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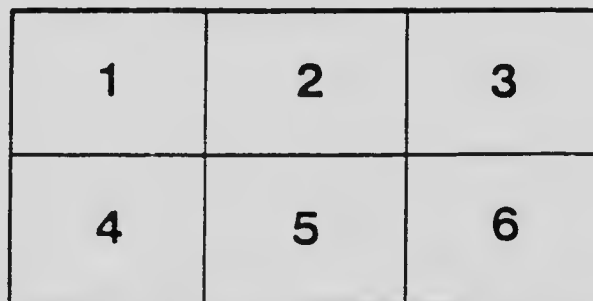
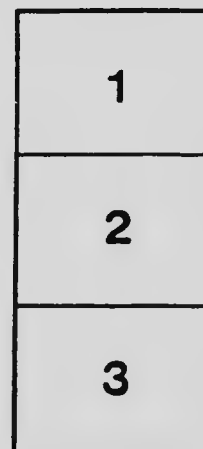
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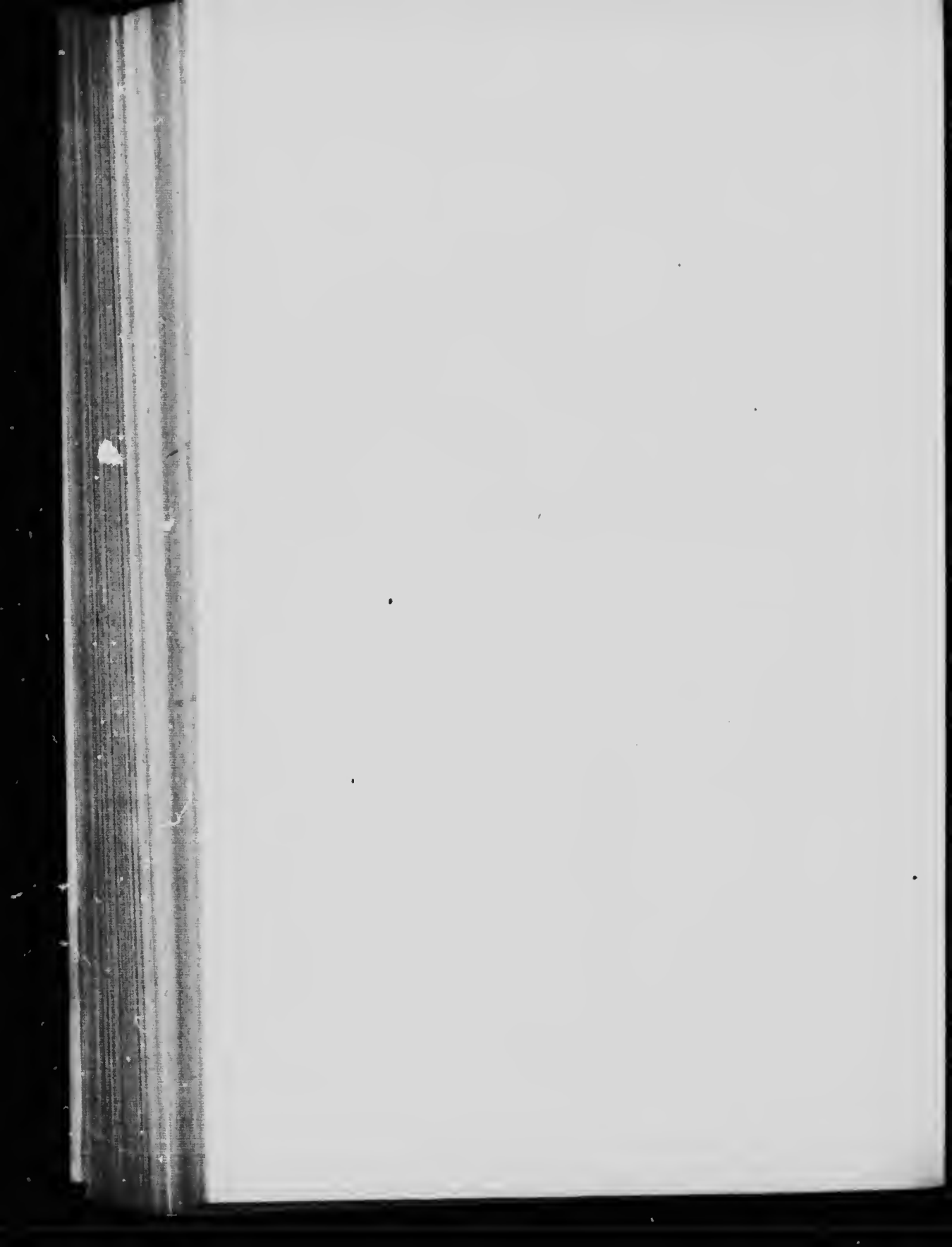
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LABORATORY  
OF THE  
INLAND REVENUE DEPARTMENT  
OTTAWA, CANADA

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BULLETIN No. 342

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LIQUID EXTRACT OF NUX VOMICA.

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LABORATORY  
OF THE  
INLAND REVENUE DEPARTMENT

BULLETIN No. 342.

LIQUID EXTRACT OF NUX VOMICA.

OTTAWA, May 20, 1916.

J. U. VINCENT, Esq.,  
Deputy Minister of Inland Revenue,

SIR,—I beg to hand you herewith a report upon nineteen (19) samples of the Liquid Extract of Nux Vomica. This is not to be regarded as a comprehensive inspection of the important drug named, but as an attempt to ascertain what, if any, ground exists in fact for certain complaints made by physicians as to the varying and unsatisfactory results obtained in practice with the Liquid Extract of Nux Vomica. The samples now reported were purchased in Montreal and Toronto only. Their examination is considered, as will be seen to justify a more extended inspection; and the present report is to be regarded as preliminary.

It must be conceded that a certain degree of unsatisfactoriness exists regarding the valuation of this drug. It is prepared from the seeds of Nux Vomica, in No. 20 powder, by re-percolation with 70 per cent alcohol. The percolate from a given weight of powder is equal, in units by measure, to the units of weight employed (grammes and cubic centimetres) in the British Pharmacopoeia of 1898; in the revision of 1914, the percolate is only half of this volume. In each case, the strychnine content of the percolate is determined, and the Extract is finally adjusted by addition of 70 per cent alcohol, to contain 1.5 percent of strychnine (weight in volume).

The seeds of *Strychnos Nux Vomica* contain two alkaloids, strychnine and brucine, whose physiological properties appear to be very similar, although the activity of brucine is much less than that of strychnine. Thus, the dose of Strychnine is fixed at  $\frac{1}{4}$  to  $\frac{1}{8}$  grain (B.P. 1914), while that of brucine is given as  $\frac{1}{10}$  to  $\frac{1}{2}$  grain. (Squires' Companion to the Pharmacopoeia, Ed'n 1908.) Both of these alkaloids are naturally present in the Liquid Extract; and if they were present in the Seeds of *Strychnos* in a constant ratio, it would of course be possible to infer the amount of either by a determination of the other. Unfortunately this is not the case; and the ratio of strychnine to brucine has been found to vary between 3 to 1 and 1 to 2. (Squire, p. 810).

In the assay of the percolate from powdered Nux Vomica, the preliminary steps are identical in both the 1898 and the 1914 editions of the British Pharmacopoeia. The separation of the two alkaloids was effected, however, in the Edition of 1898, by precipitation of the strychnine with potassium ferrocyanide, in sulphuric acid solution, and subsequent decomposing of the strychnine ferrocyanide. It has been found by Schweissinger (Allen, Com. Org. Analysis, VI, 446) that under these conditions brucine ferrocyanide is co-precipitated, to some extent, thus affecting the accuracy of the method.

In the Edition of 1914, the brucino is destroyed by oxidation with nitric acid in presence of sulphuric acid, and it is claimed that this method yields more accurate results for strychnine. In illustration of the results of work done upon the same sample by both methods, I may quote the following:—

Sample.	Method of 1898.	Method of 1914..
64627..	1'45	1'32
64628..	1'54	1'45
64629..	1'49	1'35
62636..	1'26	1'24
62637..	1'49	1'32
62640..	0'88	0'92
64632..	0'95	0'95

It will be seen that in most of these cases a somewhat higher apparent strychnine content is obtained with the older (and now no longer official) method.

There can be no doubt that most of the Liquid Extract of Nux Vomica now on the market has been assayed by the method given in the pharmacopoeia of 1898; and, indeed, in a strict sense this is the only method recognized by our Adulteration Act, in which Section 7 (a) specifically names the Edition of 1898.

Under these circumstances, and inasmuch as the collection of the samples now reported was restricted to two localities, I think it inadvisable that the names of dealers or manufacturers (as stated by the vendors) should be given.

Quite apart, however from this consideration the results of analysis are instructive, and serve to show that variations in the composition of the Liquid Extract of Nux Vomica exist, apart from the strychnine content.

The analytical results given in the following table were obtained by Mr. A. J. Landry, of this staff, working by the official method of the British Pharmacopoeia, Edition of 1914.

#### LIQUID EXTRACT OF NUX VOMICA.

Sample.	Total Solids. Grm. per 100 cc.	Alcohol. Vol. p.c.	Strychnine. Grm. per 100 cc.
64626..	11'50	59'72	0'78
64627..	13'90	59'72	1'32
64628..	14'96	54'48	1'45
64629..	17'07	50'98	1'35
64630..	15'38	65'32	1'44
64631..	11'00	36'16	0'91
64632..	2'25	74'32	0'95
64633..	16'26	64'98	1'44
64634..	11'78	68'32	1'57
64635..	15'92	58'96	0'78
64636..	25'36	36'52	1'46
64637..	15'42	56'92	1'31
62638..	11'83	61'20	1'28
62637..	13'50	67'56	1'32
62638..	18'06	50'32	1'59
62639..	9'70	.....	0'78
62640..	12'02	.....	0'92
62641..	9'44	46'44	1'43
62642..	14'48	.....	0'76

Mr. Landry reports the usual difficulties attending the estimation of small quantities of alkaloids in solution with fats, vegetable matters of varying kinds and more or less vegetable tissue and colouring; and his duplicates indicate a variation of from 0.01 to 0.15 in strychnine found. Accuracy is only possible where the mean of several carefully conducted determinations is taken.

I know Mr. Landry to be a careful worker, and am convinced that the results given indicate within very narrow limits, the actual strychnine present. The *modus operandi* for preparation of the Liquid Extract is strictly defined by the pharmacopoeia; and, unless the crude drug varies greatly in its quality, it is difficult to account for the differences in total extractive matter, except on the assumption of carelessness in manufacture.

The British Pharmacopoeia of 1898 did not standardize the powdered drug. The edition of 1914 fixes this at 1.25 per cent of strychnine, and prescribes the addition of milk sugar to adjust this value, within a limit of accuracy of 0.05 per cent excess or defect.

The total solids are found to vary, in these samples, from 2.25 per cent to 25.26 per cent. These extreme differences do not correspond to the variation in strychnine content; the sample giving only 2.25 per cent of total solids contains 0.95 per cent of strychnine; whilst that giving 25.36 per cent solids, yields but 1.45 per cent of the alkaloid. The pharmacopoeal standard requires 1.50 per cent strychnine. Most of the samples which approximate to this percentage show about 14 to 16 per cent total solids. It appears reasonable to suppose that a normal sample of the crude drug, should, on definite treatment as prescribed by the pharmacopoeia, yield an extract of approximately constant character as regards dissolved solids. This matter requires investigation.

Alcohol of 70 per cent strength is prescribed; and there can be no sufficient reason for a variation in strength of from 36.16 to 74.32 in the finished extract.

I beg to recommend that this subject be more fully investigated in the near future; and that the present report be published as Bulletin No. 342.

I have the honour to be, Sir,

Your obedient servant,

A. MCGILL,  
*Chief Analyst.*



