TRANSFORMATION OF PROTOPINE AND RELATED ALKALOIDS TO BENZO(c)PHENANTHRIDINE DERIVATIVES

Masayuki Onda, Kaoru Abe, Mitsuyo Gotoh, Kyoko Kataoka, Kumiko Yuasa, and Junko Okada

School of Pharmaceutical Sciences, Kitasato University, Shirokane, Minato-ku, Tokyo, 108

In the interests of utilization of the biologically inactive alkaloids, some attempts to convert protopine and related alkaloids to benzo(c)phenanthridine derivatives were investigated. When anhydroprotopine (I), derived from protopine, was treated with dilute hydrochloric acid, it gave the different compounds from the "Perkin's compounds". Their structures were identified by the spectroscopic data to contain the five membered spiro-type skeleton. Anhydromethylberberine (II), derived from α-allocryptopine, gave the same results as above.

The irradiation of I and II were carried out in the pure benzene solution using a high pressure mercury lamp (100W) at room temperature under nitrogen. The resulted photoproducts (III) were immediately dehydrated over palladium-charcoal, and then with DDQ to yield sanguinarine and chelerythrine, respectively, which were identified with the natural products. Since this photocyclic reaction was regarded as electrocyclic reaction of triene, the intermediates, 5,6,11,12-tetrahydrobenzo(c)phenanthridine derivatives (III) were considered to be derived from the initial photoproducts, 5,6,10b,11-tetrahydrocompounds (IV). This assumption was confirmed by trapping IV with dimethyl acetylenedicarboxylate as 4b,12-etheno-compounds.

The photocyclization of the methine base derived from 13-methyldihydroberberine methosulfate was carried out in the same manner to give carbinolamine forms of 10b-methyl-4b,10b,11,12-tetrahydrochelerythrine (V). V was treated with sodium cyanide to yield γ-cyanide which was converted *via* several steps to *trans*-11-hydroxy-10b-methyl-*cis*-4b,5,6,10b,11,12-hexahydrochelerythrine, an analogue of corynoline. The stereochemistry and the reaction mechanisms were also discussed.