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Preface

Strategies for the synthesis of tetrahydropyran-containing natural products

Over the last few decades the number of biologically active natural products isolated, which contain substituted tetrahydropyran units has increased dramatically. While their structures have fascinated chemists their biological activity has provided hope that additional and better treatments for diseases may arise from their study. However, the study of their biological activity is oftentimes hampered by the lack of availability of the natural products. This is often due to the fact that the natural products are isolated from their marine or terrestrial sources in minute amounts, meaning that synthesis is the only way to deliver either the whole molecule or fragments of the molecule for study. The synthesis of tetrahydropyran-containing natural products is not trivial as the variety of substitution patterns around the tetrahydropyran ring varies immensely, as does the position and number of tetrahydropyran rings in these natural products. This challenge has spurred the synthetic chemistry community to innovate and develop new and more selective and efficient chemical reactions to produce tetrahydropyran rings of all types.

As a result of the discovery of these natural products reports on new strategies for the synthesis of tetrahydropyran units has increased enormously. As demonstrated in this Symposium-in-Print, reactions, such as the Maitland–Japp reaction and Petasis–Ferrier rearrangement have been developed, and the Prins reaction has had its scope expanded. The oxy-Michael reaction has been refined and its selectivity increased, which has enabled its application to highly functionalised systems. Oxidative rearrangements like the Achmatowicz reaction are able to form spirocyclic tetrahydropyran units. The use of transition metals, such as palladium, iron and platinum has obviated many of the problems associated with more conventional approaches to the synthesis of tetrahydropyran rings, and modifications of the Williamson ether synthesis continue to demonstrate its power in the context of the total synthesis of tetrahydropyran-containing molecules. Examples of natural products synthesised by these reactions include phorboxazole A, leucascandrolide, apicularen A, mupirocin F, civit, diospongin A, centrolobine, bryostatin, polymaxenolide as well as the construction of C-linked glucals.

The aim of this Symposium-in-Print is to bring together the work of research groups at the forefront of the development of new methods for tetrahydropyran synthesis, and their application to the synthesis of tetrahydropyran-containing natural products. I hope that this Symposium-in-Print provides a snap-shot of the current state of the art, and that it highlights the significant advances that have been made. More importantly I hope that it inspires others to take up the challenge and the excitement of the area and contribute greater advances in the future.

Finally I must thank all the authors for contributing to this Symposium-in-Print and Prof. Richard Taylor, Angela Longman and Jane Quinn for helping me put together this important collection of work.

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