

## Table of Contents

1	Abstract .....	1
2	Kurzzusammenfassung – Abstract in German .....	3
3	Introduction .....	5
3.1	Natural Product Synthesis over Time.....	5
3.2	Mycotoxins.....	9
3.2.1	Mycotoxins Derived from Tetrahydroxanthones .....	9
3.2.2	Anthraquinone-Xanthone Heterodimers .....	10
3.3	Beticolins.....	13
3.3.1	Structure and Nomenclature.....	13
3.3.2	Biological Activities.....	15
3.3.3	The Biosynthesis of Beticolins.....	18
3.4	Synthetic Studies on Beticolin Subunits .....	19
3.4.1	Tetrahydroxanthones.....	19
3.4.2	Anthraquinone Derivatives .....	22
4	Objective .....	25
5	Results and Discussion.....	27
5.1	Retrosynthetic Analysis.....	27
5.2	Naphthoquinone Derivatives.....	30
5.3	Synthesis of Functionalized Dienes .....	33
5.4	Synthesis of Anthraquinone Derivatives.....	35
5.4.1	The Diels-Alder Reaction.....	35
5.4.2	Anthraquinone Model System.....	37
5.4.3	Diels-Alder Reaction with Cyclic Dienes .....	38
5.4.4	Scope of the Cycloaddition .....	39
5.4.5	Studies on the Control of the Selectivity in Diels-Alder Reactions.....	44
5.5	Intramolecular Cyclization of Anthraquinone Derivatives .....	48

5.5.1	Radical Cyclization .....	48
5.5.2	First Studies on Intramolecular Heck Reactions.....	49
5.6	Further Studies on Diels-Alder Reactions .....	60
5.6.1	Towards Highly Functionalized Anthraquinone Derivatives .....	60
5.7	Intramolecular Heck Reactions with Functionalized Anthraquinone Derivatives.....	65
5.8	Modifications of Anthraquinones .....	68
5.8.1	Silyl Ether Deprotection.....	68
5.9	Synthesis of a Xanthone Dienophile .....	70
5.10	Alternative Coupling Strategies: Suzuki-Miyaura Coupling.....	76
5.10.1	Halogenated Dienes .....	76
5.10.2	Borylated Dienophiles.....	78
5.10.3	Diels-Alder Reactions with Halogenated Dienes.....	79
6	Summary .....	83
7	Experimental Part.....	89
7.1	General Remarks.....	89
7.1.1	Preparative Work .....	89
7.1.2	Solvents and Reagents .....	89
7.1.3	Analytics and Equipment.....	90
7.2	Syntheses and Characterizations.....	93
7.2.1	General Procedures (GPs).....	93
7.2.2	Precursor Synthesis .....	95
7.2.3	Synthesis of Naphthoquinone Derivatives .....	101
7.2.4	Syntheses of Dienes .....	106
7.2.5	Synthesis of Anthraquinone Derivatives.....	112
7.2.6	Synthesis of the Heck Products.....	143
7.2.7	Products of the Modifications .....	156
7.2.8	Synthesis of a Xanthone Dienophile.....	159

7.3	Crystallographic Data.....	165
7.3.1	Crystallographic Data Solved by Dr. Martin Nieger.....	165
7.3.2	Crystallographic Data Solved by Dr. Olaf Fuhr.....	181
8	List of Abbreviations.....	211
9	References .....	213
10	Appendix.....	219