Micelles formed in the presence of excess electrolyte contain less alcohol than micelles formed in the absence of electrolyte. Klevens,[15] for instance, has shown that cetyl pyridinium chloride solubilized significantly less octyl alcohol when sodium chloride was added, despite the fact that sodium chloride reduces the CMC.

Keeping these two considerations in mind, we can look at the last term of the right hand side of equation (5). Since:

$$(\Gamma_I)_{\text{NaCl solution}} \ll (\Gamma_I)_{\text{water}}$$

at all concentrations, and since $d \ln a_I$ values are negative for both cases:

$$|d \ln a_I|_{\text{NaCl solution}} \ll |d \ln a_I|_{\text{water}}$$

When micelles begin to form, it is conceivable that

$$\Gamma_S > \Gamma_I(d \ln a_I/d \ln a_S),$$

and no minimum should be observed.

Department of Pharmaceutics
College of Pharmacy
University of Michigan
Ann Arbor, Michigan, 48104

NORMAN D. WEINER
GORDON L. FLYNN

Received February 23, 1974

15) H.B.J. Klevens, *J. Am. Chem. Soc.*, 72, 3780 (1950).

[Chem. Pharm. Bull. 22(11)2483—2485(1974)]

UDC 547.597.04 : 581.192 : 547.913.5.057

Transformation of *l*-Abietic Acid to Benzohydroazulene Derivative[1]

As a new utilization of pine rosin, chemical conversion of its major component, *l*-abietic acid (**1**), to biologically active compound has aroused our interest and a transformation of **1** to a compound (**8**) having a benzohydroazulene skeleton is described herein. This compound (**8**) is regarded as a potential intermediate for the synthesis of grayanotoxins (*e.g.*, grayanotoxin I[2] (**2**)).

Reduction (Zn, PrOH–H_2O, reflux) of 1-bromo-dehydroabietic acid derivatives (1β-Br: **3** and 1α-Br: **4**) previously synthesized from **1** *via* benzonilidene compound[3] (**5**), gave the same 7-oxo ester (**6**), $C_{21}H_{26}O_3$, bp 137° (bath temp.)/0.005 Torr, ν: 1730, 1680 cm^{-1}, δ: 1.23 (d, J=7.0 Hz; isopropyl), 1.33 (s; 4-Me), 1.70 (s; 10-Me), 2.32, 2.73 (d each, J=18.0 Hz; 6-CH_2), 3.70 (s; COOMe), having a cyclopropane ring.[4] In the NMR spectrum, 6-methylene signal

1) New compounds of indicated chemical formulae gave satisfactory analytical values (high-resolution mass spectrometry). Nuclear magnetic resonance (NMR) (60 MHz) and IR spectra (maximum absorption) were measured in CCl_4.

2) *a*) J. Iwasa, Z. Kumazawa, and M. Kakajima *Chem. & Ind.*, **1961**, 511 (1961); *b*) *Agr. Biol. Chem.* (Tokyo) **25**, 782, 793, 798 (1961); *c*) H. Kakisawa, *Nippon Kagaku Zasshi*, **82**, 1096, 1216 (1961); *d*) H. Kakisawa, M. Kurono, S. Takahashi, and Y. Hirata, *Tetrahedron Letters*, **2**, 59 (1961).

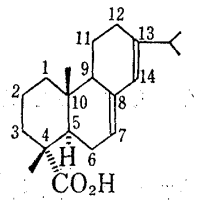
3) *a*) A. Tahara, H. Mizuno, and T. Ohsawa, *Chemistry Letters*, **1972**, 1163; *b*) A. Tahara and H. Mizuno, *Tetrahedron Letters*, **1974**, 523.

4) *cf. a*) O. Gnoj, E.P. Oliveto, C.H. Robinson, and D.H.R. Barton, *Proc. Chem. Soc.*, **1961**, 207; *b*) D.H.R. Barton, N. K. Basu, R.H. Hesse, F.S. Morehouse, and M.M. Pechet, *J. Am. Chem. Soc.*, **88**, 3016 (1966).

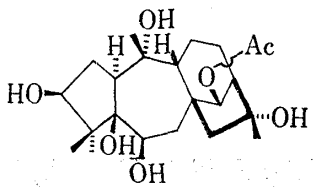
(AB-pattern) appears in the region of proton adjacent to the oxo group and 10-methyl signal moves to an abnormally low magnetic field. This observation reasonably supports the structure of **6**, in which no hydrogen exists at 5-position adjacent to 6-methylene group and 10-methyl group is coplanar with the benzene ring. The cyclopropane ring of **6** was still stable under the usual acidic condition (HCl- or H_2SO_4–$CHCl_3$) for the ring cleavage.

Bromination (N-bromosuccinimide, Ac_2O–H_2SO_4, room temp.) of **6** gave 6-bromo ester (**7**), ν: 1736, 1690 cm^{-1}, δ: 1.26 (d, J=7.2 Hz; isopropyl), 1.61 (s; 4-Me), 1.77 (s; 10-Me), 3.79 (s; COOMe), 4.46 (s; 6α-H). The lower chemical shift of 4-methyl group in **7** (*cf.* that of **6**: δ 1.33) shows that the methyl group is spatially near by 6β-bromine and is affected by its anisotropic effect.[5]

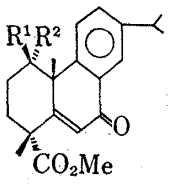
The crystalline 6-bromo ester (**7**) was so unstable that it was readily converted to an oily new compound (**8**), $C_{21}H_{24}O_3$, bp 143° (bath temp.)/0.006 Torr, ν: 1735, 1635, 1598 cm^{-1}, δ: 1.32 (d, J=7.2 Hz; isopropyl), 1.51 (s; 4-Me), 2.43 (s; 10-Me), 3.66 (s; COOMe), 6.55 (s; 6-H), by recrystallization or chromatography (silica gel). The compound (**8**) was also obtained directly by bromination (Br_2, AcOH–HBr, room temp.) of 7-oxo ester (**6**) presumably *via* **7**. The structure of **8** having a benzohydroazulene skeleton is estimated from the following NMR analysis. A singlet peak of 10-methyl group of **8** appears in the field of conjugated olefinic methyl group and the ^{13}C-NMR spectrum shows the presence of nine sp^3, two carbonyl, and ten aromatic (or olefinic) carbons. This assumption was proved by a chemical evidence. Degradation (successive treatment of ozonolysis, oxidation, and methylation) of **8** gave a methyl benzoate derivative (**9**), $C_{13}H_{16}O_3$, bp 80° (bath temp.)/0.005 Torr, ν: 1733 (sh.), 1730, 1708 cm^{-1}, δ: 1.30 (d, J=6.6 Hz; isopropyl), 2.43 (s; COMe), 3.89 (s; COOMe). This compound (**9**) was oxidized (CF_3CO_3H, CH_2Cl_2) and hydrolyzed to the known product (**10**) prepared from salicylic acid.[6]



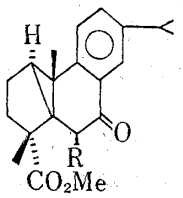
1



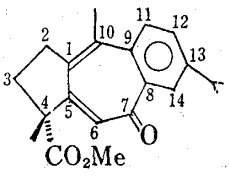
2



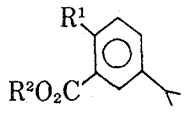
3 : R^1=Br, R^2=H
4 : R^1=H , R^2=Br
5 : R^1=R^2=H



6 : R=H
7 : R=Br



8



9 : R^1=COMe, R^2=Me
10 : R^1=OH, R^2=H

Chart 1

As the benzohydroazulene derivative (**8**) has all the functional groups required for the synthsis of grayanotoxin, the compound can be considered as a key intermediate for it, and this work is now in progress.

5) *a*) J.C. Jacquesy, L.M. Lehn, and J. Levisalles, *Bull. Soc. Chim. France*, **1961**, 2444; *b*) J.C. Jacquesy, R. Jacquesy, and J. Levisalles, *ibid.*, **1964**, 2224; *c*) A.D. Cross and I.T. Harrison, *J. Am. Chem. Soc.*, **85**, 3223 (1963).

6) P. Marcincal, *Bull. Soc. Chim. France*, **1971**, 552.

Rikagaku Kenkyusho (The Institute of Physical and Chemical Research), Wako-shi, Saitama-ken

YASUO OHTSUKA
YOSHIKO MAKOSHI
AKIRA TAHARA[7]

Received May 20, 1974

7) To whom inquiries regarding this communication should be addressed.

Chem. Pharm. Bull. 22(11)2485—2487(1974)

UDC 547.8.04

Stability of Thiabenzenes[1]

It has been reported the instability of 1,2,4,6-tetraphenylthiabenzene (**1**) would be considerably due to the steric hindrance by the bulky of 2- and 6-phenyl groups, in contrast to the lesser hindrance in other S-arylthiabenzenes by Price and his coworkers.[2] However, in this communication, we found that the stability of thiabenzenes is effected not only by the steric hindrance of the substituents but rather by the electronic structure of those molecules during the course of the studies on the application of thiabenzene derivatives to medicinal chemistry.[1]

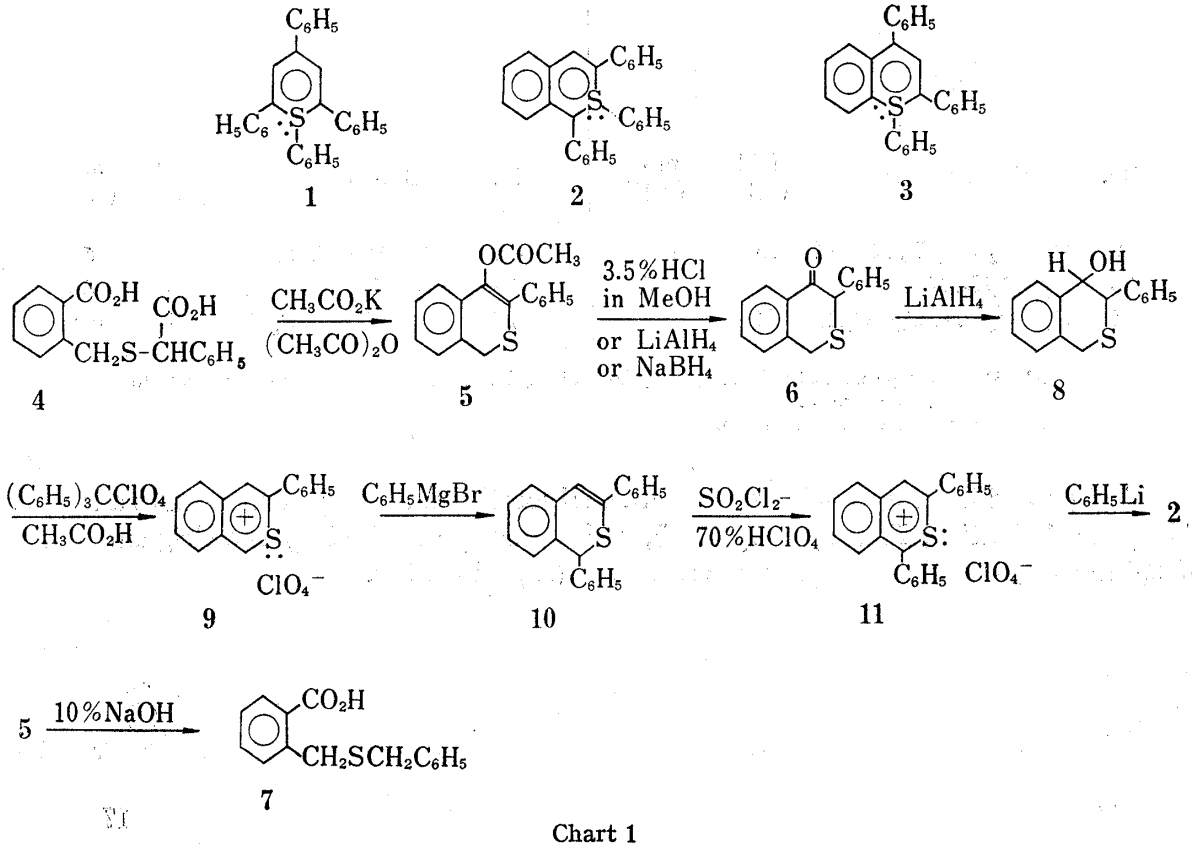


Chart 1

1) M. Hori, T. Kataoka, H. Shimizu, and S. Yoshimura, *Yakugaku Zasshi*, submitted.
2) *a*) G. Suld and C.C. Price, *J. Am. Chem. Soc.*, **83**, 1770 (1961); *idem, ibid.*, **84**, 2090, 2094 (1962); *b*) C.C. Price, M. Hori, T. Parasaran, and M. Polk, *ibid.*, **85**, 2278 (1963); *c*) M. Polk, M. Siskin and C.C. Price, *ibid.*, **91**, 1206 (1969).