

Contents

<i>Preface to the First Edition</i>	v
<i>Preface to the Second Edition</i>	vii
<i>Instructions for Students and Guidelines for Teachers</i>	viii
<i>A Note on the Collection and Identification of Plant Materials</i>	xi
1. Introduction	1
2. A Survey of the Methods of Extraction, Isolation and Fractionation of Naturally Occurring Organic Compounds	5
2.1 Selection of the material	5
2.2 Extraction	7
2.3 Fractionation using solvents	10
2.3.1 Specific extraction and fractionation procedures	11
2.3.2 Supercritical fluid extraction	16
2.3.3 Chromatographic methods	17
3. Characterisation of Naturally Occurring Compounds	31
3.1 Chemical methods	31
3.1.1 Preliminary studies—colour reactions	31
3.1.2 Detection and derivatisation of functional groups	36
3.1.3 Oxidative degradations	38
3.2 Spectral methods	40
4. Procedures for Isolation of Select Compounds	43
4.1 Bixin from <i>Bixa Orellana</i> seeds (Annatto)	44
4.2 Anthocyanins	49

4.2.1	Isolation of cyanin from red roses	49
4.2.2	A blue pigment from a blue flower	50
4.3	Flavonoids	54
4.3.1	Isolation of nepitrin from <i>Nepeta hindustana</i>	55
4.3.2	Isolation of pedaliin	59
4.3.3	Isolation of hesperidin	61
4.3.4	Isolation of a biflavone—Cupressuflavone	63
4.3.5	Isolation of catechins from green tea	65
4.4	Isoflavanones	67
4.4.1	Isolation of homoferreirin from <i>Ougenia dalbergioides</i>	68
4.4.2	Isolation of ougenin	69
4.5	Xanthones	70
4.5.1	Isolation of mangiferin	71
4.6	Betanins	72
4.6.1	Isolation of crude betanins from <i>Bougainvillea</i> flowers	73
4.7	Quinones	73
4.7.1	Isolation of lawsone from <i>Lawsonia alba</i>	75
4.7.2	Isolation of morindonin	76
4.8	Essential oils	77
4.8.1	Isolation of limonene	88
4.8.2	Isolation of geraniol	83
4.8.3	Isolation of citronellal	84
4.8.4	Isolation of α -pinene	85
4.8.5	Isolation of citral	87
4.8.6	Isolation of carvone	87
4.9	Higher terpenoids	89
4.9.1	Isolation of all the triterpenoids in birchwood bark	91
4.9.2	Isolation of lupeol—Column chromatography of crude betulin	94
4.9.3	Isolation of sitosterol	95
4.10	Non-terpenoid components of essential oils	95
4.10.1	Isolation of eugenol	96
4.11	Alkaloids	97

4.11.1	Isolation of nicotine	100
4.11.2	Isolation of piperine	101
4.11.3	Isolation of a purine derivative	101
4.11.4	Isolation of xanthosine	102
4.12	Oxygen heterocyclics other than flavonoids	103
4.12.1	Isolation of psoralen	103
4.12.2	Isolation of wedelolactone— desmethylwedelolactone	105
5.	Chemical Transformations of some Natural Products	109
5.1	Hydroxycitronellal from citronellal	109
5.2	Citral from geraniol	112
5.3	Synthetic lime mix from citral	113
5.4	Citral to pseudo-ionone	114
5.5	Pseudo-ionone to α -ionone	115
5.6	β -Ionone from pseudo-ionone	116
5.7	α -Terpineol from α -pinene	117
5.8	α -Pinene to camphor quinone	118
5.9	Calophyllolide to 2,2-dimethyl-5-hydroxy- 7,8-(4'-phenyl- α -pyreno) chroman	121
5.10	Conversion of methyl esters of tiglic acid and angelic acid into their epoxy derivatives	122
5.11	Nitration and other reactions of osthole	124
6.	Synthesis of Select Compounds	136
6.1	Flavanone	137
6.2	7-Hydroxyflavone	139
6.3	Desmethylwedelolactone	140
6.4	Lawsone	142
6.5	Terthienylmethanol	145
6.6	Nordalbergin	150
6.7	2-Hydroxy-4-methoxybenzaldehyde	152
6.8	Umbelliferone, herniarin and 7-methoxy-8-allylcoumarin	154
6.9	α -Methoxy-2,4 dihydroxyacetophenone and α -methoxy-2,4,6-trihydroxyacetophenone	157

7. Metabolism of Natural Products	161
7.1 Experimental methods used in studies on drug metabolism	162
7.2 Biochemical transformations of natural products	166
7.2.1 Isolation of bakuchiol	169
8. Suggested Projects	173
8.1 Analysis of the citral content in different samples of lemon grass (<i>Cymbopogon citratus</i>)	173
8.2 Analysis of carvone content in different samples of caraway	176
8.3 Study of antifungal activities of plant extracts and some isolated compounds	177
8.4 Chromatographic study of anthocyanin pigments in tulip	180
8.5 Chromatographic study of some marine algae	182
8.6 A chemotaxonomic study of some species of <i>Parmelia</i> lichens	185
8.7 Gas chromatography—mass spectroscopic study (GC—MS) of some sweet smelling woods	185
8.8 Essential oils from <i>Citrus</i> species	187
8.9 Examination of Ayurvedic patent preparations containing Bhringraj for wedelolactone—desmethylwedelolactone	188
<i>Appendix A</i>	191
<i>Appendix B</i>	201
<i>Index of Compounds</i>	203
<i>Index of Plants</i>	205
<i>Index of Reagents</i>	206