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BRYOPHYTES IN THE BOLIMÓW LANDSCAPE PARK

MSZAKI BOLIMOWSKIEGO PARKU KRAJOBRAZOWEGO

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Łódź

ABSTRACT

Anna SANDERSKA, Ewa FILIPIAK and Włodzimierz PISAREK. *Bryophytes in the Bolimów Landscape Park*. Monogr. Bot., Vol. 92, 197-231, 2003.

The paper summarizes the results of the autors' own studies on the bryophytes of the Bolimów Landscape Park, Central Poland, from the years 1982-1985 and 1996-1999, together with records from the literature (1972-1998). Distributional data for 15 species of liverwort and 128 species of moss are presented with reference to the ATMOS – square grid system. Among them there are 28 protected species in Poland and 6 species are threatened in Poland. The analysed liverwort and moss flora contained 9 mountain species. An analysis of the range of frequencies shows that about 60.1% of bryophytes are very rare in this area.

Key words: mosses; liverworts; atlas of distribution; the Bolimów Landscape Park; Central Poland.

1. INTRODUCTION

The predominant element of the Bolimów Landscape Park (BLP) plant cover are the large forest complexes that have undergone various forms of anthropopressure. Currently, the Bolimów Landscape Park forest vegetation is dominated by the phytocoenoses altered or shaped by a human economic activities forest exploration (OLACZEK 1999).

Such characteristics of the BLP forest vegetation area have made it unattractive for geobotanical investigations. Despite the significant anthropogenic changes in the forests of BLP, the intensive studies initiated in the late 70s has shown to presence of phytocoenoses of great botanical and scientific value (JAKUBOWSKA-GABARA 1999).

For this reason, the bryoflora of the BLP has only recently become an object of scientific research. One of the first records of the localities of this plant group in the Bolimów Landscape Park come from the works of WOJCIECHOWSKA (1969) and OLACZEK (1972). However, due to the nature of these investigations these works refer mainly to the species in the overgrand habitats and contain little information on epiphytic, epixylic and epilitic bryophytes.

The purposes of this study is to create a possibly complete list of bryophytes occurrences in the forest communities as well as on the floristically significant woodland glades of the area under investigation and the presentation of the distribution of the individual species in the area.

Due to the fact, that the forest habitats and woodland glades of the BLP undergo further anthropogenic changes the results of the investigations presented in this woork will allow for monitoring the directions of changes of the bryoflora structure of the forest complexes this area.

Acknowledgements. The authors would like to thank prof. Ryszard OCHYRA and dr Anna RUSIŃSKA for revision of critical species of mosses and dr Marta MIERZEŃSKA for help in identyfing of some liverworts.

2. MATERIAL AND METHODS

The bryological research was carried out in the years 1982-1985 and 1996-1999 in the forest complexes and the woodland glades of the Bolimów Landscape Park.

The paper includes the data on bryophytes localities referred to in the works of OLACZEK (1972), KAROLAK (1981), KNAPEK (1981), PISAREK (1989), OWCZAREK (1997) and RUSZCZYŃSKA (1998).

For the purposes of these investigations full list of bryophytes of the Bolimów Landscape Park forests along with their distribution localities were developed using the ATMOS-square grid system (OCHYRA, SZMAJDA 1981) (Fig. 1).

The herbarium specimens are retained at the Herbarium in the Department of Geobotany and Plant Ecology, University of Łódź (LOD).

The liverwort nomenclature follows GROLLE (1983) and for mosses OCHYRA et al. (1992). The mountain species groups were distinguished according to RUSIŃSKA (1981), OCHYRA (1982), MIERZEŃSKA (1994), ŻARNOWIEC (1996) and FOJCIK, STEBEL (2001).

In this treatement the following range of frequency has been used for the bryophytes recordered: very rare – 1-10 records; rare – 11-25; quite frequent – 26-50; frequent – 51-75; common – above 75.

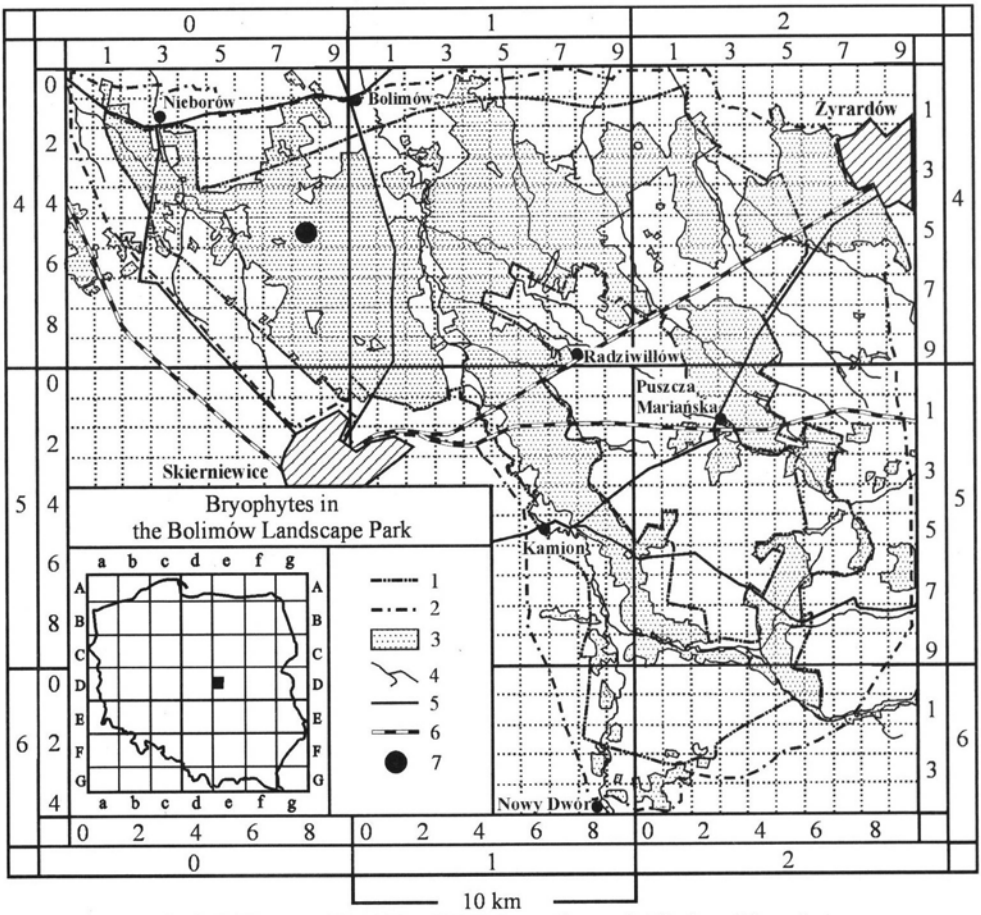

Fig. 1. Guide-map with grid by ATPOL for studies on distribution of bryophytes
1 - border of the Bolimów Landscape Park; 2 - border of protection zone; 3 - forests; 4 - rivers and streams; 5 - roads; 6 - railways; 7 -site point De 4058

3. CHARACTERISTICS OF THE BRYOFLORA

In the Bolimów Landscape Park area were found 143 species of bryophytes (15 species of liverworts and 128 species of mosses). They belong to 34 families. The greatest number of species were found in the *Amblystegiaceae* (21 taxa), *Brachytheciaceae* (17), *Sphagnaceae* (13), *Mniaceae* (10), *Dicranaceae* (9) and *Plagiotheciaceae* (9).

The bryoflora of the Bolimów Landscape Park contains 28 species under partial protection. Six species have been placed on the *Red list of threatened mosses in Poland* (OCHYRA 1992): *Campyliadelphus elodes*, *Drepanocladus sendtneri*, *Leptodictyum humile*, *Scorpidium scorpioides*, *Syntrichia virescens*, *Tomenthypnum nitens*. A group of mountain species is represented by 2 species of liverworts: *Conocephalum conicum* and *Plagiochila porelloides* and 7 taxa of mosses: *Brachythecium plumosum*, *B. populeum*, *B. reflexum*, *B. rivulare*, *Hypnum pallescens*, *Mnium marginatum*, *Sanionia uncinata*, *Sphagnum russowii*. The bryoflora analysis of

this area shows that very rare species accounted for 60.1%, while rare – 11.2%, quite frequent – 11.9%, frequent – 7% and common – 9.8%.

In the forest complexes of the BLP the greatest number of localities shows *Pleurozium schreberi* occuring in the predominant acidophilous habitats of the fresh coniferous forests and the mixed coniferous forests. Other frequent taxa are: *Dicranum scoparium, D. polysetum* and *Pseudoscleropodium purum*. Although in much smaller concentrations equally common are also species typical for mesophilous oak-hornbeam forest habitats: *Atrichum undulatum*, *Plagiomnium affine* and *Polytrichastrum formosum*. The most diversified flora of the forest mosses occurs in alder carrs andriverside carrs with rare species for both the described area and Central Poland. These are liverworts: *Conocephalum conicum*, *Plagiochila porelloides* and mosses: *Brachythecium plumosum, B. rivulare*, *Bryum pseudotriquetrum*, *Cirriphyllum piliferum*, *Fissidens adianthoides*, *F. dubius*, *Leptodicytum riparium*, *Mnium marginatum*, *M. stellare*, *Plagiomnium elatum, P. ellipticum* and *Sanionia uncinata*.

In the forest communities of the BLP, *Ptilium crista-castrensis* is rare and withdrawing from the pine coniferous forests of the whole Central Poland area.

The most interesting in terms of bryological studies are woodland glades, where species belonging to the group of glacial survivors were found in 1980s. These are: *Scorpidium scorpioides*, at that time growing in large number in reedswamps (*Caricetum elatae*, *Caricetum appropinquatae*, *Caricetum lasiocarpae*) and *Tomenthypnum nitens* scattered in the wet meadow vegetetation belonging to the alliance *Molinietum caeruleae*. Further field investigations conducted in 1990s did not confirm occurrences of these taxa localities. Many other interesting and rare for the whole region bryophytes were found in the woodland glades in 1980s. These were not confirmed by later studies, either. Among them are: *Campyliadelphus elodes*, *C. stellatus*, *Limprichtia revolvens* and *Warnstorfia exannulata*. Localities of the liverwort – *Ricciocarpus natans* and the mosses: *Sphagnum denticulatum* and *S. magellanicum* have been observed to disappear.

The studies conducted in the Bolimów Landscape Park area have shown occurrences of four species not reported earlier in Central Poland: *Callicladium haldanianum*, *Dicranoweissia cirrata*, *Hypnum pallescens* and *Orthodicranum flagellare*.

Forest and glade bryoflora of the BLP is undergoing constant changes as a result of human activity. Continuous land draining as a result of constructing the network of deep drainage ditches and the regulation of the woodland streams as well as introduction of *Pinus sylvestris* stands into an in appriopriate habitat are the main factors responsible for:

- disapperance of are higrophilous bryophytes localities,
- expansion of species characteristic for coniferous vegetation and photophilous taxa.

At the same time in the recent years in the described area the regeneration of oak-hornbeam forest is observed. This contributes to the recovery of some most resistant to habitat overdrying mosses typical for this kind of vegetation. These are mostly: *Atrichum undulatum*, *Plagiomnium affine* and *Polytrichastrum formosum*.

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5. MSZAKI BOLIMOWSKIEGO PARKU KRAJOBRAZOWEGO (streszczenie)

Praca zawiera wyniki badań briologicznych przeprowadzonych w latach 1982-1985 i 1996-1999 w kompleksach leśnych i na polanach Bolimowskiego Parku Krajobrazowego (BPK). Ponadto uwzględniono dane o stanowiskach mszaków zawarte w pracach OLACZKA (1972), KAROLAK (1981), KNAPEK (1981), PISARKA (1989), OWCZAREK (1997) i RUSZCZYŃSKIEJ (1998).

Na terenie BPK stwierdzono występowanie 143 gatunków mszaków (15 gatunków wątrobowców i 128 gatunków mchów). Spośród nich 28 taksonów mchów objętych jest ochro-

ną częściową. Sześć gatunków znajduje się na czerwonej liście mchów zagrożonych w Polsce (OCHYRA 1992): *Campyliadelphus elodes*, *Drepanocladus sendtneri*, *Leptodictyum humile*, *Scorpidium scorpioides*, *Syntrichia virescens*, *Tomenthypnum nitens*. Dwa gatunki wątrobowców: *Conocephalum conicum* i *Plagiochila porelloides* oraz 7 taksonów mchów: *Brachythecium plumosum*, *B. populeum*, *B. reflexum*, *B. rivulare*, *Hypnum pallescens*, *Mnium marginatum*, *Sanionia uncinata* i *Sphagnum russowii* reprezentuje element górski.

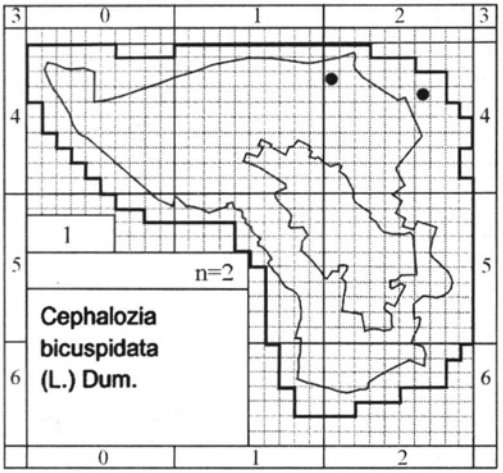
Do grupy gatunków najrzadszych w skali regionu należą: wątrobowce – *Conocephalum conicum*, *Plagiochila porelloides*, *Riccia fluitans*, *Ricciocarpus natans* oraz mchy: *Brachythecium plumosum, B. rivulare*, *Bryum pseudotriquetrum*, *Cirriphyllum piliferum*, *Fissidens adianthoides*, *F. dubius*, *Leptodicytum riparium*, *Mnium marginatum*, *M. stellare*, *Plagiomnium elatum, P. ellipticum* i *Sanionia uncinata*, *Sphagnum denticulatum* i *S. magellanicum*. Ponadto na terenie BPK stwierdzono także występowanie 4 taksonów nie podawanych wcześniej z obszaru Polski Środkowej: *Callicladium haldanianum*, *Dicranoweissia cirrata*, *Hypnum pallescens* i *Orthodicranum flagellare*.

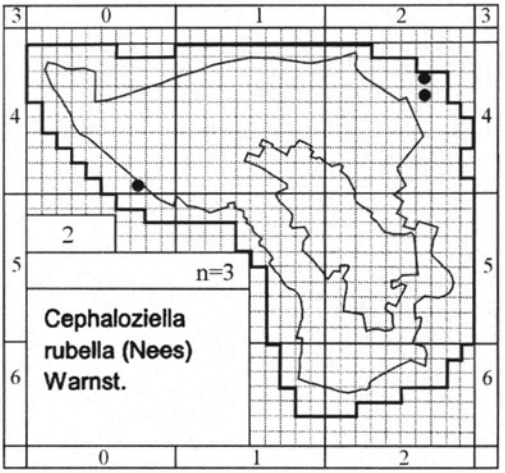
Brioflora lasów i polan Bolimowskiego Parku Krajobrazowego ulega przemianom związanym z działalnością człowieka. Obserwowane jest zanikanie stanowisk rzadkich mszaków wilgociolubnych oraz rozprzestrzenianie się gatunków borowych i światłolubnych.

Nomenklaturę wątrobowców przyjęto za GROLLE (1983), a mchów za OCHYRĄ i in. (1992). Okazy zielnikowe złożono w Herbarium Katedry Geobotaniki i Ekologii Roślin Uniwersytetu Łódzkiego (LOD).

DISTRIBUTION ATLAS OF BRYOPHYTES IN THE BOLIMÓW LANDSCAPE PARK

Explanations:
V, I - the red data book categories in Poland (acc. to OCHYRA 1992): V - Vulnerable taxa, I - Indeterminate taxa.
Ch.cz. - protection status in Poland; taxa under partial protection;
n=2 - number of sites
1-15 – distribution of liverworts
16-143 – distribution of mosses


1
n=2
Cephalozia bicuspidata (L.) Dum.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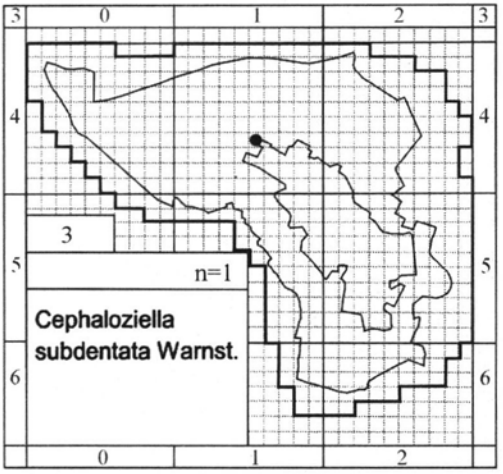
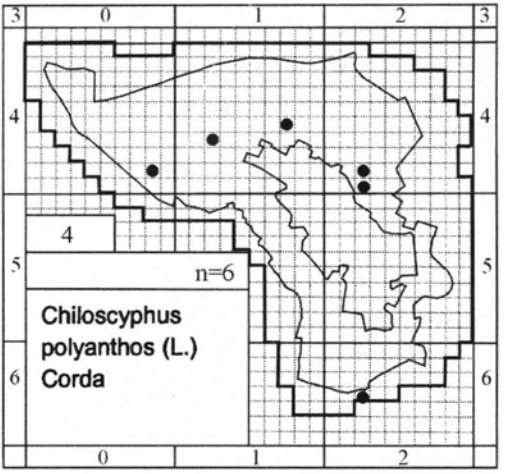
n=3
Cephaloziella rubella (Nees) Warnst.


3
n=1
Cephaloziella subdentata Warnst.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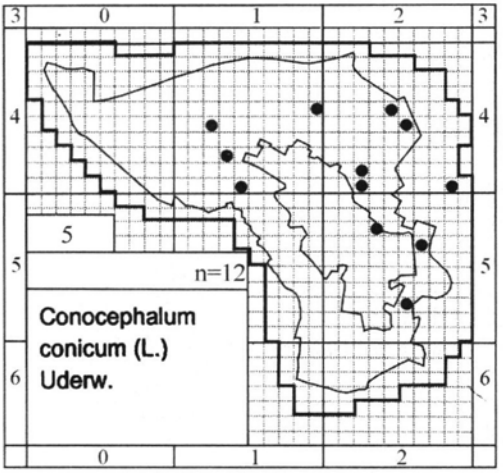
n=6
Chiloscyphus polyanthos (L.) Corda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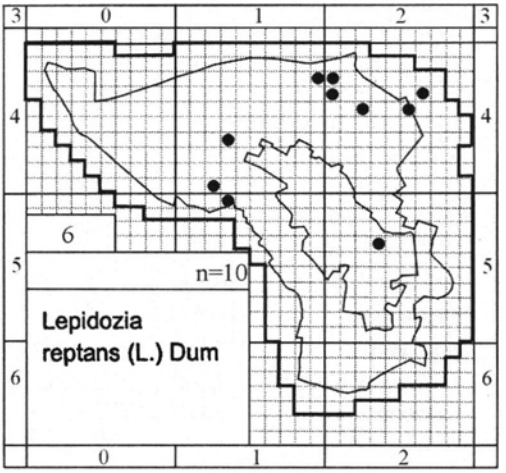
n=12
Conocephalum conicum (L.) Uderw.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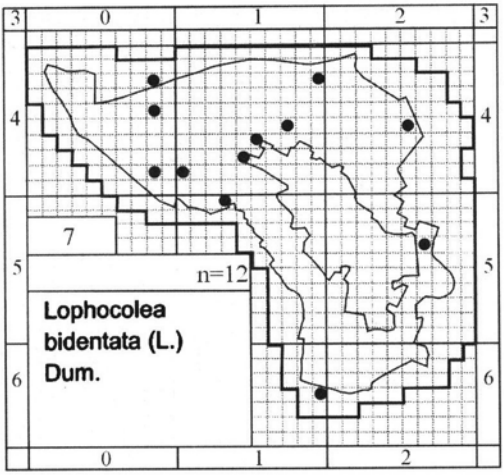
Lepidozia reptans (L.) Dum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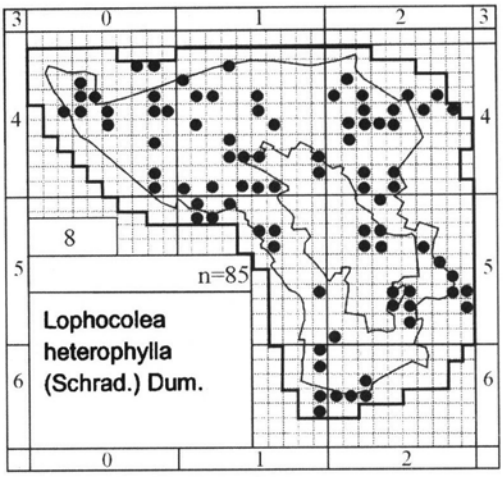
n=12
Lophocolea bidentata (L.) Dum.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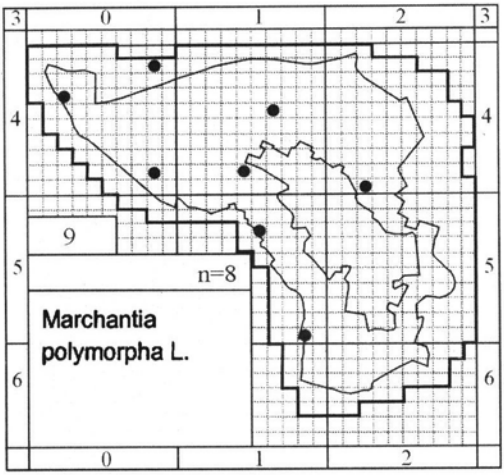
n=85
Lophocolea heterophylla (Schrad.) Dum.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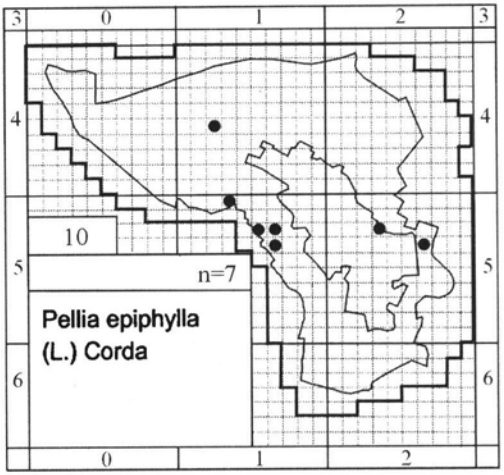
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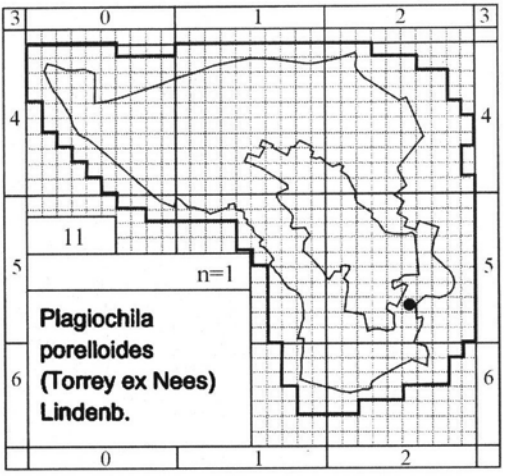
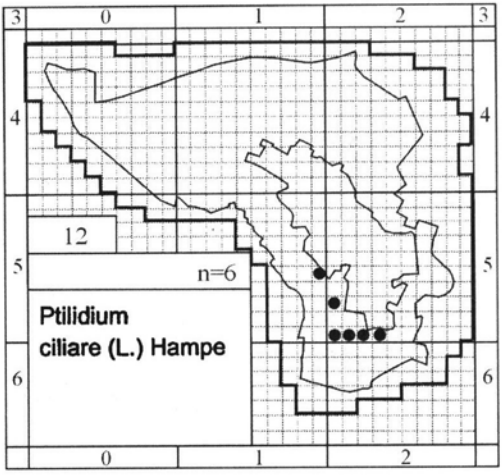
Pellia epiphylla (L.) Corda


11
n=1
Plagiochila porelloides (Torrey ex Nees) Lindenb.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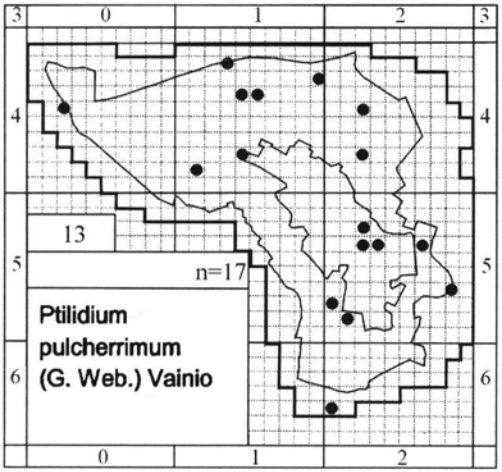
n=6
Ptilidium ciliare (L.) Hampe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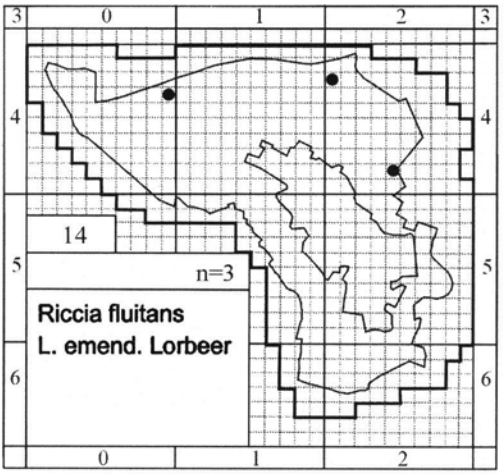
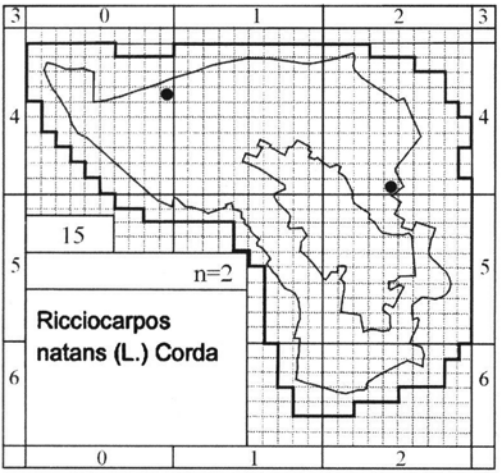
Ptilidium
pulcherrimum
(G. Web.) Vainio


14
n=3
Riccia fluitans
L. emend. Lorbeer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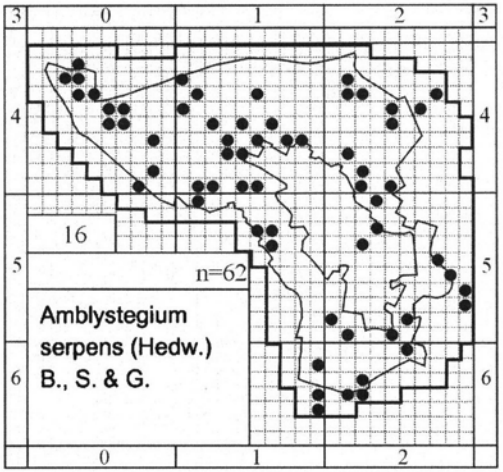
Ricciocarpos
natans (L.) Corda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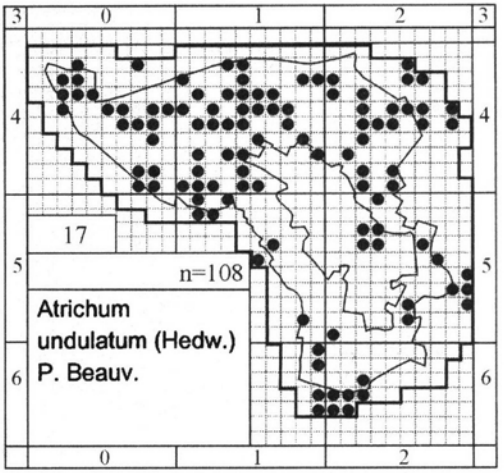
Amblystegium serpens (Hedw.) B., S. & G.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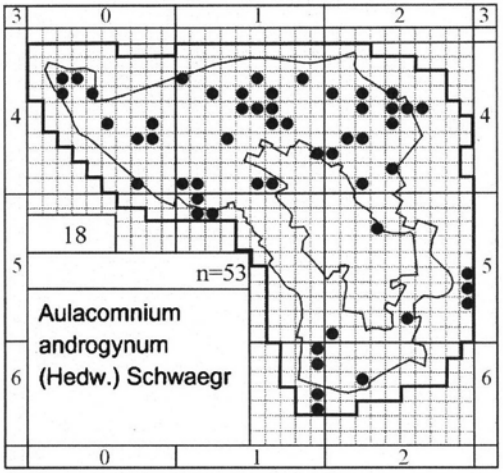
Atrichum undulatum (Hedw.) P. Beauv.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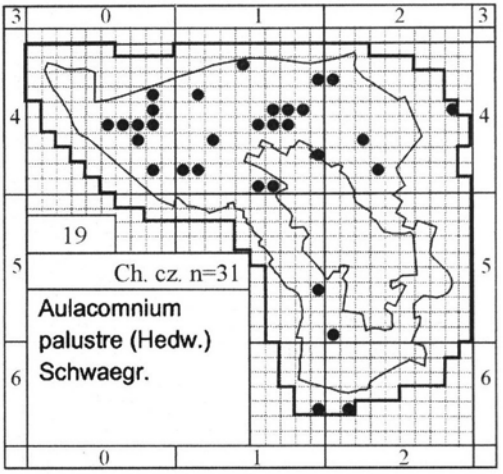
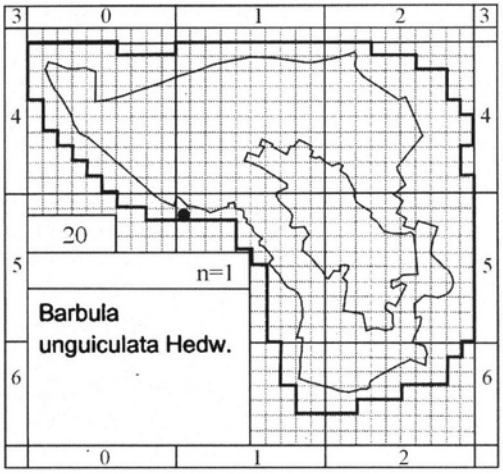
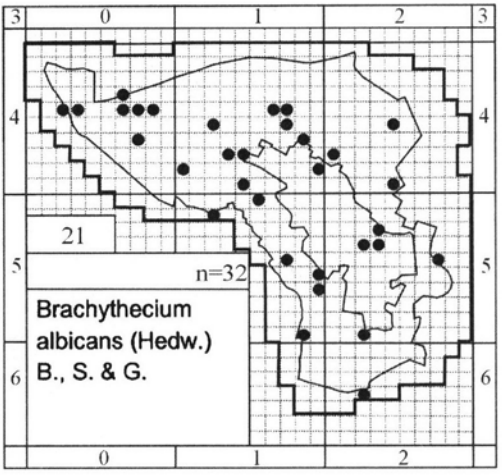
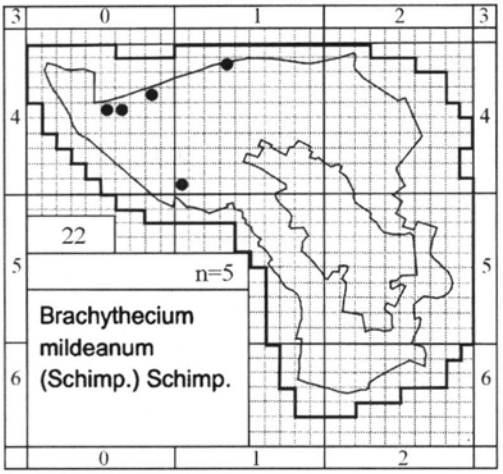
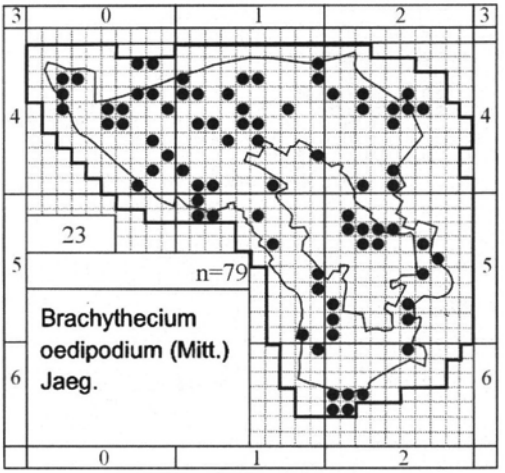
n=53
Aulacomnium androgynum (Hedw.) Schwaegr

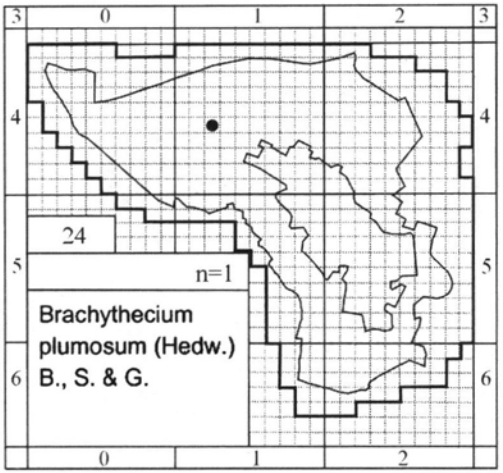

19
Ch. cz. n=31
Aulacomnium palustre (Hedw.) Schwaegr.

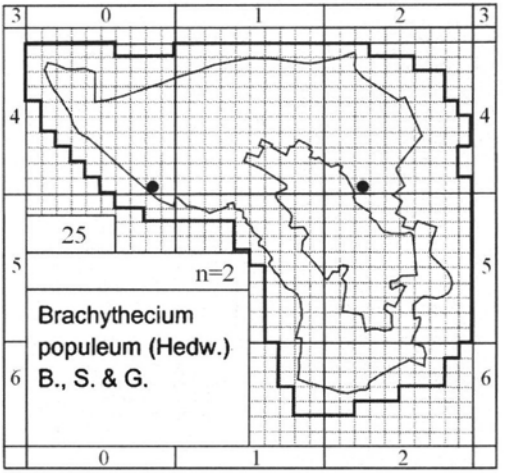

20
n=1
Barbula unguiculata Hedw.

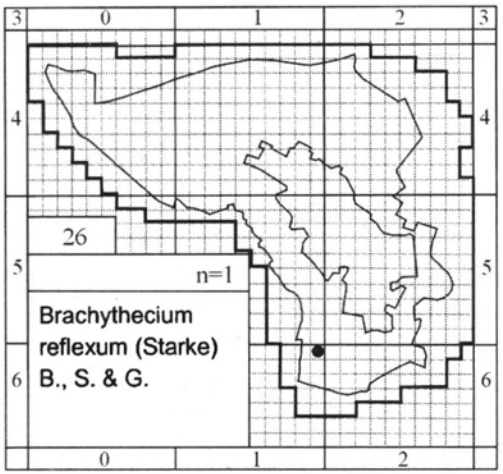

21
n=32
Brachythecium albicans (Hedw.) B., S. & G.

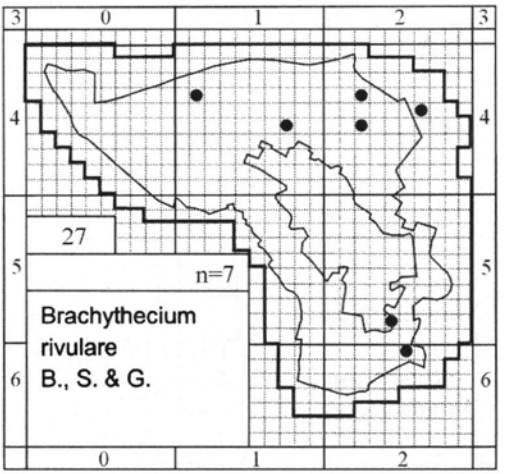

22
n=5
Brachythecium
mildeanum
(Schimp.) Schimp.

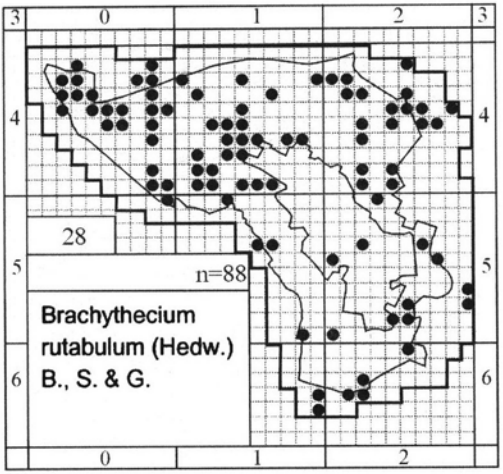

23
n=79
Brachythecium
oedipodium (Mitt.)
Jaeg.

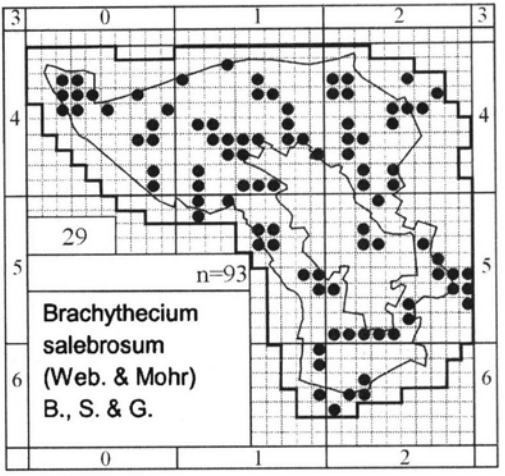

24
n=1
Brachythecium
plumosum (Hedw.)
B., S. & G.

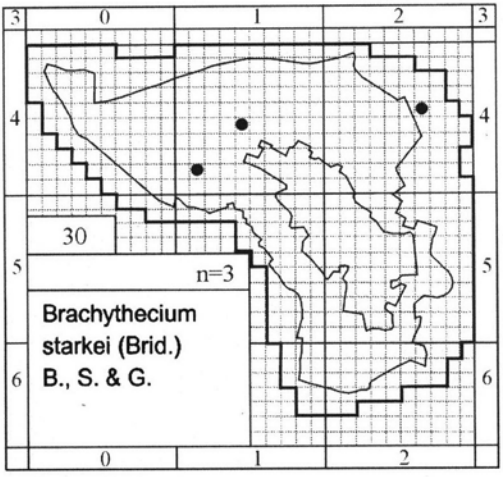

25
n=2
Brachythecium
populeum (Hedw.)
B., S. & G.

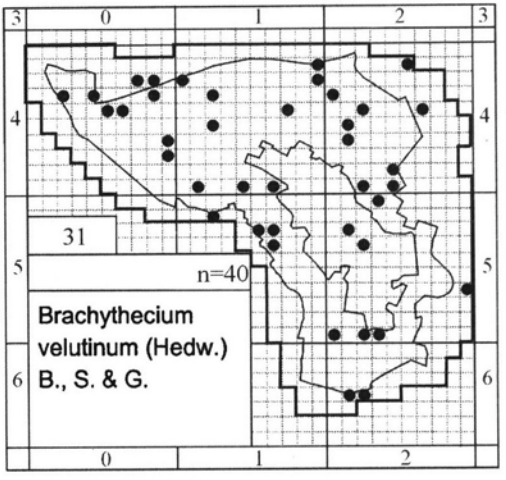

26
n=1
Brachythecium
reflexum (Starke)
B., S. & G.

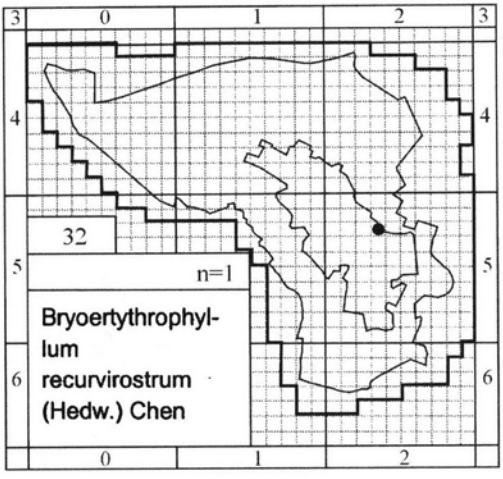

27
n=7
Brachythecium
rivulare
B., S. & G.

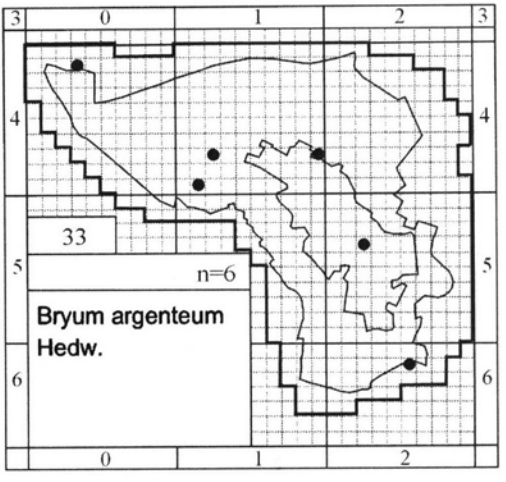

28
n=88
Brachythecium rutabulum (Hedw.) B., S. & G.

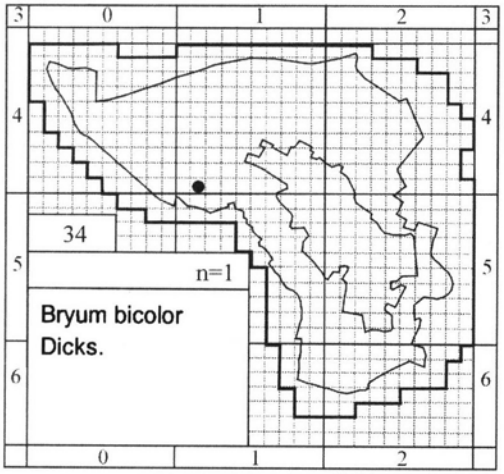

29
n=93
Brachythecium salebrosum (Web. & Mohr) B., S. & G.

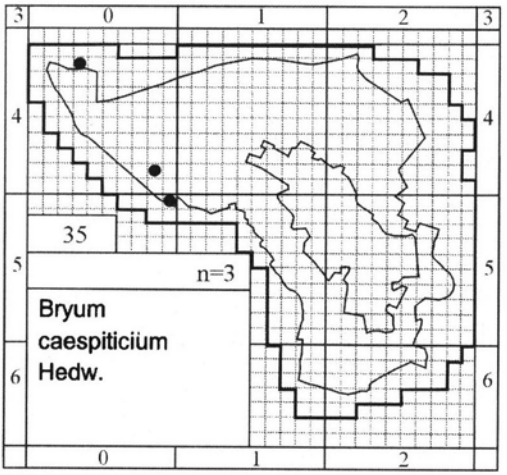

30
n=3
Brachythecium starkei (Brid.) B., S. & G.

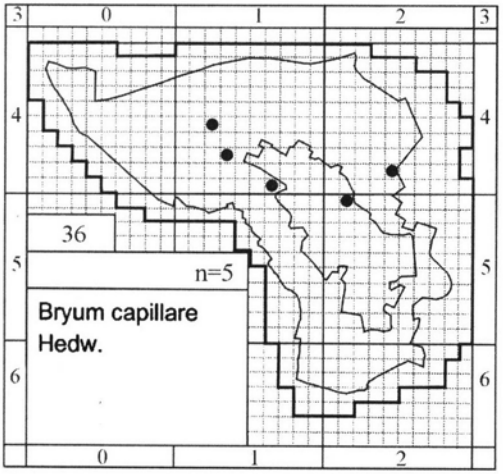

31
n=40
Brachythecium velutinum (Hedw.) B., S. & G.

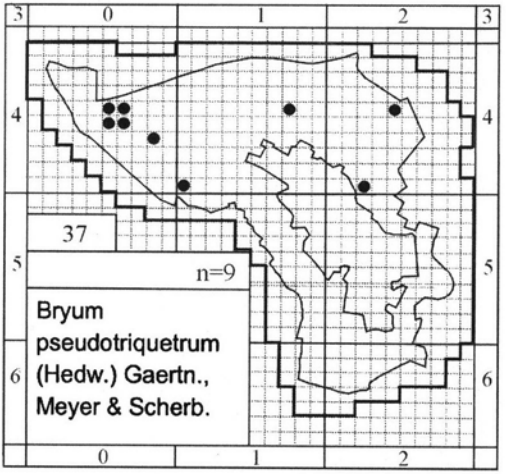

32
n=1
Bryoertythrophyllum recurvirostrum (Hedw.) Chen

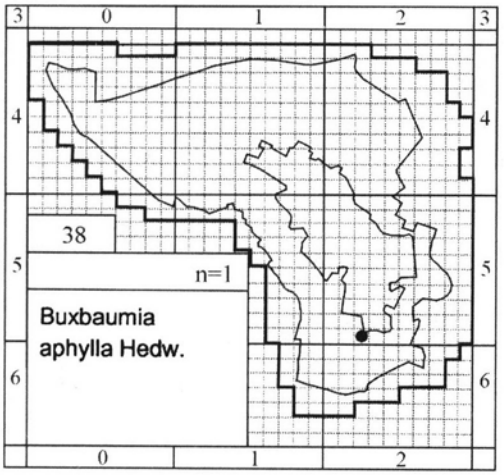

33
n=6
Bryum argenteum Hedw.

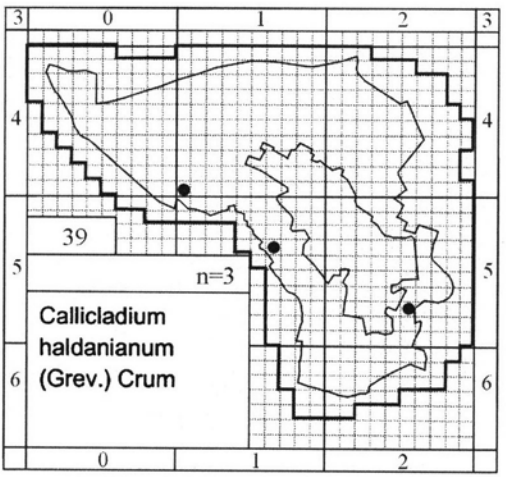

34
n=1
Bryum bicolor
Dicks.

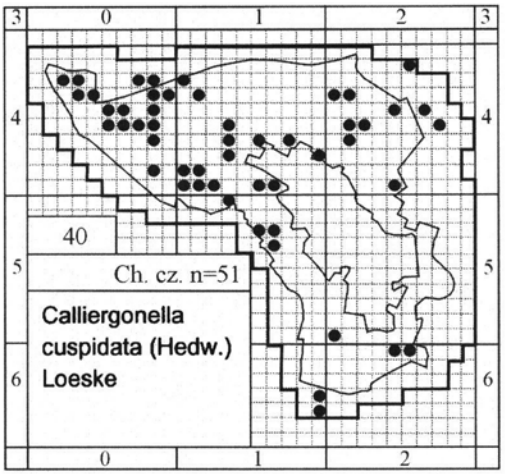

35
n=3
Bryum
caespiticium
Hedw.

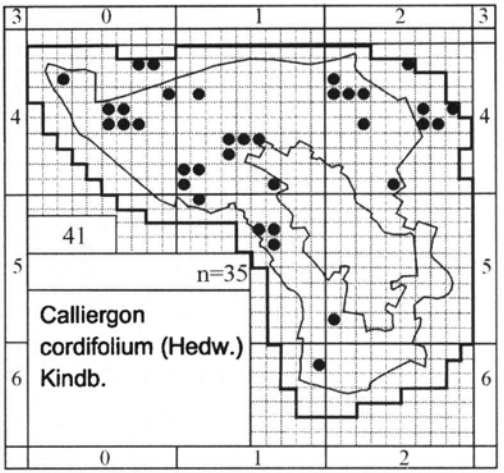

36
n=5
Bryum capillare
Hedw.

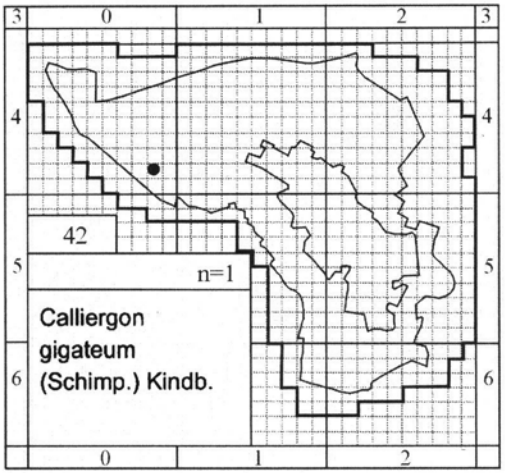

37
n=9
Bryum
pseudotriquetrum
(Hedw.) Gaertn.,
Meyer & Scherb.

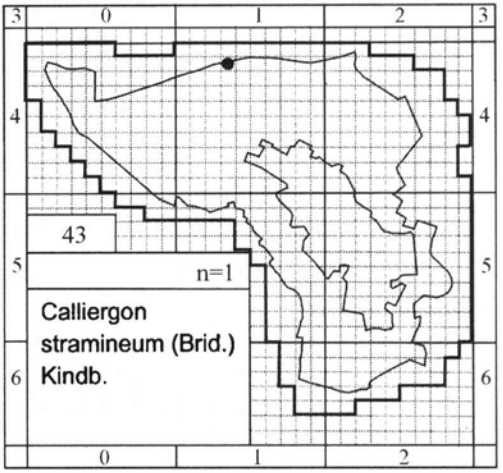

38
n=1
Buxbaumia
aphylla Hedw.

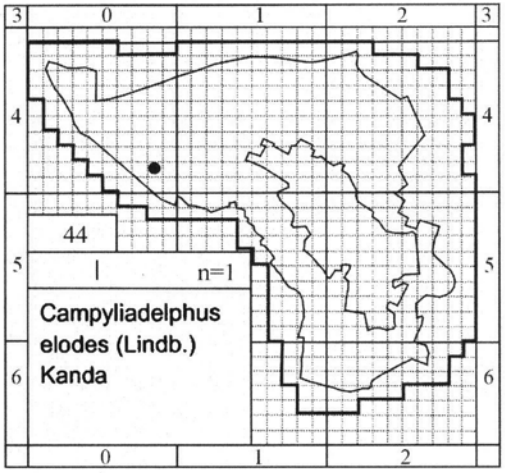

39
n=3
Callicladium
haldanianum
(Grev.) Crum

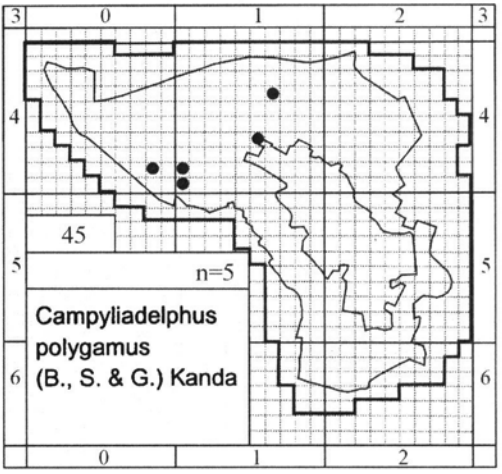

40
Ch. cz. n=51
Calliergonella cuspidata (Hedw.) Loeske

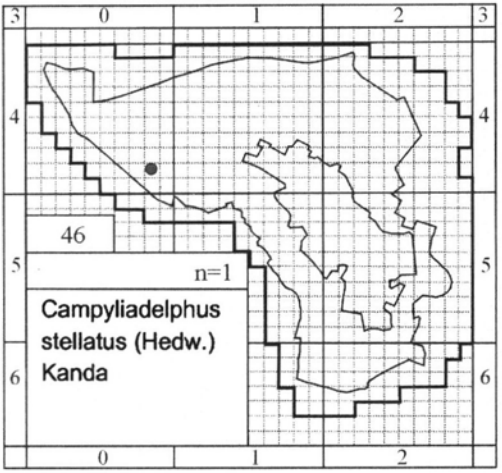

41
n=35
Calliergon cordifolium (Hedw.) Kindb.

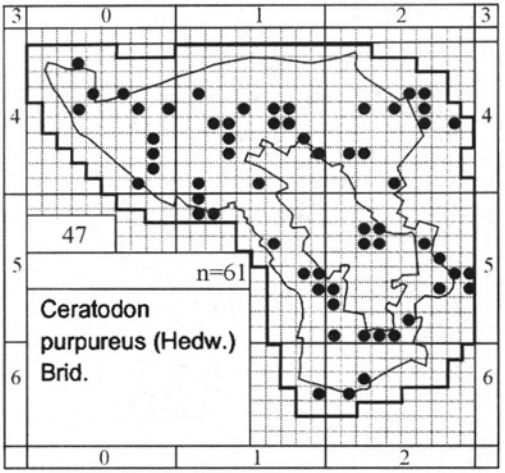

42
n=1
Calliergon gigateum (Schimp.) Kindb.

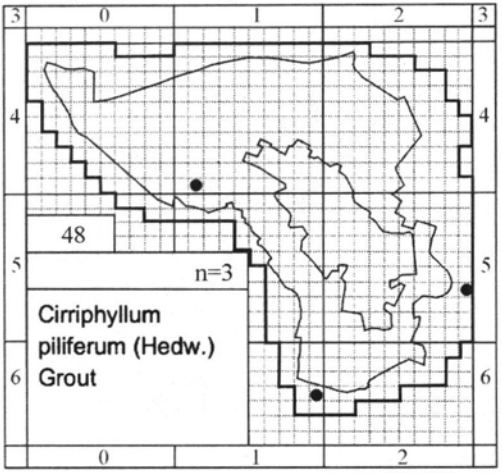

43
n=1
Calliergon stramineum (Brid.) Kindb.

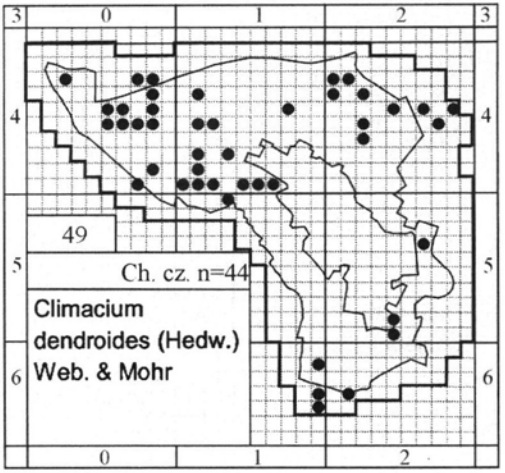

44
n=1
Campyliadelphus elodes (Lindb.) Kanda

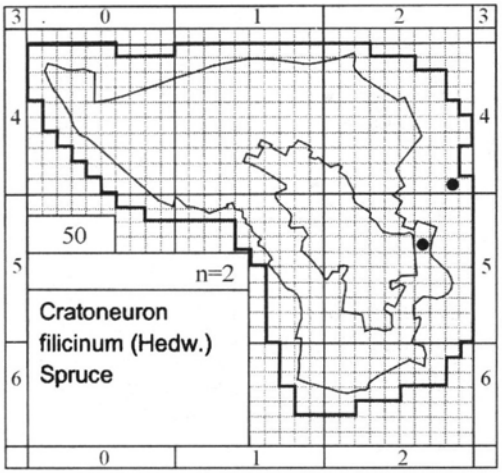

45
n=5
Campyliadelphus polygamus (B., S. & G.) Kanda

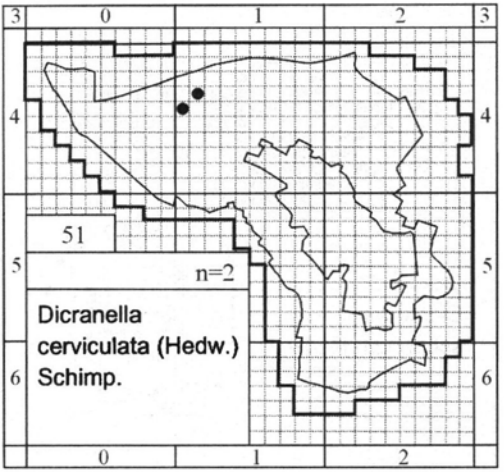

46
n=1
Campyliadelphus stellatus (Hedw.) Kanda

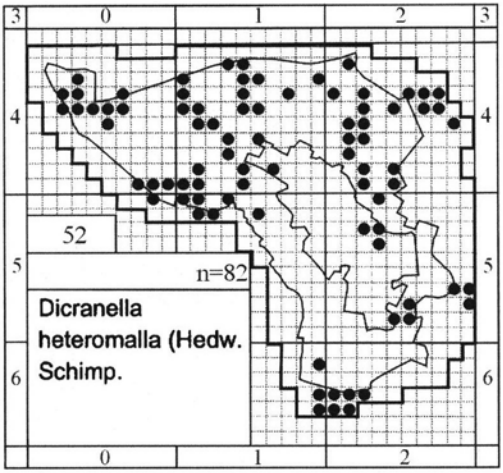

47
n=61
Ceratodon purpureus (Hedw.) Brid.

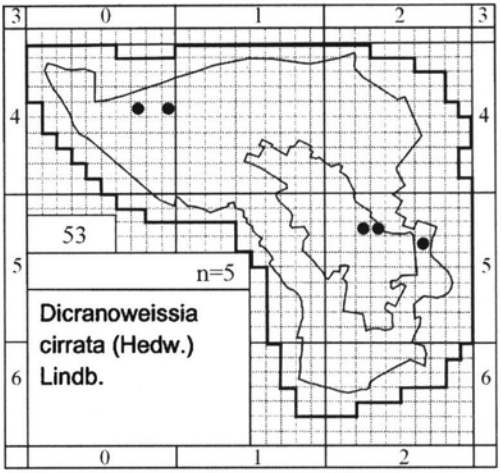

48
n=3
Cirriphyllum piliferum (Hedw.) Grout

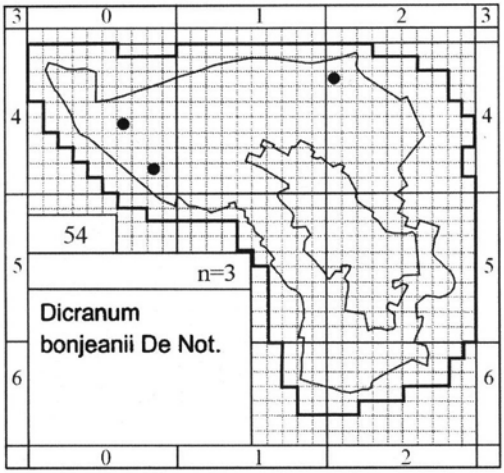

49
Ch. cz. n=44
Climacium dendroides (Hedw.) Web. & Mohr

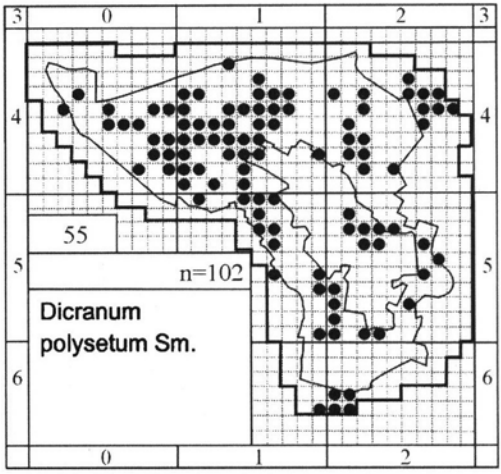

50
n=2
Cratoneuron filicinum (Hedw.) Spruce

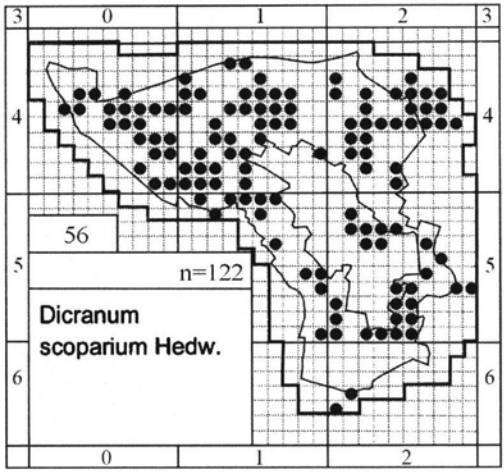

51
n=2
Dicranella cerviculata (Hedw.) Schimp.

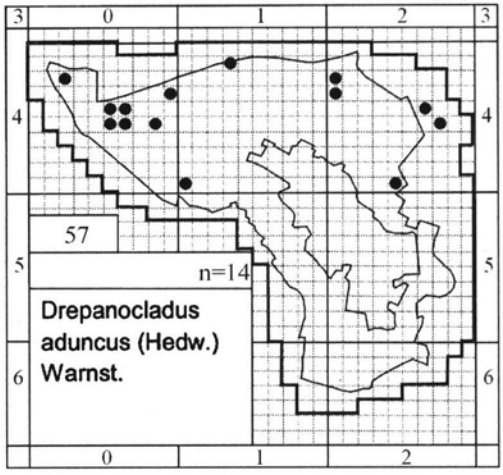

52
n=82
Dicranella heteromalla (Hedw. Schimp.

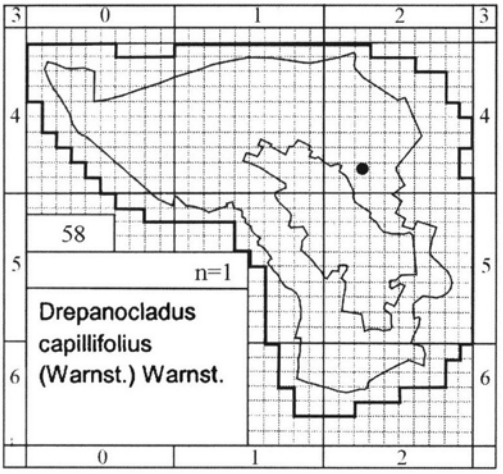

53
n=5
Dicranoweissia cirrata (Hedw.) Lindb.

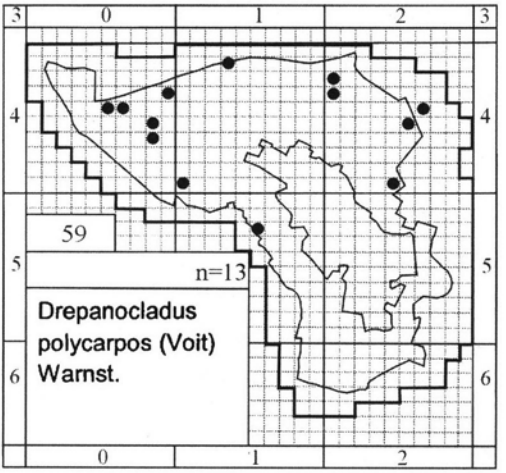

54
n=3
Dicranum bonjeanii De Not.

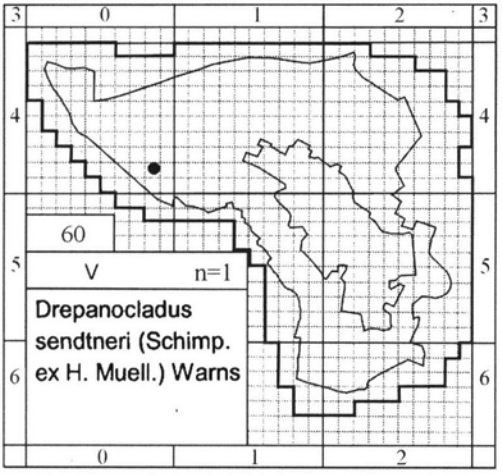

55
n=102
Dicranum polysetum Sm.

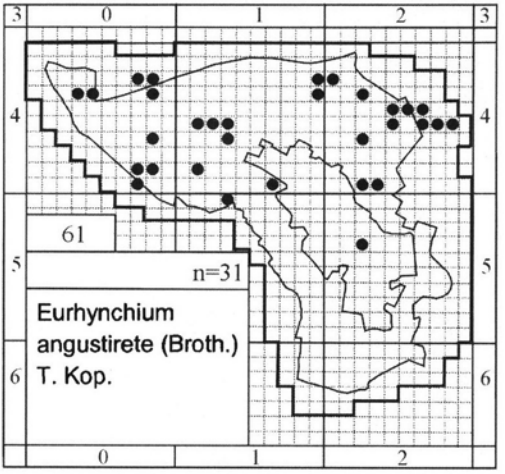

56
n=122
Dicranum scoparium Hedw.

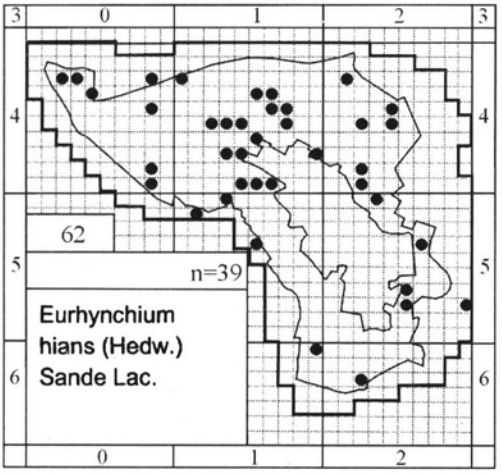

57
n=14
Drepanocladus aduncus (Hedw.) Warnst.

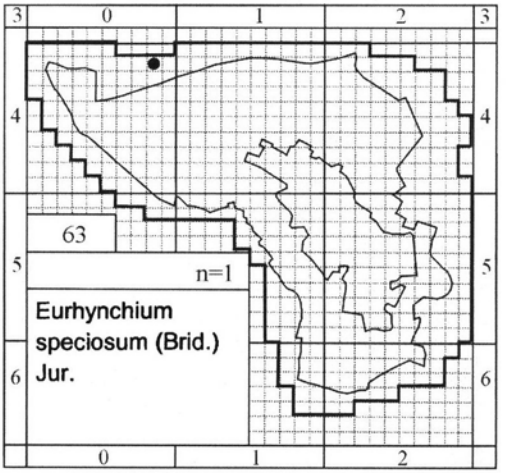

58
n=1
Drepanocladus capillifolius (Warnst.) Warnst.

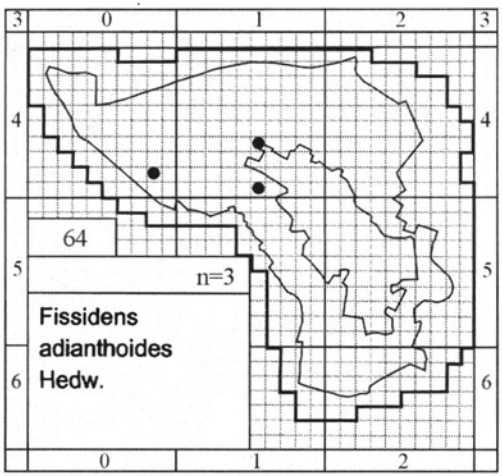

59
n=13
Drepanocladus polycarpos (Voit) Warnst.

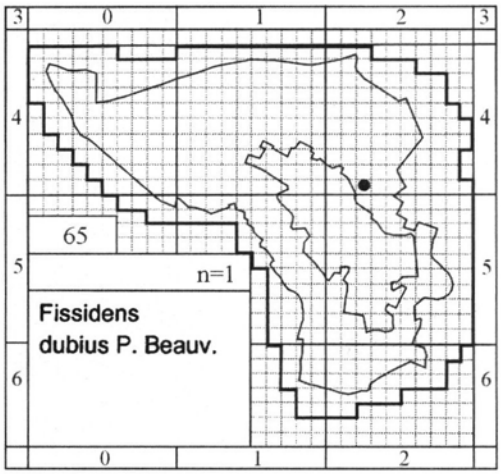

60
V
n=1
Drepanocladus sendtneri (Schimp. ex H. Muell.) Warns

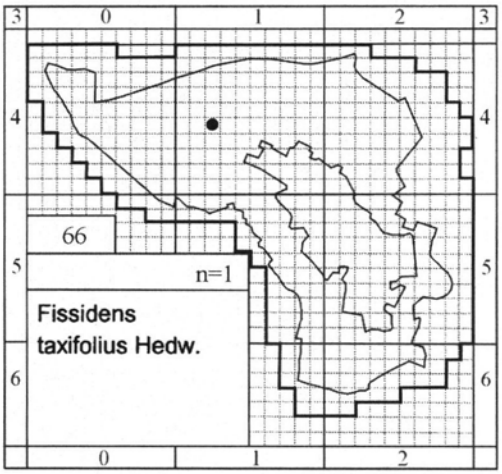

61
n=31
Eurhynchium angustirete (Broth.) T. Kop.

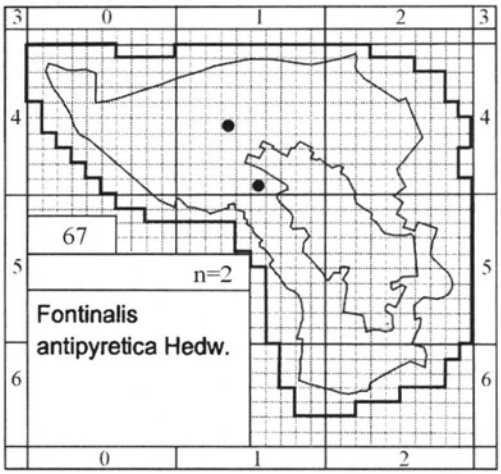

62
n=39
Eurhynchium hians (Hedw.) Sande Lac.

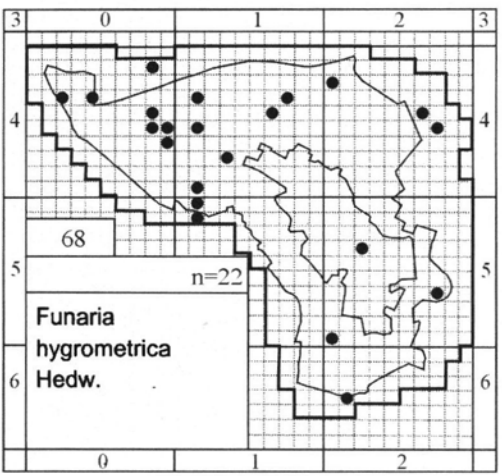

63
n=1
Eurhynchium speciosum (Brid.) Jur.

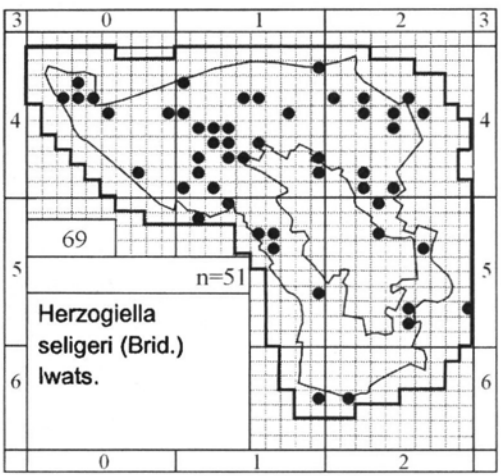

64
n=3
Fissidens adianthoides Hedw.

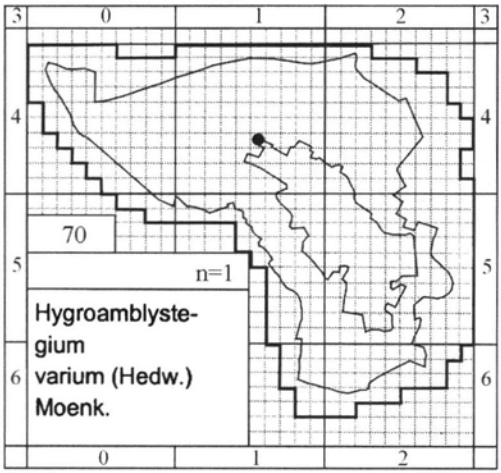

65
n=1
Fissidens dubius P. Beauv.

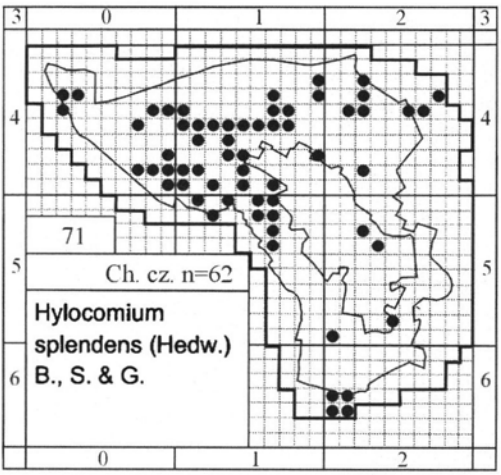

66
n=1
Fissidens taxifolius Hedw.

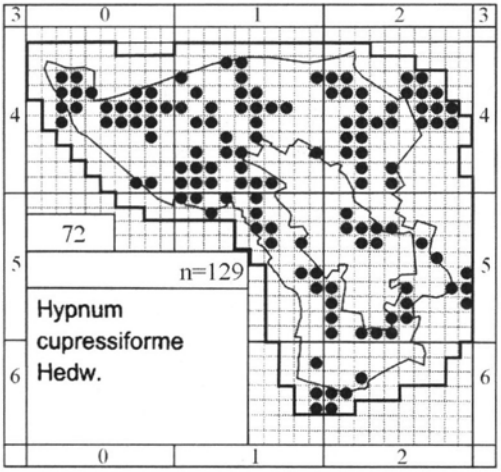

67
n=2
Fontinalis antipyretica Hedw.

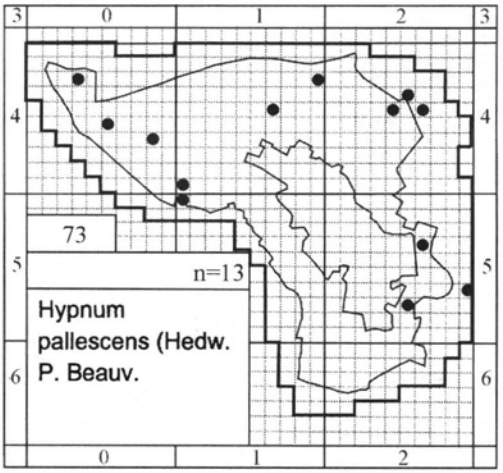

68
n=22
Funaria hygrometrica Hedw.

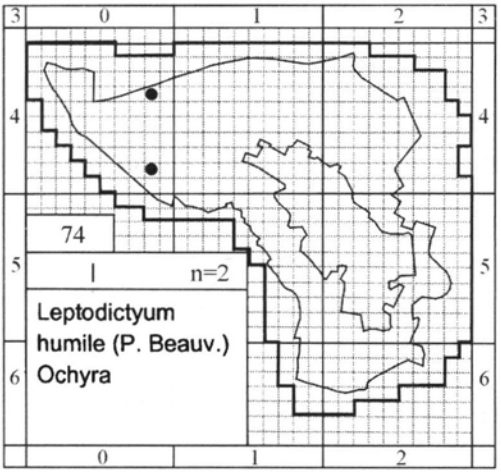

69
n=51
Herzogiella seligeri (Brid.) Iwats.

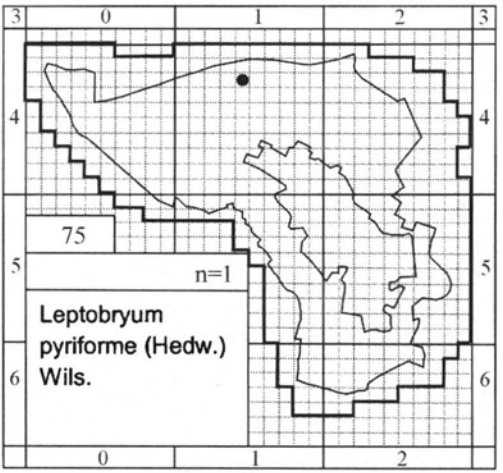

70
n=1
Hygroamblyste-
gium
varium (Hedw.)
Moenk.

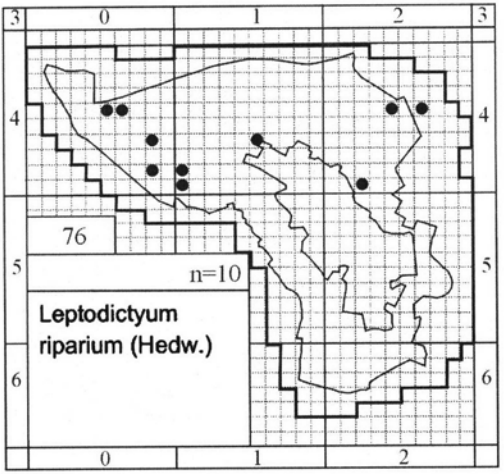

71
Ch. cz. n=62
Hylocomium
splendens (Hedw.)
B., S. & G.

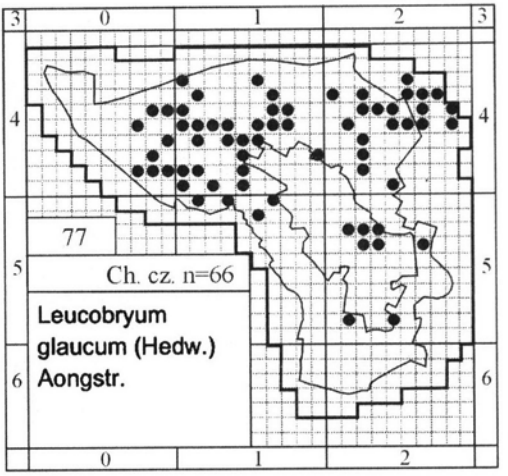

72
n=129
Hypnum
cupressiforme
Hedw.

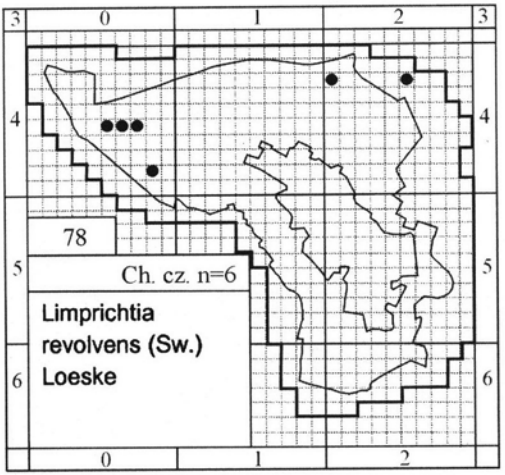

73
n=13
Hypnum
pallescens (Hedw.
P. Beauv.

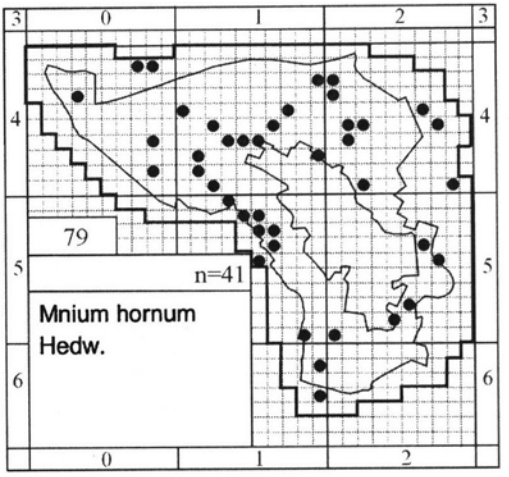

74
I
n=2
Leptodictyum
humile (P. Beauv.)
Ochyra

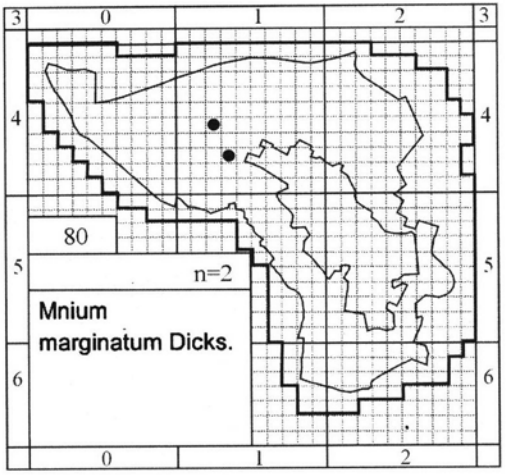

75
n=1
Leptobryum
pyriforme (Hedw.)
Wils.

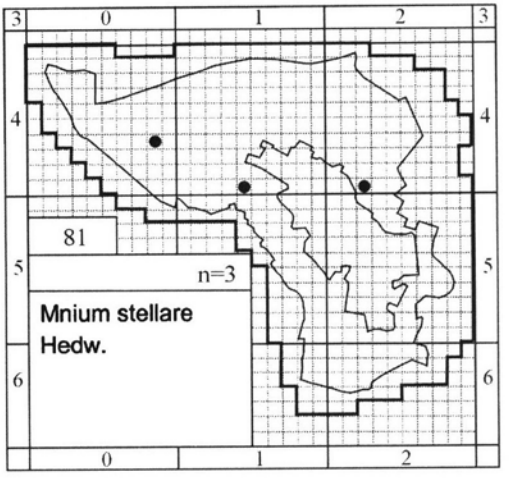

76
n=10
Leptodictyum
riparium (Hedw.)

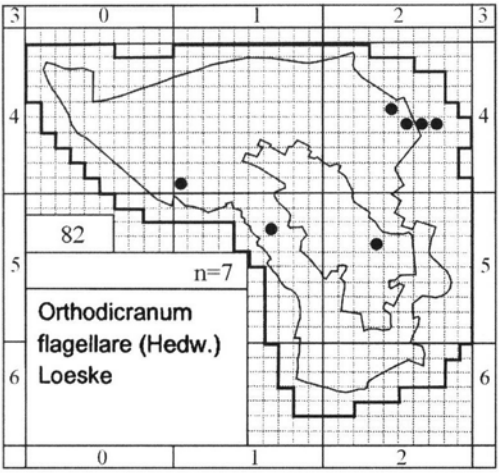

77
Ch. cz. n=66
Leucobryum
glaucum (Hedw.)
Aongstr.

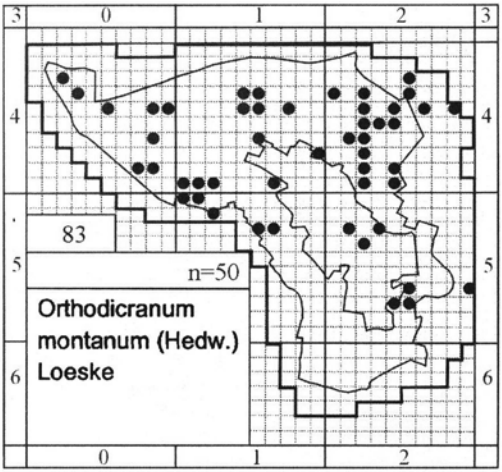

78
Ch. cz. n=6
Limprichtia
revolvens (Sw.)
Loeske

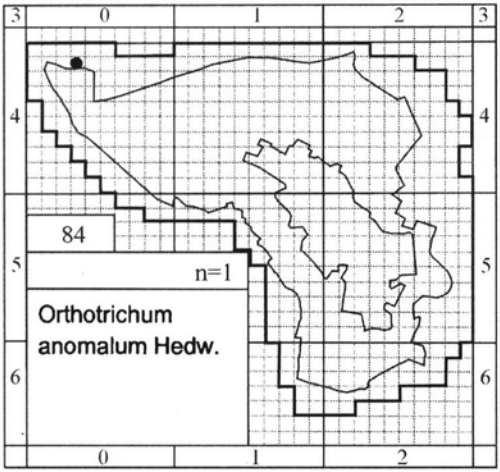

79
n=41
Mnium hornum
Hedw.

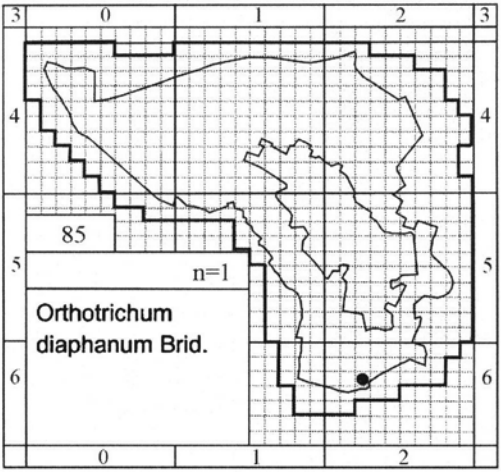

80
n=2
Mnium
marginatum Dicks.

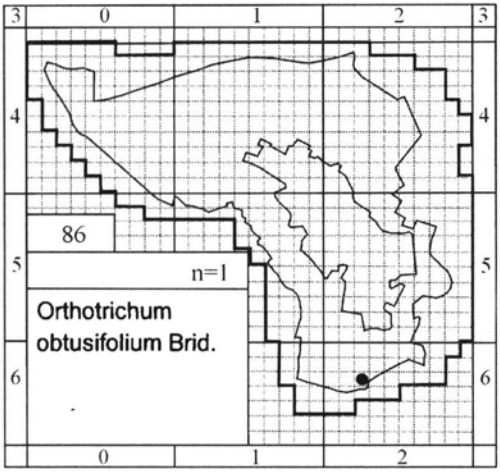

81
n=3
Mnium stellare
Hedw.

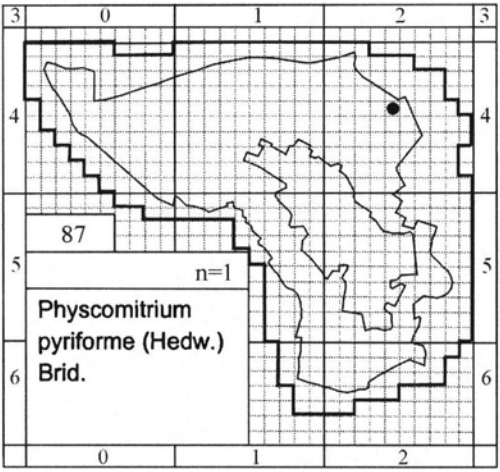

82
n=7
Orthodicranum flagellare (Hedw.) Loeske

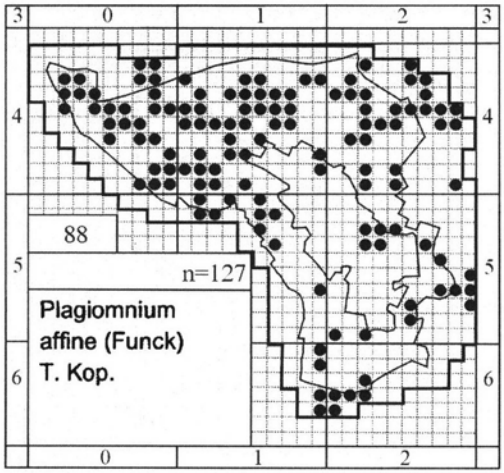

83
n=50
Orthodicranum montanum (Hedw.) Loeske

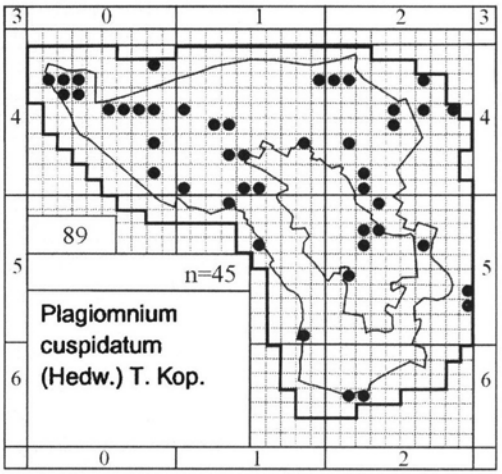

84
n=1
Orthotrichum anomalum Hedw.

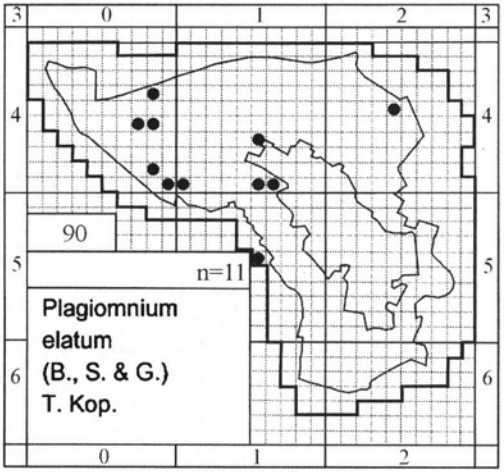

85
n=1
Orthotrichum diaphanum Brid.

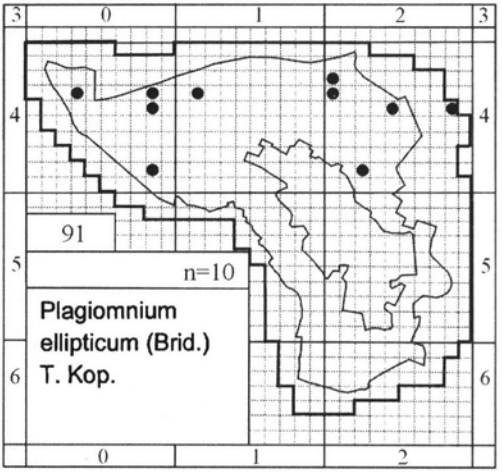

86
n=1
Orthotrichum obtusifolium Brid.

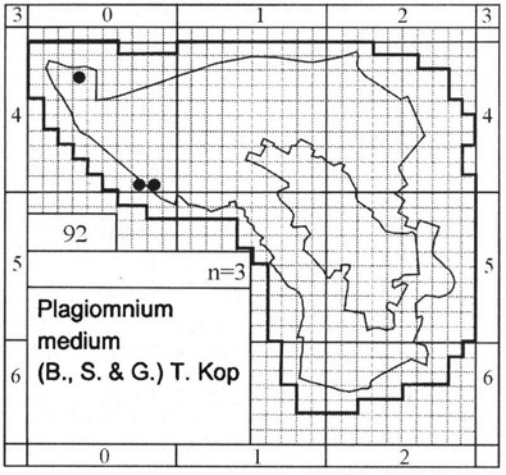

87
n=1
Physcomitrium pyriforme (Hedw.) Brid.

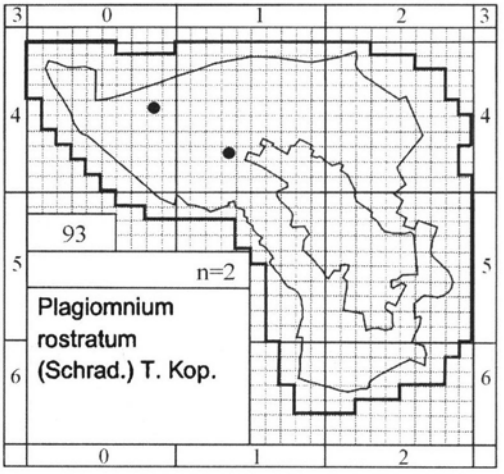

88
n=127
Plagiomnium
affine (Funck)
T. Kop.

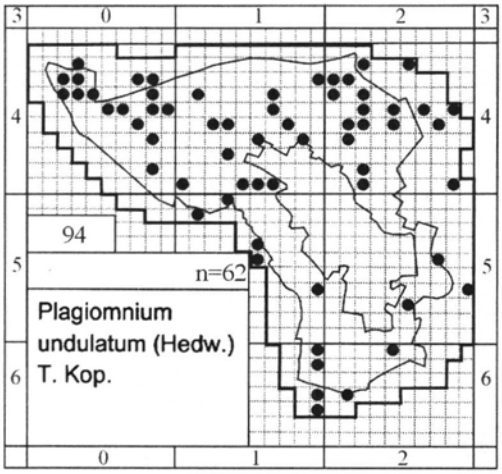

89
n=45
Plagiomnium
cuspidatum
(Hedw.) T. Kop.

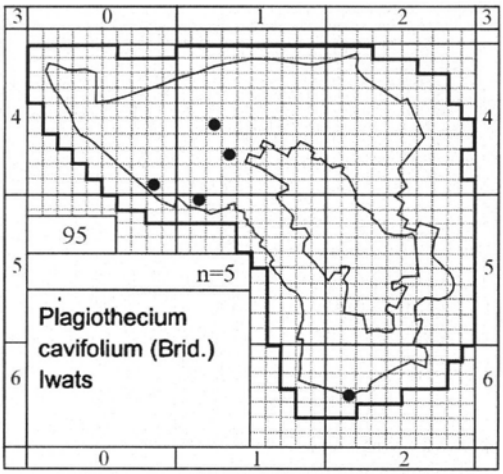

90
n=11
Plagiomnium
elatum
(B., S. & G.)
T. Kop.

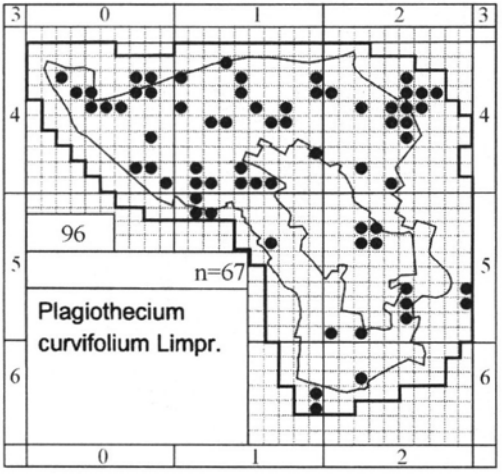

91
n=10
Plagiomnium
ellipticum (Brid.)
T. Kop.

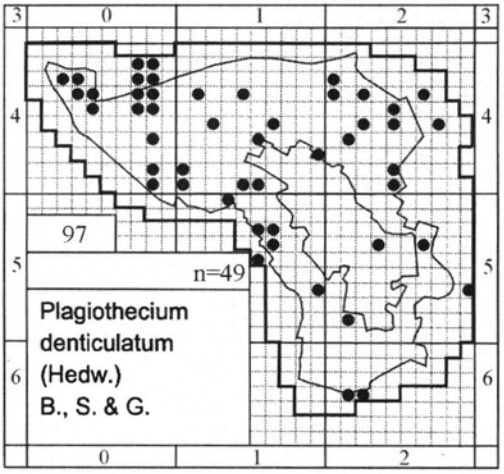

92
n=3
Plagiomnium
medium
(B., S. & G.) T. Kop

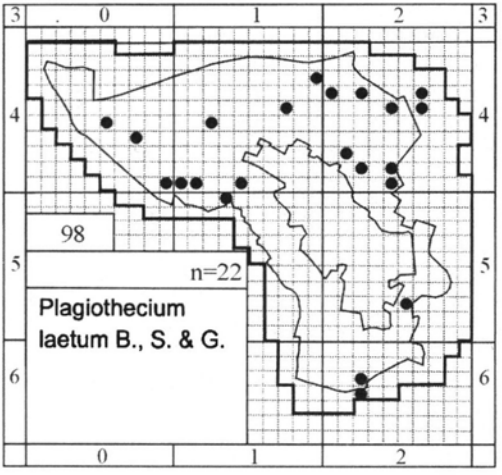

93
n=2
Plagiomnium
rostratum
(Schrad.) T. Kop.

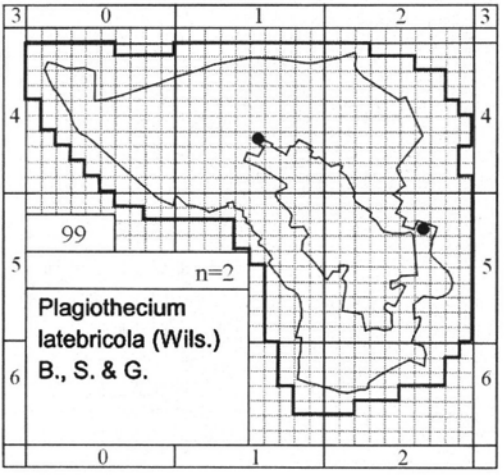

94
n=62
Plagiomnium undulatum (Hedw.) T. Kop.

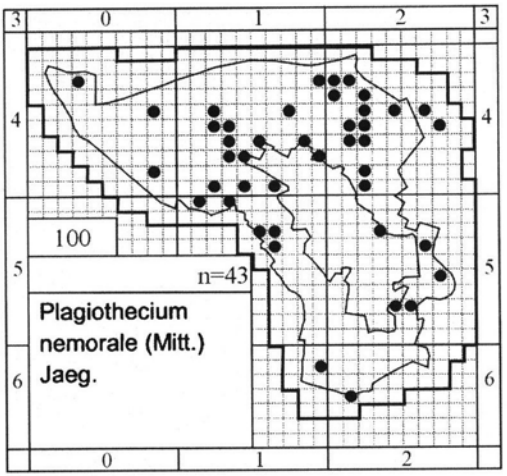

95
n=5
Plagiothecium cavifolium (Brid.) Iwats

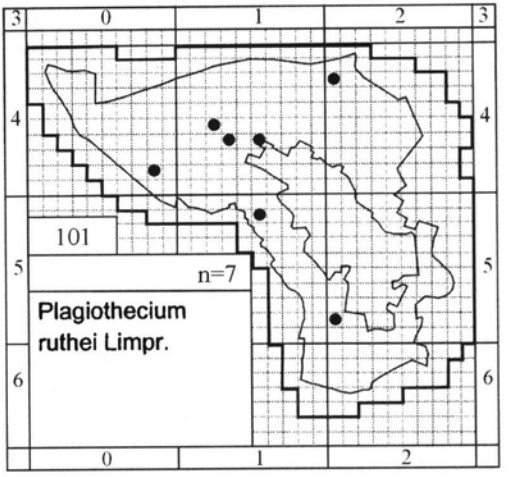

96
n=67
Plagiothecium curvifolium Limpr.

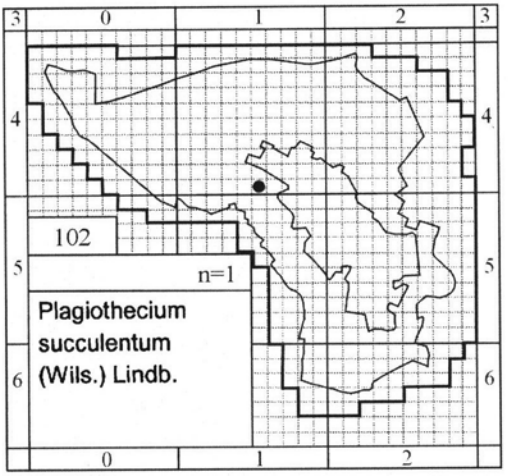

97
n=49
Plagiothecium denticulatum (Hedw.) B., S. & G.

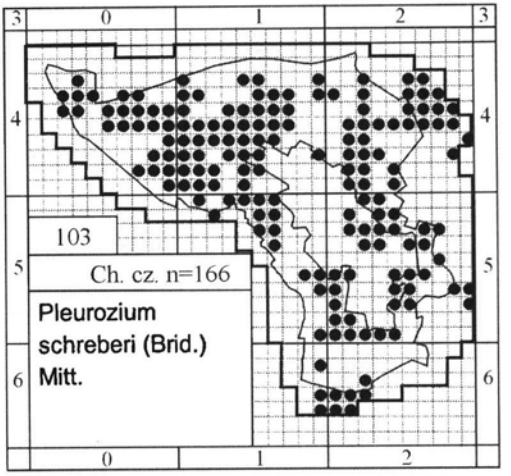

98
n=22
Plagiothecium laetum B., S. & G.

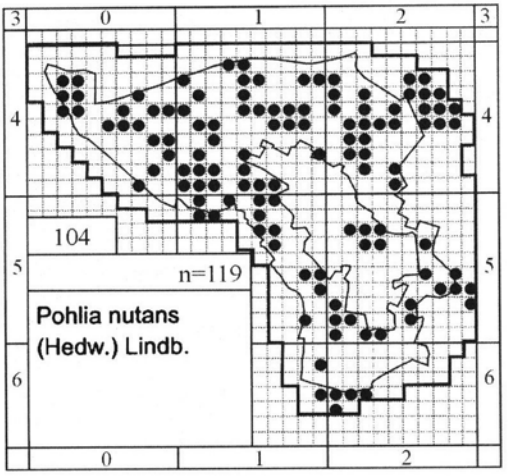

99
n=2
Plagiothecium latebricola (Wils.) B., S. & G.

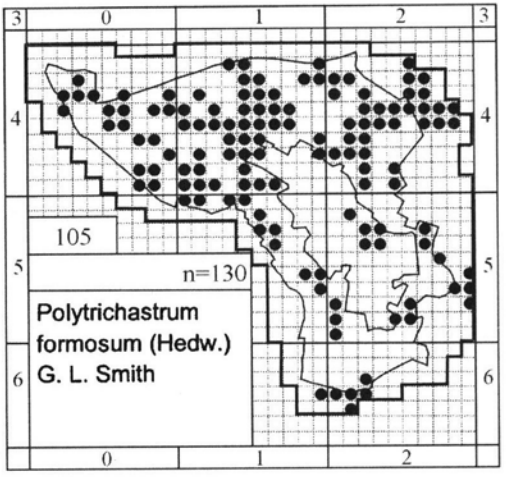

100
n=43
Plagiothecium
nemorale (Mitt.)
Jaeg.

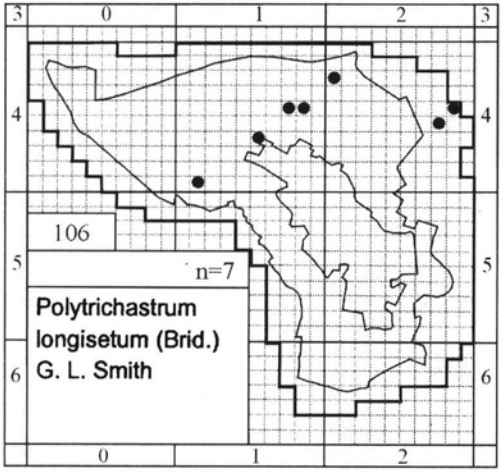

101
n=7
Plagiothecium
ruthei Limpr.

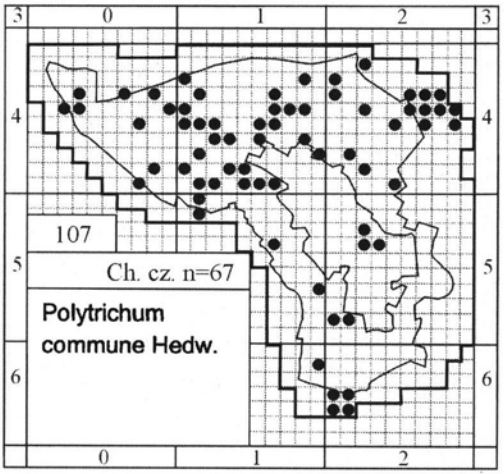

102
n=1
Plagiothecium
succulentum
(Wils.) Lindb.

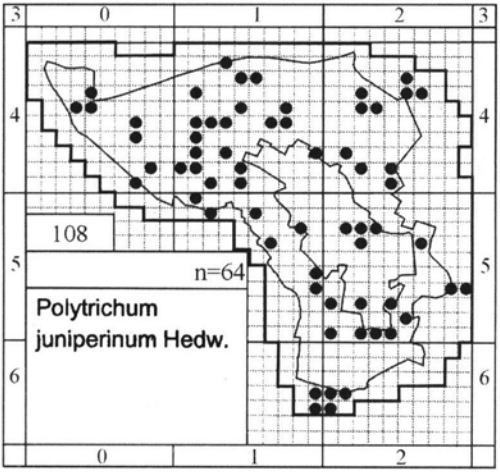

103
Ch. cz. n=166
Pleurozium
schreberi (Brid.)
Mitt.

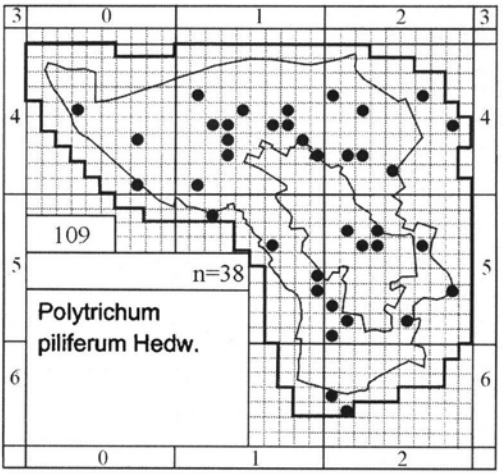

104
n=119
Pohlia nutans
(Hedw.) Lindb.

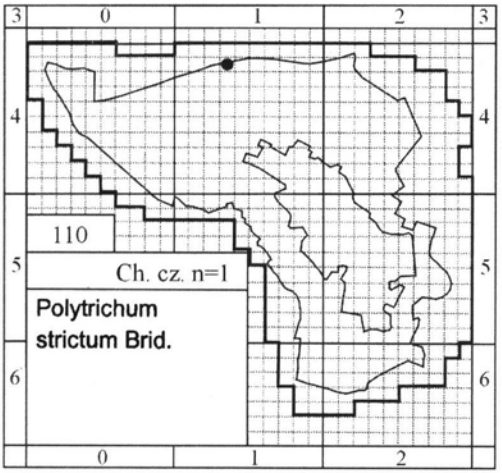

105
n=130
Polytrichastrum
formosum (Hedw.)
G. L. Smith

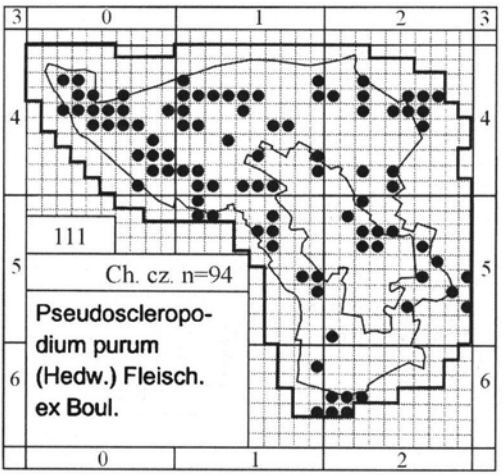

106
n=7
Polytrichastrum longisetum (Brid.) G. L. Smith

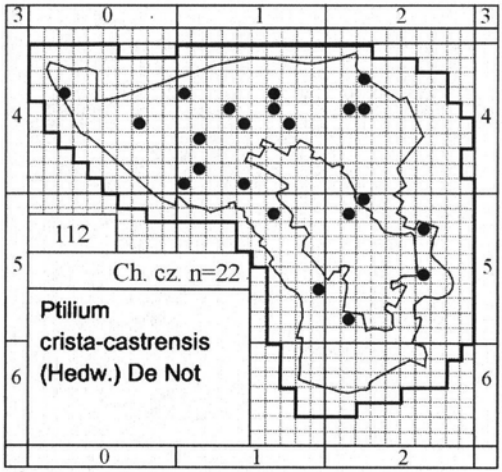

107
Ch. cz. n=67
Polytrichum commune Hedw.

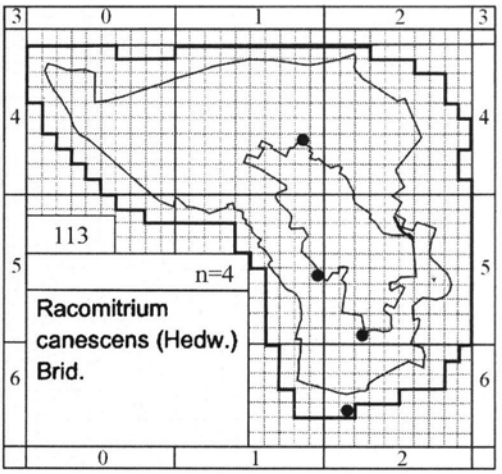

108
n=64
Polytrichum juniperinum Hedw.

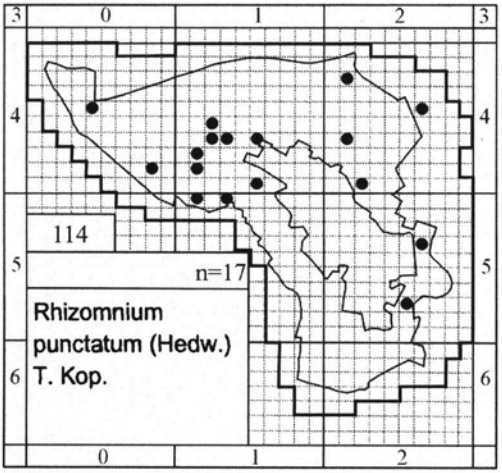

109
n=38
Polytrichum piliferum Hedw.

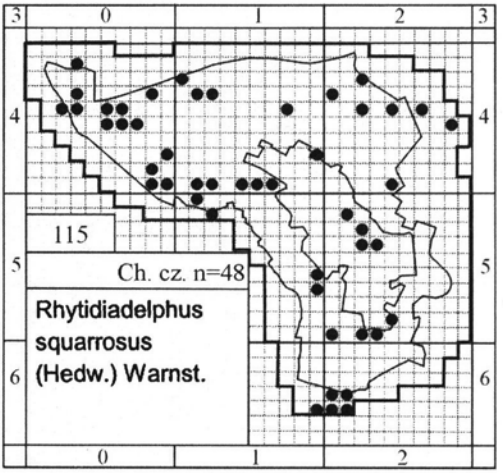

110
Ch. cz. n=1
Polytrichum strictum Brid.

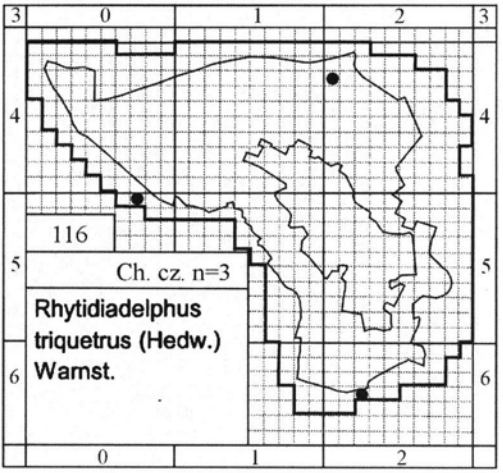

111
Ch. cz. n=94
Pseudoscleropodium purum (Hedw.) Fleisch. ex Boul.

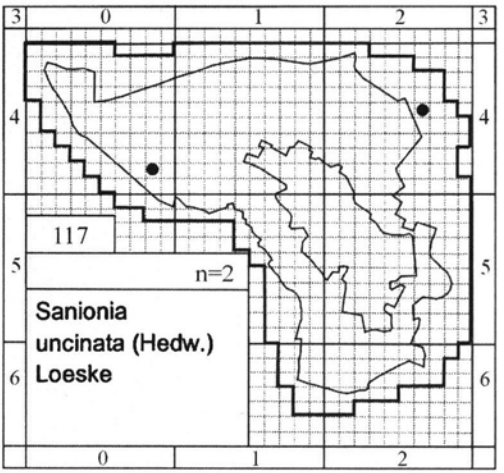

112
Ch. cz. n=22
Ptilium
crista-castrensis
(Hedw.) De Not

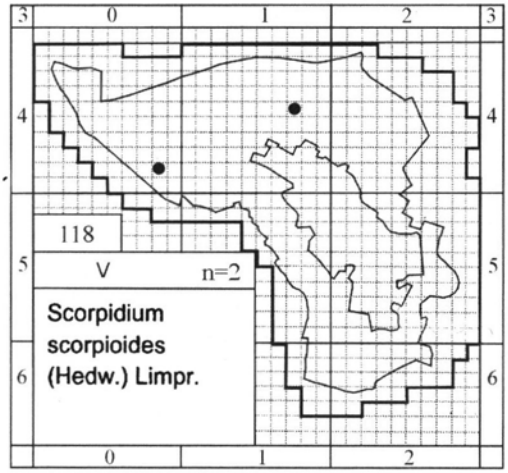

113
n=4
Racomitrium
canescens (Hedw.)
Brid.

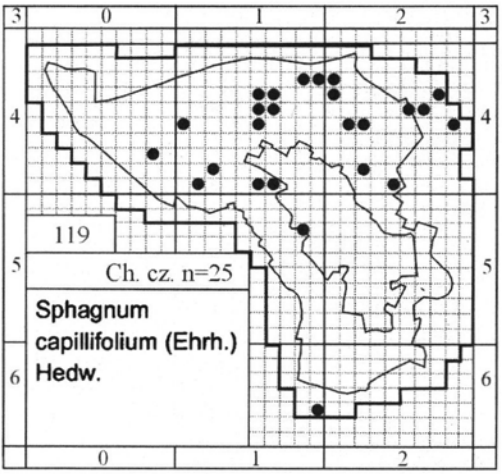

114
n=17
Rhizomnium
punctatum (Hedw.)
T. Kop.

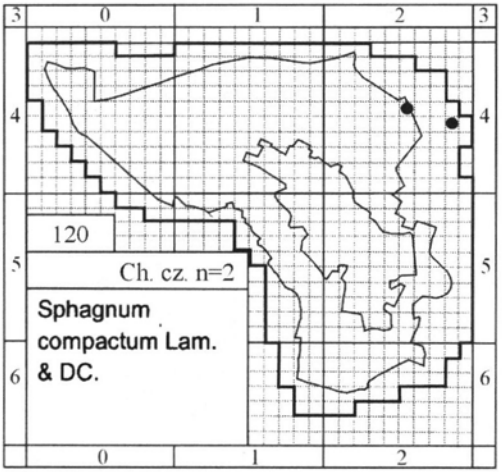

115
Ch. cz. n=48
Rhytidiadelphus
squarrosus
(Hedw.) Warnst.

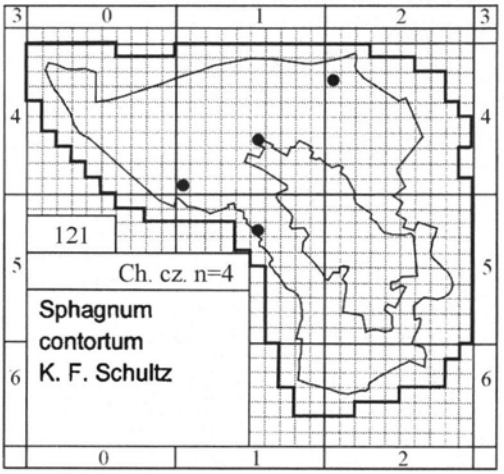

116
Ch. cz. n=3
Rhytidiadelphus
triquetrus (Hedw.)
Warnst.

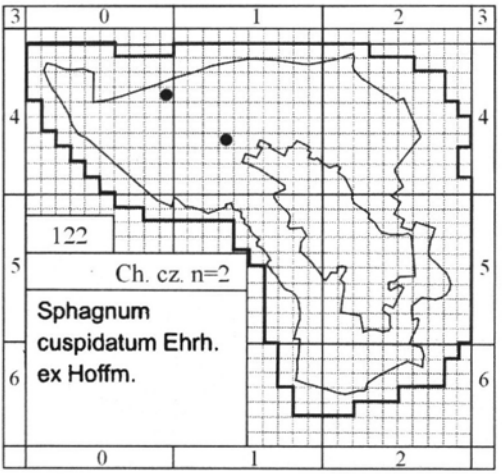

117
n=2
Sanionia
uncinata (Hedw.)
Loeske

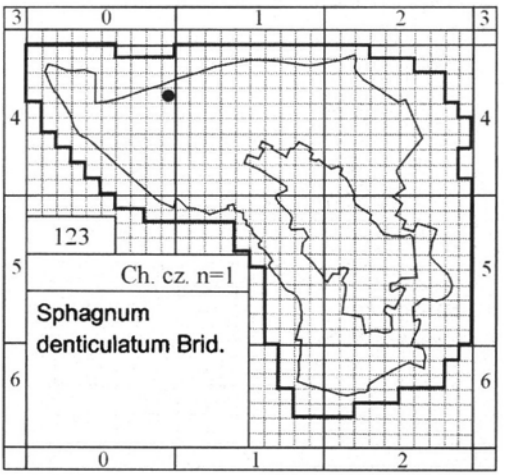

118
V
n=2
Scorpidium
scorpioides
(Hedw.) Limpr.

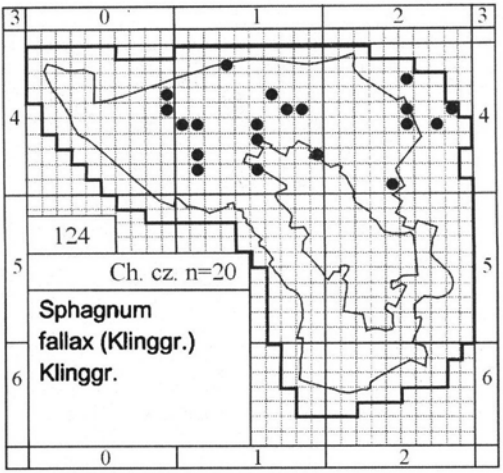

119
Ch. cz. n=25
Sphagnum
capillifolium (Ehrh.)
Hedw.

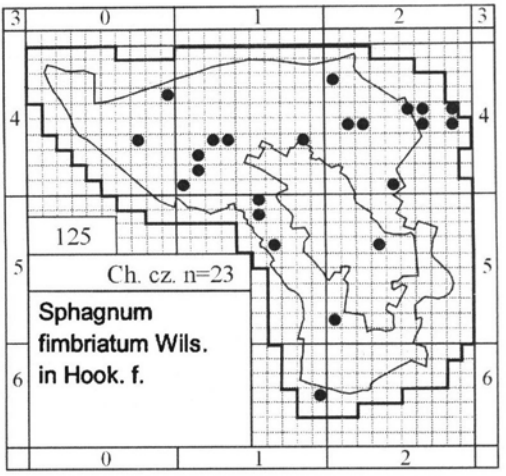

120
Ch. cz. n=2
Sphagnum
compactum Lam.
& DC.

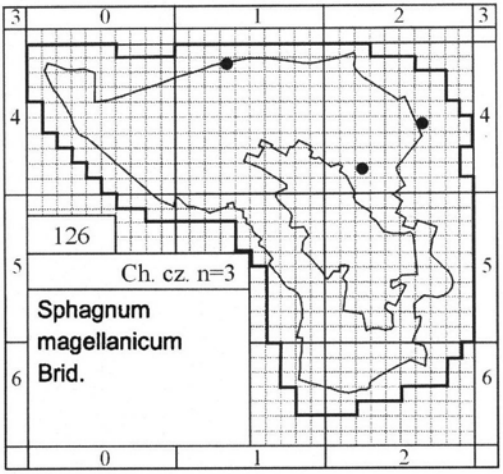

121
Ch. cz. n=4
Sphagnum
contortum
K. F. Schultz

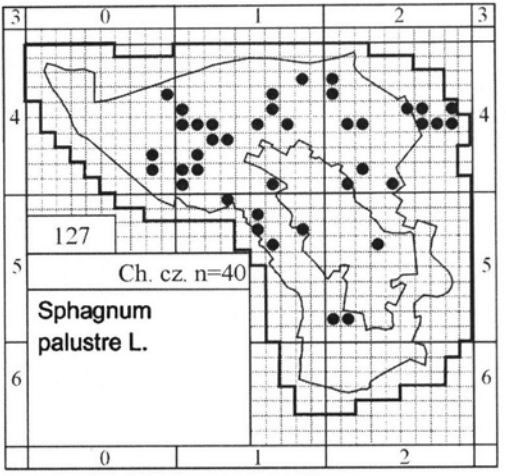

122
Ch. cz. n=2
Sphagnum
cuspidatum Ehrh.
ex Hoffm.

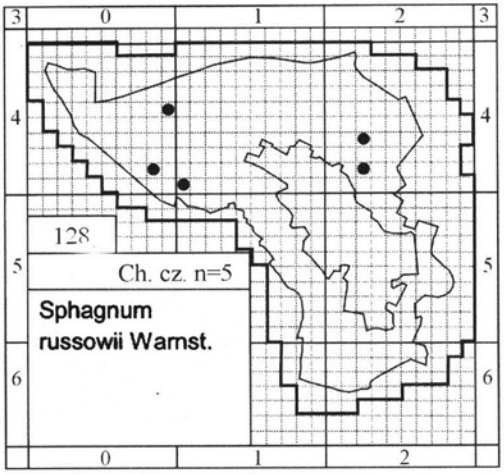

123
Ch. cz. n=1
Sphagnum
denticulatum Brid.

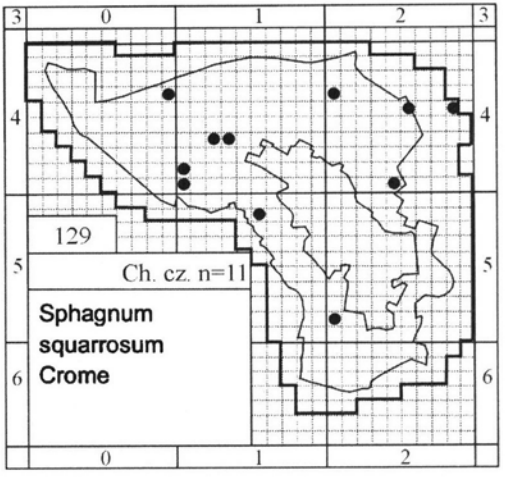

124
Ch. cz. n=20
Sphagnum
fallax (Klinggr.)
Klinggr.

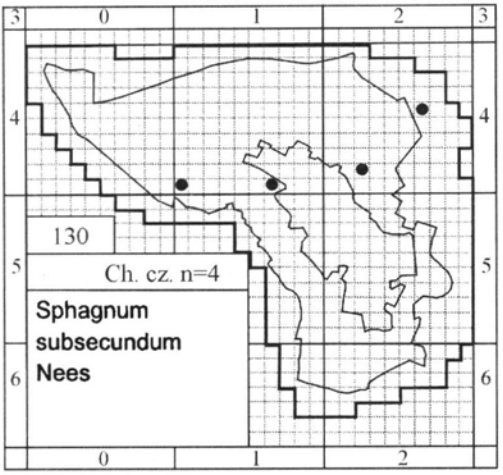

125
Ch. cz. n=23
Sphagnum
fimbriatum Wils.
in Hook. f.

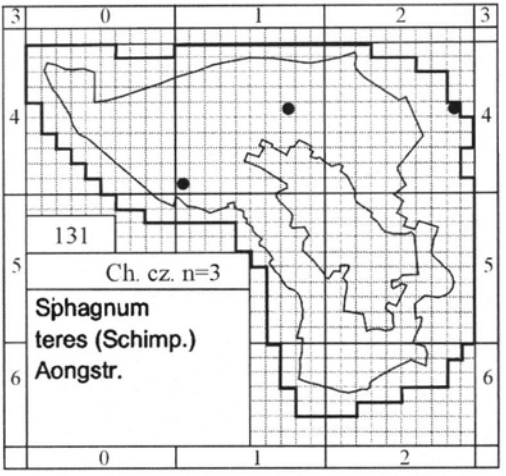

126
Ch. cz. n=3
Sphagnum
magellanicum
Brid.

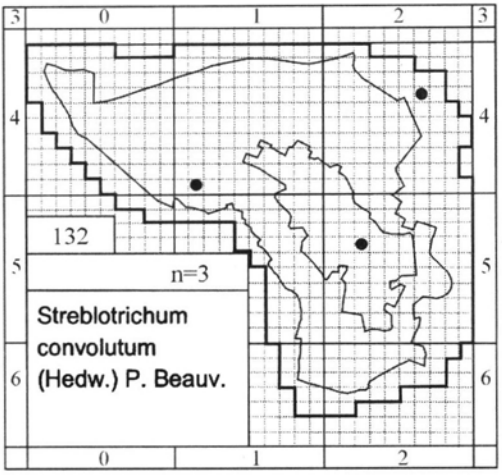

127
Ch. cz. n=40
Sphagnum
palustre L.

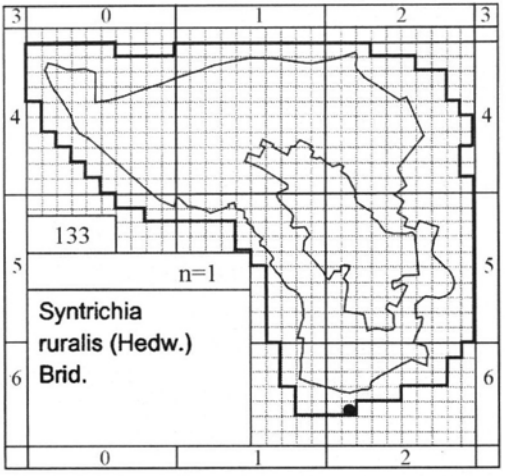

128
Ch. cz. n=5
Sphagnum
russowii Warnst.

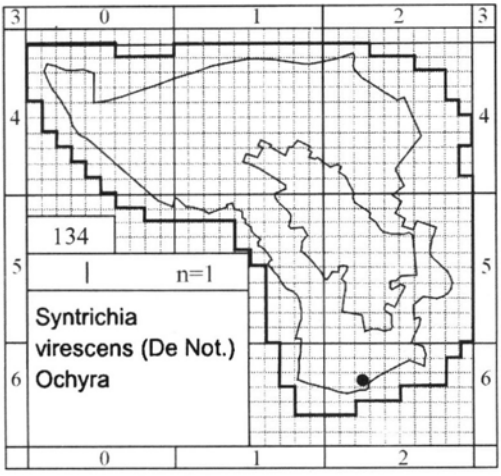

129
Ch. cz. n=11
Sphagnum
squarrosum
Crome

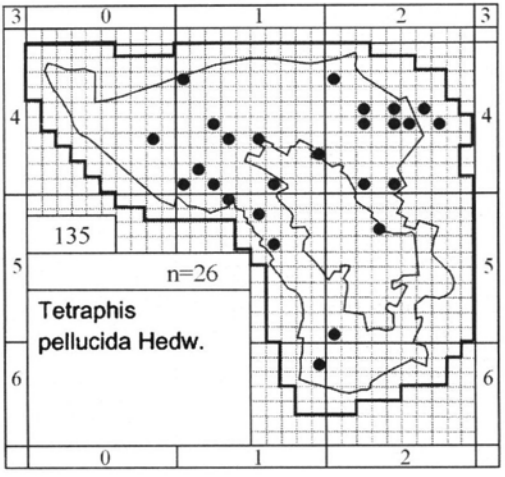

130
Ch. cz. n=4
Sphagnum
subsecundum
Nees

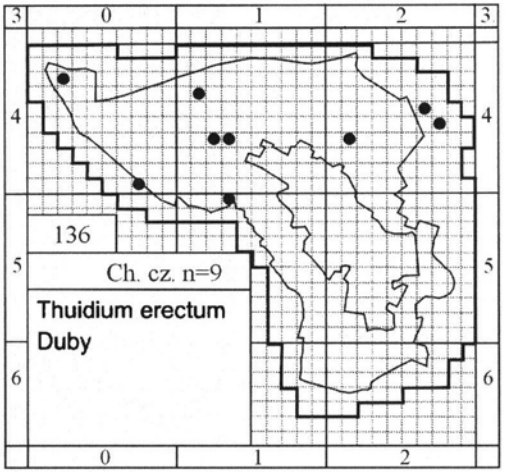

131
Ch. cz. n=3
Sphagnum
teres (Schimp.)
Aongstr.

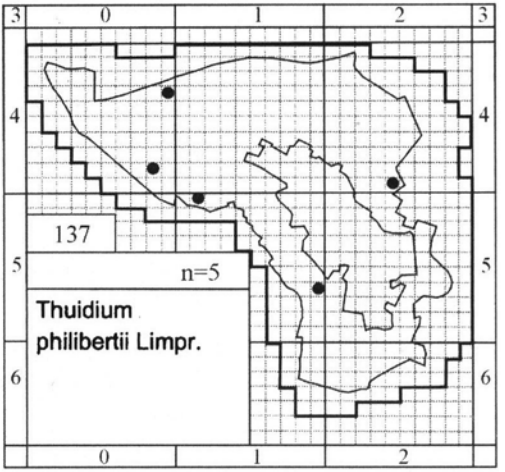

132
n=3
Streblotrichum
convolutum
(Hedw.) P. Beauv.

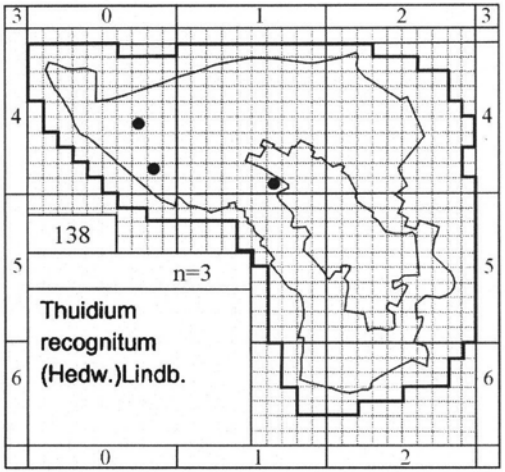

133
n=1
Syntrichia
ruralis (Hedw.)
Brid.

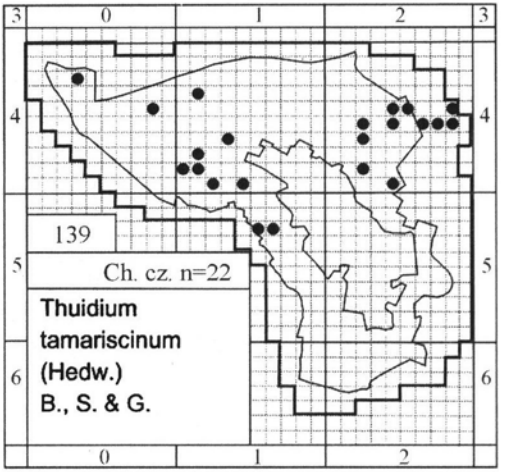

134
n=1
Syntrichia
virescens (De Not.)
Ochyra

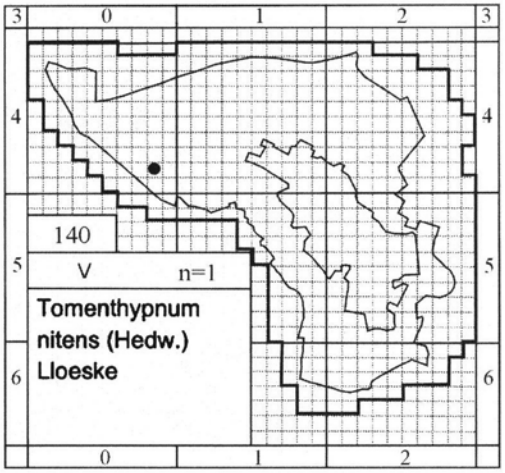

135
n=26
Tetraphis
pellucida Hedw.

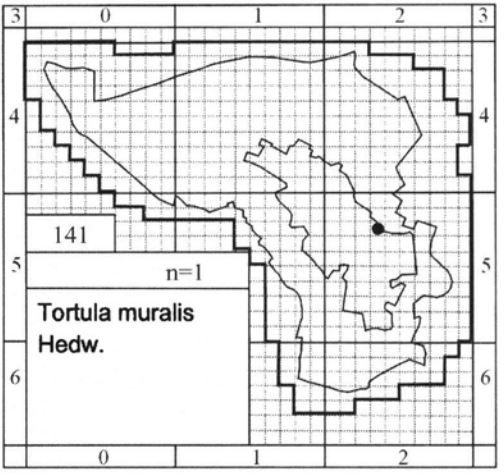

136
Ch. cz. n=9
Thuidium erectum Duby

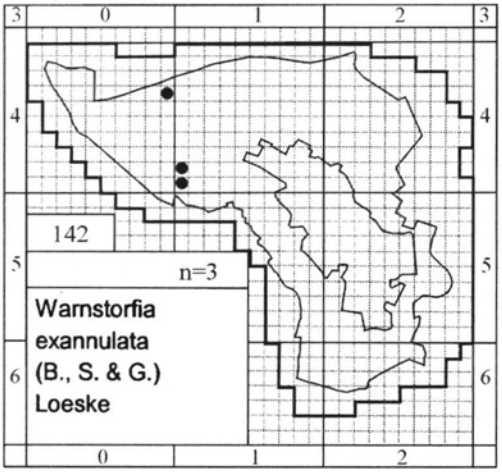

137
n=5
Thuidium philibertii Limpr.

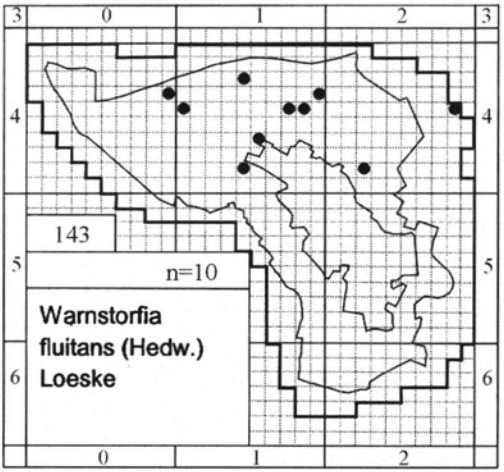

138
n=3
Thuidium recognitum (Hedw.)Lindb.


139
Ch. cz. n=22
Thuidium tamariscinum (Hedw.) B., S. & G.


140
V
n=1
Tomenthypnum nitens (Hedw.) Lloeske


141
n=1
Tortula muralis Hedw.


142
n=3
Warnstorfia
exannulata
(B., S. & G.)
Loeske


143
n=10
Warnstorfia
fluitans (Hedw.)
Loeske