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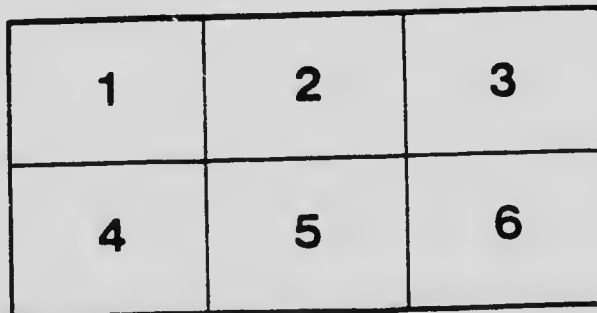
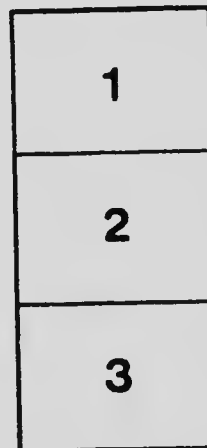
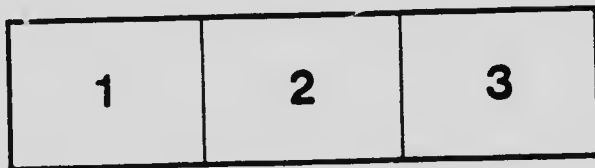
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LABORATORY
OF THE
INLAND REVENUE DEPARTMENT

OTTAWA, CANADA

BULLETIN No. 402

WITCH HAZEL

LABORATORY
OF THE
INLAND REVENUE DEPARTMENT
OTTAWA, CANADA

BULLETIN No. 402

WITCH HAZEL

OTTAWA, 20th May, 1918.

J. U. VINCENT, Esq., K.C., B.A., L.Ph.,
Deputy Minister of Inland Revenue.

SIR,—I beg to hand you a report concerning 17 samples of Witch Hazel Water, otherwise known as distilled Extract of Witch Hazel; the Aqua Hamamelidis of the U.S.P. and Liquor Hamamelidis of the B.P.

The attention of this Department has been called to considerable increased sales of the article within recent years, and it has been suggested that the fact, if fact it is, may be the result of increasing difficulty in obtaining alcoholic beverages, due to provincial legislation. The Witch Hazel water of the U.S.P. contains 15 per cent of alcohol; and the Solution of Hamamelis (Liquor Hamamelidis) of the B.P. contains about 18 per cent alcohol. An approximation to the U.S.P. article seems alone to be in evidence so far as this collection indicates.

It seemed justifiable to investigate the matter in view of the above, and the small number of samples now reported were submitted to examination by Mr. Westman of this staff. His interesting report follows:

SIR,—I beg herewith to present a report dealing with the examination of 17 samples of "Aqua Hamamelidis," known as Hamamelis Water or Distilled Witch Hazel. These samples were all collected in the cities of Montreal and Toronto during January and February of this year.

Such slight analytical data as was found available on this subject and such references to the medicinal and therapeutic effect of this extract as might be considered of value are presented. As far as seems reasonable, from existing data, the question of the possible misuse of this product as a beverage is dealt with.

Official Preparations of Distilled Witch Hazel.

Aqua Hamamelidis is a product derived from steam distillation of the bark, leaves, or other parts of the shrub known as *Hamamelis virginiana* Linné (Fam. Hamamelidaceae). It grows naturally over wide areas in the Eastern States and in Canada. The leaves are usually collected in autumn and may be used either fresh or dried. Both bark and leaves have an astringent taste. The leaves themselves have no very characteristic odour while the distillate therefrom has a quite distinct odour. Collection in autumn is usual as at that period of the year the leaves are said to have reached their maximum tannin content. Squires Companion to the B.P., 1918, p. 593, states that the leaves yield 8 to 10 per cent tannin and the bark 5 per cent ash.

The British Pharmacopoeia, 1914, p. 223, defines Liquor Hamamelidis as follows:

| | |
|----------------------------------|------------|
| Fresh Hamamelis Leaves | 1,000 g. |
| Distilled water. | 2,000 mls. |
| Alcohol (90 per cent.) | 160 mls. |

The leaves are macerated 24 hours and then 1,000 mls are distilled.

It is to be noted that fresh leaves are official and that the alcohol is added before and is present during maceration.

In the U.S.P., 1916, p. 58, the same product is defined as "A saturated aqueous liquid obtained by distilling with steam or water the bark, twigs, smaller stems, or the entire shrub of *Hamamelis virginiana*, collected in the autumn and adding 150 mls. of alcohol to each 850 mls. of distillate." No mention is made of the amount of bark to be taken and such wide latitude is given that it may be inferred that the whole process is only a matter of form. In the 1906 edition of the U.S.P. quantities were stated and were relatively the same as those at present official in the B.P. It would appear then that the tendency was to rule out eventually distilled witch hazel from official pharmacopoeial preparations in the United States.

Specific Properties and Tests for Distilled Witch Hazel.

The range of Sp. Gr. is given in the U.S.P. 1916 as from 0.979 to 0.982 at 25° C. At 15° C. the Sp. Gr. should run from 0.960 to 0.985, according to the Squires' Companion to B.P. 1908. These ranges have no particular significance, as the only factor which changes the Sp. Gr. that may reasonably be considered is the alcohol content. If the proper amount of (90 per cent.) alcohol has been added the product as sold should contain about 14 per cent alcohol by volume. In particular, witch hazel should be free from formaldehyde and methyl alcohol as it is sometimes prescribed as an eye lotion. Any dissolved impurities are given a semi-official limit of 0.025 g. per 100 mls. Scientific literature makes very few references to witch hazel and the only semi-specific test is one given by C. Glucksman, Chem. Abst. 1913, p. 214. This test works well on genuine liquid extracts of the bark and preparations of like nature containing extract of witch hazel but does not apply to the distilled product. The constituents responsible for the test are either non-volatile or are broken down during distillation. The test itself consists in diluting a few drops of witch hazel extract with 5 mls. of glycerin and adding 100 mls. of water. If a few mls. of this solution are now treated with excess ammonia a rose-red colour appears which rapidly changes to brown and then to yellow. If the solution of the extract is saturated with sodium bi-carbonate no change takes place while cold; on warming, the mixture turns greenish brown.

Discussion of Analytical Data Obtained.

Experimental work was carried out on the determination of alcohol by various methods. The alcohol content of various samples was determined by (1) further direct distillation, (2) previous treatment of the sample with dilute soda solution and boiling under a reflux condenser for one hour, and (3) the official method of shaking up the solution with concentrated brine and low boiling point petroleic ether. As far as could be determined all these methods gave the same result after due allowance was made for the blanks and the range of probable error in the manipulation was considered. Undoubtedly some aromatic product which may possibly be specific to witch hazel is present in this distillate. Its quantity, however, must be exceedingly small by weight although still sufficient to produce both a peculiar taste and odour. In other words, if there is any oil, terpene, or other defined organic compound present in the distillate it is not held there in sufficient concentration to be detected by any variation in the method of determining alcohol. It is just possible, however, that by very fine specific gravity determinations the organic matter present other than alcohol might be measured. Steam distillation of a variety of woody materials would give the same type of distillate. Organic matter other than alcohol is present in sufficient amount to form a brown coloured ring of varying intensity, when brought in contact with concentrated sulphuric acid. An ether extract of 50 mls. of distilled witch hazel when allowed to evaporate at room temperature in an open dish retains an odour more or less like that of the original distillate. When samples were examined by the Zeiss immersion refractometer the readings obtained were duplicates of those obtained from similar alcoholic solutions and no methyl alcohol was found present.

Distillates from the bark and leaves were prepared according to official methods by Mr. R. M. Rowat of this staff and were examined previous to the addition of alcohol. They gave the same specific gravity to within very close limits as distilled water. The difference noted being little more than 0.0001 on an average of four determinations. No difference was noted between refractometer readings on these solutions and on distilled water. Alcohol added to these resolutions was again determined to 0.1 per cent by direct distillation. Presuming that the total organic matter present in the distillate originating from the plant comes over as an unchanged, powerful, therapeutic substance it would be present in very small concentration. It is more than probable that what organic matter does come over is partially broken down. None of the tannic acid is carried over in the steam and the loss of this specific constituent of the extract leaves the so-called valuable constituents of the distillate rather speculative.

In no sample was the presence of formaldehyde detected. During the procedure it was noted that when a few drops of resorcinol T.S. were mixed with a few mls. of witch hazel distillate and were brought in contact with concentrated sulphuric acid a ring formed between the layers giving a line varying in intensity from brown to yellow. One sample which was heavily scented with oils gave a heavy white milky cloud in the resorcinol witch hazel layer. Some idea of certain of the organic matters present was obtained from a comparison of the intensity of these rings over a certain time under standard conditions. This was done by comparing standard preparations made in this laboratory with others obtained on the market. All the possible variables were by no means exhausted and the significance of the rings formed may not have any relation to possible therapeutic value. Giving a unit intensity to the rings formed from standard preparations the following samples fell below this standard: 79396, 81147, 81148, 81150 and 81154. It is probable that these samples were prepared from nearly exhausted bark or leaves or they may have

been derived from materials of poorer grade. There is no way of knowing whether the distillate has been prepared from genuine witch hazel bark or mixtures of this and other barks.

Discussion of Therapeutic Value and Possible Use as a Beverage.

Hamamelis leaves and bark have similar astringent properties. Originally they were used directly by native tribes in America. Kraemer states (Scientific and Applied Pharmacognosy, p. 349) that the leaves contain a volatile oil, a bitter principle, 8 per cent tannin, gallic acid, and calcium oxalate. The distillate is stated to contain an aromatic substance that apparently does not exist in the leaves. The bark is thought to contain a volatile oil consisting chiefly of a terpene, which also appears in the distillate. These statements seem to be of a speculative nature and no reference is given to authoritative research on their exact nature. No such materials seemed in evidence from samples worked upon by us and it would seem that if such substances are present it must be only in very minute traces. The distillate from any bark or leaves contains some traces of organic matter. No specific therapeutic substance has as yet been identified in the distillate from witch hazel. To attack such a problem from the viewpoint of chemical analysis would seem to be exceedingly difficult if not impossible.

The problem is not worthy of extensive chemical investigation until it has been more thoroughly dealt with by the practical methods of biological experimentation. Such results as may be quoted on work done along these lines should have removed long ago most of the quackery connected with witch hazel distillates. In 1895 (National Formulary, p. 677) a case is quoted where the first distillates from large quantities of the bark were injected into frogs and mammals with no more effect than would be produced by the injection of similar quantities of distilled water. These experiments were also carried out with the same conclusion by Dr. Gey in Paris previous to 1895. The fluid extract of the drug (no mention being made of the distillate) has been tried as a remedy for various forms of venous dilation and engorgement. The results of these experiments in different hands were different and no definite conclusion was arrived at beyond the fact that no specific curative properties were inherent in the bark or leaves (Boston Med. and Surg. Journal, May 1895), and (Bull. Gus. de Thérap. Vol. CVI). Two teaspoonfuls of the fluid extract were taken internally four times a day with impunity. This amount is easily the equivalent of a very large volume of distillate.

It would seem then that the net result of the use of this distillate is simply that which would be obtained from an equivalent solution of alcohol and distilled water. There is no need to disguise the properties of alcohol for rubbing purposes beneath the mysticism of a bark distillation. Large manufacturers are exceedingly cautious in not recommending it as more than a popular remedy, and such exact work as has been carried out by members of the medical profession does not credit the distillate as having a specific therapeutic value. The whole question is aptly summed up in a quotation from U.S. Dispensatory 1907, p. 178. Hamamelis water is referred to as follows: "This water was probably introduced into the B.P. and U.S.P. (8th Rev.) on account of the large demand for it which has grown out of the wide advertisements of a certain proprietary medicine and the universally recognized need in American families for an embrocation which appeals to the psychic influence of faith. As the tannic acid of Hamamelis bark does not come over into the distillate the water is therapeutically a mixture of water and alcohol."

The article has a quite large and perhaps increasing sale in this country and it is unfortunate indeed that there should remain such a large proportion of the

general public capable of being exploited in such an elementary manner. Some value is returned for the money in the alcohol received, but the difference between the price paid for the article and the value of the alcohol is not made up by the hypothetical curative properties of witch hazel. The question arises as to the possibility of using such a distillate as a beverage for the sake of its alcohol content. The average sample contains 14 per cent alcohol by volume and as prepared is free from methyl alcohol and formaldehyde. The small amount of organic materials that does come over with the steam into the distillate is sufficient to give the product a nauseating taste. In this way any wood distillate might act as a partial denaturant. It is quite possible, however, that a depraved alcoholic appetite might easily become immune to this rather disagreeable taste. It is relatively certain that the distillate contains no constituent derived from the bark or leaves of witch hazel that would seriously injure or affect any one using it for its alcoholic content only. A distillate prepared from partially or nearly exhausted bark would contain such very small amounts of distilled organic matter that both the taste and odour of the witch hazel would be practically nil.

I remain, Sir, your obedient servant,

L. E. WESTMAN,

Public Analyst.

There would appear to be no reason for regarding this article as dangerous to health, when used as a beverage, except in the sense in which any alcoholic beverage of equivalent strength may be dangerous.

I beg to recommend publication of this report as Bulletin No. 402.

I have the honour to be, Sir, your obedient servant,

A. MCGILL,

Chief Analyst.

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BULLETIN No. 402—WITCH HAZEL.

| Date of Collection. | Nature of Sample. | No. of Sample. | Name and Address of Vendor. | | Quantity. | Cost. | Name and Address of Manufacturer or Furnisher as given by the Vendor. | | Label. | Results of Analysis. | | No. of Sample. | Remarks and Opinion of the Chief Analyst. |
|---------------------|-------------------|----------------|-----------------------------|--|------------|-------|---|------------|---|----------------------|----------------------------|----------------|---|
| | | | Name and Address of Vendor. | Name and Address of Vendor. | | | Manufacturer. | Furnisher. | | Alcohol by Volume. | Specific Gravity at 15° C. |  |  | Non-volatile Solids. |
| 1918. | Jan. 17 | Witch Hazel. | 79391 | A. J. Mann, 190 Ville-neuve St., Montreal. | 3 bota. | 7. | | | | | | | |
| " | " | " | 79392 | H. Groulx, 1998 Hutchison St., Montreal. | 1 1/2 lbs. | 75 | Lyman, K & O Co., Ltd. | | Concentrated Extract Witch Hazel, for relief and cure, etc. | p. c. 12.20 8642 | 0.011 | 79391 | Should not be designated as a cure. |
| " | " | " | 79393 | C. H. Blouin, 225 Bernard St. W., Montreal. | 1 1/2 " | 75 | | | Witch Hazel. | p. c. 13.90 8622 | | 79392 | |
| " | " | " | 79394 | American Drug Store, 125 St. Victor St. W., Montreal. | 1 1/2 " | 75 | | | Extract Witch Hazel. | p. c. 14.20 8619 | | 79393 | |
| " | " | " | 79395 | Fraser & Bergeron, 101 Fairmount Ave., Montreal. | 1 1/2 " | 75 | | | Witch Hazel. | p. c. 13.90 8621 | | 79394 | |
| " | " | " | 79396 | Lacoste & Brault, 230 Larier Ave. W., Montreal. | 3 bota. | 75 | | | Witch Hazel. | p. c. 15.00 8616 | | 79395 | |
| " | " | " | 79397 | Jasby's Drug Store, 230 Craig St. W., Montreal. | " | 75 | | | Conc. Ext. Witch Hazel, for relief and cure, etc. | p. c. 13.90 8639 | | 79396 | Should not be described as a cure. |
| " | " | " | 79398 | American Drug Store, 701 St. Catherine St. W., Montreal. | " | 75 | | | Witch Hazel. | p. c. 13.90 8637 | | 79397 | |
| " | " | " | 79399 | Fletcher's Drug Store, 3 Catherine St. W., Montreal. | " | 75 | | | Ext. Witch Hazel. | p. c. 13.90 8630 | | 79398 | |
| " | " | " | 79400 | Pharmacie Canadienne, 805 Notre Dame St. W., Montreal. | 3 " | 75 | | | Conc. Ext. Witch Hazel, for relief and cure, etc. | p. c. 13.90 8656 | | 79399 | Should not be described as a cure. |
| " | " | " | | | 3 " | 75 | Nat. Drug and Chem. Co. | | Witch Hazel, a conc., distilled, etc. | p. c. 11.20 8632 | | 79400 | |

DISTRICT OF MONTREAL—J. J. COSTIGAN, INSPECTOR.

BULLETIN No. 402—WITCH HAZEL.

| Date of Collection. | *Nature of Sample. | No. of Sample. | Name and Address of Furnisher. | Cost. | | Name and Address of Manufacturer or Furnisher as given by the Vendor. | | Label. | Results of Analysis. | | No. of Sample. | Remarks and Opinion of the Chief Analyst. |
|---------------------|--------------------|----------------|--|-----------|--------|---|------------|-------------------------|----------------------|------------------------------|----------------|---|
| | | | | Quantity. | Cents. | Manufacturer. | Furnisher. | | Alcohol by Volume. | Specific Gravity at 15.5° C. |  |  | Non-volatile Solids. |
| 1918. | | | | | | | | | | | | |
| Feb. | 1 | Witch Hazel. | The T. Eaton Co., Ltd., Queen and Yonge Sts., Toronto. | 3 bots. | 59 | E. E. Dickenson & Co. | ..... | Dist. Ext. Witch Hazel. | p. c. 14.4 | 0.9818 | ..... | 81146 |
| " | 4 | " | The Drug Trading Co., Ltd., 6 Ontario St., Toronto. | 2 lbs. | 76 | Parke, Davis & Co., Walkerville. | ..... | Conc. Ext. Witch Hazel. | p. c. 15.5 | 0.9811 | ..... | 81147 |
| " | 4 | " | The E. B. Shuttleworth Chem. Co., 29 Dundas St. E., Toronto. | 3 bots. | 60 | Vendors. | ..... | Dist. Witch Hazel. | p. c. 9.90 | 0.9861 | 0.009 | 81138 |
| " | 4 | " | R. W. McLarty, 739 King St. W., Toronto. | 1 qt. | 37 | ..... | ..... | Dist. Ext. Witch Hazel. | p. c. 14.9 | 0.9816 | 0.027 | 81149 |
| " | 4 | " | Jones Bros. & Co., Ltd., 29 Adelaide St. W., Toronto. | 1 " | 78 | E. E. Dickenson Essex, Can. | ..... | Dist. Ext. Witch Hazel. | p. c. 13.80 | 0.9827 | ..... | 81150 |
| " | 5 | " | Milsner Mfg. Co., Ltd., Richmond St. W., Toronto. | 35 1 " | 78 | Unknown. | ..... | Invictus Witch Hazel. | p. c. 13.30 | 0.9825 | ..... | 81153 |
| " | 5 | " | Sovereign Perfumes, Ltd., 146 Brock St., Toronto. | 1 " | 78 | E. E. Dickenson Essex, Can. | ..... | Dist. Ext. Witch Hazel. | p. c. 10.20 | 0.9877 | 0.055 | 81154 |

DISTRICT OF TORONTO—H. J. DAGER, INSPECTOR.

