FOLIA CRYPTOGAMICA ESTONICA

Societas Investigatorum Rerum Naturae
Academiae Scientiarum Estoniae

Fasc. 29 **Tartu 1992**

FOLIA

CRYPTOGAMICA ESTONICA

Editio Societatis Investigatorum Rerum Naturae Academiae Scientiarum Estoniae. Cons. ed.: H. Trass (lichenologia et ed. princ.), E. Kukk (algologia), K. Kalamees (mycologia), M. Leis (bryologia). Struve 2 EE2400 Tartu Respublica Estonia.
Cover design by S.& U. Kõljalg

CONTENTS

Folia Cryptog. Eston. Fasc. 29 p. 1 - 41 Tartu, 1992

SYNOPSIS OF THE LICHEN GENUS HETERODERMIA (ASCOMYCOTINA, PHYSCIACEAE SIVE PYXINACEAE)

HANS TRASS

Department of Botany & Ecology, Tartu University Lai 40 Tartu EE2400 Estonia.

Abstract. A list of the World Heterodermia's is presented containing 81 species. 13 new combinations are made on the species level - H. allardii (Kurok.) Trass, H. cubensis (Kurok.) Trass, H. fragilissima (Kurok.) Trass, H. lamelligera (Tayl.) Trass, H. multiciliata (Kurok.) Trass, H. obesa (Pers.) Trass, H. palpebrata (Tayl.) Trass, H. pandurata (Kurok.) Trass, H. rugulosa (Kurok.) Trass, H. spinulosa (Kurok.) Trass, H. subascescens (Asah.) Trass, H. subcomosa (Nyl.) Trass, H. trichophora (Kurok.) Trass. 9 species described as Anaptychia are transferred into genus Heterodermia without official new combinations, because the author has not seen authentic materials and his suggestions are based only on descriptions made by authors of these species and other taxonomists - H. arsenei (Kurok.), H. cyathiformis (Kurok.), H. fauriei (Kurok.), H. pacifica (Kurok.), H. peruviana (Kashiw. & Kurok.), H. polyrhiza (Kurok.), H. spinigera (Kurok.), H. trichophoroides (Kurok.), H. tropica (Kurok.) (all nom. provis). One new name - H. kurokawae Trass is proposed to replace Anaptychia albicans Kurok., non Heterodermia albicans (Pers.) Swinscow & Krog. H. intermedia Trass is a new species from Russian Far East (see Appendix).

INTRODUCTION

In the course of my work with Heterodermia's of Russia (Trass, 1993) as if spontaneously a synopsis of those known up to 1990 Heterodermia species was completed. Eighty one species are included into the list. Not all of these species are well-founded sufficiently. For example, H. awasthii (Kurok.) Awasthi, H. himalayensis (Awasthi) Awasthi and H. indica (H. Magn.) Awasthi are based only on single and not taxonomically well estimated character (J + vfiolet reaction of cortex of the apothecial receptacle). These and some other species need in futher studies. Due to incomplete descriptions some species recently described are omitted, for example, Anaptychia (Heterodermia) szechuensis Zhao, Xu & Sun, A. (H.) yunnanensis of same authors (descriptions are without data on chemical substances, under side character, sporoblastidiae, etc.)

From 81 species I have personally seen and checked 61, not seen 20 - H. albiflava (Kurok.) Awasthi, H. arsenei (Kurok.) nom. provis., H. awasthii (Kurok.) Awasthi, H. chondroidea W.Weber & Awasthi, H. congoensis (Kurok.) Swinscow & Krog, H. coronata (Kurok.) Awasthi, H. crocea R. C. Harris, H. cyathiformis (Kurok.) nom. provis., H. fauriei (Kurok.) nom. provis., H. flavosquamosa Aptroot & Sipman, H. pacifica (Kurok.) nom. provis., H. papuana Aptroot & Sipman, H. peruviana (Kashiv. & Kurok.) nom. provis., H. polyrhiza (Kurok.) nom. provis, H.

punctifera (Kurok.) Awasthi, H. rubescens (Rms.) Awasthi, H. spinigera (Kurok.) nom. provis., H. translucens (Kurok.) D. Hawksw., H. trichophoroides (Kurok.) nom. provis., H. tropica (Kurok.) nom. provis. To our luck majority of Heterodermia species have so exhaustive descriptions in literature (Aptroot, 1987; Aptroot, Sipman, 1991; Awasthi, 1960, 1973, 1988; Culberson, 1966; Kashidawadani, Kurokawa, Murakami, 1990; Kurokawa, 1962, 1973, Scutari, 1990; Swinscow, Krog, 1976, 1988), that understanding of their specifity is possible in most cases.

Acknowledgements. My sincere thanks are expressed to Dr. R. Moberg (Uppsala), Dr. T. Ahti (Helsinki), Dr. N. Golubkova (Sankt-Peterburg), Dr. T. Randlane and Mr. A. Saag (Tartu) for valuable suggestions and kind help in the course of the work with herbarium materials.

SYNOPSIS

In the table 1 a survey of genus Heterodermia species according to the contemporary knowledges on systematics and taxonomy of this genus is presented.

Great part of included species are studied by the author in various herbaria (TU, LE, KW, MSK, VL, ERE, BAK, TB, H, TUR, UPS, S, LD, STU, ROST, HAL). Particulary valuable are exsiccata with Anaptychia and Heterodermia species (S. Kurokawa, Lich. rar. et crit. exs., Lich. exs. distr. by the Univ. of Colorado Museum, M. Hale, Lich. Am. exs., A. Vezda, Lich. sel. exs., K. Kalb, Lich. Neotrop., and many others). Main synonyms are presented after table 1.

For the characterization of species in the table only such characters are presented, which are most constant, repeated in descriptions of various papers and are, in the author's opinion, sufficient to recognize the species.

Characters used in table 1:

1 "Growth form" of species and width of lobes (mm);
- I speciosa-form: thallus foliose, lobes adjacent, usually short, not linear-elongate, attached to the substrate, not ascending, not erect;
- II leucomela-form: thallus loosely attached to the substrate, lobes linear-elongate, ribbon-like, disjunct, not or only slightly ascending towards apices, tangled, "flutty", irregular;
- III podocarpa-form: thallus microfruticose, lobes erect or dictinctly ascending, convex.

2 Soralia (SO), isidia (IS) and squamules (SQ):
- apm - on apothecial margin;
- ca - capitate;
- dis - dissected;
- la - laminal;
- lb - labriform;
- ma - marginal;
- us - on under side of lobes margins.

3 Rhizines:
- b - black
- g - grey
- w - white

4 Cilia: if present -
- apm - on apothecial margin;
- la - laminal on thallus;
- ma - marginal.

5 Upper cortex:
- r - rough, uneven;
- s - smooth, even.

6 Under (lower) side cortex, present (+) or absent, If absent under side
- a - arachnoid;
- s - smooth.

7 Pigments on under side or in medulla (med): if present
- b - brownish;
- p - pink;
- r - red or orange;
- y - yellow.

8 Substances:
- S - salazinic acid;
- N - norstictic acid;
- D - dissectic acid.

Note. In many species unidentified substances were discovered by TLC methods, they are characterized in descriptions of species, found in Russia and adjacent territories (Trass, 1993, in print).

9 Apothecia:
Frequency -
- c - common;
- o - occasionally;
- r - rare;
- un - unknown.

Location -
- ap - apical or subcapital;
- la - laminal;
- ma - marginal.

10 Spore size (µm).

11 Sporoblastidia: present (+) or absent (-).

12 Distribution (no strict administrative principle has been used, the names of territories are given so, as they are used in literature sources):

AFR	-	Africa	MA	-	Malaya
AMC	-	Central America	ME	-	Mexico
AMN	-	North America	MG	-	Madagaskar
AMS	-	South America	MI	-	Micronesia
AN	-	Angola	MO	-	Mongolia
AR	-	Argentina	NE	-	Nepal
AZ	-	Azores	NG	-	New Guinea
AUS	-	Australia	NZ	-	New Zealand
BO	-	Bolivia	PA	-	Panama
BR	-	Brazil	PE	-	Peru
BU	-	Burma	PH	-	Philippines
CA	-	Canary Islands	PR	-	Paraguay
CH	-	China	RU	-	Russia
CI	-	Chile	SEA	-	South-East Asia
CL	-	Colombia	SF	-	South Africa
CO	-	Corea	SI	-	Sikkim
CR	-	Costa Rica	SL	-	Sri Lanka
CU	-	Cuba	TA	-	Taiwan
EQ	-	Equador	TH	-	Thailand
ET	-	Ethiopia	TZ	-	Tanzania
EUR	-	Europe	UG	-	Uganda
GA	-	Guatemala	UR	-	Uruguay
GU	-	Guyana	VE	-	Venezuela
HA	-	Hawai	WI	-	West Indies
ID	-	Indonesia			
IN	-	India			
JA	-	Japan			
JM	-	Jamaica			
JW	-	Jawa			
KE	-	Kenia			

13 Notes:

H - holotype or isotype seen

A - authoritative and competent identification seen and checked

L - known only on base of full descriptions in literatute, no herbarium materials seen.

Character in brackets indicate, that it occurs not always (facultative character).

Table 1. Main characters of species' of the genus HETERODERMIA

Characters / Species'	Growth form width of lobes	Soralia isidia squamules	Rhizines	Cilia	Upper cortex	Lower cortex	Pigments	Substances	Apothecia	Spore size	Sporoblastidia	Distribution	Notes
	1	2	3	4	5	6	7	8	9	10	11	12	13
H. albicans (Pers.) Swinscow & Krog	I 0.5-2	SO, ma	g	-	s	+	-	S	e,la	24-35 x 11-15	-	AMC(?), AMN, AMS (PE), WI, IN, AFR (ET, KE, SF), EUR (CA)	H
H. albiflava (Kurok.) Awasthi	I 1-2	-	g	-	s	+	y (med.)	D	o,la	25-33 x 12-13		IN, CA	L
H. allardii (Kurok.) Trass comb. nov. Basion.: Anaptychia allardii Kurok., Beih. Nova Hedwigia 6:98. 1962	III 1.5-2.5	SO, us, ca	w	-	s	a	-	S,N	un	un	un	AMC(PA), AMS (BO), WI(CU), AFR(SF)	A
H. angustiloba (Müll. Arg.) Awasthi	I 0.5-1	-	g	-	s	+	-	S,N, D	e,la	25-30 x 13-15	-	JA, TA, CH, NE, IN	A
H. antillarum (Vain.) Swinscow & Krog	I 0.5-2	IS, la, ma	g	-	r	a	-	S	r,la	25-30 x 12-18	-	ME, WI, AFR(SF)	H

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.appalachensis (Kurok.) W.Culb.	II 0.5-2	SO, lb	g	-	r	a	y,r	-	un	un	un	AMN	A
H.appendiculata (Kurok.) Swinscow & Krog	I 1-2.5	SO, ma, la, dis	g(b)	-	s	a	-	(N)	o,la	37-40 x 16-18	+	AUS, NZ, AFR	H
H.arsenei (Kurok.) Anaptychia arsenei Kurok., Beih. Nova Hedwigia 6:89. 1962	III 1-2	-	g	-	r	a	-	S	c,ma	30-36 x 16-19	+	ME	L
H.awasthii (Kurok.) Awasthi	III 1-3	-	g	-	r	a	-	S,N	o,ma, cortex of receptacle J + blue	38-47 x 18-21	+	IN, BU, NE	L
H.barbifera (Nyl.) K.P.Singh	III 1-4 (6)	-	g, forming mat along the margins of lobes	-	r, verrucae with blackish tips	s	-	S,N	o,ma	43-49 x 18-20	+	AMN, AMC(CR), AMS(BO), ME, MA, JA, NG	H

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.beryi (Fée) K.P.Singh & S.R.Singh	II 0.2-1, apices cirsinately revolute	(SO, us)	b	-	r	a	-	-	c,ap	36-54 x 20-25	-	JA,CH,RU,NE, AFR(ET,KE,TZ, UG)	A
H.casarettiana (Massal.) Trevis.	I 0.5-3	SO, lb	b	-	e	s	y	(S,N)	c,la	32-48 x 18-25	+	AMC(CR,PA), AMS(CL,VE,PE, HR,BO,PR),ME, AMN,WI,SEA, AFR(UG),RU	H
H.chilensis (Kurok.) Swinscow & Krog	I 0.8-1.5, lobes with thick cortical border	SO, lb	b(g)	-	r	a	-	-	o,la	28-39 x 18-22	(+)	AUS,AMS(CI), AFR(KE)	H
H.chondroidea W.Weber & Awasthi	I 0.5-0.8 convex	-	b	-	s, hyaline, chondroid, vitreous	+	-	-	c,la	14-18 (23) x 6-8 (11)	-	AMN	L

	1	2	3	4	5	6	7	8	9	10	11	12	13
H. comosa (Eschw.) Follm. & Rédon	III 1-4 (10), lobes paddle-shaped	SO, us	g	la, ma	r	a, vein-like ridges	y (K+)	-	c, ma	30-35 x 13-16	+	AMS(CL,VE,PE, BR,BO,PR,AR, GU),AMC(GA),ME, AMN,AFR(ET, KE,TZ,UG),CH, IN,NE,NG,SEA	A
H. congoensis (Kurok.) Swinscow & Krog	III 0.5-1.5	SQ, like lateral lobules, tips sometimes sorediate	g	-	r	a	-	-	o,la	36-43 x 17-20	+	AFR(AN,UG, Central, southern, western AFR)	L
H. corallophora (Tayl.) Skorepa	I 1-2	IS, la	b	-	s	a	y	-	r,la	33-46 x 16-20	+	AMS(CL,PE,BR, PR),AMC(CR), ME,AMN,IN,NE, WI,RU	A
H. coromata (Kurok.) Ayasthi	I 0.7-2	SQ, apm	g	-	s	a	-	S	o,la	33-40 x 17-18	+	IN,NE,ID	L
H. crocea R.C.Harris	I	IS	b	-	r	a	y,b	-	?	?	?	AMN,ME	L

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.cubensis (Kurok.) Trass comb. nov. Basion.: Anaptychia cubensis Kurok., Beih. Nova Hedwigia 6:104. 1962	III 1-2.5	-	g	la, ma	r	a	-	S,N	c,ap	33-42 x 16-20	+	AMC(GA),ME, AMS(PE,BR),WI	H
H.cyathiformis (Kurok.) Anaptychia cyathiformis Kurok.,Journ. Hattori Lab. 37:602. 1976	I 1-2.5	-	b	-	r	a	y,b	D	o,la	30-45 x 13-18	+	AFR(SF)	L
H.dactyliza (Nyl.) Swinscow & Krog	I 0.5-1.5	-	g	-	r	a, with thick cortical border	-	-	o,la, ma	33-40 x 15-20	+	AMS(BR,EQ), AFR(TZ)	H
H.dendritica (Pers.) Poelt	I 0.7-2	-	b	-	r	a	y	(S,N)	r,la	35-46 x 16-20	+	AMN,JA,TA,CH, RU,ID,PH,MI, TH,NG	H
H.diademata (Tayl.) Awasthi	I 0.5-2.5	(SQ, ma)	g	-	s	+	-	-	c,la	23-31 x 10-15	-	AMS(PE),ME, AMN,AFR(UG,KE, ET),ID,NE,SI, JA,CH,CO,RU	A
H.dissecta (Kurok.) Awasthi	I 0.7-	SQ, ma	g	-	s	a	-	S,N, D	r,la	28-32 x 12-17	+	ME,IN,NE,CH, JA,RU	A

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.echinata (Tayl.) W.Culb.	III 0.5-2	-	g	-	r	a, reticulately veined	-	-	c,ma	30-42 x 13-17	+	AMN,ME	A
H.erinacea (Ach.) W.Weber	III 0.5-2	-	g	la, ma (2-5 mm)	r	a	-	-	o,la	18-26 x 8-11	?	AMN,ME,CH	H
H.fauriei (Kurok.) Anaptychia fauriei Kurok., Beih. Nova Hedwigia 6:83. 1962	II 0.2-1.2	SO, us	b	-	r	a	y(K+ y),r (K+ violet)	-	un	un	un	HA,TH	L
H.firmula (Nyl.) Trevis.	I 0.3-1, margins with white lines of pseudocyphellae	(SQ, ma)	g	-	r	+	y (med)	-	o,la	20-27 x 10-11	-	IN,NE,CH,JA	A

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.flabellata (Fée) Awasthi	I 0.7-2.5	-	b	-	r	a	y,b	-	o,la	30-45 x 13-18	+	AMS(CL,VE,BR, AR),ME,AMC (CR),WI,JW, IN,NE,SL,CH, AFR(KE)	A
H.flavoequamosa Apt-root & Sipman	I 0.4-0.6	SQ, ma	b	ma, on squamules	?	a	y	-	o,la	25-30 x 10-15	+	AMS(GU)	L
H.fragilissima (Kurok.) Trass comb. nov. Basion.: Anaptychia fragilissima Kurok., Beih. Nova Hedwigia, 6:60. 1962	I 1-2.5	SQ, ma, dis	b	-	s	a	-	-	o,la	36-50 x 16-20	+	JA,CH	A
H.galactophylla (Tuck.) Trevis.	III 0.5-1.5 (base), 2-8 (tips)	SO, us	g	-	r	a	-	-	un	un	un	AMS(PE,CI), WI (CU),AMC(PA), AMN	H
H.granulifera (Ach.) W.Culb.	I 0.3-1	IS, la ma	g	-	s	+	-	S	r,la	20-23 x 10-13	+	AMN,ME,CH	H

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.himalayensis (Awasthi) Awasthi	III 1-2	-	g	-	r	a	-	S,N	c,ma, cortex of receptacle J+ violet	32-40 x 16-20	+	IN,NE	A
H.hypocaesia (Yasuda) Awasthi	I 1-3	SO, lb	b	-	r	a	y	S	r,la	35-46 x 16-18	+	AUS,IN,NE,SI, TH,PH,NG,JW, HA,AFR(SF),JA, TA,CH,RU	H
H.hypochraea (Vain.) Swinscow & Krog	III 0.5-2	-	g	-	r	a	y,b	-	c,ap	30-42 x 17-19	+	AMS(UR),AFR, (UG),JA,TA, CH,RU	H
H.hypoleuca (Ach.) Trevis.	I 0.5-2	(SQ, ma)	g	-	r	a	-	S,N	c,la	23-30 x 10-16	-	AMN,AFR(ET,KE, TZ,UG),IN,NE, JA,CH,CO,RU	A
H.incana (Stirt.) Awasthi	III 1-4	-	g	-	r	a, veined	-	-	c,ma	?		IN,NE,SL,TH, CH,TA	A
H.indica (H.Magn.) Awasthi	III 1-3	-	b	amp	r	a, veined	-	-	o,ma, cortex of receptacle J+ violet	39-44 x 23-26	+	IN,NE	A

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.intermedia Trass (see Appendix)	I 0.3-1	SO, lb	g	-	a	+	p	S	c,la	28-32 x 14-16	-	RU(Far East)	H
H.isidiophora (Vain.) Awasthi	I 0.5-2.5	IS, la, ma (SO, on tips of isidia)	g(b)	-	s	+	-	-	r,la	25-32 x 10-15	-	AUS, IN, NE, JA, AMS(CL), ME, AMN, CH, RU, AFR(ET, KE, TZ, UG)	H
H.japonica (Sato) Swinscow & Krog	I 0.7-2	SO, lb, apm; SQ, apm	b	-	r	a	-	S,N	r,la	30-46 x 15-20	+	AMN, NZ, IN, NE, MA, SL, ID, AFR (ET, KE, TZ, UG, SF), JA, CH, TA, RU, EUR(AZ, CA)	A
H.kurokawae Trass nom. nov. Anaptychia albicans Kurok., Beih. Nova Hedwigia 6:80. 1962, non Heterodermia albicans (Pers.) Swinscow & Krog. Named in honour of Dr. Syo Kurokawa	II 1-1.2	-	g, 2-6 mm	apm	r	a, with corticate margin	y (K-)	-	o,ac	35-42 x 15-22		AMS(PE)	A

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.lamelligera (Tayl.) Trass comb. nov. Basion.: Parmelia lamelligera Tayl., Lond. Journ. Bot. 6:169. 1847	I-II	SQ, apm	b	-	s	a	y	(N)	o,la	35-44 x 16-20	+	ME,JM	H
H.lepidota Swinscow & Krog	I ?	SQ, la, ma, apm, dis	b	-	s	+	-	-	c,la	24-33 x 12-17	-	AFR(ET,KE,UG)	A
H.leucomela (L.) Poelt	II 0.5-3	SO, us	b	-	r	a	y,b	(S)	r,la, ap	35-52 x 18-25	+	AMS(EQ,VE,BR, CL,CI,PE),AMC (GA,CR),ME, AMN,JM,HA,IN, PH,JW,JA,TA, CH,MO,AFR(ET, KE,TZ,UG),RU, EUR	A
H.loriformis (Kurok.) Swinscow & Krog	II 1-1.2	SQ, apm	g	la	r	a	r(K+ purple)	-	r,ma	un	un	AFR(KE,TZ)	A
H.lutescens (Kurok.) Follm.	II 0.5-1.5	SO, us	b	-	r	a, vesiculed	y,p (K+y)	-	r,ap	36-43 x 20-21	+	AMS(CL,VE,PE, BR,AR),AMC(GA, CR),ME,WI,IN, AFR(KE,TZ,UG), CH,TA,EUR(AZ)	A

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.magellanica (A.Zahlbr.) Swinscow & Krog	I 0.3-1	SQ, ma	g, tips b	-	r	a	-	(S,N)	o,la	35-45 x 15-25	+	AMS(CI),ME, AFR(ET,KE)	H
H.microphylla (Kurok.) Skorepa	I 0.7-2	SQ, ma, dis (IS, ma)	g	-	r	a	-	(S,N)	r,la	20-30 x 10-15	-	NZ,AMN,AFR(ET, KE),JA,CH,CO, RU	A
H.multiciliata (Kurok.) Trass comb. nov. Basion.: Anaptychia multiciliata Kurok., Beih. Nova Hedwigia 6:72. 1962	III 1-2	-	b	ma, apn	r	a, veined	-	-	o,la	32-40 x 17-20	+	AMS(CI)	H
H.obesa (Pers.) Trass comb. nov. Basion.: Parmelia obesa Pers. in Gaudich, Voy. Uran. Bot.: 207. 1826	I 2-5	-	g, tips b	-	r	a	y,r (K+ violet)	-	o,la	?	+	HA	H
H.obscurata (Nyl.) Trevis.	I 0.7-2	SO, lb, ca	b	-	r	a	y,b	-	r,la	29-35 x 15-19	+	AUS,NZ,AMS (PE,CI,BR),ME, HA,AMN,IN,NE, AFR(ET,KE,TZ, UG),JA,TA,CH, RU,EUR	H

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.pacifica (Kurok.) Anaptychia pacifica Kurok., Journ. Hattori Lab., 37:592. 1973	III 1-2.5	-	g	-	r	a	y	S,N	c,la	35-46 x 16-21	+	JA,TA	L
H.palpebrata (Tayl.) Trass comb. nov. Basion.: Parmelia palpebrata Tayl., Lond. Journ. Bot. 6:173. 1847	III 2-8, laminal verrucae	SQ, apm	g	on squmules of apothecial margin	r	a, veined	-	-	c,la	33-40 x 16-20	+	AMS(PE)	A
H.pandurata (Kurok.) Trass comb. nov. Basion.: Anaptychia pandurata Kurok., Beih. Nova Hedwigia, 6:95. 1962	III 0.5-2	-	g	-	r	a	y	D	c,ma	35-44 x 16-20	+	JA,TA,TH	A
H.papuana Aptroot & Sipman	II 0.4-1.0	-	-	ma,b	s	a	y,r	-	r,la K+ purple	35-45 x 19-26	+	NG	L
H.pellucida (Awasthi) Awasthi	III 2-5	-	g	e	r	a	e	-	o,la, ma	50-70 x 23-27	+	IN,NE,SL,SI, CH	A

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.peruviana (Kashiw. & Kurok.) Anaptychia peruviana Kashiw. & Kurok.,Bull. Natn. Sci. Mus.,Tokyo, Ser. B, 16 (4):154.1990	III 1-2.5	-	g	la, ma	r	a	y (K -)	N,S	c,ap	28-38 x 13-18	+	AMS(PE)	L
H.podocarpa (Bél.) Awasthi	III 0.3-3	-	g	-	r	a	-	(S,N)	c,ma, cortex of receptacle J -	36-51 x 17-23	+	AMS(PE, BR), AMC(GA, TA), AMN,IN,NE,HA, JW,JA,APR,ET, KE,TZ,UG),CH, TA,RU	A
H.polyrhiza (Kurok.) Anaptychia polyrhiza Kurok.,Beih. Nova Hedwigia 6:32. 1962	I 0.7-3	-	b	-	s	+, blackish	-	-	c,la	26-30 x 8-10	-	ME	L
H.propagulifera (Vain.) Day	I 1-2	SO, lb, ma	b	-	r	a	y	S,N	un	un	un	AMS(VE),AMN, NE,HA,JW,JA, CH,RU,EUR	H
H.pseudospeciosa (Kurok.) W.Culb.	I 0.7-1.5	SO, lb, granulose	g	-	r	+	y	(S,N)	r,la	25-35 x 12-16	-	AUS,AMS(BR), ME,AMN,IN,NE, HA,APR(KE),JA, TA,MO.CH	A

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.punctifera (Kurok.) Awasthi	I 0.3-0.8	-	g(b)	-	r	a	-	S,N	c,la, white dots on margins	23-28 x 10-12	-	IN,NE	L
H.rubescens (Räs.) Awasthi	I ?	-	g	-	r	+	-	S,N	c,la	23-30 x 11-14	-	IN,NE,CH,SI	L
H.rugulosa (Kurok.) Trass comb. nov. Basion.: Anaptychia rugulosa, Kurok., Beih. Nova Hedwigia 6:41. 1962	I 0.7-2	-	g	-	r	+	y	-	c,la	20-28 x 11-13	+	ME,AMN	A
H.sitchensis Goward & Noble	III 0.5-2	SO, in urn-like outgrowths	b	-	r	a	-	-	?	?	?	AMN	A
H.speciosa (Wulf.) Trevis.	I 0.5-1.5	SO, lb, ca	g	-	r	+	-	-	r,la	30-37 x 12-18	+	IN,AFR(ET,KE, TZ,UG),AMN,JA, CH,MO,RU,EUR	A
H.spinigera (Kurok.) Anaptychia spinigera Kurok., Beih. Nova Hedwigia 6:66. 1962	I 0.7-1.2	-	g	spinula, la, apm	r	a	-	-	c,la	33-39 x 16-19	-	AMS(PE)	L

	1	2	3	4	5	6	7	8	9	10	11	12	13
H.spinulosa (Kurok.) Trass comb. nov. Basion.: Anaptychia spinulosa Kurok., Beih. Nova Hedwigia 6:101. 1962	III C.3-2	-	g, tips b	spinula, apm	r	a	-	-	o,ap	33-40 x 16-20	+	CH,TA	A
H.squamulosa (Degel.) W.Culb.	I 0.2-1.2	SQ, la, ma; IS, la, ma (SO on tipe of isidia)	b	-	s	a	-	-	o,la	26-37 x 11-16	+	AMS(GU),AMN, ME,CH	A
H.subascendens (Asah.) Trass comb. nov. Basion.: Anaptychia subascendens Asah., Journ. Jap. Bot., 33:325. 1958	III 2-5	SO, ma	g	-	r	a	y	-	r,ap	34-41 x 16-20	+	JA,TA,CH,RU	A
H.subcomosa (Nyl.) Trass comb. nov. Basion.: Physcia leucomelaena var.	III 1.5-2.5	(SQ, apm)	g	ma, apm	r	a	-	-	c,sp	29-35 x 14-18	+	AMS(CL),ME	H

	1	2	3	4	5	6	7	8	9	10	11	12	13
subcomosa Nyl., Syn. Lich. 1:415. 1860													
H.togashii (Kurok.) Awasthi	I 0.5-2	-	g(b), dense, richly branched rhizines projecting beyond the margins	-	r	a	-	-	o,la, cortex of receptacle J + violascens	33-43 x 16-20	+	NE,SI	A
H.translucens (Kurok.) D.Hawksw.	I 0.5-1.2	-	g,pale, translucent	-	s	a	-	-	c,la	32-42 x 16-20	+	NG	L
H.trichophora (Kurok.) Trass, comb. nov. Basion.: Amaptychia trichophora Kurok., Beih. Nova Hedwigia 6:100. 1962	III 1-3	-	g	apm, short, branched, intricate	r	a	-	-	c,ap	39-43 x 19-21	+	AMS(BO)	H

	1	2	3	4	5	6	7	8	9	10	11	12	13
H. trichophoroides (Kurok.) Anaptychia trichophoroides Kurok., Beih. Nova Hedwigia 6:101. 1962	III 1-3	-	g	apm	r	a, veined	-	S,N	c,ap	39-49 x 17-22	+	ME	L
H. tropica (Kurok.) Anaptychia tropica Kurok., Beih. Nova Hedwigia 6:36. 1962	I 0.5-1.5	-	g	-	r	+	-	S	c,la	?	?	AMC(CR), ME	L
H. usambarensis (Kurok.) Swinscow & Krog	II 1-3	SQ, apm	b,5-10 mm	-	r, veined	a	b,r (K-)	-	o,ap	40-50 x 20-25	+	AFR(TZ), MA,NG	L
H. vulgaris (Vain.) Follm. & Redon	II 0.7-2.5	SQ, apm	g, tips b, 4-14 mm	apm	r	a	purple to dark violet (K + purple)	-	c,ap	36-43 x 16-21	+	AMS(PE, BO,BR), ME,AFR (ET,KE, TZ,UG, SF)	H

MAIN SYNONYMS IN SPECIES REVIEW

A. - Anaptychia
H. - Heterodermia

A. adamsii Dodge	=	H. obscurata
A. albopruinosa Kurok.	=	H. diademata
A. burneti Dodge	=	H. comosa
A. ciliatomarginata Linder	=	H. erinacea
A. cinearescens (Nyl.) Dodge	=	H. diademata
A. circinalis (Zahlbr.) W. A. Weber	=	H. boryi
A. domingensis (Ach.) Mass.,		
H. domingensis (Ach.) Trevis.	=	H. albicans
A. esorediata (Vain.) Du Rietz	=	H. diademata
A. fulvescens (Vain.) Kurok.	=	H. flabellata
A. heterochroa Vain.	=	H. obscurata
A. hypochrocodes Vain.	=	H. leucomela
A. jattana Dodge	=	H. boryi
A. labelliifera Hillm.	=	H. obscurata
A. latifolia (Mey. & Flot.) Mass.	=	H. palpebrata
A. linearilobа (Müll. Arg.) Dodge	=	H. dactyliza
A. major (Nyl.) Vain.	=	H. diademata
A. neuleucomelaena Kurok.	=	H. boryi
A. ophioglossa (Tayl.) Kurok.	=	H. leucomela
A. pectinata (Zahlbr.) Sant.	=	H. magellanica
A. podocarpoides (Nyl.) Zahlbr.	=	H. podocarpa
A. ravenelii (Tuck.) Zahlbr.	=	H. albicans
A. sorediifera (Müll. Arg.) Du Rietz & Lynge	=	H. obscurata
A. spectabilis Zahlbr.	=	H. obese
A. squarrosa (Vain.) Dodge	=	H. boryi
A. stellata (Vain.) Kurok.	=	H. podocarpa
A. subheterochroa Kurok.	=	H. dendritica
A. tremulans (Müll. Arg.) Kurok.,		
H. tremulans (Müll. Arg.) W. Culb.	=	H. speciosa

APPENDIX

HETERODERMIA INTERMEDIA Trass sp. nov.

Thallus foliaceus, glauco-albescens, 4-5 cm diametro. Lobi 0.3 - 1.0 mm latae, dichotome divisae, superne planae, soraliis terminalibus, labriformibus, sorediis granulosis. Subtus corticatus, pigmentatus, roseus vel ochraceus, K + aurantiacus, in marginibus rhizinis simplicibus vel leviter ramosis, albidus vel glaucescentis. Apothecia numerosa, superficialia, stipitata, 0.5 - 1 mm diametro, in marginibus sine sorediis. Sporae ellipsoidea, brunneofuscae, 28-32 x 14-16 µm, 1 - septate, sine sporoblastidiis. Thallus atranorinum, zeorinum et acidum salazinicum continente.

Thallus foliose, apressed, greyish white, 4-5 cm across. Lobes 0.3-1.0 mm wide, dichotomously divided, plane, soralia apical, labriform, located on short lateral lobules, soredia granular. Under side corticate, with pink or (in central part) ochraceous K + orange pigment, with marginal white or greyish, simple or scarcely branched rhizines. Apothecia common and

numerose, laminal, stipitate, 0.5-1 mm in diameter, margin without soredia. Spores ellipsoid dark brown, 28-32 x 14-16 um, 1 - septate, without sporoblastidia. TCL: atranorin, zeorin, salazinic acid, unidentified substances X1 (Rf = 35) and X4 (Rf = 10), pigment. Reactions: upper side K + yellow, P + yellow; medulla K + yellow turning orange.

Russia. Far East, Primorski territory, middle Sikhote-Alin mountain range, Ternei, on rocks of the river Velikaya Kema. 25. 07. 1977 H. Trass (TU, Het - 169).

This new species belongs to the H. speciosa - group, but differs from H. speciosa and H. pseudospeciosa by presence of salazinic acid (in H. pseudospeciosa - norstictic acid), pigmented under side, narrow (not over 1 mm) lobes and by numerous small apothecia.

REFERENCES

Aptroot, A. 1987. Pyxinaceae. In: Flora of the Guianas, Ser. E: Fungi and Lichenes. Fasc. 1. Koeltz, Koenigstein. 60 pp.

Aptroot, A., H. J. Sipman. 1991. New lichens and lichen records from New Guinea. Willdenowia 20: 221-256.

Awasthi, D. D. 1960. Contributions to the lichen flora of India and Nepal II. The genus Anaptychia Kirb. Journ. Indian Bot. Soc. 39: 415-422.

Awasthi, D. D. 1973. On the species of Anaptychia and Heterodermia from India and Nepal. Geophytology 3: 113-116.

Awasthi, D. D. 1988. A key of macrolichnes of India and Nepal. Journ. Hattori Bot. Lab. 65: 207-302.

Culberson, W. L. 1966. Chemistry and taxonomy of the lichen genera Heterodermia and Anapthycia in the Carolinas. Bryologist 69: 472-487.

Kashiwadani, H., S. Kurokawa, S. Murakami. 1990. Enumeration of chemical variations of the lichen genus Anaptychia (s. lat.) in Peru. Bull Natn. Sci. Mus., Tokyo, Ser. B, 16: 147-156.

Kurokawa, S. 1962. A monograph of the genus Anaptychia. Beih. Nova Hedwigia, 6, 115 pp.

Kurokawa, S. 1973. Supplementary notes on the genus Anaptychia Journ. Hattori Bot Lab. 37: 563-607.

Scutari, N. C. 1990. Studies of foliose Pyxinaceae (Lecanorales, Ascomycotina) from Argentina, III: new records in the genus Heterodermia. Mycotaxon: 39: 17-26.

Swinscow T. D. V., H. Krog. 1976. The genera Anaptychia and Heterodermia in East Africa. Lichenologist 8: 103-138.

Swinscow, T. D. V., H. Krog. 1988. Macrolichens of East Africa. British Museum (Nat. Hist.), London, 390 pp.

Trass, H. The genus Heterodermia (Lichens, Physciaceae) in Russia and adjacent territories. Manuscript, 1993.

CLADONIA SPECIES NEW TO RUSSIAN FAR EAST

TEUVO AHTI

Department of Botany, University of Helsinki, Unioninkatu 44
FS-00170 Helsinki Finland

During a visit to the Herbarium of Tartu University (TU) in 1991 the following species of Cladonia new to the Russian Far East, i.e. being additions to the treatment by Trass (1978), were detected among collections made by Estonian botanists. All the records represent northern extensions of the range of species earlier known from Japan or China.

Cladonia farinacea (Vainio) A. W. Evans, Rhodora 52.95.1950.

This species is a close relative of the widespread species C.furcata (Hudson) Schrader and C.scabriuscula (Delise) Nyl. From these C. farinacea is distinguished by its ability to produce distinctly farinose soredia on the surface of its sparingly branched podetia. In its type material from Tierra del Fuego and other populations in Argentina and Chile the sorediate patches are usually rather limited, most of the podetial surface being continuously corticate, esorediate (e.g., Stenroos et al. 1992). The South American collections contain atranorin besides fumarprotocetraric acid, while in the Northern Hemisphere material the soredia are covering larger areas on podetia and atranorin is absent. It is possible that the different populations should be recognized as distinct taxa, but further studies are required.

Besides southern South America C. farinacea is known from Japan (e.g. Asahina 1974: fig. 63), China (Inner Mongolia and Xinjiang; H, HMAS-L, IFP; new to China), and temperate to hemiboreal eastern North America (Thomson 1968). Savicz (1922) actually reported it correctly from Kamtchatka under the name C. furcata var. scabriuscula f. farinacea Vainio. Here it is conformed that it belongs to the flora of the Russian Federation; Trass (1978) indicated that it "may be found in the Far East":

Kamchatka Region: Avacha Bay, Rakovaya guba, rocks by sea, 1909 V. P. Savicz 5079 (H, LE). Khabarovsk Territory: Komsomolsk District, Selikhin, Kabarsopka, forest soil, 1961 S. Pärn (H, TU).

Cladonia mongolica Ahti in Huneck et al., Nova Hedwigia 44:196. 1987.

This regularly lignicolous species was described from a single specimen from Mongolia, but has later been found elsewhere in Mongolia and several provinces in China (Ahti 1992). It is very similar to C.ochrochlora Flörke, but is coarsely granulose, without true scyphi and often forms large hymenial disks on tips of short, simple podetia. Most of the collections come from stumps and logs of Larix. Ahti (1992) already recorded the first Russian specimen (H, TU) collected by S. Pärn from the same

locality as C. subconistea below.

Cladonia strepsilis (Ach.) Vainio, Acta Soc. Fauna Fl. Fenn. 10:403. 1894.

This is a well-known suboceanic species of western Europe, East Asia, and eastern North America, and is also present in mountains around the Caribbean Sea. Though it is commonly without podetia, producing only abundant, large squamules, it is easily recognized by the for a Cladonia unique reaction C+ green, caused by the rare dibenzofuran strepsilin. Within the former Soviet Union it was reported by Trass (1978) from Ukraine only, but it is also known from the Baltic coast, e.g. in Latvia (Piterans), and the easternmost locality in Europe is at Kurkijoki on Lake Ladoga in Russian Karelia (H; Auer 1934). In the Far East its first record is as follows:

Primor'e Territory: Sikhote-Alin Range, Mt. Snezhnyy, 1200 m, 1977 H. Trass 558 (H, TU).

Cladonia subconistea Asah., J. Japanese Bot. 17:433. 1941.

This species can be recognized by its strong yellow reaction with the reagent PD, which is caused by psoromic acid (it also contains atranorin). In morphology its is much like C. humilis (With.) Laundon (which produces fumarprotocetraric acid plus atranorin and/or bourgeanic acid), i.e. the podetia have a grey tint, are broad-cupped but with short talks, and produce soredia within the cups, at least, though the outer surface of the cups may be corticate; primary squamules are rather large. C. subconistea is a temperate, endemic species of East Asia. It was described from Japan (illustrations in Asahina 1974:fig. 121 and Yoshimura 1974:fig. 263), but is also known from North Korea (Huneck et al. 1989) and is widespread in China (material examined from Liaoning, Heilongjiang, Jilin, Zhejiang, Hubei and Taiwan; H, HMAS-L, IFP). The following record appears to be the first one for Russia:

Primor'e Territory: Olga, on soil in Quercus forest, 1961 S. Pirn (H, TU).

ACKNOWLEDGEMENTS

Thanks are due to Prof. Hans Trass and Dr. Tiina Randlane in Tartu for making the collections available. My journey to Estonia was made within a scientific exchange program between the Universities of Helsinki and Tartu.

REFERENCES

Ahti, T. 1992. Some species of Cladoniaceae (lichens) from China and adjacent countries. Mycosystema 4 (in press).

Asahina, Y. 1974. Atlas of Japanese Cladoniae. Res., Tokyo.

Auer, A.V. 1934. Einige Flechtenfunde aus Finnland. Ann. Bot. Soc. Zool.-Bot. Fenn. Vanamo 5 (Not. Bot.):12 - 16.

Huneck, S., Ri, J.D., Ahti, T., Poelt, J. 1989. Zur Kenntnis der

Flechtenflora von Korea. Herzogia 8:177-185.
Piterans, A.V. 1982. Lishayniki Latvii. Zinatne, Riga.
Savicz, V.P. 1922. Die Cladonien Kamtschatkas. Feddes Repert. 19:337-400.
Stenroos, S., Ferraro, L.I. & Ahti, T. 1992. Cladoniaceae. Flora Criptogamica de Tierra del Fuego 10. Buenos Aires (in press).
Thomson, J.W. 1968 ('1967'). The lichen genus Cladonia in North America. Univ. Toronto Press, Toronto.
Trass, H. 1978. Cladoniaceae. Handbook of the lichens of the U.S.S.R. 5:7 - 79. Nauka, Leningrad.
Yoshimura, I. 1974. Lichen flora of Japan in colour. Hoikusa, Osaka.

NEW OR INTERESTING RECORDS OF LICHENS FROM ESTONIA

Roland Moberg

Botanical Museum (Fytoteket), Uppsala university, P.O. Box 541, S-751 21 Uppsala, Sweden

Abstract: Eight species is reported as new to the lichen flora of Estonia, Caloplaca biatorina, Caloplaca grimmiae, Carbonea vitellinaria, Catapyrenium pilosellum, Lecania rabenhorstii, Phaeophyscia endococcina, Rimularia furvella and Rinodina conradii.

Recently a report from two field trips made by some Swedish lichenologist appeared in this journal (Ekman et al. 1991). The present paper is a small additional contribution from two other Swedish lichenologists, myself and Professor Gunnar Degelius, who visited Estonia during ten days in the beginning of August 1991. We visited almost the same localities as Ekman et al. and collected about 150 specimens of various species of which eight appear to be new to the Estonian flora.

The main interest of Professor Degelius was to study the members of the family Collemataceae on the alvar of the Island Saarema (Ösel). His experiences (pers. comm.) was that the Collema-flora is sparse compared to the alvars of the Swedish Islands Öland and Gotland.

My own special interest, the family Physciaceae, is fairly well represented in the areas we visited and I had the pleasure to find at least one member of the family new to Estonia.

The material collected is deposited in the Botanical Museum (Fytoteket) at Uppsala University (UPS) and in Herbarium Degelius.

ACKOWLEDGEMENTS

For the arrangement of the very interesting excursion in Estonia we wish to express our gratitude to Professor Hans Trass, Dr. Tiina Randlane and Mr. Andres Saag. We also want to thank all people at the botanical institutions in Tartu and Tallinn who made the visit to Estonia very memorable.

Visited localities:

1. Läänemaa, Puhtu biological station (c. 3 km SSE of Virtsu). 58:34N 23:34E. Dense, old, broad-leaved deciduous forest at Baltic Sea. 4. VIII, 9. VIII, 10. VIII.
2. Saaremaa, Kuressaare, Castle City Park. 58:14N 22:29E. 4.VIII.
3. Saaremaa, Kuressaare, Loode oak forest SW of the village. 58:14N 22:26E. Open deciduous forest with mainly Quercus. 5. VIII.
4. Saaremaa, Sõrve Peninsula, Lõo alvar (c. 24 km SW of Kuressaare). 58:06N 22:12E. Alvar on calcareous rocks along Baltic Sea with scattered Juniperus shrubs. 5. VIII.
5. Saaremaa, Atla alvar SW of Kihelkonna village. 58:18N 21:56E. Alvar with limestone pavements, boulders and gravel. Junipe-

rus communis rather abundant. On mossy ground. 5. VIII.

6. Saaremaa, Harilaid Peninsula (c. 17 km NW of Kihelkonna village). 58:29N 21:52E. Thin pine forest on sand dunes. 6. VIII.
7. Saaremaa, Liiva church. 58:36N 23:15E. 7.VIII.
8. Muhu Island, Tupenurme cliffs (c. 12 km NW of the ferry). 58:38N 23:14E. E-exposed, calcareous, schistaceous rocks partly forested. 7. VIII.
9. Muhu Island, Üügu cliffs along the north-eastern coast (c. 13 km NW of the ferry). 58:40N 23:15E. NE-exposed, calcareous, rocks with grassy patches. 7. VIII.
10. Saaremaa, Abruka Island S of Kuressaare, 58:09N 22:31E. Dense, old, broad-leaved deciduous forest (grove) with Tilia, Acer, Ulmus etc. 8. VIII.
11. Läänemaa, Kirbla, W-exposed, calcareous rocks W of the church in an open cultivated area. On rocks. 58:44N 23:57E. 9.VIII.
12. Läänemaa, Kaseküla alvar (c. 5 km N of Virtsu). 58:39N 23:32E. Grassy alvar with rather abundant shrubs of Juniperus. Scattered siliceous and limestone boulders mixed with areas of gravel and pebbles. 10. VIII.

LIST OF SPECIES

Caloplaca biatorina (Massal.) J. Steiner - new to Estonia - locality 11. This is the northernmost locality in Europe as the locality in South Sweden (Nordin 1972) is c. 1° more southern. The species is regarded to have a southern distribution in Europe (Poelt 1954).

Caloplaca cerina (Hedw.) Th. Fr. - locality 12 (on mosses). C. cerina is a common species on tree trunks. On mosses a variety stillicidiorum has been recognized (even at species level), but transitional types to cortical appearance exist.

Caloplaca grimmiae (Nyl.) H. Olivier - new to Estonia - locality 4. The relation between C. grimmiae and C. congrediens (Nyl.) Zahlbr. has been clarified by Poelt and Kalb (1985). C. grimmiae is an obligate parasite on Candelariella vitellina and is evidently very rare, known from only a few localities in northern Europe.

Carbonea vitellinaria (Nyl.) Hertel - new to Estonia - locality 12. C. vitellinaria is a parasite on Candelariella vitellina. It is probably present in the whole range of the host and may be overlooked in Estonia.

Catapyrenium pilosellum Breuss - new to Estonia - locality 9. C. pilosellum was recently described by Breuss (1990) and is easily recognized by the hairy margins of the squamules. This record is the easternmost in northern Europe.

Lecania rabenhorstii (Hepp) Arnold - new to Estonia - locality 10. L. rabenhorstii has been treated by M. Mayrhofer (1988), but is probably more common in northern Europe (eg. Sweden) than her examined material indicate (Santesson, pers. comm.).

Phaeophyscia endococcina (Körber) Moberg - new to Estonia - locality 12. P. endococcina is evidently a rare species in Estonia as is the case in the lowland parts of the Nordic countries. It may be difficult to find as it is dark brown and grows on rocks in fairly moist condition.

Phaeophyscia nigricans (Flörke) Moberg - locality 2. P. nigricans is usually growing on basal parts of solitary trees in parks or along roads and on calcareous substrate. It is probably overlooked because of its small size.

Physcia tenella v. marina (E. Nyl.) Lynge - locality 1, 10. This variety is fairly common on boulders along the coast.

Physconia grisea (Lam.) Poelt - locality 2. P. grisea is growing on solitary trees in open situations and might be found in several parks in Estonia.

Protoparmelia atriseda (Fr.) R. Sant. & V. Wirth (Lecanora atriseda) - locality 4. P. atriseda starts as a parasite on Rhizocarpon and soon becomes an autonomous lichen (Poelt & Leuckert 1991).

Rimularia furvella (Mudd) Hertel & Rambold (Lecidea furvella) - new to Estonia - locality 10. R. furvella is growing parasitic on various lichens on siliceous rocks in open situations.

Rimularia insularis (Nyl.) Rambold & Hertel - locality 12. R. insularis is parasitic on Lecanora rupicola forming distinct dark brown patches on the host.

Rinodina conradii Körber - new to Estonia - locality 6. The species may be difficult to identify macroscopically, but the 4-celled spores makes it easily determinable in microscope. As it is growing on humus or very old wood the substrate may be of some help in finding the species.

REFERENCES

Breuss, O. 1990. Die Flechtengattung Catapyrenium in Europe. - Stapfia 23.

Mayrhofer, M. 1988. Studien über die saxicolen Arten der Flechtengattung Lecania in Europa II. Lecania s. str. Bibl. Lich. 28.

Nordin, I. 1972. Caloplaca, sect. Gasparrinia i Nordeuropa. Uppsala.

Poelt, J. & Kalb, K. 1985. Die Flechte Caloplaca congrediens und ihre Verwandten: Taxonomie, Biologie und Verbreitung. Flora 176: 129-140.

Poelt, J.& Leuckert, C. 1991. Der Formenkreis von Protoparmelia atriseda in Europa. Nova Hedw. 52: 39-64.

A NEW SPECIES OF ASAHINEA (ASCOMYCOTINA, PARMELIACEAE)

Hans Trass

Department of Botany and Ecology, Tartu University Lai 40 Tartu EE2400 Estonia

In 1977 I found in the Primorsky territory, Far East of Russia, an interesting pale-colored population of Asahinea. It was growing very abundantly, partially dominating the moss-lichen layer, over an area of about two hectares. As it appeared later, it was an usnic-acid deficient chemotype of A. chrysantha, differing from the latter by some morphological characters as well. This collection is described here as a new species -- Asahinea culbersoniorum in honore of two outstanding American lichenologists -- Dr. Chicita F. Culberson and Dr. William L. Culberson.

Asahinea culbersoniorum Trass sp. nov.

Thallus irregulariter expansus, plagas usque ad 4-15 cm latas formans, laciniae 0,5-2 cm latae. Superficies pallida, albido-grisea. Sine isidiis, valde reticulata, plicatus, plicae pseudocyphellatae, mediae vel altae (1-3 mm). Cortex superior tenuis (15-25 µm). Pagina inferior atroniger, opaca, 3-6 mm lata, margo pallido-brunneus, avellaneus, nitidus. Thallus atranorinum, acidum ∠-alectoronicum et acidum ∝-collatolicum continens, acidum usnicum nullum. Apothecia et pycnidia ignota. Subsimilis A. chrysanthae sed differt acidum usnicum deficiens, colore superfisicies (albido-griseus) et paginae inferioris (opaco-niger).

Thallus forming irregular patches 4-15 cm in diameter, lobes 0.5-2 cm broad. Upper surface pale, whitish-gray. Nonisidiate, strongly reticulate, the ridges medium to high (1-3 mm) and pseudocyphellate. Upper cortex thin (15-25 µm). Lower surface dull black, the margin 3-6 mm broad, glossy, light- or nut-brown. Chemistry: atranorin in the upper cortex, ∠-alectoronic acid and ∝-collatolic acid in the medulla; usnic acid lacking. A+pothecia and pycnidia unknown.

Russia. Far East. Primorski territory: Dalnegorsk District, Kitovoye Rebro, not far from the Japan Sea, 500 m alt., on rhyolite talus, abundant, 22.VII 1977. Trass As-3 (TU, holotypus); Sikhote-Alin Mountain Range, Mt. Sneshnyi, NE slope, 1300 m alt., on talus, abundant, 4. VIII 1977, Trass (TU); Khabarovsk territory: Badzhal Mountain Range, upper course of the Urmi River, 1200 m alt., on rocks, 29. VI 1981, Randlane (TU).

A. culbersoniorum was firstly mentioned already in 1985 in a half-page abstract without detailed description (nom. inval.; Trass, Randlane, Piin, 1985). Gao Xiang-gun (1991 p. 484) came on the base of this incomplete description to the conclusion, that "The occassional absence of usnic acid does not seem to correlate with any morphological characters ...". These correlations are demonstrated in table 1. The same author assert, that holotype of Cetraria saviszii (= Asahinea scholanderi) var. candida Oxner & Kassad. (LE) does not have isidia, but really it has, though

scarcely. It means, that var. candida does not belong to the A. chrysantha nor A. culbersoniorum.

Table 1

Differences between A. chrysantha and A. culbersoniorum

Species Character	A. chrysantha	A. culbersoniorum
Under surface	Jet-black, shining, with narrow shining brown margin or without it	Dull black with brown margin
Upper surface	Yellow; reticulation weak	Pale greyish, whitish; distinctly reticulately wrinkled
Chemistry	Usnic acid, atranorin, α-collatolic acid, α-alectoronic acid	Atranorin, α-collatolic acid, α-alectoronic acid

REFERENCES

Gao Xiang-gun, 1991. Studies in species of the lichen genus Asahinea. Nord. J. Bot., 11:483-485.

Trass, H., Randlane, T. & Piin, T. 1985. On the chemistry of genus Asahinea (lichens). Amer. J. Bot., 72:790-791.

TUCKERMANNOPSIS AMERICANA CONTRA CETRARIA CILIARIS IN RUSSIA

T. Randlane, A. Saag

Laboratory of Bioindication, Tartu University, Lai Street 38
Tartu EE 2400 Estonia

HISTORICAL BACKGROUND

The genus Tuckermannopsis was described by Gyelnik (1933) in a very laconic way: "Affinis generi Nephromopsi Mull. Arg. sed thallus subtus pseudocyphellis deficientibus". This leaves the contemporary lichenologists quite a free hand to interpret the limits of the genus. Therefore a lot (more than 20) of Cetraria species have been transferred into Tuckermannopsis by now which has made of it a new heterogenous conglomerate of cetrarioid lichens.

Cetraria ciliaris Ach. was presented by Gyelnik as the type species of his new taxon. At that time the attempts to restrict the enormous Cetraria genus were yet not successful and thus the new combination Tuckermannopsis ciliaris (Ach.) Gyelnik did not find wide use.

In the sixties the identification of the chemical constituents of lichens became necessary. It was Mason Hale (1963) who identified for the first time three different chemical strains in C. ciliaris. His wonderful population studies in the Appalachian Mountains brought him to the conclusion that"... the population patterns of the strains have therefore resulted from genetic and historical factors, not from environmental forces". Still, the taxonomy of the species remained unchanged at that moment. This was done in 1967 by Culbersons who described two new species (C. halei and C. microphyllica) besides C. ciliaris and characterized C. orbata in detail. The latter contains a fatty (protolichesterinic) acid in the medulla and always lacks atranorin in the cortex. Morphologically it differs from C. ciliaris in the absence of long cilia but it may often have short spinules. It is distributed in the western as well as in the eastern part of North America.

C. microphyllica is a rare japanese species that contains microphyllic acid in the medulla and atranorin in the upper cortex. It also lacks the characteristic marginal cilia of C. ciliaris.

C. halei and C. ciliaris are morphologically identical. The former contains either alectoronic acid only or alectoronic acid together with α-collatolic acid in the medulla. Atranorin in the cortex may be present or absent. Medullary constituents of the latter are olivetoric and physodic acids. Atranorin is always present. The distribution of these two species in America has been thoroughly studied (see Culberson, Culberson, 1967). The distribution data of C. halei and C. ciliaris in Europe and Asia are less numerous. The old map of C. ciliaris by Hakulinen in Finland (1962) and localities by Rassadina in the USSR (1950) are not sufficient nowadays because the specimens had not been tested chemically. The Culberson and Culberson (1967) have analysed some material from those countries and report that both species occur

in Finland. Three specimens available for them from Russia (two from the Lake Baikal Region and one from Kamchatka) contained alectoronic acid and were consequently C. halei.

In 1980 Lai surrected the genus Tuckermannopsis. Although the specific and diagnostic characters of the taxon are not clearly defined, the genus has been approved lately by several lichenologists. The new combination Tuckermannopsis americana (Sprengel) Hale is proposed for Cetraria halei (Egan, 1987)(the type specimen of it was described in 1920 under the name Nephroma americana but the epithet "americana" could not be used in the genus Cetraria because of the earlier species Cetraria americana (Gyelnik) Sato from the year 1939). It is clear that the former Cetraria ciliaris and its allied species form quite a different evolutional trend than the type species of the genus Cetraria - C. islandica. Consequently the transfer of this group into another genus is highly motivated and the combinations Tuckermannopsis ciliaris and T. americana ought to be in wide use. Still, the genus Tuckermannopsis as a whole needs futher definition.

MATERIAL AND METHODS

As no materials of this group from the former USSR have been tested chemically (except the three specimens mentioned by the Culbersons, 1967) and all the Soviet authors use the name Cetraria ciliaris in the broad sense only, we have carried out a series of TLC analysis of the samples from TU using standard methods (Culberson, C., Kristinsson, 1970; Culberson, C. 1972). 69 specimens all together from the territory of Russian Federation have been tested (1 from the Murmansk Region, 1 from the Yakutian Autonomic Republic, 45 from the Lake Baikal Region, 6 from the Habarovsk Region, 8 from the Primorje Region, 4 from the Kuril Islands and 4 from the peninsula of Kamchatka).

RESULTS

The only European specimen - from the Murmansk Region, Lapland Varsugae, vicinity of the village Krasnoschelye, on birch, A. Dombrovskaja, T. Piin, 1965 and identified by Dombrovskaja as Nephromopsis ciliaris (Dombrovskaya, 1970) - contained fatty acids rangiformic and norrangiformic acids in the medulla. Therefore the specimen cannot belong to the Tuckermannopsis ciliaris group at all. It was identified as a corticolous form or Cetraria nigricascens. The latter is quite a rare arctic species that is known from some localities in Europe only (Kärnefelt, 1979). The presence of a few cilia and the unclear position of apothecia at the tips of the lobes were probably misleading characters.

All the other 68 samples (from Asian part of Russia) represent Tuckermannopsis americana. There are three chemotypes among our material from the four known variants mentioned by the Culbersons (1967) in America (table 1).

Table 1 Comparison of cortical and medullary substances of T. americana in Russia and America

	Russian material (68 samples)		American material (65 samples) according to Culberson 1967	
	Number of specimens	%	Number of specimens	%
1. Alectoronic + collatolic a.	61	90	22	32
2. Alectoronic a.	4	6	6	9
3. Alectoronic + collatolic a., atranorin	3	4	3	5
4. Alectoronic a., atranorin	0	0	34	53

DISCUSSION

The overwhelming majority of Russian specimens (90 %) contains alectoronic and collatolic acids in the medulla and lacks atranorin in the cortex. It must be emphasized that both medullary substances, alectoronic and collatolic acids are, as a rule, present as the α-form. In some cases additional β-alectoronic and β-collatolic acids have been detected (see also Randlane, Saag, 1989, p. 305-307).

The chemotypes with alectoronic acid only and with alectoronic and collatolic acids plus atranorin are represented in our analysis almost on the same level as in the American material.

The fourth chemotype – alectoronic acid plus atranorin – which is the most numerous in America (53 %) is totally absent in the Russian material.

Two specimens of C. ciliaris var. atropaca Trass from Kamchatka that differ from the usual morphological form in their smaller lobes, darker thallus and the presence of a few short cilia only (Trass, 1963) were also analysed. One sample (holotype) contained atranorin and α-alectoronic as well as α-collatolic acids while the other (isotype) lacked atranorin but contained α-alectoronic and α-collatolic acids. Consequently the taxon C.C. var. atropaca is not chemically uniform.

It may be concluded that Thuckermannopsis americana is widely distributed in the Asian part of the Russian Federation. The presence of T. ciliaris in the European part of the former USSR is possible but not yet proved.

REFERENCES

Culberson, C.F., 1972. Improved conditions and new data for the identification of lichen products by a standardized thinlayer chromatographic method. Journ. of Chromatography, 72, pp. 123-125.

Culberson, C.F., Kristinsson, H., 1970. A standardized method for the identification of lichen products. Journ. of Chromatography, 46, pp. 85-93.

Culberson, W.L., Culberson, C.F., 1967. A new taxonomy for the Cetraria ciliaris group. Bryologist, 70(2), pp. 158-186.

Dombrovskaya A.V., 1970. Synopsis of the lichen flora of the Murmansk Region and North-Eastern Finland. Leningrad, Nauka Publishing House. 118 p. (in Russian).

Egan, R.S., 1987. A fifth checklist of the lichen-forming, lichenicolous and allied fungi of the continental United States and Canada. Bryologist, 90(2), pp. 77-173.

Gyelnik, V., 1933. Lichenes varii novi critici. Acta pro Fauna et Flora Universali, 2(1), pp. 1-10.

Hakulinen, R., 1962. Über Verbreitung und Auftreten von Cetraria ciliaris Ach. in Ostfennoskandien. Arch. Soc. Zool. Bot. Fenn. "Vanamo", 17, pp. 1-4.

Hale, M.E., 1963. Populations of chemical strains in the lichen Cetraria ciliaris. Brittonia, 15, pp. 126-133.

Kärnefelt, I. 1979. The brown fruticose species of Cetraria. Op. Bot., 46, pp. 1-150.

Lai, M. 1980. Studies on the cetrarioid lichens in Parmeliaceae of East Asia (I). Quart. Journ. Taiwan Mus., 33, pp. 215-229.

Randlane, T., Saag, A., 1989. Chemical variation and geographical distribution of Asahinea chrysantha (Tuck.) Culb. & Culb. Lichenologist, 21(4), pp. 303-311.

Rassadina, K.A., 1950. Tsetraria (Cetraria) of the USSR. Plantae Cryptogamae, 2(5), pp. 171-304 (in Russian).

Trass, H., 1963. On the lichen-flora of Kamchatka I. In: Studies of the nature of the Far East. Tallinn, pp. 170-220 (in Russian).

XANTHORIA SOREDIATA -- NEW SPECIES FOR THE ESTONIAN LICHEN FLORA

L. Martin, M. Temina

International Plant and Pollution Research Laboratory, Estonian Academy of Sciences, Kloostrimetsa Rd. 44 EE0019 Tallinn Estonia

Xanthoria sorediata (Vain.) Poelt in Mitt. Bot. Staatssamml. München. Heft 11 (1954); p. 29. Syn.: Caloplaca sorediata (Vain.) DR.; Placodium granulosum var. sorediata (Vain.) Räs.; Pl. granulosum f. sorediata (Vain.) Räs. (Lamb, 1963).

The Estonian lichen flora has been investigated over 120 year already. Now the list of the Estonian lichen flora contains about 800 species (Trass, Randlane, 1991). The locality of Xanthoria sorediata, which is new lichen species for Estonia, is described below. This species was found on limestone outcrop of the Kostivere karst field in 17 August 1986. This is the largest karst area of Estonia, which covers underground stream of the river Jõelähtme (Heinsalu, 1977). Xanthoria sorediata was found on formed by river south-west-exposed vertical rock face of limestone wall, at a height of 3 m above river bottom. That only habitat of Xanthoria sorediata is on the east river bank. Xanthoria sorediata grows abundantly on a small strip, with an area of about 0,3 m2. Our specimens have well-grown rosette-like yellow-orange thallus up to 6-7,5 cm in diameter, with granular and isidiose sorediate in the center. Apothecia are absent.

That lichen generally has an arctic-alpine distribution in Europe (Poelt, 1969). In North America it occurs in the arctic-alpine to the boreal regions (Thomson, 1984).

REFERENCES

Heinsalu, U. 1977. Kostivere karstiväli. Karst ja looduskeskkond Eesti NSV-s. Tallinn, Valgus, pp. 33-38.

Lamb, I.M. 1963. Index Nominum Lichenum. Inter annos 1932 et 1960 divulgatorum. New York.

Poelt, J. 1969. Bestimmungsschlüssel Europäischer Flechten. Vaduz.

Thomson, J.W. 1984. American Arctic Lichens. Columbia University Press. New York.

Trass, H. & Randlane, T. 1991. The Swedish Lichenologists and the Estonian Flora. Fol. Cryptog. Eston., fasc. 28, pp. 1-4.

NEW SPECIES IN THE ESTONIAN BRYOFLORA

N. Ingerpuu, H. Krall
Inst. of Zool. and Bot., Vanemuise 21 Tartu EE 2400 Estonia
A. Kalda
Estonian Forest Research Inst., Rõõmu tee 2 Tartu EE 2400 Estonia
L. Kannukene
Tallinn Bot. Garden, Kloostrimetsa tee 44 Tallinn EE 0019 Estonia
M. Leis
Tartu University, Lai 40 Tartu EE 2400 Estonia

After the last published lists of the Estonian hepatics (Ingerpuu, Krall, 1991) and mosses (Kannukene, 1986) 8 new species of hepatics and 18 species of mosses have been established in the bryoflora of Estonia. Some of them were found during field works within the last years, others in the former collections of Estonian herbaria (Herbarium of Tartu University -- TU, Herbarium of the Institute of Zoology and Botany -- TAA, Herbarium of the Tallinn Botanical Garden -- TBA).

The data on the habitat, substrata and collection have been given. The nomenclature is based on the works of Grolle (1983), Corley et al. (1981) and Corley, Crundwell (1991).

Most of the rare species of hepatics and mosses are distributed in the rich-in-lime region of North and West Estonia (alvars, rich fens, seashore meadows, cliffs etc.) and in the hilly sandstone region of South Estonia (moraine hills, sandstone cliffs, swamps, lakes etc.) where there occur numerous different habitats of mosses. The localities of the new species also refer to the same peculiarity of distribution.

Anthocerotopsida

Anthocerotaceae

Phaeoceros carolinianus (Michx.) Prosk.

E Estonia, Tartu district, 2 km W of Koosa, in a spruce forest on a wet pathway, Oct. 12, 1990, H. Krall (TAA).

Marchantiopsida

Ricciaceae

Riccia warnstorfii Limpr.

S Estonia, Tartu district, in a grain field behind the Uderna Museum, Oct. 19, 1990, N. Ingerpuu (TAA).

Aneuraceae

Riccardia incurvata Lindb.

W Estonia, Pärnu district, on the southern bank of Lake Lavassaare, Sept. 5, 1991, N. Ingerpuu (TAA).

Lophoziaceae

Lophozia opacifolia Culm. ex Mayl.

Centr. Estonia: 1) Tartu district, Laeva, on a pathway on roots covered with soil, July 11, 1949, leg. H. Tuvikene, det. A. Zhukova (TAA); 2) Viljandi district, in a mixed forest on the northern bank of Lake Võrtsjärv, between roots on soil, July 7, 1948, det. N. Ingerpuu (TAA); W Estonia: 3) Pärnu district, Ristiküla, in a mixed forest on a pathway, Nov. 9, 1951, leg. H. Krall, det. N. Ingerpuu (TAA).

Lophazia rutheana (Limpr.) Howe
NE Estonia, W of the Koljala village, in a mixed forest, July 3, 1953, leg. K. Pork, det. N. Ingerpuu (TAA).

Jungermanniaceae

Jungermannia atrovirens Dum.
W Estonia, Saaremaa Island, in the brook of Vesiku near a bridge on limestone, July 7, 1990, N. Ingerpuu (TAA).
Plagiochila porelloides (Torrey ex Nees) Lindenb.
Quite frequent on the whole territory of Estonia. This species was earlier not differentiated from P. asplenioides.

Cephaloziaceae

Cephalozia loitlesbergeri Schiffn.
W Estonia, Saaremaa Island, Järvesoo mire, July 9, 1951, leg. H. Krall, det. N. Ingerpuu (TAA).

Bryopsida

Polytrichaceae

Pogonatum dentatum (Brid.) Brid.
N Estonia, Harju district: 1) North Estonian glint at Rocca al Mare, on sandstone outcrop, Oct. 12, 1975, L. Kannukene (TBA); Viimsi Peninsula, on the edge of a ditch near the Randvere village, June 8, 1985, L. Kannukene (TBA); Centr. Estonia: 3) bog woodland 3 km from the Tipu village towards the village Tori on the roots of a wind-fallen tree, July 10, 1989, M. Leis (TU).
Atrichum angustatum (Brid.) B. et G.
SE Estonia, Võru district valley slope of Lake Uhtjärve, in an uncultivated field, May 9, 1975, L.Kannukene (TBA).

Buxbaumiaceae

Diphyscium foliosum (Hedw.) Mohr
W Estonia, Saaremaa Island, on a limestone fence at the Kärla village, Sept. 10, 1968, L. Kannukene (TBA).

Dicranaceae

Dicranum flexicalule Brid.
W Estonia: Ruhnu Island, in NE part of the island, in a Vaccinium type forest, July 20, 1988, M. Leis (TU); 2) Saaremaa Island, Odalätsi, on dunes, July 21, 1982, leg. L. Kannukene, det. M. Leis (TBA); 3) Vormsi Island, ca 2 km N of the Hullo village, in a Vaccinium type forest, June 25, 1991, M. Leis (TU); SW Estonia: 4) Viljandi district, Kõpu-Tipu village, in a Vaccinium type forest near the Pärtle farmstead, on a stump, July 4, 1987, M. Leis (TU).
Ditrichum lineare (SW.) Lindb.
W Estonia, Saaremaa Island, Järve, in a pine forest on dunes, June 30, 1985, leg. L. Kannukene, det. M. Leis (TBA).

Pottiaceae

Pottia bryoides (Dicks.) Mitt.
W Estonia, Vilsandi Island, juniper alvar in the northern part of the island, on an overturned turf, June 20, 1991, L. Kannukene (TBA).

Grimmiaceae

Schistidium maritimum (Turn.) B. et S.
N Estonia, Harju district, Rohusi Island at a seashore on stones, Sept. 12, 1991, L. Kannukene (TBA).
Racomitrium fasciculare (Hedw.) Brid.
W Estonia, Pärnu district, coastal dunes at Rannametsa on sand, June10, 1985, L. Kannukene (TBA).

Bryaceae

Pohlia elongata Hedw.
NE Estonia, on a roadside near the Soldino village, July 20, 1977, L. Kannukene (TBA).

Bryum subapiculatum Hampe
E Estonia, swampy forest near the Lemmatsi village, Aug. 6, 1851, leg. G.K. Girgensohn, det. L. Kannukene (TAA). G.K. Girgensohn has identified this sample as B. erythrocarpum Schwaergr. In earlier moss lists it is also noted under this name.

Rhodobryum ontariense (Kindb.) Kindb.
W Estonia: 1) Hiiumaa Island, pine alvar forest between Harju and Partsi village on ground, July 17, 1979, L. Kannukene (TBA); 2) Kassari Island, in a juniper shrubbery, on ground, July 17, 1979, L. Kannukene (TBA); 4) Vilsandi Island, pine forest in the centre of the island, juniper shrubbery on a shingle coastal ridge, on shingle, Sept. 16, 1989, L. Kannukene (TBA); 6) Lääne district, Salevere glint, on an erratic boulder on the foot of the glint, Oct. 8, 1958, leg. M. Kask, det. L. Kannukene (TAA).

Leucodontaceae

Pterogonium gracile (Hedw.) Sm.
W Estonia, Lääne district, at the Veski village, on stone, July 17, 1960, leg. L. Laasimer, det. N. Ingerpuu (TAA).

Amblystegiaceae

Campylium halleri (Hedw.) Lindb.
W Estonia, Saaremaa Island, Roomassaare Peninsula, on alvar (Vorobyov, 1984).

Amblystegium tenax (Hedw.) C. Gens.
S Estonia, Valga district, near the bridge of Märdi, in the Väike-Emajõgi River on stones, July 16, 1991, leg. T. Trei, det H. Haab (TBA).

Amblystegium saxatile Schimp.
W Estonia, Saaremaa Island, Roomassaare Peninsula, on an alvar (Vorobyov, 1984).

Amblystegium confervoides (Brid.) B. S. G.
N Estonia, Tallinn, on a limestone wall in the Tallinn Botanical Garden (Vorobyov, 1984).

Drepanocladus tenuinervis T. Kop.
NE Estonia, East-Viru district: 1) in Lake Jõuga Liivjärv, July 18, 1981, leg. A. Mäemets, det. L. Kannukene (TAA); 2) in Lake Pesujärv, July 18, 1981, leg. A.Mäemets, det. L. Kannukene (TAA); S Estonia: 3) Võru district, in Lake Väikjärv, July 3, 1981, leg. A. Mäemets, det. L. Kannukene; 4) Põlva district, in Lake Solda, June 30, 1981. leg. A. Mäemets, det. L. Kannukene; 5) Valga distridt, in Lake Koorküla Valgjärv, July 16, 1981, leg. A. Mäemets, det. L. Kannukene (TAA).

Drepanocladus trichophyllum (Warnst.) Podp.
(Warnstorfia trichophylla (Warnst.) Tuom. et T. Kop.
N Estonia, Harju district: 1) in Lake Jussi Kõverjärv, July 30, 1981, leg A. Mäemets, det. N. Ingerpuu (TAA); 2) in Lake Mähuste, July 31, 1981, leg. A. Mäemets, det. N. Ingerpuu (TAA); 3) West Viru district, in Lake Viitna Pikkjärv, July 24, 1981, leg. A. Mäemets, det. N. Ingerpuu (TAA); 4) East Viru district, in Lake Jõuga Linajärv, July 19, 1981, leg. A. Mäemets, det. L. Kannukene (TAA); S Estonia, Võru district: 5) in Lake Kavadi, July 2, 1981, leg. A. Mäemets, det. N. Ingerpuu (TAA); 6) in Lake Väikjärv,

July 3, 1981, leg. A. Mäemets, det. L. Kannukene (TAA); 7) Põlva district, in Lake Nohipalu Valgjärv, Aug. 6, 1981, leg. A. Mäemets, det. L. Kannukene (TAA).

Brachytheciaceae

Brachythecium turgidum (Hartm.) Lindb.

W Estonia, Saaremaa Island, Kõinastu islet, on a rich seashore meadow, June 15, 1989, L. Hedenäs (TU).

REFERENCES

Corley, N.P.V., Crundwell A.C., Düll R., Hilland M.O., Smith A.J.E. 1981. Mosses of Europe and the Azores, an annotated list of species, with synonyms from the recent literature. J. Bryol. 11, 609-619.

Corley, M.P.V., Crundwell A.C. 1991. Additions and amendments to the mosses of Europe and the Azores. J. Bryol. 16, 337-356.

Grolle, R. 1983. Hepatics of Europe including the Azores: an annotated list of species, with synonyms from the recent literature. J. Bryol. 12, 403-459.

Ingerpuu, N., Krall, H. 1991. Eesti kõder- ja maksasamblad. Scripta Botanica, 6, 34-53.

Kannukene, L. 1986. Mosses of the Estonian S.S.R. Bot. Zhurn. 71, 2, 206-215 (in Russ.)

Vorobyov, J.M. 1984. K flore mokhoobraznykh Estonskoi SSR. (Additions to the mossflora of the Estonian S.S.R.) Gorki (in Russ, manuscript in VINNITI).