U.D.C. 547.94 : 582.675.4

Tatsuhiko Nakano : Studies on the Alkaloids of Menispermaceous Plants. CXXXI.[1] Isolation of Magnoflorine from *Cocculus trilobus* DC.*

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It is now known that *Cocculus trilobus* DC. (Japanese name "Aotsuzurafuji") contains the biscoclaurine alkaloids of the tertiary type, such as trilobine, isotrilobine,[2] trilobamine,[3] and normenisarine.[4] Concerning the chemical constitutions of these alkaloids, a series of detailed investigations have been made so far, but no attention seems to have been paid to the possible existence of quaternary bases in this same plant. Thus reinvestigation had still to be made from this point of view, and the work reported here is concerned with the finding of a quaternary base from a newly collected plant material.

The isolation and purification of the quaternary base was effected by a procedure so far employed for Magnolia alkaloids, whereafter a quaternary base was induced to crystallize as the styphnate of yellow microscopic pillars, m.p. 230~231°(decomp.). The analyses gave values corresponding to the empirical formula, $C_{20}H_{24}O_4N \cdot C_6H_2O_8N_3$, and showed the presence of two methoxyls and one $N(CH_3)_2$ group.

In view of the fact that its molecular formula and melting point suggested a close similarity to magnoflorine,[5] a quaternary alkaloid of *Magnolia grandiflora* L., some of the derivatives of this alkaloid were prepared, and their data compared with those of the corresponding derivatives of magnoflorine. As shown in Table I, a perfect concordance was observed between them.

TABLE I.

Derivative	Present Alkaloid	Magnoflorine
Styphnate	m.p. 230~231°(decomp.)	m.p. 218.5~219°(decomp.)[6]
Picrate	m.p. 202~203°(decomp.)	m.p. 205~206°(decomp.)
Iodide	m.p. 248~249°(decomp.)	m.p. 248~249°(decomp.)
O,O-Dimethyl ether iodide	m.p. 243°(decomp.)	m.p. 242.5~243°(decomp.)

Since their melting points are all accompanied by decomposition, mixed melting points are not wholly satisfactory as a means of establishing identity, and recourse was had to infrared determination. As a result, it was seen that this quaternary base is identical with magnoflorine. This plant furnishes a comparatively higher amount of 0.29% (based upon the iodide) of magnoflorine.

The author wishes to express his appreciation to Prof. Dr. M. Tomita for his interest in this work; to Mr. M. Uchiyama for his cooperation in the collection and extraction of the plant material used in this experiment, and to Messrs. Y. Matsui and M. Narisada of the Research Laboratory, Shionogi & Co., Ltd., for carrying out the infrared determinations. The author's thanks are also tendered to the Ministry of Education for financial aids.

* This constitutes a part of a series entitled "Studies on the Alkaloids of Menispermaceous Plants" by Masao Tomita.

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6) This decomposition point somewhat depended upon the rate of heating.

Experimental[7]

(1) Extraction and Isolation of Alkaloids—4.4 kg. of the rhizome and vine (free from leaves) of *Cocculus trilobus* DC., collected late in July, 1955, in the suburbs of Kyoto City, were finely ground and extracted 3 times with hot MeOH. The MeOH extract was evaporated *in vacuo*, and the viscous residue was extracted with 5% aq. H_2SO_4 solution. The acid solution was basified with aq. NH_4OH and extracted with $CHCl_3$ to remove tertiary bases. The aq. alkaline layer was made acid to Congo red with HCl, and the water-soluble quaternary base was purified by reprecipitating it twice as the reineckate and then as the $HgCl_2$ salt. From the $HgCl_2$ salt the chloride was obtained as an oil which did not crystallize in spite of various attempts. However, the styphnate formed yellow microscopic pillars, m.p. 230~231°(decomp.) from a mixture of acetone and MeOH. Yield, 16.1 g. It was confirmed by infrared spectrum to be identical with magnoflorine styphnate from *Magnolia grandiflora* L. *Anal.* Calcd. for $C_{20}H_{24}O_4N \cdot C_6H_2O_8N_3$: C, 53.24; H, 4.47; N, 9.55; OCH_3, 10.58; NCH_3, 5.12. Found: C, 53.17; H, 4.40; N, 9.45; OCH_3, 10.69; NCH_3, 5.31.

The above styphnate was decomposed with HCl and the liberated styphnic acid removed by extraction with ether. Vaccum evaporation of the aq. layer left a syrupy chloride, a portion of which was converted into the picrate crystallizing from a mixture of acetone and EtOH as yellow microscopic pillars, m.p. 202~203°(decomp.). *Anal.* Calcd. for $C_{20}H_{24}O_4N \cdot C_6H_2O_7N_3$: C, 54.73; H, 4.59; N, 9.82. Found: C, 54.11; H, 4.81; N, 9.64.

The major portion of the syrupy chloride was treated with aq. KI. The iodide formed from MeOH colorless pillars, m.p. 248~249°(decomp.), which was shown by infrared spectrum to be identical with magnoflorine iodide. *Anal.* Calcd. for $C_{20}H_{24}O_4NI$: C, 51.18; H, 5.15. Found: C, 51.31; H, 5.01.

(2) O,O-Dimethylmagnoflorine Iodide—The above iodide was methylated with MeI and alkali in the same manner as described for the preparation of O,O-dimethylmagnoflorine iodide.[5] The O,O-dimethyl ether iodide was obtained from MeOH as colorless pillars, m.p. 243°(decomp.), the infrared spectrum of which was identical with that of O,O-dimethylmagnoflorine iodide. *Anal.* Calcd. for $C_{22}H_{28}O_4NI$: C, 53.12; H, 5.48; OCH_3, 24.96. Found: C, 53.28; H, 5.74; OCH_3, 24.71.

Summary

A quaternary base magnoflorine, a major alkaloid of *Magnolia grandiflora* L., has been isolated from *Cocculus trilobus* DC. of the family Menispermaceae.

(Received December 12, 1955)

7) All melting points are uncorrected. The author is indebted to Messrs. K. Hozumi and K. Imaeda, and Miss F. Tanase of the Microanalytical Laboratory of this Institute for the microanalyses reported herein.