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The vascular flora and vegetation on the Szabadszállás-Fülöpszállás territory of the Kiskunság National Park (KNP), I.

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ABSTRACT: The investigated area is situated in central Hungary, in the neighbourhood of Szabadszállás and Fülöpszállás villages. The natural vascular flora - including the ruderals and weeds - was studied on the basis of the author's collections and coenological mappings in the years 1977-78. The composition of the flora was analysed according to the life-form, coenological and phytogeographical characters of the species then by comparing the corresponding distributions of the Hungarian flora, an attempt is made at phytogeographical and historical characterizing of the protected area.

The third unit of KNP has been protected since 1974, principally because of its extremely rich bird fauna. It belongs to the floral district Colocense of the Eupannonicum in the Central European region of the Holarctic floral imperium. Its area comprises 3906 ha. The natural vegetation is composed of sodic deserts and ponds and to a smaller extent fragments of marshy, sandy and loessic meadows. The agricultural and ruderal places take up a considerable area too. The botanical values of the area have been less known. There is no comprehensive work on the flora and vegetation of the Solti-plain - the part of the floral district Colocense, to which our area belongs. Our knowledge has been derived from the data of collections, diaries and sporadic publications, and particularly from the generalization of the data of other sodic-like areas, e.g. Kiskun desert at Kunszentmiklós. Also the data from Szabadszállás (by ANDRASOVSZKY, DEGEN, LENGYEL, BOROS, JÁVORKA) are unsatisfying precise, they give only the name of village. For the purpose of a more effectiv nature conservation become necessary a more detailed investigation of the protected areas based on a thorough field work, which I made

whithin the scope of the research agreement between the KNP and Museum of Natural History, Budapest, in 1977-1978. years.

I express my thanks Dr. SZUJKÓ-LACZA J., Dr. FEKETE G. and Dr. KOVÁTS D. for their valuable help in this work.

In 1977 I made 30 excursions for collection and in 1978 in the course of coenological mapping I was on the field in 15 cases. I collected all the occurring species and they were determined from JÁVORKA (1925), SOÓ-JÁVORKA (1951), SOÓ-KÁRPÁTI (1969). The infraspecific taxa are given according to SOÓ (1964-). The list of species contains all the spontaneously and subspontaneously growing plants, but not the cultivated ones. Investigating the relationships with the neighbouring areas, in several cases I collected near the protected areas, namely the meadow "Gulyás kaszáló" (9281 af, ag, bf, bg squares of the map, for the interpretation of the marking, see below), and the hill "Oltó halom" (9281 eaAA). The first place ranged over neighbouring floral district Praematricum, but the boundary is not sharp, it extends over our area too. The meadow of "Gulyás kaszáló" contain some valuable floral elements, e.g. Iris sibirica L., Iris spuria L., Ophrys sphegodes MILL., Orchis x Timballi VELEN, and others, so it can be proposed for protection.

The second place, the "Oltó halom", is an artificial sandy hill, but its vegetation, in spite of its strong ruderalization, contains interesting species, which had been found previously, probably also in the protected areas.

TAXONOMICAL PROBLEMS - The critical taxa were investigated by a comparison with the sheet of individuals occurring in the herbarium of the Natural History Museum Budapest. However, some taxonomical problems remained unsolved. The collected Hieracia ssp. could not be determined to subspecies, because the herbarial specimens determined and described by ZAHN did not correspond even in essential marks to his own descriptions in ZAHN (1921, 1923). There were similar problems with the thymians too. The infraspecific determination of certain extremely variable taxa, e.g. Chenopodium album L., Crepis tectorum L., Thalictrum minus L. was not even attempted.

The nanisms, appearing under the extreme ecological conditions of sodic soils probably have no taxonomical value, being only phenotypes. On other places of our area on a better soil they grow normally. Perhaps the Erigeron acris L. can be an exception, because it occurs on the whole area only in pygmaean form. Another similar plant is the Orobanche cumana WALLR. This plant has been in Hungary since the 30ies and 40ies of this century as a weed of sunflower, tobacco and other cultivated plants. There is a herbarial specimen also from Fülöpszállás, collected by JÁVORKA in a sunflower field. In the area I have never seen it in plantations, but it is widespread in the Artemisio-festucetum pseudovinae communities living on Artemisia maritima L. ssp. monogyna (W. et K.) GAMS. The Orobanche appears in a dwarf form (10-15 cm high with 8-15 flowers), but some occurring members (less than 0.1%) approached the type. Some Rorippa taxa were collected which were subjected to further taxonomical investigations.

NEW FLORISTIC DATA - The new floristic data are published in an other paper (F. NÉMETH in print). From the 10 newly established species, 6 are adventive ruderals or weeds. From the rest the Allium paniculatum L. ssp. marginatum (JANKA) SOÓ seems to be the most important. This medi-

terranean plant is very rare on the Great Hungarian Plain, probably as a post-glacial relict in loessic meadows. The Spiranthes spiralis (L.) CHEVALL., this atlantic-mediterranean element is interesting too, but its phytogeographical, coenological and ecological role is not clearly know.

MARKINGS - The nomenclature follows SOÓ (1964) and SOÓ (1973). The list of species is drawn up according to EHRENDORFER (1973). The general markings of the species frequency are as follows: com. (=common), fr. (=frequent), n.fr. (= not frequent), r. (=rare). These markings concern the whole or a considerable part (with the code marked) of the area. The marking loc. (=local) refers to some parts or points of area marked by code-numbers and letters (see below). In order to give precisely the places of occurrence the code-numbers are given by the Central European Floristic Mapping (NIKLFELD 1971). For a more exact description a more detailed distribution of square (SZUJKÓ-LACZA, J.-FEKETE, G.-SZABÓ, L.-SIROKI, Z. 197) is necessary. The marking of subsquare goes from a till j, namely the first letter represents the horizontal coordinate, the second letter the vertical one, (see the map). There are some local species, which need to be localized from the viewpoint of protection with much greater accuracy. Their places of occurrence are marked with the most detailed distribution, namely with big letters from A till J, and the first letter represents the horizontal, the second one the vertical coordinates (see the map).

The occurrences on the neighbouring places are given only in such cases, when the plant in the area is local or was not found.

There are two main parts the region, which strongly differ floristically from the others, they contain many relicts and adventive elements. They are the "Kigyós" channel in the subsquares 9280 aj, bj, 9281 ba, ca, da, ea, marked by C, and the railway substructure in subsquares 9181 cc, dc, ec, fd, gd, hd, he, ie, marked by R. (see the map).

List of species

Pteridophyta

Equisetum ramosissimum DESF.: n.fr. R.

Dicotyledons

Achillea collina BECKER: com.
nobilis L. ssp Neilreichii (KERN.) FORM.: r.
pannonica SCHEELE: loc. 9181gaGI, ebHJ
setacea W. et K.: fr.
Adonis aestivalis L.: fr.
flammea JACQ.: fr.
Agrimonia eupatoria L.: n.fr.
Ailanthus altissima (MILL.) SWINGLE: loc. 9281da
Ajuga chamaepytis (L.) SCHREB. ssp. ciliata (BRIQ.) SMEJKAL: com.
genevensis L.: loc. 9281baFE

Althaea officinalis L.: fr. 9181id, jd, jc, 9281 ac, bc, C
Alyssum alyssoides (L.) NATH.: loc. 9280aj, bj
Amaranthus albus L.: fr.
blitoides S. WATSON: n.fr.
retroflexus L.: com.
Ambrosia elatior L.: r.
Anagallis arvensis L.: com.
femina MILL.: fr.
Anchusa officinalis L.: r.
Anthemis austriaca JACQ.: fr.
Anthriscus cerefolium (L.) HOFFM. ssp. trichospermum (SPR. in R. et SCH.) ARC.: loc. 9181hbBF, hbBG
Arctium lappa L.: n.fr.
minus (HILL) BERNH.: loc 9281acBE
Arenaria serpyllifolia L.: com.
Artemisia annua L.: r.
Artemisia maritima L. ssp. monogyna (W. et K.) GAMS.: com.
pontica L.: loc. 9181ibBH
vulgaris L.: com.
Asclepias syriaca L.: loc. 9181idHH
Asperugo procumbens L.: fr.
Aster linosyris (L.) BERNH.: loc. 9181ibHC, ibHD, 9280aj
tripolium L. ssp. pannonicus (JACQ.) SOÓ: com.
Astragalus asper WULF.: fr. 9181ha, ia, 9280aj, bj, 9281db, cb, cc
austriacus JACQ.: n.fr.
cicer L.: loc. R, 9281bbAA
exscapus L.: loc. 9181iaII, iaHJ
Atriplex hastata L.: com.
var. salina WALLR.: n.fr. 9181ca, db
litoralis L.: n.fr.
patula L.: fr.
tatarica L.: com.
Ballota nigra L.: n.fr.
Batrachium Petiveri (KOCH) F. SCHULTZ: fr.
trichophyllum (CHAIX) F. SCHULTZ: fr.
Berteroa incana (L.) DC.: loc. 9281eaAA
Bidens tripartitus L.: loc. 9181hbCE
Bilderdykia convolvulus: com.
Blackstonia acuminata (KOCH et ZIZ.) DOMIN: loc. 9181ebAD, ebBD, gdCE, gdDE, 9281acBD, af
Bupleurum tenuissimum L.: fr.
Calamintha acinos (L.) CLAIRV.: loc. 9181ecEH, ecDH
clinopodium SPENNER: loc. 9181jdCB
Calendula officinalis L.: loc. 9181ecII
Camelina microcarpa ANDRZ.: fr.
Campanula glomerata L.: loc. 9280bjDG
Camphorosma annua PALL.: com.
Cannabis sativa L. ssp. spontanea SEREBR.: n.fr.
Capsella bursa-pastoris (L.) MEDIC.: com.
Cardaria draba DESV.: com.

Carduus acanthoides L.: n. fr.
nutans L. ssp. macrolepis (PETERM.) KAZMI: fr.
Carlina vulgaris L. ssp. intermedia (SCHUR) HAY. et MARKGR.: n. fr. 9281
Caucalis platycarpos L.: n. fr.
Centaurea arenaria M. B. ssp. Tauscherii (KERN.) SOÓ: loc. 9281af
cyanus L.: fr.
pannonica (HEUFF.) SIMK.: com.
Sadleriana JANKA: fre. R, C, 9181ha, ia, id
solstitialis L.: 9181fbDH, loc.
Centaurium minus MÖNCH: loc. 9181ec, fd, 9281ac
pulchellum (SW.) DRUCE: fr.
vulgare RAF. ssp. uliginosum (W. et K.) SOÓ: fr. 9181fd, gd, he, ie, id, jc
Cerastium pumilum: fr.
fontanum BAUMG. ssp. triviale (LINK) JALAS: fr.
Ceratophyllum demersum L.: loc. C
Chaenorrhinum minus (L.) LGE.: fr.
Chenopodium album L.: com.
chenopodioides (L.) AELLEN: loc. 9181fa, ga, ec
glaucum L.: fr.
hybridum L.: r.
urbicum L.: fr.
vulvaria L.: r.
Cichorium intybus L.: fr.
Cirsium arvense (L.) SCOP.: fr.
canum (L.) M. B.: loc. 9281abEC, abFC
vulgare (SAVI) TEN.: fr.
Conium maculatum L.: fr.
Consolida regalis S. F. GRAY: com.
orientalis (GAY.) SCHRÖD.: loc. 9281ag
Convolvulus arvensis L.: com.
Coronilla varia L.: fr.
Coronopus squamatus (FORSKÅL) ASCH.: r.
Crataegus monogyna JACQ.: loc. 9181jdCB, 9281da
Crepis rhoedifolia M. B.: com.
setosa HALL f.: com.
tectorum L.: loc. 9281cb, eaAA
Cruciata pedemontana (BELL.) EHREND.: loc. C
Cuscuta epithymum (L.) MURR: n. fr.
Datura stramonium L.: fr.
Daucus carota L.: com.
Descurainia sophia (L.) WEBB: fr.
Dianthus pontederae KERN.: loc. 9281ag
Diplotaxis muralis (L.) DC.: r.
tenuifolia (JUSL.) DC.: fr.
Echium vulgare L.: fr. R, C
Elaeagnus angustifolia L.: loc. C, 9181ec, ia
Epilobium hirsutum L.: r. 9181eb, 9281ab, cb
tetragonum L. ssp. Lamyi (F; SCHULTZ) ARCANG.: loc. 9181ibCA

Erigeron acris L.: loc. 9181jdCB, 9281ab, cb
canadensis L.: com.
Erodium cicutarium (L.) L' HÉRIT: fr. R, r.
Erophila verna (L.) CHEVALL: fr.
Eruca sativa MILL.: fr.
Erucastrum nasturtiifolium (POIR.) O. E. SCHULTZ: loc. 9281aa
Eryngium campestre L.: r.
Euphorbia cyparissias L.: fr.
esula L.: n.fr. R
ssp. pinifolia (LAM.) A. et G.: fr.
exigua L.: r. 9181jc, 9281ac
falcata L. com.
helioscopia L.: fr.
virgata W. et K.: n.fr. 9181ha, ia, R
Euphrasia tatarica FISCH.: loc. 9181fd, gd, jdCB
Falcaria vulgaris BERNH.: loc. 9181iaHI
Filipendula vulgaris MÖNCH: loc. 9181ecDH, gaGI, haIH, idHI
Fragaria vesca L.: loc. 9181gaGI, haJH, jaCG, 9280bjEE
Fumaria vaillantii LOIS.: loc. R
Galium aparine L.: loc. 9181fcDF, jc, 9281ac
glaucum L.: loc. 9181gaGI, jdCB
palustre L.: 9181fdEC, 9281abGC, loc.
verum L.: fr.
Geranium pusillum BURM.: n.fr., com. R
Gnaphalium luteo-album L.: fr. 9181fa, ea, jc, 9281ac
Gratiola officinalis L.: loc. 9281abGC, af, ag, bg
Gypsophila paniculata L.: loc. 9281af
Heliotropium europaeum L.: com.
Hibiscus trionum L.: fr.
Hieracium Bauhinii SCHULT. ap. BESS.: fr.
pilosella L.: n.fr.
Holosteum umbellatum L.: fr.
Hyoscyamus niger L.: fr.
Hypericum perforatum L. ssp. angustifolium (DC.) GAUD.: loc. 9181ha, ia, 9281ac, ca, cb
Inula britannica L.: fr.
Kickxia elatine (L.) DUM.: fr.
spuria (L.) DUM.: com.
Lactuca saligna L.: fr.
serriola TORN.: fr.
Lamium amplexicaule L.: fr.
Lappula squarrosa (RETZ) DUM.: n.fr.
Lathyrus pratensis L.: loc. 9281ab
tuberosus L.: fr.
Leontodon autumnalis L.: fr.
hispidus L.: loc. 9280bj, 9281ca, cb, da, db
nudicalyx (LAG.) H. P. FUCHS: fr.
Lepidium crassifolium W. et K.: com.
perfoliatum L.: fr.
ruderale L.: com.

Limonium Gmelinii (WILLD.) O. KTZE. ssp. hungaricum (KLOKOV) SOÓ: fr.
Linaria vulgaris MILL.: r., com. R
Linum austriacum L.: n.fr.
catharticum L.: loc. 9181gd, fd
Lithospermum arvense L.: n.fr.
Lotus corniculatus L.: fr.
tenuis W. et K.: com.
Lycium barbarum L.: 9181fcDF, fcEF
Lycopus europaeus L.: loc. C, 9181fb, 9281ab
Lythrum hyssopifolia L.: loc. 9181dbIF, 9281ac
salicaria L.: r.
virgatum L.: r.
Malcolmia africana (L.) R. BR.: loc. 9280bj, 9281ba
Malva pusilla SM.: fr.
silvestris L.: fr.
Marrubium peregrinum L. loc. 9281eaAA
remotum KIT.: r.
vulgare L.: n.fr. 9181fa, fc, ec, 9281aa
Matricaria chamomilla L.: com.
matricarioides (LESS.) PORTER: r.
maritima L. ssp. inodora (L.) SOÓ: com.
Medicago falcata L.: n.fr. 9281, r. 9181
lupulina L.: com.
minima DESR.: n.fr.
sativa L.: loc. 9281ac
varia MARTYN: loc. 9281ac
Melampyrum barbatum W. et K.: loc. 9281acBD
Melandrium album L.: com. C, R,
noctiflorum (L.) FR.: loc. 9181jdCB
Melilotus albus DESR.: fr.
officinalis LAM.: com.
Mentha aquatica L.: loc. 9181fb, jc, 9281ac
pulegium L.: com.
Myagrum perfoliatum L.: fr.
Myosotis ramosissima ROCH. ex SCHULT.: n. fr.
Myriophyllum spicatum L.: com.
Myriophyllum verticillatum L.: r. C
f. limosum (HECTOT) DC.: loc. 9181ebBJ
Nigella arvensis L.: com.
Nonnea pulla (L.) DC.: fr. R, n.fr. C
Odontites rubra (BAUMG.) OPIZ: n. fr.
Onobrychis viciifolia SCOP.: loc. C, R, 9281ab
Ononis spinosa L.: fr.
Onopordum acanthium L.: fr.
Orobanche cumana WALLR.: fr. 9181hb, gd, 9281bc, cb, cc, db
Papaver dubium L.: com.
rhoeas L.: fr.
Pastinaca sativa L. ssp. pratensis (PERS.) ČELAK: fr.
Picris hieracioides L.: n.fr., R: fr.
Pimpinella saxifraga L.: loc. 9181ebJH, iaIJ

Plantago altissima L.: n.fr. C, R
indica L.: loc.: 9281af
lanceolata L.: n.fr., R, C: com.
ssp. eriophora (HOFFM. et LINK) JÁV.: loc. 9281eaAA
ssp. sphaerostachya (M. et K.) HAY.: com.
major L.: com.
ssp. pleiosperma
maritima L.: com.
media L.: fr. R, C
Schwarzenbergiana SCHUR: 9181 com., 9281 r.
tenuiflora W. et K.: r. 9181jb, jc
Polygonum aviculare L. agg.: arenastrum BOR.: fr.
heterophyllum LINDMAN ssp. virgatum (PTERM.) H. SCHOLZ: com.
monspeliense THIÉBAUD: fr.
lapathifolium L.: fr.
ssp. pallidum (WITH.) FR.: fr.
mite SCHRK.: n.fr. C
patulum M.B. ssp. Kitaibelii (SADL.) JÁV.: fr.
persicaria L.: fr.
Populus alba L.: loc. C, R, 9181ec, fc
nigra L.: loc. C, R
Potentilla adscendens W. et K.: loc. 9181gdJI, jdCB, ibHA, 9281ba, ca, da, cb, db
anserina L.: com.
arenaria BORKH.: fr.
impolita WAHLBG. em. SOÓ: n.fr.
ssp. dissecta (WALLR.) SOÓ: n.fr.
recta L.: loc. 9181gdJI, iaHJ, 9281cb
reptans L.: fr., 9281ab, ac com.
Prunella laciniata NATH.: loc. 9181gdGG, hd, id, 9281acBD, baDF
vulgaris L.: fr. 9181fb, jc, 9281ab, ac
Prunus spinosa L.: loc. 9181jaCG, 9281daDG
Pulicaria vulgaris GÄRTN.: loc. 9181hb, jaCG, com.: 9281ae
Ranunculus arvensis L.: n.fr.
illyricus L.: loc. 9280bjGH
pedatus W. et K.: fr. 9181ec, ha, hd, ia, ic, id
polyanthemos L.: fr. C, 9281ab
repens L.: fr.
sardous CR.: fr.
Raphanus raphanistrum L.: com.
Rapistrum perenne (L.) ALL.: fr.
Reseda lutea L.: fr. R
phyteuma L.: r. 9181jc, 9281ac
Rhinanthus Borbásii (DÖRFL.) SOÓ: fr.
Ribes aureum PURSH.: loc. 9181hbBG
Robinia pseudacacia L.: fr. in rows. Little forests: 9181hbBF, hbBG, hbCF, hbCG and 9281baHA
Rorippa austriaca (CR.) BESS.: r. R
silvatica (L.) BESS. ssp. Kernerii (MENYH.) SOÓ: com.

Rosa canina L.: loc. 9181ecGD, 9281daDG
Rubus caesius L.: n.fr.
Rumex crispus L.: fr.
hydrolapathum HUDS.: n.fr.
obtusifolius L.: fr.
palustris SM.: n.fr. C, 9181ec, fb
Patientia L.: n.fr. 9281aa, ab, ac
stenophyllus LEDEB.: fr.
Wachterii DANS (obtusifolius L. x stenophyllus LEDEB.): r.
Salix alba L.: r. C, loc. 9181gbGF
Salsola kali L. ssp. ruthenica (ILJIN) SOÓ: r.
soda L.: n.fr. 9181ea, hbAA, 9280aj
Salvia austriaca JACQ.: n.fr. 9180aj, 9181dcBE, fbAH, R, C
aethiopis L.: r. R
nemorosa L.: fr.
pratensis L.: loc. 9181gbIB, jcIG, 9281abFC, n.fr.: C, R
Sambucus nigra L.: loc. 9181hbBF, hbBG, hbCF, hbCG, 9281baHA
Sanguisorba minor SCOP.: loc. 9181gdHH
Saponaria officinalis L.: n.fr.
Saxifraga tridactylites L.: loc. 9181iaIH
Scabiosa ochroleuca L.: loc. R, 9281da, db
Scleranthus annuus L.: r.
Scorzonera cana (C. A. MEY.) GRIS.: com.
parviflora JACQ.: n.fr.
Scutellaria hastifolia L.: loc. 9181hbFF, hbFG, hbGF, hbGG, 9281abFC, abGC
Senecio erraticus BERTOL. ssp. barbareifolius (W. et GR.) BEGER: fr. 9281ab, ac, bb, bc
erucifolius L. ssp. tenuifolius (JACQ.) JÁV.: n.fr. 9181ebAD, dbJD, 9281
jacobaea L.: r.
silvaticus L.: r. 9281aa
vernalis W. et K.: r. 9280aj, bj, 9281aa
vulgaris L.: com.
Serratula tinctoria L.: n.fr. 9281ab, ac
Seseli osseum CR. em. SIMK.: loc. 9181gaJJ, iaHJ, 9281dbBG, eaAA
Sideritis montana L.: n.fr.
Silene conica L.: loc. 9281eaAA
multiflora (EHRH.) PERS.: loc. 9181ibHA, 9281da, ea, ac
nutans L.: loc. 9280bjGI
otites (L.) WIB. ssp. pseudotites (BESS.) A. et G.: loc. 9181id, 9281ac, da
vulgaris (MÖNCH) GARCKE: n.fr. 9181jc, 9281ac, R, C
Sinapis arvensis L.: com.
Sisymbrium altissimum L.: r. C
orientale TORN.: fr.
Solanum nigrum L.: com.
dulcamara L.: loc. C

Sonchus arvensis L.: fr. C, R
ssp. uliginosum (M.B.) NEUMAYER: n.fr. 9181db, fd, gd, 9281
asper (L.) HILL.: fr.
oleraceus L.: n.fr.
Spergularia media (L.) PRESL: com.
Stachys annua L.: com.
germanica L.: loc. 9181ibHA
Stellaria media (L.) VILL.: fr.
Stenactis annua (L.) NEES ssp. strigosa (MÜHLENB.) SOÓ: loc. C
Suaeda maritima (L.) DUM. ssp. prostrata (PALL.) SOÓ: n.fr. 9181ea, fa, ha, 9281ac
pannonica BECK.: n.fr. 9181ea, fa, ec, fc
Syrenia cana (PILL. et MITTERP.) NEILR.: loc. 9281eaAA
Tamarix tetrandra PALL.: loc. in little groups, subspontan.
Taraxacum bessarabicum (HORNEM.) HAND.-MAZZ.: fr.
officinale F. WEBER ex WIGGERS: n.fr., com. R, C
Tetragonolobus maritimus (L.) ROTH ssp. siliquosus (L.) MURB.: com.
Teucrium scordium L.: n.fr. 9181hb, hc, hd, gd, 9281ab, ac
Thalictrum flavum L.: loc. 9281abGC, abFC, com. 9281af, ag
lucidum L.: loc. 9181gaGJ
minus L.: loc. 9181jaCG, 9280bjDG
Thesium arvense HORVÁTOVSZKY: n.fr.
Thymelaea passerina (L.) COSS. et GERM.: n.fr.
Thymus glabrescens WILLD.: fr.
Marschallianus WILLD.: fr.
Torilis arvensis (HUDS.) LK.: com.
Tragopogon dubius SCOP.: fr. R
orientalis L.: fr. R
Tribulus terrestris L. ssp. orientalis (KERN.) DOSTAL: loc. 9281eaAA
Trifolium arvense L.: r.
campestre SCHREB.: fr. C, 9281ab, ac
dubium SIBTH.: fr. C, 9281ab, ac
fragiferum L.: com.
hybridum L.: r, C
pratense L.: fr.
repens L.: com.
Trigonella procumbens BESS.: n.fr. 9181jc, 9281
Tunica prolifera (L.) SCOP.: n.fr. R
Ulmus minor MILL.: n.fr.
Urtica dioica L.: loc. 9181fdBA
urens L.: r.
Utricularia vulgaris L.: loc. 9181cb, db, da, eb, ec, fb
Valeriana officinalis L.: r. C, R
Valerianella dentata POLL.: fr.
locusta (L.) LATTERADE: r.
rimosa BAST.: r.
Verbascum blattaria L.: n.fr.
phlomoides L.: fr. R, loc. 9181cc, ga, gb, ha, hb, jc, 9281aa, ac
phoeniceum L. fr. C, R

Verbena officinalis L.: com.
Veronica anagallis-aquatica L.: loc. C, 9281ab, ac, 9181dc
Veronica arvensis L.: com.
polita FR.: com.
prostrata L.: loc. 9181ecDG, gaJJ, haCH
Vicia angustifolia GRUFBG.: com.
hirsuta (L.) GRAY: fr. C, loc. 9281abGC
tenuifolia : n.fr.
villosa ROTH: fr.
Viola ambigua W. et K.: loc. 9280bjDG
arvensis MURR: n.fr.
Xanthium spinosum L.: r.
strumarium L.: fr.

Monocotyledones

Agropyron pectinatum (M.B.) R. et SCH.: loc. 9181iaJH, jaCG, 9281daEB, eaAA
repens P.B.: com.
Agrostis stolonifera L.: com.
Alisma gramineum GMEL.: r. 9181ec, 9281ac
lanceolatum WITH.: com.
plantago-aquatica L.: n.fr.
Allium paniculatum L. ssp. marginatum (JANKA) SOÓ: 9181iaGI
vineale L.: n.fr.
Alopecurus aequalis SOBOL.: n.fr.
myosuroides HUDS.: loc. 9181ec
pratensis L.: fr.
Apera spica-venti (L.) P. B.: r.
Arrhenatherum elatius (L.) PRESL.: fr. C
Bolboschoenus maritimus (L.) PALLA: com.
Botriochloa ischaemum (L.) KENG.: fr.
Bromus arvensis L.: com.
commutatus SCHRAD.: n. fr.
erectus HUDS.: fr.
inermis LEYSS.: com. R, n.fr. C
mollis L.: fr.
sterilis L. var. intermedius RCHB.: n. fr.
tectorum L.: fr.
Calamagrostis epigeios (L.) Roth: r. R, C, loc. 9281acBD
Carex caryophyllea LATOUR: n. fr.
cuprina (SÁNDOR ex HEUFF.) NENDTVICH: r. 9281ab, ac
distans L.: com.
divisa HUDS.: fr.
flacca SCHREB.: loc. 9181ec, fd, jdCB, 9281abGC
melanostachya WILLD.: loc. 9281acBD
panicea L.: loc. 9281acBD
secalina WHLBG.: 9281abJD, caJA
serotina MÉRAT: loc. 9181gdDG
stenophylla WHLBG: fr.
vulpina L.: fr. 9281ab, ac, r

Cenchrus pauciflorus BENTH.: n. fr. 9280cj, dj, ej, 9281abGB
Chrysopogon gryllus (L.) TRIN.: loc. 9181iaGI, 9281eaAA
Crypsis aculeatus (L.) AIT.: com.
Cynodon dactylon (L.) PERS.: com.
Dactylis glomerata L.: fr.
Deschampsia caespitosa (L.) P. B.: loc. 9181gdHG
Echinochloa crus-galli (L.) P. B.: com.
Eleocharis palustris (L.) R. et SCH. ssp. mamillata (LINDB.) BEAUV.: n. fr.
uniglumis (LK.) SCHULT.: com.
Eragrostis poaeoides P. B.: r.
Festuca arundinacea SCHREB.: n. fr. C
pratensis HUDS.: fr. C, n. fr. R, 9181jdCB, 9281ab, ac
pseudovina HACKEL ex WIESB.: com.
var. salina (KERN. ex HACK.) HACK.: com.
rupicola HEUFF.: n. fr.
Gagea pratensis (PERS.) DUM.: loc. 9181gaGJ
Glyceria fluitans (L.) R. BR.: n. fr.
ssp. poiformis FR.: r.
maxima (HARTM.) HOLMBG.: loc. 9281abFC, r. C
Heleochloa alopecuroides (PILL. et MITTERP.) HOST: fr.
schoenoides (L.) HOST: fr.
Helictotrichon pubescens (HUDS.) PILGER: loc. 9280bjDG
Holoschoenus romanus (L.) FRITSCH em. BECHERER ssp. holoschoenus GREUTER: loc. 9181iaGI
Hordeum hystrix ROTH: com.
murinum L.: com.
Iris pumila L.: loc. 9181jcIF
spuria L.: loc. 9181iaHI, 9281dbBF, ag, ah
Juncus articulatus L.: com.
bufonius L.: n. fr.
Gerardii LOIS.: com.
inflexus L.: loc. 9181gbJC
Koeleria cristata (L.) PERS. em BORB.: fr.
Lemna minor L.: fr.
Lolium perenne L.: com.
Muscari comosum (L.) MILL.: fr. R; n. fr.
racemosum (L.) LAM. et DC.: fr.
Najas marina L.: n. fr.
Ophrys sphegodes MILL.: loc. 9281af, ag
Orchis coriophora L.: fr; com. 9281af, ag
laxiflora LAM. ssp. palustris (JACQ.) A. et G.: r., com 9281ag
morio L.: loc. 9181ha, ia, 9281abDB
Timbalii VELEN. (coriophora L. x laxiflora Lam. ssp palustris (JACQ.) A. et G.): loc. 9181iaGI, gdHG, n. fr. 9281af, ag
Ornithogalum Gussonei TEN.: n. fr.
Phalaris canariensis L.: r.
Phleum pratense L.: n. fr.; fr. R, C
Phragmites communis TRIN: com.
ssp. humilis (DE NOT) A. et G.: fr.

Poa angustifolia L.: fr.
annua L.: n.fr.
bulbosa L. ssp. pseudoconcinna (SCHUR) DOSTAL: com.
compressa L.: fr.
palustris L.: n.fr. C
pratensis L.: fr. C
trivialis L.: fr. C
Potamogeton natans L.: com. C, 9181da, 9281ba
pectinatus L.: fr.
Puccinellia distans (L.) PARL.: com.
limosa (SCHUR) HOLMBG.: com.
peisonis (BECK.) JÁV.: n.fr.
Schoenoplectus lacustris (L.) PALLA: r.
Tabernaemontani (GMEL.) PALLA: com.
Schoenus nigricans L.: fr. 9281af, ag
Sclerochloa dura (L.) P.B.: r.
Setaria italica (L.) R. et SCH.: loc. 9280aj
lutescens (WEIGEL) HUBBARD: com.
Spiranthes spiralis (L.) CHEVALL: loc. 9181dbJD
Spirodela polyrrhiza (L.) SCHLEID.: fr. 9181fb, gb
Stipa capillata L.: loc. 9181iaHJ, 9281eaAA
Tragus racemosus (L.) ALL.: fr. 9280aj, bj, cj, dj
Triglochin maritima L.: fr. 9181dc, ec, fd, gd, hd, he, jc, 9281ab, ac
Typha angustifolia L.: fr.
latifolia L.: r. C
Laxmannii LEPECH.: fr.
Typhoides arundinacea (L.) DUM.: loc. 9281abFC, abGC, abHC, r. C
Zannichellia palustris L.: fr.
ssp. pedicellata (WAHLENB. et ROSÉN) HEGI: r.
var. aculeata (SCHUR) A. et G.: r.

PHYTOGEOGRAPHICAL SPECTRUM - In order to analyze the phytogeographical character of the area, we need to make a comparison with the geobotanical distribution of the Hungarian flora. The employed data are taken from SOÓ 1964, MEUSEL 1967 and HULTÉN 1964. Of course, this comparison would be more effective considering the correlations between the geobotanical, coenological and ecological characters of species, but it would be beyond the range of this work.

The percentile distribution of phytogeographical elements of the Szabadszállás and Hungarian floras are represented in Tables 1 and 2. The right marginal values are showing the influence of different geobotanical elements in percent, in totality the phytogeographical character of the flora. (The sum of these values because of their overlap is more than 100.) Also the total number of investigated species is given. The differences between the flora are shown in Fig. 1. The ratio of these values of geobotanical influence in each category between flora, are presented in Table 3. These quotients express the relative impoverishment (if they are less than 1) or richness (being more than 1) of the Szabadszállás flora in certain categories. Because of some sys-

tematic effects the significance level cannot be calculated therefore only those values are considered, which show the greatest deviations from 1.

The greatest relative rise occurs in the archaeophyton-adventive category in consequence of a longstanding and strong degradation of the natural vegetation. There is a considerable relative increase in the cosmopolitan, eurasian, central-european, paleotropic and circumpolar elements too. For the interpretation of this characterless feature of the Szabadszállás flora similar investigation on other sodic desert flora in Hungary would be necessary considering also the geobotanical, coenological and ecological interrelations between the species. It is remarkable, however, that the continental-pontic (-pannonian) character, which is said to be typical of the Hungarian sandy, loessic and sodic desert floras, in this case is not evident.

COENOLOGICAL SPECTRUM - Because the analysis of coenological samples is being carried out, now the coenological character of the species is given only in outline. It is also important, from the viewpoint of the comparison, that the coenological character of the most species has not yet determined exactly. Our coenological groups and their association-equivalents (SOÓ 1964) are following:

A : Ruppion maritimae, Bolboschoenion maritimi, Verbenion supinae, Puccinellio-Salicornetea
B : Hydrocharietalia, Potametalia, Phragmitetalia, Molinio-Juncetea, Arrhenatheretum elatioris, Alnetea glutinosae
C : Corynephoretea, Festuco-Brometea, Orno-Cotinion, Prunion spinosae
D : Querco-Fagetea, Quercion petreae, p. p. Aceri-Quercion
E : Secalietea, Chenopodietea
F : others
O : neutral species
AB, AC, BC, BD, CD, ABC, BCD: species with mixed or transitional character.

For this classification the Achilleo-Festucetum pseudovinae seems to be problematic: it is considered to be a typical halophile association, though it seems - at least in our area - to be the last station of degradation of sandy or loessic meadows on sodic undersoils. Its species, however, must not be placed automatically into the group AC, only those, which are joined to group C; the species joined to group A are arranged into group A. The placing of species Agrosti-Caricetum distantis can be solved similarly: only the species joined with B are placed into the group AB, the others into A. Another problem is that many species in our area do not follow their coenological character known from the literature (summarized in SOÓ 1964). Therefore it is necessary to compare the Hungarian flora with the Szabadszállás flora on the basis of both the data of the literature (SOÓ l. c.) and our own coenological samplings. Secondly the two latter distributions are compared with each other. The percentile values are represented in Table 4. These relations are shown in Fig. 2.

For characterizing the relative impoverishment or richness of our coenological groups, the quotients of corresponding categories of compared flora were calculated (see above). The quotients are represented in Table 5.

Comparing the Hungarian and the Szabadszállás flora on the basis of the literature (their quotients are given in the 1st column of Table 5) strong rise

in the ratio of neutral species is found. There is an increase in categories BC, A, AB too. It shows obviously the sodic character of the area, but the high ratio of neutral and BC species cannot be sufficiently interpreted. The comparison on the basis of coenological samplings is more interesting (columns 1 and 3 of Table 4 and column 2 in Table 5). There is a strong tendency of sodification to the detriment of marshy and steppic associations. It is shown that the marshy species are much less affected the sodification, than the steppic ones (in group B the lack is greater, than in C, in the group AB the increase is smaller, than in AC). In this comparison the weedgrowing is more explicit.

These tendencies are documented by the comparison of two distributions of the Szabadszállás flora too (column 2, 3 in Table 4, column 3 in Table 5). Under the local conditions a considerable part of species with different coenological characters are forced into sodic and transitional associations. The tendency for turning into weed appears too.

LIFE-FORM SPECTRUM - Considering the distribution of RAUNKIAER's life-forms in the Hungarian (SOÓ l. c.) and Szabadszállás flora (Table 6) it is remarkable the lack of trees and shrubs and a high ratio of therophyta because of the extreme ecological conditions and degradation of the natural vegetation.

EXPLANATION OF FIGURES

Map: Map of the Szabadszállás-Fülöpszállás territory of KNP with the detailed network of the Central European Floristic Mapping (NIKLFELD 1971)

Fig. 1: The phytogeographical composition of the Hungarian and Szabadszállás flora

Fig. 2: The coenological composition of the Hungarian and Szabadszállás flora

Table 1: The phytogeographical composition of the Hungarian flora in percentile values

Table 2: The phytogeographical composition of the Szabadszállás flora in percentile values

Fig. 1 The phytogeographical composition of the Hungarian and Szabadszállás flora

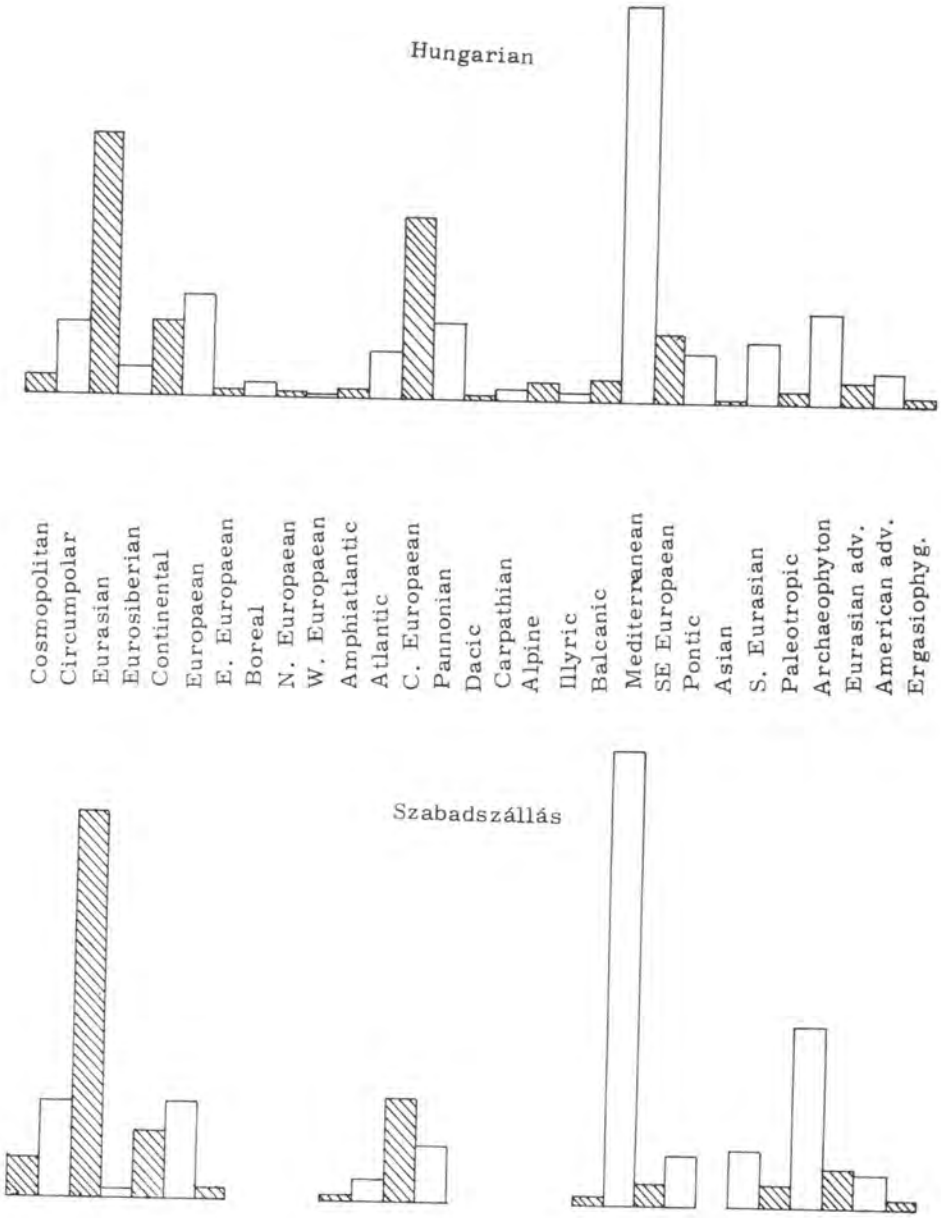
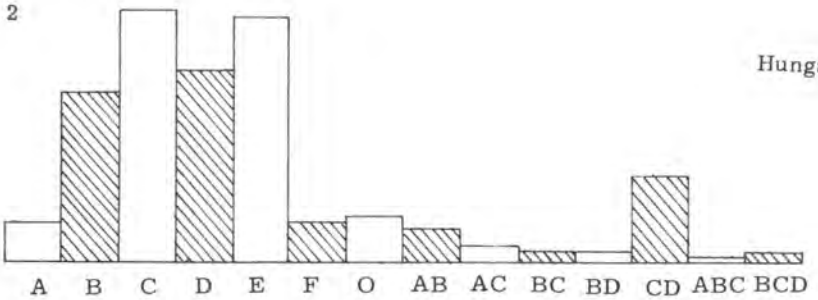
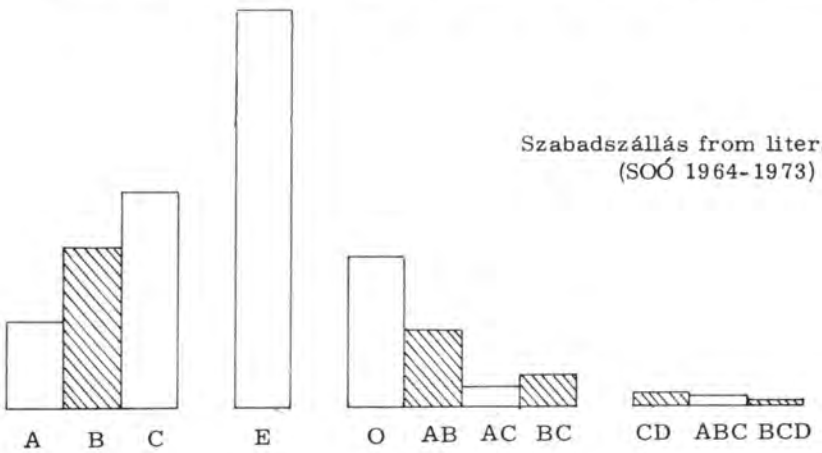


Fig. 2


Hungarian
A B C D E F O AB AC BC BD CD ABC BCD


Szabadszállás from literature
(SOÓ 1964-1973)
A B C E O AB AC BC CD ABC BCD

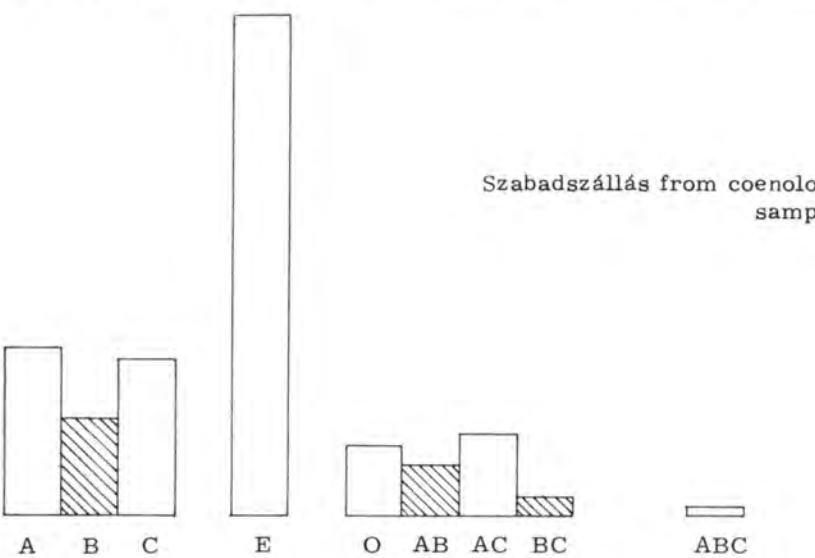

Szabadszállás from coenological samplings
A B C E O AB AC BC ABC

Table 1

Total number of species: 2118

	Cosmopolitan	Circumpolar	Eurasian	Eurosiberian	Continental	Europaean	E. European	Boreal	N. European	W. European	Amphiatlantic	Atlantic	C. European
Cosmopolitan	1.65							0.05					
Circumpolar		4.19						0.71					
Eurasian			5.99		5.47			0.19					
Eurosiberian				2.41									
Continental					0.19	0.94							0.47
Europaean						3.49							
E. Europaean							0.38						0.24
Boreal												0.05	
N. European										0.05			0.47
W. European													0.19
Amphiatlantic											0.61		
Atlantic													1.27
C. European													5.90
Pannonian													
Dacic													
Carpathian													
Alpine													
Illyric													
Balcanic													
Mediterranean													
SE Europaean													
Pontic													
C. Asian													
S. Eurasian													
Paleotropic													
Archaeophyton													
Eurasian adv.													
American adv.													
Ergasiophyg.													

Pannonian	Dacic	Carpathian	Alpine	Illyric	Balcanic	Mediterranean	SE Europaean	Pontic	C. Asian	S. Eurasian	Paleotropic	Archaeophyton	Eurasian adv.	American adv.	Ergasiophyg.	
																1.70
						1.51										6.41
						11.46										23.11
																2.41
																7.07
						4.53										8.96
																0.62
			0.24													1.24
																0.52
																0.24
																0.61
						3.02										4.34
						5.90	1.46									15.90
2.59		0.09	0.05	0.09	1.18		0.71	2.22								6.93
	0.33				0.09											0.42
		0.33	0.24	0.05												0.71
			0.05		0.47		0.57									1.65
				0.42		0.09										0.66
					0.24											1.98
						2.26		2.08	0.05	4.19						35.09
							3.16									5.90
								0.14	0.14							4.58
									0.14							0.33
											1.23					5.42
																1.23
												8.07				8.07
													1.93			1.93
														2.88		2.88
															0.66	0.66

Table 2

Total number of species: 452

	Cosmopolitan	Circumpolar	Eurasian	Eurosiberian	Continental	Europaean	E. European	Boreal	N. European	W. European	Amphiatlantic	Atlantic	C. European
Cosmopolitan	3.33												
Circumpolar		6.65											
Eurasian			9.31		5.10								
Eurosiberian				0.22									
Continental						0.89							0.44
Europaean						1.55							
E. European							0.22						0.67
Boreal													
N. European													
W. European													
Amphiatlantic											0.22		
Atlantic													0.44
C. European													2.22
Pannonian													
Dacic													
Carpathian													
Alpine													
Illyric													
Balcanic													
Mediterranean													
SE Europaean													
Pontic													
C. Asian													
S. Eurasian													
Paleotropic													
Archaeophyton													
Eurasian adv.													
American adv.													
Ergasiophyg.													

Pannonian	Dacic	Carpathian	Alpine	Illyric	Balcanic	Mediterranean	SE Europaean	Pontic	C. Asian	S. Eurasian	Paleotropic	Archaeophyton	Eurasian adv.	American adv.	Ergasiophyg.	
																3.33
						2.22										8.87
						19.29										33.70
																0.22
																6.43
						5.99										8.43
																0.89
																-
																-
																-
																0.22
						1.33										1.77
						4.88	0.44									9.09
2.22					2.22		0.22	2.00								4.66
																-
																-
																-
																-
																0.22
						0.22		2.22		3.10						39.25
							1.11									1.77
																4.21
																-
											1.77					4.88
																1.77
												15.52				15.52
													3.33			3.33
														2.88		2.88
															0.22	0.22

Table 3. The quotients of the percentile values of Hungarian and Szabadszállásean phytogeographical elements

Cosmopolitan	1.96	Carpathian	-
Circumpolar	1.39	Alpine	-
Eurasian	1.46	Illyric	-
Eurosiberian	0.09	Balcanic	0.11
Continental	0.89	Mediterranean	1.12
Europaean	0.94	SE European	0.30
E. Europaean	1.44	Pontic	0.92
Boreal	-	C. Asian	-
N. Europaean	-	S. Eurasian	0.90
W. Europaean	-	Paleotropic	1.44
Amphiatlantic	0.36	Archaeophyton	1.92
Atlantic	0.41	Eurasian adv.	1.72
C. Europaean	0.57	American adv.	1.00
Pannonian	0.67	Ergasiophyg.	0.33
Dacic	-		

Table 4. The coenological composition of the Hungarian and Szabadszállás flora

Group	Hungarian %	Szabadszállás from literature %	Szabadszállás from samplings %
A	3.16	7.27	14.54
B	14.86	13.88	8.37
C	21.89	18.94	13.88
D	16.75	-	-
E	21.42	34.80	43.61
F	3.54	-	-
O	3.68	12.78	5.95
AB	3.02	6.61	4.63
AC	1.23	1.54	7.05
BC	1.04	2.64	1.54
BD	1.04	-	-
CD	7.41	0.88	-
ABC	0.24	0.44	0.44
BCD	0.66	0.22	-

Table 5. The quotients of the percentile values of Hungarian and Szabadszállásean coenological elements

Group	Szabadszállás from literature %	Szabadszállás from samplings %	Szabadszállás from samplings %
	Hungarian %	Hungarian %	Szabadszállás from literature %
A	2.30	4.60	2.00
B	0.93	0.56	0.60
C	0.87	0.63	0.73
D	-	-	-
E	1.62	2.03	1.25
F	-	-	-
O	3.47	1.62	0.47
AB	2.19	1.53	0.70
AC	1.25	5.73	4.37
BC	2.54	1.53	0.58
BD	-	-	-
CD	-	-	-
ABC	1.82	1.82	1.00
BCD	0.33	-	-

Table 6. The life-form spectra of the Hungarian and Szabadszállás flora and their quotients (SOÓ 1964)

Group	Hungarian %	Szabadszállás %	Hungarian % / Szabadszállás %
MM-M	5.95	2.83	0.48
N	1.25	-	-
E	0.1	-	-
CH	2.1	1.30	0.62
H	46.6	39.13	0.84
G	10.9	6.74	0.62
HH	6.0	6.30	1.05
TH	5.3	6.30	1.19
Th	21.8	37.39	1.72

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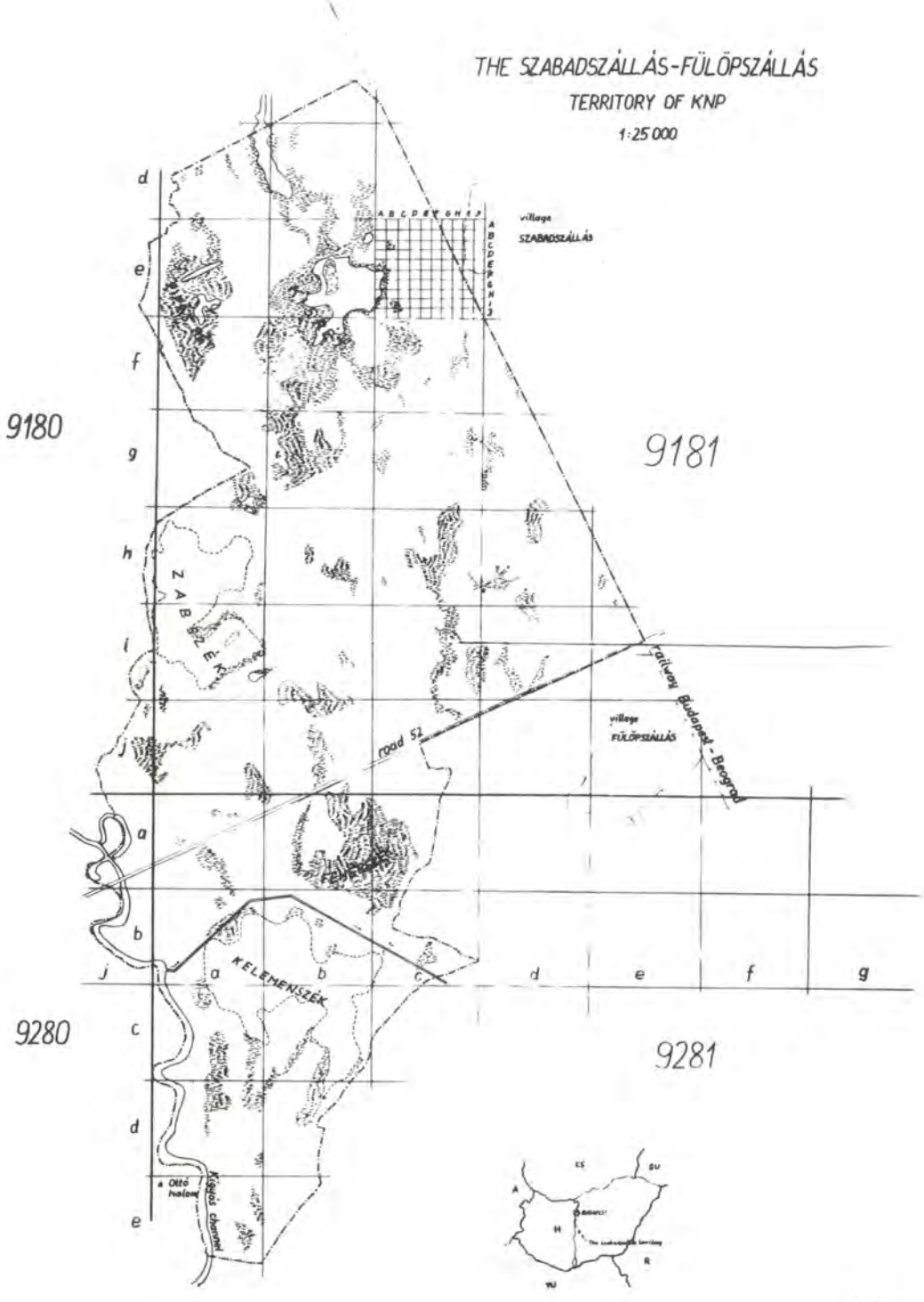
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HUNGARY


THE SZABADSZÁLLÁS-FÜLÖPSZÁLLÁS
TERRITORY OF KNP
1:25 000
9180
9181
9280
9281
village
SZABADSZÁLLÁS
village
FÜLÖPSZÁLLÁS
ZABÉLEK
KELEMENSZÉK
road 52
Budapest - Beograd railway
Kígyós channel
Öttó holom