

to which the increase in the ratio of combined to free menthol is due to the replanting in the old bed or to the transfer of the stock to the new bed the following year is an open question. The fact that the herb cut in 1935 was not distilled until the fall of 1936, as indicated in the table, may be responsible in part for the unusually high percentage of combined menthol in the oil of that year.

From a practical standpoint a high percentage of free menthol rather than of total menthol is desired. When menthol is high in price, saponification of the oil may be resorted to in order to recover the menthol not present in the free state but under other conditions only the free menthol content determines the value of the oil as an economical source of that product.

Commercial mint fields are seldom maintained longer than four or five years even under the best conditions and the results reported in the bulletin showed quite conclusively that no serious decline in the quality of the oil is indicated during the normal life of a mint field. The question remained, however, whether the establishing of new fields with plants or roots from old fields in the same locality could be continued indefinitely without decline in the percentage yield or quality of the oil or even in the yield of the herb. If such a decline occurs and is due to continuous growing of the same stock in a specific locality it would be necessary for the grower to secure new planting stock from other regions. This would add to his production costs and introduce some uncertainty. The data obtained subsequent to 1928 appear to show, however, that such is not the case and that by planting new fields at such intervals as may be required under the prevailing conditions the securing of planting stock from other regions is not necessary. American peppermint oil has been produced in this country for many years and no general change in its quality has taken place where local planting stock is used for replacements indefinitely. It could not be reasoned from this, however, that the Japanese mint would behave similarly. The menthol content of its oil is much higher than that of the American mint oil and this characteristic might conceivably be modified by climatic and cultural conditions, not immediately perhaps, but possibly gradually. Moreover, it was the view of some that oils of high menthol content cannot be produced with consistency in this country, especially in the south, a view that was certainly not based on known facts when these investigations were begun. That it is an erroneous view with respect to the region where these experiments were conducted has been clearly shown.

THE BARK OF AMERICAN LARCH.*

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Together with other parts of the tree, the bark of American larch, *Larix americana* (Muench) Michx., has been employed as a remedy since earliest times. Several of the Indian tribes held it in high esteem as treatment for chronic bronchitis, inflammation of the urinary passages and in phases of hemorrhage. They considered it "equal to one man and a medicine in itself, without the addition of any

* Scientific Section, A. Ph. A., Dallas meeting, 1936.

¹ Massachusetts College of Pharmacy, Boston, June 20, 1936.

other ingredient." The early white settlers adopted these traditions entirely and seem to have gradually added to the applications. Thus, in 1860 the bark was described as laxative, tonic, diuretic and alterative and was recommended in obstructions of the liver, in rheumatism, in jaundice and in cutaneous diseases. The main reputation, however, appears still to be in chronic bronchitis with profuse secretion, in which it is frequently combined with other drugs.

In spite of this use, sustained over several hundred years, no record could be found of any chemical examination of the bark. It is true that we might expect to find a composition similar to that which is known about the bark of other species of *Larix*, but so far no one has been interested enough to make a study.

The bark which was used in the present work was collected near Westminster, Massachusetts, in the late fall of 1934. It was first dried in the air, with a loss in weight of 27 per cent, and then ground to a number twenty powder. A partial analysis by the usual methods gave the following results, based on the air-dried bark.

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|----------------------------|-------|
| Volatile at 110° C. | 6.50 |
| Ash | 2.12 |
| Acid-insoluble ash | 0.22 |
| Crude fiber | 29.70 |
| Starch, by acid hydrolysis | 14.03 |
| Pentosans | 7.80 |
| Tannins | 6.49 |
| Alcoholic extract | 20.96 |
| Diluted alcoholic extract | 21.74 |
| Successive extractions | |
| Benzin, volatile | 0.22 |
| non-volatile | 4.19 |
| Ether, volatile | 0.60 |
| non-volatile | 5.50 |
| Alcohol | 14.65 |
| Water | 4.15 |

The tannins were found to be of the catechol type, since they gave a greenish brown precipitate with ferric salts and a light brown one with bromine water. They also gave the usual ones with gelatin, potassium chromate and dichromate and copper sulfate.

The aqueous extract gave a voluminous and persistent froth when shaken, indicative of saponins. The presence of these was still further confirmed by ability to form emulsions of oils and mercury and by precipitations. The characteristic laking of blood was not, however, obtained because the hemoglobin was precipitated by solutions of the bark, forming a dense, purple product.

About 10 per cent of the bark consisted of a brick-red resin which was obtained from the alcoholic extract by concentration and precipitation with water. It was quite hard and brittle and could easily be reduced to a fine, tasteless powder. Direct determination of the resin acids was impracticable because of the high color but 38 per cent of the resin dissolved in solutions of sodium and ammonium carbonate.

The aqueous solution, after precipitation of resins, was treated with normal and basic lead acetate to remove other substances and, after removal of the lead, concentrated to a small volume. Nothing separated until the solvent was nearly gone and the residue was evidently sugar. Certainly no crystalline glucoside was observed.

Tests for alkaloids were negative. Extraction was made both by acidified water and by alcohol, the latter solvent being removed by distillation under reduced pressure. In both cases the acid solution was treated with several of the alkaloidal reagents, but no precipitate was formed in any case.

The ash contained a notable quantity of manganese which was suspected because of the green color. The identification was confirmed by the usual qualitative procedure.

By distillation of the bark with steam, there was obtained a white, aromatic solid which was not acid and was soluble in ether. The odor was somewhat like borneol but no oxime or semicarbazone could be obtained from the oxidized product. The original substance melted under 60° C. but this was very indefinite. It was apparently a paraffin hydrocarbon mixed with some odorous substance. The amount obtained was too small to admit of a more careful examination.

SUMMARY.

A partial analysis was made of the bark of American larch and the results were tabulated. It contained starch, pentosans, tannins of the catechol type, saponins and 10 per cent of hard, brittle resin, partly acid, but no alkaloid. By steam distillation there was obtained a small amount of white solid which may be paraffin.

THE UNITED STATES PHARMACOPŒIAL STANDARD DIGITALIS POWDER.*

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One of the points of difficulty which has been encountered in connection with the biological standardization of drugs has been the necessity of supplying some standard preparation of uniform potency against which the strength of the unknown might be measured and in terms of which its value could be expressed. While this is true for all the drugs which are subjected to this form of assay, it is of special importance in connection with the members of the digitalis series on account of their wide-spread use in circulatory disorders and the well-recognized variability of the crude drugs. At the same time digitalis itself offers special difficulties, as it contains no active principle which is suitable for use as a standard. Accordingly, in the U. S. P. IX, which was issued in 1916, and the first pharmacopœia in which biological standardization was recognized officially, crystalline *g*-strophanthin (ouabain) was adopted as the standard for members of the digitalis group of drugs. This glucoside was selected for the reason that pharmacologically it belongs to the digitalis series and chemically it is easily identified by its physical characteristics such as solubilities, melting point, etc. For the next twenty years, therefore, ouabain served as the standard in the United States for digitalis and its allies and, on the whole, it proved quite satisfactory. However, at the Edinburgh conference held in 1924 under the auspices of the Health Committee of the League of Nations, it was pointed out that, while ouabain was satisfactory as a standard for preparations of strophanthus, it was not suitable as a standard for digitalis for international usage. This was due to the different species of frogs which are in use in European countries and to the different methods of assay which are employed, factors which make it practically impossible to get comparable relationships between ouabain and digitalis in assays carried on in the different countries.

Accordingly, at this conference it was decided to investigate the possibility of

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