... | 8 | 10 |
| Ores, various | 98 | ... | 92 | 190 |
| Explosives | 27 | ... | ... | 27 |
| Grass and Soil | ... | ... | 2 | 2 |
| Ebullioscope | ... | ... | 1 | 1 |
| TOTAL | 574 | 71 | 156 | 801 |

Fees appear to have been charged for about 26 of the private samples during the second half of the year for which the record is available.

Much time was occupied by the preparation for the House of Assembly of a detailed Return of Customs Samples forwarded for examination.

## TEA.

A dozen samples were found to be more or less below the very low limit of quality imposed as a minimum. In one case the stalks reached 21 per cent.; in another the mineral matter amounted to over 16, instead of about 6, per cent.; while several were deficient in soluble ash, an indication of adulteration with exhausted leaves. As one sample may represent 50 or more packages, the quantity of inferior tea re-shipped out of this Colony must have been considerable. Formerly, all teas were sampled on arrival; at present only inferior teas are sent for examination, but the general quality of the imports has deteriorated so much that more work is required in connection with these than was the case when the samples were 15 to 20 times as numerous, the figures for this year being already between two and three times more than last year.

## MILK AND CREAM.

Samples of milk were found to be watered to the extent of at least 13, 14, and 26·5 per cent. respectively; one of these containing, also, an added fatty substance.

As the milk yielded by various cows is by no means uniform in quality, it is impossible to say with absolute certainty exactly how much water has been added to a milk, but as the result of millions of analyses, the Society of English Public Analysts adopted as a lenient *limit or minimum standard*, below which a milk should not be considered genuine, a composition of 11·5 per cent. of total solids, including 3 per cent. of butter fat. I proved as far back as 1888 that this minimum was quite fairly applicable here, but an attempt was made to lower it still further, and against this I entered a strong protest. In doubtful cases the seller can prove, if he so desire, that his cows approach or hold the record for poorness of milk; but to lower the limit sufficiently to meet all possible female eccentricities in this direction would encourage further watering and skimming; would be very unjust to honest dealers; and, above all, would be harmful to infants, in too many cases already severely handicapped by deprivation of their more strictly natural food. This injustice was happily prevented, but the coming generation is shamefully maltreated if fed on condensed milk, according to some of the "Directions" on the tins. Most of these are positively dangerous, and infants so fed must be either half starved, or swamped and tortured by an enormous excess of water: to take one case—it is directed to add no less than 18 parts of water to one of the condensed milk, and the effect of this would be that a child must drink no less than *seven times more water*, to obtain the same amount of milk solids, than would be the case if he or she were properly fed on human milk of average quality. Even then, this washy mixture would be entirely wrong as regards the proper proportions of the various ingredients, not to mention the possible ill-effects of the preservative present. The added cane sugar improves matters to some slight extent, but it is not a natural constituent of milk.

If mothers are physically or morally incapable of doing their duty to those for whose very existence they are responsible, they might, at least, use one of the "Humanised Condensed Milks," to which cream and milk sugar are added, in order to imitate, as closely as possible, natural human milk. A high authority states, "The practice of adding antiseptics (preservatives) to food is to be deprecated." It is claimed that Boric Acid and Borax are quite innocuous, but that they "arrest growth (with consequent chemical changes) in the case of most microbes." It is difficult to believe that substances with such properties will in no way interfere with the processes of digestion, especially in view of the opinion that those processes are, in part, dependent on microbe action. Boron does not enter into the ordinary composition of animals, or of most plants, and the safest plan, undoubtedly, is to avoid, not only its compounds, but also the use of all other preservatives, whenever possible. Eight samples of condensed milk were very fully examined for the Central Board of Health. Four contained borax, or boric acid, and they ranged in composition between the following extremes:—

| | Per cent. | | Per cent. |
|---|---|---|---|
| Butter Fat | 1·36 | to | 15·60 |
| Proteids | 7·10 | „ | 11·52 |
| Mineral Salts | 1·50 | „ | 2·66 |
| Sugars | 9·25 | „ | 53·04 |
| Total Solids | 28·60 | „ | 77·51 |

The addition of sugar accounts for the high proportions of solids in four of the samples. A tin, labelled "Economy. Evaporated Cream. Helvetia Milk Company, Illinois," was, in spite of its misleading title, decidedly deficient in fat. The "Empire" milk contained boric acid and much added sugar, although described as "free from adulteration of any kind." The "Golden Guinea" honestly states that it cannot be used for infants' food, but it describes itself as of "separated" origin, in the smallest and most unobtrusive of type. It is possible there may be on the market samples of a yellow colour due to the addition of the poisonous bichromate of potash, as a preservative.

## CHEESE.

A sample, supposed to have caused illness in a family, was found to yield no poisonous substance. The cheese was apparently new, and it would seem that, at a particular stage of ripening, unwholesome properties may exist, which disappear later. In a former case, a large family was more or less seriously ill through eating one part of a cheese, while another part, eaten in considerable quantity at a later date, caused no ill effects whatever.

## MEAT.

One sample was tested for poisonous metals for the New Norfolk Asylum, another for tuberculous matter: in both cases the suspicions were unfounded.

## COFFEE.

Eight samples, tested for the Hobart Corporation, all contained large proportions of chicory—from 41 to 70 per cent.; but in only one case was the mixture sold as such, and not as coffee. It is probably owing to these enormous additions of chicory, a cheap and coarsely-flavoured substitute, that the use of coffee has been supplanted, to so large an extent, by less wholesome tea.

## MUSTARD.

Six samples examined for the Hobart Corporation contained from 26 up to 48 per cent. of added flour, &c. This is a usual addition, but the amount of added matter should be stated, and the mixture be sold as a "Mixture," and not as mustard.

## PEPPER.

Of seven samples examined for the Hobart Corporation, four contained from 17 to 22 per cent. of added flour, &c. These should be sold as "Mixtures," and the proportions of the various ingredients be stated on the labels.

## JAM.

Eight jams in tins were examined for the Hobart Corporation, six of these contained *much* dissolved tin, while metal was also found in the other two, but in smaller quantity. A black currant jam contained tin at the rate of seven-tenths of a grain per pound, a quantity very likely to be injurious; and red currants also had seriously acted on the tin. Apple was found in gooseberry, apricot, and raspberry jams. The two latter were sour and fermenting, while a red current jam had developed a peculiar fishy odour. The deficiency in net weight of jam was from $1\frac{1}{2}$ to $2\frac{1}{2}$ ounces, increased in a plum jam by about $1\frac{1}{3}$ ounces of stones. The following note, which I now desire to still further emphasise, was made in reporting on these samples:—"It appears to me that where, as in this case, foreign matter finds its way into foods, or again, where foreign substances are added as preservatives, colouring agents, &c, the onus of proof that such substances are harmless should rest with the manufacturers, and that, failing this, all such additions, and such practices as the tinning of strongly acid fruits should be prohibited."

Action of the contents on a tin is shown by the development of a crystalline appearance, somewhat resembling that of galvanised iron. The results of above and other tests indicate the necessity that tinned articles of food of every description should bear the date of manufacture.

## SPIRITS, CIDER, MALT LIQUORS.

Many spirits were tested on importation to ascertain if they were sufficiently methylated to render them unfit for human consumption, the present tendency being to use a highly purified methyl alcohol or wood naphtha for this purpose, instead of a crude spirit. Wood naphtha was also tested. A sample imported as "Colouring for Spirit" was reported as an undesirable substance to be admitted, as its use would materially facilitate adulteration.

Ciders and other so-called temperance drinks were examined for the Police and the Inspector of Beer Duties. Cider containing from 18 to 22 per cent. of proof spirit is likely to be a snare, not only to the total abstainer, but also to the moderate man, if used largely as a light hot-weather drink, that being about twice the alcoholic strengh of ordinary ales, and stronger than many light wines.

## ESSENCES.

Sixty-nine samples were tested for alcoholic strength for the Customs. Owing to the peculiar character of these, this is by no means a simple procedure, a fairly lengthy process being necessary in practically every case, before the spirit can be separated in sufficient purity for the determination of its strength.

## GLUCOSE, &c.

A brewer's glucose from Europe was found to contain a notable quantity of arsenic, consequently it was recommended that it should on no account be admitted through the Customs. This sample was submitted in advance by the manufacturers. Cascade ale was found to be entirely free from arsenic, the test used being indentical with the process finally recommended for adoption at a later date by a specially appointed committee, which sat for the investigation of the question; arsenic having been found in so many English malt liquors.

## VINEGAR AND ACETIC ACID.

It has been frequently pointed out that the present tariff favours the manufacture of spurious vinegar to a very marked extent. A so-called "Essence of Vinegar" was imported, which was 60 per cent. acetic acid, and was coloured ready for mixing with water; this would pay 3*s.* 3*d.* per gallon duty, and would make 20 gallons of saleable vinegar, which, if imported as vinegar, would have to pay 20*s.* duty. A recommendation was made that this particular consignment should not be admitted, but it is doubtful if there is legal power to take action. Again, to quote the tariff: "Acid, glacial acetic, not exceeding 6 per cent. absolute acid, 1*s.* per gallon," occurs in one clause, although it is of the essence of glacial acid that it shall contain 97 per cent. or more. The former tariff gave an option of paying by "pound or pint," the latter having an advantage of more than 30 per cent. over the former, from the importers' point of view.

## FRUIT.

Four samples in syrup were examined for Customs purposes to determine amount of drawback to be paid on the sugar used in preserving. Raspberries and black currants forwarded for jam-making were found to be very largely watered; it is difficult, however, in these cases, to estimate at all closely the amount of adulteration, as allowance must be made for possible variation in the quality of the fruit, and still more allowance for difficulty of sampling and loss of sugar by fermentation. Estimation of the alcohol formed is useful in the latter case.

## DRUGS.

Thirty-four samples were tested for alcohol for the purpose of fixing the amount of duty payable. As in the case of essences, the nature of the liquid usually complicated the test.

## OILS.

Many oils are tested for classification by the Customs, duties on different classes being 3*d.*, 6*d.*, 1*s.* 3*d.* per gallon, or 20 per cent. *ad valorem*, while others are exempt from duty. The alphabetical tariff specifies no less than 19 classes of oil.

## MANURES.

Sixty-two samples were analysed, about two-thirds of these being for the Council of Agriculture.

The results obtained were in one case disputed, until it was pointed out that a mixture containing 25 per cent. of sand and 20 per cent. of water could not possibly be an extremely rich Bonedust, as was claimed.

The invoice certificates given with 17 Launceston samples in only two cases gave the full equivalents required by the Act; in one case the calculated figure was 2·3 per cent. too high, but with one exception the actual contents of the manures substantially agreed with the certificates under which they were sold. Three out of eight Hobart samples were below the figures of the certificate, while calculated values varied from 5*s.* 7*d.* per ton above selling price, to 45*s.* below.

## POISONS.

Phosphorus, arsenic, and strychnine were detected in various cases; cyanide of potassium was tested for the Council of Agriculture as to quality for fumigation of imported fruit trees.

## SERGE.

This material had been libelled as a mixture of cotton and wool, but was proved to contain no cotton.

## WATER.

Many samples were tested for the Railway Department, some for fitness for human consumption, others as to fitness for use in locomotive boilers, and some in both respects. Waters causing corrosion in the Mount Cameron water-race, and on the Scottsdale line, were also received. Various waters from the Central Board of Health, Municipalities, &c., showed that fearful mixtures may occur in tanks and wells; the following figures show some of the results as compared with a pure natural water:—

| | Parts per million. | |
|---|---|---|
| | Country well. | Good water. |
| Free ammonia | 1·925 | 0·005 |
| Albuminoid ammonia | 0·72 | 0·03 |
| Nitrogen in nitrates | 0·59 | None |

In one instance, two bottles stated to contain some of the same water, were treated separately; owing to careless sampling, one contained seven times as much impurity as the other.

## BOILER COMPOSITION.

Much work was required in connection with these samples examined for the Customs, with a view to claiming higher duty.

## CEMENTS.

Three samples were examined for the Secretary for Mines, one being a crumbling cement brick from Maria Island, which had been made about ten years. The result of comparing the three complete analyses made pointed to some slight defect in original composition, and apparently faulty preparation of the cement in the first instance, as regards burning. There are some limestones which will yield cement or lime according to the temperature at which they are burned.

## GAS SALTS.

These consisted of Naphthalene, a product separated out in the purification of coal gas, they were examined as to fitness for addition to spirit, in order to render it undrinkable, and as a substitute for methyl alcohol.

## COAL AND SHALE.

Several shales were tested for percentage of alumina, with a view to their possible use as a source of aluminium.

## ORES.

The majority of these were assayed for gold and silver, but many were examined also for copper, tin, lead, antimony, cobalt, chromium, tungsten, titanium, &c.

## EXPLOSIVES.

Numerous samples of German gelatine-dynamite, which had been for some years in store, failed to pass the heat test when re-examined, the destruction of some sixty cases was therefore recommended.

## GRASS AND SOIL.

Results of tests showed that the destruction of the grass was evidently attributable to the sulphur fumes from the Mt. Lyell Smelting Works.

## EBULLIOSCOPE.

This instrument was imported by a manufacturer for use in speedy determinations of alcoholic strength. Experiments and tests as to accuracy, and best method of working, were carried out with it.

## DISINFECTANTS.

In connection with the classification of these, it appears that under the present tariff, a practically worthless material, carbolate of lime, may be imported duty free, an efficient disinfectant containing uncombined carbolic acid must pay duty. A reversal of this seems necessary in the interests of public health.

W. F. WARD, *Government Analyst.*

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