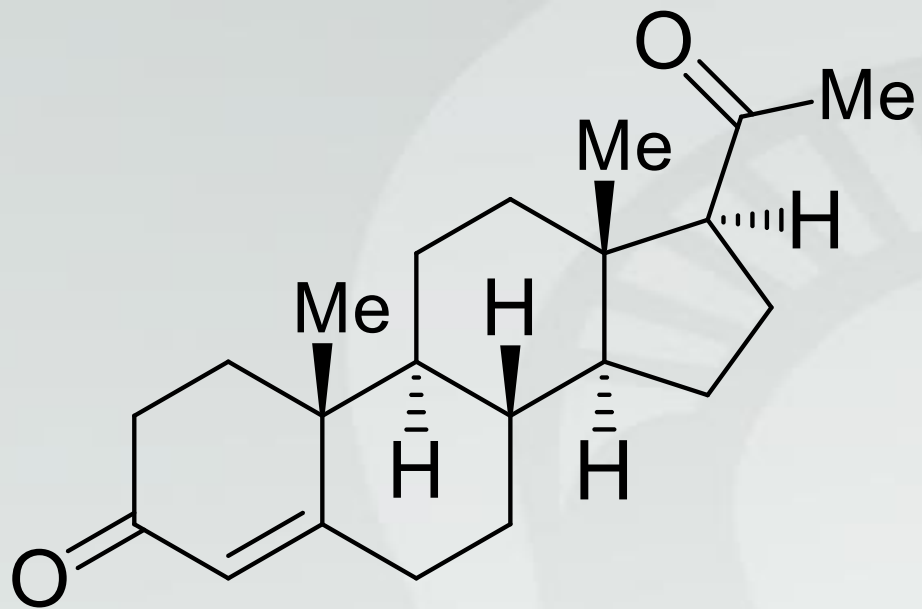


TOTAL SYNTHESIS OF PROGESTERONE



Rosemary Augustine

CEM 852

January 26th 2022

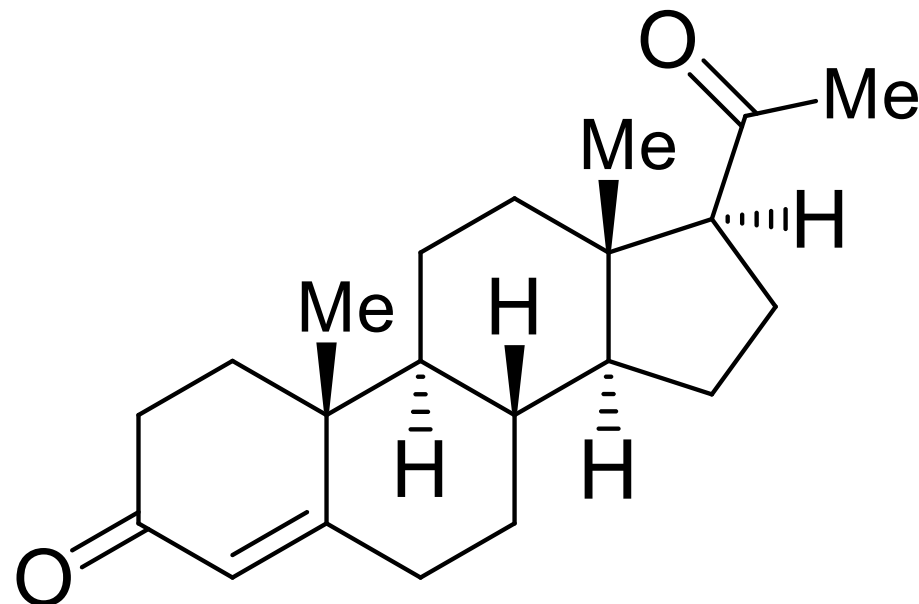
Johnson, W. S.; Gravestock, M. B.; Parry, R. J.; Myers, R. F.; Bryson, T. A.; Miles, D. H. *J. Am. Chem. Soc.* **1971**, 93, 4330.
Johnson, W. S.; Bailey, D. M.; Owyang, R.; Bell, R. A.; Jaques, B.; Crandall, J. K. *J. Am. Chem. Soc.* **1964**, 86, 1959.

Introduction

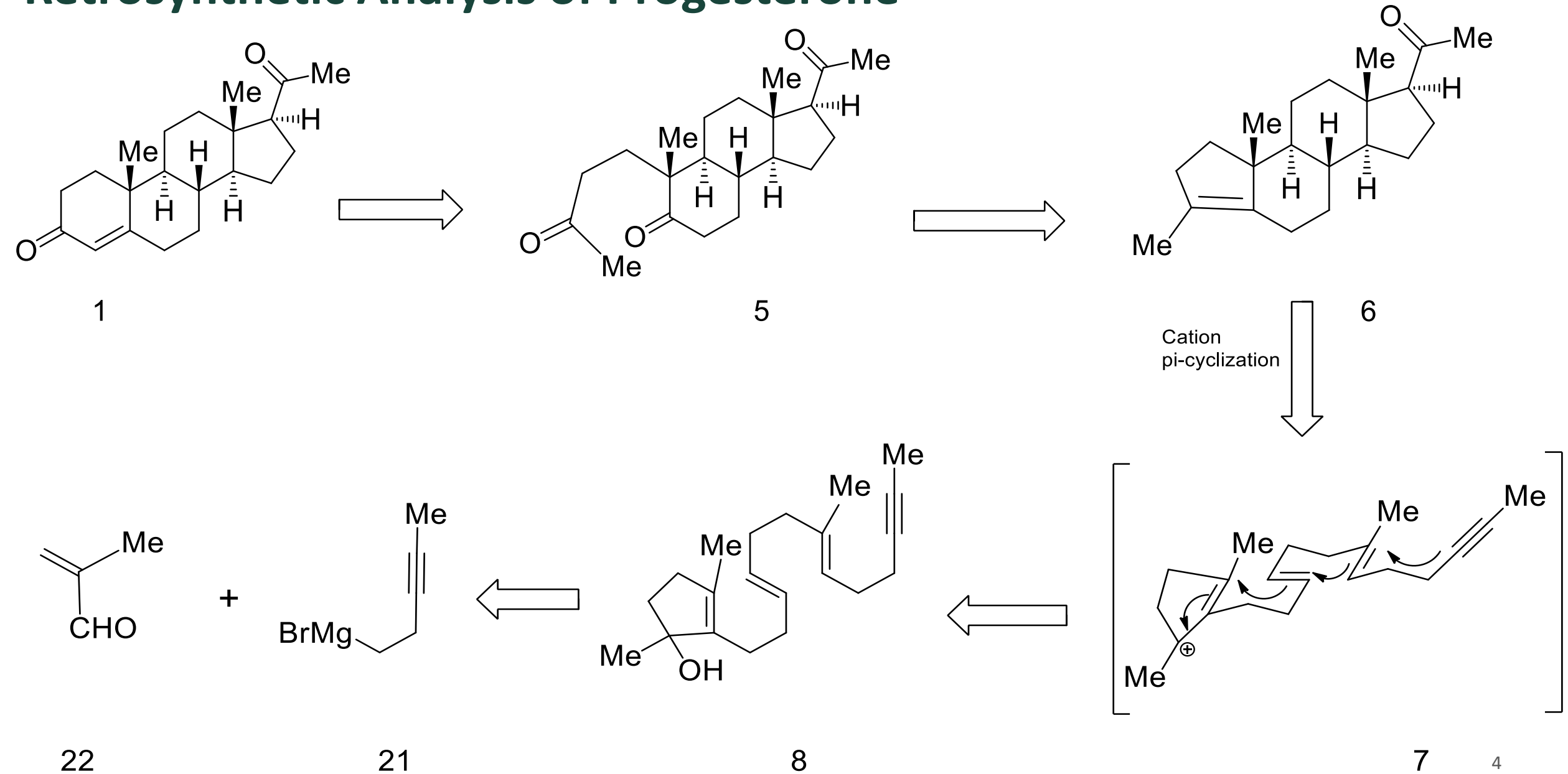
- Progesterone is a C-21 steroid hormone involved in the female menstrual cycle, pregnancy and embryogenesis of humans and other species.
- It belongs to a class of hormones called progestogens and is the major naturally occurring human progestogen.
- It helps in the prevention of preterm birth, to control anovulatory bleeding, to increase skin elasticity and for the treatment of traumatic brain injury.

Introduction (Cont'd)

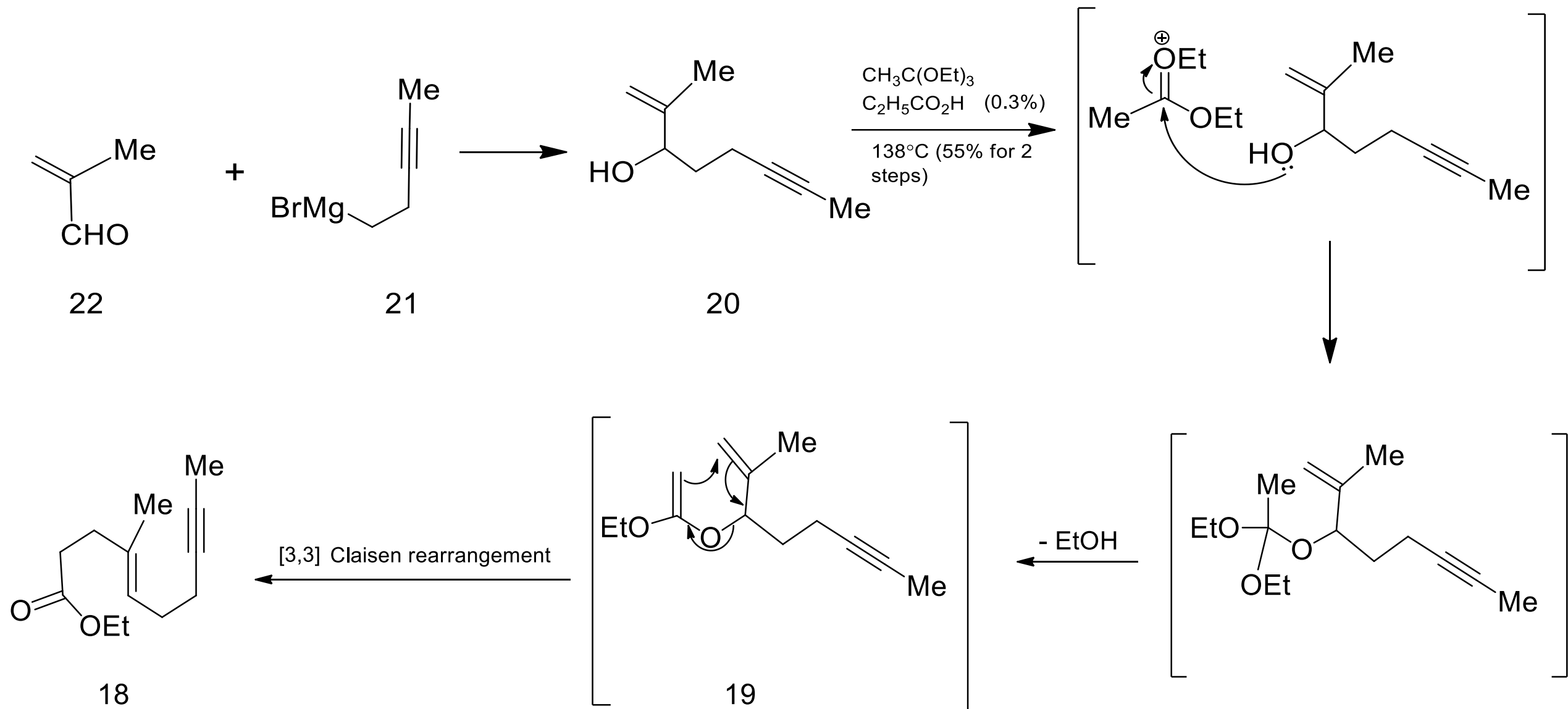
- It contains two **ketone functional groups**, as well as two methyl branches.
- Its first chemical synthesis was done by W. S. Johnson's group at Stanford in 1971.



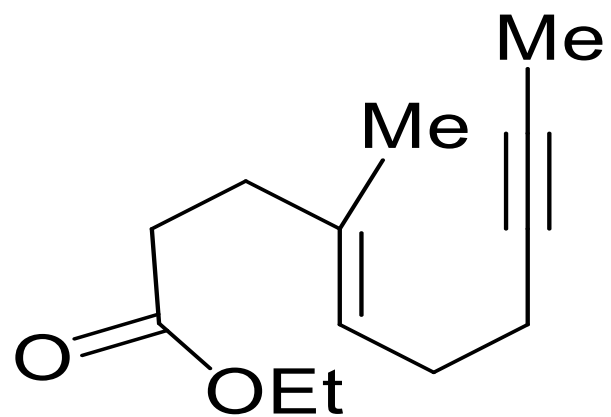
Retrosynthetic Analysis of Progesterone



Synthesis of Intermediate 13



Synthesis of Intermediate 13 (Cont'd)

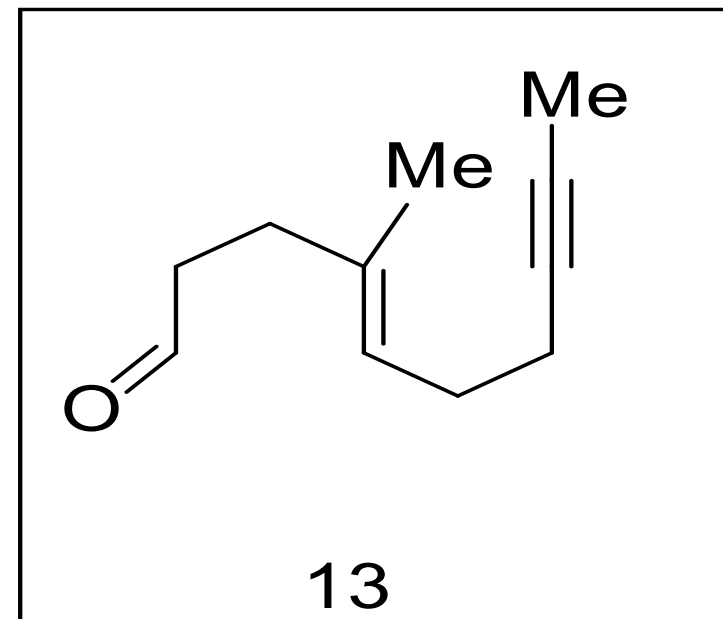


18

1. LiAlH_4 , Et_2O , 0°C

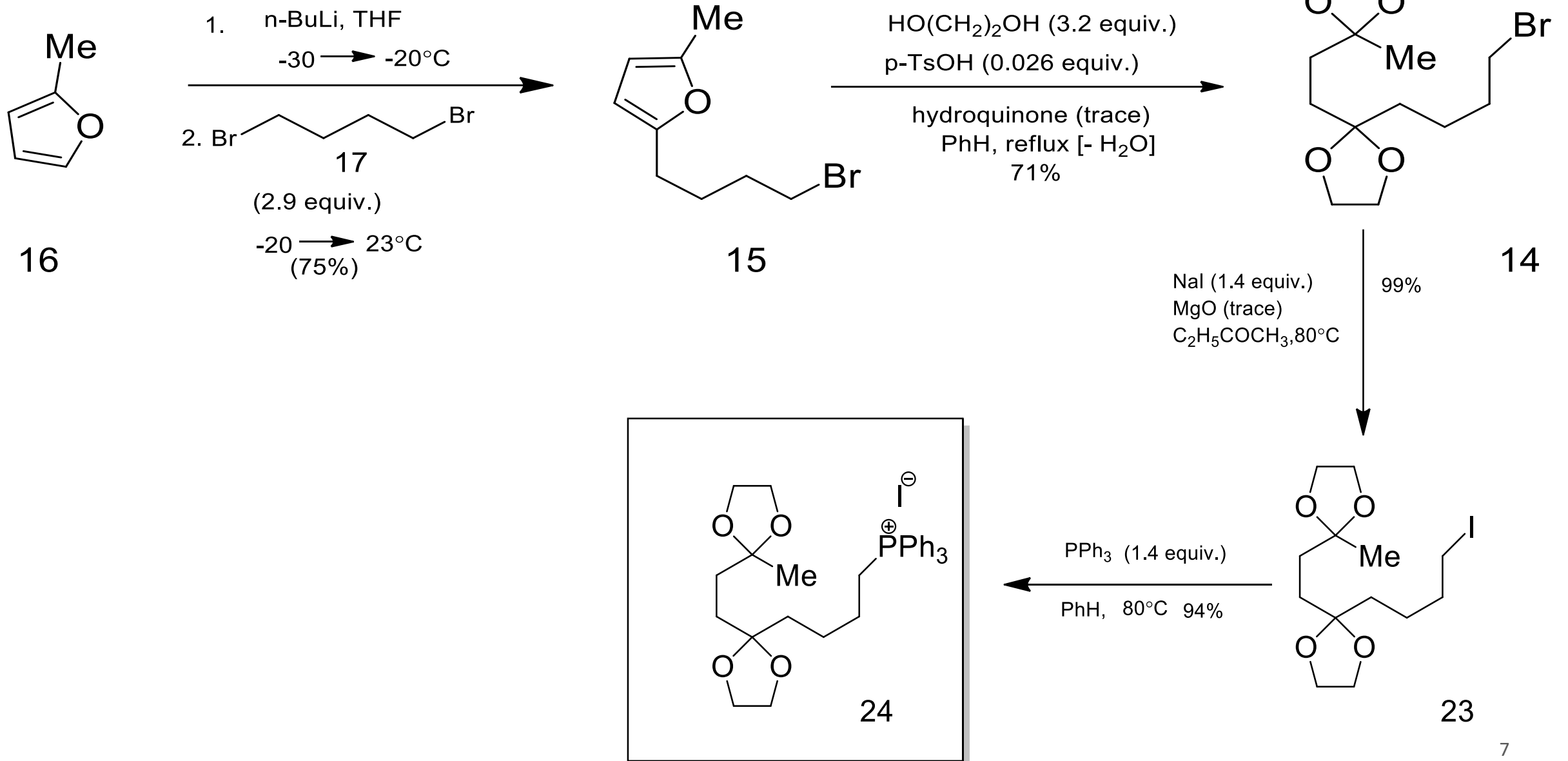
2. $\text{CrO}_3 \cdot 2\text{pyr}$
 CH_2Cl_2 , 23°C

(77% for 2 steps)

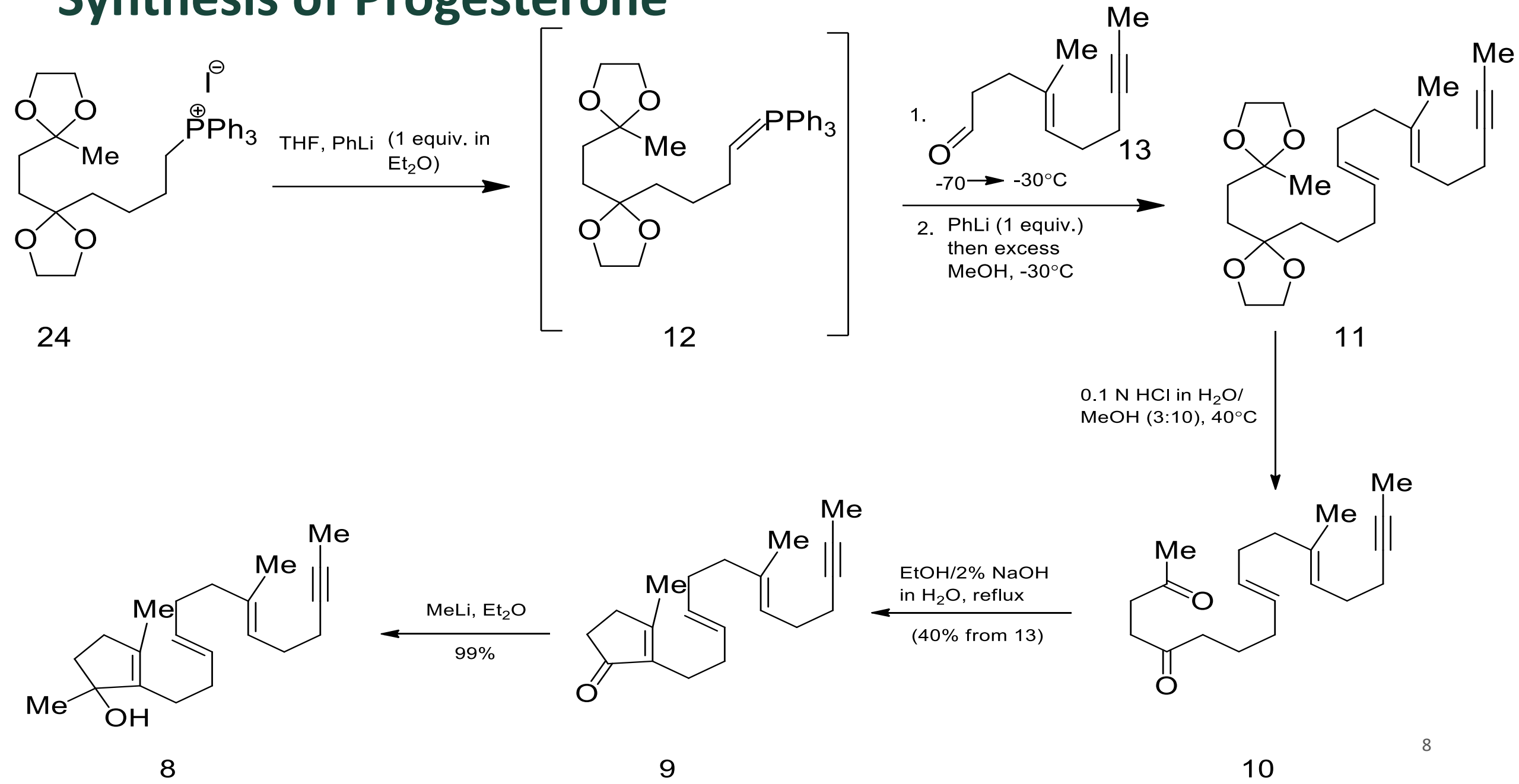


13

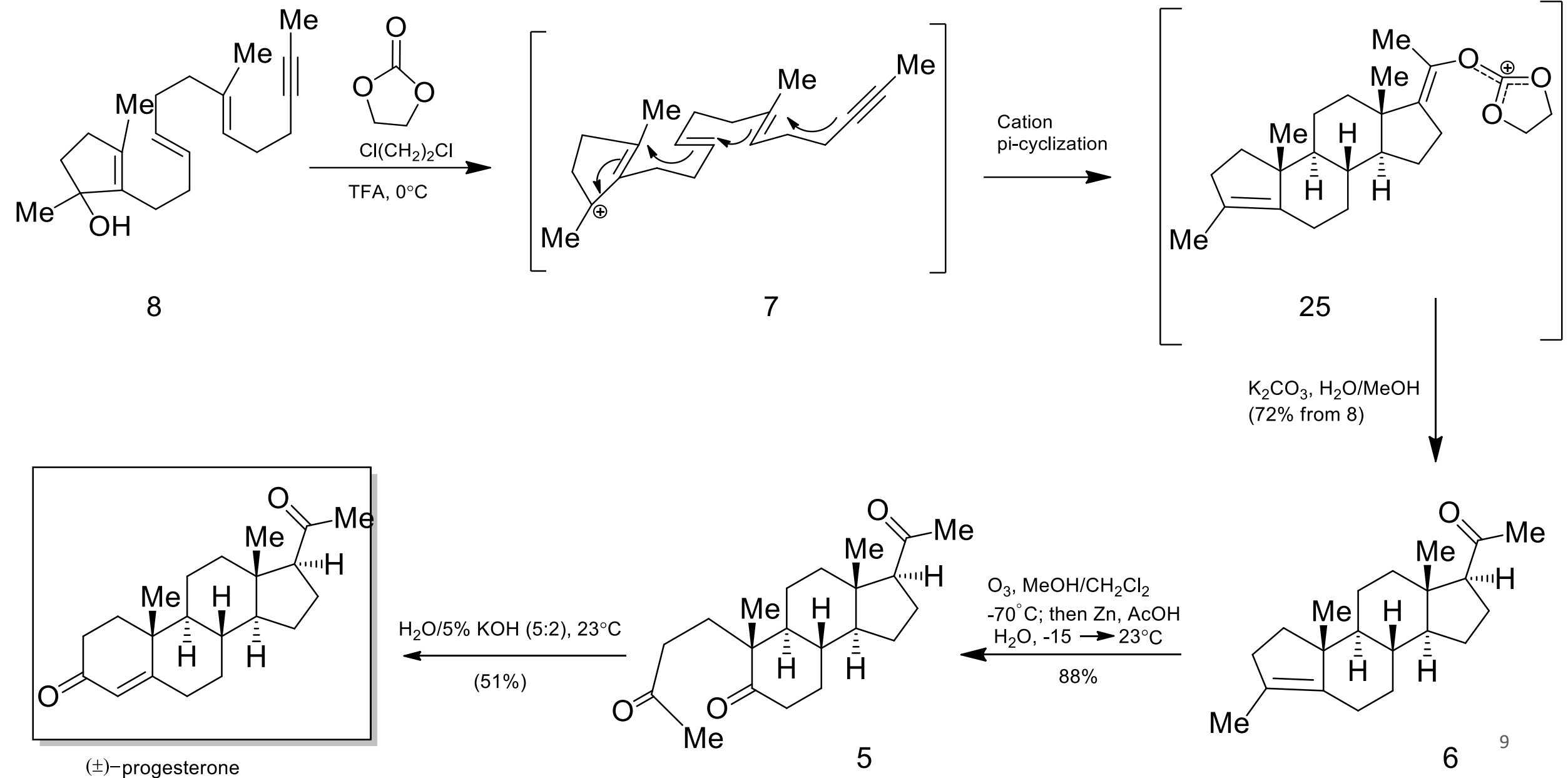
Synthesis of Intermediate 24



Synthesis of Progesterone



Synthesis of Progesterone (Cont'd)



Conclusion

- The development of novel strategies for initiating and terminating the polyolefin cascade is a particularly noteworthy contribution by W. S. Johnson group.
- It has also expanded the scope of polyolefinic cyclizations.

Thank you for Listening.

Questions?