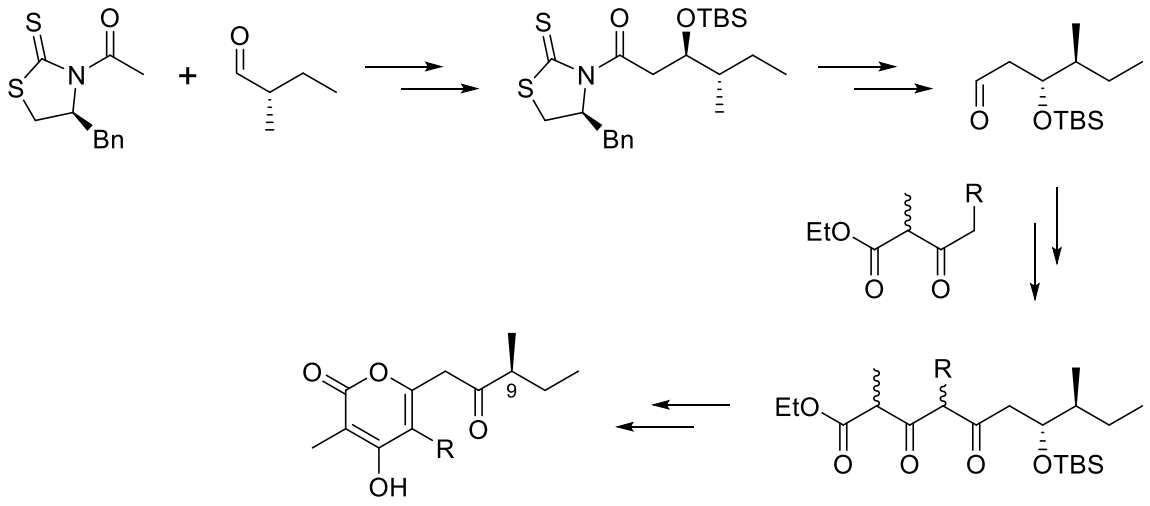
Thesis Summary

This thesis describes the first total synthesis of two α-pyrone natural products isolated from *Leptosphaeria maculans* and *Paecilomyces lilacinus*. The first total synthesis of two serrulatane diterpenoids from *Eremophila neglecta* is also discussed. Due to the segmented nature of the two projects, literature reviews and discussions for each project are separated by chapters.

The first two chapters are concerned with the total synthesis of the pyrone natural products, phomapyrone B and paecilopyrone A. **Chapter 1** gives a brief overview of pyrones, with the isolation, biological activity and biosynthetic origins discussed, as well as literature examples pertaining to the elaboration of pyrone rings in total synthesis. The isolation of micropyrone (**65**) and ascosalipyrone (**66**), as well as their respective syntheses has been detailed, forming the foundation for the following chapter.

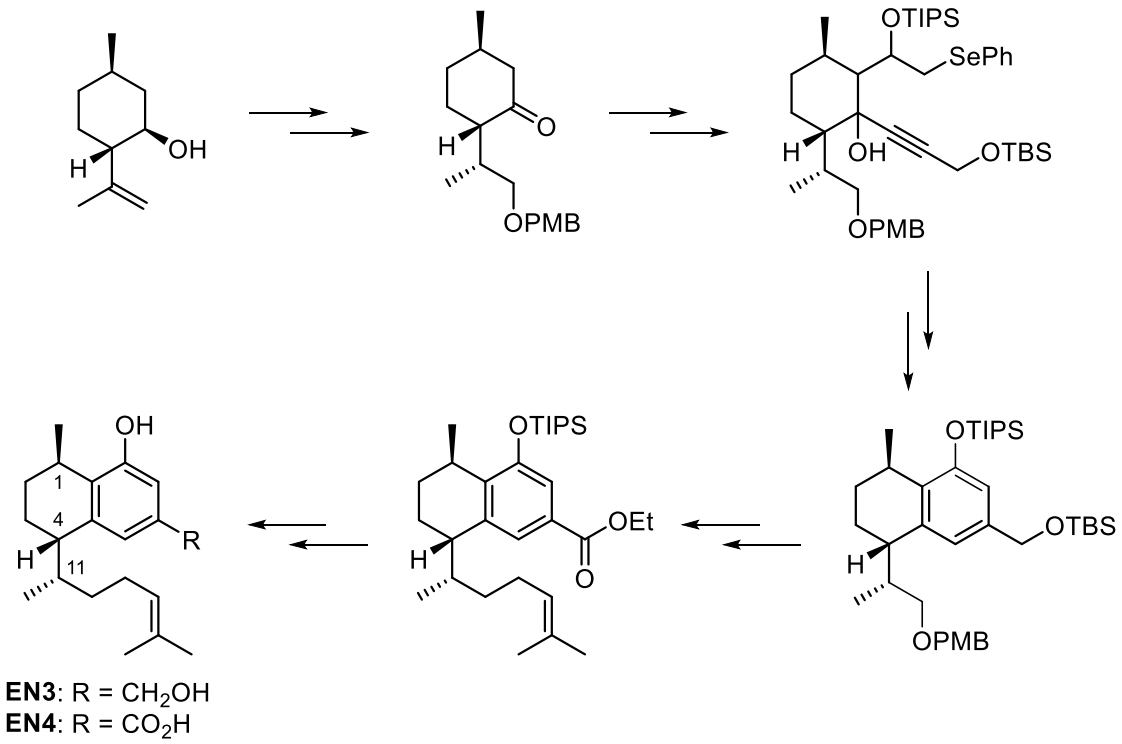
Chapter 2 details the total synthesis of two structurally related natural products, phomapyrone B (**76**) and paecilopyrone A (**78**). The known (*S*)-2-methylbutyraldehyde was used as a starting material for introduction of the stereogenic center at C9 of the natural products. Key steps in the synthesis were dianion addition of β-keto esters to a common aldehyde fragment and diketo ester cyclisation. Phomapyrone B (**76**) and paecilopyrone A (**78**) were obtained in 11% and 22% yields respectively over 9 steps. The stereochemistry was determined as (9*R*)-phomapyrone B (**76**) and (9*S*)-paecilopyrone A (**78**) based on comparison of the synthesised natural products' optical rotations to literature sources.



*Overview of phomapyrone B (**76**) and paecilopyrone A (**78**) synthesis*

Chapter 3 serves as an introduction to the diterpene natural products which are encountered predominantly amongst the plant kingdom. This chapter gives a brief overview of diterpene biosynthesis, with particular interest in radiolabelled feeding studies for determination of biosynthetic origins. SAR studies are discussed, with the goal being development of a suitable antimicrobial agent for the treatment of biofilms. Relevant literature regarding the synthesis of diterpene natural products is presented. This includes the total synthesis of leubethanol and the 8-hydroxycalamenenes, which possess similar carbon frameworks and substitution patterns to EN3 and EN4.

Chapter 4 reports the total synthesis of the EN3 and EN4 serrulatane natural products that were isolated from the Australian desert plant, *Eremophila neglecta*. The synthesis elaborates on the previous total syntheses by our group, which utilised a silver catalysed cycloisomerisation of 5-alkoxy-1,5-enynes for construction of the aromatic ring. The total syntheses of 8, 19-dihydroxyserrulat-14-ene (EN3) and 8-hydroxyserrulat-14-en-19-oic acid (EN4) were achieved in 17 steps. Analysis of the spectroscopic data as well as the specific rotations allowed for the determination of the stereochemistry at C1, C4 and C11 as (1*R*, 4*S*, 11*S*) for both natural products.



*Overview of the synthesis of EN3 (**146**) and EN4 (**147**)*