with catechol-type or quinone-type estrogen. It should be now emphasized that the steroidal moiety in the new peptide conjugate is not 2-oxygenated estrogen but estradiol or estrone itself. The proposed mechanism by these investigators involving the additive condensation of the thiol with *o*-quinone is not applicable and hence an alternative explanation must be required for the formation of this novel metabolite. In our previous study the occurrence of "NIH shift" during aromatic ring hydroxylation was observed with 3-deoxyestrone.[5] If arene-oxide would be a metabolic intermediate common to both hydroxylation and glutathione conjugation,[6] the introduced position of the thiol should be C-2 or C-4 in the steroid nucleus.

Further studies in progress in this laboratory may provide the data necessary for the more rigorous characterization as well as the formation mechanism of the estrogen-glutathione conjugate.

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Received January 9, 1971

5) T. Nambara, M. Numazawa, and S. Akiyama, *Chem. Pharm. Bull.* (Tokyo), **19**, 153 (1971).
6) D. M. Jerina, J. W. Daly, and B. Witkop, *J. Am. Chem. Soc.*, **90**, 6523 (1968); D. M. Jerina, J. W. Daly, B. Witkop, P. Zaltzman-Nierenberg, and S. Udenfriend, *ibid.*, **90**, 6525 (1968).

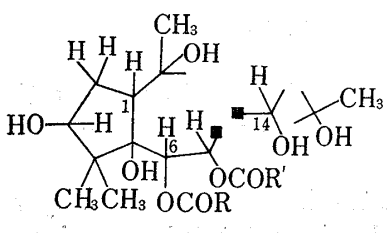
[Chem. Pharm. Bull. 19(4) 856—857 (1971)]

UDC 547.913.6.02 : 581.192 : 582.912.4

Stereostructure of Asebotoxin IV and V, Toxins of *Pieris japonica*

We have previously reported the isolation and structural elucidation of three new toxic diterpenoids, asebotoxin I, II, and III, from the flowers of *Pieris japonica* D. Don (Ericaceae), a poisonous tree in Japan.[1,2] Continuation of our work has resulted in the further isolation of two novel diterpenoids for which the names asebotoxin IV and V (A-IV and A-V) are proposed.

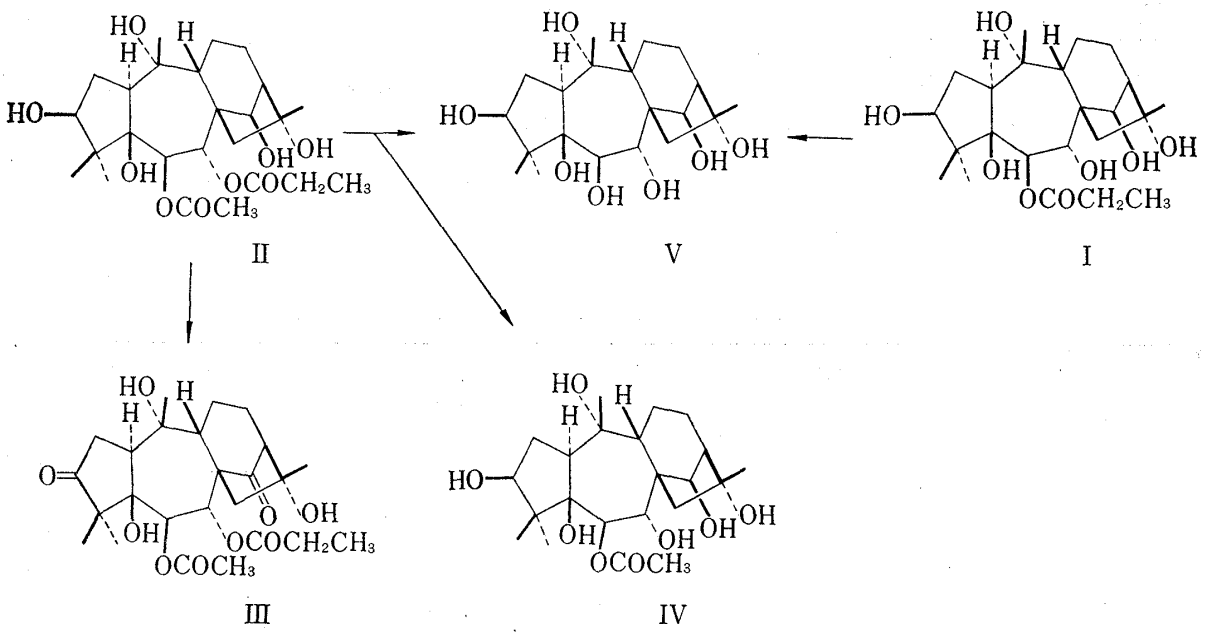
A-V, $C_{25}H_{40}O_9$, mp 280—281°, was shown by spectral properties to have two tertiary methyls (0.99, 1.48 ppm), two tertiary methyls on hydroxyl-carrying carbons (1.48, 1.82 ppm), hydroxyls (3490, 3280 cm^{-1}) two of which are secondary (3.85, 5.21 ppm), a secondary O-acetyl (1714 or 1729, 1253 cm^{-1}, 2.05, 6.14 ppm) and a secondary O-propionyl (1729 or 1714cm^{-1}, 1.12, 2.45, 6.09 ppm). Further analysis of the nuclear magnetic resonance (NMR) spectrum revealed that A-V possesses the partial structure A in which the C-1 and C-6 hydrogens and the C-1 and C-14 hydrogens are sit-



A: R=CH_3, R′=CH_2CH_3 or *vice versa*
▪ : denotes a quaternary carbon

1) H. Hikino, K. Ito, and T. Takemoto, *Chem. Pharm. Bull.* (Tokyo), **17**, 854 (1969).
2) H. Hikino, K. Ito, T. Ohta, and T. Takemoto, *Chem. Pharm. Bull.* (Tokyo), **17**, 1078 (1969).

uated in spatially close relationship. Chromic acid oxidation of A-V yielded the diketone (III) whose infrared (IR) spectrum exhibits a band at 1743 cm^{-1} attributable to cyclopentanones as well as the ester groups. Based on these data together with biogenetic considerations, we concluded that A-V is represented by stereoformula II except for the location of the acyl groups. Alkaline hydrolysis of A-V gave the monodeacyl-derivative (IV) and the bisdeacyl-derivative (V). The former (IV), which was indicated by the NMR spectrum to retain the O-acetyl group (2.08 ppm), was not reacted with periodate. Combined evidence has led to the stereostructure II for A-V.



A-IV, $C_{23}H_{38}O_8$, mp 229—230°, was indicated to possess two tertiary methyls (1.02, 1.53 ppm), two tertiary methyls on hydroxyl-bearing carbons (1.55, 1.80 ppm), hydroxyls (3540, 3470, 3330 cm^{-1}) three of which are secondary (3.84, 4.16, 5.24 ppm) and a secondary O-propionyl (1746 cm^{-1}, 1.21, 2.50, 5.84 ppm). Alkaline hydrolysis of A-IV furnished the depropionyl-derivative which was identified as bisdeacyl-A-V (V). The presence of the O-propionyl group at C-6 in A-IV was demonstrated by the following observations: 1) A-IV was not reacted with periodate and 2) the hydrogen on the O-propionyl-carrying carbon, whose signal appeared at a lower-field region (5.84 ppm) in the NMR spectrum of A-IV, was shown by the presence of an intramolecular nuclear Overhauser effect to be closely situated to the C-1 hydrogen (3.26 ppm). The stereostructure of A-IV has thus been established as shown in formula I.

Acknowledgement Thanks are due to Research Laboratories, Sankyo & Co., Ltd., Research Laboratories, Takeda Chemical Industries, Ltd., and Department of Chemistry, this University, for NMR measurements.

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Received January 18, 1971