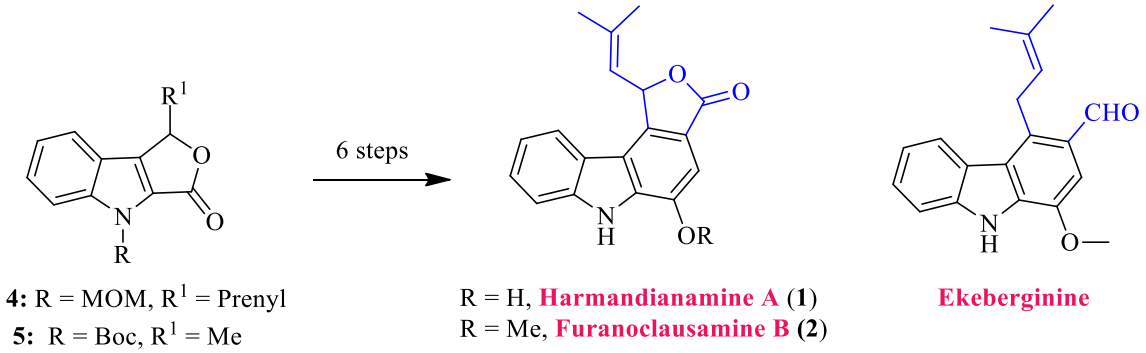
# Abstract

**Key words**: Carbazole, total synthesis, [4+2] anionic benzannulation, selective reduction, 3,4-quinolyne.

The thesis entitled "**Total synthesis of carbazole alkaloids by anionic benzannulation"** describes the total synthesis of 1-oxygenated prenylcarbazoles from easily accessible furoindolones.

Anionic [4+2] annulation followed by employment of Krapcho/retro-Kolbe-Schmitt reaction and Grignard reaction has culminated in the first total synthesis of harmandianamine A (**1**) and furanoclausamine B (2). A short and high yielding synthesis of the 4-prenylcarbazole has also been developed. This has been utilized for the total synthesis of ekeberginine (**3**).

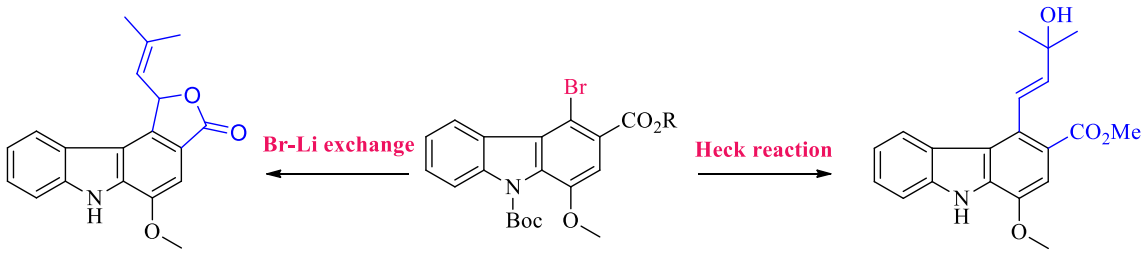



**4:** R = MOM, $R^1$ = Prenyl
**5:** R = Boc, $R^1$ = Me

R = H, **Harmandianamine A** (**1**)
R = Me, **Furanoclausamine B** (**2**)

**Ekeberginine**

4-Bromo-1-methoxycarbazole-3-carboxylate has been synthesized by a sequence annulation decarboxylation-bromination and is utilized as a common intermediate for the total synthesis of clausamine E (**8**) and furanoclausamine B (**2**). Heck coupling and Kato/Br-Li exchange protocol are respectively used as the key steps.



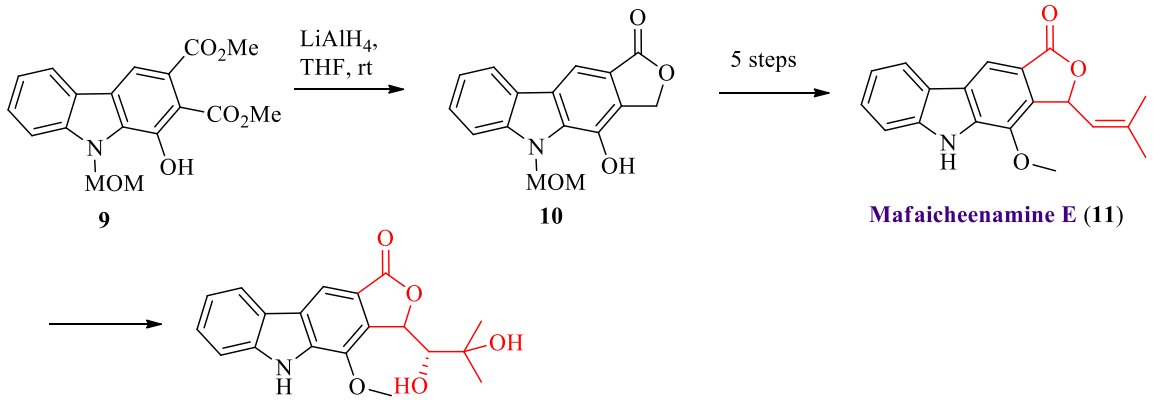

**Furanoclausamine B** (**2**)

**6**: R = H,
**7**: R = Me

**Clausamine E** (**8**)

1-Hydroxycarbazole-2,3-dicarboxylates have been shown to undergo chemoselective reductive cyclization to furo[3,4-*b*]carbazolones with $LiAlH_4$ (5 examples). One of the

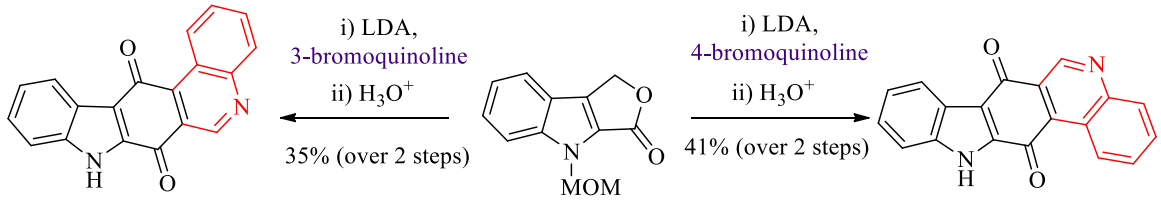
furocarbazolones has been utilized to accomplish the first total synthesis of mafaicheenamine E (**11**) and claulansine D (**12**) in 6 and 9 steps respectively. The other key steps of the syntheses are addition of an allylic indium reagent and a CC double bond isomerization.




**9** **10** **Mafaicheenamine E** (**11**)

**Claulansine D** (**12**)

Calothrixin B (**14**), an antimalarial has been synthesized in a regioselective manner by annulation of MOM-protected furoindolone **13** with 4-bromoquinoline followed by deprotection of the *N*-MOM group.




**Isocalothrixin B** (**15**) **13** **Calothrixin B** (**14**)

Further, Hauser synthons containing an indole nucleus (**15**) have been synthesized and utilized for developing new synthesis of carbazole quinones.