

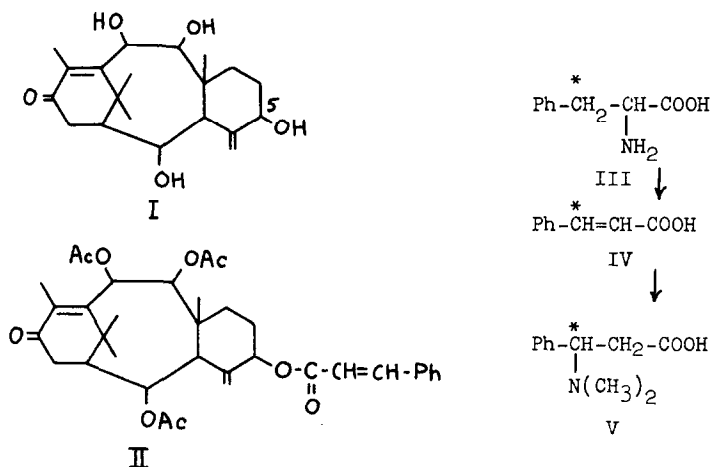
THE BIOSYNTHESIS OF 3-DIMETHYLAMINO-3-PHENYL-
 PROPANOIC ACID IN YEW

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(Received 23 May 1966)

Various *Taxus* species (Yew) contain an alkaloid named "taxine", which is actually a mixture of compounds (1-4). The basic property of some of these alkaloids is due to 3-dimethylamino-3-phenylpropanoic acid (V) (Winterstein's acid), which is esterified with the nitrogen-free taxicin-II (I) at C-5.



We considered that Winterstein's acid arose by a β -amination of cinnamic acid (IV). Since cinnamic acid is a known metabolite of phenylalanine (5), we have tested this hypothesis by feeding DL-phenylalanine-3-C¹⁴ (III, 0.25 mc.) to three-year-old Taxus baccata repandens plants by the wick method (6). After three weeks crude taxine (activity: 4.6×10^5 d.p.m.) was isolated by the method of Lythgoe (7). The taxine was converted to its methiodide and then treated with aqueous sodium carbonate when trimethylamine was eliminated and collected as tetramethylammonium iodide (inactive) by passage into an alcoholic solution of methyl iodide. The des-dimethylaminotaxine was acetylated and chromatographed on alumina affording taxinine (II = O-cinnamoyl-taxicin-II-triacetate (8)), having a specific activity of 1.2×10^5 d.p.m./mM. Hydrolysis of the taxinine with alcoholic potassium hydroxide yielded cinnamic acid (1.2×10^5 d.p.m./mM.) which was oxidized with potassium permanganate affording benzoic acid with the same specific activity. A Schmidt reaction on the benzoic acid yielded aniline, collected as benzanilide (inactive), and carbon dioxide (1.1×10^5 d.p.m./mM.). These results thus indicate that essentially all the radioactivity of the alkaloid was located at C-3 of Winterstein's acid, and strongly support our biosynthetic scheme.

Acknowledgement. This investigation was supported by Research Grant GM-13246 from the U.S. Public Health Service.

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