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THE CHEMISTRY OF POLYHYDROXYFLAVONOID
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C O N T E N T S

	Page
SUMMARY AND CONCLUSION.....	i
INTRODUCTION.....	1
RESULTS AND DISCUSSION.....	
1. <u>Asteriscus graveolens Less</u>	20
2. <u>Asteriscus pygmaeus</u>	52
3. <u>Plantago lagopus</u>	65
EXPERIMENTAL PART.....	74
1. Methods.....	74
1.1. Paper Chromatography.....	74
1.2. Column Chromatography.....	78
1.3. Paper Electrophoresis.....	79
1.4. Physical Investigations.....	80
1.5. Chemical Reactions.....	81
2. Experimental Procedure.....	85
2.1. <u>Asteriscus graveolens Less</u>	85
2.1.1. Plant material.....	85
2.1.2. Fractional extraction of the aerial parts.....	85
2.1.3. Column chromatography of the ethanolic extract.....	85
2.1.4. Investigation of the different fractions	
separated from the polyamide column.....	87
2.1.4.1. Fraction (I).....	87
Identification of free sugars.....	87
2.1.4.2. Fraction (II).....	88
- Isolation of the compound (AG ₁).....	
- Identification of (AG ₁): A new natural flavonol glycoside [5,7,3'-trihydroxy-4'- methoxyflavonol-3-O- α -L-rhamnosyl (1 \rightarrow 6)- β -D- galactoside].....	88

	Page
2.1.4.3. Fraction (III).....	94
- Isolation of components (AG ₂ , AG ₃ , AG ₄ and AG ₅).....	94
- Identification of (AG ₂) as 3,5,3',4'-tetrahy- droxy-6-methoxyflavone-7-O- β -D-glucoside.....	94
- Identification of (AG ₃) as 3,5,4'-trihydroxy- 6-methoxyflavone-7-O- β -D-glucoside.....	101
- Identification of (AG ₄) as 5,7,4'-trihydroxy- flavonol-3-O- β -D-glucoside.....	107
- Identification of (AG ₅) as 5,7,4'-trihydroxy- flavonol-3-O- β -D-galactoside.....	111
2.1.4.4. Fraction (IV).....	114
- Isolation of components (AG ₆ , AG ₇ , AG ₈ and AG ₉).....	114
- Identification of (AG ₆) as 3,5,3',4'-tetrahy- droxyflavone-7-O- β -D-glucoside.....	114
- Identification of (AG ₇) as 5,3',4'-trihydroxy- flavone-7-O- β -D-glucoside.....	119
- Identification of (AG ₈) as 3,5,4'-trihydroxy- flavone-7-O- β -D-glucoside.....	123
- Identification of (AG ₉) as 5,7,4'-trihydroxy- 3,6,3'-trimethoxyflavone.....	127
2.1.4.5. Fraction (V).....	132
- Isolation of components (AG ₁₀ , AG ₁₁ , AG ₁₂ and AG ₁₃).....	132
- Identification of (AG ₁₀) as 5,7,3',4'-tetrahy- droxyflavonol-3-O- β -D-glucosyl (1 \rightarrow 2)- β -D- galactoside.....	132

	Page
- Identification of (AG ₁₁): A new natural flavonol glycoside [3,5,3',4'-tetrahydroxyflavone-7-(6"-acetate)β-D-glucoside].....	138
- Identification of (AG ₁₂) as 5,7,3',4'-tetrahydroxyflavonol-3-O-β-D-galactoside.....	142
- Identification of (AG ₁₃) as 5,7,3',4'-tetrahydroxyflavonol-3-O-β-D-glucoside.....	147
2.1.4.6. Fraction (VI).....	150
- Isolation of the components (AG ₁₄ and AG ₁₅).....	150
- Identification of (AG ₁₄) as 5,7,3'-trihydroxy-6,4'-dimethoxyflavone.....	150
- Identification of (AG ₁₅) as 5,7,3'-trihydroxy-3,4'-dimethoxyflavone.....	155
2.1.4.7. Fraction (VII).....	159
- Isolation of the components (AG ₁₆ and AG ₁₇).....	159
- Identification of (AG ₁₆) as 3,5,7,3',4'-penta-hydroxy-6-methoxyflavone.....	159
- Identification of (AG ₁₇) as 5,7,4'-trihydroxy-3'-methoxyflavone.....	164
2.2. <u>Asteriscus pygmaeus</u>	168
2.2.1. Plant material.....	168
2.2.2. Fractional extraction of the aerial parts.....	168
2.2.3. Column chromatography of the ethanol extract.....	168
2.2.4. Investigation of the different fractions separated from the polyamide column.....	170
2.2.4.1. Fraction (I).....	170
- Identification of free sugars.....	170

	Page
2.2.4.2. Fraction (II).....	171
- Isolation of the components (AP ₁ and AP ₂)..	171
- Identification of (AP ₁) as 3-caffeoyl quinic acid.....	171
- Identification of (AP ₂) as 3,4-dihydroxy cinnamic acid.....	174
2.2.4.3. Fraction (III).....	176
- Isolation of the components (AP ₃ and AP ₄)..	176
- Identification of (AP ₃) as 5,7,3',4'-tetrahydroxyflavonol-3-O- β -D-glucosyl (1 \rightarrow 6)- β -D-glucoside.....	176
- Identification of (AP ₄) as 5,7,3',4'-tetrahydroxyflavonol-3-O- α -L-rhamnosyl (1 \rightarrow 6)- β -D-glucoside.....	181
2.2.4.4. Fraction (IV).....	187
- Isolation of the components (AP ₅ , AP ₆ and AP ₇).....	187
- Identification of (AP ₅) as 3,5,3',4'-tetrahydroxyflavone-7-O- β -D-glucoside.....	187
- Identification of (AP ₆) as 3,5,3',4'-tetrahydroxyflavone-7-O- β -D-galactoside.....	188
- Identification of (AP ₇) as 3,5,4'-trihydroxyflavone-7-O- β -D-glucoside.....	190
2.2.4.5. Fraction (V).....	192
- Isolation of the components (AP ₈).....	192
- Identification of (AP ₈): A new natural flavonol glycoside (3,5,7-trihydroxyflavone-4'-O- β -D-galactoside).....	192

	Page
2.2.4.6. Fraction (VI).....	197
- Isolation of the components (AP ₉ and AP ₁₀)..	197
- Identification of the (AP ₉) as 3,5,7,3',4'-pentahydroxyflavone.....	197
- Identification of (AP ₁₀) as 3,5,7,4'-tetrahydroxyflavone.....	200
2.3. <u>Plantago lagopus</u>	203
2.3.1. Plant material.....	203
2.3.2. Fractional extraction of the whole plant.....	203
- Isolation of some phenolic and flavonoid components.....	203
- Identification of (P ₁) as 5,7,3',4'-tetrahydroxyflavone.....	204
- Identification of (P ₂) as 5,3',4'-trihydroxyflavone-7-O- β -D-glucoside.....	207
- Identification of (P ₃) as 5,3',4'-trihydroxyflavone-7-O- β -D-galactoside.....	208
- Identification of (P ₄) as 5,3',4'-trihydroxyflavone-7-O- β -glucuronide.....	212
- Identification of (P ₅) as 5,3',4'-trihydroxyflavone-7-O- α -L-rhamnosyl (1 \rightarrow 6)- β -D-glucoside	216
- Identification of (P ₆) as 5,3',4'-trihydroxyflavone-7-O- α -L-rhamnosyl (1 \rightarrow 2)- β -D-glucoside	221
- Identification of (P ₇) as 3-caffeoyl quinic acid.....	226
- Identification of (P ₈) as 3,4-dihydroxy cinnamic acid.....	226

	Page
- Identification of (Pg) as 4-hydroxy-3-methoxy cinnamic acid.....	226
- References.....	228
- Summary in Arabic.	

SUMMARY AND CONCLUSION

Summary and Conclusion

The present thesis affords comprehensive studies on the chemical structure of the polyphenolic and flavonoid constituents and their glycosides found in the aerial parts of two local plants, namely Asteriscus graveolens and Asteriscus pygmaeus (Family Compositae) and the whole plant of Plantago lagopus (Family Plantaginaceae). These local plants have been selected to be the subject of this thesis due to their economic importance and the very few reports concerning their polyphenolic and flavonoid constituents in the literature.

The identification and the elucidation of the structure of the isolated and purified components were confirmed through U.V. spectral measurements, ^1H and ^{13}C -NMR spectroscopy, mass spectra, R_f -values in different solvents in addition to the chemical methods of investigation (acid and enzymic hydrolyses, hydrogen peroxide oxidation, demethylation, alkali fusion and the preparation of some derivatives... etc.).

The aerial parts of A. graveolens and A. pygmaeus as well as the whole plant of P. lagopus were air-dried, ground and extracted with aqueous ethanol. The ethanol extract of each of the two species of Asteriscus i.e. graveolens and pygmaeus was applied on a polyamide column, whereby seven fractions were obtained from the former and six fractions from the latter, while the extract of P. lagopus was subjected to the elution technique on Whatman 3MM paper (preparative paper chromatography) whereby nine components were obtained.

The first fraction of A. graveolens showed to contain mainly sugars, which were isolated and identified as glucose, galactose, rhamnose and xylose.

From the second fraction, a new natural flavonol glycoside was isolated, purified and identified for the first time as 5, 7, 3'-trihydroxy-4'-methoxyflavonol-3-O- α -L-rhamnosyl (1 \rightarrow 6) β -D-galactoside (Tamarixetin-3-O-robinobioside). Acid hydrolysis led to the identification of the aglycone tamarixetin and the sugars rhamnose and galactose, while enzymic and controlled acid hydrolyses failed to give any intermediate.

Investigation of the third fraction led to the identification of two methoxylated flavonol glycosides: 3,5,3',4'-tetrahydroxy-6-methoxyflavone-7-O- β -D-glucoside (Patuletrin) and 3,5,4'-trihydroxy-6-methoxyflavone-7-O- β -D-glucoside, together with two other components of glycosidic flavonoid nature, namely 5,7,4'-trihydroxyflavonol-3-O- β -D-glucoside (Astragalin) and 5,7,4'-trihydroxyflavonol-3-O- β -D-galactoside (Trifolin).

The fourth fraction desorbed from the column proved to contain the three glycosidic flavonoid components 3,5,3',4'-tetrahydroxyflavone-7-O- β -D-glucoside (Quercimeritrin); 5,3',4'-trihydroxyflavone-7-O- β -D-glucoside (Glucoluteolin) and 3,5,4'-trihydroxyflavone-7-O- β -D-glucoside, in addition to the methoxylated aglycone, jaceidin (5,7,4'-trihydroxy-3,6,3'-trimethoxyflavone).

Another new natural flavonol glycoside was separated from fraction five which was identified for the first time as 3,5,

3',4'-tetrahydroxyflavone-7-O-(6''-acetate)- β -D-glucoside, in addition to the three flavonol glycosides 5,7,3',4'-tetrahydroxyflavonol-3-O- β -D-glucosyl (1 \rightarrow 2)- β -D-galactoside; 5,7,3',4'-tetrahydroxyflavonol-3-O- β -D-glucoside (Isoquercitrin) and 5,7,3',4'-tetrahydroxyflavonol-3-O- β -D-galactoside (Hyperin).

The two major components isolated from fraction six were purified and identified as the two methoxylated aglycones 5,7,3'-trihydroxy-6,4'-dimethoxyflavone (Desmethoxycentaureidin) and 5,7,3'-trihydroxy-3,4'-dimethoxyflavone (3,4'-dimethoxyquercetin).

Detailed studies of the last fraction (seven) led to the isolation and identification of the two methoxylated aglycones 3,5,7,3',4'-pentahydroxy-6-methoxyflavone (Patuletin) and 5,7,4'-trihydroxy-3'-methoxyflavone (Chrysoeriol).

The investigation of the ethanolic fractions eluted from the polyamide column of A. pygmaeus extract led to the identification of the sugars glucose, galactose and rhamnose from the first fraction.

The second fraction proved to contain two polyphenolic components identified as 3-caffeoyl quinic acid (Chlorogenic acid) and 3,4-dihydroxy cinnamic acid (Caffeic acid).

The two glycosidic flavonoids isolated from the third fraction were identified as 5,7,3',4'-tetrahydroxyflavonol-3-O- β -D-glucosyl (1 \rightarrow 6)- β -D-glucoside (Quercetin-3-O-gentiobioside) and 5,7,3',4'-tetrahydroxyflavonol-3-O- ∞ -L-rhamnosyl (1 \rightarrow 6)- β -D-glucoside (Rutin).