Enantioselective Construction of Arrays of Stereogenic Centers: The Breit Synthesis of (+)-Bourgeanic Acid

Kyungsoo Oh of Indiana University Purdue University Indianapolis devised (Org. Lett. 2009, 11, 5682. DOI: 10.1021/ol902398z) a new ligand that with Cu delivered predominantly one diastereomer of the Henry adduct 3, and with Zn delivered the other. Liu-Zhu Gong of the University of Science and Technology of China reported (Angew. Chem. Int. Ed. 2009, 48, 6503. DOI: 10.1002/anie.200903061) the Darzens condensation of the diazoacetamide 5 with a variety of aldehydes to give the corresponding epoxy amides with high diastereo- and enantiocontrol. Michael J. Krische of the University of Texas, Austin applied (Angew. Chem. Int. Ed. 2009, 48, 9848. DOI: 10.1002/anie.200905313) an organocatalyst for the enantioselective conjugate addition of an alkoxy to an unsaturated aldehyde, to give, after oxidation, the diol 13. Carlos F. Barba III of Scripps La Jolla optimized (Angew. Chem. Int. Ed. 2009, 48, 9848. DOI: 10.1002/anie.200905313) an organocatalyst that effected enantioselective dipolar cycloaddition of a diazo ester 18 to an unsaturated aldehyde, to give 19 with high diastereo- and enantiocontrol. Francesco Fini and Luca Bernardi of the University of Bologna developed (J. Am. Chem. Soc. 2009, 131, 9614. DOI: 10.1021/ja902458m) an organocatalyst that affected enantioselective dipolar cycloaddition of the nitrene derived from 20 to the unsaturated ester 21.

Kevin Burgess of Texas A&M optimized (J. Am. Chem. Soc. 2009, 131, 13236. DOI: 10.1021/ja905458n) an Ir catalyst for the enantioselective hydrogenation of trisubstituted alkenes such as 23. In the course of a synthesis of (+)-Faranal, Varinder K. Aggarwal of the University of Bristol described (Angew. Chem. Int. Ed. 2009, 48, 6317. DOI: 10.1002/anie.200901194) a one-pot procedure for the conversion of the allyl borane 25 into 27. Bernhard Breit of Albert-Ludwigs-Universität, Freiburg reported (Org. Lett. 2009, 11, 4668. DOI: 10.1021/ol901944b) related work. Norbert Krause of the Technische Universität Dortmund and Alexandre Alexakis of the Université de Genève extended (Angew. Chem. Int. Ed. 2009, 48, 8923. DOI: 10.1002/anie.200903905) organocatalyzed aldehyde conjugate addition to alkynyl nitroalkenes such as 28. Toshimichi Ohmura and Michinori Suginome of Kyoto University observed (J. Am. Chem. Soc. 2009, 131, 11298. DOI: 10.1021/ja9046894) that the Ni-catalyzed opening of the methyldiene cyclopropane 31 proceeded with high regioselectivity. Several routes to enantiomerically-pure methyldiene cyclopropanes have been reported.

James P. Morken of Boston College devised (J. Am. Chem Soc. 2009, 131, 9134. DOI: 10.1021/ja809610h) a Pt catalyst for the asymmetric bis-boration of dienes. The allyl borane prepared from 12 added with high stereosecontrol to benzaldehyde, to give, after oxidation, the diol 13. Amino Acid Analysis

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For fragments such as 34 to be used in synthesis, the convergent coupling must proceed with high efficiency. Professor Breit developed (Org. Lett. 2009, 11, 3286. DOI: 10.1021/ol9011635) the o-diphenylphosphinobenzoate 33 for this purpose. In the course of a synthesis of the dimeric natural product (+)-Bourgeanic Acid (36), 33 was coupled with just 1.5 equivalents of the Grignard reagent 34 to give 35 in 83% yield.

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