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Application of hydrolytic kinetic resolution (HKR) in the synthesis of bioactive compounds

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In memory of my mentor Professor Arya K. Mukerjee

Contents

1. Introduction	2746
1.1. Jacobsen's HKR procedure	2747
1.2. Jacobsen's catalyst	2747
1.3. Oligomeric Jacobsen's Co(salen) catalyst	2748
2. Halogenated epoxides or epihalohydrins	2748
2.1. Muconin	2748
3. Glycidol ethers	2748
3.1. 12(<i>R</i>)-HETE, 12(<i>S</i>)-HETE, ² H ₂ -12(<i>R</i>)-HETE, and LTB ₄	2748
3.2. CMI-977 (LDP-977)	2750
3.3. 7(<i>S</i>),17(<i>S</i>)-Resolvin D5	2750
3.4. (<i>S</i>)-Atenolol	2751
3.5. (<i>S</i>)- and (<i>R</i>)-Naftopidil	2751
3.6. (<i>S</i>)-Betaxolol	2752
4. Aliphatic/aromatic epoxides	2752
4.1. (<i>R</i>)-(-)-Phenylephrine hydrochloride	2752
4.2. E type 1 phytoprostanes	2753
4.3. Massialactone	2753
4.4. <i>iso</i> -Cladospolide B and cladospolide B	2753
4.5. Neoglycolipid analogs of glycosyl ceramides	2754
4.6. Bicyclic γ -lactones	2754
4.7. C13–C22 fragment of amphidinolide T2	2755
4.8. Dihydrobenzofurans	2755
4.9. Spongiacysteine	2757
4.10. Astrocyte activation suppressor, ONO-2506	2757
4.11. (<i>S</i>)-2-Tridecanyl acetate: sex pheromone of Douglas-fir cone gall midge, <i>Contarinia oregonensis</i>	2757

Keywords: Hydrolytic kinetic resolution; Terminal epoxides; Bis-epoxides; *meso*-Epoxides; Natural products; Synthesis; Biological activity.

Abbreviations: Ac, acetyl; AD, asymmetric dihydroxylation; AE, asymmetric epoxidation; Bn, benzyl; NBS, *N*-bromosuccinimide; Boc, *t*-butoxycarbonyl; *t*-Bu, *tert*-butyl; *m*-CPBA, *m*-chloroperbenzoic acid; DBU, 1,8-diazabicyclo[5.4.0]undec-7-ene; DCM, dichloromethane; DHP, dihydropyran; DIBAL-H, diisobutylaluminum hydride; DIAD, diisopropylazodicarboxylate; DIPEA, diisopropylethylamine; DMAP, dimethylaminopyridine; DMF, dimethylformamide; 2,2-DMP, 2,2-dimethoxypropane; DMPU, *N,N'*-dimethylpropyleneurea; DMSO, dimethyl sulfoxide; Et, ethyl; HMPA, hexamethylphosphoramide; IBX, 2-iodoxybenzoic acid; Im, imidazole; LAH, lithiumaluminumhydride; LTB₄, leukotriene-B₄; LiHMDS, lithium hexamethyldisiloxane; Me, methyl; MEM, methoxyethoxymethyl; MOM, methoxymethyl; PBu₃, tributylphosphine; Ph, phenyl; PMB, *p*-methoxybenzyl; PPTS, pyridinium *p*-toluenesulfonate; RCM, ring-closing metathesis; TBAF, tetrabutylammonium fluoride; TBDMS, *tert*-butyldimethylsilyl; TBME, *tert*-butyl methyl ether; TES, triethylsilyl; TEMPO, 2,2,6,6-tetramethyl-1-piperidinyloxy; Tf, triflate; THP, tetrahydropyran; TMEDA, *N,N,N',N'*-tetramethylethylenediamine; TMS, trimethylsilyl; TBDPS, *tert*-butyldiphenylsilyl; Ts, *p*-toluenesulfonyl; TsIm, tosylimidazole.

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5.	Dialkyl-substituted epoxides	2758
5.1.	Taurospongins A	2758
6.	Amine-substituted epoxides	2759
6.1.	β -Adrenergic blocking agents	2759
6.2.	1-[2-Hydroxy-3-(4-phenyl-1-piperazinyl)-propyl]-pyrrolidin-2-one	2759
7.	Epoxides bearing a carbonyl functionality	2759
7.1.	Fostriecin	2759
7.2.	C1–C19 fragment of ulapualide A	2760
7.3.	Epothilone A	2760
7.4.	<i>N</i> -Substituted 4-hydroxypyrrolidin-2-one	2762
8.	Mono- and bis-epoxide	2763
8.1.	Insect pheromones	2763
9.	Multifunctionalized epoxides	2764
9.1.	Corossolin	2764
9.2.	Aminohydroxyiminocarenes	2764
9.3.	(+)-Allosedamine	2765
9.4.	Tarchonanthuslactone and cryptocarya diacetate	2765
9.5.	(2 <i>R</i> ,7 <i>S</i>)-Diacetoxytridecane: sex pheromone of the aphidophagous gall midge, <i>Aphidoletes aphidimyza</i>	2766
9.6.	Cryptocarya diacetate	2766
9.7.	(+)-Boronolide	2767
9.8.	Polyene-polyol macrolide RK-397	2767
9.9.	Macroviracin A	2768
9.10.	(5 <i>S</i> ,7 <i>R</i>)-Kurzilactone	2769
9.11.	(–)-Indolizidine 223AB	2769
9.12.	Optically active 1,4-anhydropentitols and 2,5-anhydrohexitols	2770
9.13.	C3–C14 fragment of antitumor agent, laulimalide	2771
9.14.	Hemibrevetoxin B: synthesis of a key intermediate	2771
9.15.	(4 <i>R</i>)-Hydroxy analogs of Annonaceae acetogenins	2772
10.	Miscellaneous epoxides	2773
10.1.	(<i>R</i>)-2-Amino-1-hydroxyethylphosphonic acid	2773
10.2.	Enantiomeric 2,3-epoxypropylphosphonates and (<i>S</i>)-phosphocarnitine	2773
10.3.	Oxacyclic ring systems	2773
10.4.	Monofluorinated analogs of (lyso)phosphatidic acid	2773
10.5.	Chiral (α,α -difluoroalkyl)phosphonate analogs of (lyso)phosphatidic acid	2774
10.6.	7(<i>S</i>),16(<i>R</i>),17(<i>S</i>)-Resolvin D2	2774
10.7.	(–)-Galantinic acid	2775
10.8.	(4 <i>R</i> ,9 <i>Z</i>)-Octadec-9-en-4-olide, the female sex pheromone of <i>Janus integer</i>	2775
10.9.	(+)-Sch 642305	2776
10.10.	hNK-1 receptor antagonist	2776
10.11.	L-Carnitine and α -lipoic acid	2777
10.12.	C20–C26 building block of halichondrins	2777
10.13.	(<i>S</i>)-Propranolol and (<i>R</i>)-9-[2-(phosphonomethoxy)propyl]adenine (<i>R</i> -PMPA)	2777
10.14.	Total synthesis of (+)-brefeldin A	2778
10.15.	C1–C16 fragment of bryostatins	2778
10.16.	Pyrinodemin A	2779
10.17.	Combinatorial synthesis of natural product-like molecules	2779
10.18.	(<i>S</i>)-(–)-Zearalenone	2780
10.19.	<i>trans</i> -2,5-Disubstituted morpholines	2780
11.	Conclusions	2780
	Acknowledgements	2781
	References and notes	2781
	Biographical sketch	2785

1. Introduction

The search for new and efficient methods for the synthesis of optically pure compounds has been an active area of research in organic synthesis. Amongst various syntheses, the enantioselective syntheses of complex natural products containing multiple stereocenters are often the most challenging.

The asymmetric catalysis provides a practical, cost effective and efficient synthesis of such molecules. Furthermore, the enantioselective synthesis of natural products by a catalytic process assumes significance since isolation from natural sources can only be accomplished in minute quantities. The use of catalytic methods not only provides an easy access to an enantiomerically pure product but also permits

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