Fifth: The use of tests of precision, such as ash determination, the extractive determinations, the solubilities and chemical or micro-chemical tests for identity, quality, and purity should be encouraged. The mention, even though just by a word in parenthesis or italics, of the adulterant, or the indication of inferior quality sought for by a test, is helpful especially to pharmacists who may not be in close touch with these tests.

Sixth: In case the U. S. P. becomes eventually a book exclusively of materia medica standards, it would be desirable to include among the materia medica such extractions or solutions of drugs and chemicals as are prepared by manufacturing houses and can be definitely standardized as to all of their medicinal constituents by appropriate assays or tests; just as volatile oils, alkaloids and glucosides are now recognized as articles of materia medica rather than preparations.

Examples: Waters—Ammonia, Rose, Peppermint, Spearmint; Solution Hydrogen Dioxide, Spirit of Nitrous Ether, etc.

After this extensive introduction I must now make apologies for not reaching sooner the actual subject of the paper. But as a matter of fact, practically all of the suggestions that I had compiled during the last few years regarding changes in some of the monographs have already been presented in the very excellent papers recently published by Messrs. Rusby, Scoville, Gane, Kraemer, Francis, Farwell, Caldwell, and others.

Dr. Rusby's paper presents a number of criticisms and very valuable suggestions that should certainly have our endorsement, especially his points regarding the definition of Pix Liquida, Taraxacum, Rheum, Asafoetida, etc. Suggestions from numerous authors regarding the admittance of stem, not exceeding a certain thickness, in Belladonnae Folia, Hyoscyamus and Stramonium, should be complied with. The suggestion of Dr. Francis regarding Viburnum Prunifolium, that the definition should be changed back so as to include only the root bark, with a small allowance of stem bark, is approved. In fact, the present description of the drug indicates that only root bark is to be regarded as official, while the definition allows the use of stem bark. Professor Day recently criticised the definition of Resina and Oleum Terebinthinae as follows: As the oil is usually distilled commercially, from the freshly gathered and, therefore, liquid or semi-liquid oleoresin, the definition should not specify that the oil of turpentine and rosin be obtained from the *concrete* oleoresin.

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A NOTE ON THE EXAMINATION OF A COMMERCIAL SAMPLE OF OIL OF PENNYROYAL.*

BY GEORGE M. BERINGER.

On two occasions, recently, samples of what, it was reported, had been sold as Oil of Pennyroyal, were presented to the writer with the request that he determine first, whether the sample was oil of pennyroyal, and secondly, if it was unadulterated. The sample referred to in this note was one of these.

* Read at the meeting of the New Jersey Pharmaceutical Association at Newark, June 9, 1920.

The sample measured only 15 Cc., and as it was desirable to retain at least a portion in the original container for court evidence, the quantity available for examination was not large.

The U. S. P., 8th Revision, defined Oleum Hedeoma as a volatile oil, obtained by distillation from *Hedeoma pulegoides* Linné. The sp. gr. was stated as 0.930 to 0.940, and the oil as soluble in two parts, by volume, of a mixture of alcohol 3 volumes, water 1 volume (approximately 70 percent alcohol by volume). "This is what is known in commerce as 'American Pennyroyal Oil.' " The later revision of the U. S. P. dismissed this title, and so we have now no official standard for Oleum Hedeoma.

A large portion of the oil of pennyroyal of commerce, however, is of European production, and is stated to be distilled from *Mentha pulegium* Linné. The European oil has a sp. gr. of 0.930–0.960, and is soluble in two parts of 70 percent alcohol. *Pulegone* is the most active constituent of both of the commercial varieties of pennyroyal oil, and is present in somewhat larger proportion in the European oil. It is a ketone $C_{10}H_{16}O$, in which the Carbonyl Group, CO, unites with two alcohol radicals. Its boiling point is given by several authorities as from 221° C. to 224° C.

The sample of oil under consideration was a limpid pale yellow liquid, having a distinct pennyroyal odor, with a mint-like tendency. The sp. gr. was 0.884, and it mixed clear in all proportions with 70 percent alcohol. The low specific gravity and the solubility at once indicated that the sample was not normal.

Ten Cc. was fractionally distilled from a small distilling flask, 5 Cc. distilled over and was collected at a temperature below 85° C. This portion responded to the ethyl acetate test and other reactions for ethyl alcohol, proving that the sample was not pure oil of pennyroyal, but a mixture of which 50 percent was alcohol.

The fraction distilling between 218° C. and 224° C. was collected, as this should contain the *pulegone*, the characteristic constituent of pennyroyal oil. It measured 1.6 Cc. corresponding to 16 percent in the sample, or, possibly, 32 percent in the original oil. It had the unmistakable odor of pennyroyal, greatly intensified and very persistent, and was soluble in 1.5 parts of 70 percent alcohol.

To prove that this was *pulegone*, two identifying tests were adopted. *Pulegone* being a ketone, the iodoform test was applied as a group reaction, and the response was prompt with copious production of iodoform. *Pulegone* can be reduced by nascent hydrogen to form a menthol. A small portion was dissolved in dehydrated alcohol, metallic sodium added; after the reaction was completed the solution was diluted with water and extracted with petroleum ether. On evaporating the solvent the residue gave the distinct odor and taste of a menthol. The quantity worked with did not permit of the making of melting point and optical rotation determinations.

From the above tests it was concluded that the sample was Pennyroyal Oil and mixed with alcohol to the extent of 50 percent.