

Toward a Panarctic Species List

A. Breen⁽¹⁾, M.K. Raynolds ⁽¹⁾, D.A. Walker ⁽¹⁾ & S.M. Hennekens⁽²⁾

(1) Alaska Geobotany Center & Institute of Arctic Biology, University of Alaska, Fairbanks, Alaska, USA

(2) Alterra, Green World Research, Wageningen, The Netherlands



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Overview of presentation

- History
- Why is a panarctic species list needed?
- Required data & format
- Species lists
 - Vascular plants
 - Lichens
 - Mosses
 - Liverworts
- Next steps



1992 Boulder, Colorado Workshop

'Boulder Resolution' signed by 44 attendees
9 March 1992

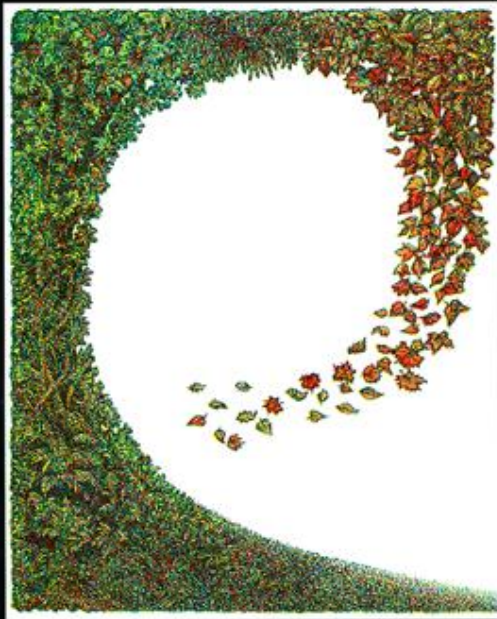
"...Be it resolved that the international community of arctic vegetation scientists undertakes the joint tasks of:

1) Creating a database of type releve data, using the Panarctic Flora as a common taxonomic base..."



1992 Boulder, Colorado Workshop

Special features in vegetation science 7



Circumpolar arctic vegetation

M.D. Walker, F.J.A. Daniëls & E. van der Maarel (eds.)

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Floristics, systematics, and the study of arctic vegetation - a commentary

Murray, David F.

Herbarium of the University of Alaska Museum, University of Alaska Fairbanks, Fairbanks AK 99775-6960 USA;
Fax +1 907 474 5469; E-mail FDFDM@AURORA.ALASKA.EDU

Abstract. Some remarks are made on the special problem encountered in arctic plant geography and vegetation studies, viz. the circumpolar distribution of many taxa, which may have been described independently in different countries. 80 % of the arctic bryophytes, 70 % of the lichens and 50 % of the vascular plants have a circumpolar distribution and especially amongst the vascular plants there are several cases of confusion. Special attention is paid to *Dupontia fisheri* s.l., *Carex aquatilis* s.l. and *C. bigelowii* s.l. Especially for a classification of vegetation based on floristic data, having a list of accepted plant names and knowing their synonyms is of paramount importance. An electronic database for arctic vegetation will foster, if not require, more unified approaches to the description of plant communities.

Keywords: *Carex*; Circumpolar distribution; Data base; Synonymy; Taxonomy; Vicariant.

Introduction

The potential for climate change in the Arctic is well recognized (Schlesinger & Mitchell 1987), and we need arctic data to assess the quality of baseline data for the vegetation by which to predict how plant communities will respond. A fundamental problem is how to relate detailed, local studies to each other and to regional generalizations of vegetation; that is, how to know the geographic limits to which any set of plot-scale, site-specific data are valid. To deal with this problem, we must synthesize and compare data on plant communities from throughout the Arctic; this presumes some system to organize the information at different levels of generalization.

Vegetation can be classified hierarchically from plot to region, and in such a (syntaxonomic) system we not only relate the units of vegetation to one another both within any one level and between levels of the classification but also from place to place. Floristic data provide the continuous thread among units of vegetation, hierarchically and geographically. Obviously, this means we must have detailed and accurate floristic characterizations of the vegetation. The quality of our syntheses

rests largely upon the accurate application of plant names.

To a remarkable extent students of arctic vegetation are united by a common flora, for an estimated 80 % of the bryophytes (Steere 1978), 70 % of the lichens (Thomson 1972), and 50 % of the vascular plants (Porsild 1958) have circumpolar distributions. Unfortunately, too many North American studies are based solely upon a knowledge of vascular plants, in a region where cryptogams are not only floristically diverse, but also very important to the structure of the vegetation. Thomson (1985, p. 2) has written that "It is really appalling to find so many arctic vegetational studies grossly considering 'lichens' and 'mosses' as if these were all alike with no species differences." A commitment to a unified floristic classification will mean attaining a better balance among the plant groups. This can be accomplished easily enough, if we form teams of botanists from the international pool of specialists in cryptogamic plants as well as the phanerogams.

Accepted names and synonymy

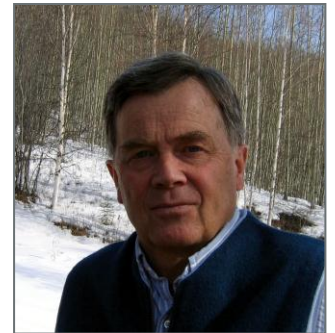
Inasmuch as scientific names are the points of reference one uses to locate information about species of plants in manual or electronic data bases, careful attention must be paid to the taxonomies followed and names used. The first priority of the Panarctic Flora Project (Murray & Yurtsev 1990) are annotated checklists for lichens, bryophytes, and vascular plants which the Circumpolar Arctic Vegetation Project will find very useful, if not essential. These checklists will provide summary statements of habitat and distribution, but most importantly the cross references to common nomenclatural and taxonomic synonyms. Thus we can recognize the correct relationships in the vegetation database of work involving the same taxa, but which appeared originally under different names. Without this understanding, the use of different names for the same taxon means the same vegetation type could be treated as dissimilar in the classification.

The name or combination of names one uses is a



Why is a panarctic species list needed?

"80% of the arctic bryophytes, 70% of the lichens and 50% of the vascular plants have a circumpolar distribution and especially amongst the vascular plants there are several cases of confusion."



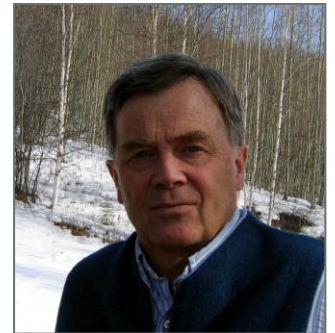
D.F. Murray



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"For various philosophical or historical reasons, the same taxon has been given different names or they appear at different ranks in different parts of the Arctic."



D.F. Murray

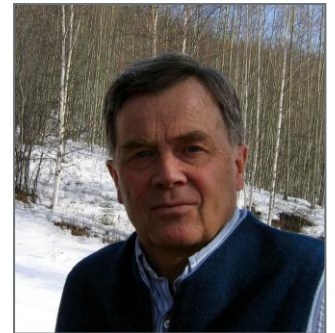


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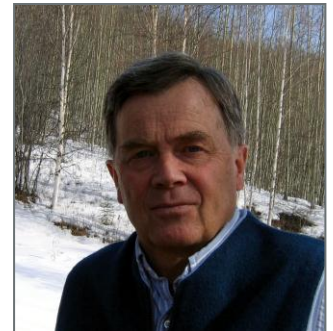
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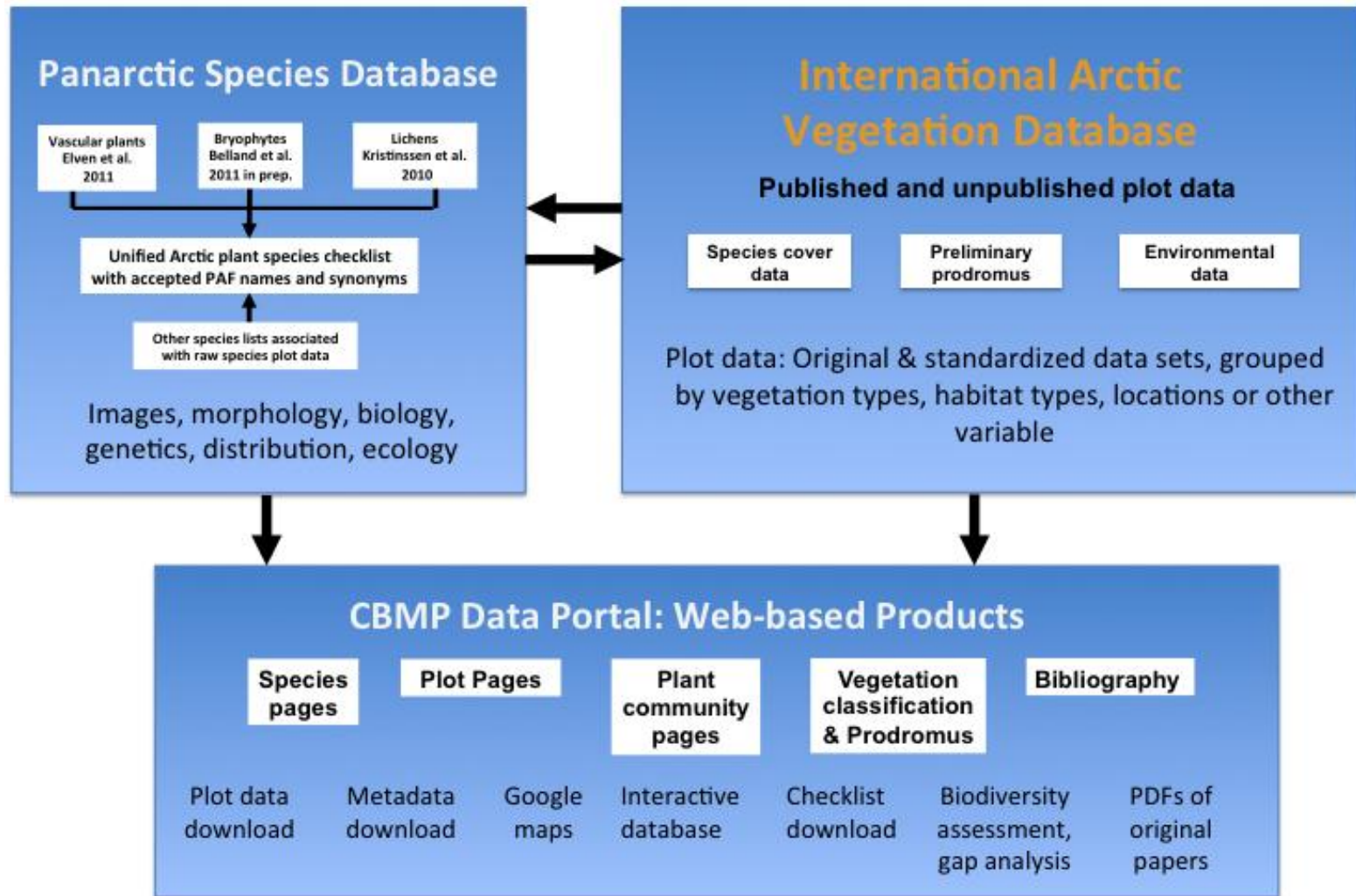
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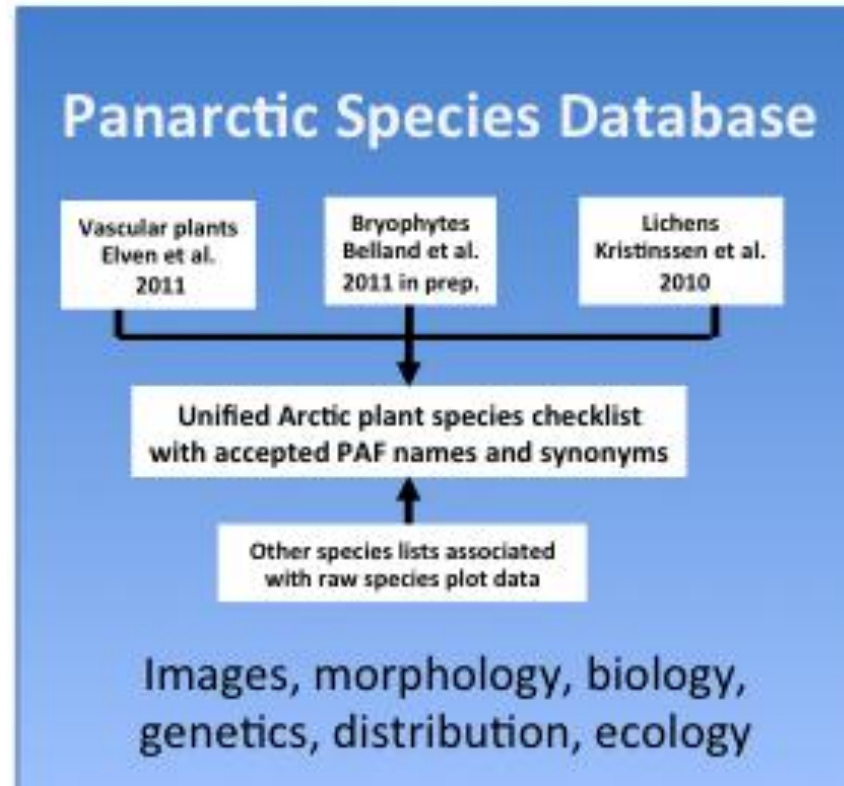
D.F. Murray



IAVD Conceptual Framework



IAVD Conceptual Framework



Required data & format

- ✓ Accepted taxa and synonyms
- ✓ Species authorities
- ✓ Genera
- ✓ Genus synonyms
- ✓ Genus authorities
- ✓ Families



Required data & format

			Sh
	A	B	C
1	Taxon	Authority	Synonym
2	Albiolopsis parvifolia	(Steph.) R.M.Schust.	
3	Anastrepta orcadensis	(Hook.) Schiffn.	
4	Anastrophylum assimile	(Mitt.) Steph.	
5	Anastrophylum michauxii	(F.Weber) H.Buch	
6	Jungermannia fertilis	Lindb.	S
7	Sphenolobus michauxii	(F.Weber) Steph.	S
8	Anastrophylum sphenoloboides	R.M.Schust.	
9	Aneura maxima	(Schiffn.) Steph.	
10	Aneura mirabilis	(Malmb.) Wickett & Goffinet	
11	Cryptothallus mirabilis	Malmb.	S
12	Aneura pinguis	(L.) Dumort.	
13	Riccardia pinguis	(L.) Gray	S
14	Anthelia julacea	(L.) Dumort.	
15	Jungermannia julacea	L.	S
16	Anthelia juratzkana	(Limpr.) Trevis.	
17	Anthelia julacea var. gracilis	(Hook.) Nees	S
18	Anthelia julacea subsp. juratzkana	(Limpr.) Meyl.	S
19	Anthelia nivalis	(Sw.) Lindb.	S
20	Jungermannia juratzkana	Limpr.	S
21	Apomarsupella revoluta	(Nees) R.M.Schust.	
22	Marsupella revoluta	(Nees) Dumort.	S
23	Apometzgeria pubescens	(Schränk.) Kuwah.	
24	Metzgeria pubescens	(Schränk.) Raddi	S
25	Apotreubia hortoniae	R.M.Schust. & Konstant.	
26	Arnellia fennica	(Gottsche) Lindb.	
27	Asterella gracilis	(F.Weber) Underw.	
28	Asterella ludwigii	auct. non (Schwägr.) A.Evans	S
29	Asterella pilosa	(Wahlenb.) Trevis.	S
30	Fimbriaria ludwigii	auct.	S
31	Fimbriaria pilosa	(Wahlenb.) Taylor	S
32	Asterella leptophylla	(Mont.) Grolle	
33	Asterella pusilla	Shimizu & S.Hatt.	S
34	Asterella sanoana	Shimizu & S.Hatt.	S
35	Asterella umbelliformis	Shimizu & S.Hatt.	S
36	Asterella lindenbergiana	(Corda ex Nees) Arnell	
37	Fimbriaria lindenbergiana	Corda ex Nees	S
38	Asterella saccata	(Wahlenb.) A.Evans	
39	Asterella fragrans	Trevis.	S
40	Fimbriaria fragrans auct.	(Schleich.) Nees	S
41	Fimbriaria saccata		S
42	Athalamia hyalina	(Sommerf.) S.Hatt.	
43	Clevea hyalina	(Sommerf.) Lindb.	S
44	Clevea suecica	(Lindb.) Lindb.	S
45	Athalamia nana	(Shimizu & S.Hatt.) S.Hatt.	
46	Athalamia glauco-virens	Shimizu & S.Hatt.	S
47		(Lindenb.) S.Hatt.	
Taxon			Genus Family +



Required data & format

				S				
<>	A	B	C		<>	A	B	C
1	Taxon	Authority	Synonym		1	Genus	Authority	Synonym
2	<i>Albiellopsis parvifolia</i>	(Steph.) R.M.Schust.			2	<i>Albiellopsis</i>	R.M.Schust.	
3	<i>Anastrepta orcadensis</i>	(Hook.) Schiffn.			3	<i>Anastrepta</i>	(Lindb.) Schiffn.	
4	<i>Anastrophyllum assimile</i>	(Mitt.) Steph.			4	<i>Anastrophyllum</i>	(Spruce) Steph.	
5	<i>Anastrophyllum michauxii</i>	(F.Weber) H.Buch			5	<i>Aneura</i>	Dumort.	
6	<i>Jungermannia fertilis</i>	Lindb.	S		6	<i>Anthelia</i>	(Dumort.) Dumort.	
7	<i>Sphenobolus michauxii</i>	(F.Weber) Steph.	S		7	<i>Apomarsupella</i>	R.M.Schust.	
8	<i>Anastrophyllum sphenoloboides</i>	R.M.Schust.			8	<i>Apometzeria</i>	Kuwah.	
9	<i>Aneura maxima</i>	(Schiffn.) Steph.			9	<i>Apotreubia</i>	S.Hatt. & Mizut.	
10	<i>Aneura mirabilis</i>	(Malmb.) Wickett & Goffinet			10	<i>Arnellia</i>	Lindb.	
11	<i>Cryptothallus mirabilis</i>	Malmb.	S		11	<i>Asterella</i>	P.Beauv.	
12	<i>Aneura pinguis</i>	(L.) Dumort.			12	<i>Athalamia</i>	Falconer	
13	<i>Riccardia pinguis</i>	(L.) Gray	S		13	<i>Barbilophozia</i>	Loeske	
14	<i>Anthelia julacea</i>	(L.) Dumort.			14	<i>Bazzania</i>	Gray	
15	<i>Jungermannia julacea</i>	L.	S		15	<i>Biantheridion</i>	(Grolle) Konstant. & Vilnet	
16	<i>Anthelia juratzkana</i>	(Limpr.) Trevis.			16	<i>Blasia</i>	L.	
17	<i>Anthelia julacea</i> var. <i>gracilis</i>	(Hook.) Nees	S		17	<i>Blepharostoma</i>	(Dumort.) Dumort.	
18	<i>Anthelia julacea</i> subsp. <i>juratzkana</i>	(Limpr.) Meyl.	S		18	<i>Bucegia</i>	Radian	
19	<i>Anthelia nivalis</i>	(Sw.) Lindb.	S		19	<i>Calycularia</i>	Mitt.	
20	<i>Jungermannia juratzkana</i>	Limpr.	S		20	<i>Calypogeia</i>	Raddi	
21	<i>Apomarsupella revoluta</i>	(Nees) R.M.Schust.			21	<i>Kantius</i>		S
22	<i>Marsupella revoluta</i>	(Nees) Dumort.	S		22	<i>Cephalozia</i>	(Dumort.) Dumort.	
23	<i>Apometzeria pubescens</i>	(Schrunk) Kuwah.			23	<i>Cephaloziella</i>	(Spruce) Schiffn.	
24	<i>Metzgeria pubescens</i>	(Schrunk) Raddi	S		24	<i>Cheilolejeunea</i>	(Spruce) Schiffn.	
25	<i>Apotreubia hortoniae</i>	R.M.Schust. & Konstant.			25	<i>Chiloscyphus</i>	Corda	
26	<i>Arnellia fennica</i>	(Gottsche) Lindb.			26	<i>Chonecolea</i>	Grolle	
27	<i>Asterella gracilis</i>	(F.Weber) Underw.			27	<i>Cladopodiella</i>	H.Buch	
28	<i>Asterella ludwigii</i>	auct. non (Schwagr.) A.Evans	S		28	<i>Cololejeunea</i>	(Spruce) Schiffn.	
29	<i>Asterella pilosa</i>	(Wahlenb.) Trevis.	S		29	<i>Conocephalum</i>	Hill	
30	<i>Fimbriaria ludwigii</i>	auct.	S		30	<i>Hepatica</i>		S
31	<i>Fimbriaria pilosa</i>	(Wahlenb.) Taylor	S		31	<i>Crossocalyx</i>	Meyl.	
32	<i>Asterella leptophylla</i>	(Mont.) Grolle			32	<i>Crossogyna</i>	(R.M.Schust.) Schljakov	
33	<i>Asterella pusilla</i>	Shimizu & S.Hatt.	S		33	<i>Cryptocolea</i>	R.M.Schust.	
34	<i>Asterella sanoana</i>	Shimizu & S.Hatt.	S		34	<i>Cryptocoleopsis</i>	Amakawa	
35	<i>Asterella umbelliformis</i>	Shimizu & S.Hatt.	S		35	<i>Dichiton</i>	Mont.	
36	<i>Asterella lindenbergiana</i>	(Corda ex Nees) Arnell			36	<i>Diplophyllum</i>	(Dumort.) Dumort.	
37	<i>Fimbriaria lindenbergiana</i>	Corda ex Nees	S		37	<i>Eocalypogeia</i>	(R.M.Schust.) R.M.Schust.	
38	<i>Asterella saccata</i>	(Wahlenb.) A.Evans			38	<i>Eremonotus</i>	Lindb. & Kaal. ex Pearson	
39	<i>Asterella fragrans</i>	Trevis.	S		39	<i>Fossombronina</i>	Raddi	
40	<i>Fimbriaria fragrans</i> auct.	(Schleich.) Nees	S		40	<i>Frullania</i>	Raddi	
41	<i>Fimbriaria saccata</i>		S		41	<i>Geocalyx</i>	Nees	
42	<i>Athalamia hyalina</i>	(Sommerf.) S.Hatt.			42	<i>Gymnocolea</i>	(Dumort.) Dumort.	
43	<i>Clevea hyalina</i>	(Sommerf.) Lindb.	S		43	<i>Gymnomitrium</i>	Corda	
44	<i>Clevea suecica</i>	(Lindb.) Lindb.	S		44	<i>Cesius</i>		S
45	<i>Athalamia nana</i>	(Shimizu & S.Hatt.) S.Hatt.			45	<i>Haplomitrium</i>	Nees	
46	<i>Athalamia glauco-virens</i>	Shimizu & S.Hatt.	S		46	<i>Harpanthus</i>	Nees	
47		(Lindenb.) S.Hatt.			47		R.M.Schust. & Inoue	

Taxon

Genus





UNIVERSITY OF
ALASKA
FAIRBANKS

Panarctic species lists

Vascular Plants: The Panarctic Flora (Elven *et al.* 2011; 2770 species)

- ✓ Accepted taxa and synonyms
- ✓ Species authorities
- ✓ Genera
- ✓ Genus synonyms
- ✓ Genus authorities
- ✓ Families



Annotated Checklist of the Panarctic Flora (PAF) Vascular plants

Editor-in-Chief

Reidar Elven
Natural History Museum,
University of Oslo

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Panarctic species lists

Vascular Plants: The Panarctic Flora (Elven *et al.* 2011; 2770 species)

01 Lycopodiaceae

Huperziaceae.

0101 Lycopodium L.

010101 Lycopodium annotinum L.

010101a Lycopodium annotinum subsp. annotinum

010101b Lycopodium annotinum subsp. alpestre (Hartm.) Á. Löve & D. Löve

Lycopodium annotinum var. *alpestre* Hartm.

Lycopodium annotinum var. *pungens* Desv. ex Spring

Lycopodium annotinum subsp. *pungens* (Desv. ex Spring) Hultén

010102 Lycopodium clavatum L.

010102a Lycopodium clavatum subsp. clavatum

010102b Lycopodium clavatum subsp. monostachyon (Grev. & Hook.) Selander

Lycopodium clavatum var. *monostachyon* Grev. & Hook.

Lycopodium clavatum var. *lagopus* Laest. ex C. Hartm.

Lycopodium lagopus (Laest. ex C. Hartm.) G. Zinserl. ex Kuzen.

010103 Lycopodium dendroideum Michx.

Lycopodium obscurum var. *dendroideum* (Michx.) D.C. Eaton



Panarctic species lists

Lichens: CAFF Arctic Checklist (Kristinsson *et al.* 2011; 1699 species)

- ✓ Accepted taxa and synonyms
- ✓ Species authorities
- ✓ Genera
 - Genus synonyms
- ✓ Genus authorities
 - Families



Panarctic species lists

Mosses: CAFF Arctic Checklist (Belland *et al.* 2012; 825 species)

- ✓ Accepted taxa and synonyms

 - Species authorities

- ✓ Genera

 - Genus synonyms

 - Genus authorities

 - Families



Panarctic species lists

Liverworts: Russian Checklist for the Arctic Floristic Region (Konstantinova & Bakalin 2009)

- ✓ Accepted taxa and synonyms
- ✓ Species authorities
- ✓ Genera
- ✓ Genus synonyms
- ✓ Genus authorities
- ✓ Families

Arctoa (2009) 18: 1-64

CHECKLIST OF LIVERWORTS (MARCHANTIOPHYTA) OF RUSSIA СПИСОК ПЕЧЕНОЧНИКОВ (MARCHANTIOPHYTA) РОССИИ

N.A. KONSTANTINOVA¹ & V.A. BAKALIN²

With contributions on regional floras from

E.N. ANDREJEVA³, A.G. BEZGODOV⁴, E.A. BOROVICHEV¹,
M.V. DULIN⁵, YU.S. MAMONTOV⁶

Н.А. КОНСТАНТИНОВА¹, В.А. БАКАЛИН²

С дополнениями по флорам отдельных регионов следующих авторов:

Е.Н. АНДРЕЕВА³, А.Г. БЕЗГODOV⁴, Е.А. БОРОВИЧЕВ¹,
М.В. ДУЛИН⁵, Ю.С. МАМОНТОВ⁶



Next steps

- Assure checklists are the best available
- If possible, add missing data for moss & lichen checklists
- Assess quality of checklists using the Taxonomic Name Resolution Service
- Construct Access database with separate tables for each plant group and their taxa, genera & families
- Import species list into Turboveg
- Maintain and update lists as new versions become available



Questions for discussion

- Who is in charge of the individual species lists and making sure they are maintained? CAFF Flora Group?
- What will the final species database look like, who will host it and how will updates be made?
- Are we on the right track regarding coordination with global data portals (e.g. CBMP, GBIF)?
- Are there other unresolved issues related to the panarctic species lists?

