2. A history is given of the drug and its sources in former editions of the U. S. P. and National Formulary.

3. The second-year root can be distinguished from the first-year root by the presence of characteristic wood fibers throughout the entire root, whereas the first-year root possesses these only in its crown region.

4. The structure of the first-year root has been described.

5. It is recommended that the drug continue to be restricted to the root of first-year plants of *Arctium Lappa* and *Arctium minus*. This recommendation is based upon extraction tests here recorded.

6. It is suggested that a crude fiber standard be introduced into the purity rubric paragraph of the Lappa monograph as a means of eliminating the second-year growth.

REFERENCES.

(1) Kroeber, *Das neuzeitliche Krauterbuch. Leipzig*, 202 (1934).
(2) Weckler, G. A., *Am. J. Pharm.*, 59, 393 (1857).
(3) Henderschott, J., *Proc. Mich. Pharm. Assoc.*, 121 (1887).
(4) Trimble, H., *Pharm. Era*, 133 (1888).
(5) Donaldson, T., *Am. J. Pharm.*, 62, 123 (1890).

CONVALLARIA.

Convallaria majalis or Lily-of-the-Valley has been used as a medicine in certain specific cardiac conditions and in the treatment of dropsy for several centuries. Its use by the Germans is discussed by Dr. Pietro Matthioli in Commentaries on the Materia Medica of Dioscorides, Venice, 1621. Lloyd (1) states that, in Russia, it was investigated by the medical profession as early as 1880, having long been used in dropsy by the people. It was introduced into the U. S. P. of 1890 under the title of "Convallaria" where it was defined as "the rhizome and roots of *Convallaria majalis* (nat. ord. *Liliaceæ*)" and again became official in the U. S. P. of 1900. It was deleted from the U. S. P. of 1910 and admitted into the fourth edition of the National Formulary of 1916 which recognized it under the title of "Convallaria Radix." This edition also made the dried inflorescence of Lily-of-the-Valley official under the title of "Convallaria Flores." Both of these drugs were retained in the fifth edition of the National Formulary but Convallariæ Radix alone was recognized in the sixth edition of 1936.

The histology of the drug has been described by Youngken (2). Crosbie (3), in commenting upon the structure of the rhizome and root, failed to find the collenchyma in the hypodermis of the rhizome mentioned in the N. F. V.

The purpose of this study was to investigate the accuracy of the statements in the present N. F. monograph and more especially the pharmacognostic aspects of the monograph.

Materials.—The materials used in this investigation consisted of entire plants gathered at Arlington, Mass. by the senior author and of a number of samples of commercial drug collected from the market during 1936, 1937 and 1938 and botanically authenticated.

Nomenclature.—The Latin title, "Convallariæ Radix" and the corresponding English title, "Convallaria Root" and the synonym, "Lily-of-the-Valley Root" are found to be scientifically incorrect since the drug consists of the rhizomes and roots, not merely the roots alone. In fact the rhizome portion represents the greater bulk of this drug. We suggest that the Latin and Eng-

lish titles be changed to Convallaria since the flowers are no longer officially recognized, that "Convallaria Root" be added as a synonym and that "Fluidextractum Convallariæ Radicis" be changed to "Fluidextractum Convallariæ."

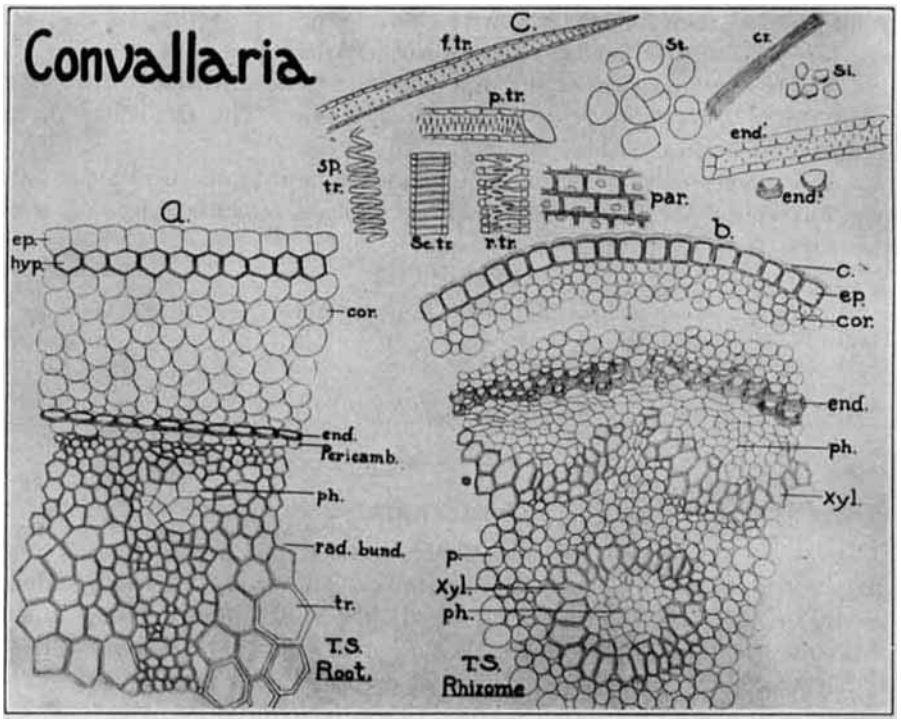

Fig. 2.—Convallaria. *a*, Transverse section of root. *b*, Transverse section of rhizome. *c*, Powdered Convallaria. All magnified. *ep.*, epidermis; *c.*, cuticle; *hyp.*, hypodermis; *cor.*, cortex; *end.*, endodermis; *pericamb.*, pericycle; *ph.*, phloem; *tr.*, trachea; *rad. bund.*, portion of radial bundle of root; *xyl.*, xylem; *p.*, parenchyma; *f. tr.*, fiber-tracheid; *p. tr.*, pitted trachea; *r. tr.*, fragment of reticulate trachea; *sc. tr.*, fragment of scalariform trachea; *sp. tr.*, spiral thickening of wall of spiral trachea; *st.*, starch grains; *cr.*, raphides of calcium oxalate; *si*, silica; *end.*[1], lengthwise view of an endodermal cell of rhizome; *end.*[2], cross views of endodermal cells of rhizome; *par.*, parenchyma in lengthwise view.

Purity Rubric.—The present standards for limits on foreign organic matter (5 per cent) and acid-insoluble ash (6 per cent) were investigated with the following results:

TABLE I.—DETERMINATION OF FOREIGN ORGANIC MATTER.

Sample No. 1	Assay A	2.03%	
	Assay B	4.80%	
	Assay C	3.02%	
	Assay D	5.30%	
	Assay E	4.60%	Average 3.95%
Sample No. 2	Assay A	4.47%	
	Assay B	4.19%	
	Assay C	13.75%	
	Assay D	6.95%	
	Assay E	4.72%	Average 6.81%

Sample No. 3	Assay A	1.5 %	
	Assay B	3.9 %	
	Assay C	3.7 %	
	Assay D	6.5 %	
	Assay E	3.6 %	Average 3.84%

Average of three samples—4.90%

Suggested per cent for monograph—"not more than 5%" (present standard).

It was noted that a considerable portion of the foreign organic matter represented *Polytrichum* species.

TABLE II.—DETERMINATION OF ACID-INSOLUBLE ASH (U. S. P. METHOD).

Sample No. 1	Assay A	2.21%	Sample No. 3	Assay A	5.71 %
	Assay B	2.78%		Assay B	6.008%
Sample No. 2	Assay A	5.00%	Sample No. 4	Assay A	2.95 %
	Assay B	5.37%		Assay B	3.34 %

Average of above samples—4.17%

Suggested per cent for monograph—"not more than 6%" (present standard).

Description and Physical Properties.—The present N. F. describes Unground Convallaria as follows:

"Rhizome horizontal, elongated, usually branched, cylindrical, from 1 to 3 mm. in diameter; externally yellowish white to pale brown; nodes with an occasional circular stem scar, and with several thin, tortuous, dark brown branching roots, root remnants or root scars at each node; occasional terminal or lateral buds up to 8 mm. in thickness and with numerous scales; occasional groups of annulate leaf scars; fracture short or somewhat fibrous; internally whitish. Odor faint; taste sweetish, becoming bitter and acrid."

Examination of the growth habit of the living rhizomes show that this varies from horizontal to oblique, the oblique direction of growth being noted by the senior author in plants growing in crowded colonies, although some of the plants in the crowded colonies possessed horizontal rhizomes. The internodes of 50 rhizomes were measured, and it was found that the nodes were averagely 4.3 cm. apart; 3 to 9 roots were observed to arise from each node of freshly dug rhizomes, and that these may arise from all surfaces of the nodes. Examination of our samples of commercial drug showed the rhizomes to be light yellow externally, the nodes showing occasional hollow stem scars and giving rise to from 3 to 9, thin, dark brown, branching roots, root remnants or root scars from all surfaces. Accordingly, the following changes in the description of the unground drug are recommended:

Line 1. "Rhizome horizontal" should be changed to read "Rhizome horizontal or oblique."

Line 2. "Externally yellowish white" should read "externally light yellow."

Line 3. "Nodes with an occasional circular stem scar, and with several thin, tortuous, dark brown, branching roots, root remnants or root scars at each node" should be changed to read as follows: "nodes averagely 4.3 cm. apart, occasionally with a circular, hollow, stem scar, and giving rise to from 3 to 9 thin, dark brown, branching roots, root remnants or root scars from all surfaces of the nodes."

Structure.—Careful study of the histology of the rhizome and root of *Convallaria majalis* in water and in phloroglucin and hydrochloric acid mounts and in teased, macerated preparations showed (1) that the endodermis of the rhizome consists usually of two layers, occasionally of from one to three layers of endodermal cells, irregularly polygonal in shape when examined in cross sections, with strongly lignified walls, the radial and inner walls being considerably more thickened than the outer walls, (2) that the endodermis of the root possesses cells whose radial and inner walls are slightly more thickened than the outer walls with Casparyan spots on the radial walls and (3) that a polyarch, radial bundle occurs in the stele of the root.

The xylem strands of the bundles were found to contain reticulate, as well as spiral and scalariform tracheæ and also fiber-tracheids, the latter with slightly lignified walls and oblique pores. The fiber tracheids are here reported in Convallaria for the first time.

As a result of this study we suggest the following changes in the paragraph on "Structure:"

Line 3. "A prominent endodermis, the radial and inner walls strongly lignified" should read "endodermis of usually two layers, occasionally of one or three layers of irregularly polygonal, strongly lignified cells, the radial and inner walls of which are materially thickened."

Line 4. "Adjacent to the inner surface of the endodermis, an interrupted circle of closed collateral fibrovascular bundles, the woody portion V-shaped in cross section; a few leptocentric fibrovascular bundles scattered in the stele; pith parenchyma cells separated by large intercellular spaces" should read "a broad central region composed of a matrix of pith parenchyma, through which course closed collateral and leptocentric fibrovascular bundles; the former with a V-shaped xylem and arranged in an interrupted circle just within the endodermis, the latter few in number and scattered in the stele."

Line 10. Referring to the root endodermis: "the endodermal cells thin-walled and bearing Casparyan spots" should be changed to read "endodermis whose radial and inner walls are slightly more thickened than the outer walls, and with Casparyan spots on the radial walls."

Line 11. "A stele with a several rayed bundle" should read, "a layer of pericambium, a polyarch radial bundle and central pith."

Powdered Convallaria.—Microscopic examination was made of clean drug, freshly ground and sieved, and mounted separately in water, and in phloroglucin and hydrochloric acid solution. As a result of studies made on this powder, we suggest the following changes in the Powdered Convallaria paragraph:

Line 1. "Simple or compound starch grains" should read "simple or 2- to 4-compound starch grains."

Line 5. After "porous walls;" there should be added the following: "slightly lignified fiber tracheids with oblique walls;"

Line 5. "Fragments of tracheæ with spiral and scalariform thickenings, or with porous walls" should read, "tracheæ with spiral, reticulate and scalariform markings."

Silica crystals were found in all samples. These were very numerous in the powdered commercial drug. It would seem proper to include them in the microscopic picture of the powder.

REFERENCES.

(1) Lloyd, J. U., "Origin and History of Pharmacopœial Vegetable Drugs, Chemicals and Preparations, I," 110 (1921).

(2) Youngken, H. W., "Text Book of Pharmacognosy," 4th Edition, 166 (1936).

(3) Crosbie, H. H., JOUR. A. PH. A., 19, 560 (1930).

STILLINGIA.

Stillingia or Queen's Root is defined in the N. F. VI as "The dried root of *Stillingia sylvatica* Linné (Fam. *Euphorbiaceæ*)." It represents the root of a low sub-shrub, native to sandy, pine-barren regions of the southeastern United States, ranging from Maryland to Florida and west to Kansas and Texas.

History.—The generic name *Stillingia* from which the Latin title of the drug was derived was named in honor of Doctor Benjamin Stillingfleet, an English botanist. The drug was used by the early settlers of the south in the form of a decoction as a cathartic and "blood purifier." Rafinesque (1) reported its use by the settlers as a domestic remedy in the treatment of sores, ulcers and elephantiasis, etc., and of its being the active ingredient in a former proprietary medicine, Wayne's Panacea. It was first introduced to the medical profession by Thomas Y. Simmons in a paper published in 1829 in the *American Medical Recorder* as an alterative in syphilitic and scrofulous affections. In 1846, Dr. H. B. Frost (2) extolled its actions upon the capillary and secreting vessels in changing their morbid conditions. For a long period it was frequently prescribed empirically but, as rational therapy advanced, its use waned and to-day, it is claimed to be rarely prescribed (3). Nevertheless, the demand for this drug and its preparations, the fluidextract of stillingia and compound fluidextract of trifolium has persisted to the extent as to warrant standards for them.