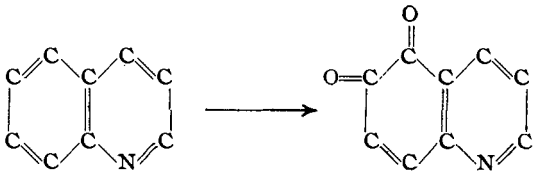

When phenylhydrazine is added as in my reaction, two of the chromophores are changed and in consequence the color changes.

SUMMARY.

1. The thalleioquin reaction is due primarily to oxidation.

2. A readily oxidizable group at the 6 position of the quinoline nucleus is essential.

3. A modification of the thalleioquin reaction has been found which is more efficient with smaller quantities of alkaloid.

4. The inhibiting action of morphine and codeine is quite evident if the ratio is greater than 1:1.

5. An interpretation of these reactions has been suggested.

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A PRELIMINARY EXAMINATION OF FOUR NORTHWESTERN PLANTS.*

BY E. V. LYNN AND PAUL Y. CHENG.

The climate of the northwest, and particularly of the state of Washington, is peculiarly adapted to the growth of a large variety of plants as well as to the health and comfort of human beings. It is said that there are more than four hundred varieties of wild flowers in Paradise Valley alone and many which are not found elsewhere in the state. The climate is mild and, at the same time, there are many sorts of meteorological conditions so that almost any plant can be grown within the state boundaries. Many medicinal plants of known value grow here naturally or can easily be cultivated, the drug garden at the University of Washington having been particularly successful for years with medicinal plant propagation.

Many of the native plants appear to possess qualities which would make them valuable medicinally. One can hardly walk along the country road or in a deep wood without being attracted by some strong aroma traceable to a shrub or herb which has never been investigated. Added to these possibilities are the hundreds

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of plants still unexamined which may contain potent glucosides, alkaloids, resins, fats, etc., potential factors for therapeutic purposes. We have here made a start in examining four plants whose aroma promised volatile oils. While the final results have not been commensurate with the labor involved, it is hoped that this beginning will afford a stimulation to others along this line. There are unquestionably many plants which could be utilized in some way, a majority in medicine.

Skunk Cabbage.—This is the common name for *Lysichiton camtschatcense* (Scott), *Araceae*, a perennial herb with a strong skunk-like odor. The leaves are large, 30 to 100 cm. long and 7 to 45 cm. wide, oblong, acute or acutish, narrowed at the base into a short-margined petiole. The spathe is golden-yellow, the blade boat-shaped, acute, and narrowed into a sheathing petiole. The peduncle is stout and long and the spadix cylindrical with all of the flowers crowded upon it. These are green, turning yellow. The skunk cabbage is common in swamps on the Pacific Coast from California to Alaska (1).

There are apparently no references to previous work on this plant. In the eastern part of the United States grows a plant which is also called skunk cabbage but which, as a matter of fact, differs not only in species but also in genus, although it belongs to the same family of *Araceae*. The rhizome of this, *Symplocarpus Foetidus*, Nutt., is reported to contain volatile oil, gum, fat, resin, and starch, and is affirmed to be antispasmodic, sedative, and narcotic.

Wild Ginger.—Of the numerous species of Asarum which are commonly called wild ginger, only one was examined, *A. caudatum* (Lindl), *Aristolochiaceae*. It is (1) a stemless perennial with slender branched rootstocks, 10 to 30 cm. long, sparsely hairy throughout. The leaves are reniform or cordate, 5 to 10 cm. broad, obtuse or acutish. The flowers are purplish brown, the petioles elongate and slender, and the peduncles short, 1 to 4 cm. The whole plant, which grows in shady damp woods, possesses the faint odor of ginger.

Although no mention in the literature is made of caudatum, several others of the genus Asarum have been investigated at various times and one or two of them have been suggested and used in medicine. *A. Canadense* was submitted to examination by Power (2) who found it to contain volatile oil, starch, gum, resin, fat, color, mineral salts, and a small amount of alkaloid. The oil consists principally of methyl eugenol and also esters of linalool, borneol, and terpineol, and the blue hydrocarbon, azulene. *A. Europaeum* has been examined repeatedly (3), the volatile oil containing a stearoptene which has been called asarum camphor, propenyl trimethoxy benzene. *A, arifolium* gives an oil (4) which contains safrol as the chief compound, with smaller amounts of eugenol, methyl eugenol, and asarone. *A. Blumei* oil yielded (5) eugenol and safrol. Unsaturated phenol ethers, therefore seem to be characteristic of the volatile oils of this genus.

Salol.—It is rather surprising that such a common shrub as *Gaultheria shallon, Ericaceae*, or salal, which grows in such abundance in the northwest, has not hitherto been examined chemically or medicinally. We believe that a careful study of the plant may reveal possible value to industry or medicine; at least it is interesting in that there is an absence of the methyl salicylate producing compounds of other species. Considerable work has already been done on these others, particularly the one from which the popular oil is obtained.

The leaves of *Gaultheria procumbens* have been known for years to produce an oil which contained almost entirely methyl salicylate. The minor constituents were admirably worked out by Power and Kleber in 1895 (6). *G. punctata* (*fragrantissima*, or *fragrans*) furnishes (7) a similar oil, as does also *G. leucocarpa* (7).

Gaultheria shallon is a low and almost herbaceous shrub with alternate, broad, evergreen leaves which are shiny on the upper surface and ovate-oblong, rounded or subcordate at base, accuminate, serrulate, 3 to 10 cm. long. The flowers are in axillary racemes, white or pink in color, nodding, 6 to 10 mm long. The fruit is black or dark purple, very variable in size, shape and amount of glandular pubescence, and edible. It is a very common plant in the Douglas spruce forests.

Tea Vine.—This is the common name for *micromeria douglasii*, Benth. (*M. chamissonis*, Greene), *Menthaceae*, also called *yerba buena*. It is a very low, sweet-odorous, perennial, pubescent herb with slender trailing stems, 30 to 60 cm. long. The leaves are orbicular or ovate, obtuse, rounded or subcordate at base, coarsely dentate or subentire, 6 to 25 mm. long. The flowers are solitary, axillary, the petioles 4 to 6 mm. long, and the pedicels bibracted near the base. Tea vine is common in the open woods often entangled with other plants, usually the twinflower. The whole plant has a pleasant minty or balsamic odor.

Power and Salway (8) have examined tea vine and its oil. A semi-solid substance accompanying the oil was identified as palmitic acid but no other components were established. *M. japonica* was found by Murayama (9) to yield an oil with a characteristic peppermint-like odor. He identified menthone and stated that menthol may also be present.

The samples used were collected in the campus woods and identified by Dr. G. B. Rigg and Mr. F. J. Goodrich. The whole plant of wild ginger and of tea vine, the leaves of salal, and the flowers and spathes of the skunk cabbage were used. The loss in weight of each on air drying and after heating in a boiling-water oven were determined. Since each of the plants except salal possessed a characteristic odor, a large quantity of the freshly collected samples was distilled with steam. The air-dried were then subjected to successive extraction with petroleum benzin, ether, alcohol, and water, the amount of each extract being estimated. The first two were heated in an oven at 110° C. to determine the amount of volatile material and tested for unsaponifiable material with alcoholic sodium hydroxide. All of the extracts were tested for alkaloids with Mayer's, Wagner's, and Schneiber's reagents and with tannic acid and picric acid. They were also hydrolyzed by sulphuric acid in order to detect evidences of glucosides. The results are tabulated herewith:

	Skunk cabbage.	Wild ginger.	Salal.	Tea vine.
Loss Air-drying	85.41	84.63	45.54	70.98
Vol. at 100° C.	92.07	92.11	51.53	79.19
Benz. Ext.*	1.46	1.83	2.04	2.96
Ether Ext.*	2.13	3.04	4.07	1.44
Alcohol Ext.*	28.01	21.11	16.76	19.89
Water Ext.*	17.95	17.19	7.85	16.38
Volatile Oil	None	0.05%	None	0.03%
Volatile Benz. Ext.*	0.54	0.52	0.43	0.46
Volatile Ether Ext.*	0.76	1.41	0.99	0.32

* Based on the dry sample.

Skunk cabbage, in spite of its peculiar aroma, apparently gives no volatile oil, although the aqueous distillate possessed some odor, was slightly acid, and deposited a minute amount of white sediment. There were no indications of glucosides but possibilities of the presence of some alkaloids.

Wild Ginger yielded a small amount of oil which had a very strong pungent odor. It solidified at —4 to —5° C. and had a refractive index of 1.5195 at 22°. There were indications also of acid resins and alkaloids, but probably no glucosides.

Salal, although a member of the genus *Gaultheria* which universally gives methyl salicylate, gave no indication of a volatile oil, even after long maceration with acidified water. The aqueous distillate was first cloudy and later precipitated but had very slight odor. The precipitate was probably a hydrocarbon but was not very carefully examined because of the small amount. During the water extraction a similar white precipitate appeared on cooling, indicating waxy hydrocarbons which give the leaves their shiny nature. There was no evidence of the presence of any glucosides and but slight tests for alkaloid.

Tea Vine was found to contain a small amount of volatile oil accompanied by the deposition of a solid material, thus according with results previously reported on this plant. Distillation of larger quantities of the vine, however, gave but traces of oil and it has since been found that drying seems to dissipate the volatile components almost entirely. The water extract deposited what was apparently the same solid observed in distillation. No indications of the presence of glucosides or alkaloids could be obtained.

Work is now under way in this laboratory to examine more carefully all of these plants and others of the numerous herbs and shrubs in the state. Particularly are we interested in wild parsnip, water hemlock, salal, and dog fennel.

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CHANGES IN U. S. PHARMACOPŒIA X.

BY E. FULLERTON COOK.*

It has been found necessary to make the following changes in the United States Pharmacopœia, Tenth Revision. These alterations have been made in the plates so that recent printings need not be corrected.

* Chairman U. S. P. Revision Committee.