all samples. The variance for each sample over the range of concentration used and the variable reduction units demonstrate that colorimetric assays of tannic acid cannot be accomplished due to the inconsistency of the sample and difference in color. The numerical results are given in the following table.

TABLE I.—RANGE ONE. CONCENTRATION IN PER CENT.

Sample.	0.1.	0.2.	0.3.	0.4.	0.5.	0.6.	0.7.	0.8.	0.9.	1.0.
1	4.50	11.00	18.75	21.25	25.25	29.25	32.75	35.75	38.75	41.25
2	3.25	4.25	7.75	9.25	11.50	12.75	15.00	16.00	18.25	19.50
3	2.50	7.00	10.25	12.25	15.25	17.75	20.75	22.00	25.00	26.75
4	6.25	11.25	15.50	19.25	23.00	27.00	29.75	33.00	34.50	37.25
5	3.75	6.00	8.00	10.75	15.00	15.25	18.00	19.50	21.50	23.00
6	7.75	14.25	20.00	25.00	29.50	33.00	36.50	39.75	42.50	45.50
7	6.25	11.00	15.25	18.25	21.50	25.25	28.25	31.00	33.75	35.75
8	4.75	7.00	9.25	11.00	13.50	16.25	17.50	19.75	21.50	23.25
9	4.25	7.00	10.00	12.75	15.00	17.00	19.00	21.75	23.25	25.25
10	7.50	10.25	12.75	15.00	17.25	19.00	21.25	22.75	25.25	27.00
11	9.75	13.50	19.00	23.75	28.25	32.00	34.25	37.25	40.25	42.75

CONCLUSIONS.

1. The available samples of U. S. P. Fluffy Tannic Acid were purchased and compared by the tests for purity as outlined by the Pharmacopœia. The wide variation in these results gave proof of the variable composition of Tannic Acid Fluffy, U. S. P.

2. The determination of the melting point, refractive index, surface tension, optical activity, titratable acidity and spectroscopic analysis have been made with the hope that an assay might be developed making use of one of these constants.

3. A critical study of the various color reactions of tannic acid has been made together with an electrophotometric analysis, and as a result we conclude that an assay making use of color reactions is at present impractical.

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THE VOLATILE OIL OF POLIOMINTHA INCANA.*

BY A. F. SIEVERS[1] AND C. G. MARSHALL.[2]

Among the species of southwestern plants under cultivation and observation at the Nursery of the Soil Conservation Service of the U. S. Department of Agriculture at Tucson, Arizona, one of particular interest to the senior writer while visiting the nursery in May 1938 was *Poliomintha incana* (Torr.), A. Gray (*Hedeoma incana* Torr.), N. O. *Labiatæ*. The one-and-a-half acre plot of this species was in full bloom and the strong odor of the foliage and flowers suggested the advisability of making a preliminary study of the volatile oil, inasmuch as a search of the litera-

* Presented before the Scientific Section, A. PH. A., Atlanta meeting, 1939.

[1] Bureau of Plant Industry, Dept. of Agriculture, Washington, D. C.
[2] Soil Conservation Service, Dept. of Agriculture, Washington, D. C.

ture failed to reveal any references to its previous examination. Accordingly, 165 pounds of the herb was cut on May 12th from 0.14 acre and after drying was shipped to Washington, D. C., where it was distilled. The 53 pounds of dry herb yielded 187 Gm. of oil, equivalent to 0.78 per cent.

The plant occurs in sandy soils from western Texas through New Mexico and Arizona and from southern Utah and Colorado to Mexico. It attracts large numbers of bees but the writers have no information whether nectar is obtained from it. The Indians appear to have a number of uses for the plant, as indicated by the following statement from *Uncultivated Native Plants Used as Sources of Food*, by Edward F. Castetter, University of New Mexico Bulletin, Biological Series, Vol. 4, No. 1, pages 42–43 (1935):

"This plant is dipped in salt water and eaten as food by the Hopi. The leaves are boiled and eaten; the flowers are rubbed, then used as a flavoring substance which Hopi say tastes like brown sugar."

The plot of 1.5 acres was established on the Tucson Nursery as a seed-increase planting in the spring of 1937 from transplants which had been grown in nursery seed beds. The plants grow rapidly, bloom profusely and produce seed throughout the growing season. As the plant has a sprawling, prostrate habit of growth which in time would make irrigation, cultivation and the harvesting of seed difficult, it has been the practice to prune the plants back each winter to within about one foot of the base. The new growth is produced rapidly in the spring and a round symmetrical plant is formed which does not become sprawling until late in the season.

Seed in the hull at the rate of 436 pounds per acre has been harvested. About 25 per cent of the hulls contain seed. As the seed scatters as it ripens continuously through the summer, its collection is accomplished by sweeping it up from the ground under the plants and then separating it from dirt and débris by means of a seed-cleaning machine.

The seed germinates readily and the plant can also be propagated from stem cuttings, rooted in sand beds in the greenhouse or in propagating frames.

The amount of herb cut from the area mentioned is not the maximum that may be expected because the stand was only fair and the growth only what had been produced that spring following winter pruning.

EXAMINATION OF THE OIL.

The oil is light brown in color becoming somewhat darker on standing. It has a minty, pennyroyal-like odor but the taste is without the characteristic "cooling" effect of peppermint. The specific gravity at 25° C. is 0.9339. It is soluble in all proportions of 95 and 80 per cent alcohol and in $1^1/_2$ volumes of 70 per cent alcohol. The angle of rotation in 100-mm. tube at 20° C. is +17.2°. The acid number is 2.11; saponification number 23.3 and acetylization number 42.5. Schiff's reagent revealed the presence of traces of aldehydes.

Following are the results of fractionating 100 cc. of the oil at atmospheric pressure:

Fraction.	Temperature.	Volume.
1	—183° C.	2.5 cc.
2	183–200° C.	3.0 cc.
3	200–220° C.	76.0 cc.
4	above 220° C.	18.5 cc. (residue)
		100.0 cc.

Fraction 3 was again fractioned as follows:

Fraction.	Temperature.	Volume.
1	—210° C.	10.0 cc.
2	210–216° C.	16.0 cc.
3	216–220° C.	38.0 cc.
4	220–220.5° C.	7.5 cc.
5		4.5 cc. (residue)
		76.0 cc.

The physical constants of fraction 3 from the refractionation were found to be:

Specific gravity at 25° C.	0.9328
Angle of rotation 100 mm. 20° C.	+24.6°
Index of refraction at 25° C.	1.4837

Inasmuch as the above constants correspond closely to those of pulegone it is obvious that pulegone is the principal constituent of the oil.

A COLLABORATIVE INVESTIGATION OF THE SPECTROPHOTOMETRIC METHOD FOR ASSAY OF VITAMIN A.*

BY C. L. BARTHEN, F. F. BERG, E. B. CARTER, D. M. COPLEY, R. J. FOSBINDER, T. LEWIS AND F. O. TAYLOR.[1]

At the combined A. D. M. A. and A. P. M. A. Contact Committee Meeting (held at the Washington Hotel, Washington, D. C., March 28, 1938) the Chairman of the Sub-Committee on Physical Tests read a report of a preliminary investigation showing to what extent, in six (6) different laboratories, the biological vitamin A assays of various fish liver oils parallel the spectrophotometric determination. The general discussion which followed the reading of the report was terminated by the acceptance of a proposal that the members of the Sub-Committee on Physical Tests and the members of the A. D. M. A. Vitamin Assay Committee (who were present) meet and outline a program for further study of this subject.

At the meeting of the combined committees, the Chairman of the Sub-Committee on Physical Tests was instructed to prepare a bulletin covering the suggested tentative program and submit copies of this bulletin to the members of both committees for their comments, corrections, etc.

In view of the report of the Vitamin Assay Committee (1) and the paper by Barthen and Leonard (2) and in accordance with the suggestions made in the replies to the bulletin, it was decided that six (6) samples be submitted for optical readings with various types of instruments, in as many laboratories as were willing and in a position to do so.

Inventors of physical instruments which are specially designed for the estimation of vitamin A (such as the photoelectric photometer, photoelectric colorimeter, monochrometer, spectrophotometer and vitameter) claim to achieve results by means of these instruments that are comparable with biological assays. Since the laboratories employing these various instruments expressed a willingness to collaborate, it seemed apparent that this study afforded an excellent opportunity to demonstrate whether or not, in the determination of vitamin A potency, the results obtained by physical instruments are as reliable as those obtained by biological assay.

The committee takes this occasion to express its sincere appreciation and gratitude to:

Atlantic Coast Fisheries Corp.	Mead Johnson & Co.
Distillation Products, Inc.	National Oil Products Co.

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[1] Sub-Committee on Physical Tests.