

# HISTO-ANATOMICAL COMPARATIVE STUDIES OF FLOWER COVERS BY *MELAMPYRUM CRISTATUM* L. AND *MELAMPYRUM BIHARIENSE* KERN. SPECIES

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**ABSTRACT.** For a further analysis of the active principles, you have to know the histoanatomic organ structure of the *Melampyrum* species. The *Melampyrum cristatum* L. and *Melampyrum bihariense* Kern species are plants belonging to the Romanian spontaneous flora. After comparative analyses made on the sepals and petals of the two *Melampyrum* species, there have been found the following: tector hairs, glandular hairs and a few stomata on the tracta epidermis, glandular hairs and tector hairs in the sepal elevation, and in the petal elevation the analysis indicates the presence of conic papilla and glandular hairs.

**Keywords:** *Melampyrum bihariense* Kern. and *Melampyrum cristatum* L., histological structure, petals, sepals

## INTRODUCTION

Medicinal hubs are an important natural asset. They have got back their proper place among the curative remedies of the modern world. If you use them, there are almost no side untoward effects, which means a much better tolerance of the human body. The present study aims to underline, by means of histo-anatomic analyses, the importance of the two *Melampyrum* species, plants of the spontaneous flora, unvalued until now in therapy, having the strong belief that in the future, as a result of these studies as well as of the fitochemicals, they will join the rank of medicinal plants of therapeutic interest. Specialty literature referring to the plants from the *Scrophulariaceae* family's anatomy is relatively rich, as it results from the anatomy of *dicotyledonate*, elaborated by Solereder (Solereder H., 1899), Metcalfe and Chalk (Meetcalfe C.R., Chalk L., 1957) and Napp-Zinn (Napp-Zinn K., 1973, 1978, 1984). Following these treaties, which analyse the *Scrophulariaceae* family from histoanatomic point of view, it results that the *Melampyrum* family is rarely quoted and the references of these species that we are studying are poor and seldom. Disparate information regarding some structural particularities of the *Melampyrum* family or the *Scrophulariaceae* family are met in some works with general character: either anatomotaxonomical character or anatomoecological character (Aneli A.N., 1975, Federowicz S., 1915, Flot L., 1893, Julg E., 1916, Koch L., 1888, Koch H., 1895, Lohrer O., 1887, Rugină R., Toma C., 1993, Spierri W., 1930, Toma C., Rugină R., 1998).

The *Melampyrum* gender is mentioned in some monographic studies or different treaties or in morphology and vegetal anatomy books.

Studies regarding the *Melampyrum* gender are yet poor, and in the Romanian technical literature we only know two studies that approached the *Melampyrum* gender, pointing three species: *Melampyrum saxosum* and *Melampyrum sylvaticum* (Niță, M. et al., 1995); *Melampyrum bihariense* and *Melampyrum cristatum* (Munteanu M., Oroian S., Darkó B., 2004, Munteanu M., Oroian S., 2005).

## MATERIAL AND METHODS

The material that has been studied was gathered in 24. 06.2004 from the Bala and Ercea villages in Mures county. The collected material was preserved in 70° ethanol. Transversal sections have been done using a botanic razor through the vegetative organs in elder tree pith. The vegetative mature organs have been studied from a histoanatomic point of view: the flowers cover. After highlighting them with a Javel solution, the sections have been colored using Malachite green and Genevese reactive. The sections have been assembled in glycerol-jelly. The analysis of the samples has been made using Nikon Eclipse E 600 (Japan) binocular microscope, and the resulting images have been photographed. The resulting images for the obtained samples have been grouped in parts of organs. For describing different tissues, and anatomical parts we used the already described methods for the *Dicotyledonous* in general, or *Scrophulariaceae* in particular.

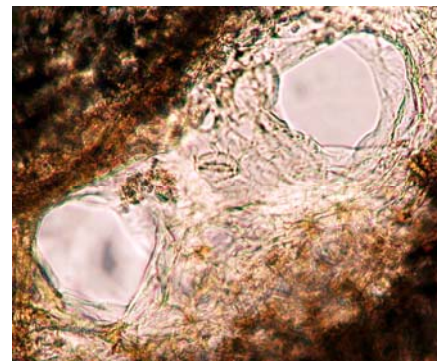
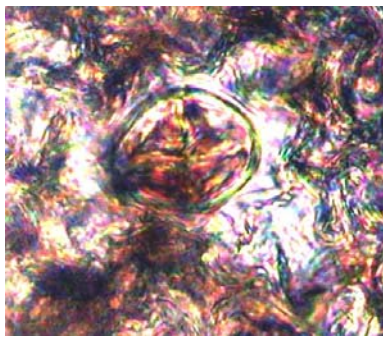
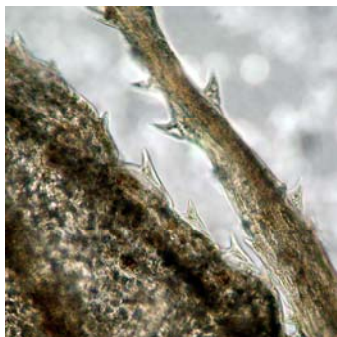
For the flower, the bractees, sepals and petals have been analysed in sections.

**RESULTS AND DISCUSSIONS**

*The anatomic structure of the bractees*

In the case of *Melampyrum bihariense* L., the bractees do not cover the inflorescences axis. The inferior ones resemble the stalk leaves, having wide basis, subcorded and with acuminate teeth. The upper ones are light blue with long teeth. Under the optical

microscope, the front scene, on superficial sections, numerous tector trichomes (fig.1) have been highlighted, having wide basis and a sharp point, glandular hair, with four secretor cells and few stomates (fig.2). Close to the central line, on the lower side of the bractees, two cavities have also been noticed (fig.3).



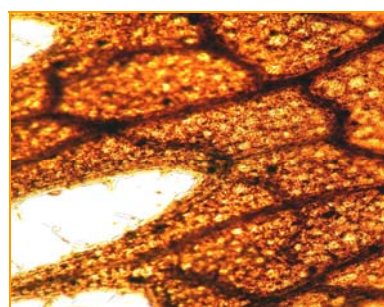
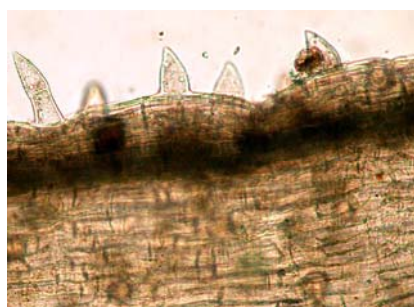
**Fig. 1** *Melampyrum bihariense* – bractees with tector hairs (x100)

**Fig. 2** *Melampyrum bihariense* – glandular hairs (x 400)

**Fig. 3** *Melampyrum bihariense* – Bractees with two cavities (x400)

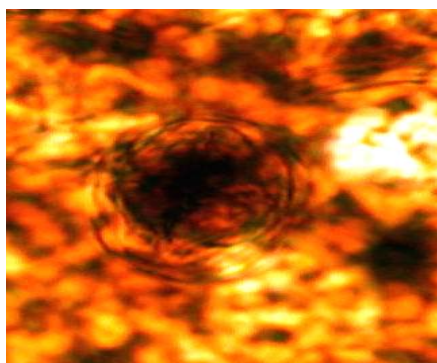
At the *Melampyrum cristatum* the bractees are covering the inflorescence axis. They are dense and arranged in four lines. The lower ones have an entire point (fig. 4) that is long and bent downwards.

The front seen epidermis has polygonal, rectangular cells, few stomates, and secretor and tector hairs (fig. 5, 6, 7).



**Fig. 4** *Melampyrum cristatum* – bractees with tector hairs (x100)

**Fig. 5** *Melampyrum cristatum* – bractees with sinuses between teeth (x 200)



**Fig. 6** *Melampyrum cristatum* – secretor hair (x400)

**Fig. 7** *Melampyrum cristatum* – bractees with sinuses (x400)

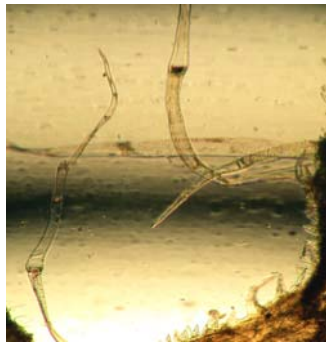
*The anatomic structure of the sepals*

The *Melampyrum bihariense* calyx has a tubular shape, glabrous, disperse long and white ciliary, the teeth are separated by open sinuses (fig 8), can be thin 6-10, mm long, bent forward. As a structure, the sepales are very much resembling the nomophiles. In the superficial section, we may observe the epidermis

(fig 9.) that has numerous glandular hairs, and on the sinuses – the presence of liniar tector hairs.

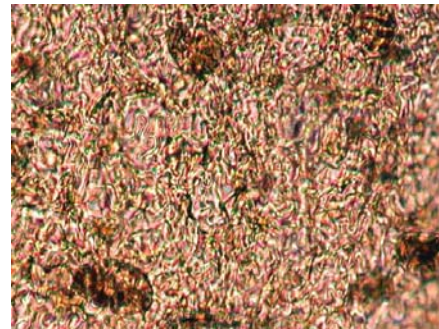
The *Melampyrum cristatum* calyx has a tubular shape, having the two upper teeth much longer than the three lower teeth. The teeth show a series of pluricellular trichomes on the edges, some being shorter and some longer and bent (fig. 10, 11, 12, 13).

In a superficial section, on the lower epidermis numerous ground hairs with wide basis and sharp point

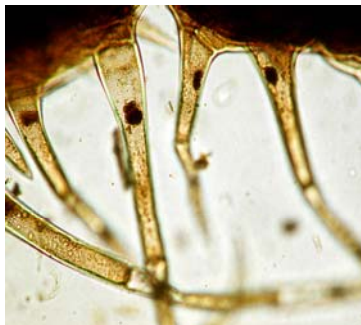


**Fig. 8** *Melampyrum bihariense* - sinuses by calyx with hairs (x100)

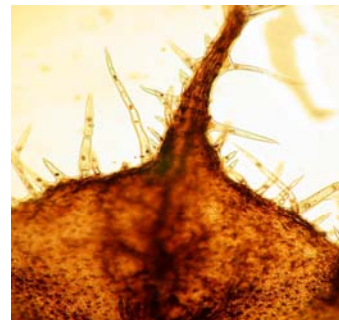
have been found.



**Fig. 9** *Melampyrum bihariense* - upper epidermis (x 200)



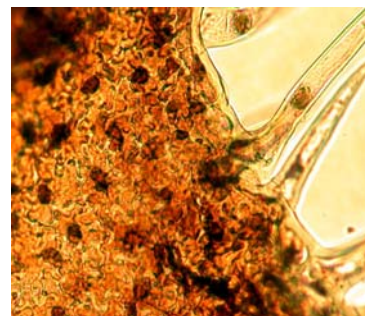
**Fig. 10** *Melampyrum cristatum* – pluricellular tector hairs (x200)



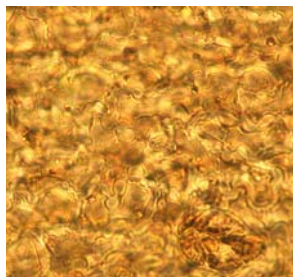
**Fig. 11** *Melampyrum cristatum* - sepal with pluricellular tector hairs (x100)



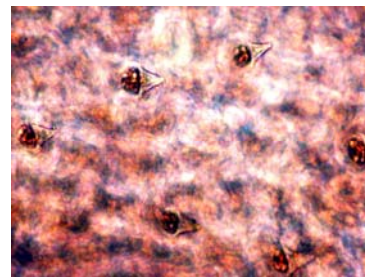
**Fig. 12** *Melampyrum cristatum* –pluricellular tector hairs (x 200)



**Fig.13** *Melampyrum cristatum* - pluricellular tector hairs (x200)



**Fig. 14** *Melampyrum bihariense* – sinuous epidermis (x200)



**Fig. 15** *Melampyrum bihariense* – epidermis with cone papillas (x200)

**The anatomic structure of the petals**

The corolla of *Melampyrum bihariense* is 18-24 cm long, gold yellow, having a geniculated inner tube, being very wide on the extremity. The lower labium is 6 mm wide. The upper labium is round and helmet shaped. In the analysed superficial section, the petal structure resembles the leaf, having some particularities: the 2 epidermis and especially the adaxial one has a sinuous epidermis (fig. 14),

presenting cone papillas (fig 15), cromoplasts and different tector short hairs (fig. 16,17).

The *Melampyrum cristatum* corolla is tubular shaped, 13-16 mm long. The tube is long and pale yellow. The lower labium is magenta. The superficial section executed on this species reveals the presence of cone shaped papillas (fig. 18) and of glandular hairs (fig. 19).

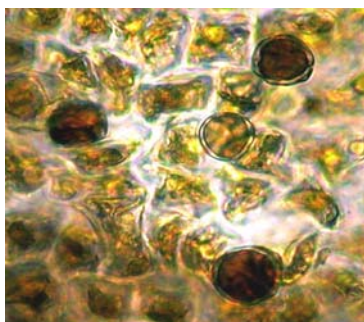


Fig. 16 *Melampyrum bihariense* – secretion hairs (x200)

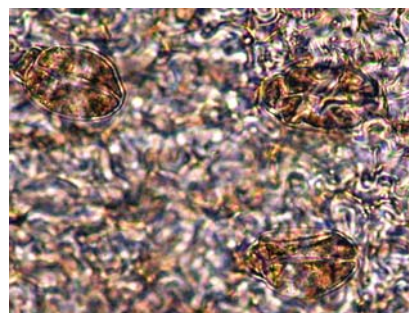


Fig. 17 *Melampyrum bihariense* - secretion hairs (x400)

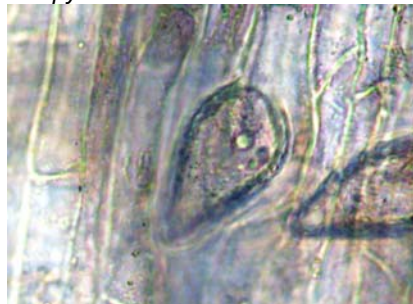


Fig. 18 *Melampyrum cristatum* –cone papillas (x400)

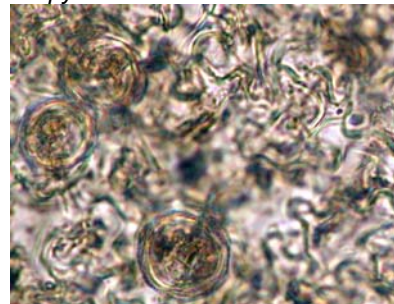


Fig. 19 *Melampyrum cristatum* - glandular hairs (x200)

## CONCLUSIONS

After studying the two species of *Melampyrum*, the conclusion has been drawn that the histo-anatomic structures of the vegetative organs are very much alike, with differences existing just regarding the hairs. The following results are shown:

- the axial organ research reveals the anatomical symmetry phenomenon, and shows some of the histo-genetical process moments
- on both species the bractees epidermis presents tector hairs, glandular hairs and few stomates
- the superficial sections executed on the sepals reveal the presence of the glandular hairs and tector hairs
- the superficial sections executed on the petals indicate the presence of cone shaped papillas and glandular hairs

The histological and anatomical features facilitate the easier way to differentiate the two species of *Melampyrum*, constituting diagnosis features for the two taxa.

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