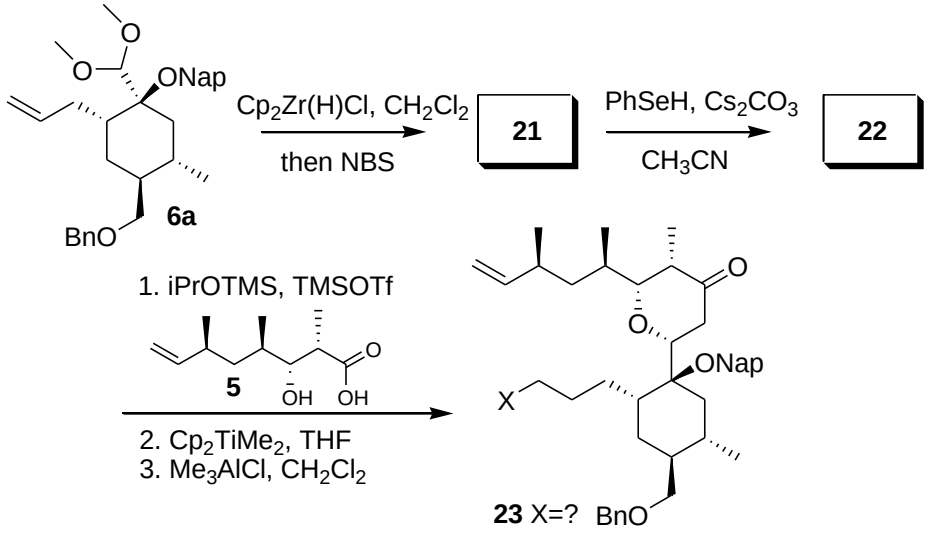
Synthesis of the advanced intermediate 3

With the fragment **5** and **6** in the hands, the authors were ready for the construction of the advanced intermediate **4** by a tactic developed in their laboratories. Disappointingly, they ran into an unexpected reactivity that we'll discuss later.
To overcome the problem they had to transform compound **6a** into compound **22** through compound **21**.

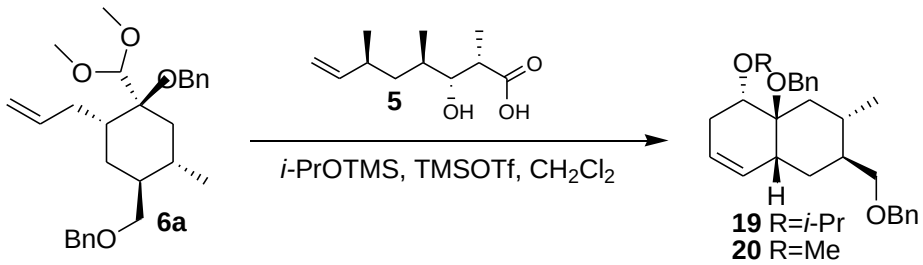
14) Which is the structure if **21**?
15) Which is the structure if **22**?
16) Could you provide a reasonable mechanism for the transformation of **22** into **23** and the name of this reaction?



Scheme 3.

When the authors treated **6b** as reported in Scheme 4, they obtained the by-products **19**/**20**.

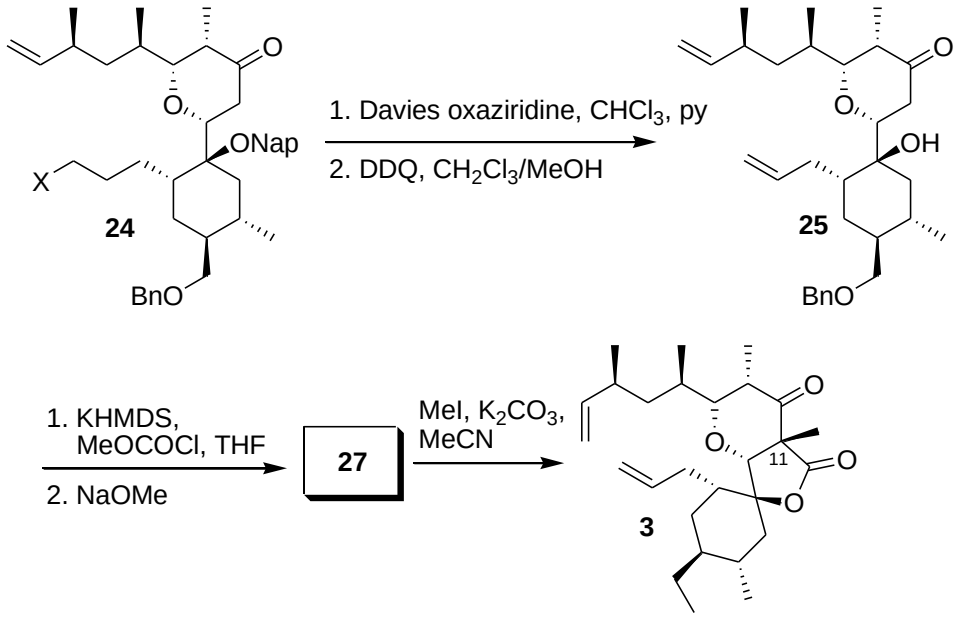
17) Which type of reaction is that?



Scheme 4.

Compound **24** is then transformed in other 4 steps into the advanced intermediate **3** (Scheme 5).

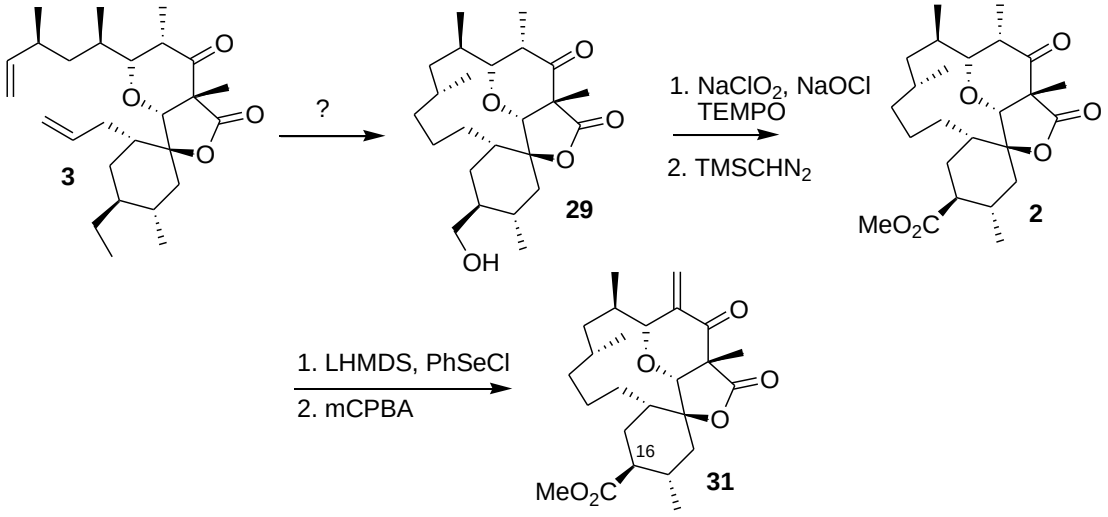
18) What are the structure and the role of Davis oxaziridine?
19) How does DDQ act in the removal of naphtylmethyl group?
20) Can you provide the structure of compound **27**?
21) The methyl group is installed on the C(11) in a complete selective fashion. Can you explain why?



Scheme 5.

Toward the synthesis of the final product 1

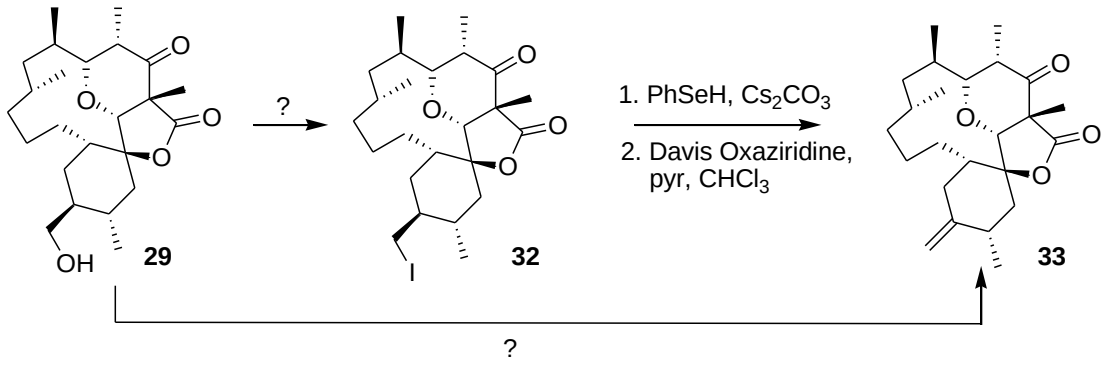
22) How could you transform **3** into **29**? It takes two steps.
23) The alcohol group in **29** is converted into the methyl ester of the key intermediate **2.** How does the oxidant system work?
24) How could the selenation-oxidative elimination work?



Scheme 6.

The authors were expecting to install the C(16)-C(17) exocyclic olefin by a bis-selenation but it did not occur. They had to go back to the alcohol **29** and to install that double bond first (Scheme 7).

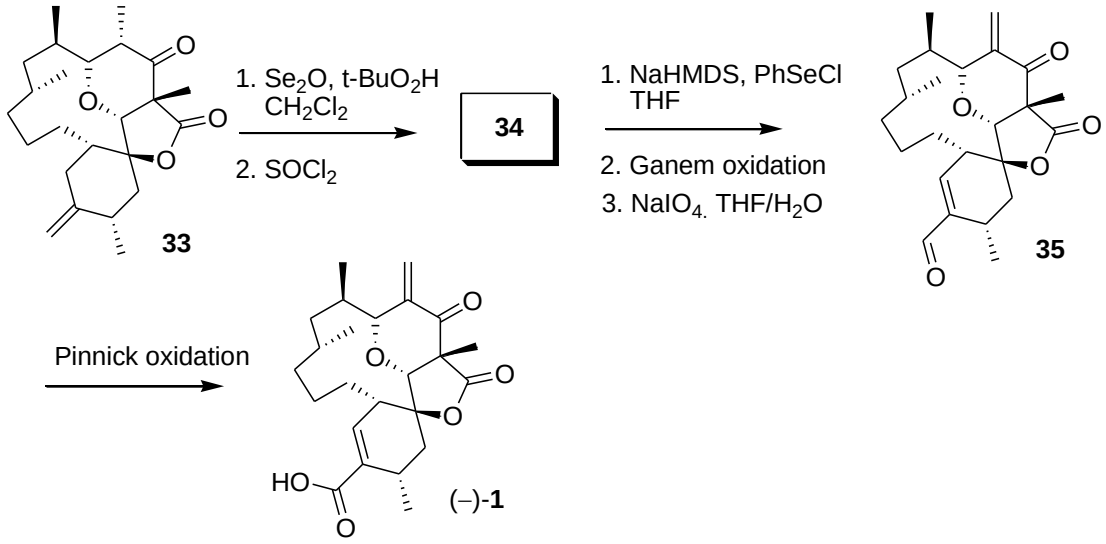
25) Give some methods for transforming an alcohol into an iodide.
26) How do you think the transformation from **32** into **33** could work?
27) Later the authors were able to convert **29** directly into **33** using a Grieco-Nishizawa protocol. Do you know which reagents are involved?



Scheme 7.

With intermediate **33** in the hands, they are few steps away from the final product (Scheme 8).

28) What do you think is the structure of intermediate **34**?
29) Can you explain step by step the transformation of **34** into **35**?
30) What's the Ganem oxidation?
31) And finally, what is the Pinnick oxidation that leads to final (–)-**1**?



Scheme 8.