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# CYCLOPENTANOID ALLYLSILANES IN SYNTHESIS : A STEREOSELECTIVE SYNTHESIS OF (±)-HIRSUTENE

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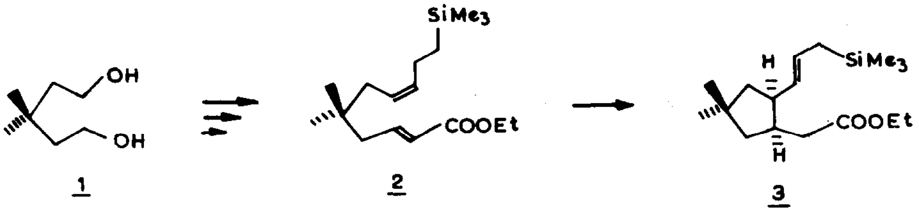
**Summary** : A formal total synthesis of the mold metabolite (±)-hirsutene is described from the cyclopentanoid allylsilane 3 where the key step utilizes an epoxy-allylsilane ring closure.

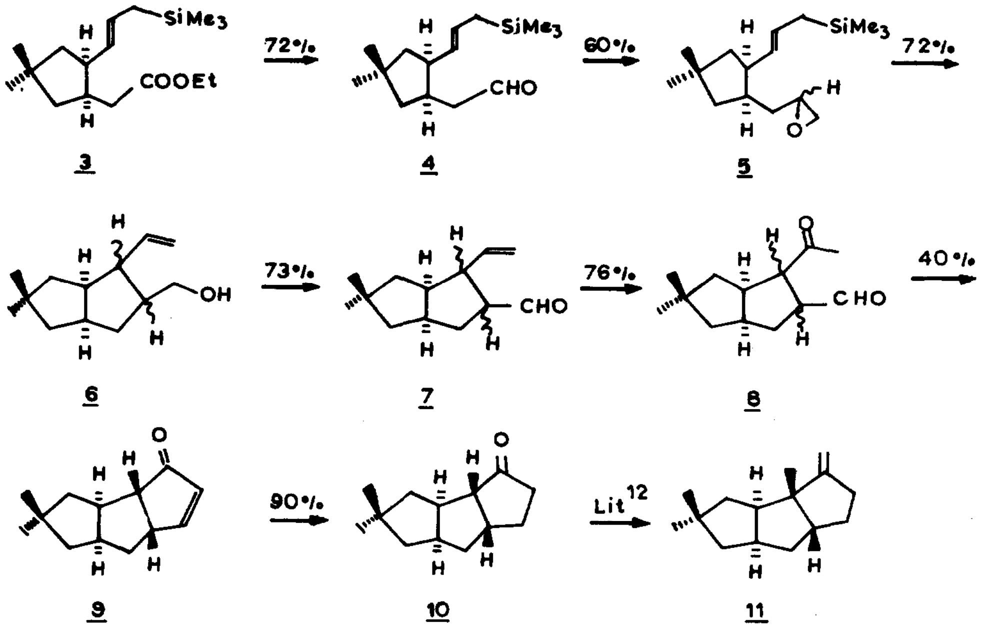
A general route to cis-1,2-disubstituted cyclopentanoid allylsilanes via intramolecular ene reaction of activated 1,6-dienes featuring a homoallylsilane unit as the ene donor has been disclosed.[1] This letter describes an application of the functionalized allylsilane 3,[1] prepared from 1 (Scheme I) to a synthesis of (±)-hirsutene (11)[2,3,12] via the key intermediate 10.

**Scheme I**



Reduction (LAH/Et$_2$O) of the ester functionality in 3 and oxidation[4] (PDC/AcOH/3°A mol. sieve) gave aldehyde 4 in 72% yield (Scheme II) which was converted[5] (Me$_3$SI/NaH/DMSO) to the epoxide 5 (60%). Lewis acid (TiCl$_4$/CH$_2$Cl$_2$/-80°C) induced epoxy-allylsilane ring closure[6] furnished the carbinol 6[7] (72%). Oxidation (PCC/CH$_2$Cl$_2$) of 6 gave aldehyde 7[8] (73%) which on further oxidation[9] (PdCl$_2$/CuCl/O$_2$/DMF-H$_2$O/55°C/1h) afforded 8[10] (76%). Intramolecular aldolization[11] (5% aq KOH/EtOH/50-52°C/1.5h) served to channel the stereoisomeric mixture 8 into the pure cis, anti, cis-triquinane 9 (m.p. 63°C). Finally, hydrogenation (10% Pt-C/H$_2$, 1atm/EtOAc) furnished 10 (90%), the spectral data (IR, PMR, CMR) of which were found to be identical to those for the same ketone described by Little and Muller.[12] Since 10 has previously been converted[12] into (±)-hirsutene, the present synthesis is complete.

**Scheme II**[13]



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8. Stereoisomeric mixture (67 : 17 : 16) by GC.
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10. Stereoisomeric mixture (65 : 35) by GC.
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