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# Taxonomic Studies on the Genus *Alectoria*

Studia systematyczne nad rodzajem *Alectoria*

Систематические изучения рода *Alectoria*

In Lichenographia Universalis, Acharius (1) distinguished the genus *Alectoria* in which he placed the lichens of filamentous, thinly capillaceous, abundantly dichotomously branched and pendulous thalli, of radiate structure of branches, and without central axis and mechanical pseudotissue in medulla. In the genus *Alectoria*, he recognized only two species *Alectoria sarmentosa* and *A. jubata* with some varieties: namely, *prolixa*, *chalybeiformis*, *lanestris*, *setacea*, *cana*, *implexa* and *capillaris*. The remaining species of similar but shrub-like structure of thalli, already known to him and now classified to the genus *Alectoria*, were included into other genera by Acharius. He treated *Alectoria bicolor* and *A. nigricans* as belonging to the genus *Cornicularia*, and at first placed *A. ochroleuca* in the genus *Parmelia* and then in the genus *Cornicularia*.

Link (7) introduced the name *Bryopogon* which comprised the majority of species classified to the genus *Alectoria* by Acharius. In the genus *Bryopogon*, Link differentiated only four species: *Bryopogon jubatus*, *Br. chalybeiformis*, *Br. ochroleucus* and *Br. sarmentosus*.

Th. Fries (4) divided *Alectoria* into two subgenera: *Eualectoria* and *Bryopogon*. He included *Alectoria nigricans*, *A. ochroleuca* and *A. sarmentosa* in the subgenus *Eualectoria* characterized by the species of shrub-like or pendulous thalli, but of 2—4 large spores in the asci. In the subgenus *Bryopogon*, he placed the species of thinly capillaceous, pendulous or shrub-like thalli, of 4—8 small spores in the asci, and included there *Alectoria jubata* var. *prolixa* for. *chalybeiformis*, *A. jubata* var. *lanestris* and *A. bicolor*.

Some lichenologists treated *Alectoria* on a broader basis and included the exotic species *Oropogon* Th. Fr. and some species of the genera *Parmelia* Ach. and *Ramalina* Ach. in that genus. The system worked out by M. Choisy in the years 1954—1955 seems to be the best example. M. Choisy divided the genus *Alectoria* into six sections: 1) *Oropogon* (Th. Fr.) Stizenb., 2) *Hyalodidyma Saccardo*, 3) *Eualectoria* (Th. Fr.) Choisy, 4) *Coenocaulopsis* Choisy, 5) *Bryopogon* (Link) Th. Fr. and 6) *Pseudephebe* Choisy.

Gyelnik (5) divided the *Alectoria* species, on the basis of their chemical properties i.e. of their reaction with KC reagent, into the following sections: 1) *Eujubatae* Gyel. with the species giving no reaction with KC, 2) *Implexae* Gyel. with the species colouring red by KC, and 3) *Ochroleucae* Gyel. with the species of yellow colouration by KC. In his subsequent works he accepted the name *Bryopogon* for the genus *Alectoria* and kept the division similar to that in the latter genus.

Du Rietz (10) divided the subgenus *Bryopogon* — the richest in species — into two sections and two subsections. He based his division on the morphology of thalli, the presence or absence of lateral branchlets and the thickness of branches. He included the species of thallus without protruding lateral branchlets in the section *Eujubatae* D.R. and placed the species of numerous lateral branchlets in the section *Divaricatae* D.R. in which he recognized two subsections: *Subfibrillosae* D.R. with the species of thin and capillaceous thalli and *Sulcatae* D.R. with those of thick thalli and flattened branches.

Keissler (6) divided *Alectoria* into the sections: *Bryopogon* (Th. Fr.) Keissl. with the subsections *Jubatae* D.R. and *Divaricatae* D.R., and the section *Eualectoria* (Th. Fr.) Keissl.

A detailed description of the genus *Alectoria* was given by Motyka (8, 9). He took into consideration the phylogenesis of individual species and within the genus. He also included the synopsis of genus worked out on the basis of the structure of thalli, the size of spores and their number in the asci. Motyka (9) divided *Alectoria* into three subgenera: 1) *Bryopogon* (Link) Th. Fr., 2) *Sulcaria* Mot. and 3) *Alectoria* Ach. In the subgenus *Bryopogon* he differentiated six sections: 1) *Subfibrillosae* (D.R.) Mot., 2) *Tortuosae* Mot., 3) *Bryopogon*, 4) *Jubatae* D.R. emend. Mot., 5) *Pellucidae* Mot., and 6) *Subdivergentes* Mot. He recognized *Oropogon* Th. Fr. as a separate genus, the species from the section *Pseudephebe* Choisy as belonging to the genus *Parmelia* and the species from the section *Hyalodidyma* Saccardo to the genus *Ramalina*.

My own research carried out for a few years on rich material col-

lected in the herbarium at the Department of Plant Taxonomy and Geography UMCS induced me to a certain restriction within the genus. A detailed analysis of the features of individual species showed that some species included in the genus *Alectoria* had not many features in common. Moreover, they differed greatly in the structure ot apothecia, the size and number of spores in the asci, the thickness of ascus walls, external and anatomical structure of thallus branches, the way of vegetative propagation and finally in the chemical properties. Unchangingness of the above-mentioned features in individual species made me divide *Alectoria* into several separate genera and describe them in detail.

In the present paper which is a part of the world monograph of *Alectoria* and other related genera I would like to present an outline of the system for these genera. I have divided the genus *Alectoria* as recognized by Acharius into four separate genera: 1) *Oropogon* Th. Fr., 2) *Bryopogon* Link emend. Bystr., 3) *Alectoria* Ach. emend. Bystr., and 4) *Sulcaria* (Mot.) Bystr. I have placed, after Motyka, the species of the section *Pseudephebe* Choisy in the genus *Parmelia* and the species of the section *Hyalodidyma* Saccardo in the genus *Ramalina*. Such a division pictures the relations between individual genera clearly; the genera *Oropogon* and *Bryopogon* are related to the genera *Parmelia* and *Cornicularia*, and the genera *Alectoria* and *Sulcaria* to the genera *Ramalina*, *Evernia* and *Usnea*.

Below I have presented a key to the identification of genera.

1. Main branches of thallus cylindrical, sometimes slightly flattened or pitted, smooth, with cyphellae or pseudocyphellae ... 2.
2. Thallus glabrous, without cyphellae, often with pseudocyphellae ... 3.
3. Thallus thinly capillaceous, with whitish, streak-shaped pseudocyphellae which are recessed in the thallus. Spores small, of thin walls, 4—8 in the ascus. Apothecia often sterile ... *Bryopogon* Link emend. Bystr.

3*. Thallus thickly filamentous or fruticose, green, yellow-green or yellow, with pseudocyphellae on wrinkles of the thallus. Spores large, of thick walls, 2—4 in the ascus. Talli are yellow with KC ... *Alectoria* Ach. emend. Bystr.

2*. Thallus with circular cyphellae. Spores muriform, 1 in the ascus. Plants exotic ... *Oropogon* Th. Fr.

1*. Main branches sulcate, burst with longitudinal fissure. Apothecia large, spores fusiform and seemingly 2-celled. Plants exotic ... *Sulcaria* (Mot.) Bystr.

## GENUS *OROPOGON* TH. FR.

Gen Heterol: 49. 1861.

Typus generis: ***Oropogon loxensis*** Gyel.

Thallus capillaceous, pendulous or fruticose, erect or prostrate, attached to the substrate by a distinct but mostly short blackened base; rigid, regularly dichotomously branched, of angles between the branches normally broad, not differentiated into main and lateral branchlets; dark, olive-brown or almost black, rarely light; of the branches completely smooth, cylindrical, not deformed; with ± numerous cyphellae situated on segments of the thallus or in the angles of branches; without pseudocyphellae.

Anatomical structure. Cortex rather thick and rigid, formed of very conglutinate hyphae, inside freguently uneven, 60—90 μ in diameter. Medulla loose, filled with shortly branched hyphae. Algae of the *Trebouxia* genus in clusters in the medulla just under the cortex, more abundant near the cyphellae.

Apothecia mostly present, laterally on the branches, cause the bending of branches; of *Lecanora* type, with thalline margin often curled under hymenium in old apothecia. Discs mostly of thallus colour, at first concave, later flat or convex. Hymenium to over a dozen μ high. Asci infrequent, with large, muriform, one in the ascus spore.

Chemical properties various. Chemical substances not studied until now.

Plants only exotic. There belong a few species growing in Japan, Central and East Asia, and South America.

The species from the genus *Oropogon* differ from those of *Bryopogon* in the presence of cyphellae and muriform spores.

## GENUS *BRYOPOGON* LINK EMEND. BYSTR.

*Bryopogon* Link, Grundriss der Kräuterkunde, 3 : 164. 1833 pro p. (excl. *Br. ochroleucus* et *Br. sarmentosus*). — *Alectoria*.** *Bryopogon* Th. Fr., Lich. Scand., 1: 23. 1871. — *Alectoria subgenus Bryopogon* D.R., Arkiv. f. Botan., 20 A (11):5. 1926; A. Zahlbr. Cat. Lich. Univ., 6: 375. 1930, 10: 552. 1940 (pro sect.); Motyka, Flora Polska, *Usneaceae*, 5 (2) : 47. 1962; M. Lamb, Index Nom. Lich. 1: 10. 1963.

Typus generis: *Bryopogon jubatus* (L.) Link emend. Mot.

Thallus thinly capillaceous, pendulous or shrubby, tufted and erect, or distinctly protruding, attached to the substrate by a rather distinct, broadly blackened base. Branches of various colour, light or dark, sometimes black, tips often darker; dichotomously or seemingly submonopodially branched, of angles between the branches mostly broad, without lateral branchlets, or with numerous, short and detached lateral branchlets; oval, normally not deformed, sometimes irregularly flattened, wrinkled and spirally contorted, smooth or with fissured,

longitudinal pseudocyphellae in the form of white streaks recessed in the thallus and formed from the bursting of the cortex.

Apothecia small, situated laterally on the branches, at first of concave disc, later flat and even convex, lecanorine but of simple structure. Thalline margin formed of replicate cortex, distinct at first, then replicated by expanding hymenium and partly or almost completely covered with hymenium in old apothecia. The margin and exciple distinct. The exciple surrounds the hymenium from the sides and bottom, ca. 40—50 μ thick. Hymenium ca. 40 μ thick; asci club-shaped; spores 4—8, small, oval, colourless and of thin walls, unicellular, 7×15 μ. Hymenium often without asci and spores. Hypothecium distinct, colourless or slightly yellowish, often ca. 20 μ thick.

Anatomical structure. Thallus from 0.2 to 1.0 mm in diameter, circular in section; covered with thin, 15—70 μ thick cortex formed of thin and very conglutinate hyphae which run parallel to the surface of branches; colourless, dark or yellow-brown only in the external, ca. 6 μ thick layer. Mechanical pseudotissue lacking. Medulla loose, formed of shortly ramose, colourless hyphae, fills the branch throughout or just under the cortex. Algae from the *Trebouxia* genus situated in the medulla just under the cortex, rarely in the central part.

Soralia usually present, on small tubercles, or fissure-shaped, bursting with irregular fissure. Soredia granular, rarely isidioid. Some specimens without soralia and soredia.

Chemical properties. They colour by K, C, KC and Pd or do not colour at all, often give reactions with only one reagent. Microchemical studies showed a few lichen acids: fumarprotocetraric (found in most species), psoromic, tamnolic, norstictic, salacinic, alectronic, lecanoric and barbatolic acids. Usnic acid was not found in all the species from the genus *Bryopogon*.

The species of the genus *Bryopogon* can be easily distinguished from those of the related genera by thinly capillaceous thallus, cylindrical segments branched dichotomously, fibrous cortex and the lack of mechanical pseudotissue. This genus differs from *Oropogon* by the lack of cyphellae and the presence of small unicellular spores; from *Alectoria* and *Sulcaria* by the structure of branches, spores and the lack of usnic acid.

The species of the genus *Bryopogon* are found in Holarctis forests — mainly coniferous, rarely in foliaceous ones. Only a few of them grow outside the montane limit of forests in the mountains and tundras, and exceptionally in the mountains of tropical zone. Their habitat: trunks and branches of trees, dead wood and rarely rocks. Exceptionally they grow on earth.

*Bryopogon* is a genus rich in species, amounting to several dozen of them, which sometimes are difficult to identify, especially when not skeletonized. They are phylogenetically old species (8). Superficial observation of the genus makes one think that there are only a few species with numerous varieties (6). However, the examination of plants carefully skeletonized does not confirm this opinion.

The genus *Bryopogon* can be divided into a few sections and subsections:

1. Sectio *Subfibrillosae* (D.R.) Mot.
   Subsectio *Fruticulosae* Bystr.
   Subsectio *Subfibrillosae*
2. Sectio *Fuscidulae* Bystr.
   Subsectio *Divaricatae* (D.R.) Bystr.
   Subsectio *Flexuosae* Bystr.
   Subsectio *Fuscidulae*
3. Sectio *Tortuosae* Mot.
4. Sectio *Perspinosae* Bystr.
5. Sectio *Bryopogon*
   Subsectio *Bryopogon*
   Subsectio *Implexae* (Gyel.) Bystr.
6. Sectio *Subdivergentes* Mot.
7. Sectio *Pellucidae* Mot.

### *SECTIO SUBFIBRILLOSAE* (D. R.) MOT.

*Alectoria* subgenus *Bryopogon* sectio *Subfibrillosae* Mot., Flora Polska, *Usneaceae*, 5 (2) : 38 et 48. 1962. — *Alectoria* sectio *Divaricatae* subsectio *Subfibrillosae* D.R., Arkiv f. Botan. 20 A (11): 5 et 11. 1926.

Typus sectionis: *Bryopogon bicolor* (Ehrh.) Stein et *Br. fuscescens* Gyel.

Thallus thin, capillaceous, dark, brown-black, brown or black; attached to the substrate by a distinct, often broadly blackened base; pendulous or clearly protruding, often fruticose, vegetatively propagating or forming soredia, rarely apothecia. Soralia fissure-shaped, sharply delimited. Soredia borne in the medulla and fall out through the fissure in the cortex. Chemical properties various. Many species give no reaction with K, C, KC and Pd, or the medulla and soralia go red by Pd because of the content of fumarprotocetraric acid.

Two groups of species are recognized in the section *Subfibrillosae;* the first group of fruticose or tufted thalli, the other of thalli normally elongated, pendulous or spreading over the substrate. Two subsections are distinguished here:

#### Subsectio *Fruticulosae* Bystr., nova subsectio

*Plantae fruticulosae, erectae, obscure-fuscae vel fere nigrae, in parte basali late nigratae.*

Thalli fruticose, erect and tufted, or slightly prostrate, 1—10 cm long and broad, attached to the substrate by a distinct frequently broadly blackened base; dichotomously or partly submonopodial-

ly branched; vegetatively propagating, rarely forming soredia or apothecia; dark, olive-brown, brown or black.

Typus subsectionis: *Bryopogon bicolor* (Ehrh.) Stein.

The following species belong to the subsection *Fruticulosae: Br. intricans* (Vain.) Bystr., *Br. nitidulus* (Th. Fr.) Elenk. et Savicz, *Br. tenuis* (Dahl) Bystr., *Br. simplicior* (Vain.) Gyel., *Br. poeltii* Bystr., *Br. bicolor* (Ehrh.) Stein, *Br. berengerianus* (Mass.) Gyel., *Br. acanthodes* (Hue) Gyel., *Br. nanus* Mot., *Br. niduliferum* (Norrl.) Elenk.

Subsectio *Subfibrillosae*, nova subsectio

*Plantae elongatae, pendulae vel pro parte ascendentes, olivascente-fuscae, fuscae, fusco-nigrae vel nigrae. Soralia fissuralia. K-, C-, Pd-, vel Pd+rubescunt.*

Thalli elongate, pendulous or only partly erect, always longer than broader, attached to the substrate by a shortly blackened base; dark, forming fissure-shaped soralia. Give no reaction with K, C and KC. The medulla and soralia go red by Pd. Fumarprotocetraric acid was detected in most species.

Typus subsectionis: *Bryopogon fuscescens* Gyel.

The subsection *Subfibrillosae* comprises a few very distinct but closely related species: *Br. ambiguus* (Mot.) Bystr., *Br. cervinulus* Mot., *Br. glaber* (Mot.) Bystr., *Br. positivus* Gyel., *Br. crispus* (Mot.) Bystr., *Br. fuscescens* Gyel., *Br. canadensis* (Mot.) Bystr.

SECTIO *FUSCIDULAE* BYSTR., NOVA SECTIO

*Plantae elongatae et pendulae, raro irregulariter fruticulosae, ramuli laterales numerosi, spinuliformes, recti vel varie curvati, maiores arcuato dependentes. Acidum fumaroprotocetraricum non continent.*

Thalli long and pendulous, or partly erect, exceptionally irregularly fruticose; of various colour, light or brown, exceptionally black or almost black; attached to the substrate normally by a broadly blackened base; rigid, with lateral, often numerous, short and detached branchlets. Soralia fissure-shaped, pseudocypellae present on some branches. Chemical properties various, fumarprotocetraric acid is not the only acid in a given species.

Typus sectionis: *Bryopogon fuscidulus* (Arn.) Bystr.

The section *Fuscidulae* is divided, in relation to the structure of branches, type and way branching, and the formation of lateral branchlets, into 3 subsections:

Subsectio *Divaricatae* (D.R.) Bystr., nova comb.

*Alectoria* subgenus *Bryopogon* sectio *Divaricatae* D.R., Arkiv f. Botan. 20 A (11) : 5. 1926.

*Ramuli laterales numerosi, spinuliformes et recti, in parte basali late nigrati.*

Thalli pendulous or erect but large, normally over 10 cm long, scattered; of rigid branches, of angles between the branches broad, normally with numerous, short and detached lateral branchlets; attached to the substrate by a broadly blackened, rigid base.

Typus subsectionis: *Br. altaicus* Gyel.

To this subsection there belong a few very distinct species such as: *Br. congestus* Mot., *Br. divergescens* (Nyl.) Gyel., *Br. variabilis* Bystr., *Br. altaicus* Gyel., *Br. eciliatus* (Mot.) Bystr., *Br. asiaticus* (D.R.) Bystr., *Br. africanus* (Mot.) Bystr., *Br. tatricus* (Mot.) Bystr.

Subsectio *Flexuosae* Bystr., nova subsectio

*Plantae irregulariter fruticulosae, flexuoso-intricatae, ramuli supra basali irregulariter flexuosi, plerumque arcte curvati, perplectati et crispati, griseo-viridi, griseo-fusciduli vel sepiaceogrisei.*

Thalli fruticose, erect or very irregulary spreading over the substrate, very flexuose and entangled, crispate-looking; attached to the substrate by a short, indistinct base; of light colour, on tips slightly darkened. Branches irregularly flexuose and irregularly dichotomously or submonopodially branched, often deformed, without rigidly detached lateral branchlets, with cripsy flexed, lateral branchlets of various lengths.

Typus subsectionis: *Br. flexuosus* (Mot.) Bystr.

Only *Br. flexuosus* (Mot.) Bystr. belongs to this subsection.

Subsectio *Fuscidulae*, nova subsectio

*Plantae filamentosae, flaccide pendulae, ramuli laterales non numerosi, varie longi, serpentino flexuosi vel arcuato-curvati.*

Thalli pendulous or prostrate, attached to the substrate by a slightly blackened, short base; with infrequent, lateral branchlets uneven in length and mainly pendulous or arcuately detached. Soralia irregularly fissured. Chemical properties various.

Typus sectionis: *Br. fuscidulus* (Arn.) Bystr.

There belong a few epiphytic and epilithic species of large, pendulous thalli and fissure-shaped soralia: *Br. fuscidulus* (Arn.) Bystr., *Br. setaceus* (Ach.) Bystr., *Br. motykanus* Bystr., *Br. pseudofuscescens* Gyel. and *Br. catharinae* (Räs.) Bystr.

SECTIO *TORTUOSAE* MOT.

*Alectoria* subgenus *Bryopogon* sectio *Tortuosae* Mot., Flora Polska, *Usneaceae*, 5 (2): 38 et 72. 1962.

Thallus very irregularly branched, flaccidly pendulous, large or rather large; of main branches to 1 mm in diameter or thicker, distinctly deformed, longitudinally wrinkled and often deeply pitted, frequently tortile, of thin cortex, often bursting with longitudinal fissures. Thalli of various colours. Give no reaction with K.

Typus sectionis: *Br. tortuosus* (Merrill) Bystr.

The section *Tortuosae* comprises only 4 species: *Br. tortuosus* (Merrill) Bystr., *Br. carpaticus* (Mot.) Bystr., *Br. fremontii* (Tuck.) Rabenh., *Br. oreganus* (Tuck.) Schneid.

SECTIO *PERSPINOSAE* BYSTR., NOVA SECTIO

Thalli large, pendulous or partly erect, with main and lateral branchlets, irregularly cylindrical, of main branches irregularly flattened or pitted, copper-brown, submonopodially branched. The cortex and medulla distinctly violet by JKJ.

Typus sectionis: *Br. perspinosus* Bystr.

The section *Perspinosae* comprises 2 Asiatic species of very characteristic structure of thalli, which are related only to *Br. asiaticus*. They are: *Br. himalayanus* (Mot.) Bystr. and *Br. perspinosus* Bystr.

SECTIO *BRYOPOGON*

*Alectoria* subgenus *Bryopogon* sectio *Bryopogon* Mot., Bryologist, 67 (1): 26. 1964. — *Alectoria* subgenus *Bryopogon* sectio *Jubatae* D.R., Arkiv f. Botan., 20 A (11): 6. 1926. (excl. *A. tortuosa* et *A. fremontii*); Mot., Flora Polska, *Usneaceae*, 5 (2): 77. 1962.

Thalli elongate, pendulous, thinly capillaceous and barbate, large, only in epilithic species shorter, sometimes rather short and poorly branched, forming soredia on the tubercles.

Typus sectionis: *Br. jubatus* (L.) Link emend. Mot.

The section *Bryopogon* comprises a large number of species forming soralia on the tubercles, the species of various morphology and chemical properties. This section is divided, on the basis of the content of chemical substances, into two subsections.

Subsectio *Bryopogon*, nova subsectio

*Plantae obscure-coloratae. K-, C-, KC-, Pd-, vel Pd + rubescunt.* Thalli dark, give no reaction with K, C, KC and Pd, or the medulla and soralia go red by Pd because of the content of fumarprotocetraric acid. There belong: *Br. chalybeiformis* (L.) Link, *Br. vrangianus* Gyel., *Br. prolixus* (Ach.) Bystr., *Br. jubatus* (L.) Link emend. Mot., *Br. lanestris* (Ach.) Gyel., *Br. tenerrimus* (Mot.) Bystr., *Br. americanus* (Mot.) Bystr.

Subsectio *Implexae* Gyel. emend. Bystr.

*Bryopogon* sectio *Implexae* Gyel., Fedde Repert. Spec. Nov. 38: 238. 1935. (excl. *Br. nigricans*).

*Plantae pallide coloratae, albae, cinereae, rarius cinereo-fuscae, pallide viridulae vel luteolae aut stramineolae. Acidum fumaroprotocetraricum non continent.*

Thalli of light colour, grey, brown-grey, green-yellow or yellowish, in herbarium collections often turning russet, sometimes colouring herbarium paper. They do not produce fumarprotocetraric acid. They give various chemical reactions with K, C, KC and Pd, and produce various lichen acids.

Typus subsectionis: *Br. implexus* (Hoffm.) Elenk.

There belong all the species of lightly coloured thalli and of tubercle soralia regardless of their reaction with KC: *Br. delicatus* (Mot.) Bystr., *Br. implexus* (Hoffm.) Elenk., *Br. haynaldii* Gyel., *Br. capillaris* (Ach.) Bystr., *Br. kummerleanus* Gyel., *Br. norsticticus* (Mot.) Bystr., *Br. mirabilis* (Mot.) Bystr. *Br. subtilis* (Mot.) Bystr., *Br. canus* (Ach.) Choisy, *Br. subanus* (Nyl.) Gyel., *Br. sophiae* (Mot.) Bystr.

SECTIO *SUBDIVEGENTES* M O T.

*Alectoria* subgenus *Bryopogon* sectio *Subdivergentes* M o t., Bryologist., 67 (1) : 36. 1964.

Thalli fruticose, of thick branches irregularly dichotomously branched; erect and rigid, shining, black with bluish tint. Plants terrestrial.

Typus sectionis: *Br. subdivergens* (D a h l.) B y s t r.

There belong *Br. subdivergens* (D a h l.) B y s t r. and *Br. irvingii* (L l a n o) B y s t r.

SECTIO *PELLUCIDAE* M O T.

*Alectoria* subgenus *Bryopogon* sectio *Pellucidae* M o t., Flora Polska, *Usneaceae*, 5 (2) : 39 et 95. 1962.

Thallus pendulous or fruticose, rather rigid, distinctly tuberculate, normally with pseudocyphellae on the tubercles, glabrous and shining, of cortex slightly hyaline and as if transparent. Soralia in known species punctate, forming soredia on their surface.

Typus sectionis: *Br. pellucidus* (M o t.) B y s t r.

The section *Pellucidae* is related to the species of the *Alectoria* genus by the colour of thallus and by pseudocyphellae on the tubercles. The lack of apothecia in *Br. pellucidus* makes the establishment of systematic position of this species difficult.

GENUS *SULCARIA* (M O T.) B Y S T R., NOVA COMB.

*Alectoria* subgenus *Sulcaria* M o t., Flora Polska, *Usneaceae* 5 (2) : 39. 1962.

Thalli fruticose, thick and rather short, or elongate and pendulous, irregularly dichotomously or seemingly monopodially branched, of angles between the branches various; attached to the substrate by a strong, not blackened or slightly blackened base in fruticose species, or less distinct in pendulous species; of various colours but not black and brown, of radiate structure. Branches cylindrical, without tubercles, old and often also the young ones b u r s t i n g w i t h l o n g i t u d i n a l f i s s u r e and taking s u l c a t e s h a p e, sometimes undergoing flattening.

A p o t h e c i a large, mostly frequent, of *Lecanora* type, formed laterally on the branches near the apex and causing the bending of

branches and by this seemingly apical; thalline margin distinct, slightly protruding above the hymenium. Discs concave at first, then flat, but convex with age, brown, darker at the margin. Hymenium ca. 100—150 μ; hypothecium ca. 25—30 μ, slightly yellowish; the exciple very distinct and thick, often over 100 μ thick, colourless, surrounding the hymenium from the bottom and sides; the margin distinct, to 30 μ thick. Asci numerous, club-shaped, of rather thick walls; spores dark, brown, large 30—35 × 16—16 μ, 2-celled, of cells uneven.

Anatomical structure. Branches sometimes to 2 mm in diameter, thinner in young ones, often capillaceous on tips, bursting with longitudinal fissure reaching the medulla. Cortex fibrous, formed of parallel, very conglutinate, thin hyphae; colourless, darker only in the external layer some μ thick, rather thick, frequently over 150 μ thick. Medulla rather dense, formed of shortly ramose hyphae, denser in the algae layer. Algae from the genus *Trebouxia* rather numerous in the medulla under the cortex, rarely in its central part.

Soralia unknown.

The genus *Sulcaria* is distinguished from its related genera by sulcate thallus resulting from the fissure running along old and often along the young branches, and by large, dark and most frequently 2-celled spores.

Latin diagnosis given by Motyka recognizes the genus *Sulcaria* as the subgenus *Alectoria* and comprises the most important features of the genus. It goes as follows: "*Thallus fruticulosus, rigidus et firmus vel longe pendulus et flaccidus. Rami saltem primarii fissuris oblongis dilacerati et propterea sulcati apparentes, passim fere explanati. Sporae elongatae, fusiformes, passim biloculares apparentes*".

Typus generis: *Sulcaria sulcata* (Lév.) Bystr.

The genus *Sulcaria* comprises only two species: *Sulcaria sulcata* (Lév.) Bystr. and *Sulcaria virens* (Tayl.) Bystr. Both species live in east Asia.

## GENUS *ALECTORIA* ACH. EMEND. BYSTR.

*Alectoria* Ach., Lich. Univ.: 120. 1810 pro p. (excl. *Al. jubata* var.: *prolixa, chalybeiformis, lanestris, setacea, cana, implexa* and *capillaris.*). — *Alectoria* subgenus *Eualectoria* Th. Fr., Lich. Scand. 1: 19. 1871. — *Alectoria* subgenus *Alectoria* Mot., Bryologist 67 (1): 38. 1964.

Thalli large, filamentous and pendulous, or short, fruticose and erect; green or yellow-green, often yellow, exceptionally of other colour; attached to the substrate normally by a well-developed base; dichotomously or ± monopodially branched, always without lateral branchlets, of angles between the branches various. Pseudocyphellae present, numerous, on spinous or cicatricial tubercles of the cortex, exceptionally recessed. Soralia lacking, or tubercle-shaped or developed from pseudocyphellae.

Apothecia present in most species, frequent in some species extremaly rare in others, large, of *Lecanora* type, with distinct thalline margin, formed laterally on the branches, often seemingly apical by the bending of a branch. Discs concave at first, later flat or slightly convex, sometimes wrinkled, light- or dark-brown, frequently turning blue or black. Hymenium ca. 150 μ: hypothecium colourless or slightly yellowish, ca. 20 μ thick. The exciple well-developed, surrounding the hymenium from the bottom and sides, thick, frequently over 60 μ thick. The margin distinct but considerably thinner than the exciple. Asci broadly ovoid, pear- or club-shaped. Spores 1—2 in the ascus, large, ovoid or lemon-shaped (slightly acute at the ends), colourless when young, brown with age, unicellular, of thick walls, 30—40 × × 18—23 μ, frequently slightly larger.

Chemical properties. Most species produce usnic acid.

Geographical distribution broad. They are the alpine and northern species. They grow in the alpine region and tundras, on trees in the taiga and in the mountains, and in prealps mostly just below the upper limit of forests.

Typus generis: *Alectoria sarmentosa* Ach.

The genus *Alectoria* comprises: *Al. nigricans* (Ach.) Nyl., *Al. ochroleuca* (Hoffm.) Mass., *Al. sarmentosa* Ach. and *Al. fallacina* Mot.

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## STRESZCZENIE

Opracowanie, będące częścią światowej monografii rodzaju *Alectoria* i rodzajów pokrewnych, zawiera zarys systemu dla tych rodzajów. Rodzaj *Alectoria* rozdzielono na 4 odrębne rodzaje: *Oropogon* Th. Fr., *Bryopogon* Link emend. Bystrek, *Alectoria* Ach. emend. Bystrek i *Sulcaria* (Mot.) Bystrek.

Badania własne oparto na materiale zielnikowym, zgromadzonym w Katedrze Systematyki i Geografii Roślin UMCS, a szczególnie na wnikliwej analizie typów nomenklaturycznych poszczególnych gatunków.

Z analizy materiału zielnikowego wynika, że gatunki rodzaju *Alectoria* w dotychczasowym ujęciu mają bardzo niewiele cech wspólnych, różnią się natomiast bardzo wyraźnie, szczególnie budową owocników, zarodnikami, budową anatomiczną i morfologią plech oraz właściwościami chemicznymi.

Aby ułatwić określenie przynależności poszczególnych gatunków do odpowiednich rodzajów, zamieszczono w pracy klucz do oznaczania tych rodzajów.

Opracowano również system w obrębie rodzaju *Bryopogon*.

## РЕЗЮМЕ

В работе, представляющей часть мировой монографии рода *Alectoria* и родственных родов, представлен очерк о системе этих родов. Род *Alectoria* разделен на 4 отдельные рода: *Oropogon* Th. Fr., *Bryopogon* Link emend. Bystr., *Alectoria* Ach. emend. Bystr., *Sulcaria* (Mot.) Bystr.

Исследования заключаются в анализе материалов гербария, который находится на кафедре систематики и географии растений университета Марии Кюри-Склодовской в Люблине. Особенно внимательно анализировали номенклатурные типы отдельных видов.

Из исследований следует, что виды рода *Alectoria* до этого времени имели очень мало общих черт. Зато отличались очень выразительно многими чертами, особенно строением плодового тела, спорами, анатомическим строением и морфологией талломов, а также химическими свойствами.

Для более простого определения причастности отдельных видов к соответствующим родам в работе дается ключ для определения этих родов.

Разработана также схема системы в пределе рода *Bryopogon*.

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