On the Influence of Drying on the Active Principles of Plants.*

BY DR. LEOPOLD SCHOONROODT,
Apothecary at Liége.

The author extended his examination to 29 plants, selected for the importance and frequently of their use in medicine. The process of examination was based upon the principles of Stas' method.

The carefully collected plants, when possible collected of wild growth, were divided into two equal parts, one of which was dried, if necessary, with artificial heat, then powdered, the loss in drying replaced by water, after maceration for 24 hours displaced with 95 per cent. alcohol, and the tincture treated like that of the fresh portion.

The other half of the fresh plant was reduced to small fragments, macerated with 95 per cent. alcohol for 24 hours, then expressed and again macerated as before. The liquids were united, filtered and distilled at a temperature of 56 to 60° C., the residue filtered and the filtrate evaporated over sulphuric acid under a bell-glass; the residue upon the filter was kept separate.

The treatment of plants, containing alkaloids was modified by adding tartaric acid to the tincture, to ensure the solubility of the alkaloid in the aqueous solution of the alcoholic extract.

Treatment of the dry extract.—1. *Plants with alkaloids.* The dry extract was mixed with its own weight of burned lime, the mixture treated with twice the weight of 95 per cent. alcohol, and after 24 hours with four parts of ether, well agitated and then decanted; the sediment was twice treated in the same manner. The liquid was evaporated spontaneously, the residue dissolved in dilute sulphuric acid, filtered, precipitated by carbonate of potassa and dissolved by absolute alcohol.

This second evaporation usually yielded the alkaloid crystallized, particularly from the fresh plants. In the case of liquid alkaloids, caustic instead of carbonate of potassa was taken, and ether in place of alcohol; after proving its identity, the quantity of the alkaloid was estimated by titration with oxalic acid.

The comparative treatment of plants with alkaloids frequently gave very exact results, particularly when the alkaloids or their salts are crystallizable; this was less frequently the case when the plants contained no alkaloids and the active principle is incompletely characterized.

2. *Plants without alkaloids.* The dry extract was treated with strong ether, and the filtrate evaporated spontaneously; the undissolved portion was treated with a mixture of 8 vol. strong ether and 2 vol. 95 per cent. alcohol, and the filtrate evaporated spontaneously. The residue was treated with cold distilled water, and the liquid evaporated over sulphuric acid.

The table on page 136 contains the results obtained by the author with the most important drugs.

The leaves of *Anemone Pulsatilla*, collected in April, yielded fresh, but not dried, anemonin, little amorphous alkaloid, and a yellow, very acrid resinous matter.

Chelidonium majus (herb), collected in July, yielded, after drying, only chelidonina, but no chelerythrina.

Nicotiana Tabacum (leaves), collected in July, yielded two grm. pure nicotina; after drying scarcely half the quantity.

Digitalis purpurea (leaves, June). The extract yielded to alcoholic ether 0·60 grm. of a straw-yellow, very bitter substance; from the dried leaves a little less and deeper yellow.

Menyanthes trifolia... (leaves, August), yielded 0·45 grm. menyanthin; from the dried leaves uncrystallizable.

Marrubium vulgare (leaves and tops, June), yielded 0·70 crystallized marrubiin; from the dried, about one-half.

Tanacetum vulgare (flowers July). Bitter principle, darker from the dried.

Absinthium vulgare (leaves and tops, cultivated, July). The dried yields less aromatic preparations, and an extract-like, bitter principle.

Ergot (July). Carefully dried and powdered; it was divided into two parts, one of which was kept under alcohol in a well-filled bottle, the other kept dry in a paper box for ten months, after which time it was macerated for fifteen days in the same quantity of alcohol. The two portions were then treated exactly alike. The ergot was exhausted with alcohol in a displacement apparatus, the tincture evaporated in a water-bath, and finally over sulphuric acid. The extract was treated with distilled water, and the filtrate concentrated at the ordinary temperature over sulphuric acid.

The extracts, exhausted by water (less about one-fourth), yielded to ether about five-sixths of their weight, and the residue, about one-eighth of the alcoholic extract, was a red granular powder—Wiggers' ergotin. The etherial solution, on evaporation, yielded fixed oil and crystallized cholesterin. The fixed oil, from the old ergot, was orange-red, that from the fresh (kept under alcohol) was thinner and orange-yellow. No other difference was thus far observed.

The concentrated aqueous solution of the alcoholic extract had separated more of Wiggers' ergotin and crystals of mycose; the clear liquid was evaporated as before to near dryness (the residue of the fresh was more granular), and, since pure ether was without effect, treated with alcoholic ether, which on evaporation yielded yellow acicular crystals, regarded as pure Bonjean's ergotine (0·25 per cent. from the fresh, 0·20 from the old). The extract treated with alcoholic ether was entirely soluble in absolute alcohol except a little mycose; on spontaneous evaporation a little more mycose was separated, and then a reddish (rather darker from old ergot) oily mass was left, consisting mainly of lactic acid.

Rhus radicans (leaves, July). The distillate from the dried leaves was without odor and acid reaction, and did not reduce the salts of silver, platinum, and gold.

Ruta graveolens (leaves, July). The tincture of the fresh leaves deprived of the alcohol by distillation separated an odorous green oil, which, removed by ether, left a yellowish granular glucoside of a bitter, somewhat acrid taste. From the dried leaves the oil was not obtained, and the glucoside merely as a brown extract.

Valeriana officinalis (root collected in September, from high dry situations). The resin of the dried root is more acrid than in the fresh; 250 grms. of the former yielded 1 grm. valerianic acid. The distillate from the fresh root was neutral, had a slight odor, but on exposure to the air in the presence of alkalies, yielded 1·5 valerianic acid.

Prunus Laurocerasus (leaves, June). Lose all their virtues by drying.

Bryonia dioica (root, October). Results alike from the fresh and dried.

Inula Helenium (root of second year's growth, October). The constituents are somewhat altered. The sugar is obtained from the fresh root in white hexagonal prisms, from the dried root granular.

Saponaria officinalis (root, October). The saponin from the fresh root is white granular, from the dried amorphous colored.

Juniperus Sabina (leaves and tops, July). The dried yields a browner, less odorous, more acrid tincture.

Aspidium Filix-mas (rhizome, September). The tincture of the dried browner and more acrid, but weaker in odor than from the fresh. The distillate from the latter has a disagreeable odor and taste, reduces the salts of the noble metals, and evaporated with potassa, leaves a soap-like residue—properties which are not observed in the distillate of the tincture from the dried rhizome.

His experiments lead the author to the following conclusions:—

1. Dried plants never represent entirely the fresh. The generation of valuable constituents during the drying process, as valerianic acid in valerian, must be regarded as exceptional.

2. The alterations produced in drying consist in the votalization of a portion of the volatile constituents and in the oxidation of most of the fixed and the remaining volatile constituents. During the drying process the water in the cells is partly replaced by air, the influence of which upon the remaining constituents is intensified by the porosity of the dry plant.

3. It is always advantageous to use fresh plants for the preparation of alkaloids and other active principles, and to employ as low a temperature as possible.

4. The composition of the fresh plants is more simple than is frequently supposed; they generally contain, besides cellulose, the saccharine, starchy and albuminous principles and the mineral salts, a volatile principle, either a carbohydrogen or aldehyde; a bitter or acrid principle, which is either an alkaloid or glucoside; a coloring principle and often fat.

5. To reduce the injurious influence of the atmosphere, it appears advisable to hasten the drying and then compress the dry plants, as is the custom in North America.

* Condensed from Wittstein's Vierteljahresschr für prakt Pharm 1869, p. 73—100, by J. M. M. American Journal of Pharmacy. The author, who died Dec. 1, 1866, was by the Société Royale des Sciences Medicales et Naturelles de Bruxelles, awarded a gold medal for this essay, which was published in Journ. de Med. de Brux. 1867 and 1868.

Tincture of Chloride of Iron.*

BY R. ROTHER.

On certain conditions an excuse would be barely admissible for obtruding with further remarks on a subject so prolific in literature, and which has supplied such a difficult theme to eminent authority as the tincture of chloride of iron. But a review of those extraordinary labors which have in time emanated from an array of talent, induces the convic-

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