

SYNTHESES AND REACTIONS OF YOHIMBAN DERIVATIVES

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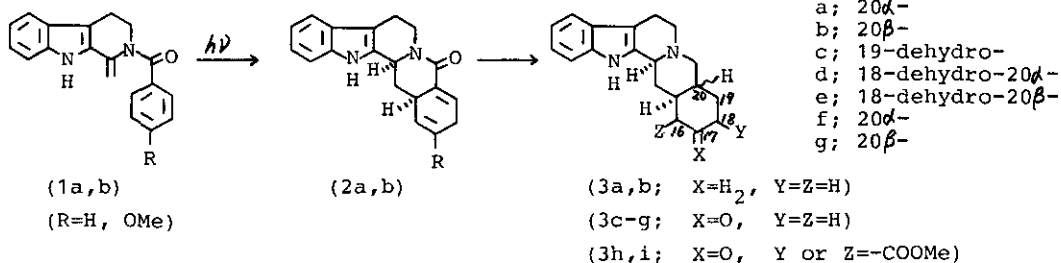
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The application of reductive photocyclization to the enamides prepared from harmalane by acylation with substituted benzoyl chlorides furnished a general synthetic route to a series of compounds having yohimban skeleton thus enabling us to study the reactions aiming at the synthesis of pharmacologically active derivatives.

1) Synthesis of Yohimban Skeletons (3a-g)

The enamides (1a,b) were irradiated in the presence of NaBH_4 in $\text{CH}_3\text{CN}-\text{MeOH}$ (20:1) to afford the lactams (2a,b) with a dihydrobenzene moiety, of which (2a) was converted into the yohimbans (3a,b) and (2b) afforded the 19-dehydroyohimbone (3c) upon acid treatment. Silica-gel chromatography of (3c) yielded the 18-dehydroalloyohimbone (3d), while the treatment of tartaric acid on (3c) afforded the 18-dehydroyohimbone (3e) in good overall yields respectively. Catalytic hydrogenation of (3d,e) yielded alloyohimbone (3f) and yohimbone (3g) respectively.



2) Reactions of the Yohimbone Derivatives (3c-g)

The reactions of the yohimbone derivatives (3c-g) with various electrophiles in the presence of various base were investigated.

Acylation of alloyohimbone (3f) with methyl chloroformate afforded two carboxylated ketones (3h) ($Y=-COOMe$) and (3i) ($Z=-COOMe$) in 15 % respective yields. However, similar reaction on 18-dehydroalloyohimbone (3d) afforded alloyohimbone (3i) in 21 % yield as a sole C-carboxylated product beside small amount of enolate. In addition, acylations of yohimbone (3g) and 18-dehydroyohimbone (3e) were also investigated.