Clionastatins A and B  
*(J. Gui et al., *JACS*, 2021)*

Chlorinated steroid drugs are an important class of synthetic steroids with various therapeutic uses. Example: Nasonex (retail price = $376 million in 2018) is prescribed as treatment of nasal allergy and nasal polyps.

Clionastatins A and B are the first polychlorinated steroids found in nature (isolated in 2004 from the burrowing sponge *Cliona nigricans*) and they exhibit potent cytotoxicity against tumor cell lines.
Solution

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\text{O} \quad \text{OMOM} \quad \xrightarrow{\text{(R)~-Me-CBS}} \quad \text{Structure?} \quad \xrightarrow{\text{BH}_3\text{Me}_2\text{S then Ac}_2\text{O}} \quad \text{A} \quad \xrightarrow{\text{KHMDS, TMSCl Name?}} \quad \text{B} \\
\text{OMOM} \quad \xrightarrow{\text{BuOCOCi, NMM Ph}_2\text{Te, DIBAL-H}} \quad \text{C} \quad \xrightarrow{\text{Me, air, Et}_3\text{B then MeOH Name?}} \quad \text{D} \quad \xrightarrow{\text{Pd(OAc)}_2, \text{dppp Et}_3\text{N, DMF Name?}} \quad \text{E not formed}
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