by the same enzyme and whether O-glucosides are normal metabolites of the corresponding hydroxyamino acids. These questions are being studied further.

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Faculty of Pharmaceutical Sciences,
University of Chiba
1-33, Yayoi-cho, Chiba

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Syntheses of New 6,9,6 Ring System, 5H-Dibenz[b,g]azonine Derivatives

Most psychotropic drugs have tricyclic dibenzo ring system. Major parts of them have concerned with 6,6,6 ring system (e.g. phenothiazine or acrydane) or 6,7,6 ring system (e.g. dibenzocycloheptane or dibenzazepine). Although as a part of 6,8,6 ring system, many dibenz[b,f]azocines have been synthesized, their homologue, 5H-dibenz[b,g]azonines have not yet been reported. We report herein the first syntheses of 6,11,12,13-tetrahydro-5H-dibenz[b,g]azonines having unknown ring system.

![Chart 1](image)

5,6-Dihydro-11H-benzo[a]carbazoles (I a,b,c) prepared from phenylhydrazines and 1-tetralone, were oxidized with ozone in chloroform or with sodium periodate in water-ethyl acetate to afford 6,11,12,13-tetrahydro-5H-dibenz[b,g]azonin-6,13-diones (II a,b,c).

IIa C_{16}H_{13}O_{2}N. M+ 251, mp 169–172°C, IR cm⁻¹: 1670 (KBr), 1645 (KBr) NMR (DMSO-d₆): 2.6–3.7 (4H, complex signals).

IIb C_{16}H_{12}O_{2}NCl. M+ 285, mp 160–162°C, IR cm⁻¹: 1680 (KBr), 1650 (KBr) NMR (DMSO-d₆): 2.4–3.7 (4H, complex signals).

IIc C_{20}H_{19}O_{4}N. M+ 337, mp 129–131°C, IR cm⁻¹: 1730 (KBr), 1650 (KBr) NMR (DMSO-d₆): 2.4–3.4 (4H, complex signals), 4.18 and 4.80 (2H, AB quartet, J=17.5 Hz).

IIa,c were treated with NaBH₄ in ethanol for 2–3 hr to give lactam alcohols (IIIa,c R₂=OH). IIIa (R₂=OH) C_{16}H_{15}O_{2}N. M+ 253. mp 185–188°C, IR cm⁻¹: 1640 (KBr). IIIc (R₂=OH) C_{20}H_{21}O_{4}N. M+ 339. mp 132–135°C, IR cm⁻¹: 1730 (KBr), 1630 (KBr).

When IIa was treated with NaBH₄ in ethanol for two days at room temperature, not only ketone but also lactam was unexpectedly reduced and amino alcohol (IV) was obtained.

IV C_{16}H_{19}O_{2}N. mp 104–105°C. Infrared (IR) spectrum showed no absorption assigned to carbonyl. Chlorination of IIIa (R₂=OH) with thionyl chloride in chloroform gave the corresponding chloride (IIIa R₂=Cl).

Refluxing in toluene with amine such as morpholine, N-methylpiperazine or N-phenylpiperazine, the chloride gave amino lactams (IIIa R₂=morpholino, R₂=N-methylpiperazino and R₂=N-phenylpiperazino respectively).

IIIa (R₂=morpholino) C_{20}H_{22}O_{2}N₂.1/5 H₂O. M+ 322. mp 236–239°C, IR cm⁻¹: 1660 (KBr).

IIIa (R₂=N-methylpiperazino) C_{21}H₂₅N₃O. mp 233–236°C. IR cm⁻¹: 1630 (KBr).

IIIa (R₂=N-phenylpiperazino, hydrochloride) C_{26}H₂₇O₃N₃HCl. mp 265–270°C. IR cm⁻¹: 1670 (KBr).

Indenoquinolinones (Va, b) were obtained by heating of IIa, b at 180°C, and these results are analogous to the transformation of VI to VII reported by Witkop.

IVa C_{16}H_{11}ON. mp above 300°C, IR cm⁻¹: 1620 (KBr).

IVb C_{16}H_{10}ONCl. M+ 267. mp above 300°C, IR cm⁻¹: 1620 (KBr).

Although the structures of IIa,b,c were suggested from their physical data, further supports were obtained from mass spectrometry. The mass spectra of IIa,b had the following peaks.

IIa m/e 251 (M+ 23%), 234 (15%), 131 (8%), 120 (100%), 119 (17%), 103 (11%), 92 (20%), 77 (11%).

IIb m/e 287 (10%), 285 (M+ 25%), 270 (11%), 268 (27%), 256 (35%), 154 (100%), 131 (19%), 126 (17%), 103 (20%), 90 (11%), 77 (17%).

The following fragmentations (Fig. 1) were assumed and most fragment peaks had corresponding metastable peaks.

These results were quite different from that of 5,6,11,12-tetrahydrodibenz[b,f]azocin-6,11-dione (VII) which was synthesized by oxidative cleavage of 5,10-dihydroindeno[1,2-b] indole. VIII C_{20}H_{11}NO₂. mp 280–282°C. IR cm⁻¹: 1660 (KBr). NMR (DMSO-d₆): 3.88 and 4.48 (2H, AB quartet, J=15 Hz).
On the mass spectrum of VIII the following peaks were observed and their peaks were assigned as Fig. 1. VIII m/e 237 (M+ 100%), 209 (58%), 208 (35%), 181 (11%), 180 (43%), 119 (13%), 118 (15%), 90 (49%), 89 (28%), 64 (12%), 63 (16%).

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Research Laboratory,
Dainippon Pharmaceutical Co., Ltd.
Enokicho 33-94, Suita, Osaka

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