

Exploring organocatalysis and carbohydrates as sources of chiral compounds

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Creation of C-C bonds remain one of the greatest challenges in organic synthesis, particularly in the stereoselective construction of complex molecules. Organocatalysis has recently emerged as a powerful tool to achieve this goal catalytically. Considerable efforts have been devoted to the development of organocatalytic asymmetric Michael additions [1]. For example, our group has achieved the 1,4-conjugate addition (1,4-CA) of carbon nucleophiles to cinnamylideneacetophenones [2], in high yields and excellent enantioselectivities using bifunctional cinchona alkaloid derivatives as chiral organocatalysts. The presence of a second unsaturation, extending the π -system gives another possible site for the nucleophilic attack, at the δ -position, resulting in a 1,6-addition. However, this topic is still underdeveloped due to the difficult control of the regioselectivity between the several electrophilic sites [3]. Indeed our group reported the only example of 1,6-CA of several carbon nucleophiles to (*E*)-2-styrylchromones (2-SC) [4]. Our group also developed the first methodology that combines a multicomponent reaction and a phase-transfer catalyst: nitromethane reacts with two cinnamylideneacetophenones molecules to give cyclohexanes with four new stereocenters in good yields and excellent diastereoselectivity [5]. Following from this work, we have also performed a domino multicomponent 1,6-1,6-1,4 conjugate addition reactions to 2-styrylchromones under phase-transfer catalysis leading to the synthesis of pentasubstituted cyclohexanes [6].

Recently in have started a project on the use of carbohydrates as source of stereodifferentiation agents, which led us to study new synthetic methods to prepare novel sugar derived aminoalkanols [7], carbohydrate 1,2-diamines [8], 1,2-diaminoinositols and the synthetic precursor of a wide range of glycosidase inhibitors 6-amino-1,6-dideoxynojirimycin [9].

In the present communication we present and discuss some of our recent results on the chemistry and some biological applications of the referred heterocyclic compounds.

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