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I. SPIRODIEPOXIDE APPLICATION: PSYMBERIN

II. DIRECT CARBINOLAMIDE SYNTHESIS

By

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ABSTRACT OF THE DISSERTATION

III. SPIRODIEPOXIDE APPLICATION: PSYMBERIN

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The complete structure of Psymberin was determined with the application of the Universal NMR database approach. A formal synthesis of psymberin was completed with the application of spirodiepoxides. An assembly of a dihydroisocoumarin ring was accomplished from a complex aldehyde and an anion derived from a pentasubstituted arene. A new condition to couple an aldehyde and an amide was achieved to reach a carbinolamide moiety. This condition was applied for the synthesis of analogs and hybrid structures. In a separate study, a metal and a ligand were investigated to promote the coupling between thioacids and azides.

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DEDICATION

This thesis is dedicated to my family.

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List of Abbreviations

°C	degrees Celsius
2,6-lut.	2,6-lutidine
Ac	acetate
acac	acetylacetonate
Bn	benzyl
Boc	<i>t</i> -butyloxycarbonyl
Bu	butyl
δ	chemical shift (parts per million)
d	doublet
DCM	dichloromethane
DIAD	diisopropyl azodicarboxylate
DIBAL-H	diisobutylaluminum hydride
DMAP	4-(<i>N,N</i> -dimethylamino)pyridine
DMDO	dimethyldioxirane
DMF	dimethylformamide
ee	enantiomeric excess
FCC	flash column chromatography
h	hour(s)
Hz	hertz
<i>i</i>	iso
imid.	imidazole
LC ₅₀	concentration that will eliminate 50% of a given population when administered as a single dose
m	multiplet
M	molar (moles/liter)

<i>m/z</i>	mass to charge ratio
m-CBA	meta-chlorobenzoic acid
m-CPBA	meta-chloroperoxybenzoic acid
Me	methyl
min	minutes
ml	milliliters
mol	moles
MOM	methoxymethyl
MS	molecular sieves
Ms	methanesulfonyl
MTP	methoxytrifluoromethylphenyl
n-BuLi	n-butyllithium
NMR	nuclear magnetic resonance
Nu	nucleophile
[O]	oxidant
OTf	trifluoromethanesulfonyl
P	protecting group (generic)
<i>p</i>	para
Pd/C	palladium on carbon
Ph	phenyl
PMB	(4-methoxy)benzyl
PMP	4-methoxyphenyl
ppm	parts per million