CONTRIBUTIONS TO THE CHEMICAL STUDY OF SOME PAPAVERACEAE SPECIES CAPSULES.
N.II. GLAUCIUM FLAVUM, GLAUCIUM CORNICULATUM AND CHELIDONIUM MAJUS

Claudia Vorniceanu¹, Mădălina Vătui ², Adrian Ionescu ², Maria-Magdalena Zamfirache¹, Ion I.Băra ¹

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Abstract: The study of the composition of the isokynolic alkaloids of the capsules of some Papaveraceae that are close taxonomically, like the genus Glaucium and Chelidonium comes to complete the data obtained from a previous study on another genus (Papaver). The investigation of the alkaloidic spectrum of the species Glaucium flavum, Glaucium corniculatum and Chelidonium majus by thin-layer chromatography (CSS) on SiO₂ as absorber and the solvent systems: CHCl₃-MeOH (85:15), C₆H₆-EtOH (9:1), CHCl₃-MeOH (1:1) and cyclohexane-dyethylamine (9:1) emphasized a complex chemical composition. We also performed the determination of the brute proteins in the fruits of the examined species by Kjeldahl proceeding. The results emphasized the greatest content in Glaucium flavum followed by Chelidonium majus.

INTRODUCTION

In a first note, we studied the alkaloid composition of the capsules of some species of Papaver sampled both from the culture (Papaver somniferum) and from the spontaneous flora (Papaver rhoeas and Papaver dubium). Going on with the study, we also examined the capsules of some other related Papaveraceae, of the genus Glaucium (Glaucium flavum and Glaucium corniculatum) and Chelidonium (Chelidonium majus). To this purpose, we used the thin-layer chromatography, following both tertiary and quaternary alkaloidic bases. The second purpose of the paper was the brute proteins dosage from the fruits (capsules) of the examined species.

MATERIAL AND METHODS

The capsules of the species of Papaveraceae studied were sampled in the summer of 2002 as it follows:
- Glaucium flavum from culture (Iaşi Botanical Garden)
- Glaucium corniculatum and Chelidonium majus of the spontaneous flora of the surroundings of Iaşi.

From every plant, two types of extracts were prepared: metanolic and dychlormethanic. To this purpose, 5 g of every vegetal product were weighted, crushed, powdered and then treated in two ways:
- with methanol (5 x 50ml) by repeated shaking, when the metanolic extract was obtained
- with dychlormethane (5 x 50ml) in alcaline environment (NH₃) by repeated shaking, when the dychlormethan extract was obtained

At thin-layer chromatography (CSS) ready-made Merck plates of silicagel were used and the following solvent systems:

The chromatograms were seen first by examining in UV at λ = 365 nm and then by powdering with Dragendorff reagent.

Using 2 g material vegetal dryness on 60 °C, crushed, powdered for the determination of the brute proteins in the capsules by Kjedahl proceeding.
RESULTS AND DISCUSSIONS

Analyzing the obtained chromatographic images, we could see that there was a number of 12-13 alkaloidic spots for *Glaucium flavum*, 18 for *Glaucium corniculatum* and 13 for *Chelidonium majus*.

As solvent system used for the general screening, we noticed the mixture of CHCl₃-MeOH (85:15) on a layer of SiO₂ (fig. 1).

![Fig. 1 Si O₂  G Merck 10x20, CHCl₃– MeOH (85:15), R.Dragendorff](image)

In the case of the *Glaucium flavum* we identified by means of the reference substances the alkaloids: glaucine, chelidonine, stilopine, protopine, allocryptopine and magnoflorine. All the four tested solvent systems proved to be useful (fig. 2), yet an optimal separation of the pair glaucine-chelidonine is obtained when the mixture C₆H₆-EtOH (9:1) is used, and also when the mixture CHCl₃-MeOH (85:15) is used, even if the separation is not as good as in the first case (fig. 3).

Using the solvent system CHCl₃-MeOH (1:1) on SiO₂, specific for the quarternary bases, in the metanolic extract of the fruits of *Glaucium flavum* we could see the presence of the magnoflorine and of another alkaloid with close Rₜ. We can also see clearly the absence of the quarternary protoberberins of the fruits of *Glaucium flavum*.

Passing to *Glaucium corniculatum* we identified via the reference substances the following alkaloids: glaucine, chelidonine, protopine, allocryptopine and coptizine. Of the used solvent systems, we noticed the one formed by C₆H₆-EtOH (9:1) (fig. 4). As to the fraction of the quarternary protoberberinic bases, we noticed their presence and the separation of a number of five spots with yellow fluorescence at various shades in the UV light upon the use of the solvent systems CHCl₃-MeOH (1:1). Of these alkaloids, we could identify only the coptisine via the reference substance.
Chelidonium majus, species that is quite close to the plants of the Glaucium genus if we consider particularly the chemotaxonomic characters, distinguishes itself by the high concentration of the quarternary protoberberins. Using the same solvent system, CHCl₃-MeOH (1:1) on SiO₂ we could distinguish a number of 4-5 spots with yellow fluorescence of various shades upon UV examination. We identified the coptisine and the berberine, the first alcaloid prevailing.

Using the 3 solvent systems used also in the case of the Glaucium species, we could identify by the behavior as to the reference substances the following tertiary alkaloids: stilpine, chelidonine, protopine, allocryptopine, sanguinarine and cheleritrine. We noticed a considerable amount of stilpine and low amounts of the quarternary benzo-(c)-fenandrinic cuaternare bases, sanguinarine and cheleritrine.
Upon the use of the solvent systems CHCl$_3$-MeOH (1:1) on SiO$_2$ we also noticed for the extracts from the fruits of *Chelidonium majus* the presence of the coline, as well.

Comparing our results with the results obtained by R. Lavenir and R. Paris as to the alkaloid composition of the fruits of *Chelidonium majus*, we have to show that they agree as to the presence of the stilopine in considerable amounts, yet the quantitatively prevailing alkaloid in our case is the coptisine. This alkaloid was not noticed by the French authors probably because of the stressed hydrosolubility of the quaternary protoberberinic bases, upon alcalizing and extraction with non-polar solvents as they remain in the mother waters, unlike the tertiary alkaloids.

The second purpose of the paper was the brute proteins dosage from the fruits of the examined species by Kjedahl proceeding (Table 1).

<table>
<thead>
<tr>
<th>Nr. crt.</th>
<th>Species</th>
<th>G media probe (g)</th>
<th>VmNaOH 0,1 n (ml)</th>
<th>Vp NaOH 0,1 n (ml)</th>
<th>V m -Vp</th>
<th>N total (g N/100 g material dryness on air)</th>
<th>brute proteins (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><em>Glaucium flavum</em></td>
<td>0,2699</td>
<td>6,95</td>
<td>6,59</td>
<td>0,35</td>
<td>0,1847</td>
<td>1.1549</td>
</tr>
<tr>
<td>2.</td>
<td><em>Chelidonium majus</em></td>
<td>0,2699</td>
<td>6,95</td>
<td>6,72</td>
<td>0,22</td>
<td>0,1167</td>
<td>0,7294</td>
</tr>
</tbody>
</table>

The results emphasized the greatest content in *Glaucium flavum* (1,15%), followed by *Chelidonium majus* (0.72%) (Fig.5).

**Fig.5** Brute proteins dosage from the *Glaucium flavum* and *Chelidonium majus* capsules

**CONCLUSIONS**

Using the thin-layer chromatographic analysis of silicagel and solvent systems CHCl$_3$-MeOH (85:15), C$_6$H$_6$-EtOH (9:1), CHCl$_3$-MeOH (1:1) and cyclohexane-dyethylamine (9:1) were identified in the fruits of *Glaucium flavum, Glaucium corniculatum* and *Chelidonium majus* the alkaloids: chelidonine, protopine, allocryptopine.

The alkaloids stilopine and coptisine were noticed only in *Chelidonium majus* and *Glaucium corniculatum*, and the glaucine only in the species of *Glaucium*. 
Sanguinarine, cheletrine and coline could be identified only in the fruits of *Chelidonium majus*, and magnoflorine only in those of *Glaucium flavum*.

We also notice the presence of the quarternary protoberberines in *Chelidonium majus* and *Glaucium corniculatum* and their absence from *Glaucium flavum*.

The results emphasized the greatest content in brute proteins in *Glaucium flavum* followed by *Chelidonium majus*.

**BIBLIOGRAFIE**


1. Faculty of Biology, “Al. I. Cuza” University, Iaşi
2. Faculty of Pharmacy, “Gr. T. Popa” University of Medicine and Pharmacy of Iaşi