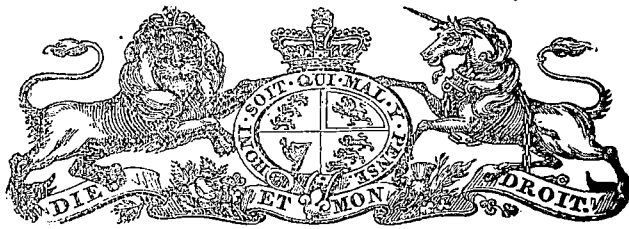


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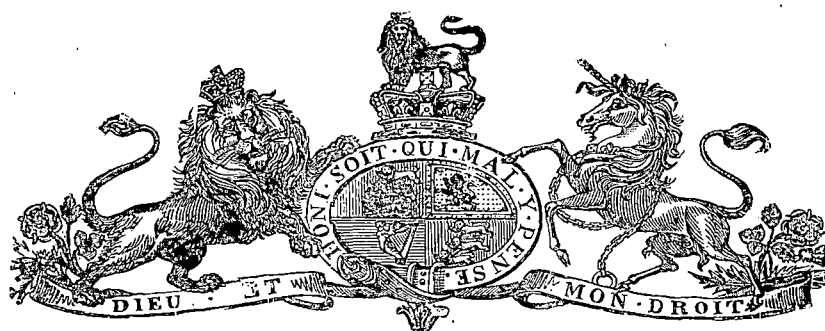


1894.

PARLIAMENT OF TASMANIA.

GOVERNMENT LABORATORIES.

Presented to both Houses of Parliament by His Excellency's Command.



GOVERNMENT LABORATORIES.

Hobart, 9th April, 1894.

SIR,

I HAVE the honor to enclose herewith a statement of the number of substances examined during the year 1893, with references to some of the more noteworthy results obtained.

The Department was, by last year's vote, reduced to myself alone, and there is no doubt that this was due to a misapprehension as to the extent of the work represented by the figures tabulated in my Annual Reports. This misapprehension I may now, perhaps, be permitted to remove by a few illustrations.

In connection with a charge of arson, five substances were examined for the Law Department. These examinations were chemical and microscopical, and required much time and care; but the case involved further the reading and noting of about 180 folios of M.S. depositions, and the hunting up in libraries of all information on the subject of spontaneous combustion, together with a special report on these, as well as that on the results of analysis. Finally, three days were spent in attending to give evidence and follow the case in the Supreme Court at Launceston.

In brief, about a week's work is represented in the "Statement of Analysis" by five units only of those marked "Sundry in Criminal Cases." Others of these last,—tests for poison and complete analyses of many substances,—may extend over a week or more; or, for various reasons, several repetitions of a test may be necessary, and in all cases these are returned in the "Statement" as single tests only. Further, much time occupied by interviews and correspondence with those seeking advice and information cannot well be recorded.

A comparison of the work of the Government Laboratory in Sydney with this, gives the following figures for the same two years:—

SYDNEY.	HOBART.
1211 general samples.	1677 general samples.
	3678 tea samples.
	<hr style="width: 20%; margin: auto;"/>
	5355 total samples.
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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
	<hr style="width: 20%; margin: auto;"/>
	£555
	<hr style="width: 20%; margin: auto;"/>

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.

Apart from the fluctuations in the number of tea samples, the examinations directly for the Government have increased thus :—

1891.....	154 samples.
1892.....	239 „
1893.....	382 „

In conclusion, I greatly regret that I have been reluctantly compelled to tender my resignation to the Technical Committee, and fear that I may ultimately be obliged to abandon teaching work altogether.

I have the honor to be,
Sir,

Your obedient Servant,

W. F. WARD, *Government Analyst.*

The Honorable the Chief Secretary.

STATEMENT of Analyses and Examinations made in the Government Laboratories during the Year 1893.

<i>Substance examined.</i>	<i>For the Government.</i>	<i>For Municipalities.</i>	<i>For Private Individuals.</i>	<i>Total.</i>
Tea	1323	...	...	1323
Coffee.....	1	...	...	1
Milk.....	...	87	3	90
Spirits, Wine, Beer.....	16	...	...	16
Acetic Acid and Vinegar	45	...	...	45
Water.....	18	11	4	33
Sugar.....	1	...	...	1
Meat.....	...	...	6	6
Butter, Colouring, and Preservitas	4	...	...	4
Sundry for poison	9	...	1	10
Ditto in criminal cases	22	...	...	22
Kerosene and other Oils.....	65	...	...	65
Paint	2	...	...	2
Soap and Soap-scent.....	6	...	...	6
Soil.....	12	...	...	12
Manure	12	...	24	36
Fruit-tree Sprays	9	...	2	11
Sheep Dip.....	1	...	...	1
Coal and Shale.....	12	...	3	15
Gypsum, Limestone, Clay	4	...	2	6
Dynamite, Gelignite, &c.....	39	...	...	39
Tin Ore.....	12	...	11	23
Nickel Ore.....	1	...	5	6
Ore for Gold, Silver, Lead, &c.....	73	...	109	182
Concentrates and Tailings.....	3	...	8	11
Sundry	15	...	14	29
TOTALS.....	1705	98	192	1995

TEA (1323).

The great bulk of the Tea imported is of low quality, but not as a rule sufficiently so to ensure its condemnation and reshipment.

Recent cases, however, have occurred indicating a revival of the adulteration of low class tea with twigs, broken into small pieces, and blackened so as to be less readily observed.

This form of adulteration was prevalent some years ago, but importation of such mixtures was stopped for a time by close examination and frequent condemnation of teas, which in this way were increased in weight and bulk, sometimes to the extent of more than 20 per cent., with corresponding lowering of their quality, otherwise originally sufficiently inferior.

COFFEE (1).

This was received from the Launceston Hospital, and was found to consist of coffee and chicory in about equal proportions.

The effect of chicory is said to be harmful in many cases, so that it would appear to be very undesirable that it should be supplied for the use of invalids.

MILK (90).

These were received from the Sanitary Officer of Launceston, the Superintendent of Police, Hobart, and the Central Board of Health, and 15 were found to be adulterated by the addition of water in quantities varying from 5 to 20 per cent., or by the abstraction of cream. The beneficial effect on the quality of milk produced by occasional analysis is shown by the following average results obtained from different batches of samples from Launceston:—

	Total Solids.	Lowest.	Highest.
1st.	11·80 per cent.	11·40 per cent.	12·72 per cent.
2nd.	12·71 per cent.	11·64 per cent.	*15·84 per cent.
3rd.	13·22 per cent.	12·64 per cent.	13·34 per cent.
			13·82 per cent.

WINE, BEER, AND SPIRITS (16).

A so-called whisky examined on importation was found to be unfit for human consumption.

Methylated spirit was tested as to degree of methylation.

An "Orange Quinine Wine," tested for Customs purposes, contained 6·21 per cent. of alcohol, equivalent to 13·5 per cent. of proof spirit.

A Tasmanian Wine gave alcohol 13·28 per cent., equivalent to proof spirit 28·72 per cent.

The alcohol in natural wines is said to be, as a rule, under 13 per cent.; this proportion is often increased directly by the addition of proof spirit, or indirectly by the addition of sugar to the *must* before fermentation, so that a fortified wine (sherry or port) may contain more than 20 per cent. of alcohol.

Several samples of Dandelion Beer received from the Collector of Beer Duties were examined for excise purposes, the alcohol being found to vary between 1·65 per cent. and 3·74 per cent.

ACETIC ACID AND VINEGAR.

This was a further new development of work for Customs purposes rendered necessary by alteration of the tariff, and in connection therewith arose the question of the limits of the strength of vinegar.

The British "Proof Vinegar" of the Excise contains about 6 per cent. of acetic acid, the limit varying in other countries between 4·6 per cent. in the United States, and 8 to 9 per cent. in France, while shipments were received here containing over 16 per cent. of acetic acid.

WATER (23.)

These were mostly forwarded by the Central Board of Health, and included a series taken from the Hobart Rivulet and the River Derwent, with a view of determining the amount of contamination produced by the waters of the Rivulet. Mineral water from Spring Bay had approximately the following composition:—

	Grains per Gallon.
Magnesium Chloride	67·3
Sodium Chloride (salt)	126·0
Iron Bicarbonate	0·6
Lime Bicarbonate	45·0
Calcium Sulphate	15·2
Silica	3·3

A little Potassium Chloride is included in the Sodium Chloride.

A mineral water, which destroyed all vegetation with which it came in contact, contained 462 grains of mineral matter per gallon, largely Magnesium Chloride, the Chlorine in this and the other Chlorides amounting to 200 grains per gallon.

Water from a well at Westbury was found polluted to such an extent as to be absolutely unfit for human consumption, and the recommendation was made that its further use should be prohibited.

Water from Sullivan's Cove, examined as to "fouling with sewage," in connection with storage of fish, contained but little impurity; but, in view of the vitality of Bacteria in salt water, there can be no doubt as to the desirability of keeping fish, more especially oysters, which are usually eaten uncooked, in a locality which is above suspicion. Water was also examined for the Railway Department and others as to fitness for use in boilers.

MEAT (6).

These included a Liver unfit for human consumption, Suet containing a Hydatid Cyst.

There is no doubt as to the destruction of the echinococci producing these cysts by thorough cooking, but there is reason to suppose that the meat of animals suffering from their presence cannot be in the most wholesome condition, apart from the sentimental objection to the ingestion of tapeworm larvæ, even when dead.

BUTTER AND PRESERVITAS (4).

The Preservitas, a preparation for preserving butter, consists of Boric Acid and Chlorate of Potash. It seems to be desirable to discourage as much as possible the use of all such chemicals, in view of their probable interference with the process of digestion.

* Cream in unusual quantity: the milk probably stood overnight, and was sampled from the top of the vessel.

SUNDRY, FOR POISON (10).

A domestic animal, supposed to have been poisoned, was found to be simply gorged with wood shavings. The question of the poisonous effects of Eucalyptus Oil arose during the year, and it was pointed out that if a drug be sufficiently powerful to produce beneficial results in doses of 2 to 10 grains or drops, it may naturally be expected to produce serious results if taken in large quantities. Several cases have occurred in which an overdose of Eucalyptus Oil has produced bad effects, and in one the death of a child may fairly be attributed to it. Many cases of poisoning by Camphor and Turpentine, which are substances related to Eucalyptol, are recorded, and in these, adults as a rule have recovered, while young children have succumbed.

In one case strychnine was detected.

A drug sold as a 4 per cent. solution of Cocaine Hydrochlorate was proved to be a 5.3 per cent. solution of Sulphate of Atropine. A dose of two grains of Atropine (the poisonous alkaloid derived from Belladonna) is recorded as having caused death. The total amount of Atropine Sulphate supplied in this case in mistake was about 23 grains.

SUNDRY, IN CRIMINAL CASES (22).

The principal of these were examinations of Clothing and Chemicals, Shot, &c., required by the Police in connection with charges of murder, arson, and train-wrecking.

The details of the work required in connection with one only of these cases have been given in the letter covering this Report, and in all such work involving life or liberty similar great expenditure of time, with closest attention to minutest details, is of course necessary.

KEROSENE AND OTHER OILS (65).

The high standard of the Kerosene imported, which has been referred to in previous Reports, was maintained throughout the year.

Various oils were tested for the Inspector of Customs with a view to their classification under the tariff; also for the Council of Agriculture, to be used as insecticides.

SOAPS, &c. (6).

These, again, were examined for Customs purposes. One much-advertised sample of Soap contained about 11 per cent. only of true Soap, the remainder being chiefly kieselguhr or diatom earth. Four Soaps tested comparatively varied between the following limits:—

Water.....	15.3 to 41.4 per cent.
Mineral Matter.....	10.6 to 63.0 „
Fatty Acids	10.5 to 67.0 „

The excess of mineral matter consisted of Carbonate of Soda (washing soda). A so-called dry Soap contained 26.5 per cent. of water. Reference to other analyses of the Soaps of commerce showed variations still greater, as follow:—

Water.....	17.4 to 84.0 per cent.
Mineral Matter.....	5.4 to 26.7 „
Organic Matter.....	11.2 to 73.5 „

Some difficulty therefore naturally exists in some cases in stating whether a given trade substance be or be not a true soap.

A scent for the use of soapmakers, imported under the *alias* of Amygdaline, contained Nitro-Benzol, which gives the odour of Bitter Almonds. It has been pointed out in previous Reports that the use of this substance is most undesirable.

SOILS (12).

Four soils or sub-soils from the Huon District, and one from Impression Bay, were found to be very deficient in lime, which in a good soil should amount to not less than 0.4 per cent., whereas in the cases referred to the proportion was only from traces up to 0.16 per cent.

MANURE (36).

These included Bone-dust, Guano, Nitrate of Potash (Saltpetre, Nitre), and Artificial Manure. Instances of the low quality and variation in manure, showing the necessity for some regulation of their sale have been given in former years, but the following analysis of rubbish sold here as Bone-dust, compared with the mean composition of genuine Bone-dust, is the most flagrant of all:—

	Bone-dust (so-called).	Steamed Bone-dust.	Unsteamed Bone-dust.
Phosphoric Acid.....	1.28	22.80	19.5
Equivalent to Phosphate of Lime....	2.80	49.77	42.57
Nitrogen in Organic Matter.....	1.40	3.80	4.05
Equivalent to Ammonia.....	1.7	4.61	4.92

The Nitrogen also found in No. 1 was largely present in hair, which is extremely slow in its action. Nos. 2 and 3 are average results from a large number of Bone-dusts (European), and in England "Genuine raw Bone-Meal is usually guaranteed to contain 45 to 50 per cent. of Phosphate of Lime and Nitrogen equal to 4 to 4½ per cent. of Ammonia;" but results obtained from a limited number of local samples show a much lower percentage of Phosphate of Lime. The Manure Adulteration Act prepared by the Council of

Agriculture, which came into operation last year, should not only prevent such a palpable fraud, but, owing to the manner in which the section relating to guarantee of chemical composition was modified, should have a distinct educational effect in emphasising the fact that Nitrogen, Phosphoric Acid, and Potash are the three essentials of a complete manure. Further, the equivalents of these to be given on the guarantee will enable comparison to be made at once (without calculation by the buyer) with the variously stated analyses throughout the literature of Agriculture.

FRUIT-TREE SPRAYS (11).

These included a series of experiments on "Bordeaux Mixture," and the methods and materials employed in its preparation.

The Copper Sulphate (Bluestone or Blue Vitriol) available was pure enough for all practical purposes, but some samples from the same makers differed by no less than 22 in their percentage of lime, owing either to imperfect burning or to exposure to the air with consequent absorption of moisture and carbonic acid. Shell-lime when well burnt and protected from such absorption appears to be the most suitable for the preparation of this mixture.

SHEEP-DIP (1).

Examined for tariff purposes.

COAL AND SHALE (15).

The ashes of the Coals varied between 4.6 per cent. (Sandfly) and 20.6 per cent. A shale which gave much gas and oil unfortunately contained also nearly 6 per cent. of sulphur. Evaporative power of three Coals was determined by Thompson's Calorimeter, and the following results obtained:—

Newcastle Coal	14.00
Sandfly Coal	13.86
Dulverton Coal	13.50

These figures represent approximately the number of pounds of water at boiling point which one pound of the Coal will convert into steam at the pressure of the atmosphere. Three samples of Coal from the same locality gave very different results on heating, no coke being formed in one case, while in the other two the quality of the cokes was very different; this shows plainly the necessity for a fuller examination than is usually made of new finds.

DYNAMITE, GELIGNITE, &c. (39).

A substance left after the explosion of a large quantity of Dynamite in a closed chamber in the rock at Circular Head resembled Pumice-stone in appearance, and consisted of over 90 per cent. of Silica with small quantities of Alumina, Lime, Oxide of Iron, Magnesia, and Soda.

This was evidently due to the fusion of the Tripolite (Diatom Earth) which is used in the proportion of about 25 per cent. for the absorption of the Nitro-glycerine, the active explosive in Dynamite. As this fused material was found in only one of four communicating rock-chambers in which the explosion took place, it was suggested that this was possibly due to the increased heat and pressure owing to the explosion being slightly delayed in this chamber. The "Tripolite" obtained from similar Dynamite was found to undergo semi-fusion when heated in the blowpipe flame.

Two chemicals which had been used in Launceston for the preparation of Oxygen gas, with the result that a violent explosion occurred, causing serious bodily injury and much damage to property, were found to be Chlorate of Potash and powdered Sulphide of Antimony. The Sulphide of Antimony had been supplied in mistake for Black Oxide of Manganese, and a similar mistake was made comparatively recently in Hobart, also resulting in explosion and damage.

In addition to the risk of this and other black powders being supplied in error, Oxide of Manganese itself may contain dangerous impurities, so that it is always advisable to test the materials by first heating small quantities of them together before proceeding to prepare large quantities of Oxygen.

TIN ORE (23).

Titanic, Chromic, and other Iron Sands are very frequently mistaken for Tin ore, and to these may be added several samples of Rutile (Titanic Acid) received during the year. These mistakes entail serious loss of time and money, and it is to be regretted that so few prospectors possess the very small amount of knowledge necessary to recognise the difference by the blowpipe, the work of a few minutes only.

The "Rutile" was a black variety of the "Nigrine" of some writers on Mineralogy, but the difference is so slight that the more general name was retained to avoid introducing a comparatively unknown name. Dana says on this point—"Nigrine contains 2 to 3 per cent. of oxide of iron, but as ordinary Rutile has 1 to 2 per cent., the distinction is very small."

NICKEL ORE.

These were mainly composed of Nickel Carbonate (Zaratite, Emerald Nickel), Nickel and Iron Sulphides, and Magnetic Iron Oxide. These ores are not associated with those of Cobalt, as is so frequently the case elsewhere.

ORES FOR GOLD, SILVER, COPPER, LEAD, &c. (182).

Numerous examinations of Mount Lyell ore, including three complete analyses were made, with results varying from a few ounces of Silver and a pennyweight or two of Gold per ton, with a low percentage of Copper and Lead, up to the yield of a specimen at the rate of 8765 ounces of Silver and 55 ounces of Gold per ton, with 22 per cent. of Copper. These last were "Stromeyerite," a mineral consisting of Copper and Silver Sulphides.

A full analysis of the Mount Reid ore made for the Museum gave—

	oz.	dwt.	grs.
Gold, per ton	0	8	4
Silver, per ton	10	18	20
<hr/>			
Metallic Lead, per cent.....			8.0
„ Iron, „			6.7
„ Copper, „			7.0
„ Zinc, „			20.0
Sulphur, „			21.1
Silica, „			32.0
Manganese Oxide, „			1.9
Not determined.....			3.3
			<hr/>
			100.0
			<hr/>

CONCENTRATES, TAILINGS, &c. (11.)

Many tests were made of Concentrates, Jigs, Slimes, and Tailings, including two full analyses of Tailings and Slimes sampled at Zeehan by the Government Geologist, and a sample of "Tailings" yielding Gold at the rate of 268 ounces, and Silver 62 ounces per ton. Unfortunately, little knowledge can be gained from the results in such cases, in the absence of fuller details than are usually obtainable.

Other examinations were of Ores for Copper, including "Bournonite"; for Bismuth, found to be very rich; for Zinc, and for Chromium in Iron Ores.

SUNDRY.

These included a brass imitation of a half sovereign, which was sufficiently like to escape detection unless examined very closely, and an alloy of copper, 80 per cent., and tin, 20 per cent., found buried, and supposed to be native metal.

W. F. WARD, A.R.S.M., Government Analyst.

APPENDIX, showing Cases of Adulteration reported during 1893.

Name.	Substance.	Adulteration.
C. Fryett, Launceston.....	4 Milks.....	5 per cent. added Water.
R. Moore, ditto	1 Milk.....	Ditto
Alcock, Glenorchy	Ditto	17 per cent. added Water and deficient in Cream.
Tilyard, ditto.....	Ditto	20 per cent. added Water.
Pierce, ditto.....	Ditto	7 per cent. added Water.
Smith, ditto	Ditto	Ditto
Not known, Hobart.....	Ditto	17 per cent. added Water and deficient in Cream.
„ Ditto.....	Ditto	17 per cent. added Water.
„ Ditto.....	Ditto	Slightly deficient in Cream.
„ Ditto.....	Ditto	Watered.
G. Mace	Ditto	5 per cent. added Water.
„ Ditto.....	Ditto	Deficient in Cream.