Total Synthesis of Astellatol

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1) I, Cs₂CO₃, HMPA
2) II, n-BuLi
3) TMSOTf, NEt₃, then 1M HCl
4) Grubbs II
5) Pd/C, H₂

10% HCl
7) SmI₂
8) LDA, 2-methyl allylbromide
9) Mg, HgCl₂ (cat.), propargyl bromide
10) PdCl₂(PPh₃)₂, Cul, NEt₃, 2-bromopropene

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Step 9: Why is HgCl₂ added to the reaction?

Hg(II)-catalyst speeds up the formation of III over the unwanted abstraction of the acetylenic H and therefore formation of IV

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In step 15 two products (C and D) are formed, which can both be converted into E by employing different hydrogenation conditions.

Step 22 + 23: Please name the reaction [Corey-Winter olefination]