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HISTOLOGICAL RESEARCH ON SOME BUDS USED IN GEMOTHERAPY

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Abstract: There were performed histological studies of some buds used for gemotherapy remedies (preparation). Thus longitudinal section of buds, by histological techniques, of the following 14 species were made: *Corylus avellana, Betula pendula, Alnus glutinosa, Alnus incana, Castanea sativa, Ribes nigrum, Rosa canina, Rubus idaeus, R. fruticosus, Crataegus monogyna, Populus nigra, P. tremula, Aesculus hippocastanum, and Tilia platyphyllos*.

The development degrees of meristematic tissue of buds in connection with therapeutic values were estimated. The most developed meristematic tissue are found in the buds of *Corylus avellana, Ribes nigrum, Rubus idaeus, R. fruticosus and Tilia platyphyllos* therefore they are considered to be the best in gemotherapic remedies.

Introduction

The therapy with hydroglyceroalcoholic macerate obtained from meristematic, embryonary buds tissue of wood species is known as got gemotherapy or embryotherapy and it is included in the natural or alternative medicine. The biological action of such preparations rely on the active substances of the meristematic tissue extracted by the solvent such as enzymes, vitamins, amino acids, microelements, etc. They have a strong biostimulating effect [6]. Even though the gemotherapy is an old therapy, their virtues rediscovered here, in Romania, through the products obtained in Plant – Extrakt Laboratories, from Rădaia - Cluj-Napoca [1]

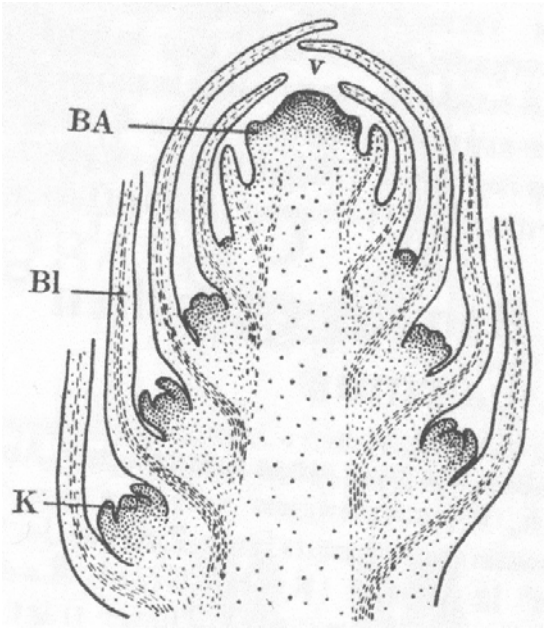

Fig. 1: Sketch showing the structure of a vegetatative bud after Strassburger
V – growing-point; **BA** – leaf primordia; **Bl** – young leaves; **K** – axillary buds;

The embryonary stage of bud formation and differentiation takes placeis at the end of summer and in autumn. After this, it follows a (dormant state) pause stage until the next spring when the cells of the growing-point switch with the active state resulting in elongation of this and the opening of the bud due to the growing of biostimulators produced by the embryonary tissue [2]. Structurally, the bud consists of an axis with the growing-point and the initial cells at the top, all these covering the primary meristem. Laterally it can be observed the external formations developed in a succession towards the apex (acropetal). These are the leaf primordia and in the leaf axils the future axillary buds (Fig.1) [2, 4, 8]. The whole bud is protected by brown cataphylla, or bud-scales which have worsens, tissue which contain resins, volatile oils and mucilage. Rarely the buds do not contain cataphylla and they are called *naked buds* [4, 5]. Depending on organs developed from the bud, they can be classified: leaf buds, mixed buds and flower buds. The latest have a globular shape in contrast with one which is rather elongate [4, 9]. The meristematic area of the different buds is distributed and developed differently, exhibiting the unequal distribution of the biological-active substances through the buds of different species [7].

This is why we have performed this histological study for the main buds used to prepare gemotherapeutical remedies. We consider that this study might allow a correlation between the development of the meristematic tissue and the content in biostimulatory substances.

Material and Methods

There have been studied buds from 14 woody plant species, trees and shrubs (Tab. 1). They were harvested in February – April 2001 and 2002 from the wild and cultivated flora of Cluj County. The buds were fixed in a mixture of ethyl alcohol and acetic acid (3:1) and then prepared according to usual histological techniques involving inclusion in paraffin and sectioning with microtome. The sections (12 µm.) we stained with 0,2% Toluidine Blue and subsequently mounted and fixed in Canada balsam to obtain microscopic preparations to be studied by light microscopy [3, 7].

Table 1: The analyzed species

Nr.	Scientific name	Common (sau english) name	Family name
1	*Corylus avellana* L.	hazelnut	Betulaceae
2	*Betula pendula* Roth.	birch tree	Betulaceae
3	*Alnus glutinosa* (L.) Gaert.	black alder tree	Betulaceae
4	*Alnus incana* (L.) Moench	alder tree	Betulaceae
5	*Castanea sativa* Miller*	chestnut tree	Fagaceae
6	*Ribes nigrum* L.*	black currant	Saxifragaceae
7	*Rosa canina* L.	wild rose	Rosaceae
8	*Rubus idaeus* L.*	raspberry	Rosaceae
9	*Rubus fruticosus* L.	blackberry	Rosaceae
10	*Crataegus monogyna* Jacq.	hawthorn	Rosaceae
11	*Populus nigra* L.	black poplar	Salicaceae
12	*Populus tremula* L.	aspen tree	Salicaceae
13	*Aesculus hippocastanum* L.*	wild chestnut tree	Hippocastanaceae
14	*Tilia platyphyllos* Scop.*	linden tree with large leaf	Tiliaceae

Legend: * - cultivated species

Results and Discussions

In longitudinal thin sections through the collected buds most of the cells were stained in blue colour when toludine blue reagent was applied. The cells with mucilaginous content turned

into violet. The buds have no mechanic tissues. The most important differential features of the analyzed buds are as follows:

1. *Corylus avellana.* The buds are ovoid-spherical , with glandular hairs and more developed basal external cataphylla compared with the internal ones. The central meristematic tissue has an ovoid shape (Fig. 2).

2. *Betula pendula* has ovoid and pointed vegetative buds as seen in the longitudinal section. In the outer part of buds these are many cataphylla inside with numerous small leaf and bud primordia.

3. *Alnus glutinosa* has buds with the pedicles, two slightly distanced scales, with many waxen glands. The buds are very hard and brittle. The basal meristematic tissue is less developed.

4. *Alnus incana* has two thinner external scales and more tomentous than *A. glutinosa*. The buds have pedicles too.

5. *Castanea sativa* exhibits lignified and callose cataphylla and weaked developed meristematic tissue..

6. *Ribes nigrum* has cylindrical and elongate buds with 1-3 cataphylla inserted at the upper of side peduncle, which have the meristematic tissue inside at the base of the growing-point. At the super side there are as well asa lot of leaf primordia floral ones with flaky texture. The development of the meristematic tissue at the base might explain the importance and the action of these buds in gemotherapy (Fig. 3).

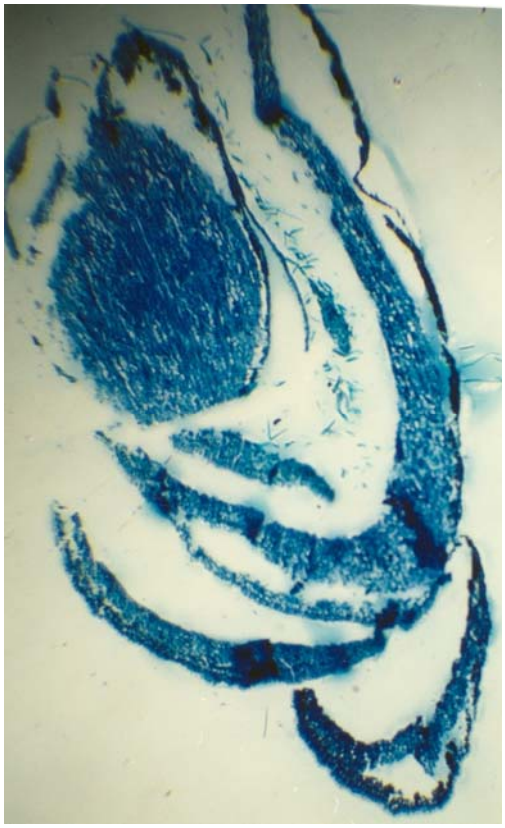

Fig. 2: *Corylus avellana,* longitudinal section of the leaf bud (X 100)

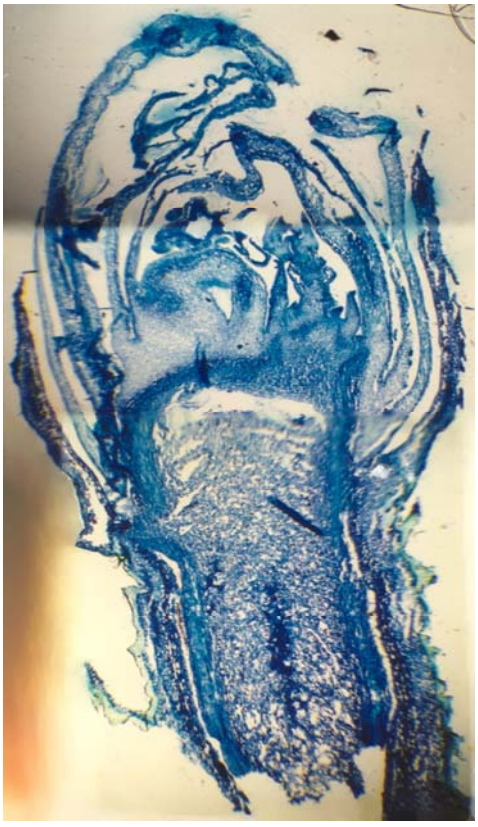

Fig.3: *Ribes nigrum*, longitudinal section of the leaf bud (X 100)

7. *Rosa canina* has cylindrical and elongate buds with protected by two almost parallel cataphylla. The growing-point is reduced but it has a lot of slightly twisted leaf primordia, the

support for the future sprouts and pinnately-compound leafs. A large number of leaf primordia are also present (Fig. 4).

8. *Rubus idaeus* has elongate to cylindrical buds with 2-3 protective marginal cataphylla and a lot of leaf primordia at their upper part (Fig. 5).

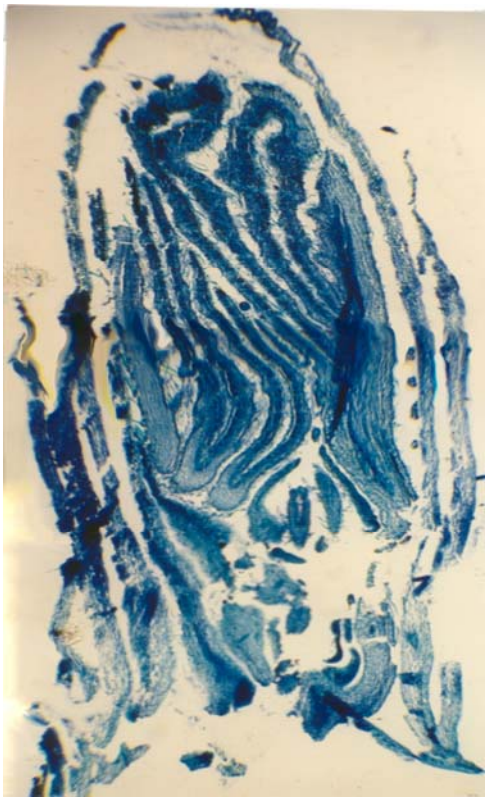

Fig. 4: *Rosa canina*, longitudinal section of the leaf bud (X 100)

Fig. 5: *Rubus idaeus,* longitudinal section of the leaf bud (X 100)

9. *Rubus fruticosus* is similar with *R. idaeus* but the growing-point is more developed and the leaf primordia are more reduced in size (Fig. 6).

10. *Crataegus monogyna,* exhibits small, reddish, globular buds. They terminate in a short sharp spine with no cataphylla, having leafs primordial located laterally. The mixed buds have the leaf primordia inside. The growing-point is small.

11. *Populus nigra.* The buds are conical, elongated or spindle shaped, laterally joined to stem. They are yellow-brown in colour and have propolis smell. The spindle shaped buds are big, bended and deviate from branches.

12. *Populus tremula* has conical and ovoid buds which are 5-6 times smaller that the buds of *P. nigra*, being wider and having the cataphylla with 4-5 bud-scales and reduced meristematic tissue.

13. *Aesculus hippocastanum* has opposite buds, being dark-brown colour and sticky. The terminal buds are bigger (2 cm) with advanced leaf primordia.

14. *Tilia platyphyllos* has ovoid and sharp buds, with three scales (cataphylla), the inferior bud remaining shorter than the half of the other bud. The meristematic tissue is conical and very advanced (Fig. 7).

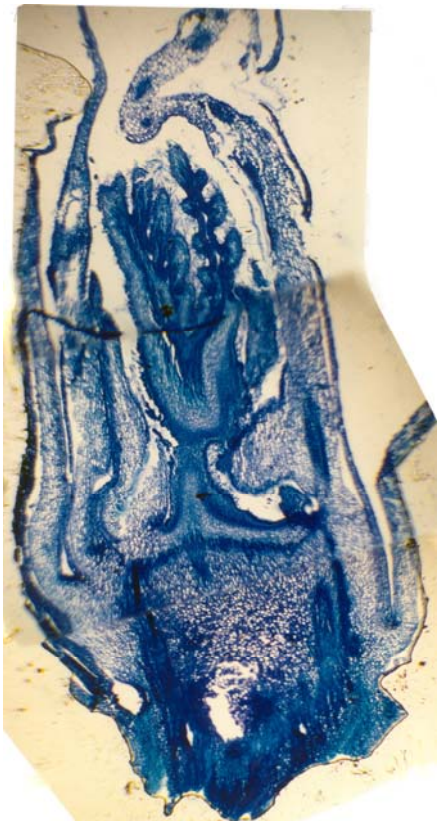

Fig. 6: *Rubus fruticosus*, longitudinal section of the leaf bud (X 100)

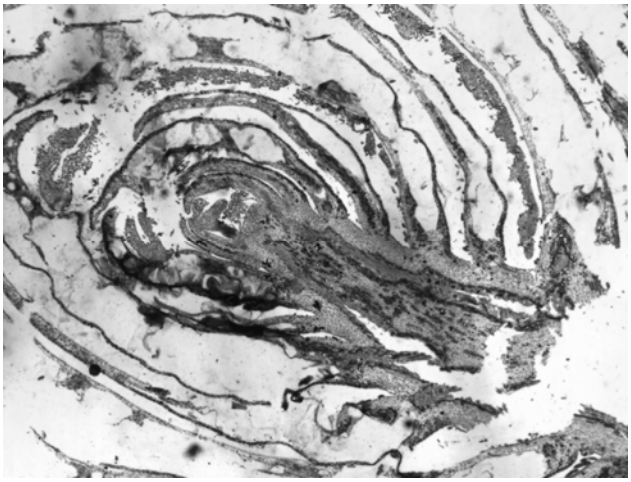

Fig. 7: *Tilia platyphyllum*, longitudinal section of the leaf bud (X 100)

Conclusions

There have been histologically analyzed the buds of 14 native species used for the preparation of some gemotherapeutical remedies.

After staining with toluidine blue reagent the structure of buds as seen in longitudinal sections have been described.

The buds differ according to the shape of section, number of cataphylla and the development of the meristematic tissue.

The most extended zones of meristematic tissue could be observed in the buds of black currant, wild rose, blackberry and raspberry.

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CERCETĂRI HISTOLOGICE ASUPRA UNOR MUGURI UTILIZAȚI ÎN GEMOTERAPIE

(Rezumat)

A fost efectuat un studiu histologic al unor muguri utilizați la prepararea de remedii gemoterapice. În acest scop au fost realizate secțiuni longitudinale după tehnici histologice în mugurii următoarelor specii: *Corylus avellana, Betula pendula, Alnus glutinosa, Alnus incana, Castanea sativa, Ribes nigrum, Rosa canina, Rubus idaeus, R. fruticosus, Crataegus monogyna, Populus nigra, P. tremula, Aesculus hippocastanum, şi Tilia platyphyllos.* S-a urmărit dezvoltarea țesuturilor meristematice din aceşti muguri în corelație cu valoarea lor terapeutică. Cele mai dezvoltate țesuturi meristematice sunt prezente în mugurii de *Corylus avellana, Ribes nigrum, Rubus idaeus, R. fruticosus şi Tilia platyphyllos*, care sunt considerați a fi şi cei mai activi din punct de vedere farmacologic.