



HERIOT-WATT UNIVERSITY

We, the undersigned Principal and Vice-Chancellor of the University, the Dean of the Faculty of Science, and the Secretary of the University, certify that

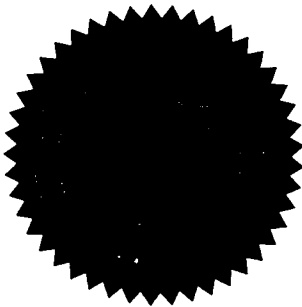
Anja-Helen Förster

*has undertaken research and satisfied the examiners
and, by resolution of the Senate, been awarded the degree of*

Master of Philosophy

and is entitled to all the academic privileges attendant thereto.

*In witness whereof this certificate is sealed with the Common Seal
of the University on the Twelfth day of July 1995.*



Oliver G. MacFarlane

Principal and Vice-Chancellor

I. M. Brown

Dean of the Faculty of Science

Neta L. Wilson

Secretary of the University

**Asymmetric Synthesis
and Chiral Ligands**

By

Anja Helen Förster

**A thesis submitted for the degree
of Master of Philosophy
at
Heriot-Watt University
Edinburgh**

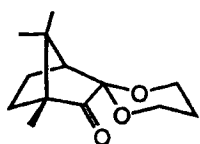
Department of Chemistry

November 1994

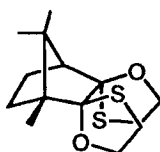
Abstract

Asymmetric synthesis plays a central role in organic synthesis, especially in the approaches to enantiomerically pure compounds (Chapter 1).

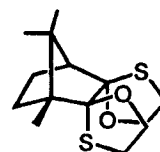
Our first interest lay in the synthesis of (\pm)-camphorquinone derivatives which could be used as chiral auxiliaries (Chapter 2). We formed mono ketals and mono dithioketals using ethane-1,2-diol, ethane-1,2-dithiol, propane-1,3-diol, propane-1,3-dithiol and 2-mercaptoethanol. We observed favoured attack on the less hindered C-3 atom of the (\pm)-camphorquinone, leading to a major product such as (I). Steric constraints effectively prevented the formation of bis dithio derivatives. However, we successfully prepared the novel bis ketals (II) and (III) from 2-mercaptoethanol.



(I)

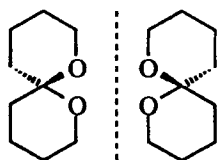


(II)

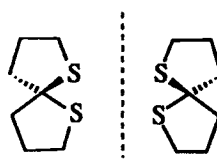


(III)

We then focused our attention on new synthetic routes towards C_2 -symmetric spiro compounds with very high chiral influence and limited conformational freedom (Chapter 3). Our first target molecule (IV) was prepared *via* an established procedure, and we successfully prepared the novel racemic 1,6-dithiaspiro[4.4]nonane (V), *via* a modification of this route.

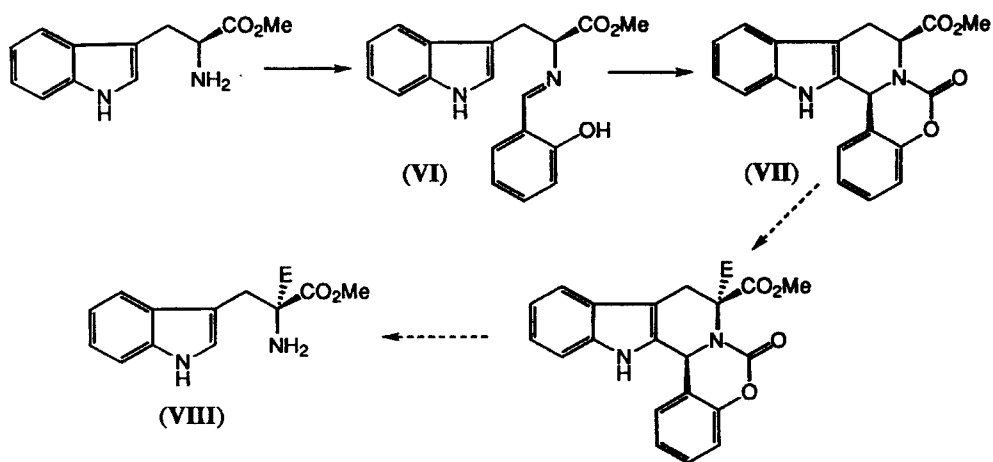


(IV)



(V)

Finally, we successfully developed a one-pot route to the tryptophan derivative (VII) (Chapter 4). By employing a modification of the Pictet-Spengler reaction we were able to cyclise the imine (VI) in a diastereoselective fashion. The phosgene adduct (VII) is functionalised for transformation into a wide range of homochiral α -substituted tryptophan derivatives (VIII).





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28th September 1994

ARE/MMD

TO WHOM IT MAY CONCERN:-

Anja Förster took the following courses in this Department during the academic year 1993-94:-

Carbohydrate Chemistry	7 lectures
Peptides and Proteins	6 lectures
Terpenoids and Steroids	7 lectures
Nucleic Acids	7 lectures
Organic Synthesis including Synthetic Methods	
Asymmetric Synthesis and Retrosynthetic Analysis	20 lectures

and successfully took examinations in all these classes in June 1994.

A. R. Edgar

A R Edgar
Lecturer in Chemistry