

Table VIII.—*Concluded.*

Stock no.	Age.	Month.	Year.	U. S. P. assay.	Absolute assay.
56	6	May	1929	3.19	3.57
36	6	May	1928	3.45	3.65
37	6	June	1928	2.43	2.69
58	6	June	1929	3.26	3.59
60	6	July	1929	2.79	3.01
39	6	August	1928	2.47	2.79
4	6	September	1927	3.00	3.19
3	6	September	1927	3.12	3.32
22	6	September	1927	2.71	2.85
28	6	September	1928	2.41	2.71
29	6	September	1928	2.69	2.95
66	6	September	1929	2.60	3.12
67	6	September	1929	2.45	2.71
70AB	6	September	1929	2.93	3.29
65N	6	September	1929	2.38	2.69
65JK	6	September	1929	2.28	2.51
65IO	6	September	1929	2.56	2.79
65AB	6	September	1929	2.48	2.73
65CE	6	September	1929	2.46	2.79
65GH	6	September	1929	2.51	2.73
65DF	6	September	1929	3.00	3.20
65LM	6	September	1929	2.42	2.65
40	6	October	1928	2.60	2.90
41	6	October	1928	2.53	2.81
42	6	October	1928	2.63	2.95
72AD	6	October	1929	2.85	3.21
72CB	6	October	1929	3.11	3.45
73	6	October	1929		
77	6	October	1929		
46	6	November	1928	2.80	3.10
48	6	December	1928	3.31	3.52
7	12	September	1927	3.08	3.27
27	13	September	1928	2.65	2.92
68	14	September	1929	2.44	2.69
		Maximum		3.45	3.73
		Average		2.82	3.01
		Minimum		2.22	2.34

(To be continued)

A PHYTOCHEMICAL AND PHARMACOLOGICAL STUDY OF MITCHELLA REPENS (LINNÉ), N. F. V.*

BY W. PAUL BRIGGS.**

The experimental research here reported was undertaken with the intention of determining the active constituents, if any, contained in the drug, *Mitchella repens*, Linné.

* From the laboratory of Glenn L. Jenkins, Professor of Pharmaceutical Chemistry, University of Maryland, School of Pharmacy.

** Associate Professor of Pharmacy, The George Washington University, School of Pharmacy.

Mitchella is indigenous to the United States and grows principally in woods and swampy places. It flowers in June and July, produces a bright scarlet berry, and its leaves, which resemble clover, remain green through the winter. *Mitchella* is also known as Squaw Vine (N. F. V), Twin Berry, Partridgeberry, Checkerberry, Winter Clover and Squaw Berry. The generic name *Mitchella* was given in honor of Dr. John Mitchell, a botanist of Virginia (1).

Millspaugh (2) states that it was one of the many plants used by the American Aborigines as a parturient. King (3) strongly recommended the drug as a parturient, diuretic and astringent and further stated that it was highly beneficial in amenorrhea, some forms of dysmenorrhea, menorrhagia, chronic congestion of the uterus, enfeebled uterine nervous system, etc. Most of the current works on *Materia Medica* arbitrarily classify it as useful in various uterine conditions. Kraemer (1) says that it is astringent, tonic and diuretic; Lynn (4) reports that it is used as an alterative in scrofula and rheumatism, mild diuretic and antiseptic and is often substituted for *Chimaphila*. Youngken (5) states that it is a diuretic, astringent and tonic; Rusby, Bliss and Ballard (6) that it is an uterine tonic and a diuretic acting like buchu, while Mansfield (7) reports that it is a diuretic and emmenagogue.

Numerous constituents have been reported, such as: Kraemer (1) saponin-like body, gum, sugar, wax and resin; Youngken (5) saponin-like compound, resin, mucilage, wax and dextrin; Rusby, Bliss and Ballard (6) resin, wax and a glucoside of the saponin group; Mansfield (7) bitter principle and a saponin-like substance. Breneiser (8) reported definitely the presence of saponin.

Since the investigation of the plant indicates, at least from a laboratory standpoint, that the drug possesses little value as a therapeutic agent, the findings will be reported as briefly as possible.

The average moisture content, determined by the Xylene Method, was found to be 10.16%, the average ash 6.17%, and acid-insoluble ash 2.22%. The qualitative examination of the ash showed that it contained the following inorganic constituents; iron, magnesium, aluminum, sodium, potassium and calcium sulphate, carbonate, chloride, phosphate and oxalate. Formic acid was identified in the distillate from the petroleum benzin extractive.

Complete extraction of 25 Gm. of the air-dried drug in a Soxhlet extractor with the following solvents successively yielded the results reported below:

Petroleum benzin.....	1.48% extractive
Ether.....	1.48% extractive
Chloroform.....	1.65% extractive
Ethyl acetate.....	2.44% extractive
Alcohol.....	7.37% extractive
Water.....	18.20% extractive

Continuous percolation of 2500 Gm. of the drug taken from a 25-pound lot with 95% alcohol until extraction was complete, upon subsequent evaporation, yielded 416.0 Gm. of syrupy extract. An alcoholic solution of 50 Gm. of this extract, poured into water, yielded 7.50 Gm. of resin. This resin had a saponification value of about 177, an acid number of about 45, and an ester number of about 133 when determined by the U. S. P. X methods.

A thorough examination of the extractive for alkaloidal and glucosidal constituents yielded negative results in every instance.

Repeated tests failed to confirm the presence of saponins reported by other investigators. Aqueous extracts of the drug do not produce hemolysis, but they do foam after standing at least 24 hours. Even after standing, however, the extracts do not produce hemolysis and the presence of saponin could not be established. The presence of reducing sugars, tannins, starches, waxes, fats and 4.89% of protein was established, in addition to an unidentified enzyme. Korsakoff (9) considers that the foaming after standing may be due to the action of this enzyme upon a saponin present, but all tests failed to reveal the presence of a saponin.

Steam distillation yielded an aromatic substance having a faint tobacco-like odor, but the substance was present in such minute quantities that it could not be isolated. The distillate gave negative tests with all alkaloidal reagents.

Pharmacological experiments performed by Professor Marvin R. Thompson gave results as follows: 1. Aqueous extracts representing 1 Gm. of drug per cc. in doses of 0.5 cc. per Kg. body weight administered intravenously to two anesthetized dogs three times at two-hour intervals produced no pressor activity. Three successive doses of 1 cc. per Kg. body weight of the aqueous extract administered orally to two dogs at one-hour intervals caused no pressor effect. Repetition of these tests using a dealcoholized fluidextract also produced no effect. 2. Both the alcoholic and aqueous extracts in concentrations of 1 cc. in a 100-cc. chamber caused no effect on the isolated uteri of rabbits and guinea pigs. 3. The syrupy liquid extractive in doses of 2 cc. per Kg. body weight caused no catharsis or other observable action when administered orally to cats. No effect was observable when the resin in doses of 0.5 Gm. per Kg. body weight was administered orally to cats.

CONCLUSION.

The results of this investigation indicate that *Mitchella* does not contain a saponin, as has been reported, or any other constituent which would cause the therapeutic action ascribed to this drug in the literature.

BIBLIOGRAPHY.

- (1) Kraemer, "Scientific and Applied Pharmacognosy" (1928), 758.
- (2) Millspaugh, "Medicinal Plants," Vol. I (1892), 77.
- (3) King, "American Dispensatory," 10th Edition (1873), 526.
- (4) Lynn, "Pharmaceutical Therapeutics" (1929), 194.
- (5) Youngken, "Text Book of Pharmacognosy," 3rd Edition (1930), 680.
- (6) Rusby, Bliss, Ballard, "Properties and Uses of Drugs" (1930), 344.
- (7) Mansfield, "Materia Medica and Pharmacognosy" (1926), 287.
- (8) Edgar Breneiser, *Am. J. Pharm.*, 59 (1887), 228.
- (9) Korsakoff, *Compt. rend.*, 155 (1912), 844.

UNIVERSITY OF FLORIDA RHO CHI.

At the annual banquet of the Iota Chapter of Rho Chi, national honorary pharmaceutical fraternity, honorary membership was conferred upon W. M. Hankins of Daytona Beach, F. H. Groover and W. D. Jones of Jacksonville.
